INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

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Eric J. Holcomb
Governor

Bruno Pigott
Commissioner

February 9, 2018

VIA ELECTRONIC MAIL

Ms. Ann W. McIver, Director
Environmental Stewardship
Citizens Energy Group
2020 North Meridian Street
Indianapolis, Indiana 46202

Dear Ms. McIver:

Re: Combined Sewer Overflow Program
LTCP Periodic Review
City of Indianapolis
NPDES Permit No. IN0023183
Consent Decree No. 1:06-cv-01456-SEB-TAB
Marion County

The Indiana Department of Environmental Management (IDEM) Office of Water Quality (OWQ) has received the CWA Authority, Inc.’s review of the approved Indianapolis Combined Sewer Overflow (CSO) Long Term Control Plan (LTCP) dated November 2017, with a revision to Table 7-5 regarding the LTCP schedule made January 2018. A periodic review of the CSO LTCP is a requirement of IC 13-18-3-2.4, and is to be conducted no less than every five years after original approval of the LTCP. The original LTCP was approved in a renewal of NPDES Permit No. IN0023183, which became effective on February 1, 2008.

The CWA Authority, Inc.’s submittal included a review of the Indianapolis LTCP that contained a summary of new technologies available as well as an update to the City’s Financial Capability Analysis (FCA). Based on the review, CWA Authority, Inc. indicated the baseline conditions of the LTCP have not changed and remain the basis of the LTCP and approved Consent Decree Control Measures. No change to performance criteria or schedule is proposed at this time. The periodic review did, however, incorporate changes to the LTCP and schedule made through the Consent Decree amendment process and are memorialized in Table 7-5. Based on this information, IDEM finds the review of the LTCP to be acceptable. The next CSO LTCP review is due no later than February 1, 2023.

Please contact Kara Wendholt at 317-233-5961 or by email at kwendhol@idem.in.gov if you have questions regarding this letter.

Sincerely,

Leigh Voss, Chief
Municipal NPDES Permits Section
Office of Water Quality

cc: Beth Admire, IDEM Attorney
Gary Prichard, Office of Regional Counsel, U.S. EPA Region 5
Noel Vargas, U.S. EPA Region 5
John Trypus, Director, Underground Engineering and Construction, Citizens Energy Group

CWA AUTHORITY, INC.
2020 North Meridian St., Indianapolis, IN 46202

IDEM
OFFICE OF
WATER QUALITY

2017 NOV 16 P 12: 44

November 16, 2017

VIA FEDEX OVERNIGHT DELIVERY

Mr. Dean Maraldo
Chief, Water Enforcement and Compliance Assurance Branch
Water Division
U.S. Environmental Protection Agency, Region 5
77 West Jackson Blvd.
Chicago, Illinois 60604

W. Benjamin Fisherow
Chief, Environmental Enforcement Section
Environmental and Natural Resources Division
U.S. Department of Justice
ENRD Mail Room, Room 2121
601 D. Street, NW
Washington, D.C. 20044
Reference Case No. 90-5-1-1-07292

Mr. Mark Stanifer
Chief, Compliance Branch
Office of Water Quality
Indiana Dep't of Environmental Mgmt
100 North Senate Avenue
Mail Code 65-42
Indianapolis, Indiana 46206

Chief, Enforcement Section
Office of Legal Counsel
Indiana Dep't of Environmental Mgmt
100 North Senate Avenue
Mail Code 60-01
Indianapolis, Indiana 46204

Re: Consent Decree Case #1:06-cv-01456-SEB-TAB
Raw Sewage Overflow Control Program Long Term Control Plan Report Update

Dear Mr. Maraldo, Mr. Fisherow, and Mr. Stanifer:

CWA Authority, Inc., (the Authority) is pleased to submit this Raw Sewage Overflow Control Program Long Term Control Plan (LTCP) Report update pursuant to Indiana Code (IC) 13-18-3-2.4. The Authority believes the enclosed LTCP update is consistent with and fulfills the reporting requirements of IC 13-18-3-2.4 to review the feasibility of implementing new or additional alternatives to attain water quality standards and to complete an updated financial capability analysis.

This update incorporates changes to the plan made through the Consent Decree amendment process and summarizes new technologies available since the original submission as required by IC 13-18-3-2.4. The baseline conditions of the LTCP have not been changed and remain the basis of the LTCP and approved Consent Decree Control Measures. The Authority has met all Consent Decree Milestones to date and has initiated the actions necessary to continue to be in compliance with upcoming Consent Decree Milestones. No change to performance criteria or schedule is requested at this time. We would appreciate very much your confirming that the requirements have been met by returning the enclosed acknowledgement to me. If you do not believe the report is compliant, please contact me as soon as possible so that we can address any deficiency promptly.

Please do not hesitate to contact me at 317-927-4393 if you have any questions or comments regarding the enclosed.

Sincerely,

Ann W. McIver, QEP, Director,
Environmental Stewardship
Citizens Energy Group

Enclosures

cc: Gary Prichard, Office of Regional Counsel, U.S. EPA Region 5 (w/o attachments)
Noel Vargas, U.S. EPA Region 5
Steve Griffin, Deputy Attorney General, Indiana Office of the Attorney General (w/o attachments)
Martha Clark Mettler, Assistant Commissioner, Office of Water Quality, IDEM (w/o attachments)
Paul Higginbotham, Deputy Assistant Commissioner, Office of Water Quality, IDEM (w/o attachments)
Valerie Tachtiris, Deputy Assistant Commissioner, Office of Legal Counsel, IDEM (w/o attachments)
IDEM Data Information Services Section
Director, Department of Public Works, City of Indianapolis
Corporation Counsel, Office of Corporation Counsel, City of Indianapolis
John Trypus, Director, Underground Engineering & Construction, Citizens Energy Group

Acknowledgement of Compliance

The Long Term Control Plan Update, submitted by CWA Authority, Inc on November 16, 2017, complies with the reporting requirements contained in Section XI, ¶36 of the Consent Decree entered in Case #1:06-cv-01456-SEB-TAB.

______________________________ Date____________________

Dean Maraldo, Chief
Water Enforcement and Compliance Assurance Branch
Water Division
U.S. Environmental Protection Agency, Region 5

Acknowledgement of Compliance

The Long Term Control Plan Update, submitted by the CWA Authority, Inc. on November 16, 2017, complies with the reporting requirements contained in Section XI, ¶36 of the Consent Decree entered in Case #1:06-cv-01456-SEB-TAB.

__________________________________ Date____________________

Mark Stanifer, Chief
Compliance Branch
Office of Water Quality
Indiana Department of Environmental Management

__________________________________ Date____________________

Chief
Enforcement Section
Office of Legal Counsel
Indiana Department of Environmental Management

CWA Authority, Inc.

Raw Sewage Overflow Control Program Long Term Control Plan Report

City of Indianapolis, Indiana

November 2017 Update

citizens energy group™

clean waters | clean neighborhoods

CWA AUTHORITY, INC.

2700 S. Belmont Ave. | Indianapolis, IN | 46221

General Links

Report Contents

Preface

This document is the Combined Sewer Overflow (CSO) Long Term Control Plan (LTCP). The LTCP was approved by entry of the Consent Decree in December 2006. CWA Authority, Inc. (the Authority), operated under the Department of Public Utilities of the City of Indianapolis, doing business as Citizens Energy Group, acquired the Wastewater System on August 26, 2011 from the City of Indianapolis Department of Public Works (the City). The Authority is responsible for the planning, design, construction, operation and maintenance of the Wastewater System as defined in the Asset Purchase Agreement by which the Authority acquired the system serving Indianapolis, Indiana. Three amendments to the Consent Decree have since been approved. The First Amendment to the Consent Decree modified CSO Control Measures 16, 27 and 28 and was approved in 2009. The Second Amendment implemented the "Modified Enhancement Plan" and was approved in 2010. The Third Amendment, approved in 2013, described the transfer of the utility from the City of Indianapolis to the Authority.

This LTCP report has been updated to include the amendments to the Consent Decree to reflect the work completed before August 26, 2011 by the City and to include the information required by Indiana Code (IC) 13-18-3-2.4. Per IC 13-18-3-2.4, communities who will not meet water quality standards at the end of implementation of their CSO LTCP must review the feasibility of implementing additional or new control alternatives to attain water quality standards. This includes a review of new technologies that may provide opportunity for attainment of water quality standards along with completion of an updated financial capability analysis (FCA).

The intent of this LTCP update is to incorporate the changes to the plan made through the Consent Decree amendment process and to summarize new technologies available since the original submission as required by IC 13-18-3-2.4. The baseline conditions of the LTCP have not been changed and remain the basis of the LTCP and approved Control Measures. The Authority has met all Consent Decree Milestones to date and has initiated the actions necessary to continue to be in compliance with upcoming Consent Decree Milestones. No change to performance criteria or schedule are requested at this time.

Generally, ownership of the wastewater system has been changed from "City" to "Authority" throughout the report. All work completed prior to August 26, 2011 is referred to as work completed by the "City," while all work completed after August 26, 2011 is referred to as work completed by the "Authority." At the end of each section a modification summary has been added to identify changes made to the section. Modifications to each section of the report are summarized as follows:

Section 1 – Introduction: The introduction has been updated to reflect the transfer of the utility to the Authority, to provide a more updated overview and to document the Authority's commitment to improving water quality.

Section 2 – Baseline Conditions: The introduction of this section has been modified to reflect the transfer of the utility to the Authority. No other changes were made to the section. The baseline conditions were developed for and support the LTCP strategy to store and treat rather than separate CSOs and therefore remains unchanged from the original submittal.

Section 3 – CSO Abatement Technologies: This section has been modified to provide updated CSO abatement technology information and to include new technologies identified as required by IC 13-18-3-2.4.

Section 4 – Alternative Analysis: Dates were added to this section to document the alternative analysis process as part of CSO LTCP negotiations. Consent Decree Amendments 1-3 were also added to this section.

Section 5 – Public Participation: A timeline was added to the section to document when public participation occurred in the CSO LTCP process. Outdated information was removed, post-CSO LTCP public participation was added and ongoing public outreach being completed by the Authority was included.

Section 6 – Financial Capability Analysis: This section was replaced entirely with an updated analysis per IC 13-18-3-2.4.

Section 7 – Selected Long Term Control Plan: This section has been updated to reflect the modifications as part of Consent Decree Amendments 1-3. No changes to plan, performance criteria or schedule are requested at this time.

Section 8 – Post Construction Monitoring Plan: This section has been modified to incorporate changes due to the transfer to the Authority and to include post construction monitoring completed to date.

Section 9 – Use Attainability Analysis: An introduction to Section 9 was added, but no other changes were made. The Authority has concluded that the Indiana Department of Environmental Management (IDEM) requirement to update the CSO LTCP was not intended to require an update to the Use Attainability Analysis (UAA) until such time of a formal request for a UAA rulemaking.

Changes to the system as a result of operations and maintenance and implementation of the Consent Decree are captured in other Consent Decree required reports, including the Consent Decree Six-Month Reports, Post Construction Monitoring and the 2013 Capacity, Management, Operations and Maintenance (CMOM) and Combined Sewer Overflow Operational Plan (CSOOP) submittals. For example, on December 31, 2016 the United Water/Suez contract for operations and maintenance of the wastewater system expired. As of January 1, 2017, the Authority assumed primary responsibly of the operations and maintenance for the wastewater system. This change was documented in a Consent Decree Six-Month Report.

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1.0 Introduction

Contents

1.1 Transfer of Utility

CWA Authority, Inc. (the Authority), operated under the Department of Public Utilities of the City of Indianapolis (the City), doing business as Citizens Energy Group, acquired the Wastewater System on August 26, 2011 from the City of Indianapolis Department of Public Works and is responsible for the planning, design, construction, operation and maintenance of the Wastewater System (as defined in the Asset Purchase Agreement by which the Authority acquired the system) serving Indianapolis, Indiana. Pursuant to these responsibilities, this report has been updated to reflect the work done after August 26, 2011 by the Authority.

1.2 Overview

This document is the Combined Sewer Overflow Long Term Control Plan (CSO LTCP). The City initially submitted its LTCP to the Indiana Department of Environmental Management (IDEM) and the U.S. Environmental Protection Agency (U.S. EPA) on April 30, 2001. The City received comments on the 2001 plan from U.S. EPA on June 28, 2001, and from IDEM on June 28, 2002. This plan was revised, updated and expanded to respond to the agencies' comments and requirements, as well as to include local public involvement and comment. The LTCP was approved by entry of the Consent Decree in December 2006. Several amendments to the Consent Decree have since been approved. The First Amendment to the Consent Decree modified CSO Control Measures 16, 27 and 28 and was approved in 2009. The Second Amendment implemented the "Modified Enhancement Plan" in 2010, which modified 14 of the original 31 CSO Control Measures, added two CSO Control Measures, and removed one CSO Control Measure. The Third Amendment, approved in 2013, described the transfer of utility from the City of Indianapolis to the Authority.

The LTCP describes the control measures that have been chosen for reducing combined sewer overflows (CSOs) and improving water quality in Marion County. The document includes a discussion of regulatory requirements, existing water quality conditions, available control technologies, an evaluation of alternatives, public input on alternatives, a financial capability assessment, the LTCP, and a description of the Authority's compliance monitoring program. This section provides background information on regulatory requirements and water quality issues in Indianapolis.

The plan is a watershed-based plan that protects and improves upon existing uses of our waterways, helps restore beneficial uses and improve the quality of life in many Indianapolis neighborhoods. In a typical year, the plan will achieve 97 percent capture of wet-weather sewer flows on Fall Creek and 95 percent capture on other waterways, as further described in Section 7. The selected plan also is expected to reduce overflow frequency from 60 storms per year to two storms in a typical year on Fall Creek and four storms per year on other waterways, based on average annual rainfall statistics.

1.3 Combined Sewer Overflows

Combined sewer systems are found primarily in older metropolitan communities of the Northeast, Mid-Atlantic, and Great Lakes regions. Of the estimated 9,471 combined sewer outfalls nationally, approximately 85 percent are found in these regions. In Indiana, combined sewer systems serve 105 municipalities with a combined population of 2.5 million people. Indiana's 898 combined sewer outfalls account for more than 9 percent of the national total. Indianapolis' combined sewer system serves the older parts of the city, and includes 131 overflow points that account for approximately 15 percent of the state total. Newer parts of the city are served by separate sanitary and storm sewers. The baseline sewer system and water quality conditions are described in more detail in Section 2 of this document.

1.4 Water Quality Impacts of CSOs

Combined sewer overflows carry raw sewage, bacteria, pathogens, industrial pollutants, oil and grease, and other contaminants into rivers and streams. These contaminants can elevate bacteria levels and reduce oxygen in the water, creating water conditions harmful to aquatic habitats, aquatic life and humans. CSOs also can carry pollutants from urban stormwater runoff, automotive fluids, household chemicals, and floating sewage and debris.

Many factors contribute to water quality concerns in Indianapolis rivers and streams. In addition to combined sewer overflows, these include stormwater runoff, failing septic systems and upstream pollution. Although a CSO LTCP normally is designed to address only combined sewer overflows, these other factors were evaluated as part of a watershed-based strategy for improving water quality. This holistic and progressive approach ensures that rate payers' investment will achieve the maximum improvements to water quality in the most cost-effective manner.

1.5 Regulatory Requirements

1.5.1 Water Quality and Water Body Uses

The Indiana Water Pollution Control Board has established water quality standards for Indiana waterways. These standards, which have been approved by the federal government, serve as the legal basis for permit requirements under the federal Clean Water Act. Water quality standards include "uses" designated by the state for each water body. Uses for a water body might include recreation, public water supply, industrial use, and irrigation. Water quality standards include pollution criteria to protect those uses and other policies designed to protect water quality. The state designated all Indiana waters to support both aquatic life and full body contact recreation — often referred to as "fishable and swimmable." These use designations are not attained at all times, especially when waterways are materially affected by urban and agriculture runoff.

To meet Indiana's full body contact recreation standard, waters must meet primary contact standards, including the *E. coli* bacteria standard of 235 coliform forming units (cfu) per 100 mL of sample. This standard will be exceeded with any CSO discharge or, even if CSO discharges were eliminated, the standard is likely to be exceeded due to stormwater runoff in urban and suburban areas.

Although water quality will improve dramatically and overflows will be reduced significantly, the Authority will not completely eliminate sewer overflows with its selected LTCP because some storms inevitably will be too large for the facilities that will be built.

One of the four key provisions in U.S. EPA's National CSO policy is to review and revise, as appropriate, water quality standards. CSO communities may seek to refine water quality standards to reflect wet weather realities and to define an attainable goal for CSO receiving waters. Section 9 requests that the state refine the recreational designated use and water quality standards to reflect the attainable wet-weather uses and enable continued progress in reducing CSOs in Indianapolis.

On August 5, 2011, U.S. EPA, in the context of responding to the City's request for a revision to water quality standards, also provided a letter to the City of Indianapolis stating that, as long as Indianapolis (and it successors or assigns) are implementing its control measures in compliance with all aspects of Section VII of the Consent Decree, U.S. EPA will not exercise its authority under Paragraph 8(a) to require the development and implementation of a Revised CSO Control Measures Plan. On August 22, 2011, IDEM transmitted an email confirming that it concurs with U.S. EPA's stance on Paragraph 8(a) and further stating that an update to the Financial Capability Assessment will not be required until a UAA is contemplated.

Based on these developments, CWA Authority, Inc. understands that IDEM will not be responding to CWA Authority, Inc.'s previous request for revised water quality standards, unless an updated request is made.

1.5.2 Permit Requirements

CSOs are regulated under the Clean Water Act and its National Pollutant Discharge Elimination System (NPDES) program, which permits and regulates wastewater discharges. In Indiana, NPDES permits are issued by IDEM, under a delegation agreement with U.S. EPA. Both state and federal regulatory agencies have authority to enforce these permits. IDEM issued NPDES permits for both the Belmont and Southport Advanced Wastewater Treatment (AWT) plants in May 2013.The permits' Attachment A includes requirements related to CSO discharges. Attachment A requirements include, but are not limited to, the following:

- The Authority must report volumes and discharges from each outfall based upon a hydraulic model of the sewer system.

- The Authority must review, modify where necessary, and enforce its existing sewer use ordinance to meet specific requirements to reduce CSO discharges.
- The Authority must update and continue implementing its CSO Operational Plan.

1.5.3 CSO Control Requirements

In April 1994, EPA published a CSO Control Policy (59 Federal Register 18688) to explain how communities and states can control CSOs and meet Clean Water Act requirements. In 1996, IDEM published a Combined Sewer Overflow Strategy to interpret the federal CSO policy under Indiana law. Both CSO policies have been supplemented by more specific guidance on various CSO-related issues. Under both state and federal policy, communities with combined sewer systems have three key responsibilities:

1. Characterize the combined sewer system and the affected streams. Characterization involves the following steps: collecting and analyzing existing data on the streams and sewer system, identifying pollution sources, reviewing existing regulations and programs, and collecting new data and information, where needed.
2. Implement nine minimum controls. These controls are measures that can reduce CSO problems without requiring significant engineering studies or major construction. They include:

- Proper operation and maintenance of the combined sewer system
- Maximum use of the collection system for storage
- Review of industrial pretreatment programs
- Maximizing flow to treatment plants
- Eliminating discharges during dry-weather
- Controlling solid and floatable materials in the overflows, such as floating trash and waste
- Public notification
- Monitoring
- Pollution prevention

3. Develop a LTCP. A LTCP should consider unique conditions of the community and evaluate the cost-effectiveness of various control options and strategies. The LTCP should include monitoring and modeling activities to characterize the impact of CSOs on each stream, and target environmentally sensitive areas. The LTCP should incorporate community input in identifying sensitive areas and selecting the long term CSO controls.

- The City of Indianapolis received notice from U.S. EPA by way of email dated March 1, 2011 that information provided by the City during negotiations over the Second Amendment to the Consent Decree (CD) satisfied the requirement in Paragraph 16 of the CD to report on actual costs of implementing the LTCP compared to estimated costs. Because of the sufficiency of the information provided to U.S. EPA, EPA stated that the costs of the LTCP do not need to be updated for five years from January 27, 2011. Pursuant to this requirement, the Authority submitted a Consent Decree Cost Report on January 25, 2016.
- On March 5, 2013, IDEM states that the signing of Amendment 3 to the Consent Decree on November 16, 2012 met the requirement for an initial five-year LTCP update, and that the next five-year update will be on November 16, 2017.

1.6 LTCP Project Approach

1.6.1 Project Team and Advisory Groups

From approximately 2001 to 2011, the project team used by the City was known as the Indianapolis Clean Stream Team. The project team included city staff in the Department of Public Works assisted by consulting firms that have expertise in water resources planning and analysis; geographic information systems and mapping; financial management; public relations; as well as design, operation, and maintenance of water and wastewater treatment facilities.

The project also incorporated input from the Raw Sewage Overflow Advisory Committee appointed by then Mayor Bart Peterson and the Wet Weather Technical Advisory Committee. The two committees were combined into the Clean Stream Team Advisory Committee. The advisory groups and their activities are described in more detail in Section 5 of this report.

1.6.2 Project Goals

The Authority's CSO control program seeks to protect streams from CSO discharges during periods when people are most likely to use them for recreation, and ultimately result in compliance with its NPDES permit. The program is designed to employ affordable and cost-effective solutions for controlling solids and floatables; capturing "first flush" discharges; and meeting state and federal requirements for dissolved oxygen, bacteria, and other water quality parameters.

All control alternatives and strategies have been evaluated based on their ability to help achieve the goals above. However, even if the Authority immediately eliminated all CSOs, waterways still would not meet the state's current water quality standards for bacteria. Many streams fail to meet standards even during dry-weather, when combined sewers do not overflow. Other factors cause water quality problems, such as failed septic systems, upstream pollution, urban stormwater, and sewer infrastructure problems. Therefore, the Authority envisions a three-pronged approach to improving water quality in Indianapolis: (1) implementing affordable and cost-effective long term CSO controls; (2) continuing to address structural and maintenance issues; and (3) implementing watershed-based strategies for reducing non-point source pollution, such as streambank restoration and converting homes on septic systems to sewer service. These watershed projects will provide tangible water quality and human health benefits.

The public has played an important role in evaluating the CSO control alternatives and the other factors contributing to water quality concerns in Indianapolis. Citizen input and the recommendations of the City's two advisory committees have been incorporated into the LTCP described in Section 7. Elected officials, the Industrial Dischargers Advisory Committee and other stakeholders were also involved in preparing the plan.

1.6.3 Activities to Meet CSO Requirements

The following work was completed to fulfill the three responsibilities of CSO communities identified in Section 1.5.3. These include:

Nine Minimum Controls: In 1997 the City developed its first CSO Operational Plan (CSOOP) to meet the nine minimum control requirements. The Authority has continued to implement the CSOOP since then, including a December 2013 update to meet water quality goals and changing regulatory requirements. The CSOOP will continue to be updated periodically.

Characterize the existing system: the City prepared and implemented a Stream Reach Characterization and Evaluation Report (SRCER) in 2000, with an update in June 2003, which describes the sewer system and receiving streams. The SRCER explains:

- How the system responds to wet-weather events of various magnitudes
- The characteristics of the CSOs (where they are, how often, and with what volume and pollutant loads they discharge)
- The water quality in the receiving waters (during both dry and wet weather)
- The degree to which wet-weather water quality is driven by CSOs and other factors

Long Term Control Plan: Section 7 of this document contains the Authority's LTCP. It identifies cost-effective control alternatives to maximize the extent that water quality standards will be attained in Indianapolis. Data used in compiling the LTCP were collected from 1948 to 2003. New data and analysis will continue to be incorporated into the Authority's decisions during facility planning, design and construction.

1.6.4 Watershed-based Strategy

As noted previously, water quality in the White River basin is affected by sources in addition to combined sewer overflows. The LTCP is part of a watershed based strategy that considers all water pollution sources and the most cost-effective means of achieving water quality goals. In addition to reducing CSOs, the City must continually implement the latest stormwater control technologies. The Authority must maintain its separate sanitary sewer system, and address failing septic systems. Programs to address these water quality infrastructure needs are described in separate reports.

In 1998, the City of Indianapolis commissioned a Stormwater Master Plan to help identify project-by-project needs for stormwater management in Marion County. This report identified more than $300 million in needed improvements, from maintenance activities to capital improvement projects. In 2001, the City implemented a stormwater utility under City County Ordinance No. 43-2001. This ordinance became effective on June 6, 2001. Assessments from this ordinance began on September 6, 2001, to create the capital required to complete needed stormwater quality and drainage projects.

Under the terms of the City's stormwater permit, the City has developed a Stormwater Management Program (SWMP) that now serves as the foundation for complying with the NPDES permit. The goal of the SWMP is to improve the overall water quality of stormwater runoff in the City of Indianapolis and Marion County. One of the program's objectives is to optimize stormwater system operation and maintenance practices to reduce the thousands of drainage complaints the City receives each year. In the fall of 2015 the City implemented a stormwater fee in order to pay for $320 million in repairs to stop flooding in over 375 areas across the city.

Within Marion County, thousands of properties were served by septic systems. Septic systems are designed to filter harmful organisms and chemicals out of wastewater before they can reach rivers, lakes or groundwater supplies. However, historically, poorly constructed or poorly maintained systems can send *E. coli* and other disease-causing organisms into the soil and water. The Authority has continued to implement this program since the transfer of the utility. This program is described in more detail in Section 4.3.3. Failing or improperly functioning septic systems are the primary source of *E. coli* exceedances during dry-weather, when public use of streams is mostly likely.

The Authority also participates in the White River Alliance (formerly Upper White River Watershed Alliance), a not-for-profit organization that unites local officials and staff in a 15-county region along the Upper White River.

1.7 Good Neighbor

The Authority is committed to providing the best value possible to their customers while improving local waterways. By accelerating schedules while maintaining budget, the Authority has provided years of water quality benefit to local waterways while minimizing the burden to ratepayers.

The Authority's partnerships with local entities and commitment to sustainability further increases their positive impact on the City of Indianapolis. The Authority has received the following awards and recognitions:

- In 2013 and 2014 the Authority was recognized by the National Association of Clean Water Agencies (NACWA) for outstanding operation and maintenance of its wastewater treatment system
- In 2015, the City awarded the Authority with the 2015 Indianapolis SustainIndy Award for the Economic Category
- In 2017 the Southport Expansion Project awarded the NACWA 2017 Operations and Environmental Performance Award
- In 2017 the Southport Expansion Project awarded the 2017 Alliant Build America Award

The Authority has thoroughly demonstrated their commitment to making Indianapolis a better place to work, live, and play by improving local waterways and promoting sustainability.

1.8 Document Organization

This document is organized as follows:

Section 1 provides background and regulatory context for CSO and water quality issues.

Section 2 describes baseline conditions, including water quality conditions, the pre-2002 wastewater collection and treatment system, how CSOs and non-CSO pollution affect water quality, and stream uses and physical characteristics.

Section 3 describes analysis of available technologies evaluated during both 2006 LTCP development and 2017 LTCP update for controlling CSOs and non-point source water pollution.

Section 4 describes the system wide alternatives evaluated during development of the 2006 CSO LTCP for controlling CSOs and meeting water quality requirements and includes a summary of the selected 2006 CSO LTCP. Section 4 also summarizes amendments to the approved 2006 Consent Decree.

Section 5 describes the public participation process conducted by the City and the Authority to obtain citizen input into the various alternatives.

Section 6 contains a financial capability assessment of the Authority's ability to afford CSO control and water quality improvement.

Section 7 describes the selected CSO control and water quality improvement plan and the schedule for project implementation.

Section 8 describes the compliance monitoring program the Authority uses to assess the impact of the long term CSO controls as they are implemented.

Section 9 incorporates federal and state processes for integrating the level of CSO control within the state's water quality standards regulations.

Section 1 Modifications Summary

The 2006 CSO LTCP was updated in 2017 as summarized below:

- Throughout Section 1, all activities completed before August 26, 2011 are referred to as "City" or "Indianapolis" work and those activities completed after August 26, 2011 are referred to as "the Authority" work.
- Section 1.1, Transfer of Utility, was added and subsequent sections were renumbered.
- Section 1.2, Overview, was modified to reflect completed events.
- Section 1.6, LTCP Project Approach, was modified to reflect completed events.
- Section 1.7, Good Neighbor, was added and subsequent sections were renumbered.
- Section 1.8, Document Organization, was modified to reflect completed events.

2.0 Baseline Conditions

Contents:

2.1 Introduction

The Authority acquired the Wastewater System on August 26, 2011 from the City of Indianapolis Department of Public Works. The baseline conditions in this Section were used to develop the agreed Consent Decree as modified by Amendments 1-3 and remain unchanged. The Authority has met all Consent Decree milestones to date and has initiated the actions necessary to continue to be in full compliance with upcoming Consent Decree milestones and requirements. No changes to performance criteria or schedule are requested at this time. No changes to text or baseline conditions were made to the remainder to this section.

This section discusses baseline conditions in the White River and its tributaries, and the sources of pollution affecting water quality in Marion County. It summarizes the characterization of the existing wastewater collection and treatment system. It describes how background and upstream sources, CSOs, industrial discharges, and non-point source pollution combine to cause water quality problems in Indianapolis.

Information on the combined sewer system is drawn in part from the following documents and sources:

- "CSO Operational Plan" (CSOOP) (Department of Public Works (DPW) - Indianapolis Clean Stream Team (ICST), May 2003)
- "Stream Reach Characterization and Evaluation Report" (SRCER) (DPW-ICST, June 2003)
- Sewer system computer modeling
- White River, Fall Creek, Pleasant Run and Bean Creek Total Maximum Daily Load (TMDL) Studies (Indiana Department of Environmental Management (IDEM), 2003)

Information on Marion County water quality and pollution sources is drawn from a variety of past and ongoing studies of Indianapolis waterways. Ongoing sewer and treatment plant capital projects are constantly improving the City's sewage treatment and collection system. For this report, unless noted otherwise, infrastructure and environmental conditions are presented as they existed in December 2001, prior to major sewer and treatment system improvements.

Documenting the baseline and historic water quality and physical conditions in Marion County streams also will support the analysis and conclusions in a Use Attainability Analysis.

2.2 Stream Conditions in the White River Basin, Marion County, Indiana

The White River basin is part of the Mississippi River system and drains 11,349 square miles of central and southern Indiana (see **Figure 2-1**). Streamflows are typically highest in April and May and lowest in late summer and fall. Rainfall in the basin ranges from 40-48 inches per year. In winter and early spring, rains are generally long in duration, steady, and of mild intensity. Late spring and summer rains tend to be shorter in duration and more intense.

The population of the White River basin in 2000 was about 2.37 million (USGS, 2004), with about 36 percent living in Marion County (860,454 people). Approximately 70 percent of the land in the combined upper and lower White River basin is used for agriculture, including about 50 percent for cropland. Forests cover 22 percent of the land area, and urban and residential areas cover 7 percent. Land use in the Indianapolis area is primarily urban, and land use outside the Indianapolis area is primarily agricultural and forest. By 1876, 60 percent of the land in Marion County had been cleared of its original forests and, by 1999, less than 2 percent of land area contained natural forest structure and species composition (Brothers, 1994) (Mertz and Miller, 1999). As of 1997, approximately 11 percent of the land in Marion County

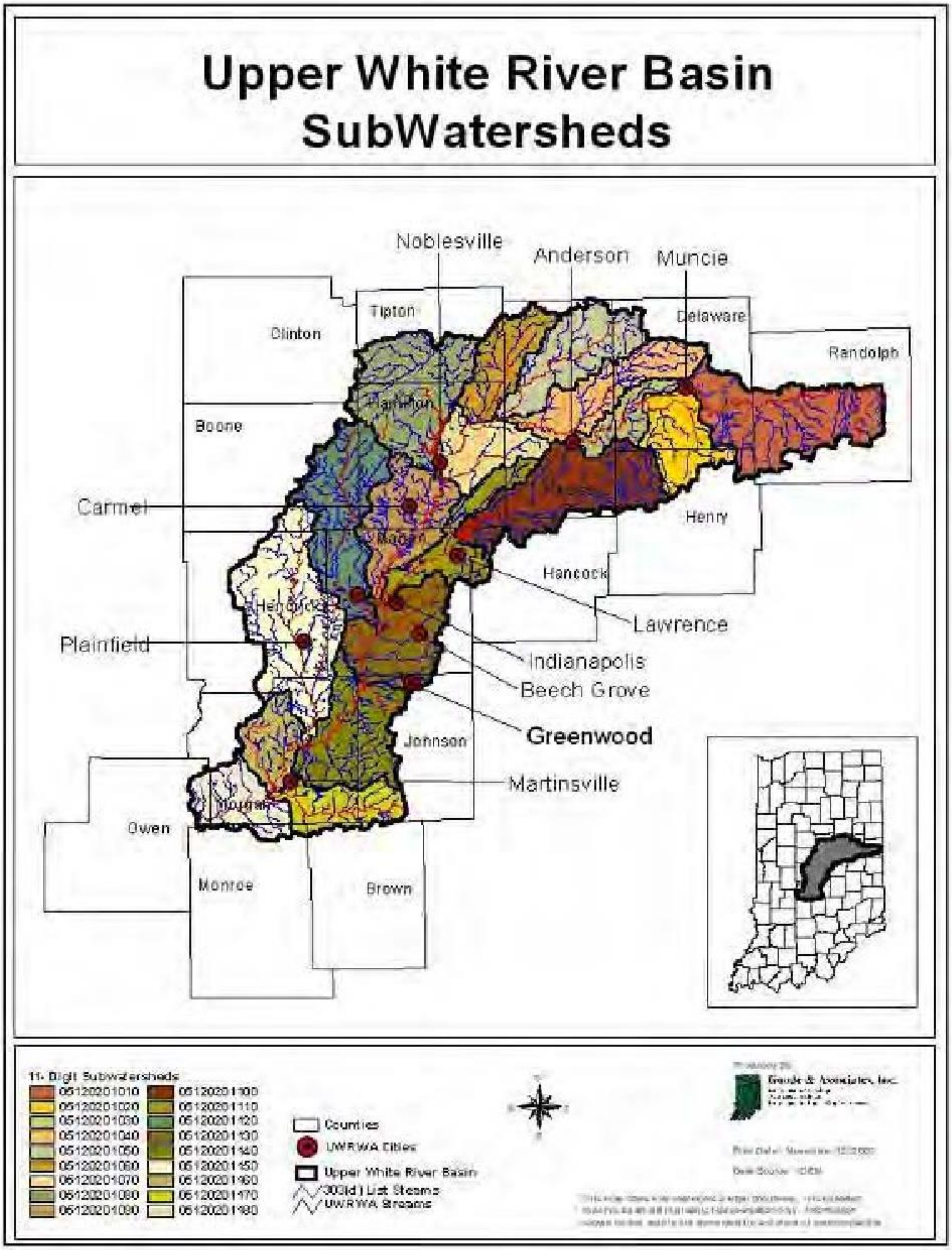

Figure 2-1
Upper White River Basin

was used for agriculture, according to the National Agricultural Statistics Service. Indianapolis is located in the upper part of the White River watershed. While river flows from north to south through Indianapolis, entering Marion County just west of 96th Street and Allisonville Road and leaving near a location west of State Road 37 and south of Southport Road. Major tributaries flowing into the river include Fall Creek, Pogues Run, Pleasant Run, Bean Creek, Buck Creek, Eagle Creek and Crooked Creek.

The White River and its two largest tributaries, Fall Creek and Eagle Creek, are the major sources of water for public and industrial supply for Indianapolis. Flows in Fall Creek are affected by Geist Reservoir, which has a storage capacity of 6.9 billion gallons at a reservoir elevation of 785 feet national geodetic vertical datum (NGVD). Flows in Eagle Creek are affected by Eagle Creek Reservoir, which has a storage capacity of 7.8 billion gallons at a reservoir elevation of 790 feet NGVD. These reservoirs are used to attenuate high streamflows and augment low streamflows (Renn, 1998).

2.2.1 Historic Water Quality Conditions

Although the City faces many challenges to improve water quality, conditions are much improved from early in the 20th century. From 1900 through the mid-1970s, published reports document extremely poor water quality conditions in the White River due to inadequate wastewater treatment, industrial pollution and sewage overflows. According to the U.S. Geological Survey (USGS), researchers have reported 158 species of fish in the White River basin since 1875. Of these species, six have not been reported since 1900 and 10 have not been reported since 1943. Five of the 10 species not found since 1943 are darters, which are sensitive to changes in water quality. Since the 1820s, fish populations have declined due to alteration of stream habitat, overfishing, the introduction of nonnative species, agriculture, and urbanization. A historical record of fish species in the White River Basin is provided in the USGS Water Resources Investigations Report 96-4232.

In the early 1900s, 70 percent of the 33 principal cities and towns in the White River basin had no sewage treatment of any kind, and only 6 percent had some sort of sewage treatment plant (Tucker, 1922, p.307-308). Industries also commonly discharged untreated wastewater into streams. Tucker reported that untreated sewage from Indianapolis seriously degraded water quality for 100 river-miles downstream.

Since the turn of the last century, there have been many studies performed to determine the water quality of the White River and its tributaries. As early as 1906, R. L. Sackett, Professor of Sanitary Engineering at Purdue University and Sanitary Engineer to the State Board of Health, reported on the pollution in the White River from Winchester to Martinsville. In addition to pointing out the poor conditions of the White River, the report showed just how much the pollution in the river was annually costing the people along the stream reach. Sackett based this cost on the annual charges for water treatment in the cities of Muncie, Anderson, and Indianapolis, along with the annual cost attributed to typhoid, depreciation of farmlands, and loss of recreation.

In 1911, "An Investigation into the Sanitary Condition of White River with Reference to the Influence of the Sewage of the City of Indianapolis on the Purity of the White River" was submitted as part of the Thirtieth Annual Report of the State Board of Health of Indiana. H.E. Bernard, Ph.D., State Board of Health Chemist, and W.F. King, M.D., Assistant Health Commissioner authored the report. The report was commissioned as a result of complaints brought before the State Board of Health by Johnson and Morgan Counties concerning the effects of pollution from Indianapolis. The summary of the report states that the "White River, a stream which above Indianapolis has the characteristics of the flowing waters of Indiana, receives the industrial waste and domestic sewage of that city and thereby becomes an open sewer, flowing a liquid possessing all the attributes of sewage. The condition of the water improves but slightly during the first twenty miles of flow and as far south as Waverly."

In 1913, H.E. Bernard, Ph.D., Director, J.A. Craven, C.E., Sanitary Engineer, J.C. Diggs, A.B., Chemist and Bacteriologist, as part of the Thirty-second Annual Report of the State Board of Health of Indiana, published "A Sanitary Survey of White River." At the time, it was believed that natural purification and removal of pollutants occurred as the stream flowed from its source to its mouth. The authors concluded, "One noticeable fact, as shown in the analytical data, is the great purification that takes place in the river water. Above Winchester the water is of as good a quality as average surface water…the addition of sewage and manufacturing wastes at Muncie, Anderson, Noblesville and Indianapolis increases the pollution until below Indianapolis the worst condition in the river is found. The chemical reactions that take place are not complete until the water reaches Martinsville. Below this point the purification is rapid and the water at the mouth is practically the same in quality as above Winchester."

In 1922, W.M. Tucker wrote an article titled "Hydrology of Indiana," which read, "In 1909, Mr. J.A. Smith and the writer descended White River from Indianapolis and found the condition such that it produced extreme nausea. Night camp was pitched twenty river-miles by river below Indianapolis, and one-fourth of a river-mile from the river on a tributary stream, but the effects of sewage were still very disagreeable. The decaying carcasses of several hogs which had been thrown into the river by the packing houses of Indianapolis greatly aggravated the situation. The sewage of Indianapolis at this time formed practically half the volume of the stream. The bed of the stream was covered with a coating of dark, greasy, sludge, largely organic matter, to a depth of one inch or more." (W.M. Tucker, 1922, p. 302).

Later investigations in 1938 and 1942 continued to find poor water quality, high bacteria counts, low dissolved oxygen, and a sludge-covered riverbed in the White River. In 1938, S.C. Denham wrote "A Limnological Investigation of the West Fork and Common Branch of White River" In his report, Denham noted black sludge deposits were common for a few miles downstream from the Indianapolis sewage treatment plant. In addition, the polluted area was characterized by a great abundance of tolerant organisms. Minimum dissolved oxygen concentrations during July 1933 were 0.0 mg/L for 14 miles downstream from the treatment plant effluent discharge point, with the maximum dissolved oxygen concentrations reported as 0.0 mg/L from 2.5 to 6.5 miles downstream from the discharge.

A subsequent study in 1942 by E.L. Brinley entitled "The Effect of Pollution Upon the Plankton Population of the White River, Indiana" was published in the Indiana Department of Conservation, Investigations of Indiana Lakes and Streams. In this study, Brinley evaluated the White River during low flow in August and September of 1940 and determined that the phytoplankton community was almost totally destroyed by sewage from Muncie. The 5-Day Biological Oxygen Demand (BOD) and coliform bacteria concentrations downstream from Muncie were as high as 57.6 mg/L and 460,000 organisms/ml (46,000,000 colonies/100ml) respectively. Concentrations of dissolved oxygen downstream from Muncie were 0.0 mg/L for at least 1 mile during the same period and similar conditions were observed south of Indianapolis.

In the 1960s, John Winters, a biologist for the State of Indiana, and his colleagues stretched a net across the White River downstream of Indianapolis and injected poison into the water with the intent to survey the resulting number of dead fish. However, they discovered there were no fish to kill with the poison since the pollution in the White River had previously destroyed all fish. Sources of pollution were attributed to sewage, paper mill sludge, and packing house waste (Indianapolis Star, October 22, 2002).

Since the mid to late 1970s, water quality in the White River basin has begun to improve due to substantial public and private investment in improved municipal and industrial wastewater treatment, and reduced nonpoint-source contamination, such as soil erosion and agricultural runoff.

W.J. Shampine assessed the water quality of the upper White River in his 1975 report "A River-Quality Assessment of the Upper White River in Indiana," U.S. Geological Survey, Water-Resources Investigations and concluded that the river was most severely affected in the Indianapolis area. The median coliform bacteria count below Indianapolis was 360,000 colonies per 100 mL for bacteria analysis conducted in October of 1972. Shampine found that areas with historic problems of bacterial pollution continued to have problems in 1972 and that, "Generally speaking, the outlook for future quality of the White River and its tributaries is optimistic. Although increasing population and urbanization will stress the river, a burgeoning awareness of environmental problems by the populace and improvements in technology should, at least, help prevent wanton pollution."

2.2.2 Urbanization

The population in the White River basin has grown from 39,400 in 1820 (fewer than 200 in Indianapolis), to 860,000 in 1900 and to 2.37 million in 2000. Between 1940 and 1990, the most significant change in population density within the basin occurred in Marion County (Schnoebelen and others, 1999).

Approximately 85 percent of the 30 river-mile reach of the West Fork White River that flows through Marion County is urbanized. The remaining 15 percent of the river is located downstream of the Belmont Advanced Wastewater Treatment (AWT) plant and is bordered by either gravel mine, farm field, parkland, or residential development. Natural flows of the river are affected by regulation of reservoirs and by water withdrawals for municipal drinking water supply by Indianapolis Water. Urbanization profoundly alters the runoff and sediment supply to a stream. Urban streams tend to have higher peak flows and lower base flows than nonurban streams. As a result of this altered hydrologic setting, the stream will carve into and widen the streambanks where possible to accommodate the higher peak flows. When the storm runoff recedes, the reduced base flow is unable to sustain the enlarged channel. This results in urban streams that during dry-weather frequently lack enough flow to fill the channel. These physical changes in stream morphology will be accompanied by equally profound reductions in stream water quality.

A 1998 USGS study concluded that urban areas were responsible for stream water quality degradation in Indianapolis (Fenelon, pp. 16-17). Two concerns were noted for urban areas: 1) elevated levels of trace metals and organic compounds found in streambed sediments (although generally not at sufficiently high levels to present a concern for human health); and 2) wet-weather impacts from runoff and sewer overflows, which can deplete oxygen and contribute to fish kills. Poor fish communities have been found in good habitats in some streams.

2.2.3 Agricultural Impacts

Agriculture is the major land use found within the White River basin. As a result, streams within the basin are affected by the chemicals used to control both insects and weeds that prove harmful to agriculture. Pesticides are commonly detected in the White River basin, with higher concentrations found in the streams following the first one or two spring applications. Atrazine, metolachlor, cyanazine, and alchlor are commonly detected. In addition, insecticides such as diazinon, chlorpyrifos, and fonofos are also commonly detected. Land-applied insecticides can have a significant impact on the types of pollutants found in waterways. Diazinon is commonly applied during midsummer on lawns, whereas chlorpyrifos and fonofos are more commonly associated with agriculture. At times, individual sample concentrations of pesticides have exceeded the EPA standards for drinking water or protection of aquatic life (Nowell and Resek, 1994). Most herbicides are introduced into the basin during the prime growing period between May and July. As with the insecticides, the herbicide concentrations are dependent on the amount of runoff and the time lapse between application and the rainfall events. Herbicides such as atrazine degrade or become bound in soil and plant material after two months, making them unavailable for transport by stormwater runoff (Fenelon, 1998). Significant rainfall occurring two months after the peak growing period usually contributes minor amounts of atrazine to the waterways. For about six weeks each year following spring herbicide applications, concentrations of atrazine near the mouth of the White River at its confluence with the Wabash exceed the U.S. EPA's maximum contaminant levels (MCL) for drinking water. The average atrazine concentration in the White River from 1992-1995 never exceeded the MCL (Fenelon, 1998).

The high levels of insecticides and herbicides identified in the White River, along with high bacteria levels in the White River upstream of Indianapolis, indicate that water quality in the White River is a regional problem with many pollution sources contributing to water quality impairments.

2.2.4 Hydrology and Physical Characteristics of Marion County Streams

The following descriptions of physical characteristics of Marion County streams are primarily derived from data provided by the U. S. Geological Survey, the City of Indianapolis Office of Environmental Services, and the Marion County Health Department. Information from these sources was supplemented by a detailed field survey conducted by the City of Indianapolis during May and June 2001. During this time, survey teams walked each water body and viewed aerial videos to determine the physical characteristics that would encourage or discourage water use. Teams noted areas of easy access to the water as well as dense vegetation, steep slopes, or infrastructure that would discourage water contact. The teams also took photographs and made spot observations of stream substrate and depth at CSO outfalls. These data are found in **Figures 2-2** through **2-15.**

The physical stream characteristic data were collected by the City in preparation for submitting the 2007 Use Attainability Analysis to IDEM. Streamflow, depth, substrate and accessibility information were used by the City to note possible opportunities and obstacles for recreational use in the waterways. The City used these data to help prioritize areas of concern as it moved forward with a number of early action projects to reduce or eliminate combined sewer overflows. These early action projects are described in Sections 4 and 7. It is important to note that these data are a snapshot of stream physical conditions at one point in time. While the data provide a good general view of stream conditions during the survey period, streams are dynamic and physical conditions can change rapidly. Details of the physical surveys are summarized in the following sections.

2.2.4.1 White River

Streamflow in the White River and its tributaries is highly variable and is related to precipitation. Flow in the White River is generally highest in the late winter and early spring and, occasionally, during the summer during intense rainfall. Both high and low streamflows can significantly affect the quality of the river water.

Streamflow: The U.S. Geological Survey had maintained a gauging station on the White River at the Morris Street Bridge at river-mile 230.3 (2.6 river-miles downstream from Fall Creek, 3.4 river-miles upstream from Eagle Creek and 4.0 river-miles upstream from Indianapolis Power and Light dam).The drainage area above this gauging station is 1,635 square miles. Based on low flow measurements taken from 1943 - 1993, the lowest 7-consecutive-day flow over a 10-year period (i.e., $Q_{7,10}$) is 69 cubic feet per second (cfs) or 45 million gallons per day (MGD). According to the USGS the $Q_{7,10}$, which is used as a criterion in managing the quality of stream water, is exceeded 99.5 percent of the time at the USGS gauges located in Nora and at the Stout Generating Station. These two gauges measure White River flows upstream (Nora) and downstream (Stout) of the Belmont AWT plant.

Physical Description and Access: Appendix A1 illustrates data collected during the physical stream characteristic survey conducted in May and June 2001. The data indicate that the physical nature of White River changes as it flows through Marion County and that the river can be described in terms of four general sections, or reaches.

1. White River from Holliday Park to approximately 42nd Street (Appendices A1a and A1b) Land use in this area tends to be primarily low density residential. The river in this section is rather narrow (approximately 50 feet) and shallow with well-developed pool and riffle sequences and a rocky substrate. Much of the channel in this section is tree lined. Stream accessibility is mixed in this reach. While accessibility is good in public areas such as Broad Ripple, Marott, and Holliday Park, much of this reach flows through low- density residential areas where access is restricted to individual landowners and their neighbors. There is a public boat launch in Broad Ripple Park

2. 42nd Street to 16th Street (Appendices A1c and A1d) The Emrichsville (16th Street) dam determines much of the physical character of the river in this reach. The river is wider (approximately 80 feet), and deeper. Substrate becomes sandy as the river’s velocity slows in response to the dam. Land use in this section is mixed, with much of the river bordered by City parks and golf courses. The central portion of this section, upstream of the dam, is locally known as Lake Indy, illustrated in **Figure 2-2**. This portion of the river is accessible as it flows through City parks and golf courses. There is a public boat launch in Riverside Park.

Figure 2-2
White River at Lake Indy

3. Emrichsville Dam to Morris Street (Appendices A1d and A1e) Downstream from the Emrichsville Dam at 16th Street, the river is bordered by levees as it flows through downtown Indianapolis. In this reach the river is approximately 80 feet wide and averaged 2-3 feet in depth during the June 2001 survey. Substrate is primarily fine sand and silt. This is the most urban portion of the White

River in Indianapolis. Land use is this section is high density residential, mixed industry, and mixed urban. The floodplain in this section is restricted by the levees; much of the flood- plain is maintained as turfgrass, with few trees along the channel. The photograph in **Figure 2-3** shows a portion of the river in this stream reach, just upstream of the Raymond Street bridge. White River State Park also is located along this stream reach. Accessibility is mixed in this reach. While the levees are steep, there are frequent unofficial access points that allow vehicles down on to the floodplain, as shown in the figure. Along the east bank of the river in the lower portions of this reach access is restricted by industrial development.

Figure 2-3
White River Upstream of Raymond Street Bridge

4. Morris Street to County Line (Appendices A1e through A1h) From Morris Street south to County Line Road, the White River begins to lose its urban character. The river begins to meander after it leaves the leveed downtown reach and pool and riffle sequences begin to develop. Land use in this section is predominately aggregate mining and agriculture with some light residential. The river in this section narrows to 50-60 feet and had an average depth of 2-3 feet during the June 2001 field survey. Access to the river in this section is limited by the aggregate mining and industry in the area.

2.2.4.2 Fall Creek

Fall Creek begins as a rural stream that flows through Henry, Madison and Hamilton counties. In Hamilton County, Fall Creek discharges to, and is controlled by, Geist Reservoir. On the downstream side of the reservoir Fall Creek continues to flow as an urban stream as it continues through Marion County prior to its confluence with the White River. Of the 18 river-mile reach of Fall Creek that flows through Marion County, approximately 75 percent of the stream is urbanized. The remaining 25 percent of the creek is located along the former Fort Benjamin Harrison (i.e., Fort Harrison State Park). Downstream of the reservoir, natural flows of the river are affected by regulation of Geist Reservoir and by water withdrawals for municipal drinking water supply by Indianapolis Water near Keystone Avenue.

Streamflow: Like the White River, streamflow in Fall Creek is highly variable and is related to precipitation. Flow in Fall Creek is generally highest in the late winter and early spring and, occasionally, during the summer during intense rainfall. Both high and low streamflows can significantly affect the quality of the river water. During wet weather, Fall Creek streamflows are predominantly made up of CSO flows downstream of the Keystone Dam. During the summer and fall, most of the water above the Keystone Dam is diverted into the Fall Creek Treatment Plant, allowing little or no water to pass over the dam.

The U.S. Geological Survey maintains a gauging station on Fall Creek at Millersville (i.e., 9.2 river-miles upstream of its mouth). The drainage area above this gauging station is 298 square miles. Based on low flow measurements taken from 1943-1993, the $Q_{7,10}$ is 37 cfs or 24 MGD.

Physical Description and Access: Appendix A2 illustrates data collected during the physical stream characteristic survey conducted in May and June 2001. These data suggest that Fall Creek in the combined sewer area of Indianapolis can be divided into three sections with different physical characteristics.

1. Keystone Dam to 34th Street (Appendices A2a and A2b) At the Keystone Dam, Indianapolis Water removes approximately half of the average annual flows in Fall Creek to help supply drinking water for the City of Indianapolis. Fall Creek divides into multiple channels in the upstream portion of this section as the stream adjusts to the water removal. Numerous sediment wedges and sandbars have formed in this area due to the reduced flow being unable to transport the sediment load. Stream depth varies in this section from 1-3 feet in the pools to exposed sandbars in mid channel. Some of these sandbars have been colonized by vegetation and several small islands have formed. The channel substrate is primarily sand. Fall

Creek varies in width in this section from 50 to 60 feet. Heavy vegetation borders the channel throughout much of this section. Land use in the area is primarily residential with some pockets of light industry. Heavy vegetation and steep slopes along much of the stream limit access in this reach.

2. 34th Street to Boulevard Dam (Appendices A2c through A2e) From 34th Street to Boulevard Dam, Fall Creek flows through older residential neighborhoods. Levees built to protect the area from flooding frequently border the channel and restrict channel movement. There is significant in-channel sediment buildup in this section of Fall Creek as the stream continues to adjust to water withdrawals at the Keystone Dam. **Figure 2-4** shows an example of sediment buildup downstream of the Illinois Street bridge. The channel substrate is primarily sand. Stream depth continues to vary in this section and ranged from 1-3 feet in the pools to exposed sandbars in mid channel during the field survey. Fall Creek varies in width in this section from 50 to 60 feet to approximately 80 feet above Boulevard Dam. Large trees typically border the channel in this area. Steep flood control levees restrict access throughout much of this reach. There are, however, a number of potential access points along the Fall Creek Greenway.

Figure 2-4
Fall Creek Downstream of Illinois Street Bridge

3. Boulevard Dam to White River Confluence (Appendices A2e through A2g) Fall Creek has been straightened or channelized throughout most of this lower reach. **Figure 2-5** shows the channelization upstream of 16th Street. This type of stream modification was commonly done in the past in an effort to reduce flooding and make a stream more efficient at moving water through an area. Channelizing is rarely done anymore, as most data suggest that negative impacts to the stream outweigh benefits. Streams frequently adjust to channelization by incising or downcutting, which can lead to unstable banks. As a result of past channelization, Fall Creek has fairly high and unstable banks throughout much of this section. In this channelized section of Fall Creek the channel narrows to an average of 50 or 60 feet and deepens to 2-3 feet. The channel substrate is primarily sand. Stream side, or riparian, vegetation in this reach tends to be dominated by invasive bush honeysuckle (*Lonicera spp.*) that further contributes to erosion in this area. The City's Parks Department is working to control the spread of these plants. Land use in this area is mixed parkland, residential, and light industry. Stream access is mixed in this reach. The stream is accessible in Watkins Park and Fall Creek & 16th Street Park and along much of the Fall Creek Greenway. However, steep levee slopes, heavy vegetation, and unstable banks tend to make that access difficult.

Figure 2-5
Fall Creek Upstream from 16th Street

2.2.4.3 Eagle Creek

Eagle Creek begins as a rural stream that flows through Hamilton, Boone and Marion counties. In Marion County Eagle Creek discharges to, and is controlled by, Eagle Creek Reservoir. On the downstream side of the reservoir, Eagle Creek continues to flow as an urban stream as it continues through Marion County prior to its confluence with the White River. Of the 22-mile reach of Eagle Creek that flows through Marion County, approximately 70 percent of the stream is urbanized. The remaining 30 percent of the creek is located along parkland (i.e., Eagle Creek Park) upstream of the reservoir. Natural flows of the river are affected by regulation of Eagle Creek

Reservoir and by water withdrawals for municipal drinking water supply by Indianapolis Water and the Speedway Water Utility.

Streamflow: Streamflow in Eagle Creek is regulated by Indianapolis. Approximately 3.1 cfs or 5.6 MGD are released from the reservoir to provide water supply for the Town of Speedway and meet minimum daily flow requirements for Eagle Creek.

Flow in Eagle Creek is generally highest in the late winter and early spring and, occasionally, during the summer during intense rainfall. Both high and low streamflows can significantly affect the quality of the river water.

The U.S. Geological Survey maintains a gauging station on Eagle Creek at Lynhurst Drive (i.e., 7.1 river-miles upstream of its mouth). The drainage area above this gauging station is 174 square miles. Based on low flow measurements taken from 1943-1993, the $Q_{7,10}$ is 3.3 cfs or 2.1 MGD.

Physical Description and Access: Appendix A3 illustrates data collected during the physical stream characteristic survey conducted in May and June 2001. These data suggest that Eagle Creek in the combined sewer area of Indianapolis can be divided into three sections with different physical characteristics.

1. Little Eagle Creek above Cossell Road (Appendix A3a) This is a short (approximately 0.75 mile) section of Little Eagle Creek. This reach is characterized by dense vegetation along both sides of the channel, as shown in **Figure 2-6**, a photograph of Little Eagle Creek at Michigan Street. The channel in this section is wide (20-25 feet) and the flow in the channels tends to be shallow (approximately 1 foot during the May/June 2001 field survey). The channel substrate is rocky. Land use in this section is primarily industrial with some small residential areas. As this figure illustrates, stream access in this reach is limited by dense vegetation.

Figure 2-6
Little Eagle Creek at Michigan Street

2. Little Eagle Creek and Eagle Creek from Cossell Road to Kentucky Avenue (Appendices A3a through A3d) In this section both Little Eagle Creek and Eagle Creek are bounded by earthen levees, as shown in **Figure 2-7**, a photograph of Eagle Creek upstream of Minnesota Street and Pershing Avenue. The channel is wide (from 20 to 30 feet) and flows are shallow (less than 1 foot deep during the May/June 2001 field survey). The channel substrate is sandy. Land use is mixed industry and high density residential. The levees are maintained in mown turf. Some riparian forest is developing near the channel in the lower reaches of this section. Despite the steep levees throughout much of this reach, accessibility is good. There are several areas where vehicles can drive right up to the stream, or as shown in **Figure 2-7**, right into the stream.

Figure 2-7
Eagle Creek Upstream of Minnesota Street and Pershing Avenue

3. Eagle Creek from Kentucky Avenue to White River (Appendices A3e and A3f) This is a channelized reach of Eagle Creek that flows through a heavily industrial area. The channel is bounded by earthen levees throughout this section. The levees are maintained in mown turf. Some riparian forest is developing near the channel in the lower reaches of this section. The channel is wide (from 20 to 30 feet) and flows are shallow (less than 1 foot deep during the May/June 2001 field survey). The channel substrate is sandy. Accessibility is very limited in this reach by industrial activity along both banks.

2.2.4.4 Pleasant Run

Pleasant Run is an urban stream located entirely within Marion County. The stream is approximately 10 river-miles long and flows into the White River at a point just east of the Belmont AWT plant. Approximately 50 percent of the stream flows through City parkland. The remainder flows through urban and industrial areas.

Streamflow: Like the White River, streamflow in Pleasant Run is highly variable and is related to precipitation. Flow in Pleasant Run is generally highest in the late winter and early spring and, occasionally, during the summer during intense rainfall. Both high and low streamflows can significantly affect the quality of the river water. During wet weather, Pleasant Run is dominated by flows from CSOs.

The U.S. Geological Survey maintains a gauging station on Pleasant Run at Arlington Avenue (i.e., 7.9 river-miles upstream of its mouth). The drainage area above this gauging station is 7.58 square miles. Based on low flow measurements taken from 1943-1993, the $Q_{7,10}$ is 0.1 cfs or 0.06 MGD.

Physical Description and Access: Appendix A4 illustrates data collected during the physical stream characteristic survey conducted in May and June 2001. These data suggest that Pleasant Run in the combined sewer area of Indianapolis can be divided into two sections with different physical characteristics.

1. Pleasant Run Golf Course (10th Street) to Bluff Road (Appendices A4a through A4h) This section includes most of Pleasant Run in the combined sewer area. From 10th Street to Bluff Road, Pleasant Run flows through a golf course (Pleasant Run Golf Course), three City parks (Ellenberger, Christian, and Garfield) and the wide Pleasant Run Greenway. Throughout much of this section Pleasant Run is a classic small urban stream. Baseflow is minimal as a result of a heavily urbanized watershed, which results in very low flow conditions during dry months and high flows in response to runoff. This tremendous variation in flow has created a channel that is very wide relative to its average discharge. In this reach the channel is approximately 20 feet wide; average flows during the May/June 2001 field survey ranged from 6 inches to 1 foot deep. **Figure 2-8**, a photograph of Pleasant Run at Ellenberger Park, shows how high runoff conditions have created a rocky substrate as most of the finer grained sediments are removed by the high flows. Floodplain vegetation varies from fairly high quality native riparian (streamside) forest communities to large stands of invasive bush honeysuckle (Lonicera spp.). Parks and greenways dominate land use. The adjacent neighborhoods are primarily low density residential.

Figure 2-8
Pleasant Run at Ellenberger Park

In this section of Pleasant Run there is one large area of industrial land use. From English Avenue to Prospect Street, Pleasant Run flows through the Citizen’s Gas and Coke Utility property. This section of Pleasant Run is markedly different from the surrounding area. Throughout the Citizen’s Gas and Coke facility there is light vegetation along the stream and steep, unstable banks.

Throughout most of this reach, dense vegetation and steep slopes limit accessibility in some locations. However, there are public access points in the parks and along the greenway. Pleasant Run is not accessible to the public as it flows through Citizen’s Gas and Coke complex.

2. Bluff Road to White River (Appendix A4h) This is a short (approximately 0.5 mile) downstream section of

Pleasant Run that has been channelized, as shown in the photograph in **Figure 2-9**. This reach runs through the Bluff Road industrial corridor. Streamside vegetation is primarily invasive bush honeysuckle *(Lonicera spp.)* with some areas of mown turfgrass. Stream banks in this reach are steep and unstable; erosional slumps are common. The stream channel in this section of Pleasant Run is 15-20 feet wide. During the May/June 2001 field survey flow averaged 6 inches deep. This reach of Pleasant Run is fairly accessible. Dense vegetation can limit access at some points, but that vegetation is not continuous. There is some limited accessibility near the Bluff Road industrial corridor.

Figure 2-9
Pleasant Run at Bluff Road

2.2.4.5 Pogues Run

Pogues Run is an urban stream located entirely within Marion County. The stream is approximately 11 river-miles long and flows into the White River at a point just north of the Interstate 70 bridge over White River, near downtown Indianapolis. The Pogues Run watershed drains an area of about 13.0 square miles. This drainage area includes a major portion of downtown Indianapolis and areas east and northeast of downtown.

Streamflow: The lower portion of Pogues Run is enclosed in an underground conduit. The majority of the conduit, built in 1914-1915, consists of two nearly rectangular sections, each with a maximum height of 8 feet and a width that varies from 16 to 19 feet. The conduit extends under downtown Indianapolis, from New York Street to the White River, for a distance of approximately 2.2 river-miles. The last 310- foot portion of the conduit, built in 1936, consists of three 9- foot-high by 12-foot-wide culverts.

The U. S. Geological Survey does not maintain a gauging station on Pogues Run and does not publish a 7-day, 10-year low flow for the stream. However, given the similarities between the Pogues Run and Pleasant Run watersheds, a low flow similar to the $Q_{7,10}$ for Pleasant Run can be assumed. That would make $Q_{7,10}$ for Pogues Run ~ 0.1cfs.

Physical Description and Access: Appendix A5 illustrates data collected during the physical stream characteristic survey conducted in May and June 2001. These data suggest that Pogues Run in the combined sewer area of Indianapolis can be divided into two sections with different physical characteristics.

1. 21st Street (Forest Manor Park) to State Avenue (Spades Park) (Appendices A5a and A5b) This section of Pogues Run flows through three City parks: Forest Manor, Brookside, and Spades. Vegetation along the stream is heavy and is dominated by invasive bush honeysuckle *(Lonicera spp.)*, which the City's Parks Department is working to control. This type of streamside vegetation actually promotes erosion and contributes to bank instability. In many ways, Pogues Run is a classic small urban stream. Baseflow is minimal as a result of a heavily urbanized watershed, which results in very low flow conditions during dry months and high flows in response to runoff. **Figure 2-10**, showing Pogues Run near Temple Avenue, illustrates how the tremendous variation in flow has created a channel that is very wide relative to its average annual discharge. In this section the channel is 10 to 15 feet wide. Flow during the field survey was less than 1 foot deep. High runoff has created a very rocky substrate in much of this reach by removing most of the finer grained sediments. As illustrated in **Figure 2-10**, dense vegetation and steep slopes can limit stream access throughout most of this reach. However, there are abundant public access points in the parks and along the greenway.

Figure 2-10
Pogues Run Near Temple Avenue Upstream of CSO 099

2. State Avenue (Spades Park) to New York Street (Appendices A5b and A5c) From State Avenue to New York Street, Pogues Run flows through a mixed residential and urban corridor. Pogues Run in this section has been channelized, or straightened, and several sections have been armored with concrete slabs or riprap. As a result of the channelization the channel narrows, and typically ranges from 5 to 8 feet wide throughout this section. During the 2001 field survey, flow averaged less than 1 foot deep. **Figure 2-11**, a photograph of Pogues Run downstream of Arsenal and 10th Street bridge at School 101, illustrates how the substrate remains rocky as a result of high runoff flows, but bank instability leads to a buildup of finer grained sediment during low-flow periods. Streamside vegetation is typically turfgrass. This section of Pogues Run is generally very accessible.

Figure 2-11
Pogues Run Downstream of Arsenal and 10th Street Bridge and School 101

2.2.4.6 Lick Creek

Streamflow: Lick Creek is an urban stream located entirely in Marion County. Lick Creek begins in east central Marion County and flows generally southwest to a confluence with the West Fork of the White River on the south side of Marion County. The main channel is approximately 16.6 miles long and has a drainage area of approximately 26.2 square miles. The U.S. Geological Survey maintains a gauging station on Lick Creek at Sherman Drive (approximately river mile 6.2). Average annual discharge for Lick Creek at Sherman Drive for the period of record (1970 –2002) was 20 cfs or approximately 13 MGD. The $Q_{7,10}$ for Lick Creek is 0.2 cfs at Sherman Drive. Land use in the Lick Creek watershed is primarily residential.

Physical Description and Access: Appendix A6 provides a graphical representation of data collected during the physical stream characteristic survey conducted in May and June 2001. These data suggest that Lick Creek in the combined sewer area of Indianapolis can be divided into two sections with different physical characteristics.

1. Madison Avenue to Meridian Street (Appendices A6a and A6b) For most of this reach, Lick Creek flows through an armored channel, illustrated in **Figure 2-12** by a photograph taken near CSO 235. Stream width for most of the reach ranges from 10 to 15 feet. During the May/June 2001 field survey depth of flow was 6 inches. Channel substrate in most of this reach is concrete. Land use is industrial. No natural floodplain exists in this reach. Some areas of the armored channel have been colonized by vegetation. Accessibility is mixed in this section of Lick Creek. In the uppermost reach of this section, Lick Creek is accessible only from the south bank; the north side of the stream is bounded by I-465. Immediately downstream from this reach, Lick Creek flows in between the eastbound and westbound lanes of I-465 and is inaccessible.

Figure 2-12
Lick Creek Downstream of CSO 235

2. Meridian Street to the White River (Appendices A6b through A6d) In this lower reach Lick Creek reverts to a more natural channel, although this reach has been channelized in some areas, as shown in **Figure 2-13**, a photograph taken near Bluff Road. Stream width for most of the reach ranges from 10 to 15 feet. During the May/June 2001 field survey depth of flow was 6 inches. Channel substrate is rocky. Some sections of the floodplain are heavily vegetated while others are in mown turf. Land use is primarily industrial with some light residential areas. Lick Creek is fairly accessible throughout this reach. Industrial areas, dense vegetation and steep banks can locally limit access, but these areas are not continuous and numerous potential access points exist.

Figure 2-13
Lick Creek Near Bluff Road

2.2.4.7 State Ditch

Streamflow: State Ditch is an urban stream located entirely in Marion County. State Ditch begins in south western Marion County and flows generally south to a confluence with the West Fork of the White River on the south side of Marion County. The main channel is approximately 8.5 miles long. The State Ditch watershed has a drainage area of approximately 10.7 square miles at its confluence with the West Fork of the White River. There are no gauging stations on State Ditch. The $Q_{7,10}$ for State Ditch has not been calculated, but given the observed low flow character of the stream, can be estimated as 0.0 cfs. Land use in the State Ditch watershed is primarily residential in the headwaters region above I-465 and agricultural in the lower reaches south of the interstate highway.

Physical Description and Access: Appendix A7 illustrates data collected during the physical stream characteristic survey conducted in May/June 2001. These data suggest that State Ditch in the combined sewer area of Indianapolis can be divided into three sections with different physical characteristics.

1. Sam Jones Expressway to Kentucky Avenue (AppendixA7a) This section of State Ditch has been extensively channelized. It is also, much like Pogues Run and Pleasant Run, a classic small urban stream. Baseflow is minimal as a result of a heavily urbanized watershed, which results in very low flow conditions during dry months and high flows in response to runoff. This tremendous variation in flow has created a channel that is wide relative to its average annual discharge. In this reach the channel is approximately 5 feet wide. Flow depth during the May/June 2001 field survey ranged from 2 to 6 inches. As with most channelized streams, the stream banks are high and frequently unstable. The channel substrate is rocky in response to the high flows associated with runoff, as shown in **Figure 2-14**, a photograph taken downstream of CSO 217. Land use in this area is primarily residential. Stream side vegetation is frequently dense and is usually dominated by invasive bush honeysuckle (*Lonicera spp.*). In this headwaters reach of State Ditch, accessibility is limited in a number of areas by dense vegetation, as shown in **Figure 2-14**. This vegetation is not continuous and numerous potential access points exist.

Figure 2-14
State Ditch Downstream of CSO 217

2. Kentucky Avenue to I-465 (Appendices A7a through A7c) From Kentucky Avenue to I-465 most of the channel begins to meander and develop a more natural channel pattern. Some small areas are channelized. This reach is still heavily impacted by urbanization. Stream banks are high and tend to be unstable. Stream side vegetation is frequently dense and is usually dominated by invasive bush honeysuckle *(Lonicera spp.).* In this reach the channel is approximately 5 feet wide. Flow depth during the May/June 2001 field survey ranged from 2 to 6 inches. **Figure 2-15** illustrates the low flow in State Ditch downstream of the Mooresville Street bridge. Land use is residential. Similar to the headwaters reach of State Ditch, accessibility is limited in some areas by dense vegetation. However, this vegetation is not continuous and numerous potential access points exist.

Figure 2-15
State Ditch Downstream of Mooresville Street

3. I-465 to the White River (Appendices A7c and A7d) From I-465 to its confluence with the White River, State Ditch becomes a rural stream as the channel meanders through agricultural fields. Stream banks remain high and unstable. Floodplain vegetation, where present, is frequently restricted to a narrow bank immediately adjacent to the stream. In this reach the channel is approximately 5 feet wide. Flow depth during the May/June 2001 field survey ranged from 2 to 6 inches. This reach of State Ditch flows through privately owned farms, which restricts public access. Steep, unstable banks throughout much of the reach also discourage access.

2.2.5 Fisheries and Stream Biology

Biological assessments can identify water quality impairments and help evaluate the success of mitigation efforts. Biological criteria complement chemical and physical measures of water quality. A cooperative program was developed with the USGS to use biological indicators to monitor and improve the interpretation of the overall health of the White River and its tributaries in Marion County. A study, Biological Assessment of Streams in the Indianapolis Metropolitan Area, Indiana, 1999–2001, was authored by David C. Voelker and published in 2004.

The aquatic ecology of the White River basin has been impacted by human activity since the early 1800s. Starting with early deforestation to clear the land for agriculture, aquatic organisms have been subjected to a number of impacts. The initial clearing of the land led to erosion of cropland, bank erosion from pasturing of farm animals near streams, and the resulting siltation of the stream bed. Overfishing also took a toll on the fishery. As early as 1883 Ryland Brown was writing that “the abundance of fish, for which the White River and it tributaries were once noted, has greatly diminished…” (Brown, 1883). By the early 1900s the streams in Marion County were also being subjected to the impacts of early industrialization as industrial waste and untreated sewage flowed into the streams. Early reports indicate that the White River was impacted for over 100 miles by the untreated sewage from Indianapolis (Craven, 1914).

The lack of early baseline studies makes it difficult to gauge just how much this combination of agricultural and industrial impacts altered aquatic life in Marion County streams. This much is known: historically 158 species of warm-water fish from 25 families have been reported in the White River basin. Since the early 1970s significant advances have been made in the treatment of industrial and municipal wastewater (Crawford and Wangsness, 1991). Prior to the City of Indianapolis making improvements in its wastewater treatment plants and implementing industrial pretreatment programs, researchers were reporting as few as nine species in the White River near Indianapolis. With the improvements in wastewater treatment since the 1980s, researchers in 1995 were reporting 63 species of fish in the White River at Indianapolis (USGS, 1996).

A cooperative DPW and USGS study conducted from 1999 to 2001 identified 52 fish species and one hybrid in the White River at Indianapolis. This number is significant. In December 1999, a discharge near the City of Anderson caused a massive fish kill in White River from Anderson to Indianapolis. Most species of fish were killed, including fairly hardy fish such as catfish and carp. In March and July of 2000 Department of Natural Resources (DNR) biologists conducted a survey of the impacted portion of the White River. The survey found that food sources for fish were plentiful and that wild fish had begun to move into the river from tributaries, backwaters, upstream and even from downstream. Fish were found to be reproducing in the affected area of the river. Biologists developed plans to stock sport fish before an abundance of predatory fish established territories. In spring of 2000, the DNR stocked the river with 1,937 adult game fish to spawn and 63,000 channel catfish fingerlings ranging in length from 3 to 4 inches. In cooperation with White River Rescue 2000, a not-for-profit organization, a coordinated restocking of the river occurred in October 2000 with more than 300,000 bass, bluegills, crappies, and catfish being released at 18 sites between Anderson and Indianapolis. Additional stocking was done in 2001 and 2002. As a result of the restoration efforts and the overall improvements in water quality in the White River, less than a year after the fish kill the number of species identified in the White River at Indianapolis was close to the high number recorded in 1995.

Benthic macroinvertebrates can provide a more conservative appraisal of current water quality. Because fish are more mobile, they can migrate out of the reach if conditions slowly worsen. Macroinvertebrates are less mobile and their presence or absence will often provide insight into current water conditions. As part of the cooperative agreement between DPW and USGS, the benthic invertebrate community is regularly sampled. Studies have been done from 1981-1987 (Crawford, Martin, and Wangsless, 1992), from 1994-1996 (Voelker and Renn, 2000), and from 1999-2001 (Voelker, 2004).

During the 1999-2001 study twelve sites were sampled, six on the White River and six on the tributaries. A total of 246 benthic invertebrate samples representing 82 data sets were collected during the study. In the samples collected, 151 taxa were identified. The data were used to determine general descriptions of the benthic invertebrate community and to calculate biological indices. Benthic invertebrate indices calculated include:

- The EPT index, which is a measure of the total number of distinct taxa in three pollution-sensitive insect orders: the Ephemeroptera (may-flies), Plecoptera (stoneflies), and Trichoptera (caddisflies.)
- The Hilsenhoff Biotic Index (HBI), calculated from the number of arthropods and their tolerance to pollution.
- The Invertebrate Community Index (ICI), which used community metrics to describe the benthic invertebrate community.

The indices were used to determine variations between sites and changes at sites throughout the study period. Benthic invertebrate conditions at sites tended to be relatively stable over time on the index scores calculated.

On the White River, EPT scores in Nora consistently scored the highest of all White River sites, and sites in the immediate vicinity of Indianapolis (Morris and Harding) had the lowest scores indicating the negative effect of conditions in the reach. There was some improvement in the EPT score in the farthest downstream reached, indicating that conditions were improving somewhat. For the tributary sites, EPT values were highest on Buck Creek and lowest at Pogues Run.

HBI scores ranged from 4.95 (good) to 9.59 (very poor) at the White River sites, and from 5.2 (good) to 7.96 at the tributary sites. Nora had the lowest scores, indicating fewer pollution tolerant species were present as the White River enters Marion County. The Morris and Harding sites typically had the highest HBI scores, representing the least favorable water quality conditions of all White River sites. On the tributaries, Buck, Eagle, and Fall Creeks had HBI scores indicating generally fair water-quality conditions, while Pleasant Run and Pogues Run rated the fairly poor to poor range.

The ICI was developed by the Ohio Environmental Protection Agency to provide descriptive statistics to compare sites within a study unit. On the White River, ICI scores indicated the best conditions were at the Nora site, and that conditions degraded in the downtown Indianapolis areas with slight improvement in the farthest downstream reached of the study area. At the tributary sites, Buck Creek (a non-CSO stream) was the only site to achieve exceptional water quality scores. Williams Creek (a non-CSO stream) also had generally good scores, while the remaining sites – all of which have CSOs located on them – reflected only fair conditions (Voelker, 2004).

DPW continues to work with USGS to monitor the biological health of Marion County waterways.

2.3 Water Quality Parameters of Concern

Water quality problems in Indianapolis have a number of causes, including CSOs, wet-weather bypasses at wastewater treatment plants, urban stormwater, failing septic systems, construction-related soil erosion, and upstream pollution sources. The current water quality parameters of concern in each receiving water are presented in **Table 2-1** and discussed further below. The parameters of concern include depressed dissolved oxygen levels, high bacteria levels, impaired biotic communities, fish consumption advisories, and elevated metals and organics in streambed sediments. CSO discharges contribute to high bacteria levels and depressed dissolved oxygen levels. The City developed computer models of the combined sewer system, White River, and Fall Creek, verifying the accuracy of these models and presenting their findings in the "Indianapolis CSO LTCP Hydraulic and Water Quality Modeling Report" (Department of Public Works -Indianapolis Clean Stream Team (DPW-ICST, 2004) and the SRCER (DPW-ICST, June 2003).

2.3.1 Bacteria

The water quality standard for bacteria has been established by the Indiana Water Pollution Control Board at 235 *E. coli* colonies/100 mL (instantaneous) and 125 *E. coli* colonies/ 100 mL (monthly geometric mean) to protect full-body contact recreation. IDEM has assessed more than 99 percent of Indiana's rivers and streams for their ability to support fish, shellfish, macroinvertebrates and other aquatic life. Water quality assessments began in 1997 and were completed for the entire state in 2002. Sixty-four percent of the streams were found to fully support aquatic life. Of the 8,660 stream miles surveyed for recreational use, about 59 percent were found to support swimming and boating. *E. coli* bacteria indicated unsafe recreational levels in over 3,500 stream miles (IDEM, 2004).

Even during dry-weather, pollutant concentrations in White River often exceed bacteria standards at the Marion-Hamilton County border and downstream of the Indianapolis Power & Light (IPL) dam, located south of the Belmont AWT plant. During wet weather, when combined sewers and stormwater contribute bacteria, the standard is exceeded throughout the watershed. The peak concentrations are much higher in the CSO areas than the non-CSO areas, but both areas far exceed the bacteria water quality standard.

Extensive instream water quality data collected by the Authority, the City, Marion County Health Department, and IDEM since the 1990s indicate that CSO-impacted streams in Marion County are unable to support the full-body contact recreational use. IDEM's 2002 and 2004 Clean Water Act § 303(d) lists of impaired waters in the State of Indiana identify White River, Fall Creek, Eagle Creek, Pleasant Run, Pogues Run, Bean Creek, and State Ditch as being impaired for *E. coli* bacteria. Even streams that are not affected by CSOs are listed as impaired for *E. coli*, including Dollar Hide Creek, Fishback Creek, and Mars Ditch.

Table 2-1
Water Quality Problems in Indianapolis

Stream	Water Quality Condition of Concern
White River	1) Depressed dissolved oxygen (DO) levels
	2) High bacteria levels
	3) Impaired biotic communities
	4) Fish consumption advisories (PCB □ mercury)
	5) Elevated metals concentrations in streambed sediments
	6) Elevated organic concentrations in streambed sediments
Fall Creek	1) Depressed dissolved oxygen (DO) levels
	2) High bacteria levels
	3) Impaired biotic communities
	4) Elevated organic concentrations in streambed sediments
Eagle Creek, Pleasant Run and Pogues Run	1) High bacteria levels
	2) Impaired biotic communities
	3) Elevated metals concentrations in streambed sediments
	4) Elevated organic concentrations in streambed sediments

This table is based on studies by the Office of Environmental Services, Indiana Department of Environmental Management, and the U.S. Geological Survey.

Nationally, virtually no urban streams consistently meet bacteria water quality standards (WQS) and support full-body contact recreation. A number of cities have collected in-stream bacteria data that demonstrate the severe disparity between bacteria levels in urban waterbodies and primary contact recreation standards. These cities include Atlanta, Boston, Cincinnati, Louisville, New York City and Pittsburgh. The cause of bacteria exceedances is not solely CSO discharges. As in Indianapolis, the streams outside the CSO area do not meet the bacteria standard due to stormwater discharges and the pollutants they carry from wildlife and domestic animals.

2.3.2 Dissolved Oxygen

The Indiana Water Pollution Control Board has established a water quality standard for dissolved oxygen (DO) to support aquatic life at no less than 4 mg/L for a single sample and 5 mg/L daily average. Within the combined sewer area, modest size storms can cause the DO concentration to drop below standard on both Fall Creek and the White River. From July through October, CSO discharges and stormwater runoff coupled with low river flow and high river temperature can contribute to low DO levels in both streams.

A 1995 Camp Dresser & McKee (CDM) study concluded that two fish kills on the White River in September 1994 were caused by extremely low DO levels. The study identified eight related factors that caused the events, with three factors (river hydraulics, wet-weather biochemical oxygen demand (BOD) loads, and low streamflow) determined to be the principal causes.

A 1995 USGS study monitored water quality in Fall Creek, which drains 35 percent of the Indianapolis CSO area. The study sought to compare baseflow water quality to storm runoff water quality, and water quality in urbanized areas to water quality in non-urbanized area. Three dissolved oxygen gauges were installed: one upstream of the CSO area at Emerson Avenue, one in the middle at Central Avenue, and one downstream at 16th Street. Of the three gauges, the least concentration of DO was found at Central Avenue. The measured DO concentration at this location ranged from 3.9 mg/L to 5.2 mg/L, which at times was below the Indiana minimum water quality standard of 4 mg/L. Although the 1995 dissolved oxygen samples would not be expected to produce a fish kill, the September 1994 fish kills and other historical fish kills had DO levels well below 3.9 mg/L. The low DO level was most likely caused by an increase in oxygen demand by CSOs, urban runoff, resuspension of deposited organic material, and warmer summer temperatures decreasing the solubility of dissolved oxygen. Black sludge deposits that can exert an oxygen demand also were found along the bottom of the stream within the CSO area. Section 2.4.1 presents more recent DO sampling for Fall Creek and White River.

2.3.3 Mercury and PCBs

Mercury is a naturally occurring metal that does not break down in the environment, but cycles between land, water and air. Some mercury that reaches the White River occurs naturally. Mercury also is released from coal-burning power plants, and from household and industrial wastes. Most of the mercury load on the White River is from airborne sources, which cannot be controlled through the NPDES process or CSO control.

According to IDEM's 2003 Fish Consumption Advisory, the state has issued Fish Consumption Advisories for mercury and PCBs for the West Fork of White River within Marion County. Both mercury and PCBs collect in soil, water and sediment as well as in microscopic animals. As a result, these contaminants tend to build up or bio-accumulate in fish within these waters. The 2003 Fish Consumption Advisory did not carry an advisory for Fall Creek in Marion County, although it did carry an advisory upstream in Madison and Hamilton counties. The City of Indianapolis is currently monitoring mercury loads as required in its NPDES permits. The permits required the City to submit a Mercury Sampling and Analysis Plan (MSAP) to IDEM in 2002. A revised plan was resubmitted to the agency in August 2004. The approach considers potential mercury sources (i.e. dental offices, laboratories, hospitals, etc.) not as individual sources but as groups or clusters. A review of potential non-industrial sources identified that most sources tended to be geographically located in groups. The revised mercury sampling program was approved by IDEM on Nov. 16, 2004. The city plans to complete the sampling program in 2005.

The mercury question has been further complicated by a change in the mercury standard. NPDES permits IN0023183 (Belmont Advanced Wastewater Treatment Plant) and IN0031950 (Southport Advanced Wastewater Treatment Plant) contain more stringent limitations for mercury in treatment plant effluent. Because no proven technologies exist to achieve the new mercury limit, the City applied to IDEM for a variance from the requirement. To accommodate the many communities needing such a variance, the Indiana Water Pollution Control Board adopted a streamlined variance rule for mercury in 2005. The rule provides for a streamlined process for obtaining a variance from the existing mercury effluent limit because of the lack of economically viable, end-of-pipe treatment options and the widespread existence of mercury in the environment. The rule establishes the conditions under which a variance will be granted and requirements for mercury minimization in wastewater discharges. The City is implementing a mercury minimization program to satisfy the requirements associated with the streamlined mercury variance rule.

Polychlorinated Biphenyls (PCBs) are complex organic compounds developed for use as synthetic oils and cooling fluids for transformers and capacitors. PCBs are a concern along the entire West Fork of the White River, including upstream of Marion County in Randolph, Delaware and Hamilton counties. Due to their complex chemistry, PCBs take an extremely long time to break down in nature. Because PCBs are complex (they persist in the environment) and organic (they have an affinity for other organic compounds), they tend to accumulate within stream sediments and the fatty tissue of fish. The manufacture of PCBs in the U.S. was discontinued in the late 1970s and their use and disposal strictly controlled. Therefore, a majority of the PCB load on the White River is from existing sediment loads, which cannot be controlled through the NPDES process or CSO control.

2.3.4 Other Metals and Organics

The 1981 USGS report titled *Preliminary Water-Quality Assessment of the Upper White River Near Indianapolis* assessed both metals and organic contaminants in bottom sediments. The report noted that chromium, copper, lead, mercury and zinc had accumulated in bottom materials of the White River downstream from 30th Street (river-mile 235.58). The source of the metals was believed to be from stormwater runoff and from combined sewer overflows. While the report indicated that some metals had accumulated on bottom materials of the White River, the availability of these sediment-bound constituents to aquatic organisms, the water column, and possibly man remains unknown.

In 1981, a USGS study also reported the presence of three pesticides and chlorinated hydrocarbons present in White River sediment. Chlordane, an insecticide; DDD, a degradation product of the insecticide DDT; and PCBs were reported in the parts per billion levels in sediment from the Washington Street sampling location. It was noted that before the ecological effect of pesticides and related organic compounds could be determined, additional information would be needed: (1) the physiological and ecological characteristics of the organisms present and (2) the chemical forms of the sorbed metals. A discussion of pesticide levels in stream and groundwater is provided in the USGS Circular 1150 titled "Water Quality in the White River Basin, Indiana, 1992-1996" (Fenelon, 1998). It was noted that agriculture is the major land use in the White River basin, and most pesticides detected in streams and groundwater during the study period were used primarily in agriculture. Consequently, pesticide concentrations in streams in the White River basin follow a seasonal pattern (Crawford and others, 1995).

2.3.5 Impaired Biotic Communities

The significant studies of aquatic biota and stream ecology in the White River and its tributaries in the Indianapolis area are:

- Biological Assessment of Streams in the Indianapolis Metropolitan Area, Indiana, 1999–2001 (USGS Water-Resources Investigations Report 03–4331, Voelker, 2004)
- Benthic Invertebrates and Quality of Streambed Sediments in the White River and Selected Tributaries In and Near Indianapolis, Indiana, 1994-96 (USGS Water Resources Investigations Report 99-4276, Renn and Voelker, 2000)
- Indianapolis Fish Kill Study (CDM, 1995)
- Water Quality Studies of the White River and its Tributaries (Commonwealth Technologies, 1993)

Other comprehensive studies of the aquatic biota/ecology in the area are the 1994-1996 and the 1999-2001 USGS studies. Key findings are:

- The concentration of some metals, pesticides and organic compounds are elevated in the streambed sediments in the downtown Indianapolis area.
- Some of the elevated concentrations are high enough to adversely affect aquatic organisms.
- Benthic invertebrate communities at most sites in Marion County show some impact due to organic pollution and other contaminants, especially during periods of low streamflow. These impacts are generally most severe in the White River and tributaries in the downtown Indianapolis area.

2.3.6 Water Quality Improvements Due to Advanced Wastewater Treatment

A 1991 USGS study analyzing data from 1976 to 1986 found that advanced wastewater treatment (removal of ammonia) at the Belmont and Southport AWT plants led to significant improvements in water quality from 1978 to 1986. Based on a statistical analysis of data from four sites on the White River, the analysis compared water quality during pre-advanced (1978-1980) and post-advanced (1983-1986) wastewater treatment conditions. Water quality data from 1981-82 were omitted from the analysis because of variability due to plant construction.

Analysis of data from the two plants and downstream from the plants showed a significant decrease in concentrations of BOD, total suspended solids (TSS), ammonia, bacteria, and phosphorus. The decrease in BOD, TSS and ammonia due to implementation of advanced wastewater treatment resulted in a statistically significant increase in DO levels in the White River.

2.4 Water Quality Analysis of Marion County Waterways

2.4.1 Data Sources and Analysis Methods

The City reviewed in-stream water quality data for the West Fork of the White River and its tributaries was reviewed for use in performing a total maximum daily load White River (West Fork) (TMDL) analysis.[1] The TMDL data analysis and conclusions also apply to the characterization of water quality conditions related to CSO long term control planning, and therefore are summarized here. This section describes the data collected to review and assess compliance for each parameter of concern on the CSO-impacted waterways in and downstream of Marion County. In-stream water quality data was obtained from the following sources:

- City of Indianapolis Department of Public Works Office of Environmental Services (OES)

[1] Section 303(d) of the Clean Water Act requires the development of Total Maximum Daily Loads (TMDLs) for waters that a state has identified as being impaired. A TMDL determines the amount of a specific pollutant discharged into a water body that can be assimilated and still meet water quality standards.

- Marion County Health Department (MCHD)
- Indiana Department of Environmental Management (IDEM) (White River and Fall Creek only)

E. coli bacteria data for 2000-2002 as analyzed for compliance with:

- IDEM's geometric mean water quality standard for *E. coli* bacteria (125 cfu/100 mL or less)
- IDEM's 303(d) Listing Methodology (2002) guidance that no more than 10 percent of samples be above 235 cfu/100 mL
- IDEM's 303(d) Listing Methodology (2002) guidance of no sample having an *E. coli* bacteria count greater than 10,000 cfu/100 mL

In order to better analyze *E. coli* sampling results, data was separated into wet-weather and dry-weather categories. Wet weather was defined as days on which precipitation fell (greater than 0.1 inch) and the three days following that precipitation. The three-day period was determined by an analysis of *E. coli* bacteria in stormwater and CSOs during development of the April 2001 LTCP. Dry-weather was defined as any time other than wet weather.

Data for each parameter were collected at various intervals and locations by the three agencies between 2000 and 2002. The data was evaluated for compliance with the Indiana Surface Water Quality Standards as set in the Indiana Administrative Code (327 IAC 2-1-6) for each parameter. The following subsections summarize the findings for each waterway reviewed.

2.4.2 White River (West Fork)

2.4.2.1 Cyanide

An earlier analysis indicated that the primary sources of cyanide in this portion of the White River are the Belmont and Southport AWT plants, which receive and treat cyanide from industrial users. In-stream water quality monitoring data supports this finding.

2.4.2.2 Dissolved Oxygen

Dissolved oxygen data was collected at 17 locations on the White River at varying intervals ranging from monthly to weekly from January 2000 to December 2001. The data for 16 out of 17 stations showed 100 percent compliance with the Indiana DO standard of 4 mg/L minimum and 5 mg/L average per day. The one exception was at the New York Street station, where there was one occurrence of being below the standard of 4 mg/L. **Figure 2-16** presents this information. In addition to the grab samples, OES also deployed continuous dissolved oxygen and temperature probes at three locations on the White River: 16th Street, Indianapolis Power and Light (IPL), and Waverly (SR 144) from June to December (1998 to present).[2] The IPL monitoring station achieved 100 percent compliance with the DO minimum value of 4 mg/L, while the Waverly and 16th Street stations achieved 96 percent and 99 percent compliance, respectively. Compliance with the daily average of 5 mg/L was 100 percent at 16th Street, 99.3 percent at IPL, and 98.7 percent at Waverly. **Figures 2-17** through **2-20** present this information. Daily averages for the sample data are presented in **Figures 2-21** through **2-23**. Some data has been flagged as "questionable" by the agency collecting the data. Questionable data was not used in determining the above compliance rates.

Dissolved oxygen content that is less than the Indiana minimum in-stream water quality standard of 4 mg/L is believed to be caused by CSO discharges for this river segment. Dissolved oxygen concentrations frequently drop as oxygen is consumed by oxygen-demanding materials from combined sewer overflows, urban runoff, re-suspended sediment, and anoxic water from combined sewer overflows (USGS, 1995).

2.4.2.3 *E. coli* Bacteria

The City analyzed *E. coli* bacteria sampling data for January 2000 to December 2001 was reviewed from OES, MCHD, and IDEM. In addition, the TMDL project utilized data from 2002 where available. Compliance with the single sample maximum *E. coli* standard (235 cfu/100 mL) generally decreases when moving from the upstream boundary at 96th Street (64 percent compliance) to the downstream boundary at Waverly (21 percent). Only the New York Street sampling location has sufficient sampling frequency (5 samples in 30 days) for a geometric mean comparison. During 2001, that station did not meet the geometric mean monthly standard of 125 cfu/ 100 mL. **Figures 2-24** through **2-39** present this information. Some data has been flagged as "questionable" by the agency collecting the data. The City

[2] *DO data was not collected in 2000 at the 16th Street site.*

did not use questionable data in determining the above compliance rates.

In addition, the White River was divided into three segments for *E. coli* analysis purposes:

- White River North: Upstream Marion County line to Interstate 65 (upstream of CSO area),
- White River CSO Area: Interstate 65 to Tibbs/Banta Landfill, and
- White River South: Tibbs/Banta Landfill to Waverly (downstream of CSO area).

Figure 2-40 shows the geographic extent of each analyzed river segment. The segment between the upstream Marion County Line to Lake Indy is considered upstream of the CSO area since the two CSOs that discharge within that area are only active an average of once per year.

The findings of the compliance analysis are presented in **Table 2-2** and described in the text below for the three segments on the White River for all weather, dry-weather, and wet weather.

2.4.2.3.1 All-Weather Analysis

All three river segments exceed the *E. coli* bacteria geometric mean standard of 125 cfu/100 mL, and the TMDL criteria of less than 10 percent of samples greater than 235 cfu/100 mL and no samples in excess of 10,000 cfu/100 mL. The analysis suggests that all segments of the White River are not able to assimilate the *E. coli* bacteria load from wildlife, failed septic systems, stormwater, and CSO sources. However, the White River upstream of Interstate 65 comes closest to meeting the Indiana geometric mean standard of 125 cfu/100 mL..

2.4.2.3.2 Dry-Weather Analysis

During dry-weather, two of the river segments – from 96th Street to Tibbs/Banta Landfill – have *E. coli* bacteria geometric mean values lower than the Indiana standard of 125 cfu/100 mL. However, neither river segment meets the TMDL criteria of less than 10 percent of samples greater than 235 cfu/100 mL during dry-weather. The analysis suggests that the White River through the CSO area has sufficient baseflow to absorb the *E. coli* bacteria load during a “typical” dry-weather day; however, frequent low flow conditions or fluctuations in the septic or wildlife loads occur more than 10 percent of the time during dry-weather. The White River segment downstream of the CSO area exceeds both the Indiana geometric mean standard of 125 cfu/100 mL and the TMDL criteria of less than 10 percent of samples greater than 235 cfu/100 mL during dry-weather. The analysis suggests that the stream receives excessive *E. coli* bacteria loadings from failed septics, illicit connections and wildlife sources.

2.4.2.3.3 Wet-Weather Analysis

All of the river segments exceed all criteria during wet weather. The analysis suggests that all segments of the White River receive excessive *E. coli* bacteria loadings from stormwater and CSO sources. The number of samples in excess of 10,000 cfu/100 mL for the White River CSO area is less than that for the Fall Creek and Pleasant Run CSO areas during wet weather. This suggests that the White River possesses more baseflow to absorb the wet-weather load and avoid extremely high bacteria counts. However, the percent of samples in excess of the more stringent daily maximum standard of 235 cfu/100 mL for the White River CSO area is comparable to the Fall Creek and Pleasant Run CSO areas.

2.4.3 Fall Creek

2.4.3.1 Dissolved Oxygen

Dissolved oxygen (DO) data was collected at 13 locations on Fall Creek at varying intervals from monthly to weekly from January 2000 to May 2002. The data for nine stations out of the 13 showed 100 percent compliance with the Indiana minimum DO standard of 4 mg/L. The exceptions were located at 79th Street, 5700 Fall Creek Parkway North, 4500 Fall Creek Parkway North and 30th Street. **Figure 2-41** presents this information.

Dissolved oxygen concentrations that fall below the instream water quality standard at 30th Street are caused primarily by upstream CSO discharges. **Figure 2-42** presents continuous DO data from an August 30, 2001 storm event. The BOD load from the CSOs causes the DO to drop during the storm event. However, the 79th Street, 5700 Fall Creek Parkway North, and 4500 Fall Creek Parkway North stations, which are upstream of the CSO area, also report occurrences of DO below the standard of 4 mg/L. In this area above the CSOs, low streamflow appears to contribute to the exceedances of the DO standard.

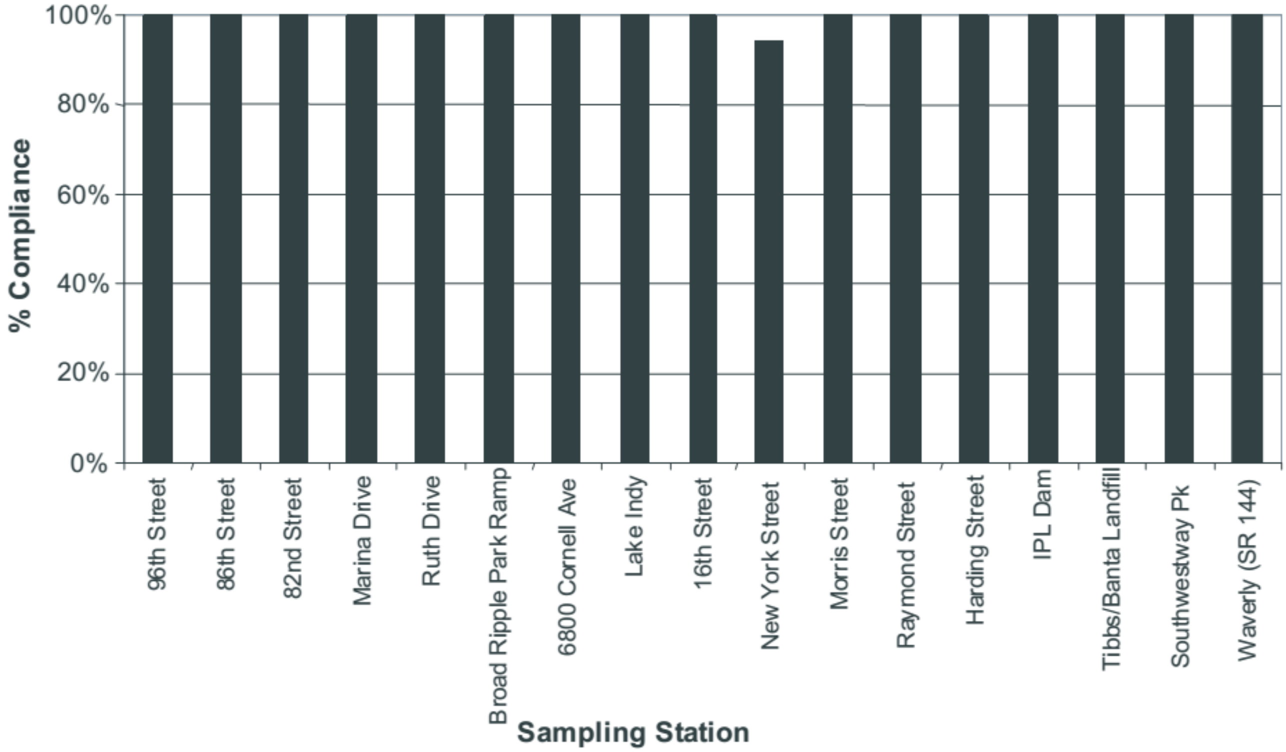

Figure 2-16
White River: Percent Compliance with Indiana Dissolved Oxygen Standard of 4 mg/L

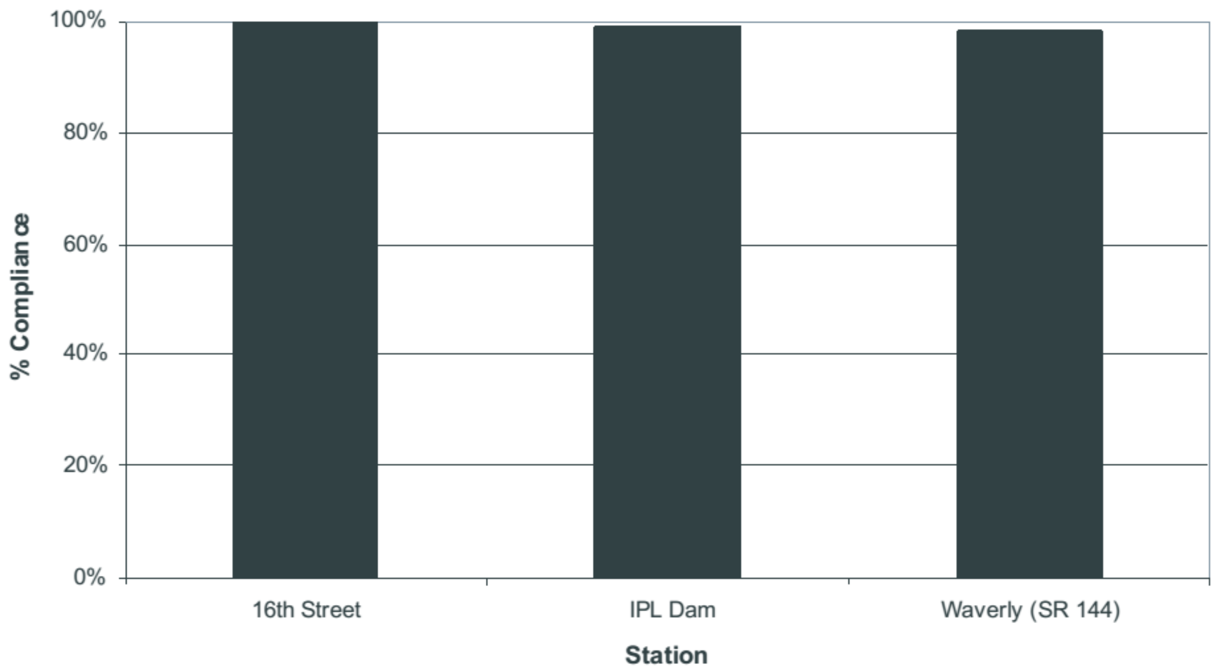

Figure 2-17
White River: Percent Compliance with Indiana Dissolved Oxygen Standard of 5 mg/L Average Daily Value

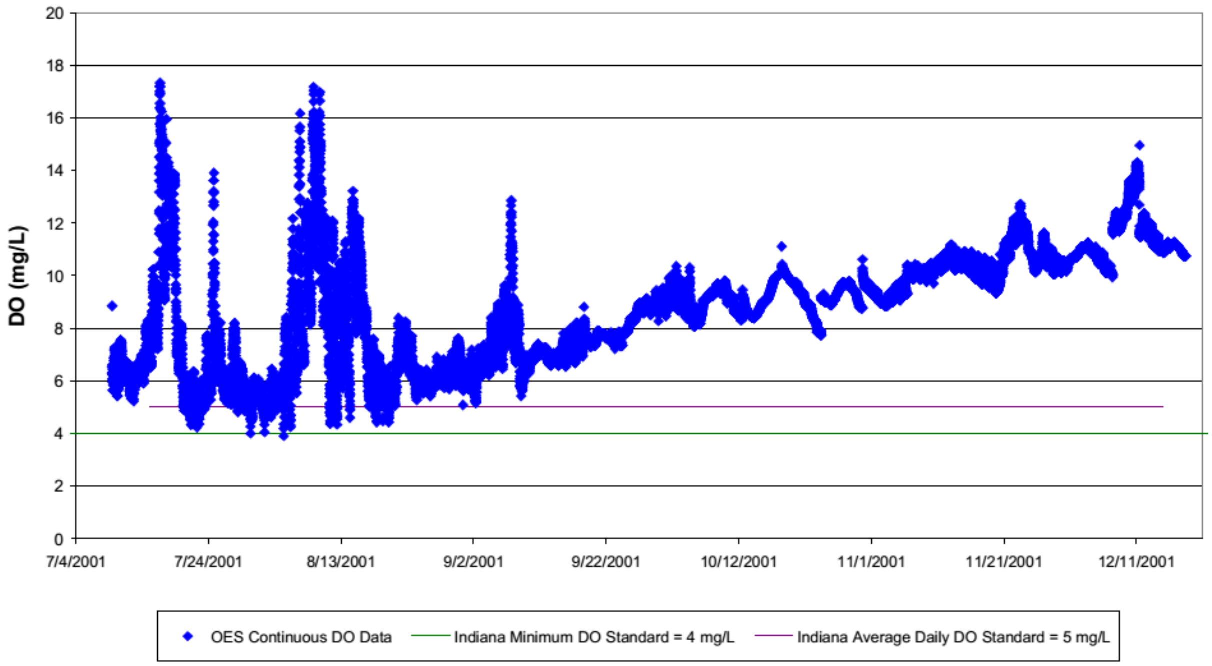

Figure 2-18
White River Continuous Dissolved Oxygen Data:
16th Street City of Indianapolis OES Continuous DO Meter Location
(July 2001 to December 2001)

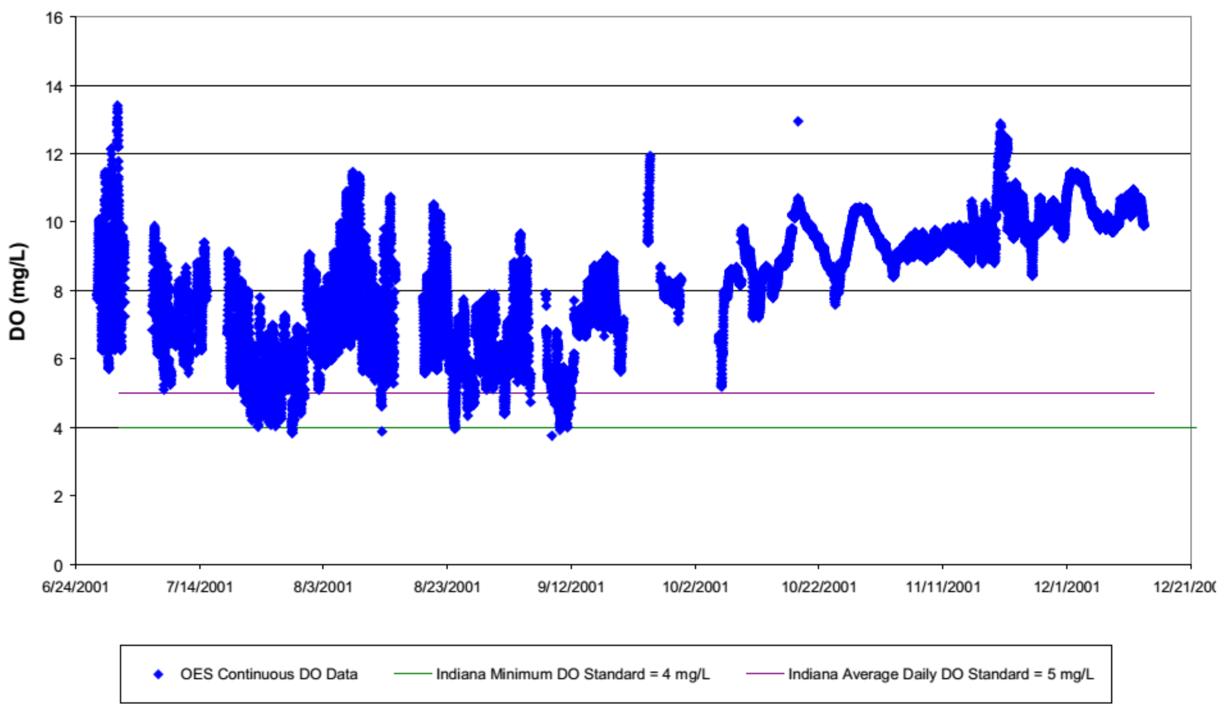

Figure 2-19
White River Continuous Dissolved Oxygen Data: Waverly (SR 144)
City of Indianapolis OES Continuous DO Meter Location (July 2001 to December 2001)

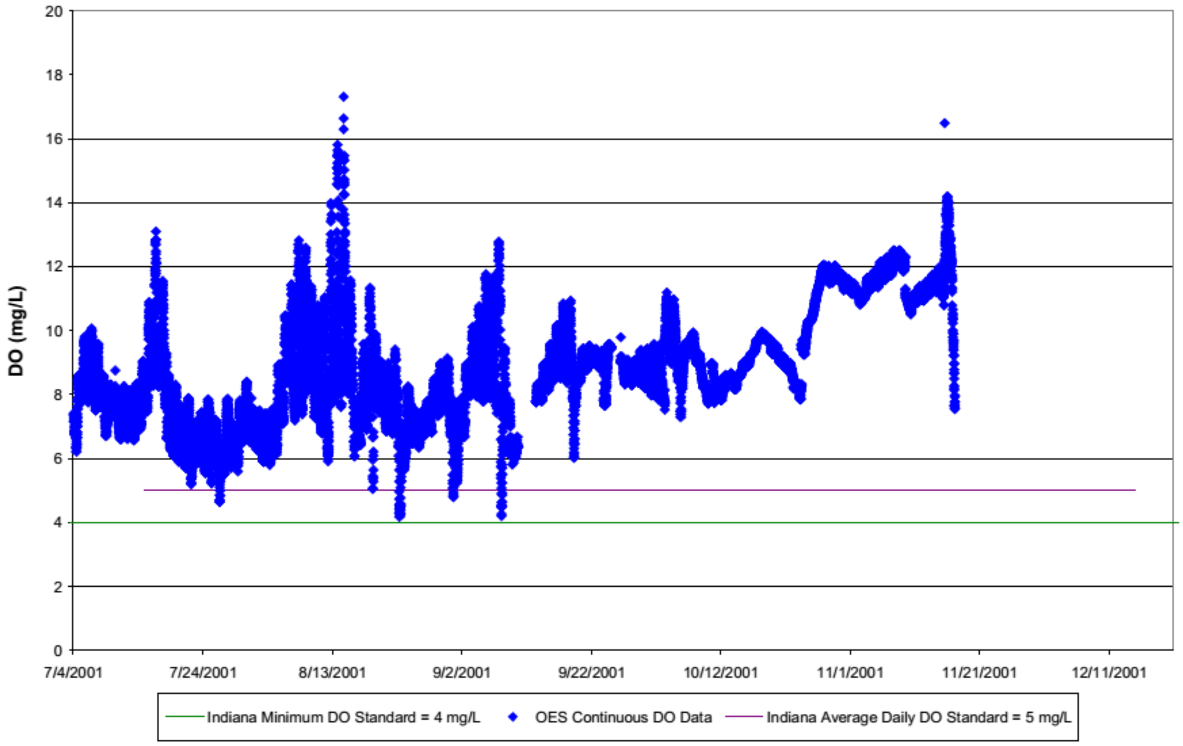

Figure 2-20
White River Continuous Dissolved Oxygen Data: IPL Station City of Indianapolis OES Continuous DO Meter Location (July 2001 to December 2001)

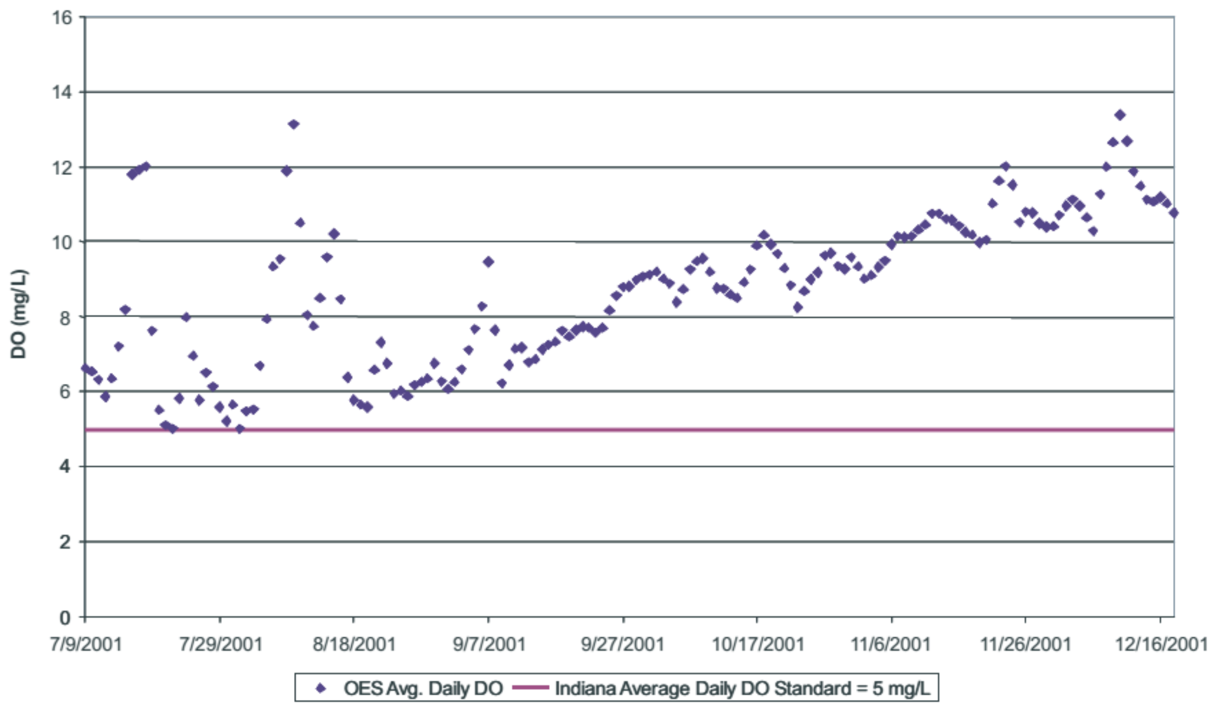

Figure 2-21
White River Average Daily Continuous Dissolved Oxygen Data: 16th Street City of Indianapolis OES Continuous DO Meter Location (July 2001 to December 2001)

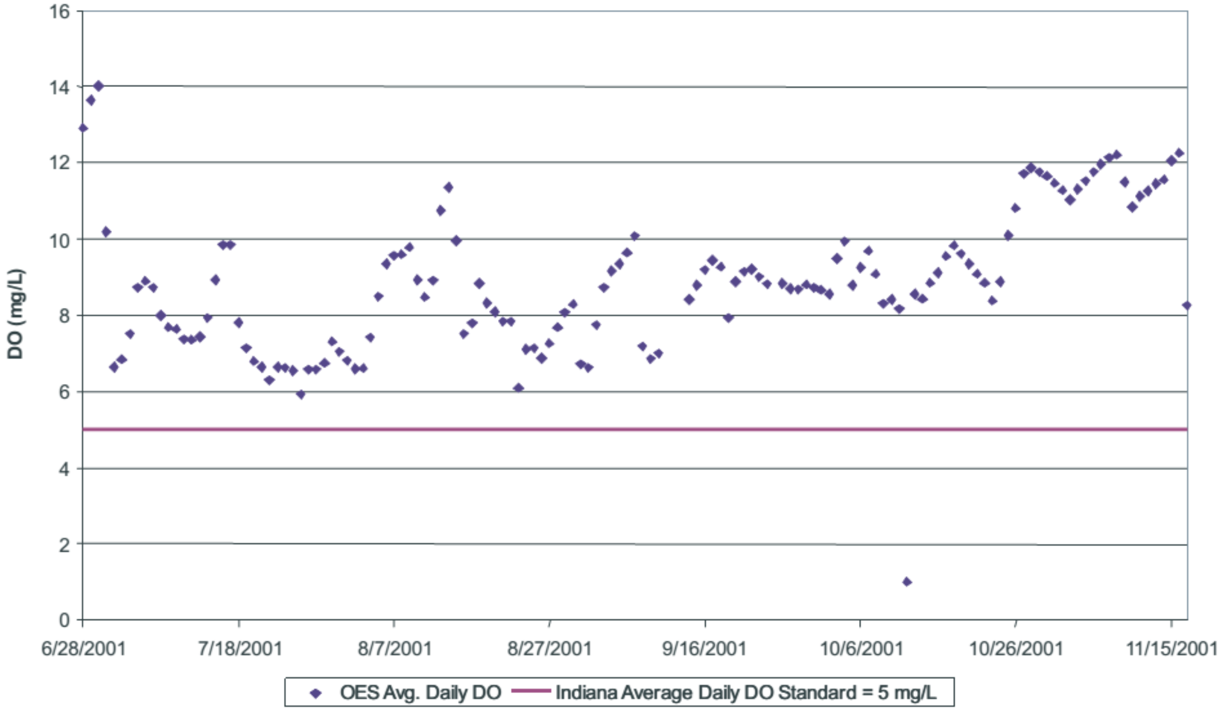

Figure 2-22
White River Average Daily Continuous Dissolved Oxygen Data: IPL Station City of Indianapolis OES Continuous DO Meter Location (July 2001 to December 2001)

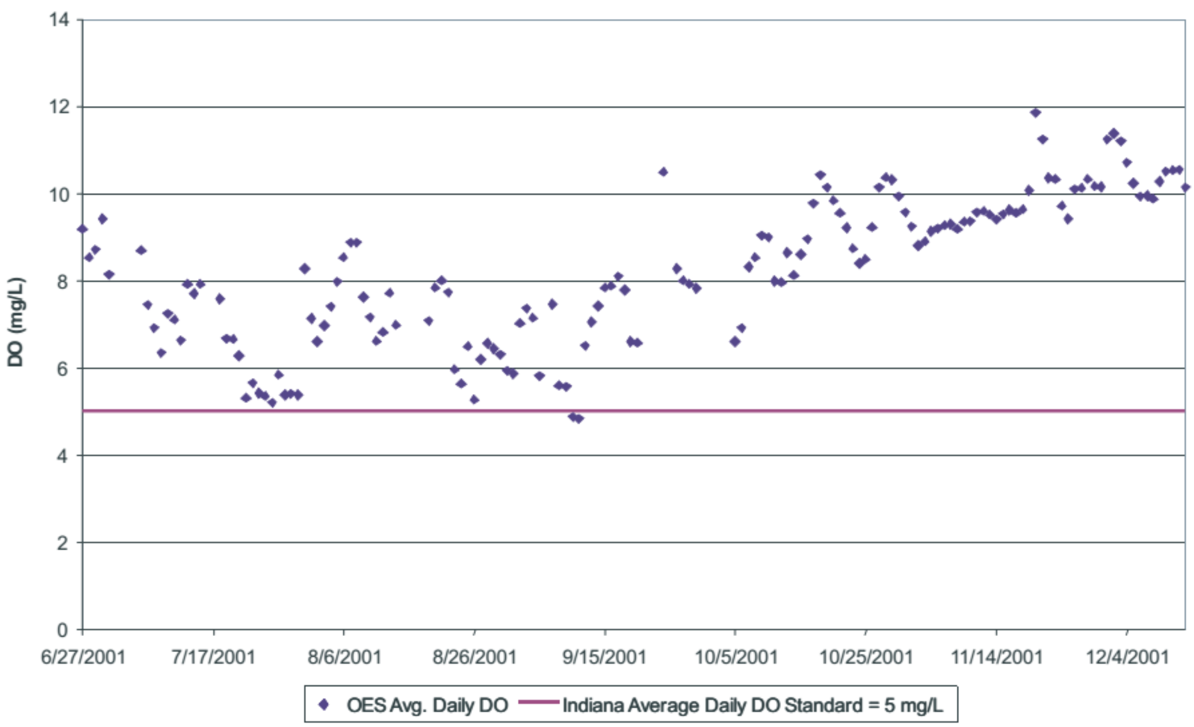

Figure 2-23
White River Average Daily Continuous Dissolved Oxygen Data: Waverly (SR 144) City of Indianapolis OES Continuous DO Meter Location (July 2001 to December 2001)

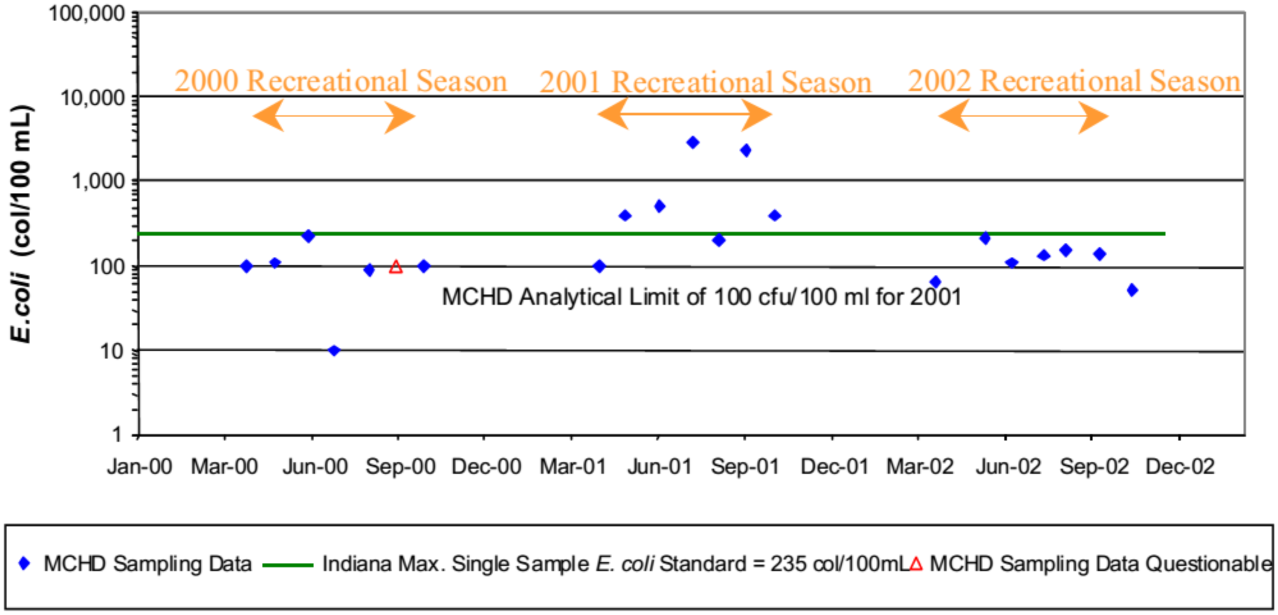

Figure 2-24
White River *E. coli* Data: 96th Street
Marion County Health Department (MCHD) Sampling Site
(April 2000 to October 2002)

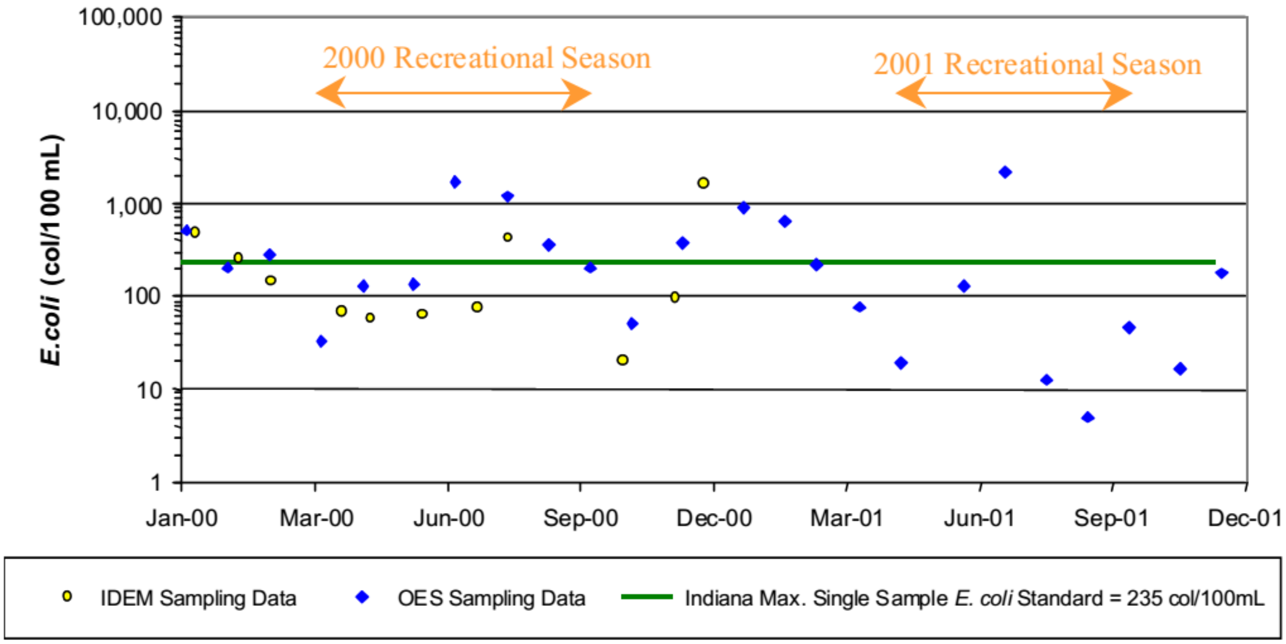

Figure 2-25
White River *E. coli* Data: 82nd/86th Street IDEM & OES Sampling Site
(April 2000 to October 2001)

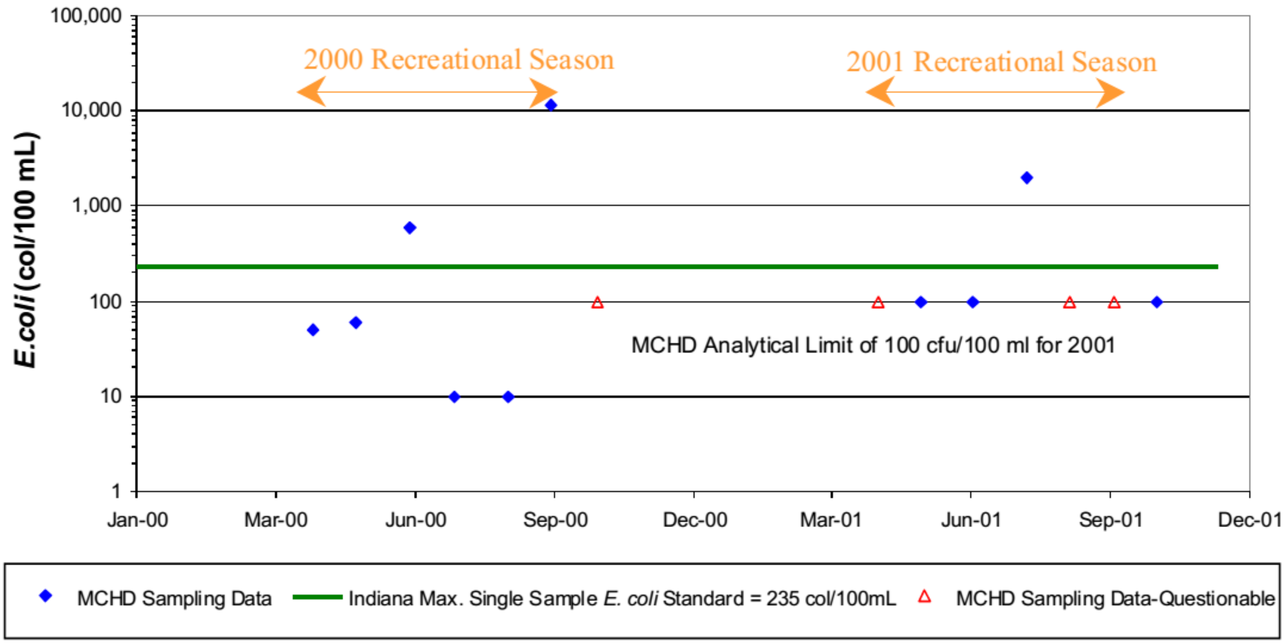

Figure 2-26
White River *E. coli* Data: Marina Drive
Marion County Health Department (MCHD) Sampling Site
(April 2000 to October 2001)

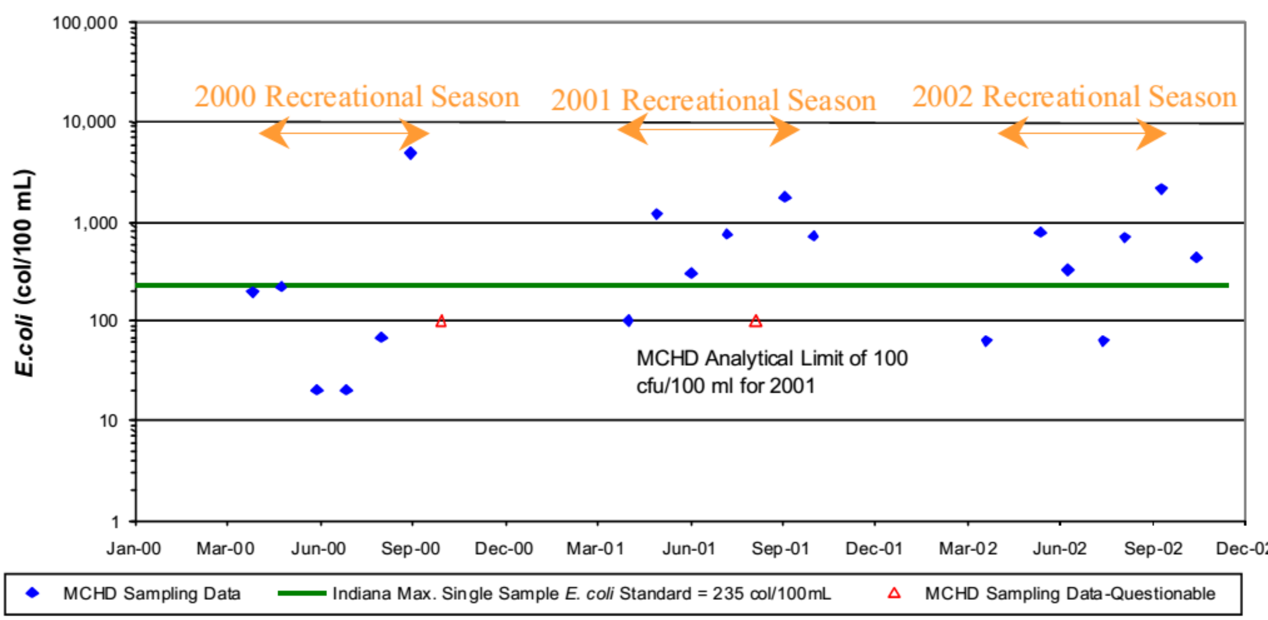

Figure 2-27
White River *E. coli* Data: Ruth Drive
Marion County Health Department (MCHD) Sampling Site
(April 2000 to October 2002)

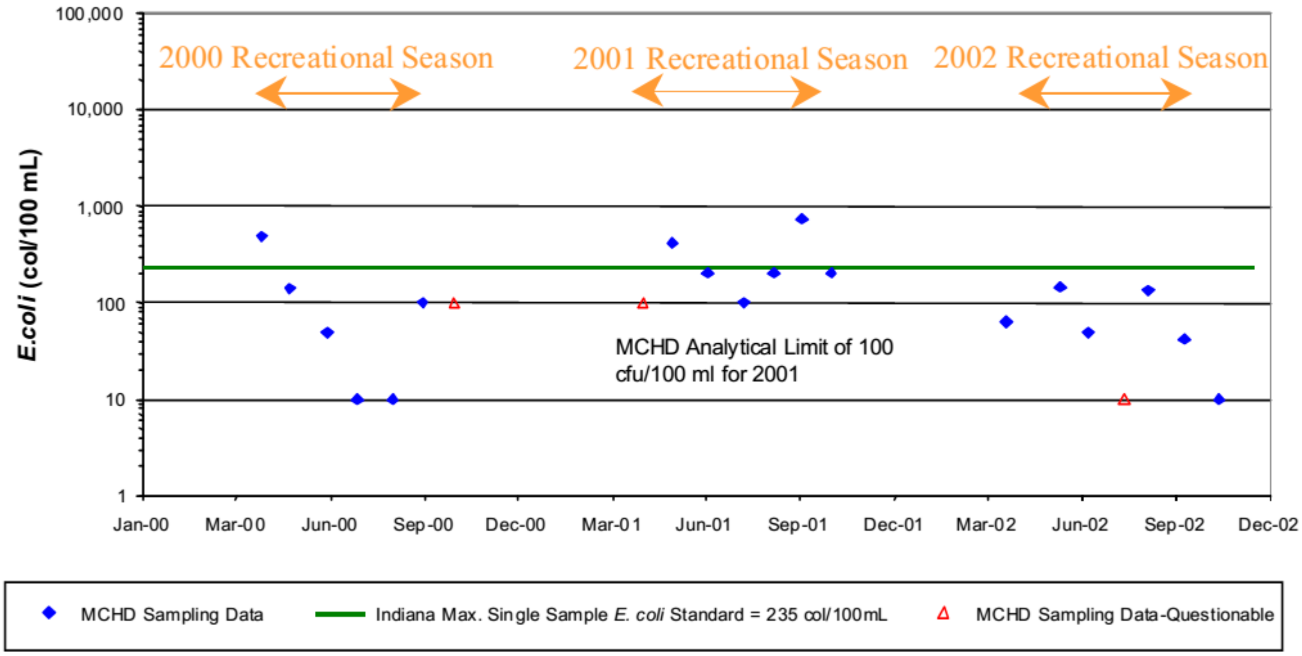

Figure 2-28
White River *E. coli* Data: Broad Ripple Park Ramp Marion County Health Department (MCHD) Sampling Site
(April 2000 to October 2002)

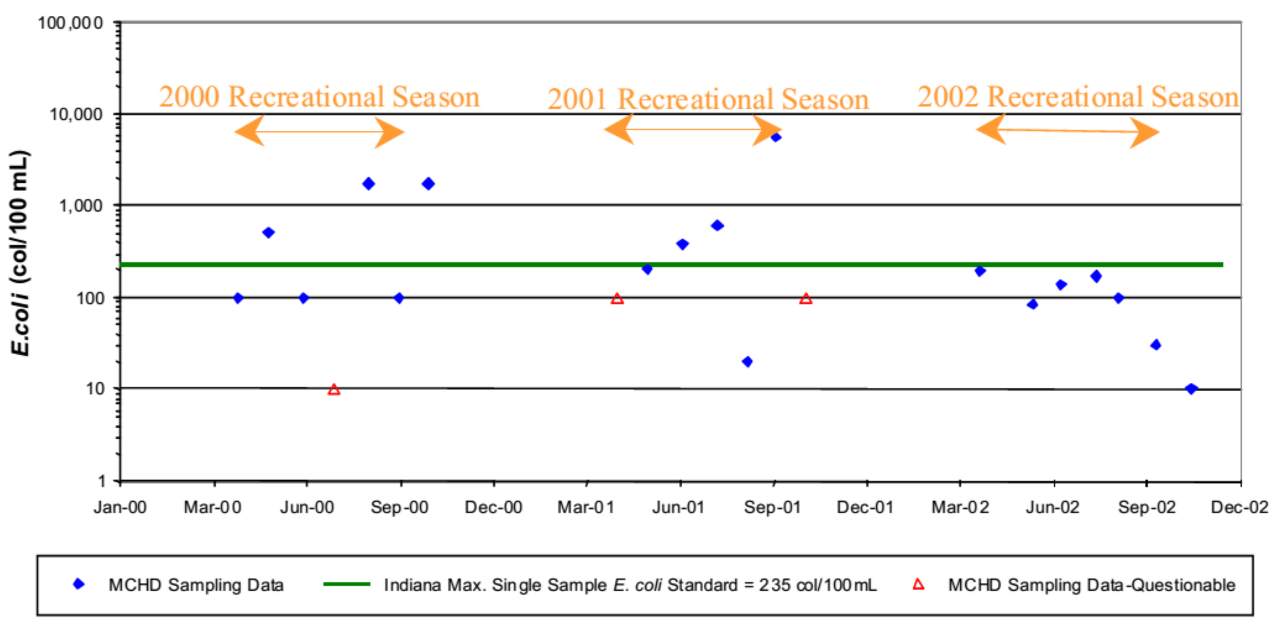

Figure 2-29
White River *E. coli* Data: 6800 Cornell Avenue Marion County Health Department (MCHD) Sampling Site
(April 2000 to October 2002)

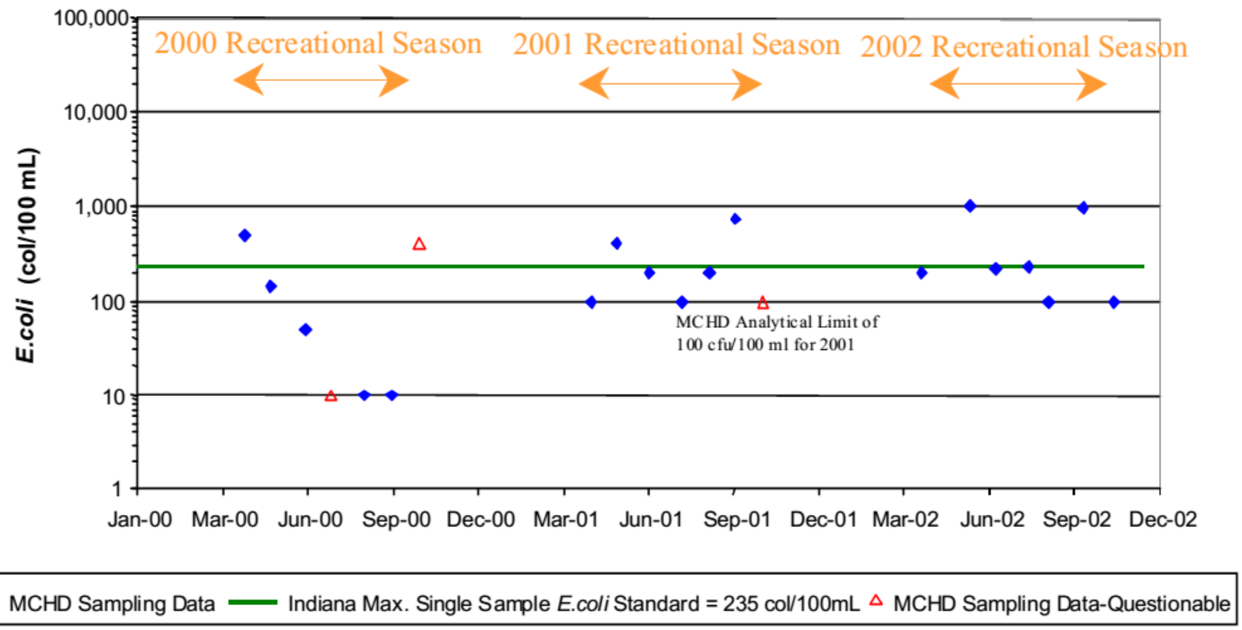

Figure 2-30
White River *E. coli* Data: Lake Indy
Marion County Health Department (MCHD) Sampling Site
(April 2000 to October 2002)

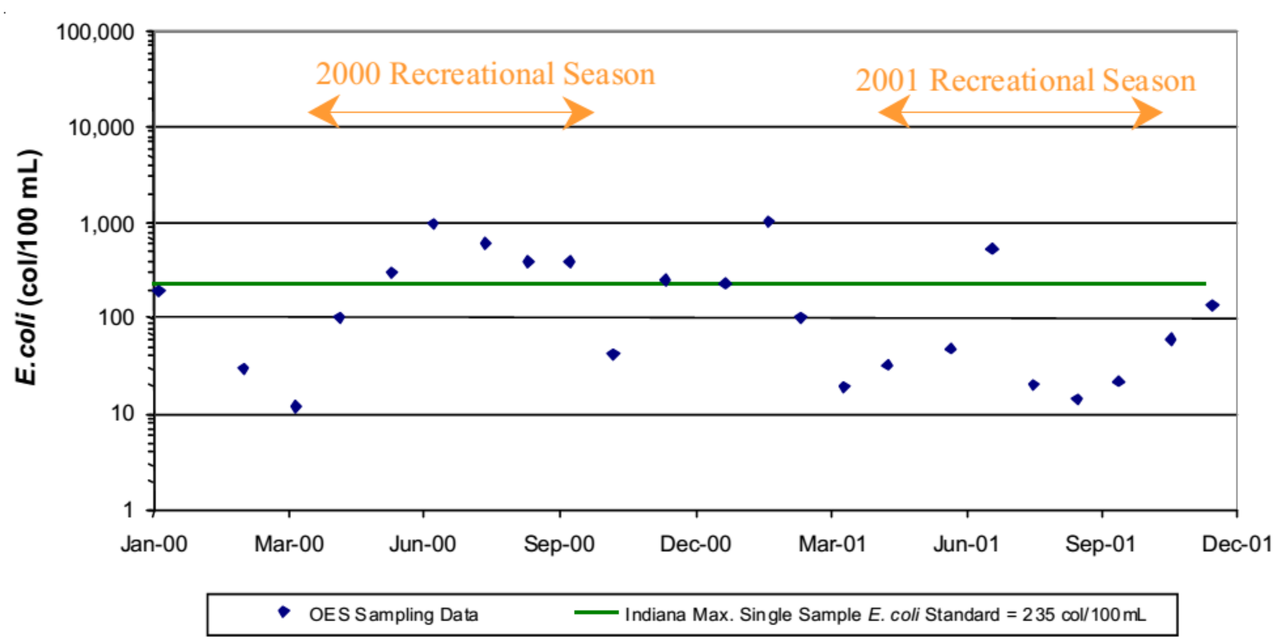

Figure 2-31
White River *E. coli* Data: 30th Street
City of Indianapolis OES Sampling Site
(January 2000 to December 2001)

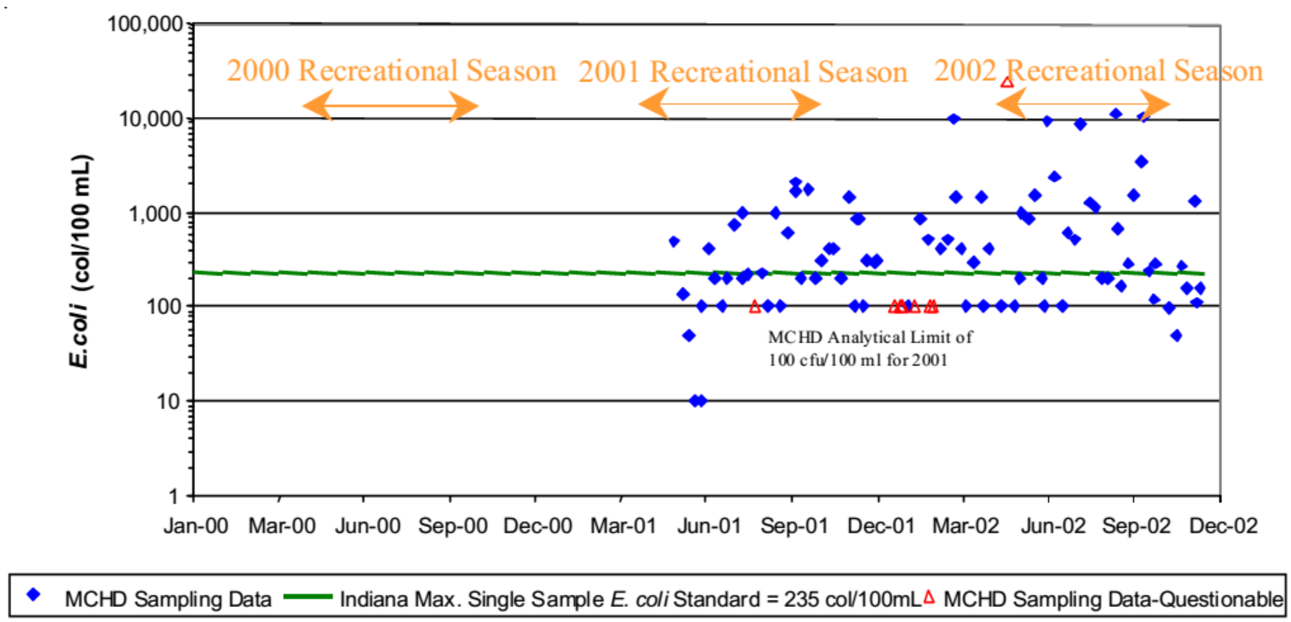

Figure 2-32
White River *E. coli* Data: New York Street
Marion County Health Department (MCHD) Sampling Site
(April 2000 to October 2002)

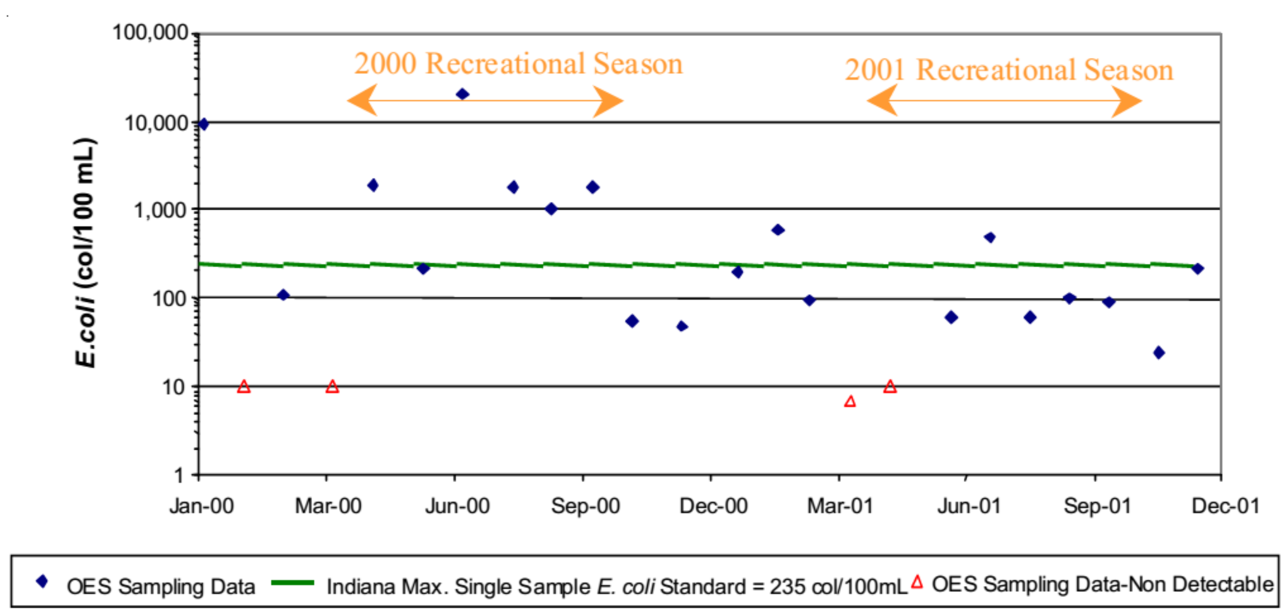

Figure 2-33
White River *E. coli* Data: Morris Street
Marion County Health Department (MCHD) Sampling Site
(April 2000 to October 2002)

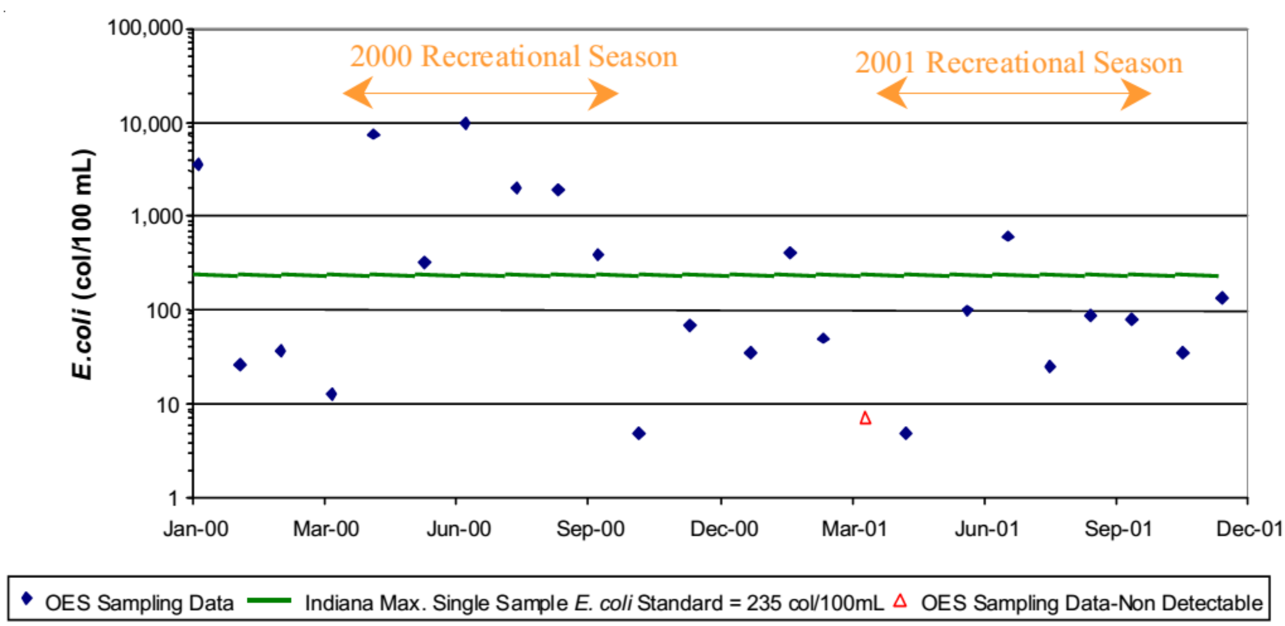

Figure 2-34
White River *E. coli* Data: Harding Street
Marion County Health Department (MCHD) Sampling Site
(April 2000 to October 2002)

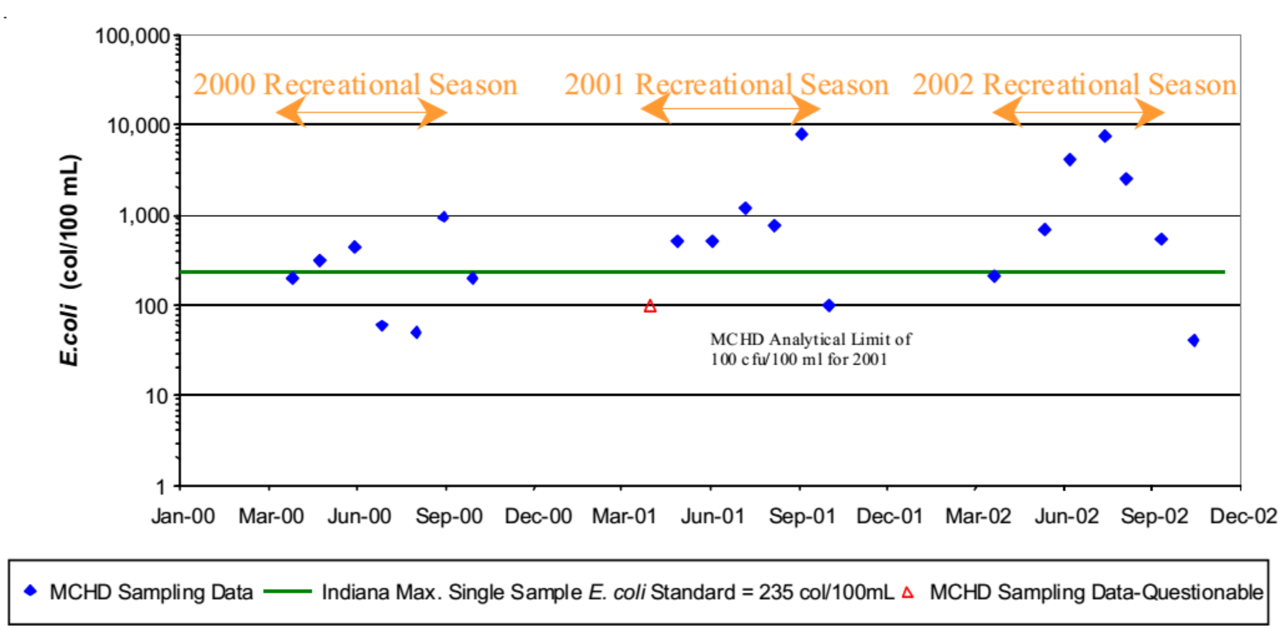

Figure 2-35
White River *E. coli* Data: Raymond Street
Marion County Health Department (MCHD) Sampling Site
(April 2000 to October 2002)

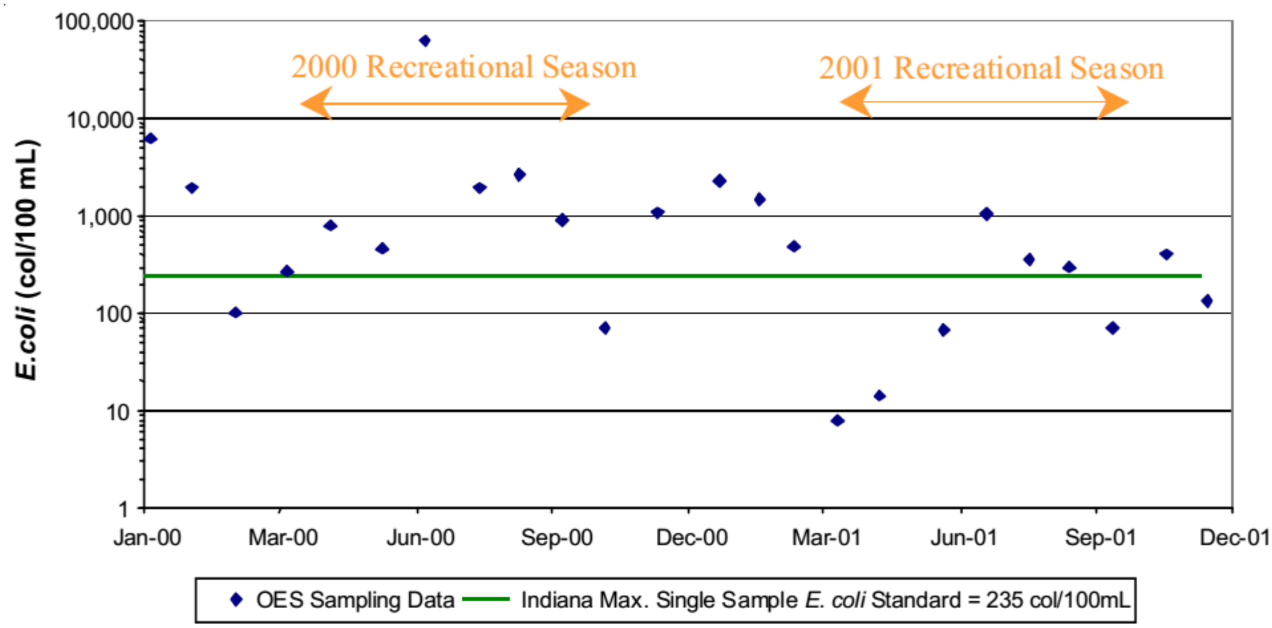

Figure 2-36
White River *E. coli* Data: Tibbs/Banta Landfill Marion County Health Department (MCHD) Sampling Site (April 2000 to October 2002)

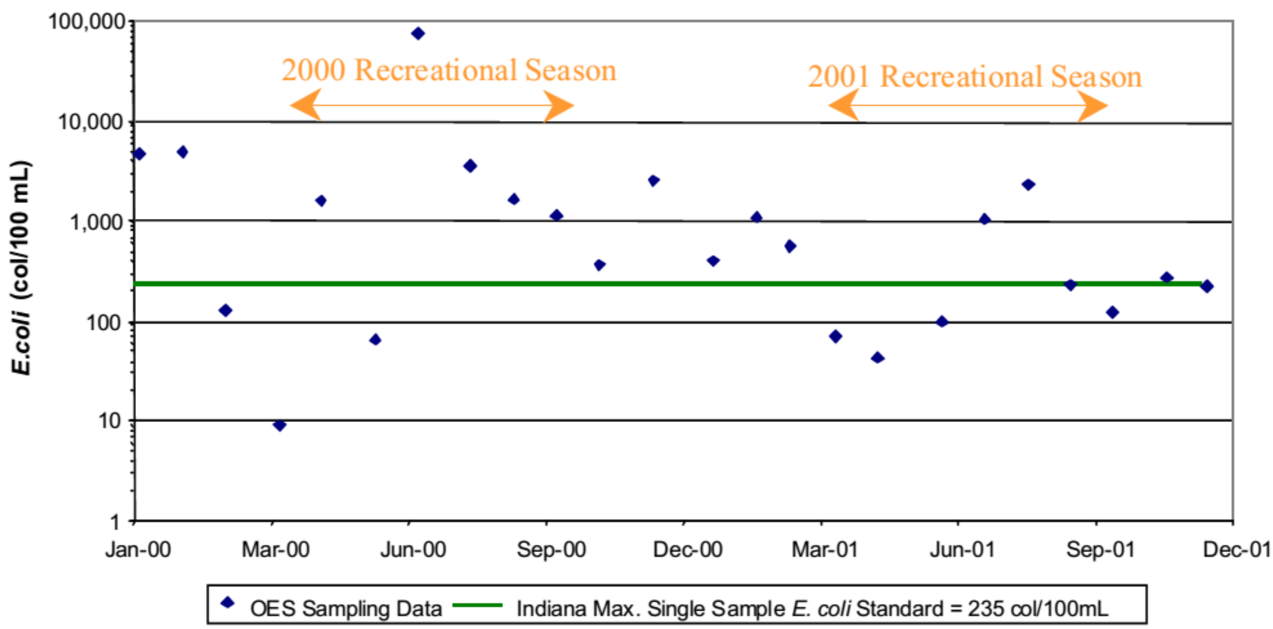

Figure 2-37
White River *E. coli* Data: Southwestway Park City of Indianapolis OES Sampling Site (January 2000 to December 2001)

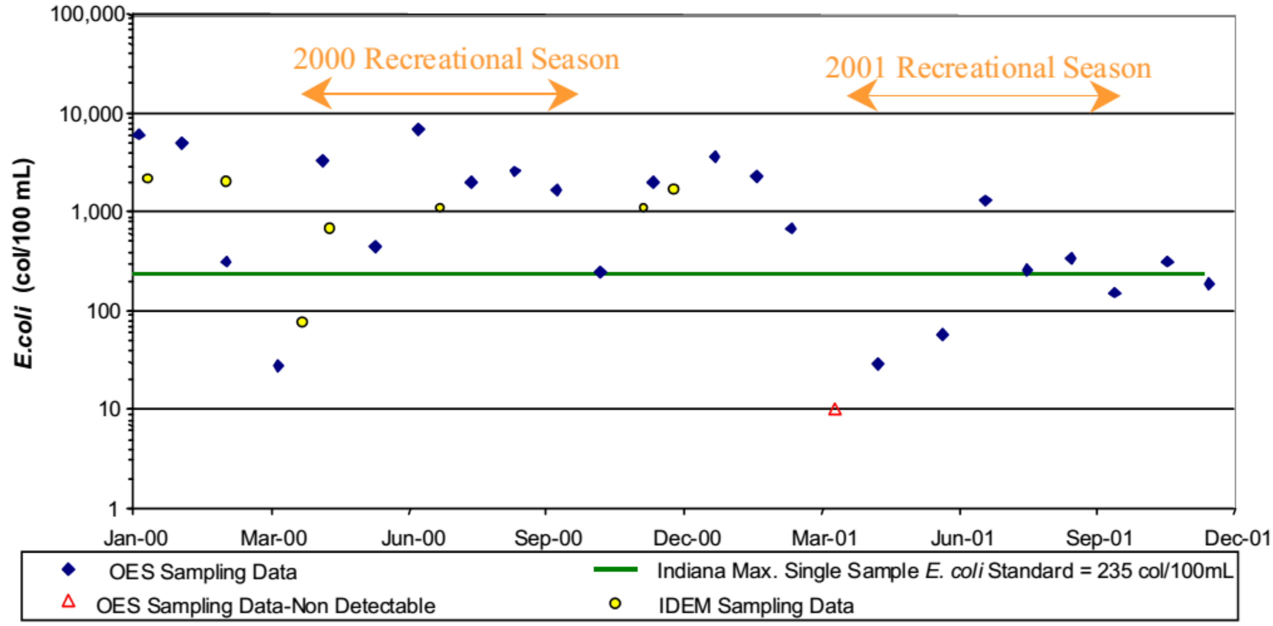

Figure 2-38
White River *E. coli* Data: Waverly (SR 144)
City of Indianapolis OES Sampling Site
(January 2000 to December 2001)

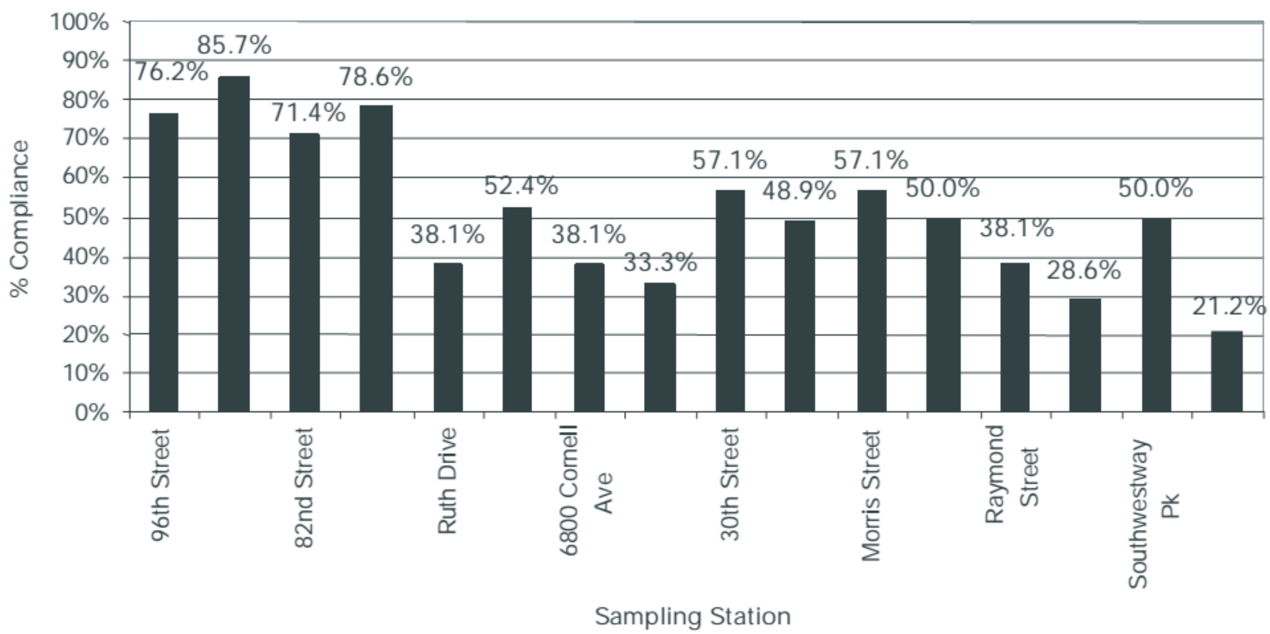

Figure 2-39
Percent Compliance with Indiana Single Sample Maximum *E. coli* Bacteria
Standard of 235 cfu/100mL in the White River
April through October for 2000 and 2002
MCHD / City of Indianapolis

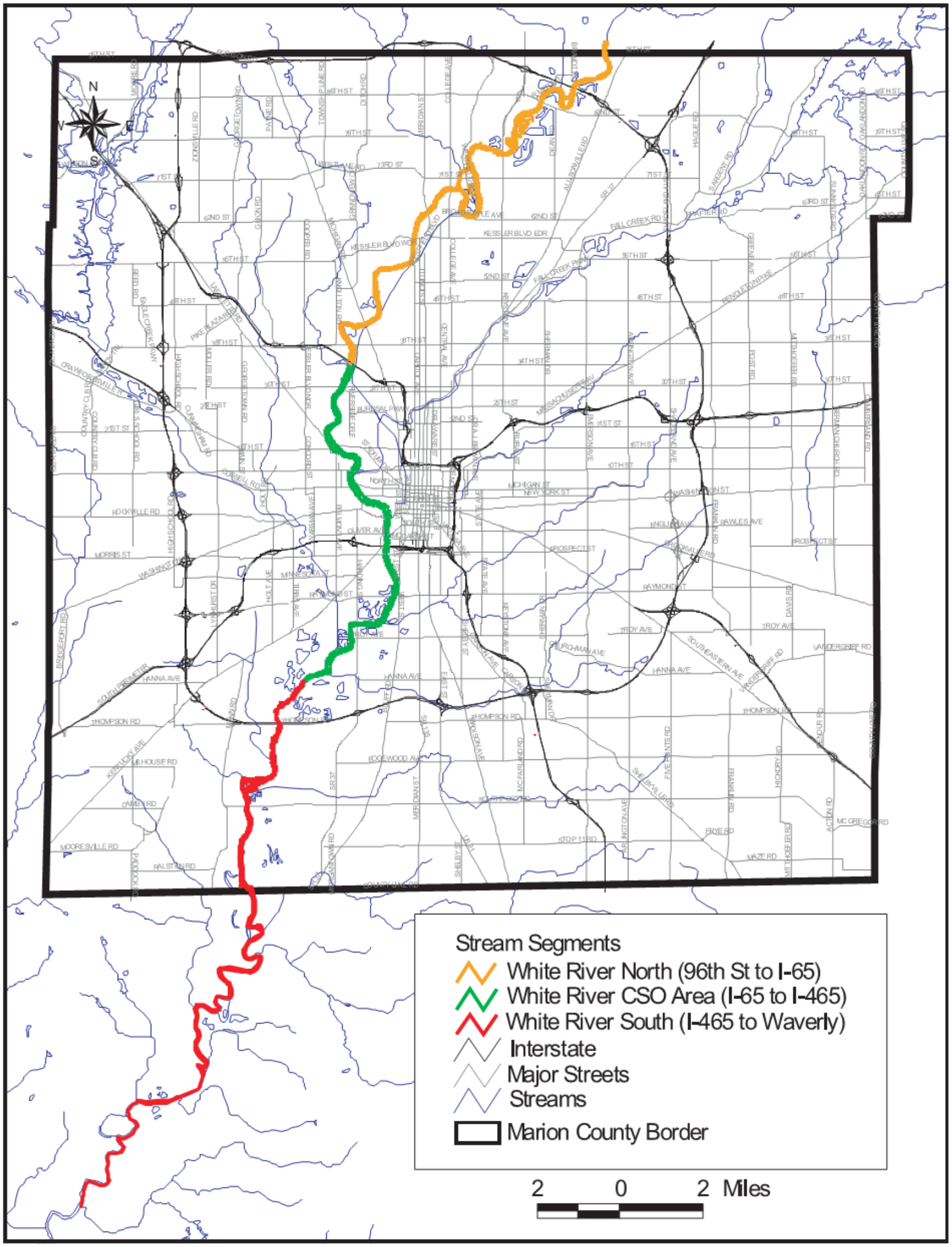

Figure 2-40
White River Stream Segments

Table 2-2
White River *E. coli* Bacteria Compliance

All Data

River Segment	Geometric Mean of 2000-2002 data	% of Samples > 235 cfu/100 ml	Number of Samples > 10,000 cfu/100 ml	Total Number of Samples
White River - Upstream of Lake Indy	166	32.9%	1	155
White River - Within CSO Area	238	46.2%	4	184
White River - Downstream of CSO Area	410	63.8%	2	47

Dry Weather

River Segment	Geometric Mean of 2000-2002 data	% of Samples > 235 cfu/100 ml	Number of Samples > 10,000 cfu/100 ml	Total Number of Samples
White River - Upstream of Lake Indy	74	19.1%	0	47
White River - Within CSO Area	99	25.3%	0	91
White River - Downstream of CSO Area	165	44.0%	0	25

Wet Weather

River Segment	Geometric Mean of 2000-2002 data	% of Samples > 235 cfu/100 ml	Number of Samples > 10,000 cfu/100 ml	Total Number of Samples
White River - Upstream of Lake Indy	236	38.9%	1	108
White River - Within CSO Area	561	66.7%	4	93
White River - Downstream of CSO Area	1159	86.4%	2	22
State Guidance (1)	**(IDEM standard of 125 cfu/100 ml)**	**(IDEM Guidance 10% or less)**	**(IDEM Guidance None > 10,000 cfu/100 ml)**	

(1) **Indiana's 303(d) Listing Methodology for Impaired Waterbodies and Total Maximum Daily Load - September 2002**

2.4.3.2 *E. coli* Bacteria

Data collected between January 2000 and December 2001 (and 2002, where available) demonstrate that Fall Creek exceeds the Indiana water quality standard for *E. coli* bacteria.

- Forty-four percent of the sampling stations exceeded the daily maximum E. coli bacteria standard (235 cfu/ 100 mL) more than 50 percent of the time.
- Fifty percent of the sampling stations with sufficient data (five samples in 30 days) exceed the geometric mean *E. coli* bacteria standard (125 cfu/100 mL) at least 75 percent of the time.

E. coli bacteria exceedances occur at all stations on Fall Creek, as shown in data and compliance plots provided in **Figures 2-43** through **2-56**. The upstream sampling station at 79th Street has the best compliance with the bacteria standard; 100 percent of the time the in-stream value is less than the daily maximum limit of 235 cfu/100 mL. Some data has been flagged as “questionable” by the agency collecting the data. Questionable data was not used in determining the above compliance rates.

Fall Creek was divided into two stream segments for analysis purposes:

- Fall Creek Upstream of the CSO Area (Geist Reservoir to Keystone Avenue)
- Fall Creek Within the CSO Area (Keystone Avenue to the West Fork of the White River)

In-stream *E. coli* bacteria sampling data were grouped for each segment. For informational purposes, data from major tributaries – Mud Creek, Lawrence Creek and Devon Creek – were also analyzed. **Figure 2-57** shows the geographic extent of each stream segment for Fall Creek and its tributaries.

The findings of the compliance analysis are presented in **Table 2-3** for the two Fall Creek stream segments, based upon all weather, dry-weather, and wet-weather data.

2.4.3.2.1 All-Weather Analysis

Two segments, upstream Fall Creek and Mud Creek, have monthly geometric mean *E. coli* values that meet the Indiana geometric mean standard of 125 cfu/100 mL. However, neither stream is in compliance with the TMDL criteria of less than 10 percent of samples greater than 235 cfu/100 mL, and Mud Creek had an observed count above 10,000 cfu/ 100 mL. The analysis suggests that Fall Creek upstream of the CSO area and Mud Creek (upstream of the CSO area) possess sufficient baseflow to absorb the *E. coli* bacteria load on a “typical” day, but receive excessive *E. coli* loadings from stormwater and failed septics during wet-weather or low-flow, dry-weather days. The other three segments – Fall Creek within the CSO area, Devon Creek, and Lawrence Creek – do not meet the geometric mean standard of 125 cfu/100 mL or the TMDL criteria of less than 10 percent of samples greater than 235 cfu/100 mL. The analysis suggests that these streams are not able to absorb the *E. coli* bacteria load from wildlife, failed septics, and stormwater sources. The 30 samples in excess of 10,000 cfu/100 mL in the Fall Creek CSO area segment in an 18-month period imply that CSOs are a significant source of *E. coli* bacteria loads to the stream.

2.4.3.2.2 Dry-Weather Analysis

One stream segment, Mud Creek, is in compliance with all three TMDL *E. coli* bacteria criteria during dry-weather. The analysis suggests that the septic and wildlife *E. coli* bacteria loads to Mud Creek are reasonable for the dry-weather baseflow. Two other stream segments, Fall Creek upstream of the CSO area and Lawrence Creek (upstream of the CSO area), are in compliance with the geometric mean standard of 125 cfu/100 mL, but not the TMDL criteria of less than 10 percent of samples greater than 235 cfu/100 mL. The analysis suggests that although the streams possess sufficient baseflow to absorb the *E. coli* bacteria load during a “typical” dry-weather day, frequent low-flow conditions or fluctuations in the septic or wildlife loads occur more than 10 percent of the time during dry-weather. Two stream segments, Fall Creek within the CSO area and Devon Creek, do not meet the Indiana geometric mean standard of 125 cfu/ 100 mL or the TMDL criteria of less than 10 percent of samples greater than 235 cfu/100 mL. The analysis suggests that the septic, illicit connection and wildlife loadings are excessive for the stream.

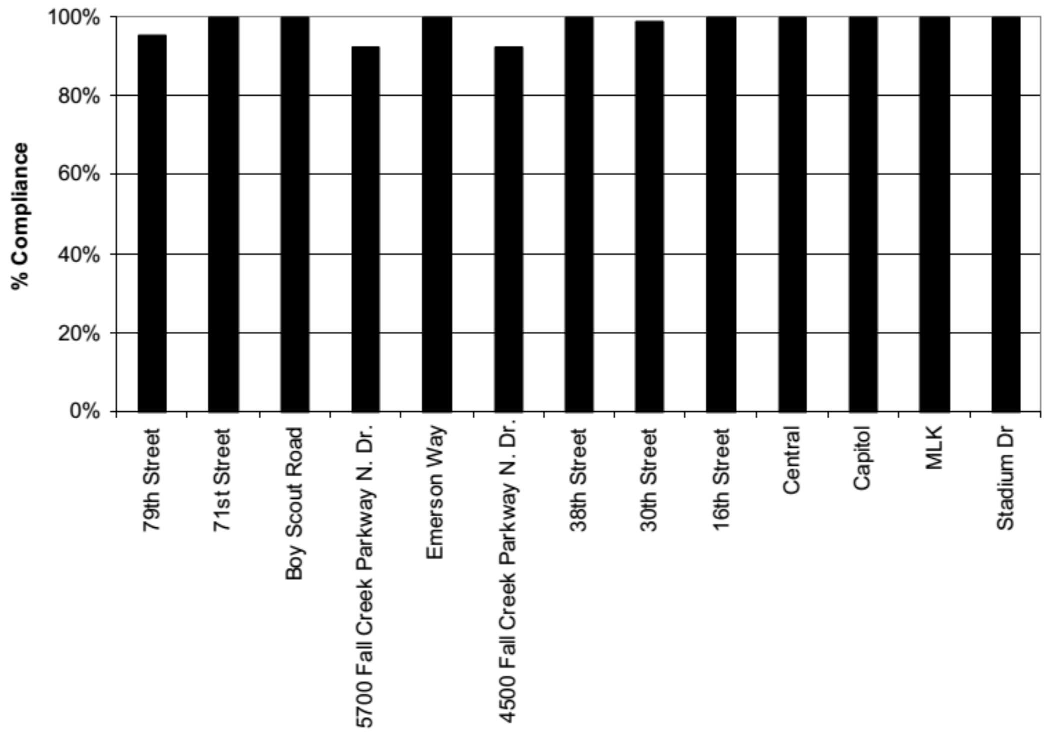

Figure 2-41
Percent Compliance with Indiana Dissolved Oxygen Standard of 4 mg/L in Fall Creek

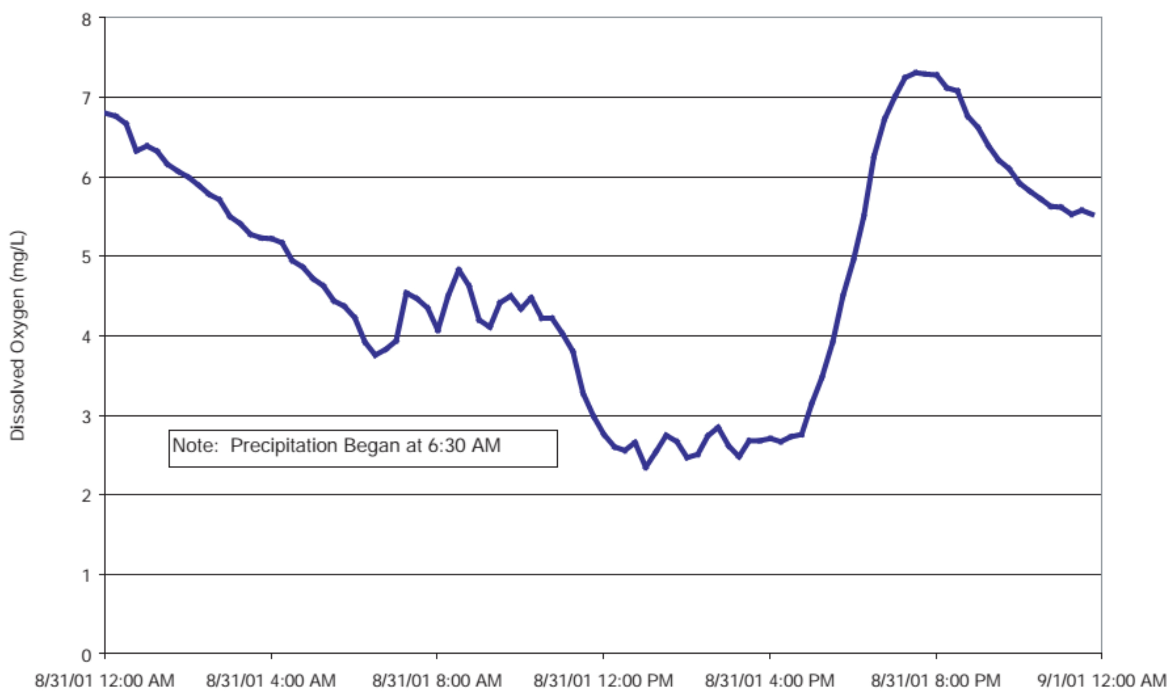

Figure 2-42
Fall Creek Measured Dissolved Oxygen at Boulevard Station 8/31/01 Storm Event

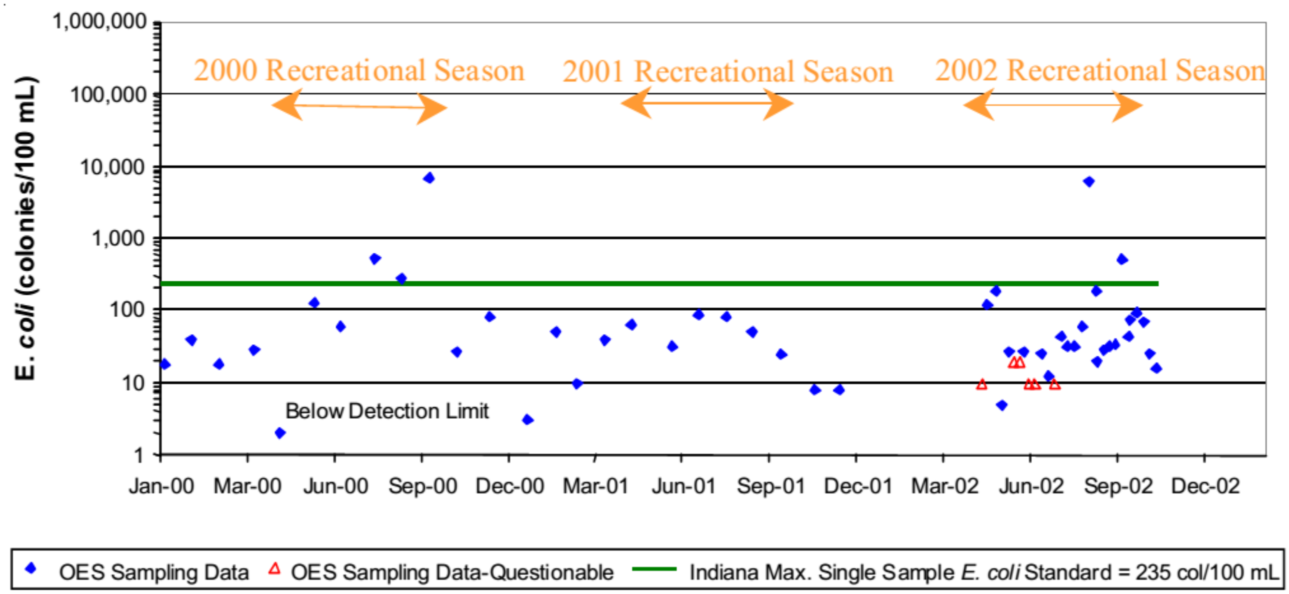

Figure 2-43
Fall Creek *E. coli* Data: 71st Street
City of Indianapolis OES Sampling Sites (January 2000 to October 2002)

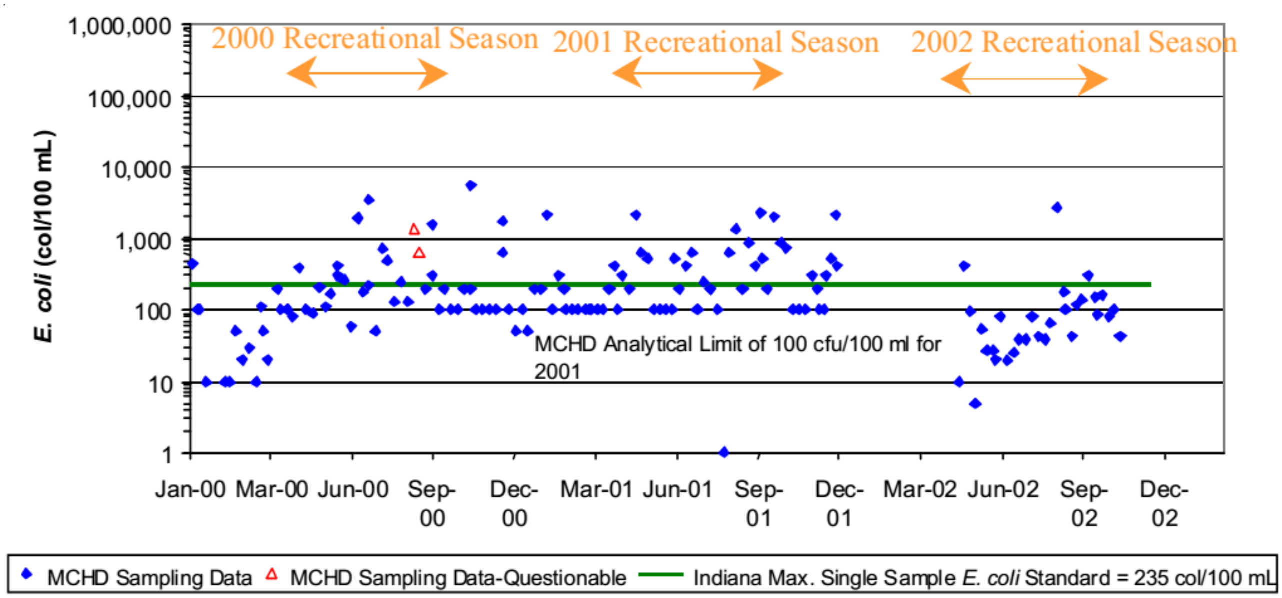

Figure 2-44
Fall Creek *E. coli* Data: Emerson Way
Marion County Health Department Sampling Sites (January 2000 to October 2002)

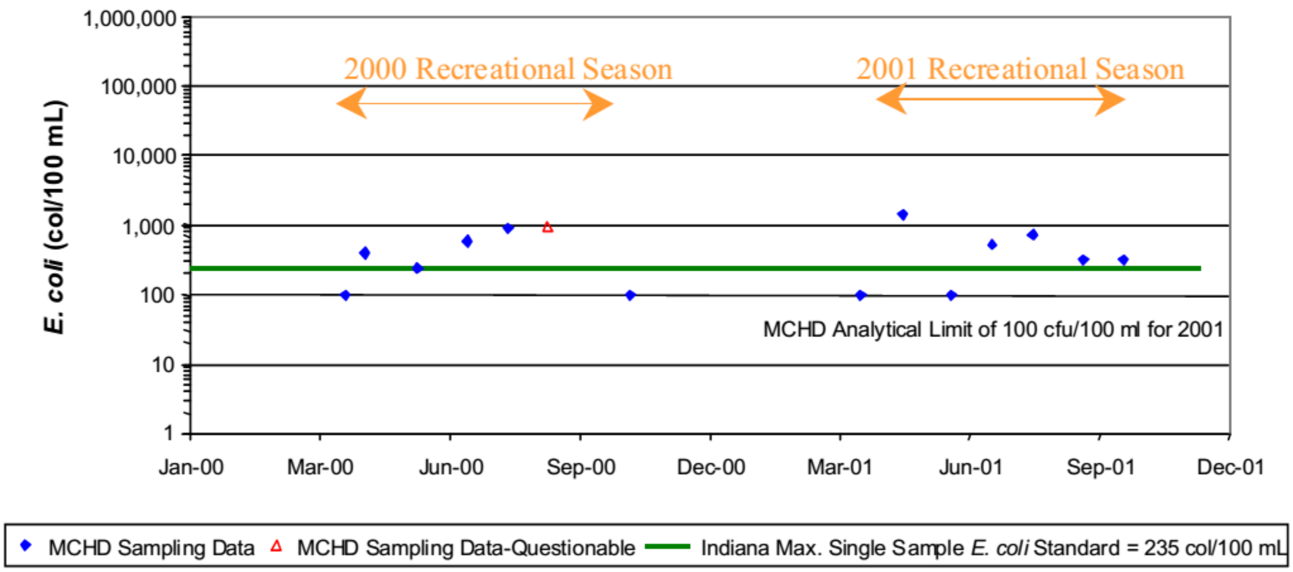

Figure 2-45
Fall Creek *E. coli* Data: 5700 Fall Creek Parkway
Marion County Health Department Sampling Sites (January 2000 to October 2001)

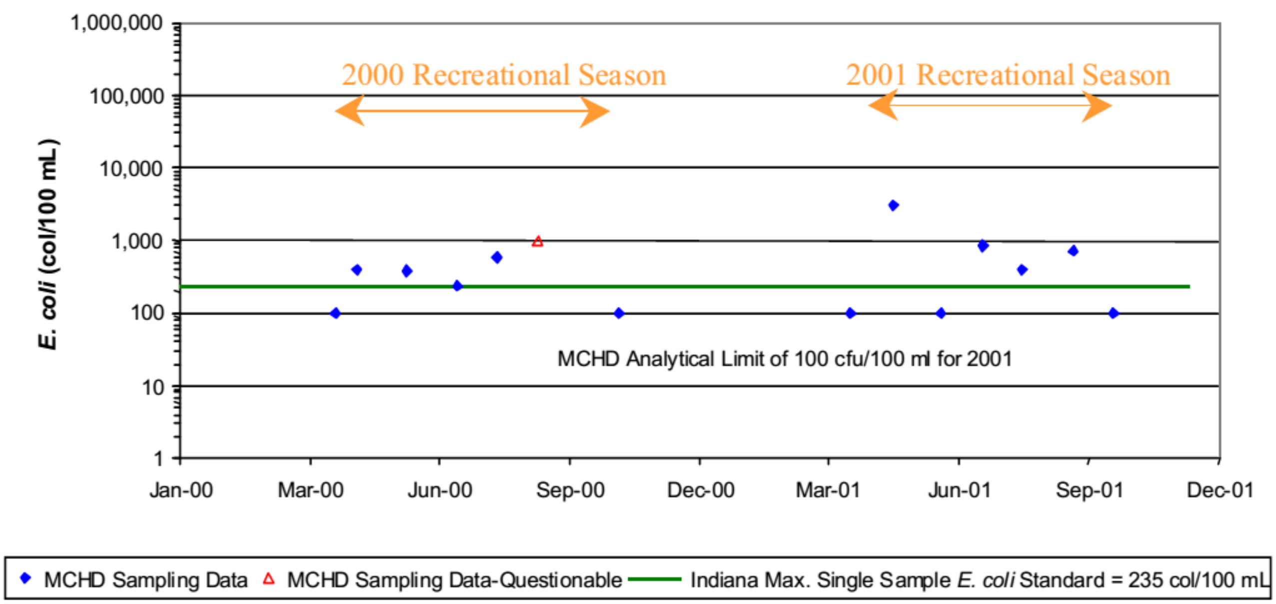

Figure 2-46
Fall Creek *E. coli* Data: 4500 Fall Creek Parkway
Marion County Health Department Sampling Sites (January 2000 to October 2001)

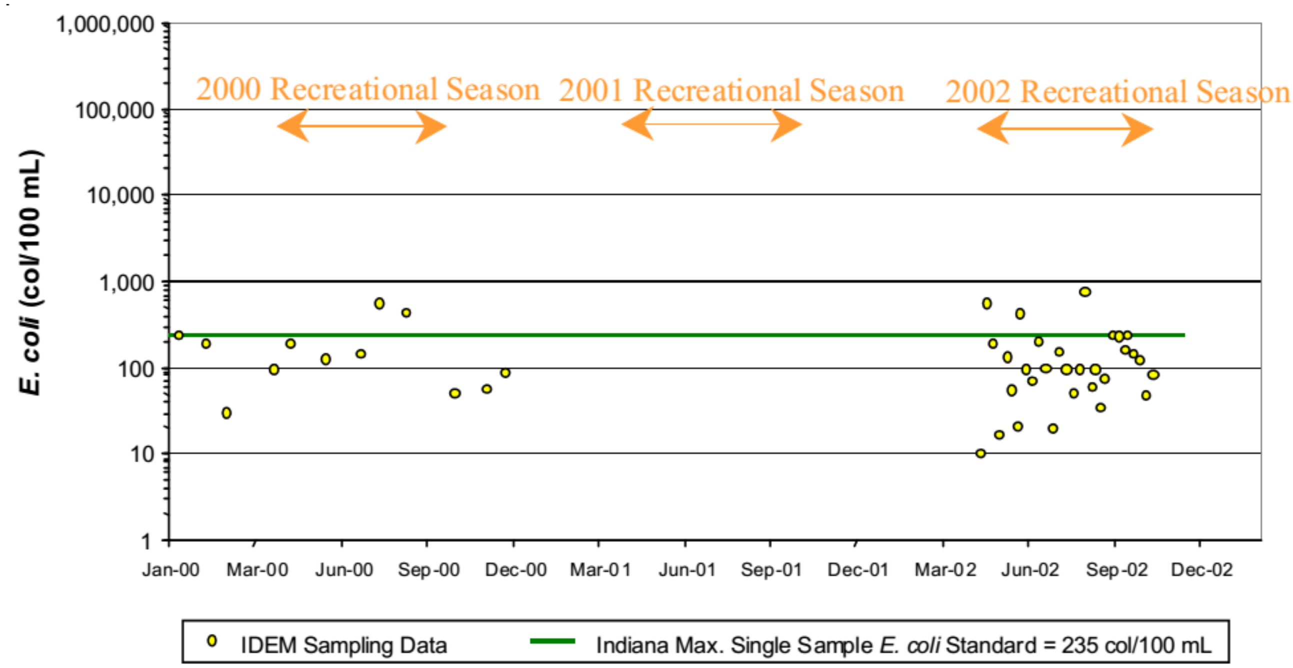

Figure 2-47
Fall Creek *E. coli* Data: Keystone Avenue
Marion County Health Department Sampling Sites (January 2000 to October 2002)

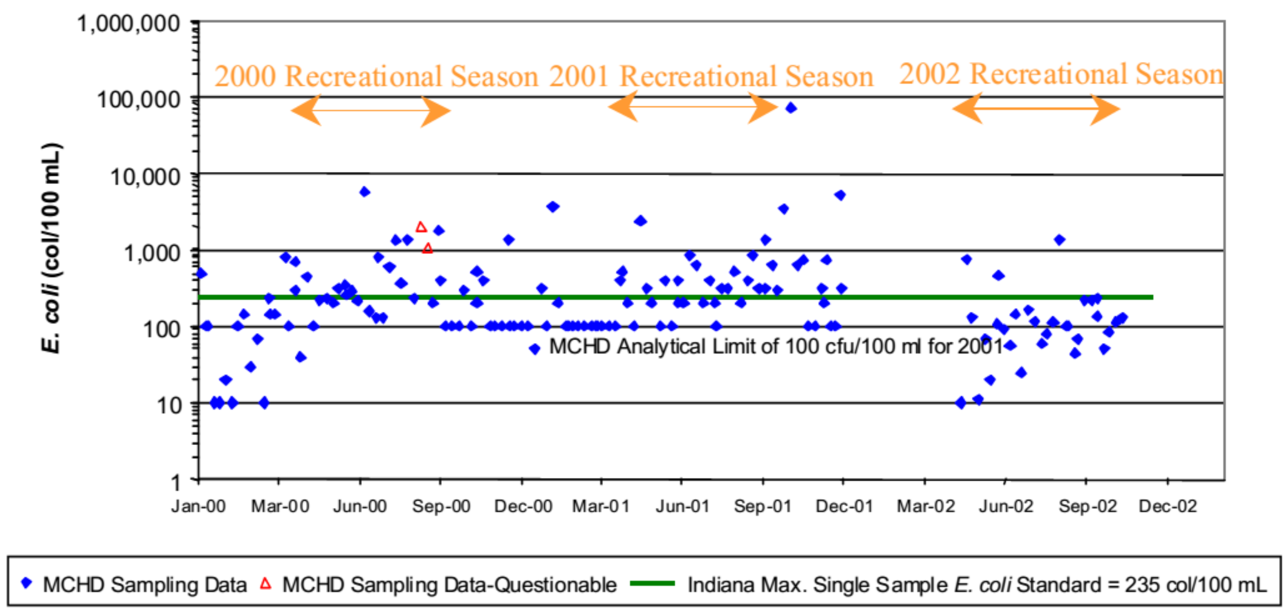

Figure 2-48
Fall Creek *E. coli* Data: 38th Street
Marion County Health Department Sampling Sites (January 2000 to October 2002)

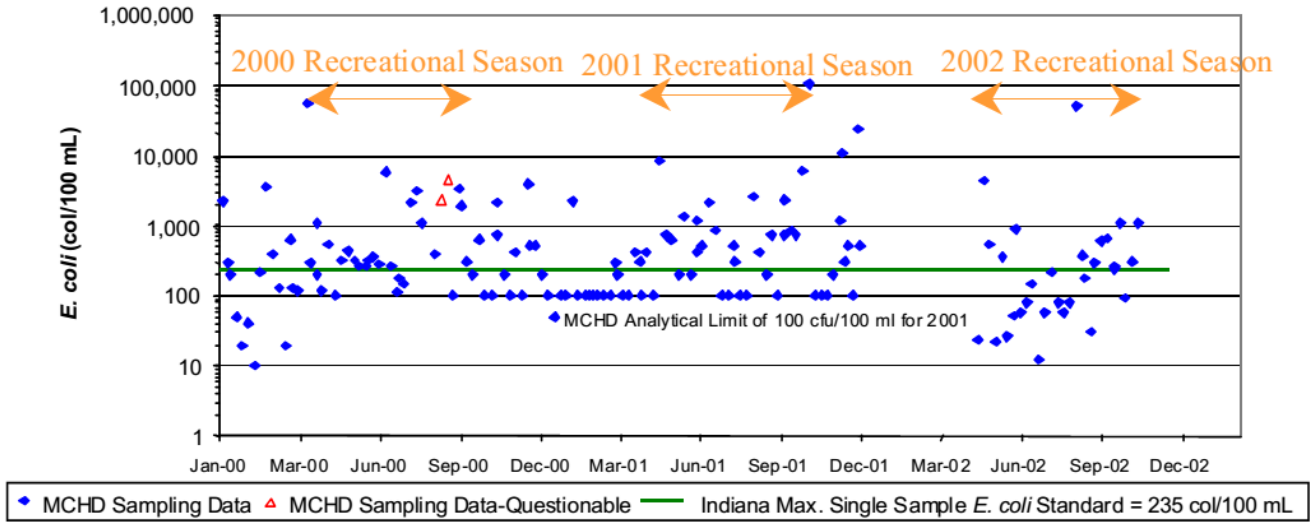

Figure 2-49
Fall Creek *E. coli* Data: 30th Street
Marion County Health Department Sampling Sites (January 2000 to October 2002)

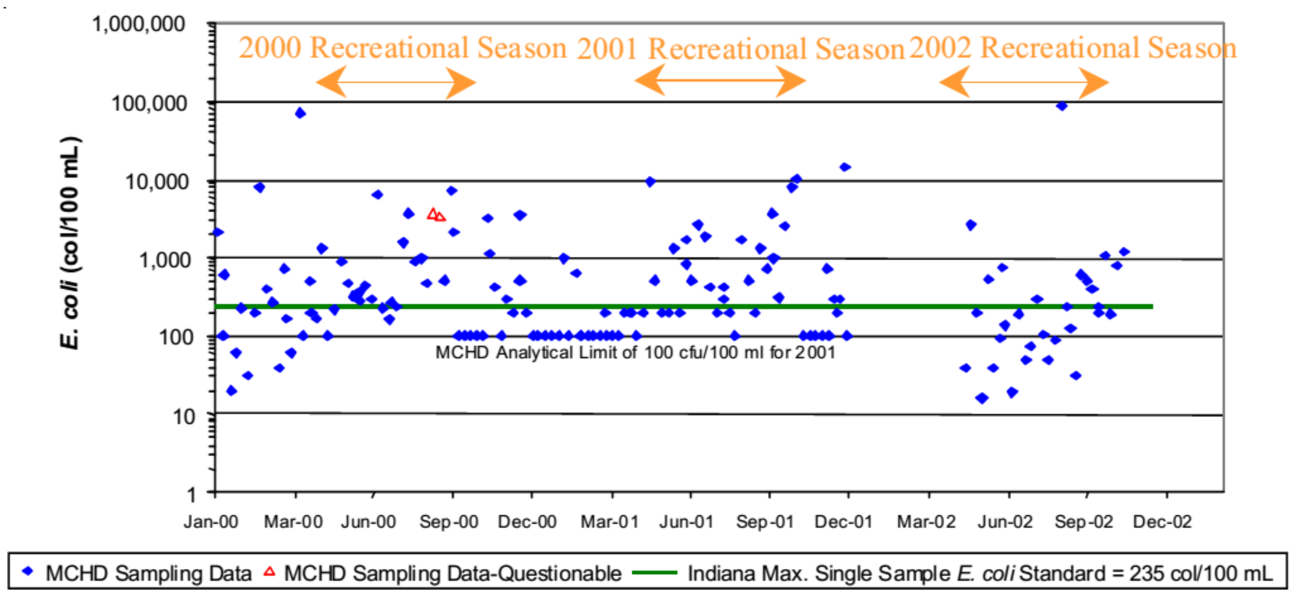

Figure 2-50
Fall Creek *E. coli* Data: Central Avenue
Marion County Health Department Sampling Sites (January 2000 to October 2002)

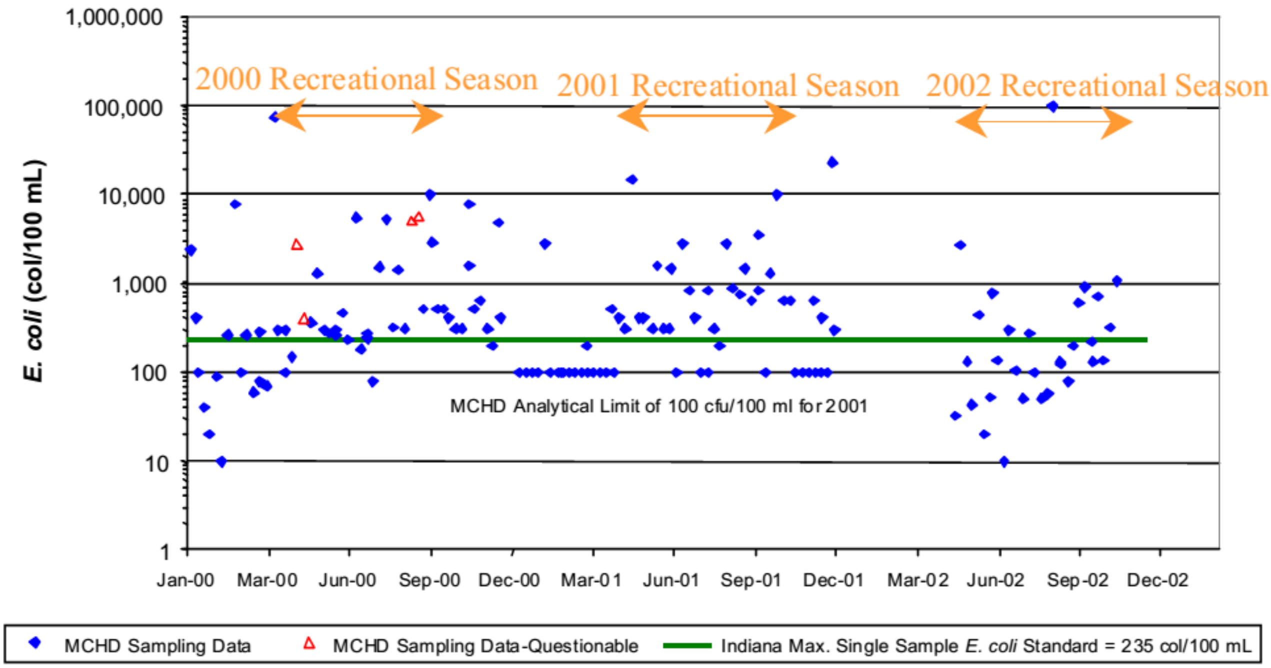

Figure 2-51
Fall Creek *E. coli* Data: Capitol Avenue
Marion County Health Department Sampling Sites (January 2000 to October 2002)

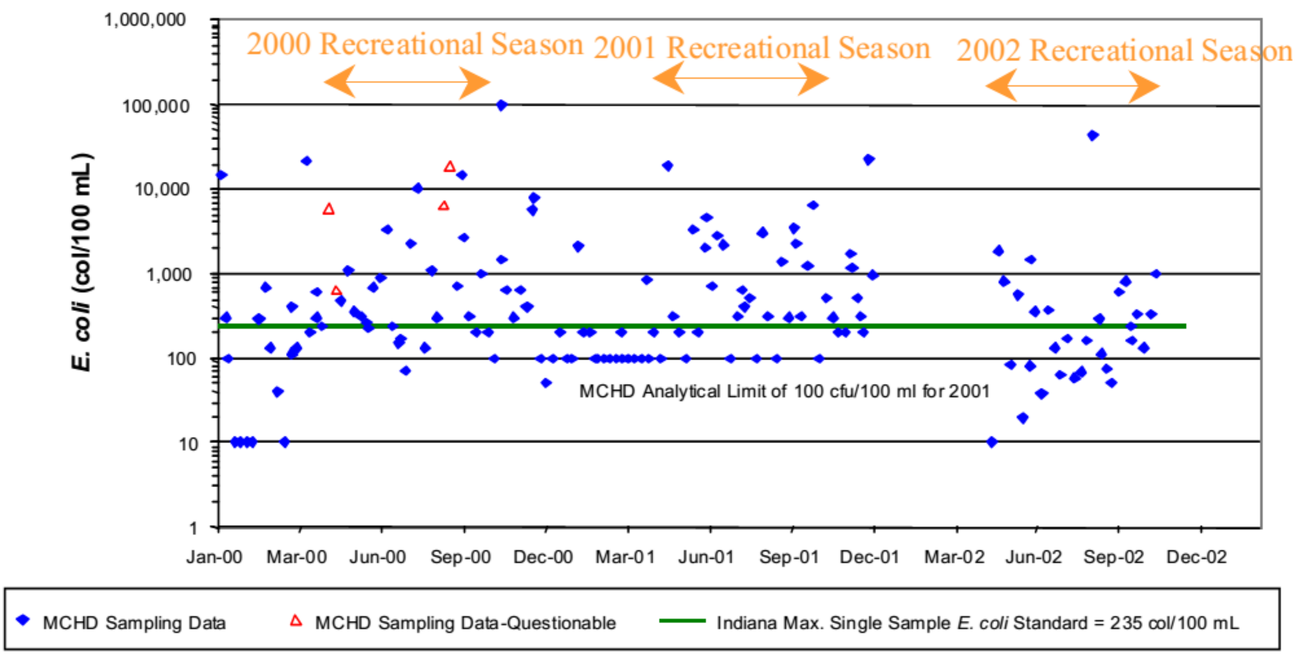

Figure 2-52
Fall Creek *E. coli* Data: Martin Luther King, Jr. Street
Marion County Health Department Sampling Sites (January 2000 to October 2002)

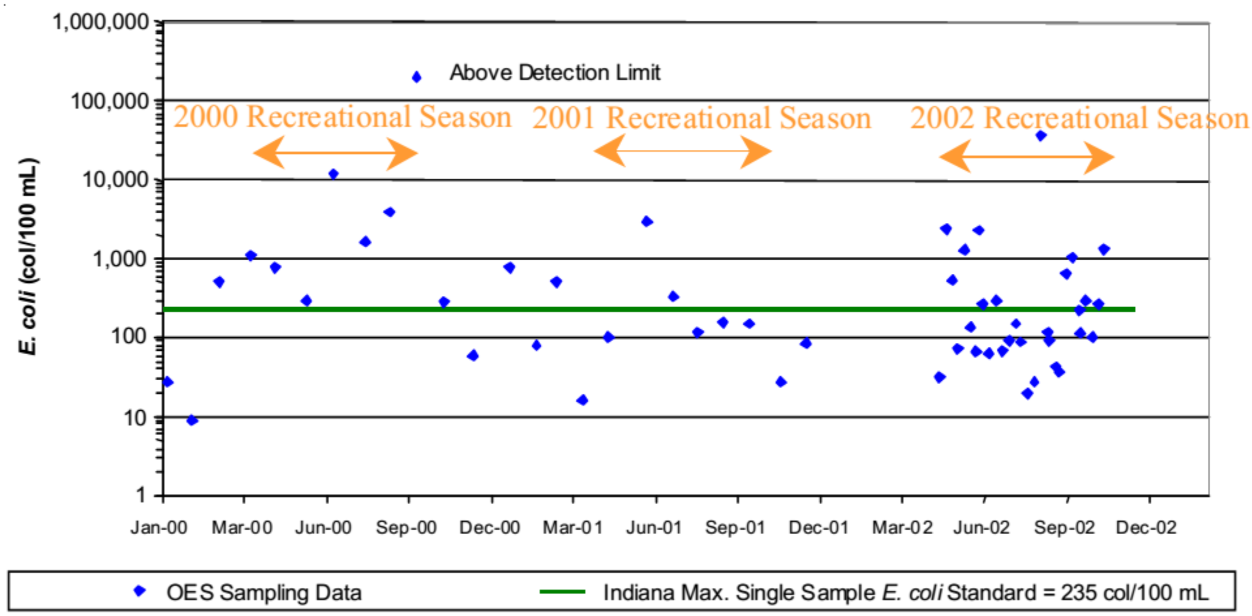

Figure 2-53
Fall Creek *E. coli* Data: 16th Street
Marion County Health Department Sampling Sites (January 2000 to October 2002)

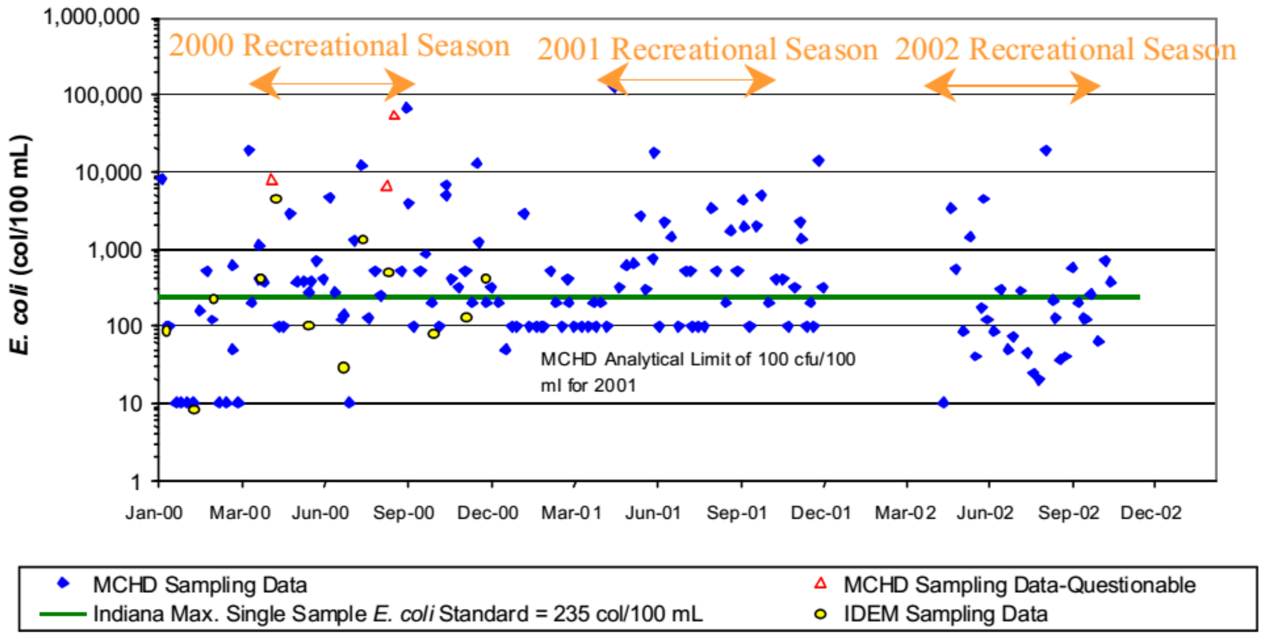

Figure 2-54
Fall Creek *E. coli* Data: Stadium Drive
Marion County Health Department Sampling Sites (January 2000 to October 2002)

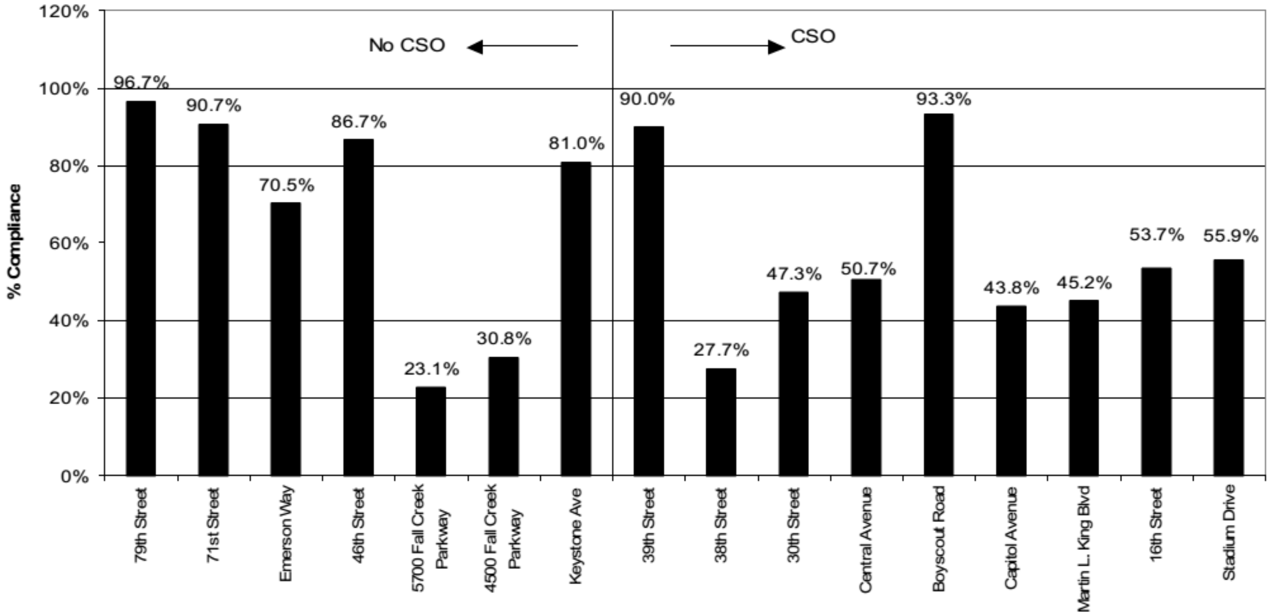

Figure 2-55
Percent Compliance with Indiana Single Sample Maximum *E. coli* Bacteria Standard of 235 cfu/100 ml in Fall Creek
April through October for 2000, 2001, and 2002

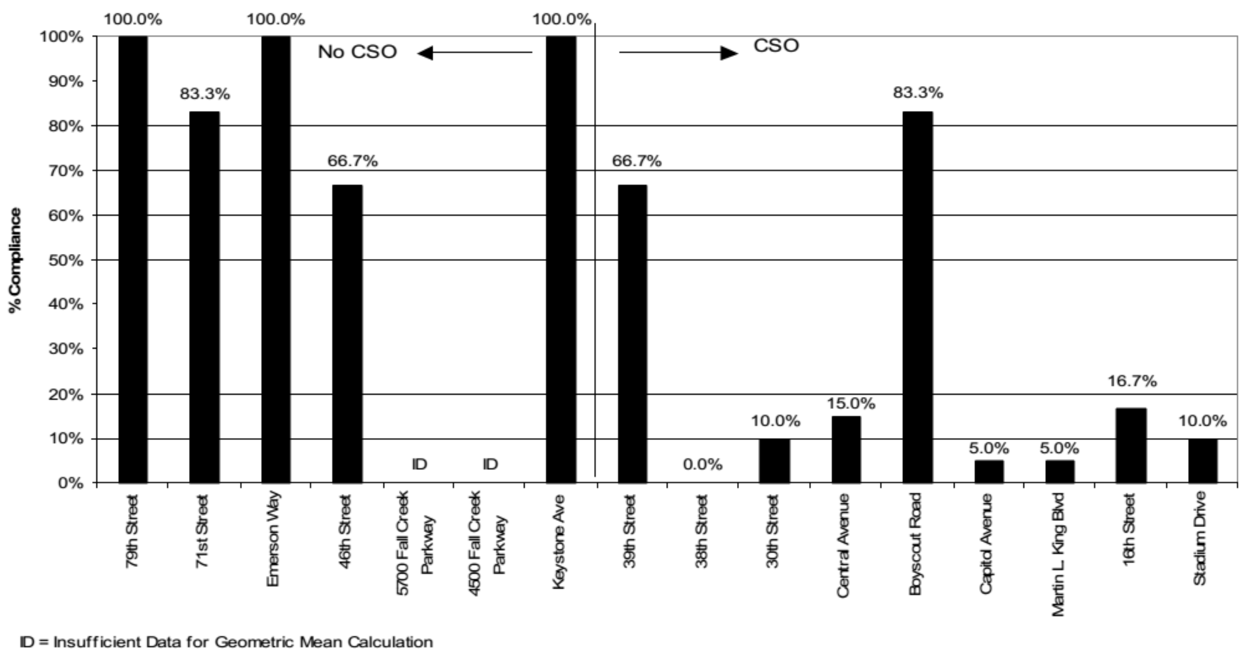

Figure 2-56
Percent Compliance with Indiana Monthly Geometric Mean *E. coli* Bacteria Standard in Fall Creek
April through October 2000, 2001, and 2002

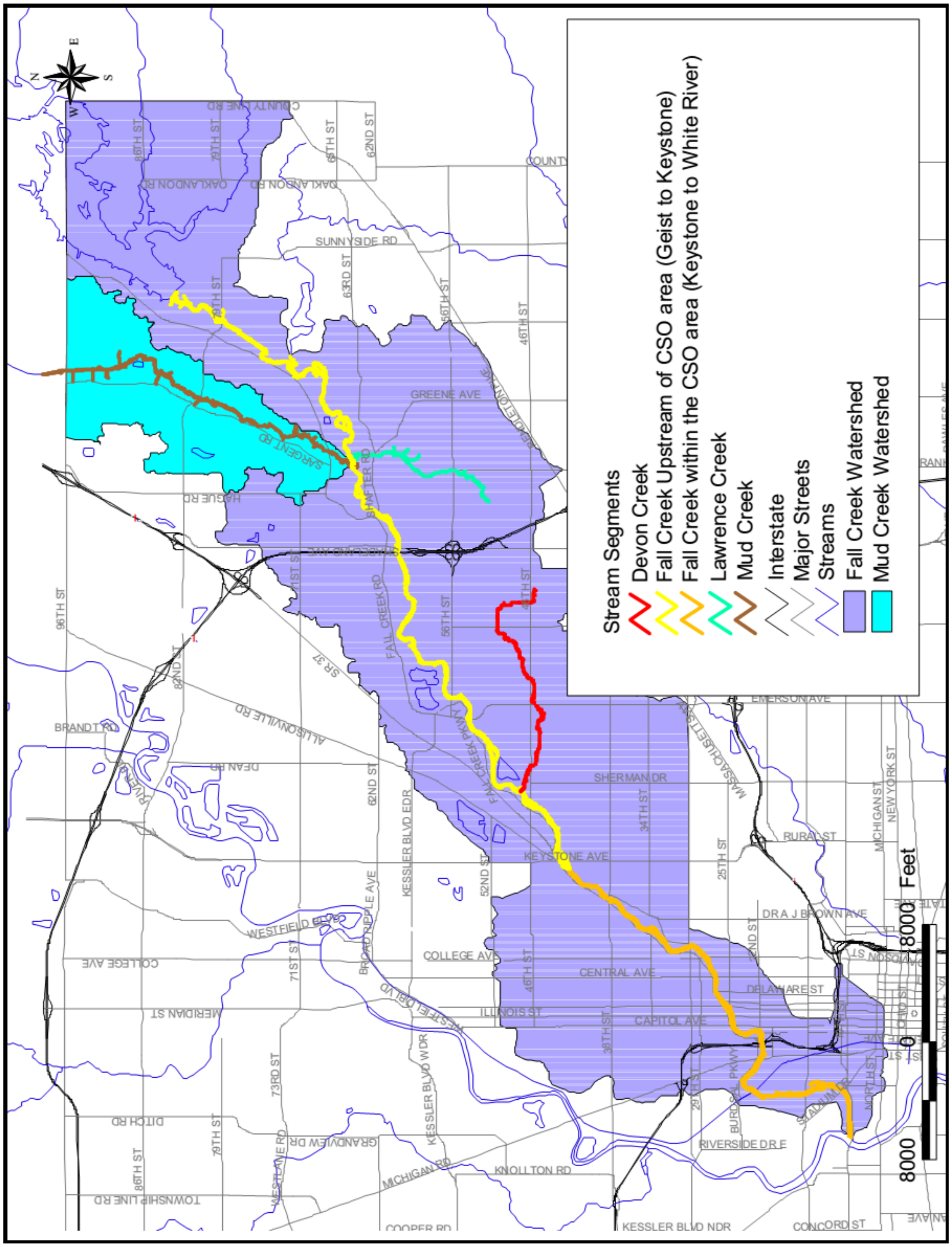

Figure 2-57
Fall Creek Stream Segments

Table 2-3
Fall Creek and Tributaries *E. coli* Bacteria Compliance

All Data

River Segment	Geometric Mean of 2000 2002 data	% of Samples > 235 cfu/100 ml	Number of Samples > 10,000 cfu/100 ml	Total Number of Samples
Fall Creek - Upstream of CSO Area	117	27.4%	0	274
Fall Creek - Within CSO Area	295	50.1%	30	902
Mud Creek - Tributary to Fall Creek	125	16.0%	1	144
Devon Creek - Tributary to Fall Creek	347	59.2%	0	49
Lawrence Creek - Tributary to Fall Creek	132	17.2%	0	29

Dry Weather

River Segment	Geometric Mean of 2000 2002 data	% of Samples > 235 cfu/100 ml	Number of Samples > 10,000 cfu/100 ml	Total Number of Samples
Fall Creek - Upstream of CSO Area	72	11.4%	0	132
Fall Creek - Within CSO Area	146	33.2%	0	425
Mud Creek - Tributary to Fall Creek	89	6.8%	0	73
Devon Creek - Tributary to Fall Creek	259	58.3%	0	24
Lawrence Creek - Tributary to Fall Creek	112	14.3%	0	14

Wet Weather

River Segment	Geometric Mean of 2000 2002 data	% of Samples > 235 cfu/100 ml	Number of Samples > 10,000 cfu/100 ml	Total Number of Samples
Fall Creek - Upstream of CSO Area	185	42.3%	0	142
Fall Creek - Within CSO Area	552	65.2%	30	477
Mud Creek - Tributary to Fall Creek	176	25.4%	1	71
Devon Creek - Tributary to Fall Creek	460	60.0%	0	25
Lawrence Creek - Tributary to Fall Creek	155	20.0%	0	15
State Guidance [1]	**(IDEM standard of 125 cfu/100 ml)**	**(IDEM Guidance 10% or less)**	**(IDEM Guidance None > 10,000 cfu/100 ml)**	

[1] Indiana's 303(d) Listing Methodology for Impaired Waterbodies and Total Maximum Daily Load - September 2002

2.4.3.2.3 Wet-Weather Analysis

All five sampling sites do not meet the Indiana geometric mean standard of 125 cfu/100 mL or the TMDL criteria of less than 10 percent of samples greater than 235 cfu/100 mL. The analysis suggests that each stream segment receives excessive *E. coli* bacteria loadings from stormwater and related sources. The observed wet-weather geometric mean and the 30 samples in excess of 10,000 cfu/100 mL in the Fall Creek CSO area segment in an eighteen-month period imply that CSOs are a dominant source of *E. coli* bacteria in the watershed.

2.4.4 Eagle Creek

2.4.4.1 Dissolved Oxygen

Dissolved oxygen (DO) data was collected at six locations on Little Eagle Creek and Big Eagle Creek at varying intervals from monthly to weekly from January 2000 to May 2002. The data for all six stations showed 100 percent compliance with the Indiana minimum DO standard of 4 mg/L, as shown in **Figures 2-58** and **2-59**.

2.4.4.2 *E. coli* Bacteria

Data collected between January 2000 and December 2002 demonstrate that Eagle Creek exceeds the Indiana water quality standard for *E. coli* bacteria.

- More than 40 percent of the sampling stations exceeded the daily maximum *E. coli* bacteria standard (235 cfu/ 100 mL) more than 50 percent of the time.
- None of the sampling stations along Eagle Creek collect sufficient data (five samples in 30 days) to determine the frequency of geometric mean *E. coli* bacteria standard (125 cfu/100 mL) exceedances.

Eagle Creek was divided into two stream segments for analysis purposes:

- Eagle Creek Upstream of the CSO Area: Reservoir to Tibbs Avenue (Big Eagle Creek), 65th Street to Michigan Street (Little Eagle Creek)
- Eagle Creek Within the CSO Area: Tibbs Avenue to the White River (Big Eagle Creek), Michigan Street to the confluence with Big Eagle Creek at Washington Street (Little Eagle Creek)

In-stream *E. coli* bacteria sampling data were grouped for each segment. **Figure 2-60** shows the extent of each stream segment for Eagle Creek.

The findings of the compliance analysis are presented in **Table 2-4** for the two Eagle Creek stream segments, based upon all weather, dry-weather, and wet-weather data.

2.4.4.2.1 All-Weather Analysis

Eagle Creek upstream of the CSO area has geometric mean values lower than the Indiana geometric mean standard of 125 cfu/100 mL. However, the stream segment does not meet the TMDL criteria of less than 10 percent of samples below 235 cfu/100 mL, and had one observed count over 10,000 cfu/100 mL. The analysis suggests that Eagle Creek upstream of the CSO area possesses sufficient baseflow to absorb the *E. coli* bacteria load on a “typical” day, but receives excessive *E. coli* loadings from stormwater, illicit connections and septic sources during wet weather or low-flow, dry-weather days. In the CSO area, Eagle Creek exceeds the Indiana geometric mean standard of 125 cfu/ 100 mL, the TMDL criteria of less than 10 percent of samples below 235 cfu/100 mL, and the TMDL criteria of no samples above 10,000 cfu/100 mL. The analysis suggests that CSOs are a significant source of *E. coli* bacteria in the stream. Another potential source of *E. coli* in Eagle Creek is the Town of Speedway’s wastewater treatment plant and its primary effluent bypass.

2.4.4.2.2 Dry-Weather Analysis

During dry-weather conditions, the upstream segment of Eagle Creek is in compliance with the Indiana geometric mean standard of 125 cfu/100 mL, the TMDL criteria of less than 10 percent of samples below 235 cfu/100 mL, and the TMDL criteria of no samples above 10,000 cfu/100 mL. The analysis suggests that Eagle Creek contains sufficient baseflow to absorb the *E. coli* bacteria load during dry-weather conditions. However, in the CSO area, Eagle Creek is does not meet the Indiana geometric mean standard of 125 cfu/100 mL, and the TMDL criteria of less than 10 percent of samples below 235 cfu/100 mL. The analysis suggests that the septic, pets/wildlife, and illicit connection loads are excessive for the stream as it becomes more urbanized.

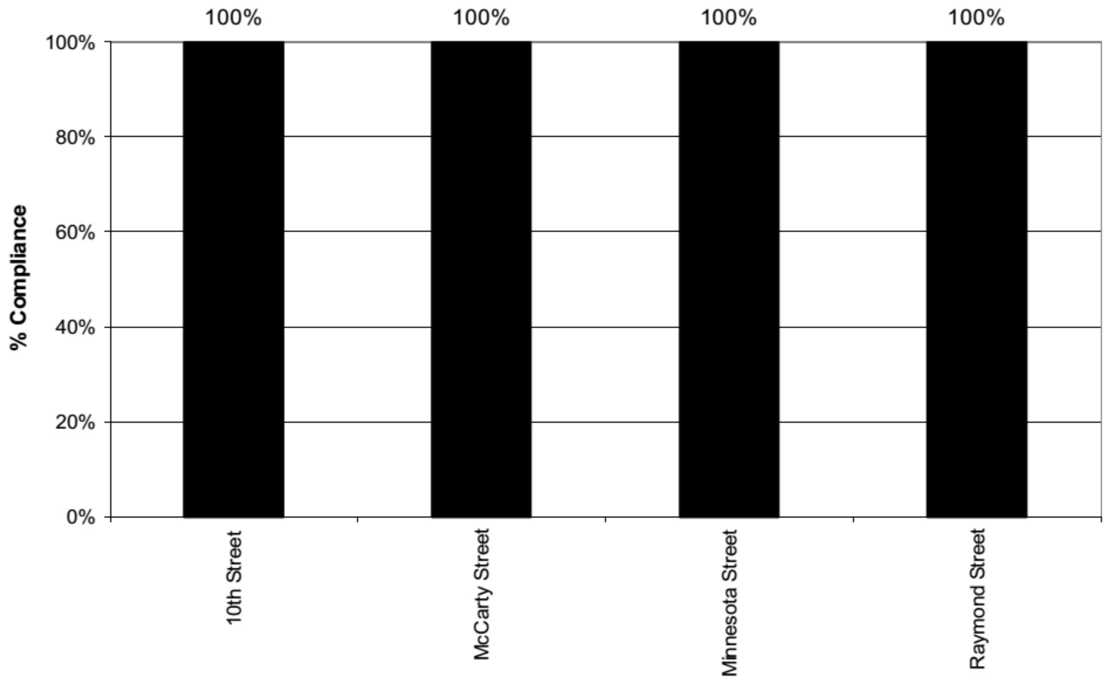

Figure 2-58
Percent Compliance with Indiana Dissolved Oxygen Standard of 4 mg/L in Eagle Creek

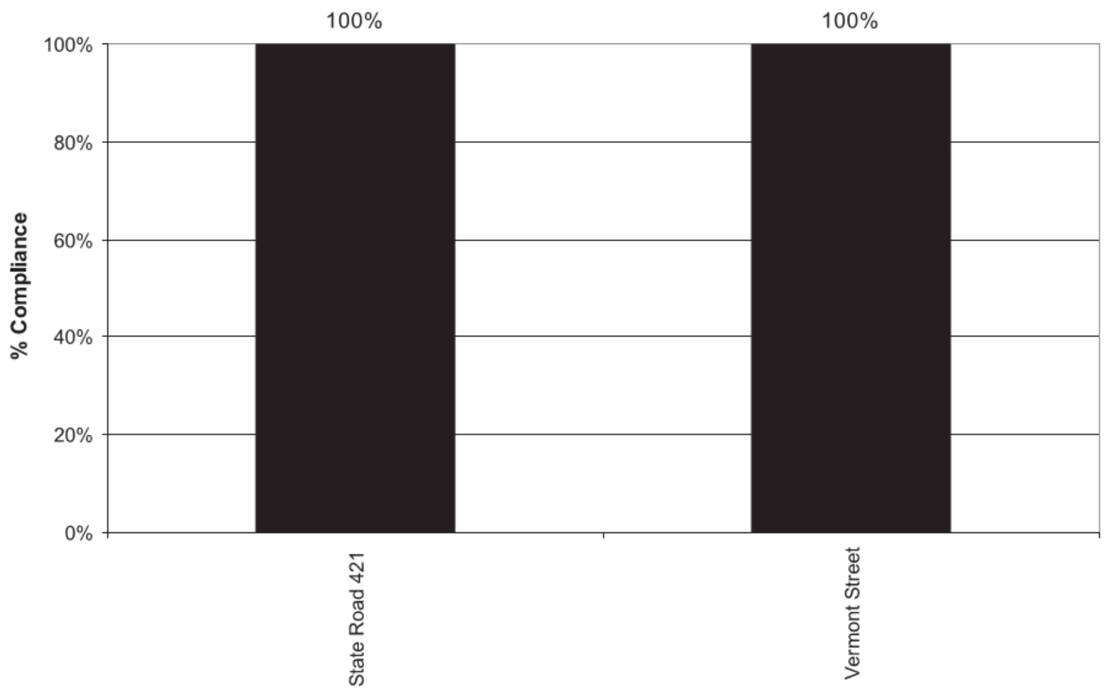

Figure 2-59
Percent Compliance with Indiana
Dissolved Oxygen Standard of 4 mg/L in Little Eagle Creek

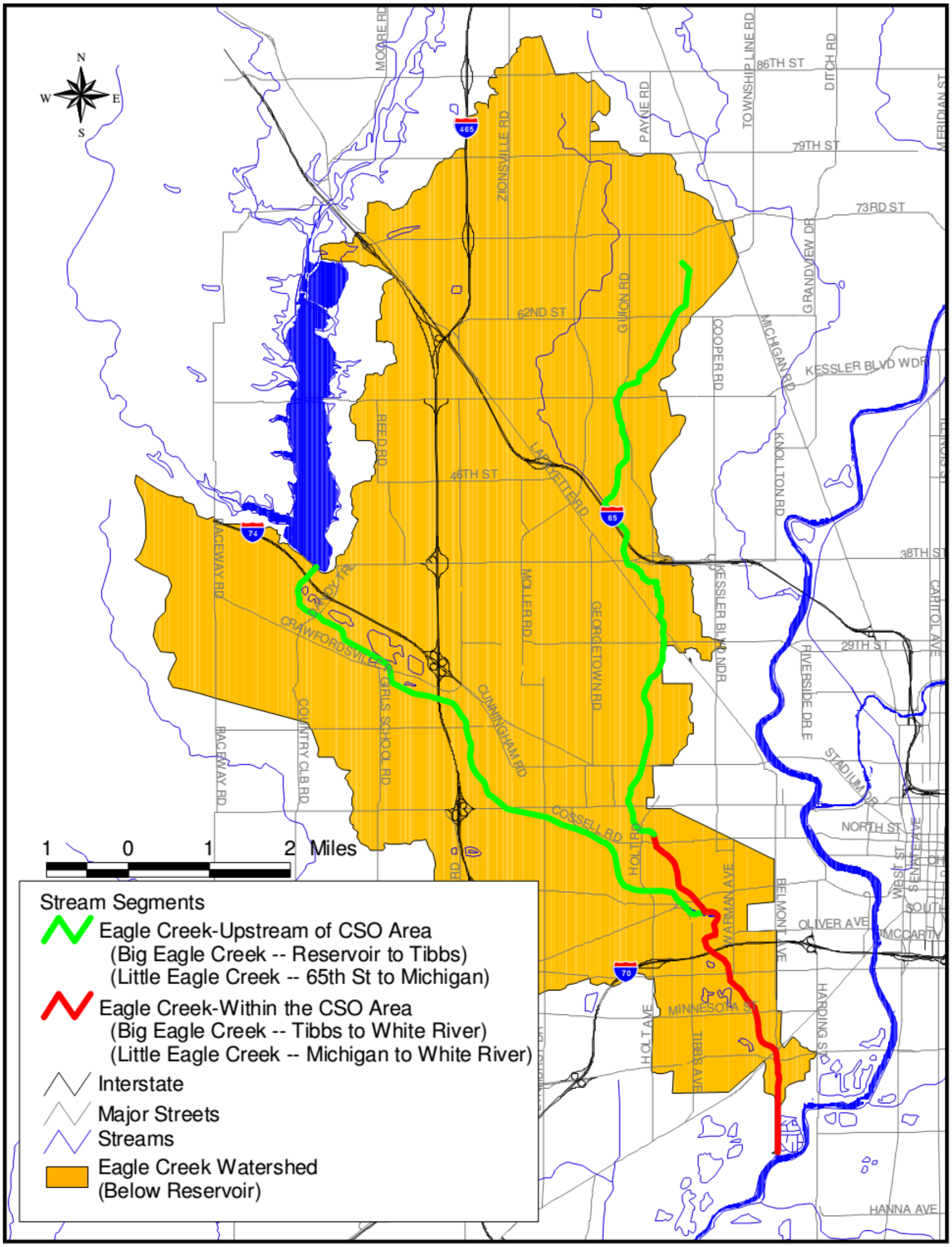

Figure 2-60
Eagle Creek Stream Segments

Table 2-4
Eagle Creek *E. coli* Bacteria Compliance

All Data

River Segment	Geometric Mean of 2000-2002 data	% of Samples > 235 cfu/100 ml	Number of Samples > 10,000 cfu/100 ml	Total Number of Samples
Eagle Creek - Upstream of CSO Area	70	14.3%	1	21
Eagle Creek - Within CSO Area	419	58.7%	2	63

Dry Weather

River Segment	Geometric Mean of 2000-2002 data	% of Samples > 235 cfu/100 ml	Number of Samples > 10,000 cfu/100 ml	Total Number of Samples
Eagle Creek - Upstream of CSO Area	49	7.1%	0	14
Eagle Creek - Within CSO Area	165	44.7%	0	38

Wet Weather

River Segment	Geometric Mean of 2000-2002 data	% of Samples > 235 cfu/100 ml	Number of Samples > 10,000 cfu/100 ml	Total Number of Samples
Eagle Creek - Upstream of CSO Area	145	28.6%	1	7
Eagle Creek - Within CSO Area	1719	80.0%	2	25
State Guidance [1]	(IDEM standard of 125 cfu/100 ml)	(IDEM Guidance 10% or less)	(IDEM Guidance None > 10,000 cfu/100 ml)	

[1] Indiana's 303(d) Listing Methodology for Impaired Waterbodies and Total Maximum Daily Load - September 2002

2.4.4.2.3 Wet-Weather Analysis

During wet-weather conditions, neither stream segment of Eagle Creek meets the Indiana geometric mean standard of 125 cfu/100 mL, the TMDL criteria of less than 10 percent of samples below 235 cfu/100 mL, and the TMDL criteria of no samples above 10,000 cfu/100 mL. The analysis suggests that stormwater and CSOs are a significant source of *E. coli* bacteria to the stream. The substantial difference in geometric means between the CSO area and upstream segments in Eagle Creek suggest that CSOs are a significant source of *E. coli* bacteria to the stream.

2.4.5 Pleasant Run and Bean Creek

2.4.5.1 Dissolved Oxygen

Dissolved oxygen (DO) data was collected at 10 locations on Pleasant Run and Bean Creek at varying intervals from monthly to weekly from January 2000 to May 2002. The data for five stations out of the 10 showed 100 percent compliance with the Indiana DO standard of 4 mg/L. The exceptions were located at 21st Street, Southeastern Avenue, Garfield Park, and Bluff Road on Pleasant Run, and Keystone Avenue on Bean Creek. **Figures 2-61** and **2-62** present this information. An analysis of the data indicates the low dissolved oxygen concentrations occur primarily with low streamflows. The dissolved oxygen concentration generally improves with wet weather or higher streamflows. This suggests that the DO issues in Pleasant Run and Bean Creek are not caused by CSOs.

2.4.5.2 *E. coli* Bacteria

Available data from 2000-2002 were compared to both the maximum monthly *E. coli* bacteria standard of 235 cfu/100 mL and the monthly geometric mean standard of 125 cfu/ 100mL.

Overall, the major findings are:

- More than 90 percent of the sampling stations exceed the daily maximum *E. coli* bacteria standard (235 cfu/ 100mL) more than 50 percent of the time.
- All of the sampling stations with sufficient data to calculate the geometric mean (five samples in 30 days) exceed the geometric mean *E. coli* bacteria standard (125 cfu/100 mL) 100 percent of the time.

From 21st Street to the confluence with the White River, Pleasant Run exhibits often does not meet the *E. coli* single sample maximum bacteria standard. In addition, the number of exceedances of the standard occurring

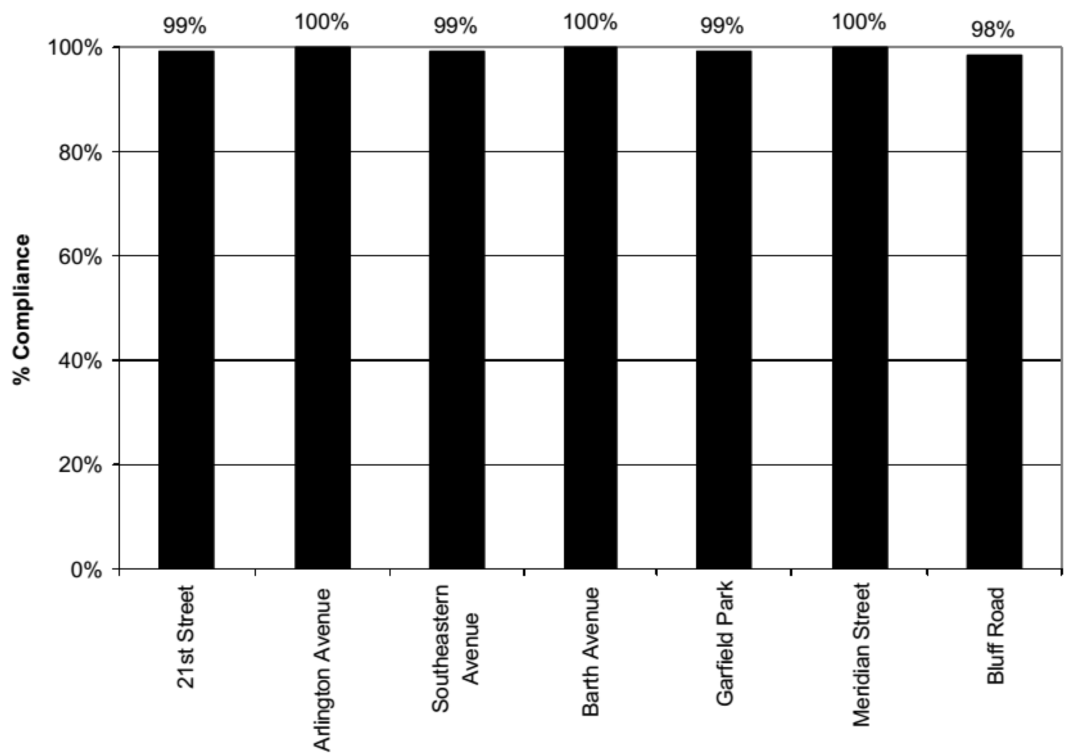

Figure 2-61
Percent Compliance with Indiana Dissolved Oxygen Standard of 4 mg/L in Pleasant Run

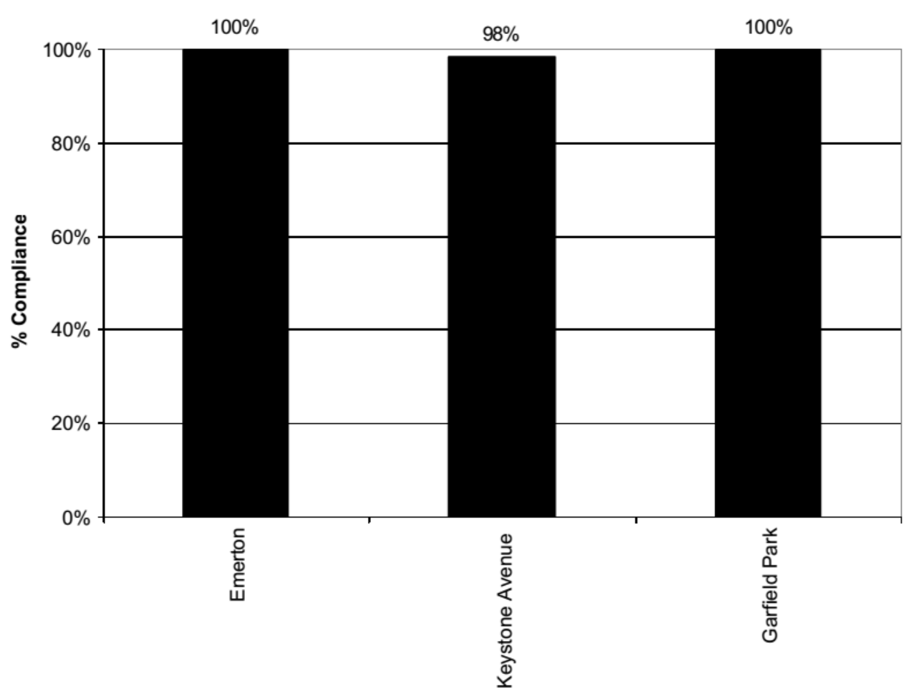

Figure 2-62
Percent Compliance with Indiana Dissolved Oxygen Standard of 4 mg/L in Bean Creek

upstream of the CSO segment is similar to the number of exceedances occurring within the CSO stream segment.

Pleasant Run and Bean Creek were divided into the following segments for analysis purposes:

- Pleasant Run Upstream of the CSO Area: (30th Street to 9th Street)
- Pleasant Run Within the CSO Area: (9th Street to the confluence with the West Fork of the White River)
- Bean Creek Upstream of the CSO Area: (Arlington Avenue to State Street)
- Bean Creek Within the CSO Area: (State Street to confluence with Pleasant Run)

Figure 2-63 shows the extent of each stream segment analyzed. **Table 2-5** summarizes *E. coli* bacteria samples for each stream segment compared to the three TMDL *E. coli* bacteria compliance criteria. Findings are presented for dry-weather, wet weather, and all weather.

2.4.5.2.1 All-Weather Analysis

All four stream segments do not meet the *E. coli* bacteria monthly geometric mean standard of 125 cfu/100 mL or the TMDL criteria of less than 10 percent of samples below 235 cfu/100 mL and no samples in excess of 10,000 cfu/100 mL. The analysis suggests that all stream segments are not able to accept the *E. coli* bacteria load from septic, stormwater, and CSO sources. The 29 samples in excess of 10,000 cfu/ 100 mL in the Pleasant Run CSO area imply that CSOs are a significant source of *E. coli* bacteria to the stream. The high number of samples in excess of 10,000 cfu/100 mL in Bean Creek upstream of the CSO area suggests that pets/wildlife, septic and stormwater sources are significant to that stream segment.

2.4.5.2.2 Dry-Weather Analysis

All four stream segments do not meet the Indiana geometric mean standard of 125 cfu/100 mL or the TMDL criteria of less than 10 percent of samples above 235 cfu/100 mL during Dry-Weather. The analysis suggests that the septic, wildlife, and illicit connection loads are excessive for the stream. The presence of samples in excess of 10,000 cfu/100 mL in Bean Creek and the Pleasant Run CSO area segment illustrates the significance of these dry-weather sources.

2.4.5.2.3 Wet-Weather Analysis

All four stream segments fail to comply with all three criteria during wet weather. The analysis suggests that the septic, stormwater and CSO loads are excessive for the stream. However, there is a relatively small difference between dry-weather and wet-weather periods in the percent of samples above 235 cfu/100 mL. This comparison and the geometric mean values ranging from 267 - 421 in dry-weather suggest that dry-weather loads are producing *E. coli* bacteria concentrations in slight excess of 235 cfu/100 mL, while wet-weather loads are producing *E. coli* bacteria concentrations far in excess of 235 cfu/100 mL.

2.4.6 Pogues Run

2.4.6.1 Dissolved Oxygen

Dissolved oxygen (DO) data was collected at six locations on Pogues Run at varying intervals from monthly to weekly from January 2000 to May 2002. The data for two stations out of the six showed 100 percent compliance with the Indiana DO standard of 4 mg/L minimum. The exceptions were located at 38th Street, Emerson Avenue, 21st Street, and at the New York Street Station. **Figure 2-64** presents this information.

An analysis of the data indicates the low dissolved oxygen concentrations occur primarily with low streamflows. The dissolved oxygen concentration generally improves with wet weather or higher streamflows. This suggests that the dissolved oxygen issues in Pleasant Run and Bean Creek are not caused by CSOs.

2.4.6.2 *E. coli* Bacteria

Data collected between January 2000 and December 2002 demonstrate that Pogues Run exceeds the Indiana water quality standard for *E. coli* bacteria.

- More than 70 percent of the sampling stations exceeded the daily maximum *E. coli* bacteria standard (235 cfu/ 100 mL) more than 50 percent of the time.
- All of the sampling stations with sufficient data (five samples in 30 days) exceed the geometric mean *E. coli* bacteria standard (125 cfu/100 mL) at least 90 percent of the time.

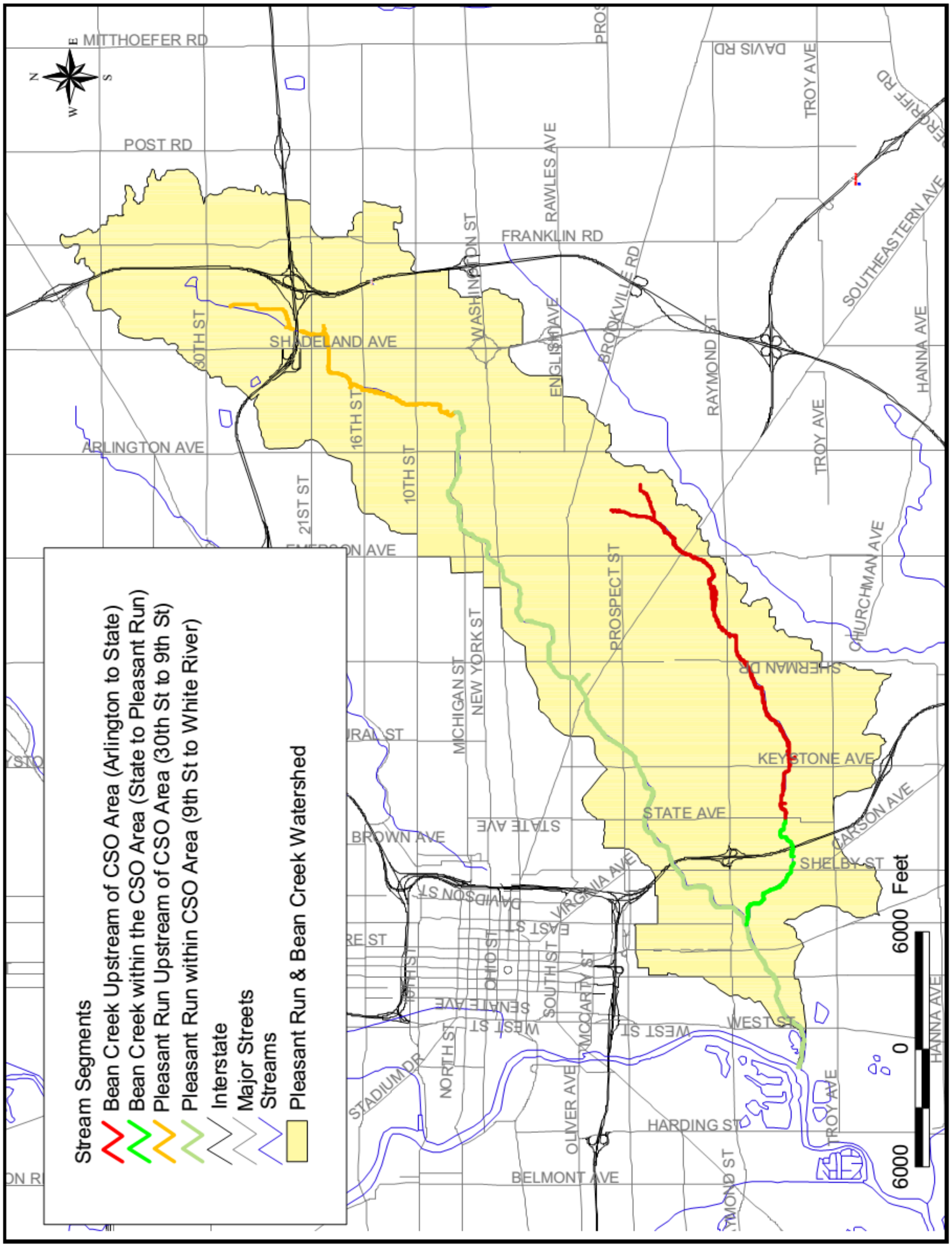

Figure 2-63
Pleasant Run and Bean Creek Stream Segments

Table 2-5
Pleasant Run and Bean Creek *E. coli* Bacteria Compliance

River Segment	Geometric Mean of 2000-2002 data	% of Samples > 235 cfu/100 ml	Number of Samples > 10,000 cfu/100 ml	Total Number of Samples
Pleasant Run - Upstream of CSO Area	342	59.3%	4	258
Pleasant Run - Within CSO Area	413	59.5%	29	862
Bean Creek - Upstream of CSO Area	502	71.1%	8	340
Bean Creek - Within CSO Area	466	71.3%	5	178

Dry Weather

River Segment	Geometric Mean of 2000-2002 data	% of Samples > 235 cfu/100 ml	Number of Samples > 10,000 cfu/100 ml	Total Number of Samples
Pleasant Run - Upstream of CSO Area	267	56.2%	0	137
Pleasant Run - Within CSO Area	269	53.8%	3	461
Bean Creek - Upstream of CSO Area	421	68.6%	1	175
Bean Creek - Within CSO Area	346	70.5%	0	88

Wet Weather

River Segment	Geometric Mean of 2000-2002 data	% of Samples > 235 cfu/100 ml	Number of Samples > 10,000 cfu/100 ml	Total Number of Samples
Pleasant Run - Upstream of CSO Area	454	62.8%	4	121
Pleasant Run - Within CSO Area	676	66.1%	26	401
Bean Creek - Upstream of CSO Area	603	73.3%	7	165
Bean Creek - Within CSO Area	625	72.2%	5	90
State Guidance (1)	(IDEM standard of 125 cfu/100 ml)	(IDEM Guidance 10% or less)	(IDEM Guidance None > 10,000 cfu/100 ml)	

(1) Indiana's 303(d) Listing Methodology for Impaired Waterbodies and Total Maximum Daily Load - September 2002

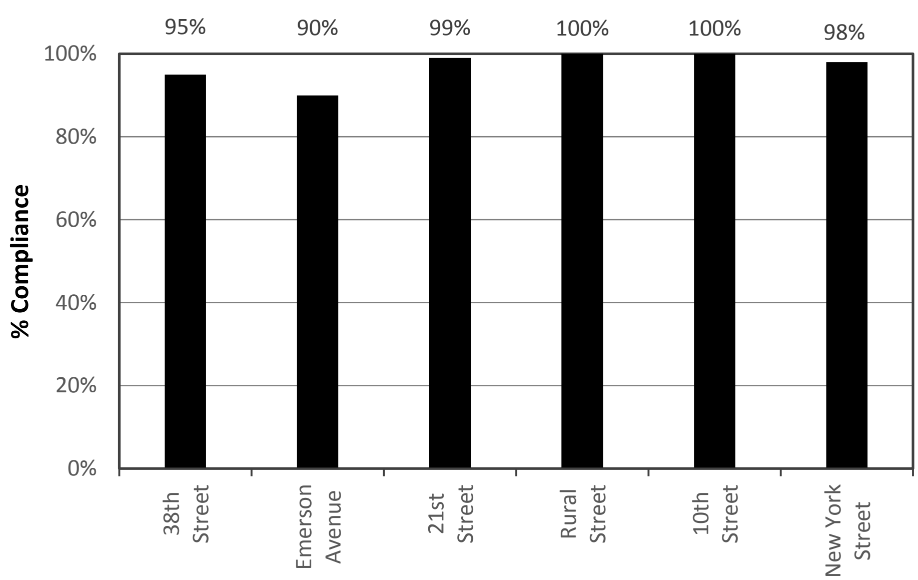

Figure 2-64
Percent Compliance with Indiana Dissolved Oxygen Standard of 4 mg/L in Pogues Run

- All of the sampling stations with sufficient data (five samples in 30 days) exceed the geometric mean *E. coli* bacteria standard (125 cfu/100 mL) at least 90 percent of the time.

Pogues Run was divided into two stream segments for analysis purposes:

- Pogues Run Upstream of the CSO Area: Shadeland Ave. to I-70
- Pogues Run Within the CSO Area: I-70 to New York Street

In-stream *E. coli* bacteria sampling data were grouped for each segment. **Figure 2-65** shows the extent of each stream segment for Pogues Run.

The findings of the compliance analysis are presented in **Table 2-6** for the two Pogues Run stream segments, based upon all-weather, dry-weather, and wet-weather data.

2.4.6.2.1 All-Weather Analysis

Neither stream segment of Pogues Run meets the Indiana geometric mean standard of 125 cfu/100 mL, the TMDL criteria of less than 10 percent of samples below 235 cfu/100 mL, and the TMDL criteria of no samples above 10,000 cfu/ 100 mL. The analysis suggests that Pogues Run does not possess sufficient baseflow to absorb the *E. coli* bacteria load on a "typical" day, or during wet-weather or low-flow, dry-weather conditions. The analysis suggests that these streams are not able to absorb the *E. coli* bacteria load from wildlife, septic, stormwater, and CSO sources.

2.4.6.2.2 Dry-Weather Analysis

During dry-weather conditions, neither stream segment of Pogues Run is in compliance with the Indiana geometric mean standard of 125 cfu/100 mL, the TMDL criteria of less than 10 percent of samples below 235 cfu/100 mL, and the TMDL criteria of no samples above 10,000 cfu/100 mL. The analysis suggests that the septic, pets/wildlife, and illicit connection loads are excessive for the stream. The presence of samples in excess of 10,000 cfu/100 mL illustrates the significance of these dry-weather loads.

2.4.6.2.3 Wet-Weather Analysis

During wet-weather conditions, neither stream segment of Pogues Run meets the Indiana geometric mean standard of 125 cfu/100 mL, the TMDL criteria of less than 10 percent of samples below 235 cfu/100 mL, and the TMDL criteria of no samples above 10,000 cfu/100 mL. The observed wet-weather geometric mean in the upstream segment of Pogues Run suggests that stormwater, illicit connections and septic sources are a significant source of *E. coli* bacteria in the stream.

2.4.7 Lick Creek and State Ditch

State Ditch and Lick Creek are two small urban streams located in southern Marion County, shown in **Figures 2-66** and **2-67**. Both streams have all the problems commonly identified with urban streams: decreased baseflow, elevated peak flows, and polluted runoff. State Ditch was listed by IDEM on the 1998 303(d) list as having three parameters of concern: cyanide, pH and *E. coli*. The 2002 303(d) list notes two parameters of concern for State Ditch: impaired biotic communities and *E. coli*.

Neither State Ditch nor Lick Creek meet the Indiana geometric mean standard of 125 cfu/100 mL, the TMDL criteria of less than 10 percent of samples below 235 cfu/100 mL, and the TMDL criteria of no samples above 10,000 cfu/100 mL. Marion County Health Department data suggest neither State Ditch nor Lick Creek possess sufficient baseflow to absorb the *E. coli* bacteria load on a "typical" day, during wet-weather, or during low-flow, dry-weather conditions. The analysis suggests that these streams are not able to absorb the *E. coli* bacteria load from pets/wildlife, septic, illicit connections, stormwater, and CSO sources.

Sewer separation projects will be implemented for both of these relatively small isolated CSO areas.

2.5 Sewer System Characterization

The City of Indianapolis owns the wastewater collection system serving most of Marion County. Under contract with the City, United Water manages the collection system. Both combined and sanitary sewers carry wastewater to three combined interceptor branches and a centrally located core combined interceptor subnetwork. Additionally, separate sewers carry wastewater to the core interceptor subnetwork and to sanitary interceptors. These interceptors carry wastewater to two advanced wastewater treatment (AWT) facilities, the Belmont and Southport AWT plants.

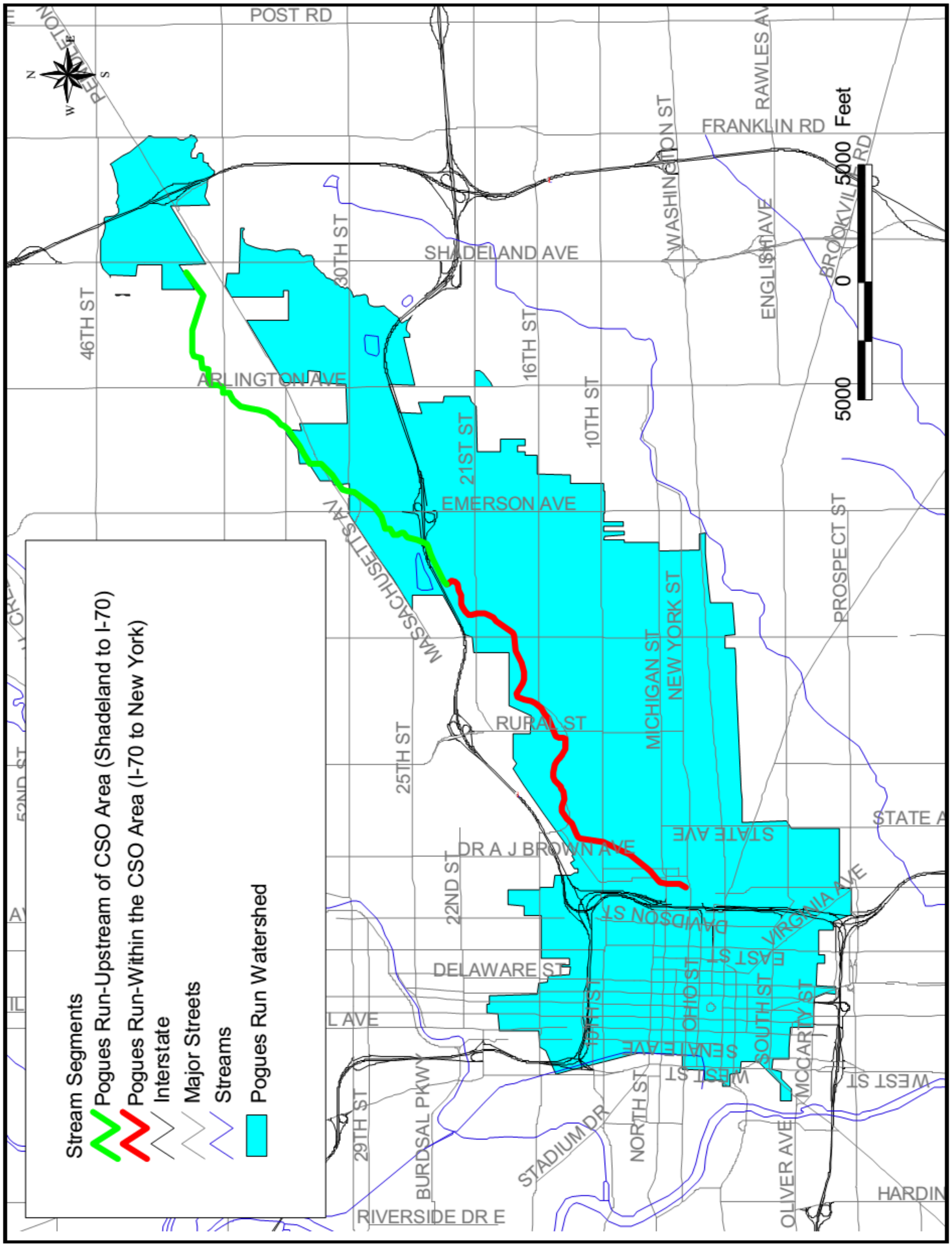

Figure 2-65
Pogues Run Stream Segments

Table 2-6
Pogues Run *E. coli* Bacteria Compliance

River Segment	Geometric Mean of 2000-2002 data	% of Samples > 235 cfu/100 ml	Number of Samples > 10,000 cfu/100 ml	Total Number of Samples
Pogues Run - Upstream of CSO Area	896	72.8%	6	228
Pogues Run - Within CSO Area	481	64.9%	9	536
Dry Weather				
River Segment	**Geometric Mean of 2000-2002 data**	**% of Samples > 235 cfu/100 ml**	**Number of Samples > 10,000 cfu/100 ml**	**Total Number of Samples**
Pogues Run - Upstream of CSO Area	634	66.4%	2	107
Pogues Run - Within CSO Area	251	51.3%	2	271
Wet Weather				
River Segment	**Geometric Mean of 2000-2002 data**	**% of Samples > 235 cfu/100 ml**	**Number of Samples > 10,000 cfu/100 ml**	**Total Number of Samples**
Pogues Run - Upstream of CSO Area	1217	78.5%	4	121
Pogues Run - Within CSO Area	934	78.9%	7	265
State Guidance [(1)]	(IDEM standard of 125 cfu/100 ml)	(IDEM Guidance 10% or less)	(IDEM Guidance None > 10,000 cfu/100 ml)	

[(1)] Indiana's 303(d) Listing Methodology for Impaired Waterbodies and Total Maximum Daily Load - September 2002

The combined sewer area, which is located primarily in the older sections of the City of Indianapolis, contains 132 combined sewer outfalls. The following subsections provide a detailed discussion of the combined sewer system. The separate sewer area extends beyond the combined sewer area to the limits of the county. The following subsections also provide a detailed discussion of the separate interceptors. **Figure 2-68** shows the locations and alignment of the interceptor network.

2.5.1 Combined Sewer Area

The yellow-shaded area in **Figure 2-68** shows the combined sewer area, which generally follows the pre-1972 City limits, before the City and county governments were consolidated. The map also shows the Belmont and Southport AWT plants. The combined sewer area covers approximately 55.5 square miles.

Combined sewers overflow when the volume of sewage and rainwater exceeds a pipe's carrying capacity. Interceptors are typically smaller than combined sewers and reach capacity much more frequently. Under dry-weather conditions, regulators divert these combined flows into interceptor sewers for conveyance to one of the two treatment facilities. Typically, a regulator consists of a small dam in the sewer pipe that conveys dry-weather sewage flows to the interceptor, but allows high wet-weather overflows to escape into a stream via an outfall pipe. Some CSO outfalls serve more than one regulator.

2.5.2 Combined Sewer System Interceptor Network

Interceptors are underground pipes that carry flows from the sewers to the treatment plant. The combined sewer interceptor network has three branches: the Pleasant Run/ Bean Creek, Pogues Run, and Fall Creek interceptor branches. These three interceptor branches flow into a centrally located core interceptor subnetwork, which conveys the sewage into the Belmont and Southport AWT plants.

The core interceptor subnetwork contains 23.4 miles of interceptor sewers, 15 overflow points, 8,337 acres of tributary area, and three pump stations. This subnetwork includes the Belmont, West Indianapolis, Southwest Diversion, White River, and Adler-McCarty interceptors and conveys wastewater from the three combined interceptor branches described above (as well as from the northerly portions of the separate sewer area) to the Belmont and Southport AWT plants.

Adler-McCarty interceptor, which is part of the core subnetwork. Pipe sizes in this interceptor branch range from 15 inches to 78 inches. The overflow point associated with the University Heights Interceptor discharges to Lick Creek.

The Pogues Run interceptor branch is located north of the Pleasant Run/Bean Creek interceptor and contains 11.5 miles of interceptor sewers and 24 overflow points. A total of 5,453 acres of combined sewer area drains into

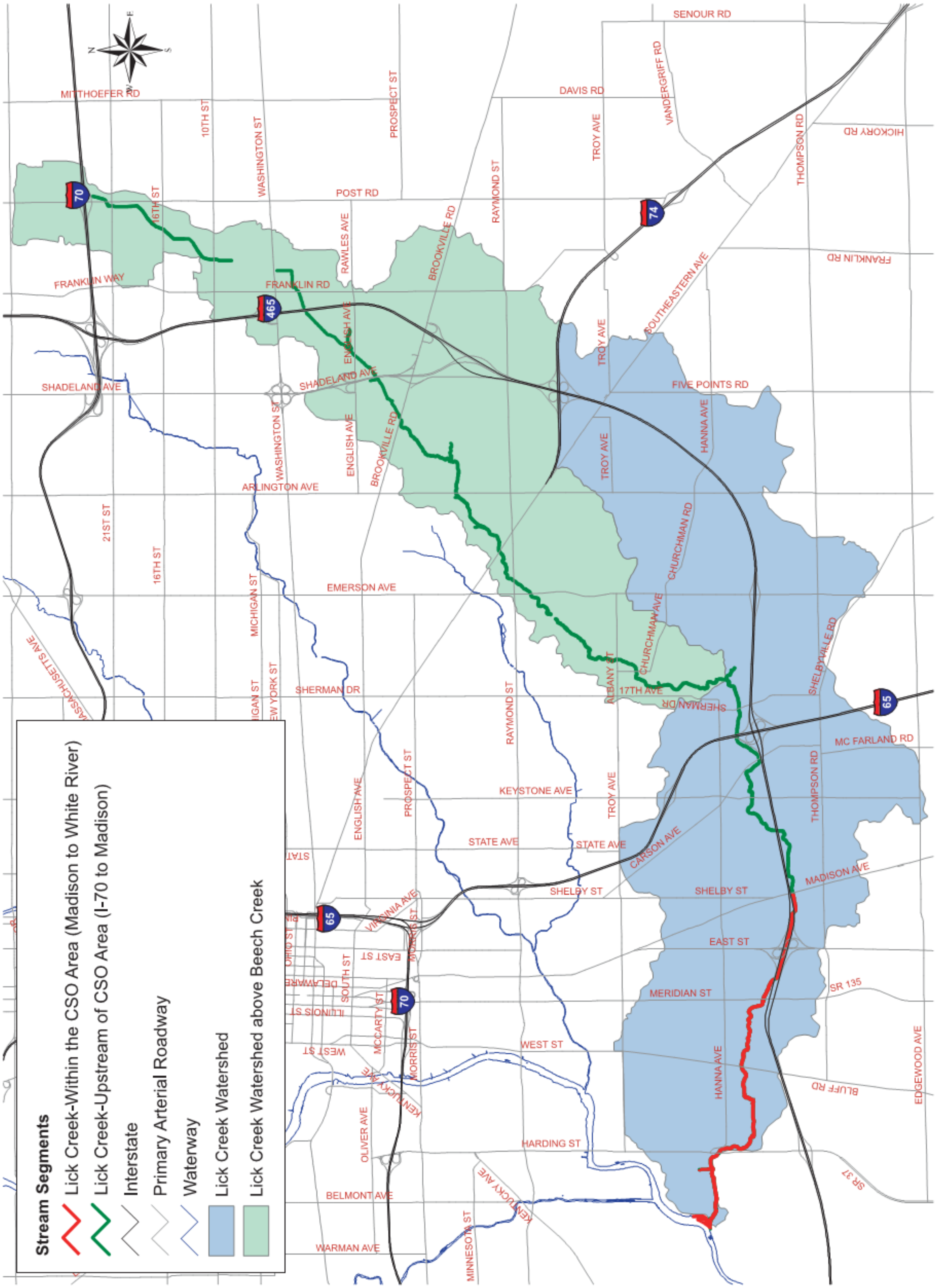

Figure 2-66
Lick Creek Stream Segments

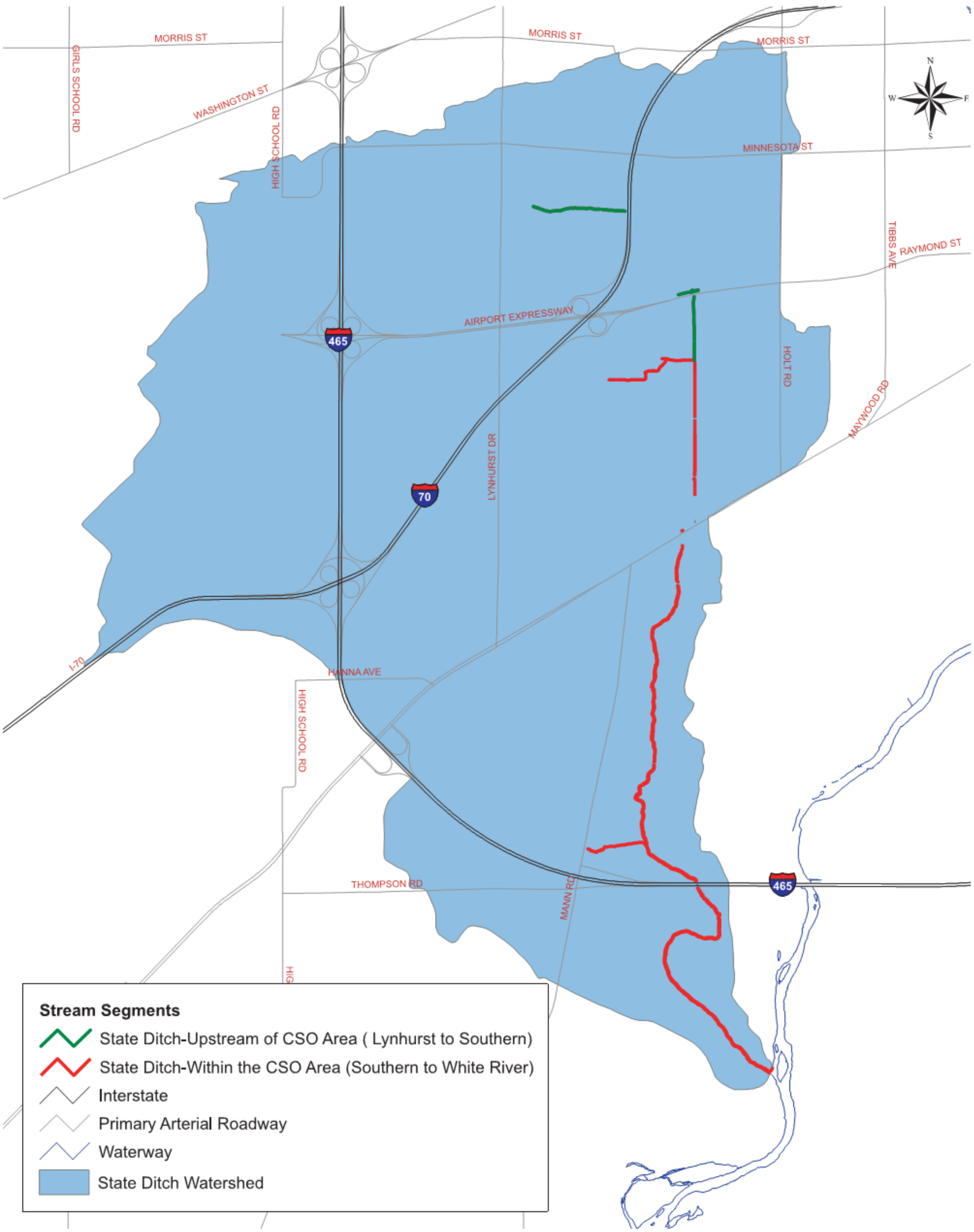

Figure 2-67
State Ditch Stream Segments

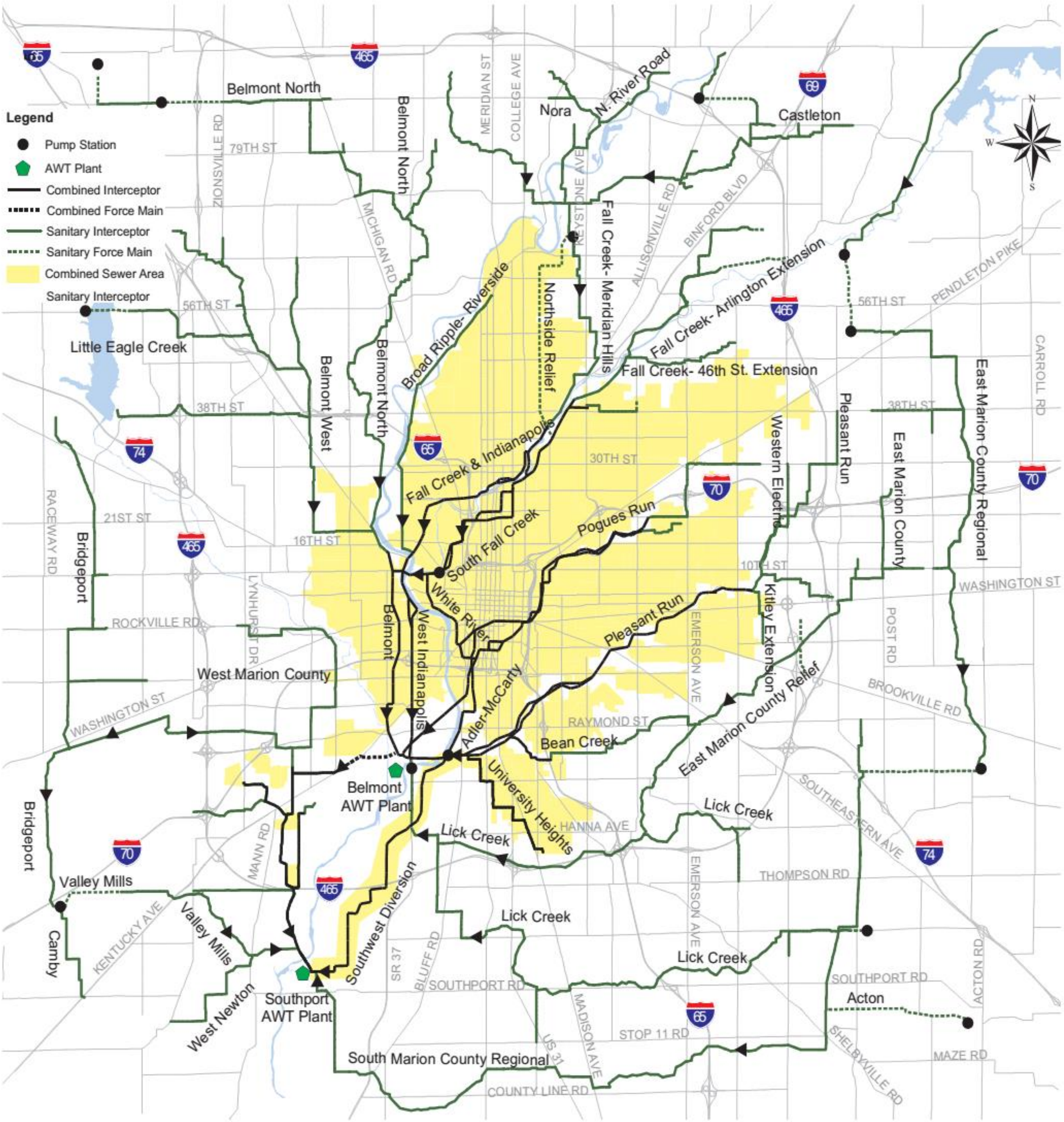

Figure 2-68
Network Location Map

this branch. A large portion of the area served by the interceptor is combined; however, the far upstream portion serves a separately sewered area. This branch also ends at the Adler-McCarty interceptor. Pipe sizes in this interceptor branch vary from 15 inches to 66 inches.

The Fall Creek interceptor branch is located north of the core interceptor and includes both the North and South Fall Creek interceptors. This branch contains 14.7 miles of interceptor sewer and 15,192 acres of combined area draining into 28 overflow points. The North Fall Creek branch ends at the West Indianapolis interceptor while the South Fall Creek branch ends at the White River interceptor but also extends to the West Indianapolis interceptor. Pipe sizes in this interceptor branch vary from 12 inches to 120 inches.

The remaining 13 overflow points are located outside of the major interceptor network branches and the core interceptor sub-network. The breakdown of these overflow points is as follows: four overflow points are located on the Broad Ripple-Riverside interceptor network that contributes to overflows along upper White River. Three overflow points are located on the West Marion County interceptor network, resulting in overflows in lower White River and State Ditch. Five overflow points are on the Eagle Creek and Belmont interceptors, contributing to overflows on Eagle Creek. Finally, one overflow point is located at the Southport AWT plant; it overflows to Little Buck Creek.

2.5.3 Combined Sewer Outfall Points

Table 2-7 summarizes the active combined sewer outfalls as of 2005. The first column in the table denotes the three-digit identification number for each outfall. The table shows the approximate location of each outfall, and the corresponding receiving stream. Five overflow points have been eliminated since 2001; they are shown on the table to document baseline conditions.

2.5.4 Separate Sewer Area

The area outside of the combined sewer area shown in **Figure 2-68** contains separate sanitary and storm sewers. In addition, some neighborhoods outside the combined sewer area by septic systems, as described below in Section 2.5.7. Separate sewers are located in all townships, although combined sewers prevail in Center Township. The separate area covers approximately 222 square miles. While most of Marion County has already been developed and sewered, approximately 95 square miles remain undeveloped. These undeveloped and unsewered areas exist in the following townships: Franklin, Pike, Washington, Decatur, and Wayne.

2.5.5 Separate Sewer System Interceptor Network

The City's separate interceptor network is split into two parts: one east and one west of the White River. The network includes 25 major interceptors containing 184.7 miles of sewers, ranging in size from 12 inches to 108 inches, and 11 pump stations. Details of this network are described below and included in **Table 2-8.**

Roughly 50 percent of the separate sewer system discharges to the Southport AWT plant and has no direct impact on the ability of the combined interceptor network and the Belmont AWT plant to capture and treat combined wastewater. The other 50 percent of the separate sewer area discharges into the combined interceptor network (112 out of 222 square miles). Note, however, that the City is developing a project to mitigate CSOs by diverting sanitary flows from the Belmont North and Belmont West interceptors away from the Belmont interceptor. The area served by the Belmont North and Belmont West interceptors is roughly 58 square miles, thereby reducing the percent of the separate area discharging into the combined network to 24 percent. The City has also reduced separated sewer flows into the Fall Creek combined sewer interceptor by diverting flow from some separated sewer areas to the East Marion County Sewer and treating flows at the Southport AWT plant.

The sanitary flow and the wet-weather response associated with the separate sewer system that does discharge into the combined interceptor network has been accounted for in hydraulic modeling. These impacts are generally limited to the upstream areas in the combined interceptor network. For a more detailed description of the hydraulic modeling of separate sewer impacts on CSOs, see the "Indianapolis CSO LTCP Hydraulic and Water Quality Modeling Report" (DPW-ICST, 2004), located in **Appendix A** of this report. As an example, the model predicts that for a three-month storm, 11 percent of the total flow through the combined interceptor network comes from the separately sewered areas. One-third of

Table 2-7
Combined Sewer Outfalls

ID Number CSO	Watershed Discharging to:	Approximate Location
03A	Little Buck Creek	Southport AWTP
03B	Little Buck Creek	Southport AWTP
008	White River	Belmont AWTP
011	Big Eagle Creek	Minnesota St. & Pershing Ave.
012	White River	Raymond St. & West St.
013	White River	Meridian St. & Adler St.
014	White River	Kentucky Avenue & York Street
015	Bean Creek	Southern Ave. & Manker Ave.
016	Bean Creek	Shelby St. & Willow Dr.
017	Bean Creek	Boyd Ave. & Nelson Ave.
019	Pleasant Run	PLRPND & Meridian St.
020	Pleasant Run	PLRPND & Pennsylvania St.
021	Pleasant Run	PLRPND & Ransdall St.
022	Pleasant Run	PLRPSD & Raymond St.
023	Pleasant Run	PLRPND & Iowa St.
025	Pleasant Run	PLRPND & Shelby St.
027	Pleasant Run	PLRPSD & Cottage Ave.
028	Pleasant Run	PLRPND & State St.
029	Pleasant Run	Orange St. & Randolph St.
030	Pleasant Run	PLRPSD & Randolph St.
031	Pleasant Run	PLRPSD & Churchman Ave.
032	Big Eagle Creek	Morris St. & Warman Ave.
033	Little Eagle Creek	Vermont St. & Somerset Ave.
034	Pogues Run	Michigan St. & Dorman St.
34A	Pogues Run	548 Dorman St.
035	Pogues Run	Arsenal Ave. & 10th St.
036	Pogues Run	Nowland Ave. & Tecumseh St.
037	White River	Washington St. & Geisendorff St.
038	White River	New York St.& University Blvd.
A38	Pogues Run	800 E. Washington St.
039	White River	New York St. & Beauty Ave.
040	White River	New York St. & Koehne St.
041	White River	WRPWD & Michigan St.
042	White River	Saint Clair St.& Miley Ave.
043	White River	Harding St. & Waterway Blvd.
044	White River	Waterway Blvd. & Riverside Dr.
045	White River	WRPWD & Belmont Ave.
046	White River	Lafayette Rd. & 19th St.
049	Fall Creek	Stadium Dr. & Fall Creek
050	Fall Creek	Fall Creek Blvd. & Bursdsal Pkwy.
50A	Fall Creek	Northwestern Ave. & 24th St.
051	Fall Creek	Capital Ave. & 22nd St.
052	Fall Creek	Fall Creek Blvd. & Boulevard Pl.
053	Fall Creek	FCPND & Illinois St.
054	Fall Creek	FCPND & Meridian St.
055	Fall Creek	28th St. & Talbot St.
057	Fall Creek	28th St. & Washington Blvd.
058	Fall Creek	28th St. & New Jersey St.
059	Fall Creek	FCPND & Central Ave.

Table 2-7
Combined Sewer Outfalls - Continued

ID Number CSO	Watershed Discharging to:	Approximate Location
060	Fall Creek	Sutherland Ave. & Central Ave.
061	Fall Creek	FCPND & Ruckle St.
062	Fall Creek	Guilford Ave. & 30th St.
063	Fall Creek	FCPND & 32nd St.
63A	Fall Creek	FCPND & 32nd St.
064	Fall Creek	Winthrop Ave. & 34th St.
065	Fall Creek	Sutherland Ave. & 34th St.
066	Fall Creek	Fall Creek Blvd. & Balsam Ave.
072	Pleasant Run	PLRPND & Saint Peter St.
073	Pleasant Run	PLRPND & Keystone Ave.
074	Pleasant Run	PLRPND & Prospect St.
075	Pleasant Run	PLRPND & Southeastern Ave.
076	Pleasant Run	PLRPSD & English Ave.
077	Pleasant Run	PLRPND & Sherman Ave.
078	Pleasant Run	PLRPSD & Brookville Rd.
079	Pleasant Run	PLRPND & Linwood Avenue
080	Pleasant Run	PLRPND & Wallace Ave.
081	Pleasant Run	PLRPND & Riley Ave.
083	Pleasant Run	Hawthorne Ln. & Lowell Ave.
084	Pleasant Run	PLRPND & Michigan St.
085	Pleasant Run	PLRPND & Ritter Ave.
086	Pleasant Run	PLRPND & Ritter Ave.
087	Pleasant Run	PLRPND & Audubon Ave.
088	Pleasant Run	PLRPND & Graham Ave.
089	Pleasant Run	PLRPND & Arlington Ave.
89A	Pleasant Run	PLRPND & Arlington Ave
090	Pleasant Run	Lowell Ave. & Sheridan Ave.
091	Pleasant Run	PLRPSD & Kenmore Rd.
092	Pleasant Run	PLRPSD & Ridgeview Dr.
095	Pogues Run	BPND & Coyner Ave.
096	Pogues Run	BPSD & Nowland Ave.
097	Pogues Run	BPSD & Keystone Ave.
098	Pogues Run	Tacoma Ave. & Nowland Ave.
099	Pogues Run	BPSD & Temple Ave.
100	Pogues Run	BPSD & Rural St.
101	Pogues Run	Sherman Dr. & BPND
102	Pogues Run	Forest Manor Ave. & 19th St.
103	Fall Creek via Meadow Brook	3900 N. Sherman Dr.
106	Pleasant Run	PLRPND & Orange St.
107	Pleasant Run	PLRPND & Saint Paul St.
108	Pleasant Run	PLRPSD & Saint Paul St.
109	Pleasant Run	PLRPND & Churchman Ave.
115	Pogues Run	Henry St. & Kentucky Ave.
116	White River	Meikel St. & Ray St.
117	White River	Southern Ave. & White River
118	White River	WRPED & West St.
119	Pleasant Run	PLRPSD & Beecher St.
120	Pleasant Run	PLRPSD & Southern Ave.
125	Pogues Run	Meridian St. & South St.

Table 2-7
Combined Sewer Outfalls - Continued

ID Number CSO	Watershed Discharging to:	Approximate Location
127	Pleasant Run	1325 S. State
128	Pogues Run	Senate Ave. & Merrill St.
129	Pogues Run	Meridian St. & Merrill St.
130	Pleasant Run	Manual High School
131	Fall Creek	Fall Creek Blvd. & Capitol Ave.
132	Fall Creek	FCPND & Pennsylvania St.
133	Pogues Run	Market St. & Pine St.
135	Fall Creek	Orchard Avenue & 39th St.
136	Pogues Run	New York St. & Dorman St.
137	Pogues Run	Pine St. & Ohio St.
138	Pogues Run	College Ave. & Washington St.
141	Fall Creek	College Ave. & 38th St.
142	Fall Creek	College Ave. & 38th St.
143	Pogues Run	Forest Manor Ave. & 21st St.
145	Big Eagle Creek	Raymond St. & Kentucky Ave.
147	White River	WRPWD & Vermont St.
148	Pleasant Run	PLRPND & Madison Ave.
149	Pleasant Run	PLRPSD & Garfield Dr.
150	Pleasant Run	PLRPND & Raymond St.
151	Pleasant Run	PLRPND & Beecher St.
152	Pogues Run	Pine St. & Ohio St.
153	Pogues Run	Illinois Ave. & Merrill St.
154	Pleasant Run	PLRPND & Michigan St.
155	White River	5600 N. Kenwood
156	White River	Kenwood Ave. & Westfield Blvd.
205	White River	Boulevard Pl. & Westfield Blvd.
210	Fall Creek	Indiana Ave. & 10th St.
213	Fall Creek	Hillside Ave. & 29th St.
216	Fall Creek	Crittenden Ave. & 42nd St.
217	State Ditch	Gadsden St. & Lyons Ave.
218	State Ditch	Gadsden St. & Fleming St.
223	Big Eagle Creek	Victoria St. & Warman Ave.
224	Pleasant Run	PLRPND & Washington St.
226	Pleasant Run	PLRPND & Colorado Ave.
227	Pleasant Run	5702 E. Michigan
228	Pleasant Run	Michigan St. & Graham Ave.
229	Pleasant Run	PLRPND & Arlington Ave.
235	Lick Creek	Shelby St. & Markwood Ave.
275	White River	4945 S. Foltz

PLRPND Pleasant Run Pkwy. N. Dr.
PLRPSD Pleasant Run Pkwy. S. Dr.
WRPWD White River Pkwy. W. Dr.
WRPED White River Pkwy. E. Dr.
FCPND Fall Creek Pkwy. N. Dr.
BPND Brookside Pkwy. N. Dr.
BPSD Brookside Pkwy. S. Dr.

Eliminated (shaded rows)

that 11 percent is the wet-weather response in the separate system.

The separate interceptor network on the east side of the White River has three interceptor branches: the East Marion County, the East Marion County Regional, and the Franklin Regional. These interceptor branches ultimately flow into the South Marion County Regional interceptor, which conveys sewage directly into the Southport AWT plant.

In addition to these separate interceptors, other separate interceptors on the north, south and east sides flow into the combined interceptor network. In the north, the following separate interceptor branches discharge into the combined Fall Creek interceptors: Williams Creek, Nora, North River Road, Castleton, Fall Creek-Meridian Hills, Fall Creek Arlington Extension, and Fall Creek 46th Street Extension. In the east, the Western Electric and the

Table 2-8
Separate Sewer System Interceptor Inventory

Interceptor	Township	Pipe Size (inches)	Length (miles)
West Side of White River			
Belmont North	Pike, Washington	27 to 42	13.8
Little Eagle Creek	Pike	12 to 18	3.8
Belmont West 38th Street	Pike, Wayne	24 to 30	4.2
Belmont West	Pike, Wayne	30 to 42	6.6
West Marion County	Wayne, Decatur	15 to 72	10.1
Bridgeport	Wayne, Decatur	15 to 48	10.6
Camby	Decatur	24 to 30	2.3
Valley Mills	Decatur	54 to 66	5.7
West Newton	Decatur	30	2.7
East Side of White River			
Nora	Washington	18 to 24	2.2
North River Road	Washington	18 to 48	4.6
Williams Creek	Washington	12 to 42	5.8
Castleton	Lawrence, Washington	14 to 42	5.3
Fall Creek/Meridian Hills	Washington	30 to 36	4.4
Fall Creek/Arlington Extension	Lawrence, Washington	12 to 42	12.2
Fall Creek 46th Street Extension	Lawrence, Washington	21 to 24	2.5
East Marion County	Lawrence, Warren	36	3.4
East Marion County Regional	Lawrence, Warren	15 to 60	21.7
Franklin Regional	Franklin	18 to 30	8.9
South Marion County Regional	Franklin, Perry	21 to 108	20.5
Western Electric	Warren	24 to 36	2.3
Kitley Extension	Warren	24 to 42	1.1
East Marion County Relief	Warren, Center, Perry	18 to 36	10.8
Lick Creek (Section 1 through 4)	Franklin, Perry	18 to 66	21.6
Lick Creek Shelby Street Extension	Perry	30	1

Kitley Extension interceptor branches flow into the combined Pleasant Run interceptor at the upstream end. Lastly, in the south, the following separate interceptor branches discharge into the combined Southwest Diversion interceptor: the East Marion County Relief (upper and lower), the Lick Creek (Section 1 through 4), and the Lick Creek Shelby Street Extension.

The City's separate interceptor network on the west side of the White River has four branches: Bridgeport, Camby, West Newton, and Valley Mills. These interceptor branches flow into the West Marion County interceptor, which conveys sewage directly to the Southport AWT plant. A wet-weather bypass from the Belmont AWT plant to the West Marion County interceptor also exists that can divert 30 MGD of pumped flow from the Belmont to the Southport AWT plant. Other separate interceptors also flow into the combined interceptor network on the west side. In the northwest, the Little Eagle Creek and Belmont West 38th Street interceptor branches into the Belmont West interceptor. This interceptor and the Belmont North interceptor ultimately discharge into the combined Belmont interceptor.

2.5.6 Separate Sewer Outfall Points

Approximately 40 years ago, sanitary sewer overflows (SSO) were designed and constructed as critical relief structures at 16 locations within the sanitary network. Since the late 1980s, all but three of these sanitary sewer overflow points have been eliminated. The remaining overflows include SSO 113 associated with the Bridgeport interceptor, and SSO 124 and SSO 105 associated with the Fall Creek Arlington Extension interceptor. The City eliminated these overflows in 2007.

2.5.7 Private Septic Systems

Within Marion County, an estimated 30,000 properties are served by private septic systems. Septic systems generally have a limited design life and eventually fail, resulting in potential surface and groundwater contamination. The health and environmental risks associated with septic failures are well documented in the 2003 TMDL studies and other publications. Neighborhoods served by septic systems are typically located just outside the old City of Indianapolis limits, as shown in **Figure 2-69**. The City has historically used the state's Barrett Law to finance the conversion of properties served by septic systems to sanitary sewers. As part of its 2001 LTCP, the City proposed accelerating its septic conversion program from a 60-year plan to a 20-year schedule. From 2000-2004, the City extended sewer service to six neighborhoods serving 414 homes and businesses.

2.6 Treatment Plant Design and Characterization

Wastewater flows in the Indianapolis collection system are treated at one of two AWT plants. These plants, known as the Belmont and Southport AWT plants, are located along the Lower White River. Approximate locations of the AWT plants, relative to streams and major interceptors, are shown on **Figure 2-68**. The Belmont AWT plant is situated at the confluence of Eagle Creek and White River. Its effluent (Outfall 006) discharges directly to the White River. The Southport AWT plant is located approximately 5 miles down-stream at the confluence of Little Buck Creek and the White River. Its effluent (Outfall 001) also discharges directly to the White River.

The Belmont AWT plant receives sanitary and wet-weather flow predominately from the north and east sides of Marion County, as well as from Center Township (which encompasses a majority of the CSO area). Flows are conveyed through the following five major interceptors:

- Belmont Interceptor
- West Indianapolis Interceptor
- Harding Street Interceptor
- Adler-McCarty Interceptor
- Pleasant Run Interceptor

The Southport AWT plant receives sanitary and wet-weather flow predominately from the east, west and south sides of Marion County, as well as from the City of Greenwood in northern Johnson County. Flows are conveyed through the following four major interceptors:

- South Marion County Regional (Greenwood) Interceptor
- Southwest Diversion (Southern Avenue) Interceptor
- West Marion County (Tibbs) Interceptor
- Valley Mills Interceptor

A majority of the wet-weather flow from the CSO system is conveyed to the Belmont AWT plant. However, during significant wet-weather events some of the Belmont flow may be diverted to the Southport AWT plant by one of three methods as shown on **Figure 2-70** (*Wet Weather Diversion Schematic*). First, approximately one-third of the capacity of the Adler-McCarty Interceptor may be diverted away from the Belmont AWT by opening a 60-inch gate at the Southwest (Southern Avenue) Diversion Structure located along the east bank of the White River across from the Belmont AWT plant. A second method involves the use of a wet-weather pump station at the Belmont plant to pump up to 30 MGD of raw sewage to the Southport AWT plant via the Tibbs Interceptor. A third method uses an existing gravity line to divert up to 17 MGD of de-gritted sewage to the Southport AWT plant via the Tibbs Interceptor. The second and third methods take advantage of the same pipe and therefore cannot be operated concurrently.

Several engineering studies have been completed that included capacity assessments of the Belmont and Southport AWT plants for treating both wet and dry-weather flows. An initial series of analyses that focused on the Belmont AWT plant was completed in 2001 (White River Environmental Partnership (WREP), 2001). A follow-up analysis that assessed the benefits of wet-weather storage basins at both plants was completed in 2002 (CDM, 2002). In 2004, facility planning analyses were completed that focused on a new interplant connection and the Southport AWT facility (ICST, 2004). Collectively, these studies included detailed reviews of plant information, design criteria, and operational data relevant to the strategic planning issues. They included activities such as review of previous engineering studies and facility plans; analysis of existing data to characterize long-term, seasonal, in-plant recycle and wet-weather loadings; preparation of simplified drawings such as process flowsheets; review of upcoming non-CSO capital improvements; analysis of CSO abatement improvements thus far completed; and identification of plant site areas that could accommodate new CSO abatement facilities. Baseline conditions at the Belmont and Southport AWT plants are described in the text that follows.

Based on an assessment of seven consecutive years of daily flow data (i.e., 1996 through 2002), the long-term average dry-weather flowrate for the Belmont/Southport AWT plant system was estimated to be approximately 156 MGD. Of this, approximately 93 MGD was directed to the Belmont AWT plant with the remaining 63 MGD directed to the Southport plant. Flow peaking due to wet-weather contributions and seasonal infiltration was significantly more pronounced at the Belmont plant. Peak monthly average flowrates sometimes reach about 200 MGD at the Belmont plant, whereas they seldom exceed 100 MGD at the Southport plant. Ninety-nine percent of the time, daily average flowrates are less than about 300 MGD at the Belmont plant and less than about 150 MGD at Southport. During extreme wet-weather conditions, however, peak hourly flowrates of about 600 MGD and 270 MGD have been observed at the Belmont and Southport plants, respectively.

2.6.1 Belmont AWT Plant - Baseline Operational Conditions

The Belmont AWT plant was first placed in service in 1924 as a primary clarification plant. In May 1925, a 50-MGD activated sludge plant was put in service to serve a connected population of 300,000. This was among the first large activated sludge facilities in the country. In 1936 the Belmont plant was expanded to add three aeration tanks and 12 final clarifiers. In 1954, new primary settling tanks, aerated grit tanks, and pre-aeration channels were put into operation. In 1955, the plant was expanded to provide secondary treatment for flows up to 120 MGD. It was upgraded again in the late 1970s through early 1980s to provide tertiary treatment (nitrification and filtration) for average flows up to 120 MGD and peak flows up to 150 MGD. Solids handling improvements were added in the late 1980s.

In recent years the City has initiated several projects to upgrade and expand the Belmont AWT Plant. This section documents baseline plant conditions prior to December 2001. **Table 2-9** summarizes the basis of design for the baseline Belmont AWT plant configuration. Unit operations at the Belmont AWT plant are shown on **Figure 2-71** *(Belmont AWT Plant Process Flow Schematic).*

2.6.1.1 Belmont Preliminary Treatment

Combined wastewater and stormwater flows are conveyed through five interceptor sewers: Alder-McCarty, Harding Street, Pleasant Run, West Indianapolis, and Belmont. Flows from all five interceptors are combined and enter the Belmont AWT through a 10-by-10-foot influent sewer. A wet-weather pumping station was constructed in

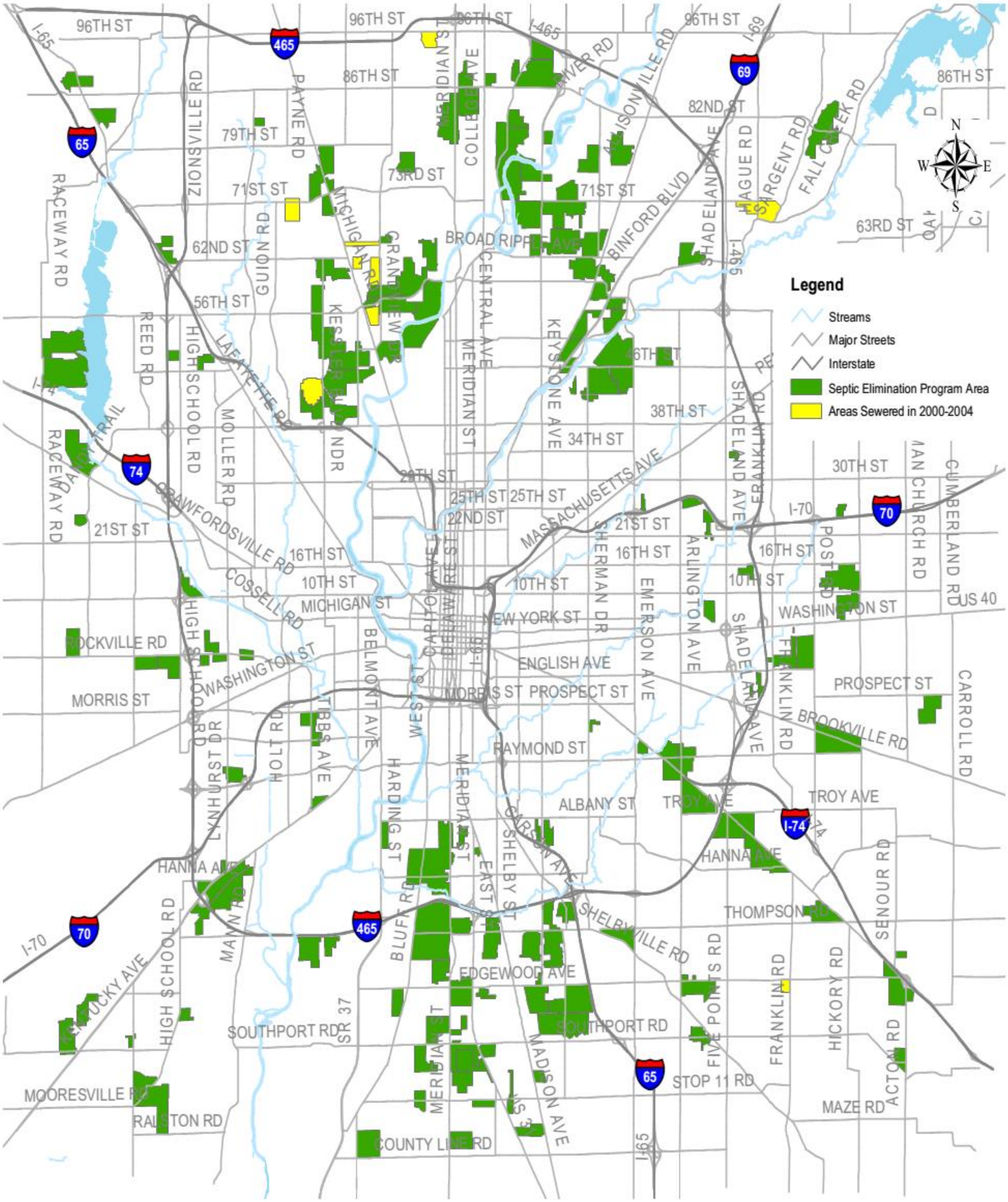

Figure 2-69
Septic Tank Elimination Program

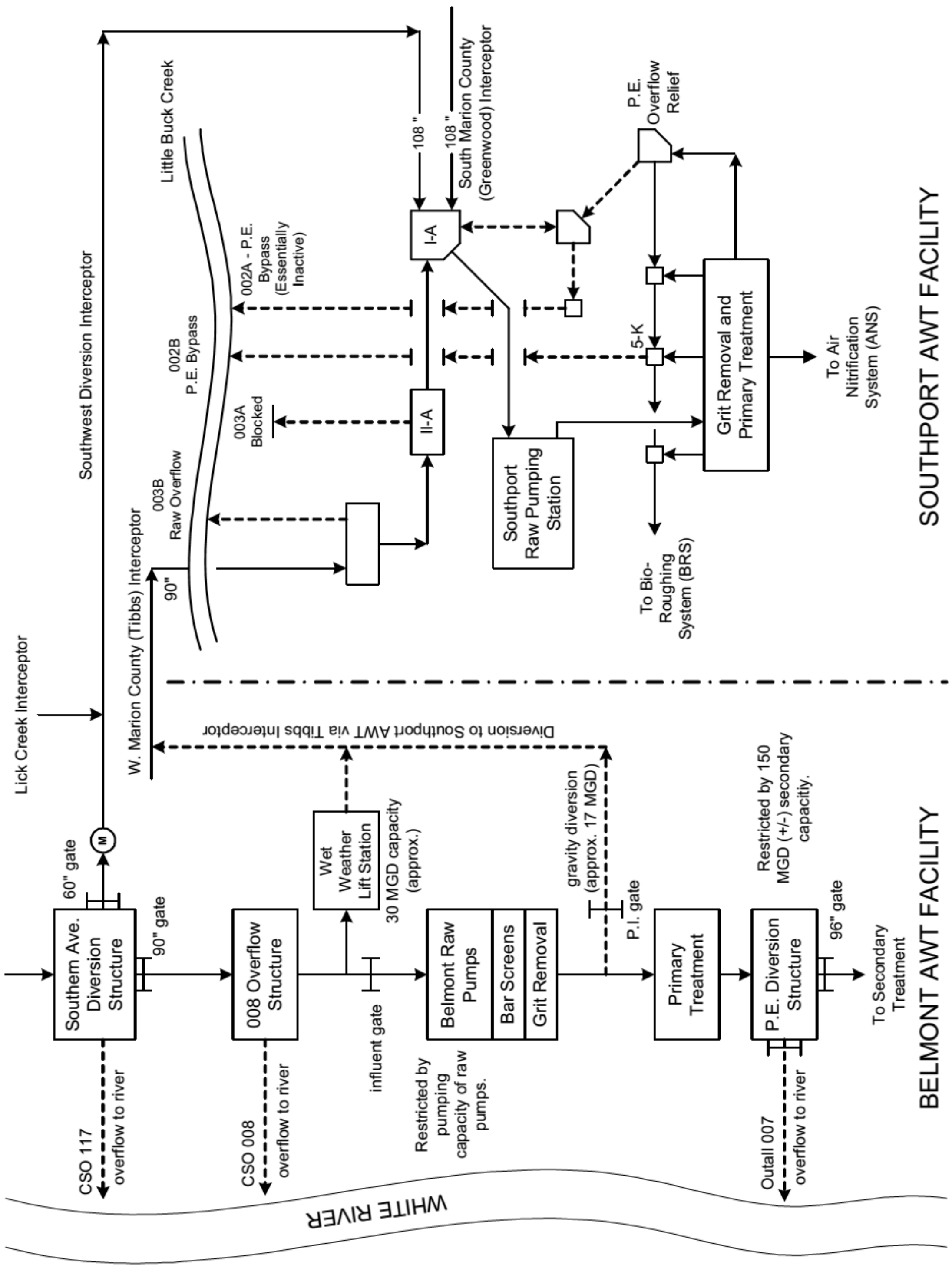

Figure 2-70
Pre-2001 Wet Weather Diversion Schematic

Table 2-9
Belmont AWT Plant - Baseline Design and Loading Criteria

Treatment Process / Units	Unit Description	Capacity
Preliminary Treatment		
Trash Racks	3 - 150 mgd Mechanically Racked Trash Racks with 4-inch spacings located in three 10-foot wide channels	300 mgd (Firm Peak)
Raw Sewage Pumps	10 - 33 mgd Screw Pumps	297 mgd (Firm Peak)
Mechanical Bar Screens	5 - 75 mgd Mechanically Cleaned	300 mgd (Firm Peak)
Aerated Grit Tanks	5 - 75 mgd	300 mgd (Firm Peak)
Primary Treatment		
Primary Clarifiers	4 - 265' L x 64' W x 15' D Tanks	
	1 - 265' L x 88' W x 15' D Tanks	
- Total Surface Area	91,160 SF	
- Average Flow	At 1,000 gpd / SF overflow rate	91.2 mgd
	At 1,371 gpd / SF overflow rate	125 mgd (Design Avg. Flow)
- Peak Hourly Flow	At 3,000 gpd / SF overflow rate	273.6 mgd
Primary Sludge Pumps	6 - 800 gpm Pumps	4,000 gpm
Secondary Treatment	**Carbonaceous BOD Removal**	
Bio-Roughing Pump Station	30,900 CF Wet Well volume or 231,132 gallons	Detention Time of 2.2 minutes at 150 mgd
	4 - 50 mgd Horizontal Centrifugal Pumps with VFDs rated at 34,725 gpm at 64 ft. TDH at 500 rpm	150 mgd (Firm Peak)
Bio-Roughing Towers	4 - 150' dia. x 21.5' Deep Towers with self supporting 149 ft. dia. plastic media	
- Media Surface Area	17,436 SF each (69,744 SF total)	
- Media Volume	374,874 CF each (1,499,496 CF total)	Calc. by JTP/DPW
- Avg. Organic Loading	84 lbs BOD_5 / 1000 CF / day	
- Vol. Surface Ratio	Plastic media - 27 SF / CF	
- Avg. Hyd. Loading Rate	1.25 gpm / SF (4 towers in use)	125 mgd
- Peak Hyd. Loading Rate	2.0 gpm / SF (3 towers in use)	150 mgd (Firm Peak)
- Min. Hyd. Loading Rate	0.5 gpm / SF (4 towers in use)	50.2 mgd

References:

1.) "Preliminary Assessment of Wet Weather Improvements for Belmont AWT Facility (Phase II)," WREP (May 1998)
2.) "A Guide to the Belmont Advanced Wastewater Treatment Facility," Indianapolis DPW bulletin (January 1984 approx.)
3.) "Task 1 Report - Review of Existing Belmont and Southport AWT Facilities, " WREP (February 2001)
4.) Based on observations made by City staff.
5.) "Recommended Standards for Sewage Works," 1997 Edition.
6.) "Operator's Guide" (1987)
7.) 1977 Design Summary for the Southport AWT Plant by Reid, Quebe, Allison, Wilcox & Associates, Inc.

Table 2-9
Belmont AWT Plant - Baseline Design and Loading Criteria - Continued

Treatment Process / Units	Unit Description	Capacity
Tertiary Treatment	**Nitrification**	
ONS Pump Station	6 - 132-inch dia. Open Archimedean Screw Pumps at 55,034 gpm design cap. per pump at 22 rpm and max. 17.69 ft. TDH	317 mgd with 2 of 3 pumps running per side (4 total of 6)
Oxygen - Nitrification System	6 - 60' L x 60' W x 15' D Tanks	
	With 8 Stages / Train	
- Average Flow		125 mgd (Avg. Daily)
- Peak Flow		150 mgd (Peak Daily)
- Design Average BOD_5 Load	38 lb BOD_5 / 1000 CF	
- Design Average NH_3 Load	6.4 lb. NH_3 / 1000 CF	
- MLVSS Range	2600 - 4000 mg/L	
- Mean Cell Res. Time	13 days (max.)	
- Oxygen Generation	Vacuum Swing Absorption	
- Cryo O_2 Capacity	180 tons per day	Currently operated w/ VSA rated at 120 ton/day
- Liquid O_2 (LOX) Storage	1,000 tons w/ 225 ton/day vaporization cap.	LOX backup system provided by Air Liquide (2 - 13,100 gallon tanks)
- Ambient Vaporizers	2 - 120,000 scf per hour	
ONS - Final Clarifiers	10 - 245' L x 90' W x 14.78' D Rectangular Clarifier with sludge removal by travelling bridge siphon collectors	
- Design Average Flow	At 473 gpd / sf overflow rate	125 mgd (Avg. Daily)
- Peak Flow (Max. Day)	At 568 gpd / sf overflow rate	150 mgd (Peak Daily)
- Peak Hourly Flow (Ten States)	At 800 gpd / sf overflow rate	211 mgd (Peak Hourly)
Tertiary Treatment	**Effluent Filtration**	
Effluent Filters	12 - Mixed Media (Anthracite Coal and Sand) Filters with 2 cells per filter	Note: The filter media was replaced with coarse mono-media sand in 1995.
- Dimensions per Filter Cell	61 ft. L x 15.25 ft. W with 20-inch anthracite coal, 7 inch sand, and 12 inch gravel layers. The filter media was replaced with course mon-media sand in 1995.	Coal Layer Missing
- Surface Area per Cell	930 SF	2 Cells per Filter
- Total Surface Area	22,320 SF	For all 24 Filter Cells
- Average Flow	At 4.41 gpm / sf (11 Filters)	131 mgd (120 mgd Avg. Flow plus 11 mgd washwater recycle)
- Peak Flow	At 5.29 gpm / sf (11 Filters)	156 mgd (145 mgd Avg. Flow plus 11 mgd washwater recycle)
- Peak Flow	At 5.0 gpm / sf (11 Filters)	147.4 mgd (Peak Hourly)
Effluent Disinfection	4 - 110' L x 25' W x 16' SWD Ozone Contact Tanks with 4 stage over and under baffling	Ozone off line with temp. Liquid NaOCl Bleach disinfection system installed by WREP in 1995, sodium bisulfite used for dechlorination
- Contact Tank Vol. each	44,000 CF or 329,120 gallons	
- Contact Tanks Volume Total	176,000 CF or 1,300,000 gallons	
- Average Flow	Contact Time @ 125 mgd	15 minutes (Peak w/ Chlorine)
- Peak Flow	Contact Time @ 160 mgd	11.7 minutes (Peak w/ Ozone)

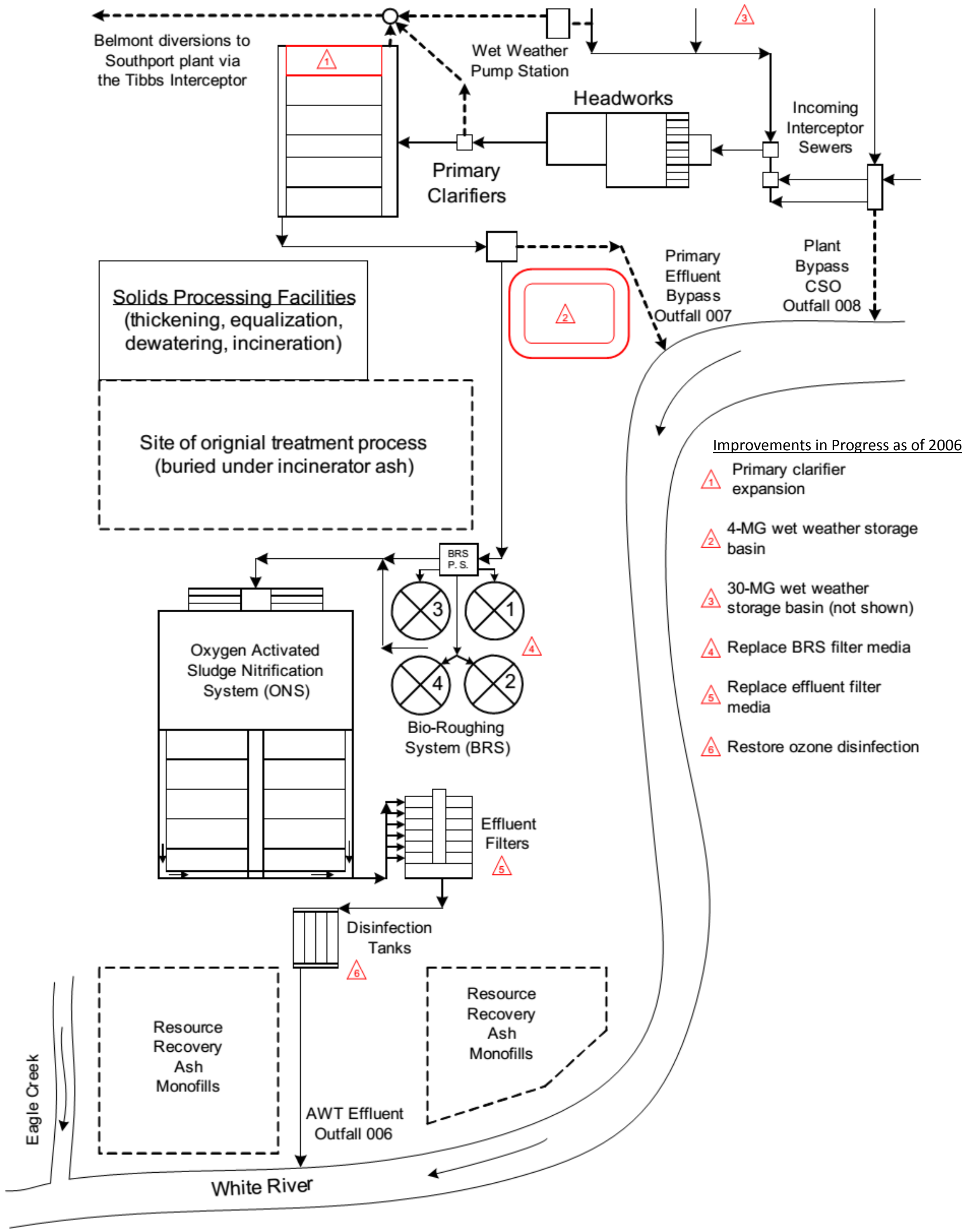

Figure 2-71
Belmont AWT Plant Process Flow Schematic

1997 that can transfer raw sewage from the Belmont interceptor to the Southport plant (via the Tibbs Interceptor) at a peak rate of about 30 MGD.

Raw wastewater entering the headworks facility is split into three parallel channels. Each channel is equipped with a trash rack that is mechanically cleaned, inclined, and front raking with 4-inch clear openings. The trash racks remove large pieces of wood, trash, and debris prior to influent pumping.

Influent wastewater is pumped by ten open Archimedean screw pumps into a common bar screen influent channel and is split among five parallel channels. All ten of the pumps were replaced in 2002 and each is rated at 33 MGD under optimum conditions. Therefore, the firm pump capacity (i.e., design capacity with one pump out of service) is 297 MGD. The pump ratings are based on the assumption that each pump is brand new and that influent flows are at an optimum level (a condition that is seldom, if ever, achieved). Flow then passes through five parallel channels containing bar screens that are mechanically cleaned, inclined, and front-raking with 1-inch clear openings.

Flow then passes through five aerated grit chambers. Diffusers near the bottom of the chambers provide air that suspends light organic solids while allowing the heavier inorganic solids such as sand, gravel, and cinders to settle to the bottom of the chambers.

Effluent from the aerated grit chambers can be diverted to the Southport AWT plant by gravity at a rate of about 17 MGD, provided the 30 MGD wet-weather pumping station is not in service. Flow that exceeds the raw sewage pumping capacity overflows to the White River at CSO Outfall 008 upstream of the Belmont headworks.

2.6.1.2 Belmont Primary Treatment

After preliminary treatment, the wastewater is settled to remove settleable and floatable solids in five rectangular primary clarifiers. The clarifiers reduce the suspended solids and organic loading from the wastewater before secondary treatment. The existing primary clarifiers are rated according to Ten States Standards for an average flow of 91 MGD (at a surface overflow criterion of 1,000 gpd/sf) and a peak hourly flow of 274 MGD (at a surface overflow criterion of 3,000 gpd/sf). They can hydraulically handle up to 300 MGD, at which point the primary clarifiers flood.

2.6.1.3 Belmont Secondary Treatment

Primary effluent is pumped to four biological roughing towers having a firm capacity of 150 MGD (assuming one tower is out of service). The aerobic biological roughing towers reduce soluble BOD loads prior to oxygen nitrification.

Effluent from the biological roughing towers is conveyed to the Oxygen Nitrification System (ONS) mixing structure where it combines with return activated sludge. Six screw pumps convey mixed liquor to six ONS reactors, each with eight stages. Each stage is equipped with a mechanical aerator for mixing and oxygen transfer to the wastewater for BOD and ammonia removal. Flow passes through the stages in a serpentine manner to minimize short-circuiting. The ONS is designed for an average daily flow of 120 MGD plus 5 MGD of recycle flows from solids handling.

Effluent from the ONS flows by gravity to twelve rectangular secondary clarifiers having an average daily design capacity of 125 MGD and a peak hourly flow capacity of 150 MGD. Primary effluent flow that exceeds secondary treatment peak capacity (150 MGD) is bypassed at Diversion Structure 007 to the White River.

2.6.1.4 Belmont Tertiary Treatment

Secondary clarifier effluent flows by gravity to twelve effluent filters that remove residual suspended solids. Flow passes through the filter media, is collected by the underdrain system, and flows to the ozone contact tanks. The filter media at the Belmont AWT plant consists of a top layer of anthracite, a second layer of silica sand, and a bottom layer of garnet sand. The design average flow is 131 MGD with a design peak hourly effluent filtration capacity of 156 MGD.

Filtered effluent flows by gravity to the four chlorine contact tanks for disinfection during the April-October recreational season before being discharged to White River via Outfall 006. Sodium hypochlorite and sodium bisulfite are used for effluent chlorination and dechlorination, respectively. The disinfection process reduces the concentration of bacteria in the treatment plant effluent. Disinfectants are added prior to the effluent filters to allow sufficient contact times.

The City is moving forward to replace the chlorination disinfection system with an ozonation system at the AWT plants. Treating the effluent flow with ozone will allow the City to improve the dissolved oxygen conditions in White River and to avoid the problems associated with the byproducts of chlorination and dechlorination. Flows in excess of ozonation capacity will still be treated with sodium hypochlorite and sodium bisulfite for chlorination and dechlorination.

2.6.2 Southport AWT Plant - Baseline Operational Conditions

The Southport AWT plant was first placed in service in July 1966 as a 28 MGD secondary (activated sludge) treatment plant. The capacity was later doubled to 56 MGD. Similar to the Belmont AWT plant, it was upgraded in the late 1970s through the early 1980s to provide tertiary (advanced) treatment for daily average flows up to 125 MGD and peak hourly flows up to 150 MGD.

Table 2-10 summarizes the bases of design for the baseline configuration at the Southport AWT plant. Unit operations at the Southport AWT plant are shown on **Figure 2-72** (Southport AWT Plant Process Flow Schematic).

2.6.2.1 Southport Preliminary Treatment System

Wastewater is conveyed to the Southport AWT plant facility through four interceptor sewers: West Marion County (Tibbs), Southwest Diversion, Valley Mills, and South Marion County (Greenwood). Flows from all three interceptors are combined and enter the Southport AWT plant through a 132-inch influent sewer.

Three mechanically cleaned bar screens with 1/2-inch spacing are located in parallel channels in the Raw Sewage Pumping Station. Four horizontal centrifugal pumps are used to lift raw wastewater to the aerated grit process. Flow passes through two aerated grit chambers and onto a flow splitting structure where the grit effluent can be sent to one of two sets of primary clarifiers. Wet-weather flow that exceeds preliminary treatment capacity (150 MGD) overflows at Outfall 003A into Little Buck Creek, a tributary to the White River. A second outfall, Outfall 003B, has been blocked and is no longer in service.

2.6.2.2 Southport Primary Treatment

Primary settling consists of two sets of four circular, center-feed clarifiers. Horizontal vortex-type pumps remove primary sludge from individual hoppers. Due to their shallow depth, the primary clarifiers are rated for an average daily flow of 57 MGD and a peak hourly flow of approximately 150 MGD.

2.6.2.3 Southport Secondary Treatment

Primary effluent is pumped to four biological roughing towers having a firm design capacity of 150 MGD. The aerobic biological roughing towers reduce the influent soluble BOD loading to the oxygen nitrification system. Effluent from the biological roughing towers is conveyed to either the Oxygen Nitrification System (ONS) or to the Air Nitrification System (ANS) or both. In the ONS process, a mixing structure is used to combine the effluent from the bioroughing towers with the return sludge from the ONS process. Six screw pumps convey the mixed liquor to ten ONS reactors, each with four stages. Each stage is equipped with a mechanical aerator for mixing and oxygen transfer to the wastewater for BOD and ammonia removal. Flow passes through the stages in a serpentine manner to minimize short circuiting. The ONS was designed to treat an average daily flow of 95 MGD and a peak hourly flow of 131 MGD. The Southport ONS reactors are operated using air rather than high purity oxygen but will be returned to the oxygen mode after completion of a project to upgrade the oxygen supply system. Effluent from the ONS flows by gravity to ten rectangular secondary clarifiers capable of settling peak hourly flows up to 176 MGD (at 800 gpd/sf).

In the ANS process, air is diffused into the aeration tanks using coarse pore diffusers. Process air is supplied to the diffusers using 14 centrifugal blowers that range in size from 250 to 500 horsepower. The ANS is rated to treat average daily and peak hourly flows of 30 MGD.

Table 2-10
Southport AWT Plant - Baseline Design and Loading Criteria

Treatment Process / Units	Unit Description	Capacity
Preliminary Treatment		
Mechanical Bar Screens	3 - 75 mgd Mechanically Cleaned Catenary Bar Screens with 1/2-inch Clear Openings Inclined at a 75 Degree Slope to the Horizontal	150 mgd (Firm Peak)
Raw Sewage Pump Station	11,250 CF Wet Well Volume or 84,150 gallons	Detention Time of 0.8 minutes at 150 mgd
	4 - 50 mgd Horizontal Centrifugal Pumps with VFDs rated at 35,000 gpm at 47 ft. TDH at 385 rpm	150 mgd (Firm Peak)
Aerated Grit Chambers	2 - 95' L x 25' W x 15' SWD	The operators report the need for partial bypass at flows above 130-135 mgd
	At 2.55 minutes detention time	150 mgd (Peak Hourly)
	At 3 minutes detention time (minimum)	127.9 mgd
	At 5 minutes detention time	76.7 mgd
Primary Treatment		
Primary Clarifiers	8 - 95' dia. x 8.25' SWD Circular, Center Feed with Mechanical Sludge Collectors and Surface Grease Skimmers	
- Surface Area Each	7,088 SF	
- Surface Area Total	56,704 SF	
- Average Flow	At 1,000 gpd / SF surface overflow rate	56.7 mgd
- Peak Hourly Flow	At 1,500 gpd / SF surface overflow rate	85 mgd
	At 2,204 gpd / SF surface overflow rate	125 mgd (Design Avg. Flow)
	At 2,821 gpd / SF surface overflow rate	160 mgd (Max. Flow)
Secondary Treatment	**Carbonaceous BOD Removal**	
Bio-Roughing Pump Station	27,830 CF wet well volume or 208,168 gallons	Detention Time of 2.0 minutes at 150 mgd
	4 - 50 mgd Horizontal Centrifugal Pumps with VFDs rated at 34,725 gpm at 60 ft. TDH at 500 rpm	150 mgd (Firm Peak)
Bio-Roughing Towers	4 - 150' dia. x 21.5' deep towers with self supporting 149 ft. dia. plastic media	
- Media Surface Area	17,436 SF each (69,744 SF total)	
- Media Volume	374,874 CF each (1,499,496 CF total)	Calc. by JTP/DPW
- Avg. Organic Loading	84 lbs. BOD_5 / 1000 CF / day	
- Vol. Surface Ratio	Plastic media - 27 SF / CF	
- Avg. Hyd. Loading Rate	1.25 gpm / SF (4 towers in use)	125 mgd
- Peak Hyd. Loading Rate	2.0 gpm / SF (3 towers in use)	150 mgd (Firm Peak)
- Min. Hyd. Loading Rate	0.5 gpm / SF (4 towers in use)	50.2 mgd

Table 2-10
Southport AWT Plant - Baseline Design and Loading Criteria - Continued

Treatment Process / Units	Unit Description	Capacity
Tertiary Treatment	**Nitrification**	
ONS Pump Station	6 - 120-inch dia. Open Archimedean Screw Pumps at 44,300 gpm design cap. per pump at 22 rpm and max. 16.56 ft. TDH	255 mgd with 2 of 3 pumps running per side (4 total of 6)
Oxygen Nitrification System	10 - 240' L x 60' W x 15' D Tanks	Currently Operated with Air
	With 4 Stages / Train	
- Average Flow		95 mgd (Avg. Daily)
- Peak Hourly Flow		120 mgd (Peak Hourly)
- Peak Hourly Flow	With Filter Backwash	131 mgd (Peak Hourly)
- Design Avg. BOD5 Load	33.9 lbs. BOD_5 / 1000 CF	
- Design Peak BOD5	63.3 lbs. BOD_5 / 1000 CF	
- Design Avg. NH3 Load	6.7 lbs. NH_3 / 1000 CF	
- Design Peak NH3 Load	10.6 lbs. NH_3 / 1000 CF	
- MLVSS Range	2600 - 4000 mg/L	
- Mean Cell Res. Time	13 days	
- Oxygen Generation	Cryogenic	
- Cryo O_2 Capacity	140 tons per day	Cryogenic off line
- Liquid O_2 (LOX) Storage	800 tons w/ 175 tpd vaporization cap.	LOX off line
ONS - Final Clarifiers	10 - 245' L x 90' W x 14.75' D Rectangular Clarifiers with sludge removal by traveling bridge siphon collectors	
- Average Flow	At 431 gpd / SF surface overflow rate	95 mgd (Avg. Daily)
- Peak Hourly Flow	At 549 gpd / SF surface overflow rate	120 mgd (Peak Hourly)
- Peak Hourly Flow	At 800 gpd / SF surface overflow rate	176 mgd (Peak Hourly)
Air Nitrification System	8 Trains of 4 Tanks - 188' L x 30' W x 15' D	
- Average Flow	Nitrification Mode	30 mgd (Avg. Daily)
- Peak Hourly Flow		30 mgd (Peak Hourly)
- Design Avg. BOD_5 Load	17.4 lbs. BOD_5 / 1000 CF	
- Design Peak BOD_5 Load	31.77 lbs. BOD_5 / 1000 CF	
- Design Avg. NH_3 Load	3.3 lbs. NH_3 / 1000 CF	
- Design Peak NH_3 Load	5.32 lbs. NH_3 / 1000 CF	
ANS - Final Clarifiers	8 - 100' Diameter	
- Average Flow	At 477 gpd / SF surface overflow rate	30 mgd (Avg. Daily)
- Peak Flow	At 796 gpd / SF surface overflow rate	50 mgd (Peak Hourly)
	Peak hourly same as design avg. flow	30 mgd (Peak Hourly)
Intermediate Pump Station (ANS effl. to ONS Effl.)	6,900 CF Wet Well Vol. or 51,612 gallons	Detention Time of 2.5 minutes at 30 mgd
	3 - 15 mgd Single Stage Axial Flow Variable Speed Pumps rated at 25 ft. TDH at 750 rpm	30 mgd (Firm Peak)

Table 2-10
Southport AWT Plant - Baseline Design and Loading Criteria - Continued

Treatment Process / Units	Unit Description	Capacity
Tertiary Treatment	**Effluent Filtration**	
Effluent Filters	12 - Mixed Media (Anthracite Coal and Sand) Filters with 2 cells per filter	
- Dimensions per Filter Cell	61 ft. L x 15.25 ft. W with 20-inch anthracite coal, 7 inch sand, and 12 inch gravel layers	Coal Layer Missing
- Surface Area per Cell	930 SF	2 Cells per Filter
- Total Surface Area	22,320 SF	For all 24 Filter Cells
- Average Flow	At 4.58 gpm / SF (11 Filters)	135 mgd (125 mgd Avg. Flow plus 10 mgd washwater recycle)
- Peak Flow	At 5.46 gpm / SF (11 Filters)	160 mgd (150 mgd Avg. Flow plus 10 mgd washwater) recycle)
- Peak Flow	At 5.0 gpm / SF (11 Filters)	147.4 mgd (Peak Hourly)
Effluent Disinfection	4 - 110' L x 25' W x 16' SWD Ozone Contact Tanks with 4 stage over and under baffling	Ozone off line with temp. Liquid NaOCl Bleach disinfection initiated in 1995, sodium bisulphite used for dechlorination.
- Contact Tank Vol. each	44,000 CF or 329,120 gallons	
- Contact Tanks Volume	176,000 CF or 1,300,000 gallons	
- Average Flow	Contact Time @ 125 mgd	15 minutes (Peak w/ Chlorine)
- Peak Flow	Contact Time @ 160 mgd	11.7 minutes (Peak w/ Ozone)
Effluent Pumping Station (diesel engine power supply)	34,650 CF Wet Well Volume or 259,200 gallons	Detention time of 3.0 min. at 125 mgd and 1.15 min. at 325 mgd
	7 - 54.2 mgd/61.2 mgd Double Stage Axial Flow Pumps with variable speed rated at 37,650 gpm at 290 rpm, and 42,500 gpm at 300 rpm	325 mgd (Firm Peak - 6 of 7 pumps running at 290 rpm), 428 mgd (Peak with all pumps running at maximum speed of 300 rpm)
	1 - 57.6 mgd Single Stage Axial Flow Submersible Pump with maximum speed rated at 44,000 gpm at 24 ft TDH	486 mgd (Peak with all pumps running at maximum speed)

References:

1.) "Preliminary Assessment of Wet Weather Improvements for Belmont AWT Facility (Phase II)," WREP (May 1998)
2.) "A Guide to the Southport Advanced Wastewater Treatment Facility," Indianapolis DPW bulletin (January 1984 approx.)
3.) "Task 1 Report - Review of Existing Belmont and Southport AWT Facilities, " WREP (February 2001)
4.) "Recommended Standards for Sewage Works," 1997 Edition.
5.) Based on observations made by WREP staff.
6.) Comment: Due to shallow depth, primary clarifiers can barely handle 140 mgd.
7.) "Operator's Guide" (1987)
8.) 1977 Design Summary for the Southport AWT Plant by Reid, Quebe, Allison, Wilcox & Associates, Inc.
9.) Design Drawings for the Headworks Screw Pump Replacement Project

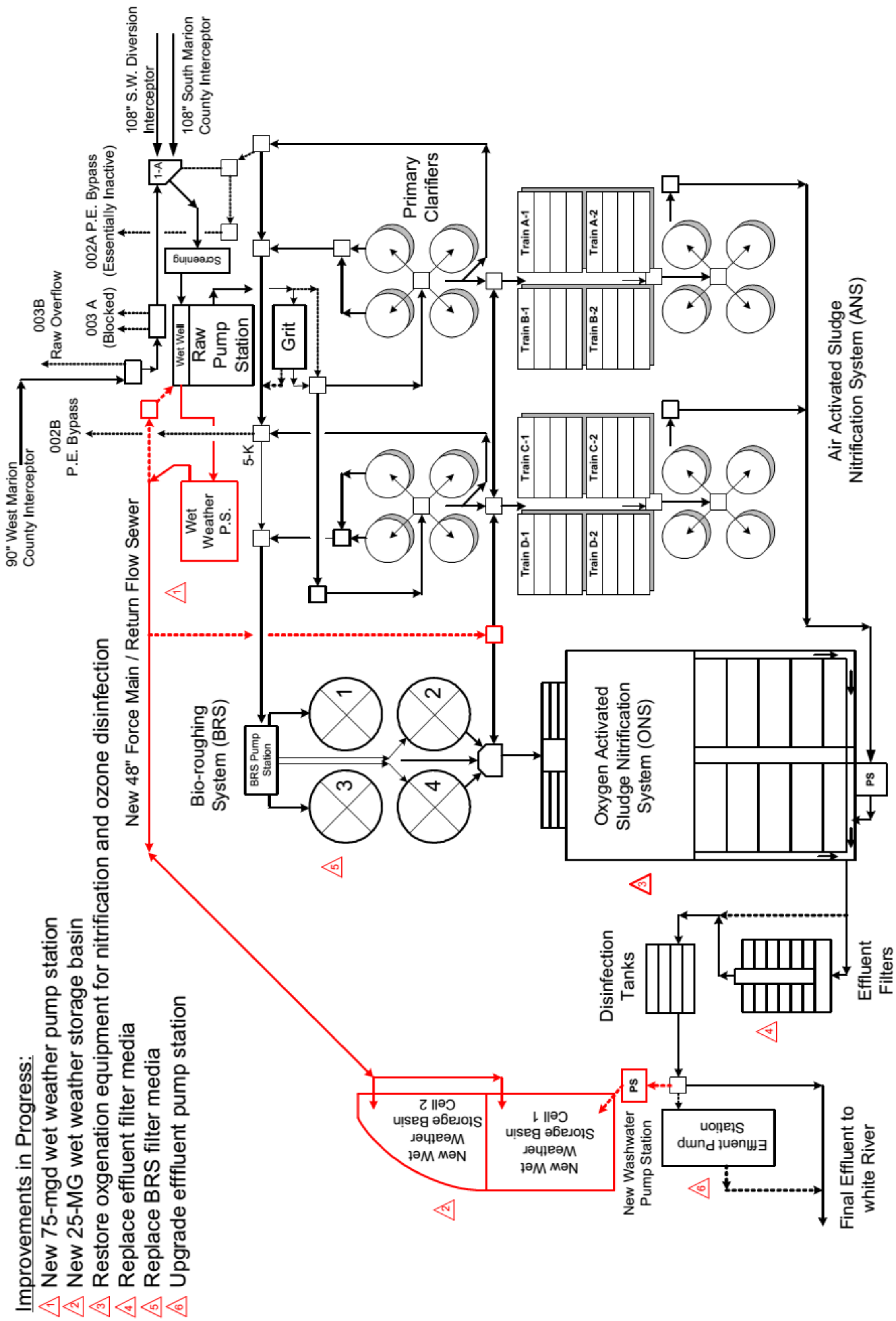

Figure 2-72
Southport AWT Plant Process Flow Schematic

Effluent from the ANS flows by gravity to two sets of four c circular, center-feed secondary clarifiers capable of settling flows up to 50 MGD (at 800 gallons per day/square foot (gpd/sf)). However, the intermediate pump station capacity from the ANS to the effluent filters is 30 MGD. Primary effluent flow that exceeds secondary treatment capacity is bypassed at Outfalls 002A or 002B. The primary effluent bypasses into Little Buck Creek, a tributary to the White River.

2.6.2.4 Southport Tertiary Treatment

Secondary clarifier effluent from ONS flows by gravity to 12 effluent filters that remove residual suspended solids. Secondary clarifier effluent from ANS has to be pumped to the effluent channel of the ONS clarifiers before filtration. Flow passes through the filter media, is collected by the underdrain system, and flows to the ozone contact tanks for disinfection. The effluent filters consist of multimedia similar to those at the Belmont AWT. The peak hourly effluent filtration capacity is approximately 150 MGD.

Filtered effluent flows by gravity to four contact tanks for disinfection during the April-October recreational season before being discharged to White River. Sodium hypochlorite and sodium bisulfite are used for effluent chlorination and dechlorination, respectively. Ozone disinfection will be resumed upon completion of a project to upgrade the oxygen ozone generation equipment. The disinfection process reduces the concentration of bacteria in the treatment plant effluent..

2.6.2.5 Southport Effluent Pumping

The Southport AWT plant was constructed in an area subject to occasional flooding. Accordingly, an earthen dike and floodwall system was constructed around the facility to protect it from flooding. The plant is also protected from high groundwater levels by a moat located inside several sections of the dike. These provisions include a high capacity effluent pumping station that is occasionally needed to pump treated effluent to the White River during times when discharge by gravity is not possible.

2.7 CSO Impacts on Water Quality

This section describes systemwide CSO impacts on water quality. It summarizes the *E. coli* bacteria, biochemical oxygen demand and total suspended solids sources along the White River in the combined sewer area, and presents a comparison with its various tributaries. Analyses are based on the *E. coli* bacteria information presented in the "White River TMDL Study" (IDEM, December 2003). CSO discharges consist of mixtures of domestic sewage, industrial and commercial wastewater, and storm runoff. CSOs often contain high levels of suspended solids, pathogens, toxic pollutants, floatables nutrients, oil and grease, and other pollutants. (U.S. EPA, 2001).

2.7.1 Pollutant Loads to the White River and Tributaries

2.7.1.1 *E. coli* Bacteria

Table 2-11 and **Figure 2-73** present the annual *E. coli* bacteria load discharged from CSOs into the White River and its tributaries. This information comes from the White River, Fall Creek and Pleasant Run TMDL studies (December 2003). The White River system consists of CSOs that discharge directly into the White River, the four system relief points (008, 117, 118, and 039), and the Primary Effluent (PE) Bypass at the Belmont AWT plant.

The *system relief points* are CSO discharge locations along the interceptor sewers. These system relief points act as regulators for those drainage areas in the Central Sub-Network that are directly connected to the interceptors.

The *Primary Effluent (PE) Bypass* is the wet-weather discharge outfall at the Belmont AWT plant. The Belmont PE Bypass point is the single largest point source of BOD and TSS loads within the wastewater treatment system. **Table 2-12** compares average annual PE Bypass volumes to estimated annual overflows at the nine largest CSO outfalls. The PE Bypass overflow estimate is based on measured data from 2001 through 2002. The CSO values are based on estimated CSO duration and overflow volumes reported in the Discharge Monitoring Reports for the same period. The PE Bypass at the Belmont AWT plant is the single largest discharge point for wet-weather flows. Because it is technically not part of the combined sewer network, the PE Bypass was not considered a "combined sewer overflow" during the 2003 TMDL study. However, the PE Bypass contribution to pollution in the White River has been addressed, as described in Section 7 of this LTCP.

Table 2-11
***E. coli* Bacteria from CSO Sources**

Watershed	Annual CSO *E. Coli* Load (cfu)
Fall Creek CSO	4.02E+16
Pleasant Run CSO	1.51E+16
Pogues Run CSO	4.67E+16
Eagle Creek CSO	2.05E+15
White River CSO & System Relief	5.23E+16
Full CSO System	1.56E+17

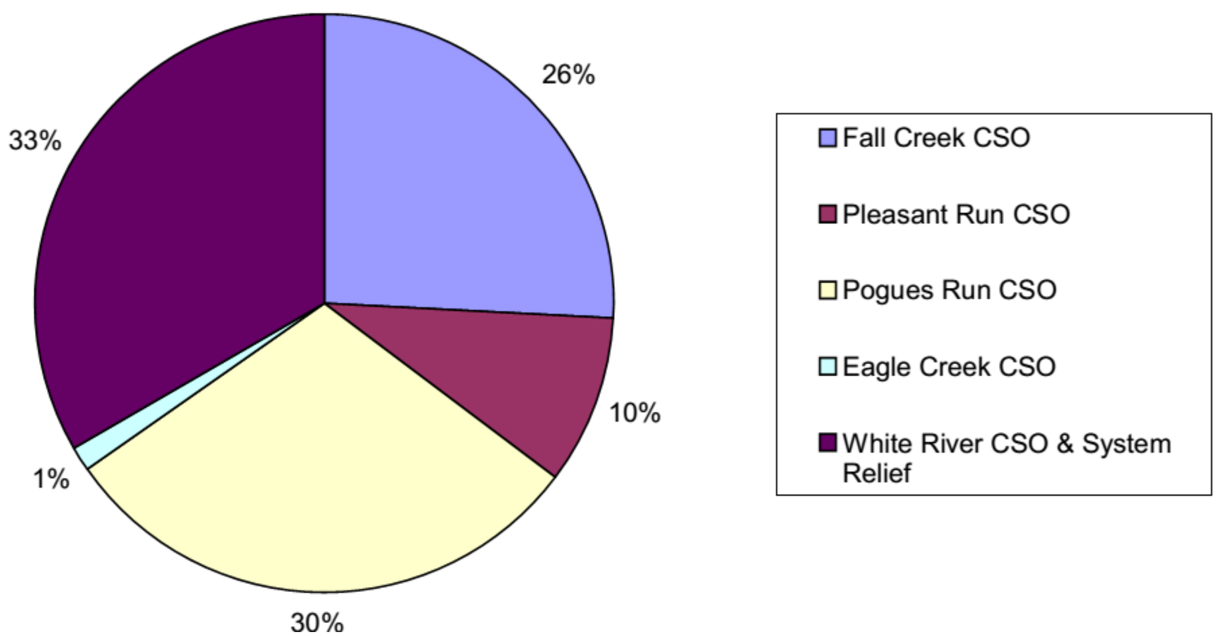

Figure 2-73
Average Annual *E. coli* Bacteria Load (cfu/yr) from CSO Sources
Total Load = 156,000 Trillion cfu/year

Table 2-12
Largest Overflow Points (Ranked by Average Annual Overflow Volume)
(*Outfall close to or associated with Belmont AWT Plant)

Outfall Number	Waterbody	Est. Annual Overflow Volume (MG per Year)	
		2001	2002
P.E. Bypass (007)□	White River	902	1768
CSO 008□	White River	695	1376
CSO 117□	White River	391	412
CSO 034	Pogues Run	375	284
CSO 051	Fall Creek	360	321
CSO 128	Pogues Run	299	307
CSO 062	Fall Creek	273	243
CSO 039	White River	240	270
CSO 115	Pogues Run	223	227
CSO 065	Fall Creek	183	195

Note: P.E. Bypass (007) and CSO 008 volumes are from the 2001 and 2002 Monthly Report of Operations (MRO) data submitted to IDEM. All other CSO volumes are from 2001 and 2002 CSO Discharge Monitoring Reports (DMR) submitted to IDEM.

2.7.1.2 Biochemical Oxygen Demand (BOD)

Figure 2-74 presents the location of the 10 largest CSO BOD load discharge points throughout the combined sewer area. **Table 2-13** summarizes the BOD load estimates for these outfalls. Three of the 10 discharge points are located along the White River, four along Fall Creek, and three on Pogues Run. The three system relief points along the White River are large CSO BOD load discharge points. CSO Outfalls 061 and 063 are relief points for the upper North Fall Creek interceptor. CSOs 051 and 062 are outfalls located along the South Fall Creek interceptor serving the two largest combined sewer drainage areas in the South Fall Creek area. In Pogues Run, CSO 115 is located along the downstream portions of the interceptor that serves most of the Pogues Run system, including the downtown area. CSO 115 functions as the system relief point for the Pogues Run interceptor, which explains the greater CSO volumes and pollutant loads.

2.7.1.3 Total Suspended Solids (TSS)

Figure 2-75 shows the location of the 10 largest CSO TSS load outfalls throughout the combined sewer area. **Table 2-14** summarizes the TSS load estimates for these CSO outfalls. As indicated, five of the 10 discharge points are located along Fall Creek and three in Pogues Run. The other two discharge points are the system relief points discharging to the White River. With two exceptions (CSO 099 and CSO 117), all the CSO outfalls with the largest BOD loadings also discharge the largest TSS loads. Based on the TSS load estimates, CSO 065 and CSO 128 are among the 10 largest discharge points. All but one of the system relief points (CSO 117) are among the largest TSS load discharge points.

The PE Bypass at the Belmont AWT plant is the largest wet-weather contributor of BOD and TSS in the CSO system. Furthermore, it discharges almost twice the BOD load and nearly half the TSS load of the next nine largest CSO contributors combined.

2.7.2 Impact of CSO Discharges on Marion County Streams

According to a 1996 *E. coli* bacteria study performed by the City, exceedances of the daily maximum *E. coli* bacteria standard occur approximately 180 days a year at the upstream county line. An analysis of the *E. coli* bacteria concentration in stormwater and CSOs concluded that:

- CSOs discharge approximately 60 times a year and their impact on water quality lasts for about three days (approximately 180 days per year) after the overflow event.

Table 2-13
Ten Largest CSO-Related BOD Load Discharge Points
(Excludes 007 PE Bypass: est. 1,177,000 lbs/year BOD load)

Rank	CSO	Tributary	Range of BOD Load (lbs/yr)
1	CSO 008	White River	620,000 - 1,458,000
2	CSO 118	White River	307,400 - 430,600
3	CSO 115	Pogues Run	197,500 - 275,000
4	CSO 034	Pogues Run	109,700 - 152,700
5	CSO 051	Fall Creek	106,100 - 147,800
6	CSO 061	Fall Creek	85,400 - 118,900
7	CSO 099	Pogues Run	83,700 - 115,900
8	CSO 063	Fall Creek	77,600 - 107,900
9	CSO 117	White River	65,600 - 89,200
10	CSO 062	Fall Creek	59,200 - 82,400

Source: 1997-2004 MRO data for CSO 008 and PE Bypass (007), 1950-2003 NetSTORM simulation for all other CSOs.

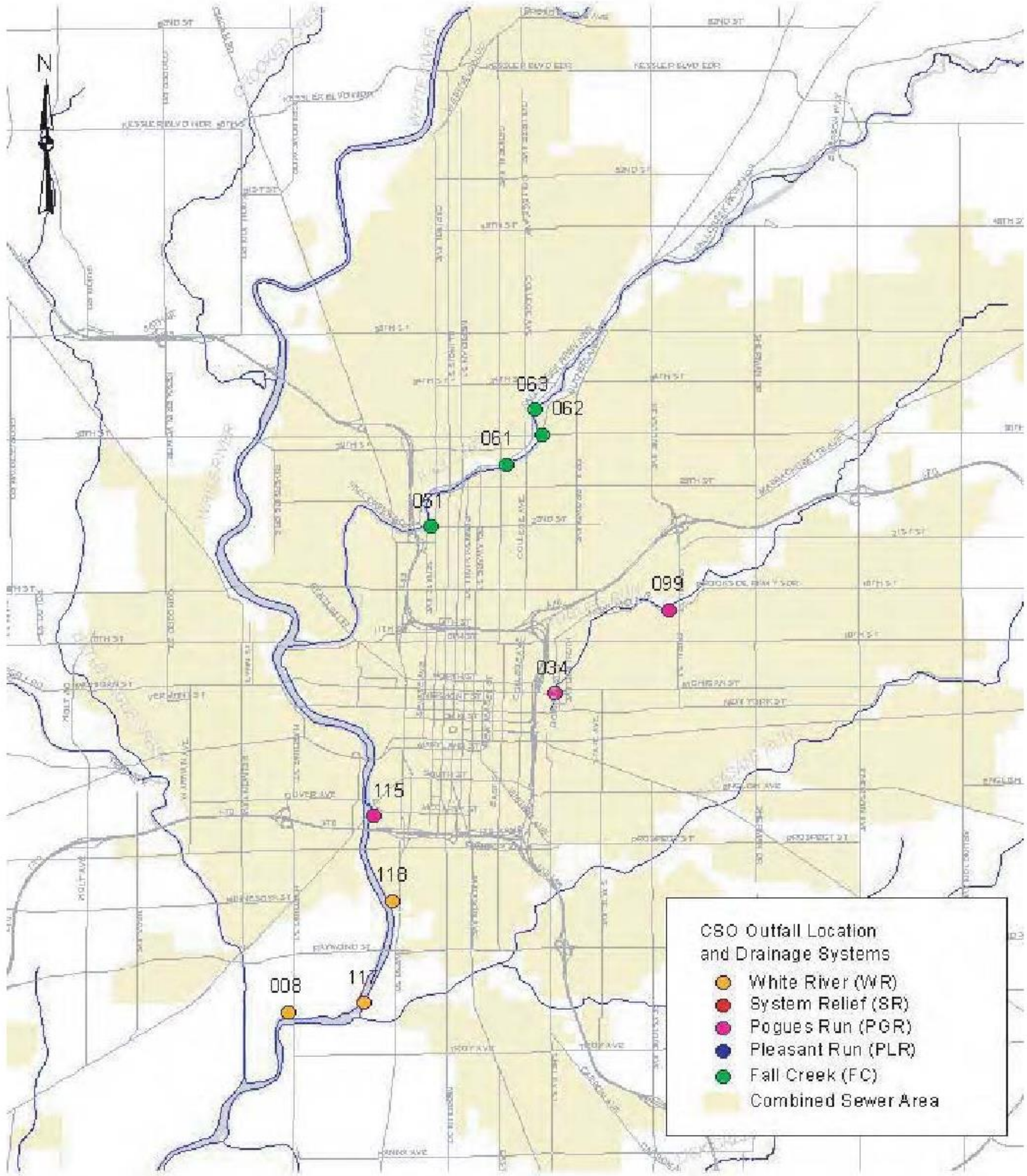

Figure 2-74
Ten Largest CSO BOD Load Discharge Points (excludes 007 PE Bypass)

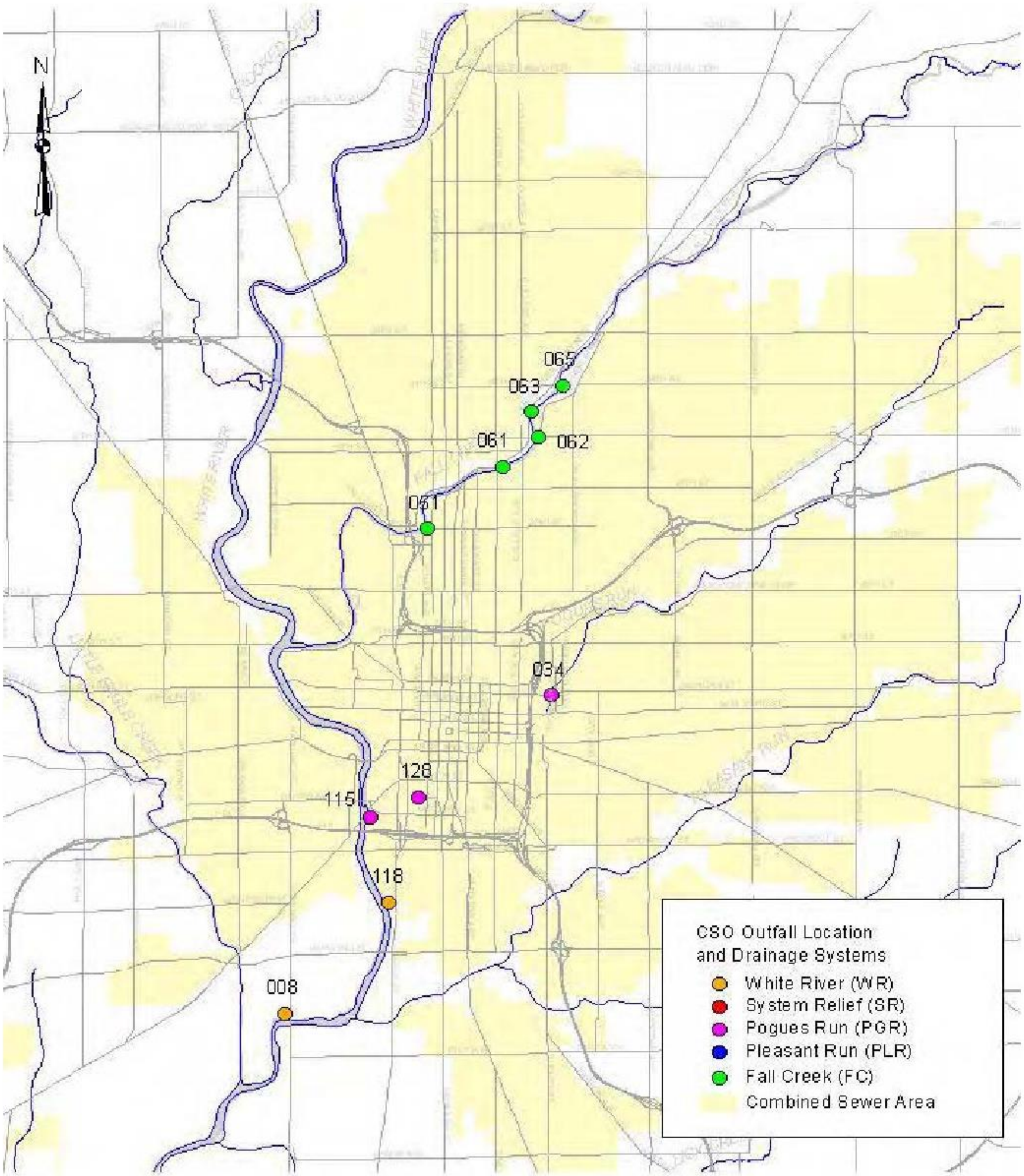

Figure 2-75
Ten Largest CSO TSS Load Discharge Points (excludes 007 PE Bypass)

Table 2-14
Ten Largest CSO-related TSS Load Discharge Points
(Excludes 007 PE Bypass: est. 1,279,000 lbs/year TSS load)

Rank	CSO	Tributary	Range of TSS Load (lbs/yr)
1	CSO 008	White River	976,000 - 2,639,000
2	CSO 118	White River	631,900 - 858,800
3	CSO 115	Pogues Run	538,900 - 731,200
4	CSO 061	Fall Creek	425,800 - 576,900
5	CSO 051	Fall Creek	390,600 - 529,500
6	CSO 063	Fall Creek	241,600 - 327,600
7	CSO 034	Pogues Run	214,800 - 291,700
8	CSO 062	Fall Creek	180,400 - 244,700
9	CSO 065	Fall Creek	174,100 - 236,100
10	CSO 128	Pogues Run	169,600 - 229,900

Source: 1997-2001 MRO data for CSO 008 and PE Bypass (007), 1950-2003 NetSTORM simulation for all other CSOs.

- Stormwater discharges that lead to a significant water quality impact occur at least 60 times a year, but their impact on water quality lasts two days after the event, or approximately 120 days per year.
- Since both stormwater and CSO discharges are caused by rainfall, the discharges often occur simultaneously. The impact of CSO discharges lasts longer because of the higher bacteria counts in CSOs.

Previous analysis concluded that reducing CSO discharges would reduce the days of exceedances of the *E. coli* daily maximum bacteria standard (235 cfu/100 mL) by one day for every systemwide CSO event eliminated. Recent studies have examined the problem in more detail. The more detailed analysis was possible because of additional instream data and several studies, including TMDL studies on White River, Fall Creek, Pleasant Run, and Bean Creek that required a more detailed review of available water quality data. The Office of Environmental Services, Marion County Health Department and IDEM instream *E. coli* data from the years 2000, 2001, and some of 2002 were used for all sampling stations within the CSO area. These data included information on tributaries as well as White River.

Frequency distribution plots were developed by compiling all the data from the sampling stations along each stream. These plots are shown in **Figures 2-76** through **2-81**. The data were plotted from low to high to demonstrate the percent of time *E. coli* values achieved a certain level in the stream during the sampling period. The plots illustrate the state's 235 cfu/100 mL recreational standard as well as an *E. coli* benchmark of 2000 cfu/100 mL. (The 2000 cfu/100 mL benchmark was analyzed for informational purposes only, since it is not a regulatory threshold or standard.

The percent of time that sampling results are linked to CSOs and stormwater is based on the frequency of stormwater and CSO discharges and the travel time for the specific stream. For example, Pleasant Run has stormwater discharges approximately 60 times per year and an impact time of 24 hours. Therefore, stormwater impacts occur 60 days, or 16 percent of the year. The percent of time that stormwater discharges, but not CSOs, are impacting *E. coli* levels is illustrated within the area marked "stormwater influence." The most frequent CSOs discharge 45 times per year on Pleasant Run, or 45 days (12 percent) of the year. Both stormwater and CSOs are impacting the stream for samples that fall within the area marking the "beginning of CSO influence." CSOs are the primary factor affecting in-stream water quality for samples labeled "CSO dominant." These results, and other aspects of CSO impacts on water quality are discussed in more detail in the January 7, 2003, "Presentation Supplement for CSO Control Technology Evaluation" and the May 2003 "Supplemental Information to the CSO Control Technology Evaluation Meeting."

Figure 2-82 illustrates the analysis of downstream CSO impacts based upon water quality modeling of the White River. These results indicate that Indianapolis CSO discharges caused by a 1-year storm in Marion County

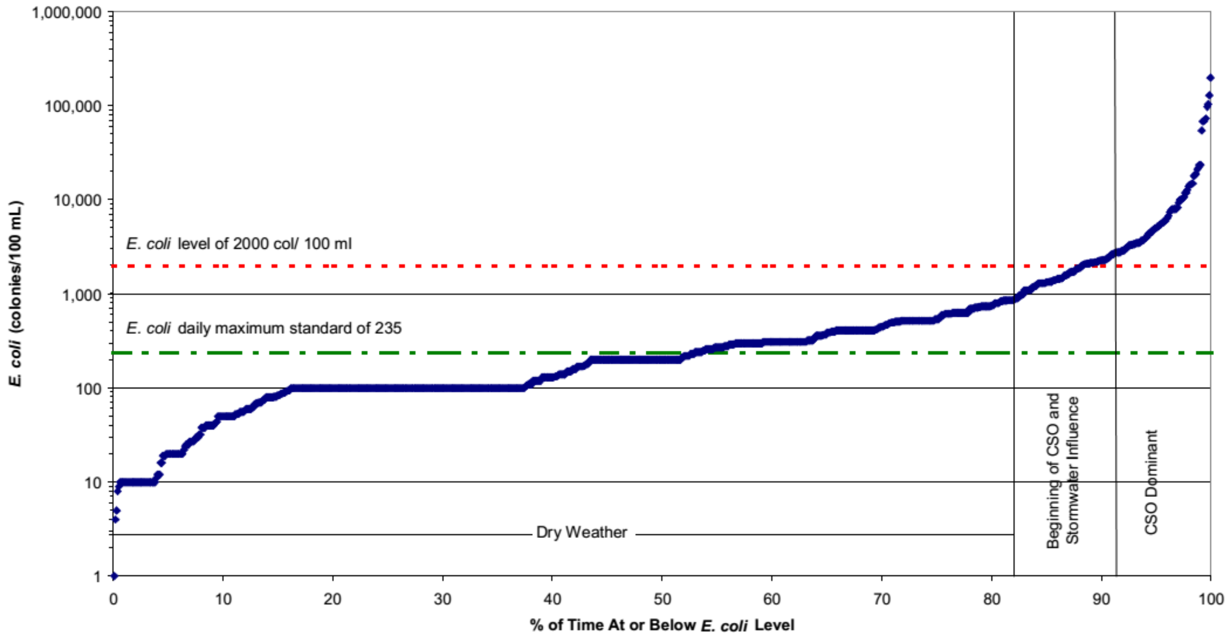

Figure 2-76
Monitored Instream *E. coli* Bacteria Concentrations Frequency Curve
White River in Indianapolis - January 2000 to December 2001

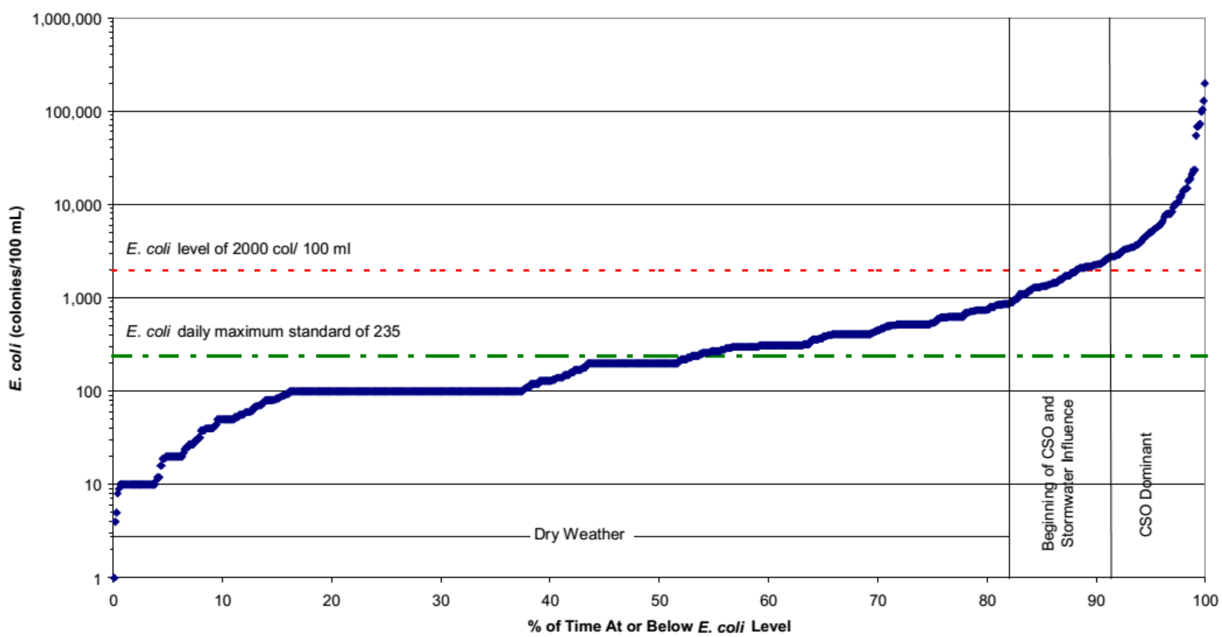

Figure 2-77
Monitored Instream Bacteria Concentrations Frequency Curve
Fall Creek - January 2000 to July 2002

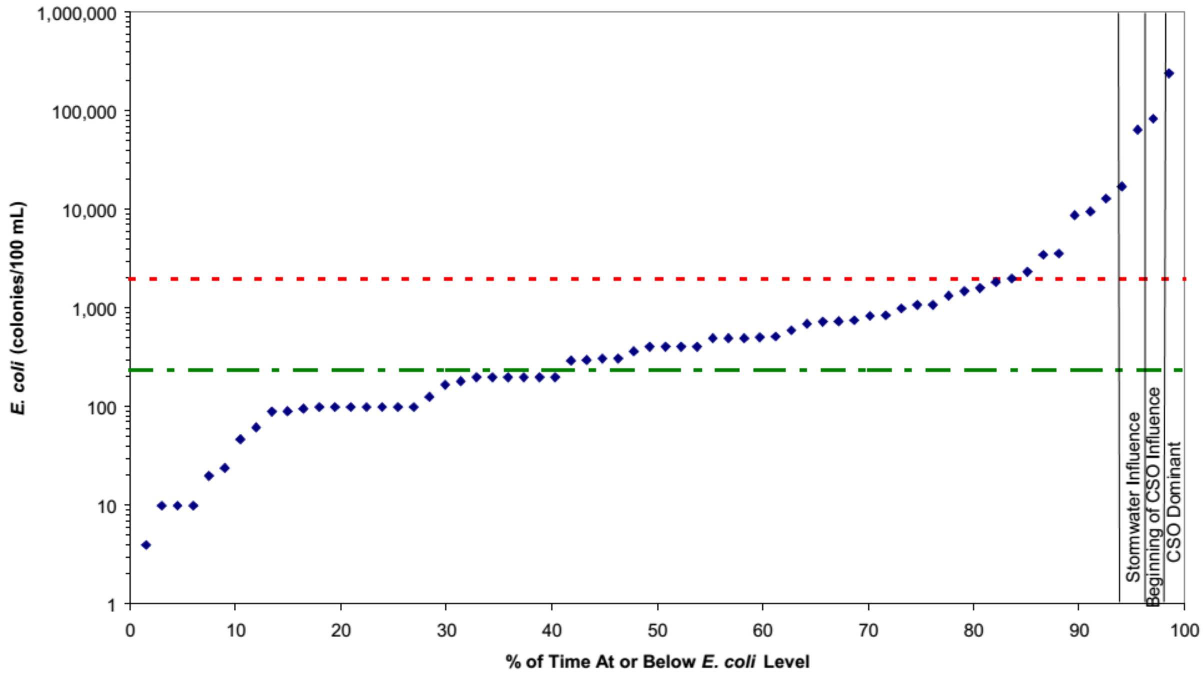

Figure 2-78
Monitored Instream Bacteria Concentrations Frequency Curve
Eagle Creek - January 2000 to December 2001

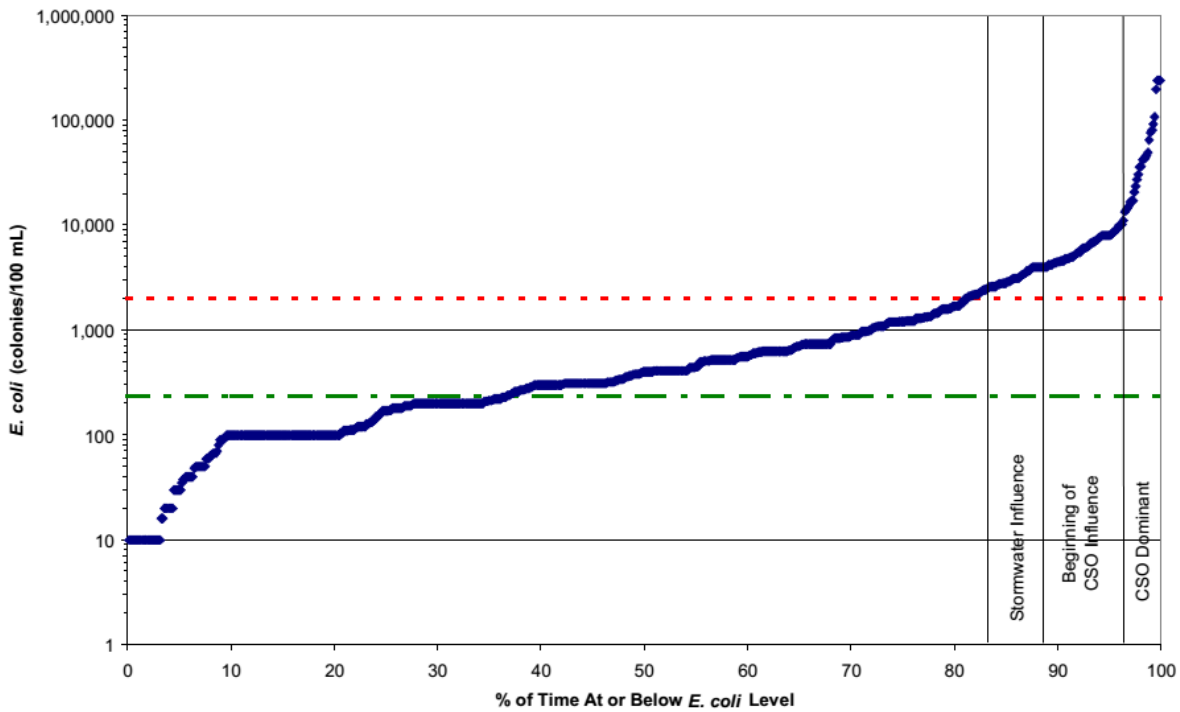

Figure 2-79
Monitored Instream Bacteria Concentrations Frequency Curve
Pleasant Run- January 2000 to July 2002

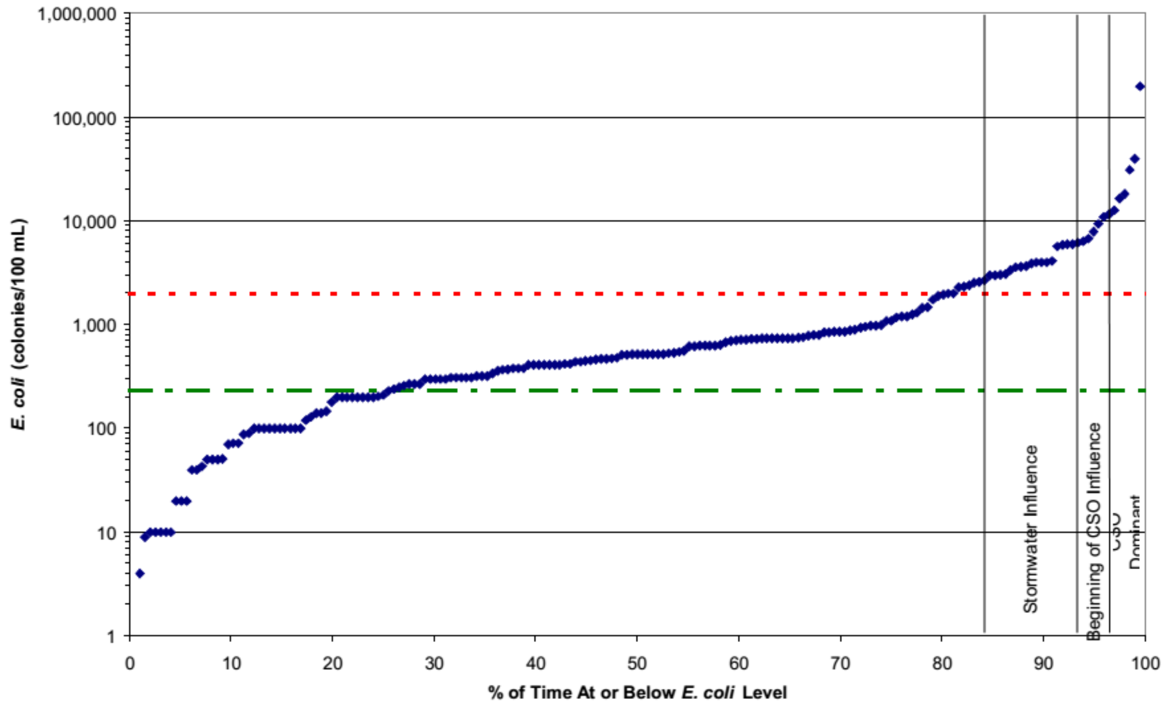

Figure 2-80
Monitored Instream Bacteria Concentrations Frequency Curve
Bean Creek - January 2000 to July 2002

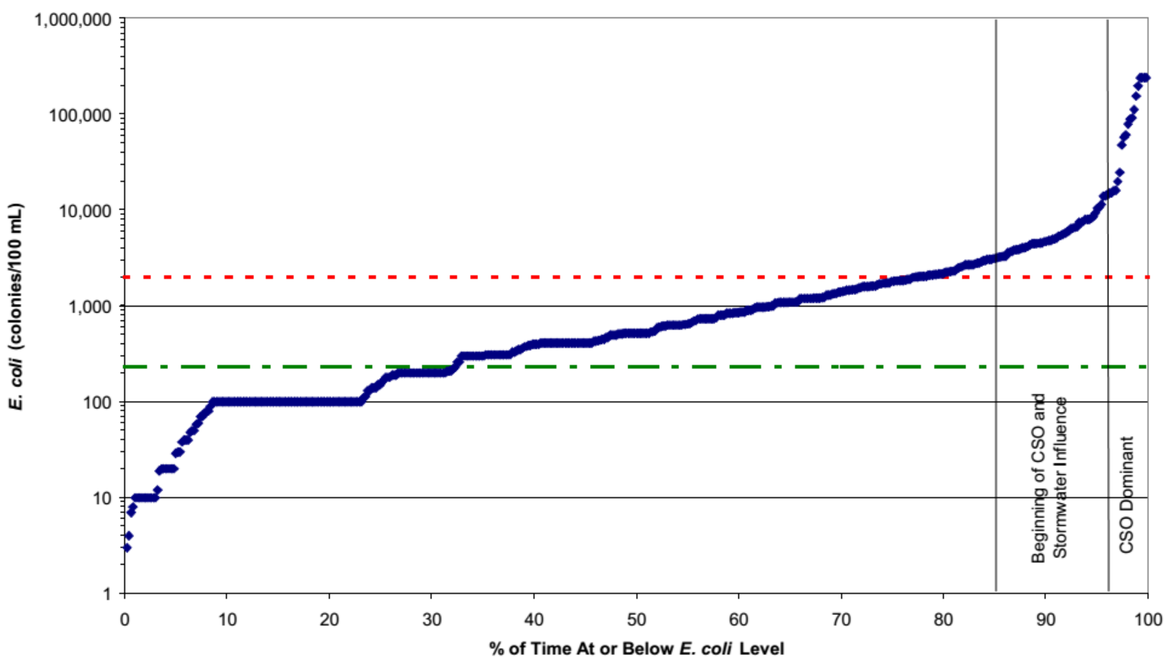

Figure 2-81
Monitored Instream Bacteria Concentrations Frequency Curve
Pogues Run - January 2000 to December 2001

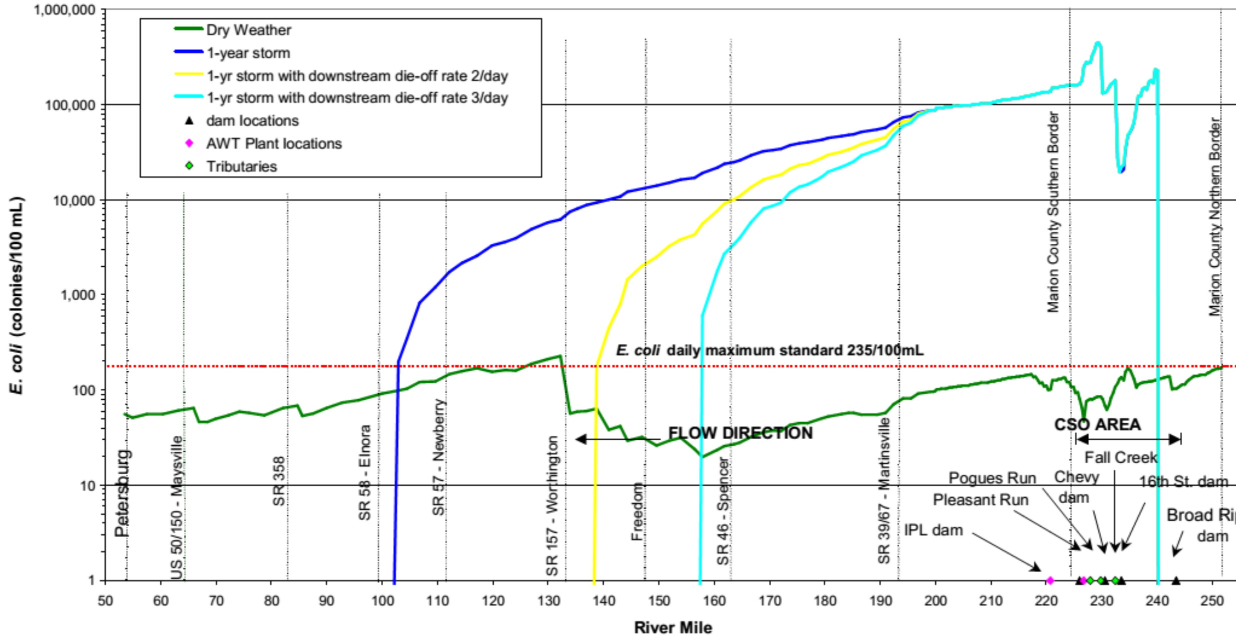

Figure 2-82
Maximum Predicted Bacteria Concentrations Caused by CSOs in the White River for Various Scenarios - Huff 50th Percentile 1-Year, 6-Hour Event (Excludes Background and Non-point Source Contributions)

May contribute to exceedances of the *E. coli* daily maximum bacteria standard to a downstream point somewhere between Newberry an d Petersburg (a distance of approximately 140 river-miles from the Belmont AWT plant).

Instream water quality data collected by the City of Indianapolis and data reported by IDEM appear to support the modeling results presented in **Figure 2-82**. **Figure 2-83** shows sampled *E. coli* bacteria levels downstream from Marion County at Waverly (river-mile 211), Centerton (river- mile 199), and Martinsville (river-mile 190). These data show that *E. coli* conditions improve from 30 percent compliance at Waverly to 45 percent compliance at Centerton and 64 percent compliance at Martinsville. It is important to note that there are multiple potential sources for bacteria loads in White River both upstream and downstream of Marion County. These sources also contribute to non-attainment of water quality standards downstream of Indianapolis.

2.8 Non-CSO Pollution Sources in the Watershed

In addition to CSOs, other factors contribute to water quality problems in the White River and its tributaries. This section will examine those other contributing factors and discuss their impacts on the river system. The focus is on non-CSO sources that contribute to poor water quality in the White River system, including lack of dissolved oxygen, high *E. coli* bacteria, and poor aesthetics such as solids, floatables, and odors. Analyses are based on the *E. coli* bacteria information presented in the *White River TMDL Study* (IDEM, December 2003), *Fall Creek TMDL Study* (IDEM, December 2003), and the *Pleasant Run and Bean Creek TMDL Study* (IDEM, December 2003).

The pollution concerns in the White River system are varied and dynamic. Significant non-CSO pollutant sources to the White River system include the following:

- Stormwater
- Failing septic systems
- Illicit sanitary connections to storm sewers

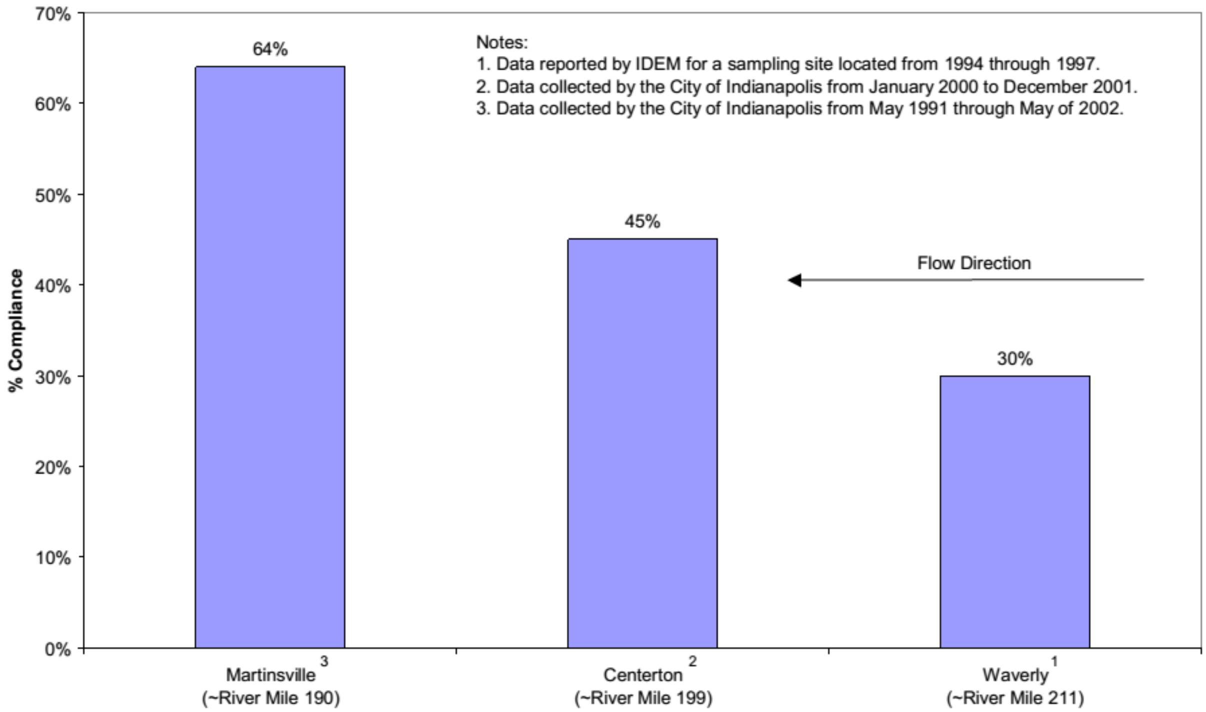

Figure 2-83
Percent Compliance with Indiana Single Sample Maximum of *E. coli* Standard on the White River Downstream of Marion County

- Urbanization
- Domestic animals and wildlife
- Sediment oxygen demand
- Belmont and Southport AWT plant discharges
- Pollutant sources upstream and downstream of Marion County

In addition to these sources, there are three additional factors that can aggravate pollution problems in Indianapolis waterways. They are:

- Dams
- Indianapolis Power & Light heated cooling water discharges
- Water withdrawals for public drinking water

2.8.1 Stormwater

Stormwater often carries *E. coli* bacteria because of loadings from domestic animals, wildlife and agricultural land. **Table 2-15** presents a summary of the annual surface runoff *E. coli* bacteria loadings into White River and its tributaries, based upon water quality modeling. This load contains all sources of *E. coli* bacteria carried by stormwater runoff, including wildlife. **Figure 2-84** shows these same data in a pie chart. The chart shows that sources upstream of Marion County and along the White River north of the CSO area contribute 50 percent of the average annual *E. coli* bacteria load from stormwater sources.

The City, as part of the state permit required that data on the quality of urban stormwater runoff be collected. Water quality samples were collected at three storm drain outfalls for three storms. The drainage areas to the three storm drains had representative areas of low density residential, commercial, and industrial land use. All samples were above the former U.S. EPA fecal coliform water quality standard of 200 colony forming units (cfu)/100 mL. Bacteriological monitoring confirms that stormwater contributes to high bacteria levels in Indianapolis area waterways. Although controlling CSOs is the most critical factor in improving bacteriological

Table 2-15
***E. coli* Bacteria from Stormwater Sources**

Watershed	Daily Average Stormwater Load (cfu)	Annual Stormater Load (cfu)
Mud Creek	1.79E+11	6.52E+13
Fall Creek Upstream of the CSO Area	1.24E+12	4.52E+14
Fall Creek CSO Area	3.40E+11	1.24E+14
Fall Creek Total	**1.76E+12**	**6.41E+14**
Pleasant Run Upstream of the CSO Area	2.56E+11	9.34E+13
Pleasant Run CSO Area	4.35E+10	1.59E+13
Pleasant Run Total	**2.99E+11**	**1.09E+14**
White River Upstream of Marion County	7.06E+11	2.58E+14
White River North	4.54E+12	1.66E+15
White River CSO Area – Includes Pogues Run and Eagle Creek	1.90E+12	6.95E+14
White River South	1.24E+12	4.51E+14
White River & Tributary Total	**1.04E+13**	**3.81E+15**

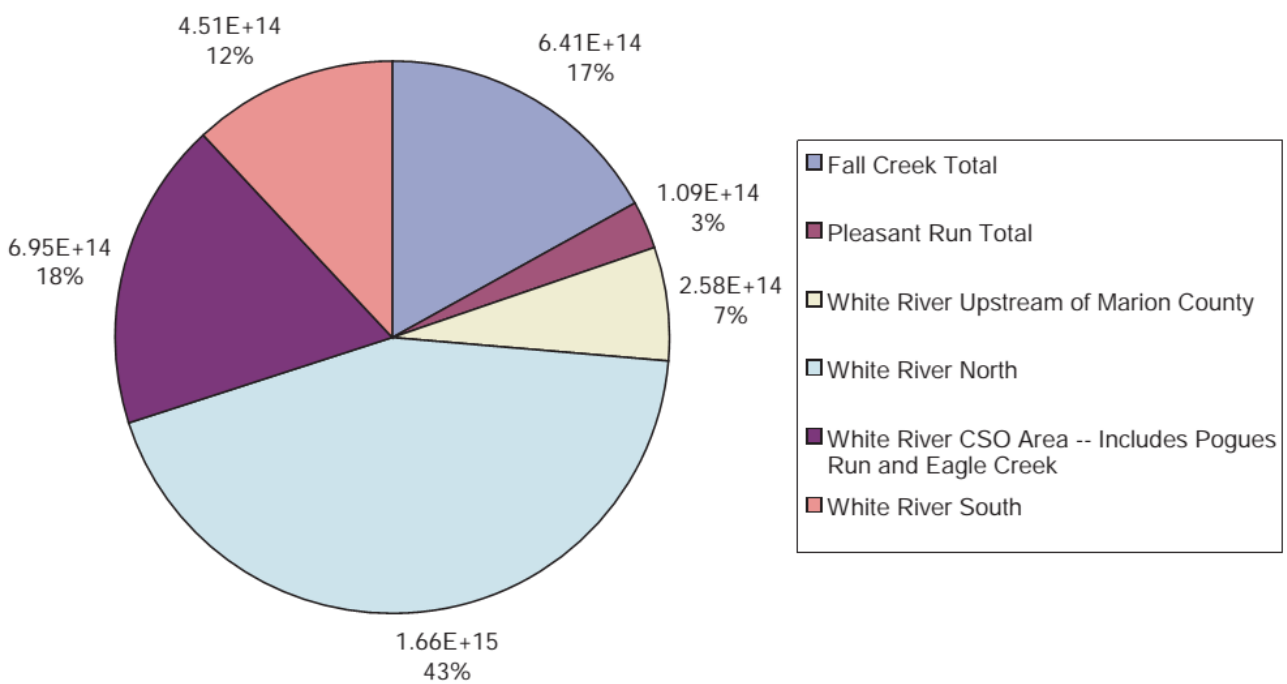

Figure 2-84
Average Annual *E. coli* Bacteria Load (cfu/yr) from Stormwater Sources Total Load = 3,810 Trillion cfu/year

conditions, urban stormwater also contributes to water quality exceedances. Based on bacteriological monitoring results, the water quality model estimates stormwater runoff concentrations averaging 5,000 *E. coli* colonies/100 mL in each drainage basin in Indianapolis.

The estimate was based on sampling conducted for the City's stormwater permit application, an extensive 18-month bacteriological survey in 1996 and 1997, representative sampling of storm sewers, CSO project-related data, and the river monitoring program. Based on existing data and studies in similar communities, relative contributions to in-stream stormwater bacteria concentrations were estimated to equal 1,000 colonies/ 100 mL from septic systems, 2,000 colonies/100 mL from surface runoff, 1,500 colonies/100 mL from illicit sewer connections, and 500 colonies/100 mL from background sources, such as waterfowl, fish, etc. The sources of bacteria in stormwater are described in greater detail in the text that follows.

2.8.2 Septic Systems

Areas within Marion County that are not served by sanitary sewers are a potential threat to the health, welfare, and environment of the community. In past years, county administrators have allowed developers in unsewered areas to utilize septic systems as a means to handle sanitary waste. While some septic system permits are still issued each year, the number of residential septic systems has declined by about 30 percent since 1990, according to the Marion County Health Department. Although septic systems remain a viable disposal option for some rural areas in Indiana, they require suitable soils, geology, and enough space to prevent the occurrence of health and environmental hazards. Unfortunately, due to rapid development in Marion County, there are very few areas where all the aforementioned criteria can be adequately met. In addition, many older neighborhoods rely on septic systems that are more than 20 years old. Aging septic systems have a greater risk of failure.

When a septic system fails, sewage is forced to the ground surface, resulting in pools of wastewater in residential yards. This sewage can carry a variety of disease-causing bacteria. Residents often construct tiles and other illicit connections to divert sewage and/or laundry and sink water to ditches and streams. Failing systems also can transport contaminants into groundwater and nearby drinking water wells. Stormwater also can carry septic system contaminants to streams.

While CSOs contribute significant concentrations of *E. coli* into Marion County streams, they are episodic and intermittent in nature. Failing septic systems are a more persistent problem throughout the year. Because failed septic systems are more widespread and persistent than CSOs, septic systems on their own lead to a significant number of days of bacteria violation in Indianapolis, particularly during dry-weather. **Table 2-16** summarizes the estimated failed septic *E. coli* bacteria loadings into the White River and its tributaries. **Figure 2-85** illustrates the same data proportionally, showing that failing septic systems along the White River upstream of the CSO area contribute 44 percent of the average annual *E. coli* bacteria load from septic sources. Failing septic systems along Fall Creek and Pleasant Run each contribute another 21 percent of the average annual load.

2.8.3 Illicit Sanitary Connections to Storm Drains

Stormwater outfalls can carry *E. coli* bacteria from illicit sanitary connections to the stormwater collection system. The City of Indianapolis Fifth Annual Report (2002) for the NPDES stormwater permit (AMEC, 2002) reported that approximately 7.7 percent of the stormwater outfalls sampled contained dry-weather flows. This flow is assumed to contain *E. coli* bacteria. **Table 2-17** summarizes the estimated *E. coli* bacteria loadings to Marion County streams from illicit storm sewer connections. **Figure 2-86** illustrates this same data proportionally, showing that Fall Creek contributes 33 percent and Pleasant Run 22 percent of the average annual *E. coli* bacteria load from unpermitted sanitary connections.

The Department of Public Works OES responds to complaints of dry-weather discharges from stormwater outfalls. The MCHD has the legal authority to take enforcement actions for illicit connections. Once dry-weather stormwater discharges are identified and found to be illegal, OES refers them to MCHD to further investigate and take appropriate action against the illegal discharger.

From 1998 to 2002, OES had a dry-weather stormwater outfall screening program as required by Phase I of the NPDES stormwater permit. During this five-year period,

Table 2-16
***E. coli* Bacteria from Failed Septic Sources**

Watershed	Estimated Failing Septic Daily Load (cfu)	Estimated Failing Septic Annual Load (cfu)
Mud Creek	4.11E+09	1.50E+12
Fall Creek Upstream of the CSO Area	4.25E+10	1.55E+13
Fall Creek CSO Area	0.00E+00	0.00E+00
Fall Creek Totals	**4.66E+10**	**1.70E+13**
Pleasant Run Upstream of the CSO Area	5.39E+09	1.97E+12
Pleasant Run CSO Area	4.18E+09	1.53E+12
Pleasant Run Totals	**9.57E+09**	**3.49E+12**
Howland & Johnson Ditch	1.64E+10	5.99E+12
Crooked & Williams Creek	4.17E+10	1.52E+13
White River North	3.91E+10	1.43E+13
Eagle & Guion Creek	2.18E+09	7.96E+11
White River CSO Area -- Includes Pogues Run	2.04E+10	7.44E+12
State Ditch, Buck & Lick Creek	2.16E+10	7.87E+12
White River South	2.57E+10	9.37E+12
White River & Tributary Total	**2.23E+11**	**8.15E+13**

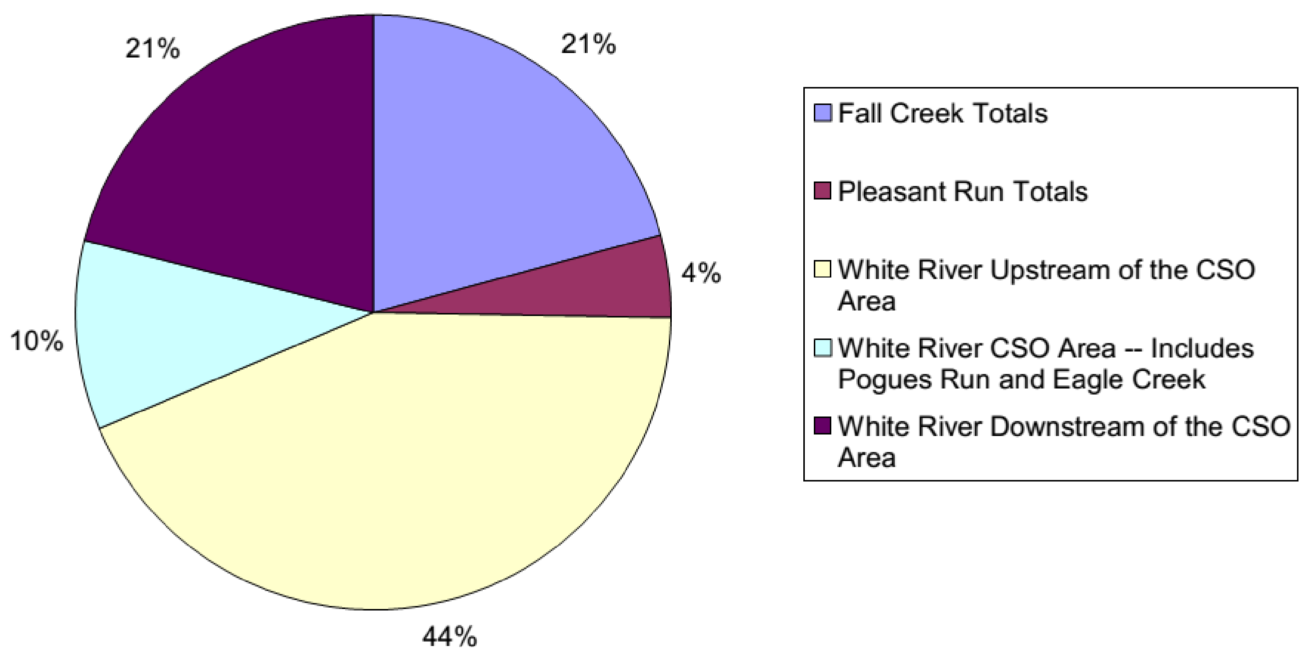

Figure 2-85
Average Annual *E. coli* Bacteria Load (cfu/yr) from Failing Septic Sources Total Load = 81.5 Trillion cfu/year

OES screened 100 stormwater outfalls greater than 24 inches in diameter during dry-weather each year, and sampled any dry-weather discharges found. After surveying 500 outfalls, OES had identified approximately 25 illicit connections and referred them to MCHD for further action.

2.8.4 Urbanization

U.S. EPA and states develop biological assessment tools and biological criteria to reflect and interpret the biological integrity goal of the Clean Water Act as the natural (or minimally impacted) condition of the water body. Many factors inhibit the attainment of natural aquatic communities in urban areas: the amount of impervious surface, human activity, and/or the type and extent of hydrologic modifications. Some recent literature suggests the restoration of natural aquatic life communities may not be feasible in small watersheds with heavily urbanized areas. One study found significant impairment of aquatic life where levels of impervious cover in urban areas were in the range of 8 percent to 20 percent (Schuler, 1994). Another found this threshold level is also influenced by other factors such as pollutant loadings, watershed development history, riparian buffers, CSOs, and types of land use (Yoder, 1999). More sensitive aquatic life, such as brook trout, may be unable to survive in watersheds with as little as 1 percent to 2 percent impervious land cover.

2.8.5 Domestic Animals and Wildlife

Pets and wildlife that have adapted to an urbanized landscape can be a significant source of bacteria in an urban stream. In recent years, scientists have experimented with bacterial source tracking, a new methodology to determine the sources of fecal bacteria from environmental samples (from human, livestock, or wildlife origins). Both molecular (genotype) and biochemical (phenotype) fecal sourcing methods are under development. DNA fingerprinting has received the greatest publicity, but there are other methods described in scientific literature that show potential.

A number of studies have used fecal sourcing methods to identify the sources of bacteria in a watershed. A study released on October 26, 2000, by the Northern Virginia Regional Commission and Virginia Tech identified not only the sources, but also the relative contributions of waterfowl, dogs, humans and wildlife to bacteria pollution in an urbanized watershed. The study used DNA analysis to track sources of waterborne *E. coli* in the Four Mile Run watershed in suburban Washington, D.C., an area that includes the predominantly residential communities of Arlington, Alexandria, Falls Church, and Fairfax County, Virginia. The area does not include any combined sewer systems. Fecal coliform monitoring in the Four Mile Run watershed shows that approximately 50 percent of samples taken since 1990 have exceeded the Virginia state water quality standard for fecal coliform bacteria.

The City estimated *E. coli* bacteria loadings from wildlife sources have been estimated as part of the TMDL analysis. **Table 2-18** summarizes the estimated *E. coli* bacteria loadings into the White River that are a result of natural biota in the watersheds. **Figure 2-87** illustrates this same data proportionally, showing that 56 percent of the average annual *E. coli* bacteria load is found in White River south of Marion County, with 29 percent coming from White River upstream of Marion County. This load represents wildlife or natural *E. coli* bacteria during dry-weather conditions only. *E. coli* bacteria from wildlife or natural sources that is conveyed to the river by surface runoff is discussed in the stormwater discussion in Section 2.8.1.

2.8.6 Sediment

The organic matter deposited in the sediment on the riverbed creates a sediment oxygen demand (SOD). Though not a direct factor, SOD has an effect on the dissolved oxygen in the river system. The organic matter comes from natural sources, such as leaves, as well as from CSO discharges and the partially treated PE Bypass from the Belmont AWT plant. Once deposited on the riverbed, SOD exerts a dissolved oxygen demand. Better CSO controls will reduce future deposits of new organic matter, and thereby reduce the SOD.

2.8.7 Belmont and Southport AWT Plant Discharges

During dry-weather, both the Belmont and Southport AWT plant facilities discharge highly treated effluent that

Table 2-17
E coli Bacteria from Unpermitted Sanitary Connections

Watershed	Estimated Unpermitted Connection Daily Load (cfu)	Estimated Unpermitted Connection Annual Load (cfu)
Mud Creek	3.03E+07	1.11E+10
Fall Creek Upstream of the CSO Area	9.08E+07	3.32E+10
Fall Creek CSO Area	5.30E+07	1.93E+10
Fall Creek Totals	**1.74E+08**	**6.36E+10**
Pleasant Run Upstream of the CSO Area	5.30E+07	1.93E+10
Pleasant Run CSO Area	6.06E+07	2.21E+10
Pleasant Run Totals	**1.14E+08**	**4.14E+10**
Crooked Creek & Johnson Ditch	6.81E+07	2.49E+10
Williams Creek	3.79E+07	1.38E+10
White River North	1.51E+07	5.53E+09
White River CSO Area -- Includes Pogues Run and Eagle Creek	9.08E+07	3.32E+10
White River South	1.51E+07	5.53E+09
White River & Tributary Total	**5.15E+08**	**1.88E+11**

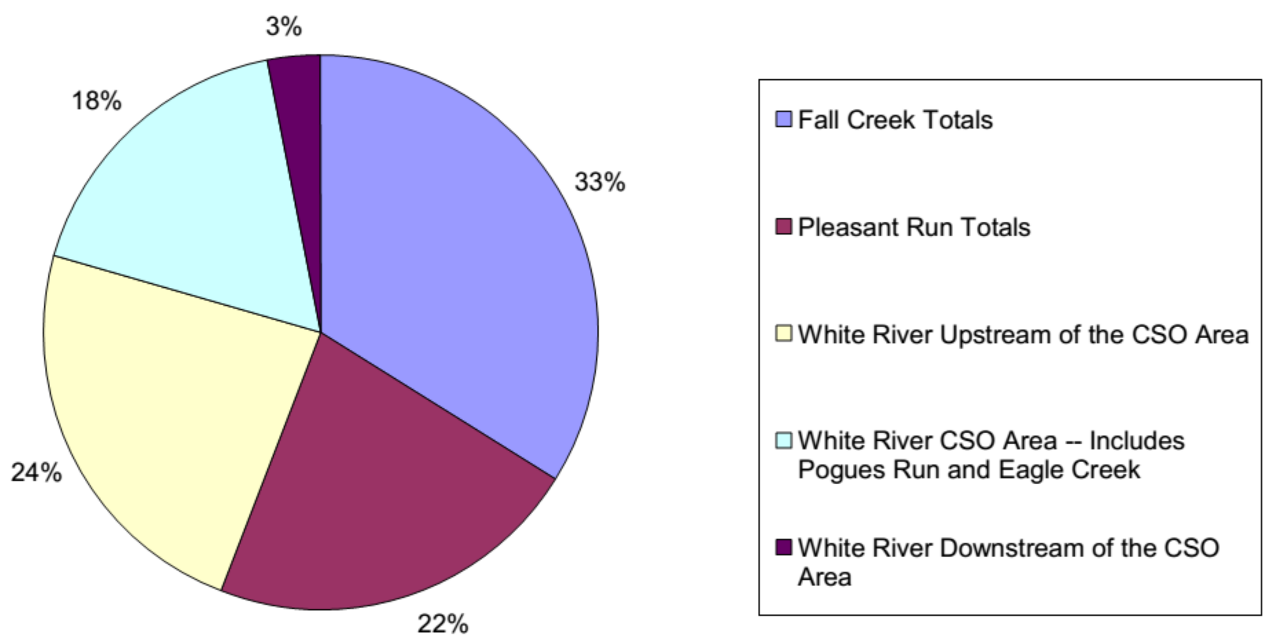

Figure 2-86
Average Annual *E. coli* Bacteria Load (cfu/yr) from Unpermitted Sanitary Sources Total Load = 0.188 Trillion cfu/year

is seasonally disinfected. During wet weather, the Belmont AWT plant often receives inflow that receives primary treatment but exceeds the secondary treatment capacity. Flows that exceed secondary capacity are discharged without disinfection to the White River. Under these wet-weather conditions, the Belmont AWT plant can contribute to exceedances of the dissolved oxygen and bacteria water quality standards.

As a requirement of its NPDES permits, the City monitors effluent at its AWT plants for *E. coli* bacteria during the recreational season, when the effluent must be disinfected. **Table 2-19** summarizes the estimated daily and annual *E. coli* bacteria loadings into the White River from the Belmont and Southport AWT plants. **Figure 2-88** displays this same data graphically, showing that 56 percent of the average annual load comes from the Southport AWT plant and 44 percent from the Belmont AWT plant.

2.8.8 Pollutant Sources Upstream of Marion County

The White River also receives pollutants from sources upstream of Marion County. These upstream sources include major wastewater treatment plants at Carmel, Anderson, Noblesville, and Muncie; urban stormwater runoff; and agricultural sources. To support the White River TMDL Study (IDEM, December 2003), the City's monitoring programs collected sampling data from 2000-2002 for the White River at 96th Street, the upstream border with Hamilton County. The analysis determined that roughly 25 percent of the samples taken at 96th Street were above the 235 cfu/100 mL *E. coli* bacteria standard. The *E. coli* bacteria loads from upstream stormwater sources were presented previously in **Table 2-15** and **Figure 2-84** and from upstream domestic animals and wildlife sources in **Table 2-18** and **Figure 2-87**.

2.8.9 Other Sources of Impacts to the Streams

Dams: Three dams are located on Fall Creek and four dams are on the White River in Marion County. Though not a source of pollutants, the dams change river hydraulics and reduce the dissolved oxygen in the river system. By raising the water depth and lowering the velocity of the river, dams increase settling rates (which increases sediment oxygen demand) and reduce natural aeration of the stream. Both factors reduce the dissolved oxygen in the river segments above each dam. After passing over a dam, however, the stream is aerated and dissolved oxygen levels improve significantly.

Water Withdrawals: To supply drinking water for the City of Indianapolis, Indianapolis Water removes water at two locations in Marion County (Broad Ripple dam on the White River and the Keystone dam on Fall Creek) and one location in Hamilton County immediately north of the Marion/ Hamilton County line. Normally, in late summer, much of the water in White River and Fall Creek is diverted into the water plants, thus reducing the volume of water that flows downstream into lower Fall Creek and White River. The water withdrawal reduces the ability of both Fall Creek and White River to absorb pollutant loads during wet weather.

2.9 Industrial Impacts on Water Quality

Each day, industrial facilities discharge waste into the combined sewer system under the industrial pretreatment permitting program administered by the City of Indianapolis. This wastewater is suitable for treatment at the treatment plants; however, it can potentially impact a receiving stream when discharged through a combined sewer outfall during wet weather.

2.9.1 Pollutant Parameters

Within each CSO basin, the pollutant parameters contained in each industrial facility's NPDES permits have been identified. Within Marion County, the conventional pollutants permitted for industrial users are ammonia (NH), total suspended solids, BOD, pH, and oil and grease. The non-conventional permitted pollutants include both toxic organic and toxic inorganic pollutants. The toxic organic pollutants consist of the following volatile organic compounds: benzene, ethylbenzene, methylene chloride, and toluene. The toxic inorganic pollutants consist of the following: copper, phenols, arsenic, cyanide, selenium, beryllium, lead, silver, cadmium, mercury, thallium, chromium, nickel and zinc.

Table 2-18
***E. coli* Bacteria from Instream Wildlife**

Watershed	Estimated Instream Wildlife Daily Load (cfu)	Estimated Instream Wildlife Annual Load (cfu)
Mud Creek	2.45E+09	8.93E+11
Fall Creek Upstream of the CSO Area	1.61E+10	5.89E+12
Fall Creek CSO Area	5.81E+10	2.12E+13
Fall Creek Totals	**7.67E+10**	**2.80E+13**
Pleasant Run Upstream of the CSO Area	9.79E+08	3.57E+11
Pleasant Run CSO Area	9.79E+08	3.57E+11
Pleasant Run Totals	**1.96E+09**	**7.14E+11**
White River Upstream of Marion County	3.36E+11	1.23E+14
Crooked Creek	1.19E+10	4.33E+12
White River North	7.31E+10	2.67E+13
White River CSO Area -- Includes Pogues Run and Eagle Creek	9.49E+09	3.46E+12
White River South	6.41E+11	2.34E+14
White River & Tributary Total	**1.15E+12**	**4.20E+14**

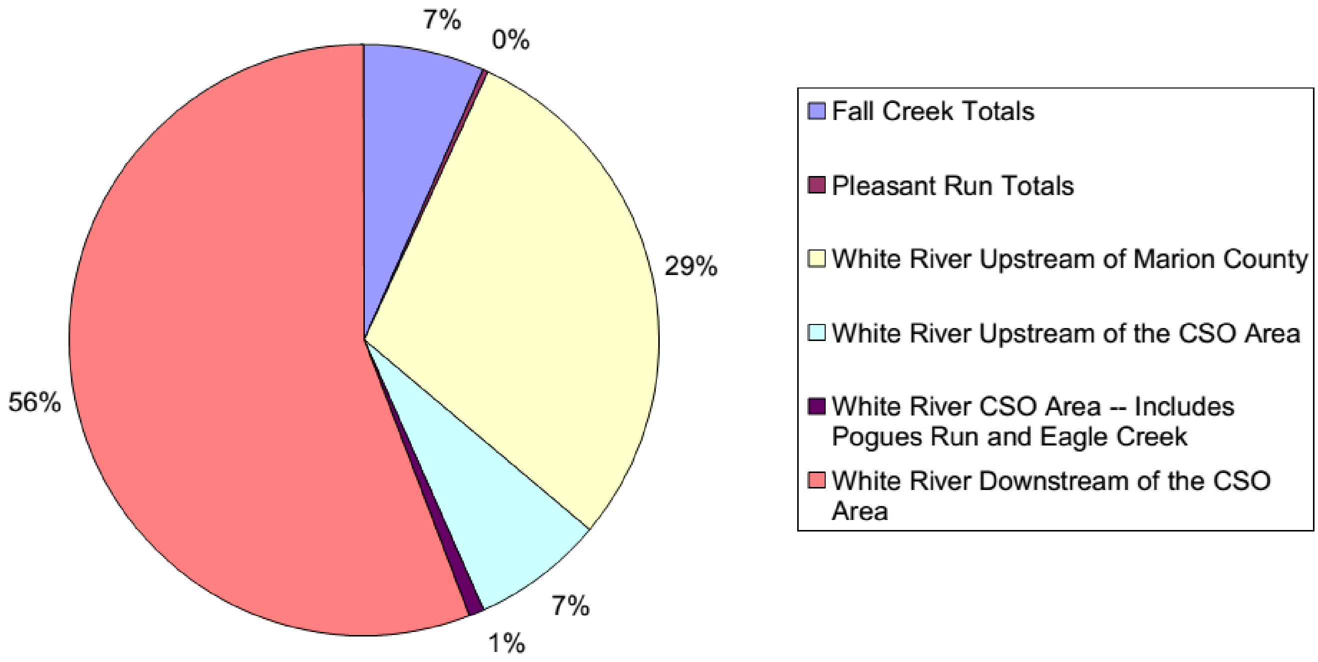

Figure 2-87
Average Annual *E. coli* Bacteria Load (cfu/yr) from Instream Wildlife Total Load = 420 Trillion cfu/yr

Table 2-19
***E. coli* Bacteria from AWT Plants' Treated Effluent (Does not include PE Bypass)**

AWT Discharge	Average Daily AWT Load (cfu)	Annual AWT Load (cfu)
Belmont AWT Plant	1.26E+11	4.59E+13
Southport AWT Plant	1.60E+11	5.82E+13

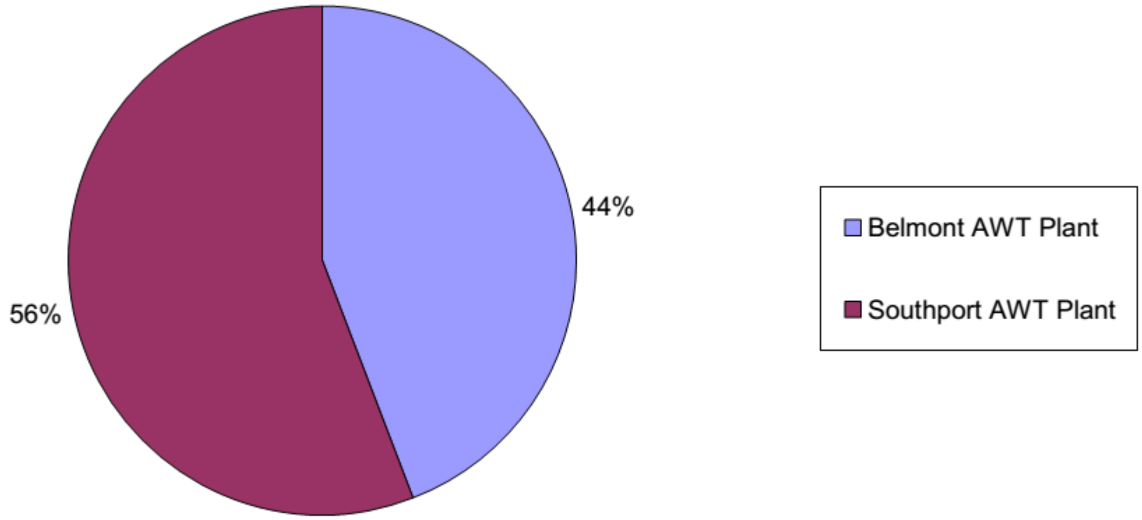

Figure 2-88
Average Annual *E. coli* Bacteria Load (cfu/yr) from AWT Plants' Treated Effluent (Does not include PE Bypass) Total Load = 104 Trillion cfu/year

2.9.2 Potential Toxicity of Industrial Discharges

The City of Indianapolis has developed an industrial pretreatment program that minimizes possible toxic discharges from industries to sewer collection system, and thus to the downstream CSOs. Since Indianapolis began its pretreatment program in 1985, it has recorded substantial improvement in the quality of industrial wastewater discharged to the municipal sewer system. For example, the discharge of heavy metals has been reduced by up to 90 percent from 1988 levels.

To assist in identification and prioritization of CSO controls, the City conducted additional analysis of the potential toxicity of discharges associated with significant industrial users and corresponding CSO outfalls. This analysis involved two steps: 1) confirming the location of industrial users within the combined sewer system, and 2) analyzing the potential toxic characteristics of industrial user discharges. It is important to recognize that these data are dynamic; each year new industries start-up and other industries close. Industries also change and process flows can be increased or decreased by changes in plant operations.

2.9.2.1 Confirm Location of Industrial Users

The City reviewed industrial user permit renewal applications, sewershed maps, pretreatment program inspection reports, the GIS database, and other data was reviewed to confirm the spatial relationships between significant or categorical industrial users and interceptors within the combined sewer area. This analysis was performed to identify CSO outfalls with the greatest potential to discharge industrial wastewater, and those CSOs not potentially discharging industrial wastewater. This analysis yielded an updated list of significant industrial users (SIU) within the combined sewer system, and a map that identifies the location of each significant industrial user within the CSO basins.

2.9.2.2 Confirm Industrial User Discharge Characteristics

The City collected, validated, and evaluated compliance monitoring data to develop a system that would rank the CSOs based on potential presence of toxins in the effluent of SIUs. For purposes of this U.S EPA/IDEM-approved analysis, the City assumed that potential industrial toxic discharges into receiving streams would be associated with the first CSO outfall downstream from the industrial user. In reality, multiple CSO outfalls are associated with a single industrial user's discharges. However, for purposes of prioritizing CSO controls, the City, IDEM and U.S EPA agreed to make an assumption that 100 percent of the potential toxic impacts would be associated with the first outfall downstream of the industrial user. It is important to emphasize that this analysis is based on a theoretical approach, and not on actual monitoring of the toxic constituents of CSO discharges.

The discharge characteristics analysis will be particularly valuable during facility planning of specific CSO control technologies. By understanding the chemical characteristics of the industrial wastewater potentially present in CSOs, the City will be better able to evaluate and design site-specific CSO controls. Data evaluated to identify and quantify industrial discharge characteristics included:

- List of SIUs and permit numbers matched to first potential receiving CSO, prepared by United Water, formerly White River Environmental Partnership (WREP).
- Industries Flow Information Report of July 14, 2004, detailed by process flow, sanitary flow, and cooling flow. The calculations in this analysis were based on process flow from industries meeting the definition of "significant industrial user" as defined in 40 CFR 403.
- White River Environmental Partnership, Belmont AWT Laboratory, Industrial Monitoring Report, Aug. 6, 2004. This report includes compliance data and self-monitoring data. Only values for zinc were used from this report. The report is sorted based on permit number.

Data from the above documents and databases was used to characterize the individual SIU discharges. A potential toxicity ranking of individual CSOs was then developed using the following approach:

1. Associate SIUs with CSOs: The City identified all SIUs associated with each CSO, assuming all the potential SIU effluent discharges from the first potential receiving CSO.

2. Toxic Effluent Characterization: The City identified average toxic effluent concentrations (in parts per million) were identified for each SIU. Concentrations are based on an average of all effluent samples taken by United Water during the year 2004. At least two effluent samples were taken from each SIU during this time period. These data were then used in a preliminary screening analysis to identify which SIUs would likely contain the most significant concentrations. Using toxic weighting factors, those SIUs having an apparent aggregate discharge concentration higher than 1 mg/L were then subjected to a more detailed analysis using averages from a broader base of data, such as from monthly reports of operation, over the same time period.

3. Sum of Weighted Toxics: The City normalized SIU average effluent characteristics using U.S. EPA Toxicity Weighting Factors (see **Table 2-20**); and summed normalized effluent data to represent an overall toxicity value.

4. Significant Industrial Concentration (Criterion 1): The likely "toxic weighted" concentration computed for each industrial user was then converted to a flow-weighted concentration in the aggregate of the industrial flows for a given CSO location. The resultant values were then ranked from 1 to 5 based on the priority rating footnoted in **Table 2-21**. Domestic sewage is also a recognized source of most of the toxic constituents listed in **Table 2-20**. Using national averages reported by U.S. EPA, domestic sewage would have a "toxic weighted concentration" of about two to three. Therefore, total volume of CSO discharge is another important criterion for ranking of potential toxic sources.

5. Significant Industrial Flow Percentage (Criterion 2): The likely industrial flow contribution relative to the total flow was computed as the ratio of the aggregate industrial flow component (using annual average flow data for each of the industries) to the estimated total carrying capacity of the CSO outfall. The ratios were then grouped into five categories and assigned values of one to five, with five as the highest priority. Definitions for each ranking are footnoted in **Table 2-21**.

Table 2-20
Toxic Weighting Factors for Elements Present in SIU Effluents

Weighting Factor	Toxic Weight
Ammonia-N - 252	0.0037
Antimony	0.1900
Arsenic	4.0000
Cadmium	5.2000
Chromium	0.0267
Copper	0.4700
Cyanide - total	1.0800
Cyanide, amendable to chlorination - 257	1.0800
Lead	1.8000
Mercury	500.0000
Nickel	0.0360
Phenolics High Level, 4AAP - 267	0.0280
Selenium	1.1000
Silver	47.0000
Zinc	0.0510

Reference: U.S. EPA, 1995, FLI Assessment of Compliance Costs, Table 4-1 and updated by U.S. EPA Region V in 1997

6. Frequency of Overflow Events (Criterion 3): The likely frequency of CSO outfall activation was based on recorded data and modeled estimates. Modeled simulations using precipitation data from 1950 – 2003 indicate, for example, that CSO 008 near the Belmont plant activates a maximum of about 70 days per year, whereas CSO 003 near the Southport plant activates much less frequently; about seven days per year. The overflow frequencies for the remaining CSO outfalls were based on the frequency data previously presented in Table 2-8 of the "Indianapolis CSO LTCP Hydraulic and Water Quality Modeling Development Report" (Department of Public Works - Indianapolis Clean Stream Team (DPW-ICST), 2004). Like the other criteria, the frequency data were grouped into five categories and assigned values of one to five with five the category of highest frequency.

The average of the three criteria were used to rank CSO outfalls for their potential to discharge toxics into receiving streams in the CSO area. Based on this methodology, **Table 2-21** lists 20 Indianapolis CSOs that scored an average of 0.7 or greater on a 1-to-5 scale. **Table 2-21** also includes individual criterion ratings for each CSO, and their receiving water and general location.

The location and potential toxic characteristics of these CSOs will be used to identify, prioritize, and design specific CSO control projects during the facility planning stage of implementing the LTCP.

2.10 Sensitive Areas Analysis

U.S. EPA's National CSO Control Policy and Indiana CSO Strategy identify elimination, relocation or control of CSO discharges to sensitive areas as being the highest priority requirement for the development of the LTCP. Sensitive areas are waters impacted by CSO discharges that must be given the highest priority for CSO discharge elimination, relocation, or control. Sensitive areas include:

- Waters with threatened or endangered species and their habitat
- Waters supporting primary contact recreation (e.g., bathing beaches)
- Public drinking water intakes or their designated protection areas
- Outstanding State Resource Waters or Outstanding National Resource Waters

The EPA's CSO Control Policy states, that for sensitive areas, the LTCP should:

1. prohibit new or significantly increased overflows;
2. eliminate or relocate overflows that discharge to sensitive areas:
    a. wherever physically possible and economically achievable, except where elimination or relocation would provide less environmental protection than additional treatment, or;
    b. where elimination or relocation is not physically possible and economically achievable, or would provide less environmental protection than additional treatment, provide the level of treatment for remaining overflows deemed necessary to meet water quality standards for full protection of existing and designated uses;

Table 2-21
Ranking of CSOs that Could Contain Toxics from Industrial Users: Future Conditions

CSO	No. of SIUs for this CSO	Average of Criterion Ratings	Criterion 1 Likelihood of Significant Industrial Concentration		Criterion 2 Likelihood of Significant Industrial Flow Percentage		Criterion 3 Likelihood of Overflow Events		Receiving Water	Location
			Computed toxic equivalent concentration (mg/L)	Rating	Percent of capacity of sewers leading to CSO outfalls	Rating	Estimated number of overflow events per year (maximum)	Rating		
003	20	2.0	0.684	2	5.333	2	4	2	White River	Southport Plant
117	2	2.0	3.59	3	1.305	1	4 *	2	White River	Southern Avenue & White River
074	2	2.0	6.01	4	0.561	0	4	2	Pleasant Run	PLRPND & Prospect Street
135	1	2.0	5.787	4	0.003	0	4	2	Fall Creek	Orchard Avenue & 39th Street
008	17	1.7	0.127	2	3.038	1	4 *	2	White River	Belmont Raw Wastewater Overflow
011	1	1.7	0.575	2	1.621	1	4	2	Eagle Creek	Minnesota Street and Pershing Avenue
051	5	1.7	1.917	3	0.039	0	4	2	Fall Creek	Capital Avenue & 22nd Street
150	1	1.3	0.685	2	0.372	0	4	2	Pleasant Run	PLRPND & Raymond Street
A38	3	1.3	0.318	2	0.372	0	4	2	Pogues Run	Davidson Street & Washington Street
120	2	1.3	0.123	2	0.261	0	4	2	Pleasant Run	343 W. Southern
065	3	1.3	0.222	2	0.099	0	4	2	Fall Creek	Sutherland Avenue & 34th Street
076	1	1.3	0.835	2	0.052	0	4	2	Pleasant Run	PLRPND & English Avenue
049	1	1.3	0.62	2	0.023	0	4	2	Fall Creek	Stadium Drive & Fall Creek
080	1	1.3	0.618	2	0.020	0	4	2	Pleasant Run	PLRPND & Wallace Avenue
075	1	1.3	0.612	2	0.007	0	4	2	Pleasant Run	PLRPND & Southeastern Avenue
062	2	1.3	0.029	2	0.005	0	4	2	Fall Creek	Guilford Avenue & 30th Street
152	2	1.3	0.692	2	0.002	0	4	2	Pogues Run Tunnel	Pine Street & Ohio Street
034	1	1.3	0.023	2	0.000	0	4	2	Pogues Run	Michigan Street & Dorman Street
092	3	1.0	0.474	2	1.053	1	<1	0	Pleasant Run	PLRPSD & Ridgeview Drive
032	1	0.7	0.083	2	0.174	0	<1	0	Eagle Creek	Morris Street & Warman Avenue

* Individual overflow frequency estimates for CSO 117 and 008 are presented within the same range (67-70 events per year.) Overflow frequency at CSOs 117 and 008 is dependant on manual operation of the Southwest Diversion Structure.

Priority Rating System				
Criterion 1 Likelihood of Significant Industrial Concentration	Criterion 2 Likelihood of Significant Industrial Flow Percentage	Criterion 3 Likelihood of Overflow Events	Priority Rating	Description
10.1 - 100	61 - 100%	> 50 events/yr.	5	Most significant
5.1 - 10	21 - 60%	21 - 50 events/yr.	4	Moderate
1.1 - 5	11 - 20%	11 - 20 events/yr.	3	Modest
0.011 - 1.00	5 - 10%	1 - 10 events/yr.	2	Minimal
< 0.01	1 - 5%	1 event/yr.	1	Insignificant
0	< 1%	< 1 event/yr.	0	No impact

3. where elimination or relocation has been proven not to be physically possible and economically achievable, permitting authorities should require, for each subsequent permit term, a reassessment based on new or improved techniques to eliminate or relocate, or on changed circumstances that influence economic achievability.

The sensitive area analysis is documented below.

2.10.1 Recreational Use Data

Although the water quality of Marion County streams is not suitable for recreation and recreation is prohibited by ordinance, some recreational uses do occur. Extensive data was collected regarding recreational uses occurring along CSO-impacted streams, as presented below.

2.10.1.1 Prohibited Uses

City ordinance prohibits swimming in most waterways in Marion County, including all streams in the combined sewer area. The ordinance states, "It shall be unlawful for any person to fish, bathe, wash, operate boats in or enter any public waterways, or to send, drive or ride any animal into any public waterways, where not authorized for such purposes." (Code 1975, Sec. 7-21). A separate ordinance passed by the Health and Hospital Corporation of Marion County states that public swimming or wading beaches "shall not be located in areas subject to pollution by sewage" (Gen.Ord. 8-1996(A)).

2.10.1.2 Reported and Observed Uses

Although prohibited by ordinance, some citizens use portions of the White River and its tributaries for fishing, canoeing, kayaking, wading, and occasional swimming. As demonstrated earlier in Section 2.2, the low-flow nature of most streams in the combined sewer area is not conducive to full-body contact, with the exception of the White River. Section 2.4 also demonstrated that water quality conditions in CSO-impacted waterways do not support swimming, particularly following wet weather events. Yet these activities occur despite the public notification program and signs posted along the streams by the Department of Public Works and the Marion County Health Department, warning citizens to avoid contact with streams in the CSO area because of sewage pollution.

As part of developing the LTCP and use attainability analysis, the City identified how and where people use the streams. This information was used to prioritize and schedule CSO control projects. In public meetings and a non-random face-to-face survey, people were asked to report how they use or have seen others use the waters. As one might expect, recreational uses occurred primarily in dry-weather or after light rainfall events.

During the information-gathering stages of the research, the team used the following definitions:

- **Swimming:** Full-body contact with the water, including a high potential for swallowing the water (water should be deep enough to permit actual swimming).
- **Water Skiing/Jet Skiing:** Water skiing, jet skiing, tubing or other recreational boating activities that carry a high potential for full-body contact with the water (falling or jumping into the water).
- **Wading:** Partial body contact with the water (usually water contact to lower legs and possibly hands and arms).
- **Playing at the Stream Bank:** Kneeling, squatting or sitting at stream bank (some water contact may occur when hands reach into the water to touch or pick up something).
- **Fishing:** Fishing at the stream bank or from a boat (water contact occurs through handling fish and tackle).
- **Boating:** Recreational boating that involves little or no water contact.
- **Canoeing:** Recreational canoeing that may involve some water contact upon entry or exit, or through contact with paddles, etc.
- **Kayaking (whitewater):** Recreational kayaking that involves navigating whitewater areas and/or significant potential for water contact from frequent kayak overturn movements.

Results of the City's additional research into recreational use activities are presented below. Sources of information used by the City included:

- Physical stream survey in May-July 2001
- Public non-random intercept survey in June 2002
- Public outreach meetings with neighborhoods and environmental/recreation groups in September-November 2002
- Marion County Health Department reports from 2001- 2002
- Indy Parks stream use survey in October 2002
- Survey of downstream communities and agencies.

The following is a description of the data gathering methodology for each data source:

Physical Stream Survey: Survey teams walked each water body and viewed aerial videos to determine the physical characteristics that encourage or discourage water use. Teams would note areas of easy access to the water as well as dense vegetation, steep slopes, or infrastructure that discourages water contact. Streams were walked from late May 2001 to early July 2001. An aerial videotape of Marion County streams was taken on April 1, 2002. A video of White River downstream of Marion County was taken in January 2003. The survey teams walked along the water bodies to identify any recreational areas where primary water contact could occur within the CSO areas, as well as indications of use such as graffiti on bridge structures. The physical stream survey also noted locations of use based upon actual observations.

The City selected this period was selected for the survey because children were out of school for summer and the weather was warm. The temperature was generally above 75 degrees Fahrenheit, and most days the temperature was above 80 degrees. It was assumed that warm weather would encourage use in and along the streams. The team conducted the physical stream survey between 9:00 am and 5:00 p.m. on weekdays.

Public Outreach Surveys: The City conducted public outreach surveys were conducted in June 2002 to gather information about activities that occur near and in the water by people who use the water bodies or nearby corridors, and their reports of current and historical observed usage of the streams. The team surveyed walkers, joggers, residents and child-centered organizations along the White River, Fall Creek, Eagle Creek, Pleasant Run, and Pogues Run to learn where and how often water contact occurred within the areas prone to sewage overflows. One hundred people were surveyed along each stream. The surveys were non-random intercept personal interviews. According to those interviewed, the primary usage of all the streams in Indianapolis is walking, jogging, and biking along the water or nearby corridors. The primary activity involving water contact is fishing, followed by playing at the stream bank. The respondents said that the uses have not changed over the past two decades; however, most respondents were between the ages of 18-29. The majority of respondents also observed infrequent and inconsistent recreational usage within 24 hours after a rainfall.

Regulatory agencies and advisory committees helped to develop a 10 question survey that was consistently followed by a team trained to implement the questionnaire.

These surveys had several limitations that must be considered in using and interpreting the data:

- **The results cannot be extrapolated to the City's general population.** The survey was not conducted using random sampling, nor is the sample size large enough to warrant extrapolation of the results to the general population.
- **The goal of the recreational use study was to survey people who recreate near the water to determine their opinions.** The methods described below were specifically designed to skew results toward finding people who do or are most likely to use the water, at a time when water use is at its highest levels. Respondents were members of environmental or recreational organizations, church groups and childcare providers within a mile of a water body; citizens encountered while they were walking, jogging or biking along a stream; and residents living on or within a mile of a water body.
- **The targeted population is not similar to other segments of the population who were not surveyed.** It is expected that other segments of the population would use the waters less frequently than those surveyed. A 1999 telephone survey that used a random, representative study population suggests that stream use occurs significantly less frequently among all residents of Marion County. In this survey 89 percent of respondents said that they never swim in Marion County waterways (margin of error +5

percent). This question did not distinguish between waterways affected by combined sewer overflows and those not affected by CSOs.

Public Outreach Meetings: The Department of Public Works (DPW) conducted additional public outreach meetings from September through November 2002 to add to information gathered on stream use. The Department of Public Works partnered with neighborhood associations and environmental groups in Indianapolis to host public meetings to gather information about stream use by those most likely to use the water in the City. The survey questions and definitions were the same as those used in the public outreach survey; however, the method of question delivery was to a group, not a personal interview.

MCHD Public Access Stream Sampling Information: The MCHD samples water bodies for *E. coli* and macroinvertebrates. Some sampling sites are based on where stream activities have been reported to MCHD by the public. The sites and activities identified by the public in 2001- 2002 also were included in the stream use survey results.

Indy Parks Stream Use Surveys: In late 2002, the Department of Public Works surveyed eight employees of the Indy Parks system who work closest to the water bodies. The survey was a modified version of the stream use questionnaire and supplemented the reported uses found in the other surveys.

Downstream Agency Survey: In late 2002, the Department of Public Works mailed a survey to downstream agencies, including county health departments, parks departments, county offices, McCormicks Creek State Park, and the Department of Natural Resources headquarters in Districts 5-7. IDEM reviewed this survey form and appropriate comments were incorporated before distribution the week of October 6, 2002. Instructions accompanying the survey requested that each recipient utilize one staff person who was familiar with recreational uses of the White River in the area to answer or compile the information from others. It was requested that the survey be returned October 31, 2002.

Detailed results of these surveys and the City's research into recreational uses in CSO-impacted waterways can be found in "Recreational Use and Stream Characteristics" (DPW-ICST, April 2004). A brief description of the results for each stream is provided below.

2.10.1.2.1 Fall Creek

Appendix A8 illustrates the reported and observed recreational uses involving water contact along Fall Creek, based upon the above data sources. North of 30th Street, where access is more limited, some fishing and playing at the stream bank is reported. Wading is reported at 30th Street and Fall Creek Park, particularly when children wade into the creek to retrieve basketballs from the basketball courts there. Fishing and playing by the stream bank also are reported at locations from 30th Street to Martin Luther King Jr. Drive. Wading is reported upstream of the Boulevard dam, a popular fishing location, and at Watkins Park. Fishing is the dominant activity downstream of Watkins Park, with playing at the stream bank reported at Fall Creek & 16th Park and along the floodplain near the confluence with White River.

2.10.1.2.2 Pleasant Run and Bean Creek

Appendix A9 illustrates the reported and observed recreational uses involving water contact along Pleasant Run and Bean Creek. Recreational uses on Pleasant Run are found predominantly along the many parks and greenways located along this low-flow, neighborhood stream. Wading and playing by the stream bank is reported at various spots along the greenways, including Pleasant Run Golf Course, Ellenberger Park, Christian Park, and Garfield Park. Fishing also is reported, although the fishing in this small stream involves hunting for crayfish rather than traditional sport fishing. Swimming is reported in three locations, although streamflows are too low to support full-body contact along most of Pleasant Run. One small swimming hole was reported on Pleasant Run downstream of Prospect Street and another along Bean Creek near Keystone Avenue. A third reported swimming hole, between Meridian and Bluff, is believed to refer to a gravel pit just north of Pleasant Run; Pleasant Run is normally too shallow to support swimming.

2.10.1.2.3 Pogues Run

Similar to Pleasant Run, reported and observed recreational uses along Pogues Run are found predominantly along parks and greenways, as shown in **Appendix A10**. Playing by the stream bank and wading are reported along much of the stream, including in Forest

Manor Park, Brookside Park, Spades Park and at the downstream end before Pogues Run enters the tunnel that carries it under downtown Indianapolis. Pogues Run flows through several Indianapolis Public Schools campuses south of 10th Street; playing by the stream bank is reported in this area. Fishing for crayfish is reported in Brookside Park and Spades Park. Occasional full-body contact (swimming) is reported in two locations, one within Brookside Park and one in Spades Park, although normally Pogues Run is too shallow for full-body contact activities.

2.10.1.2.4 Eagle Creek

Appendix A11 illustrates the reported and observed recreational uses involving water contact along Eagle Creek. Unlike Fall Creek, Pleasant Run and Pogues Run, Eagle Creek does not flow through City parks and greenways. Nevertheless, recreational uses involving water contact are reported along this waterway. Fishing, wading and playing by the stream bank are reported on both Big Eagle Creek and Little Eagle Creek within the CSO area. Despite the lack of parks and public access, swimming is reported in at least nine locations along Eagle Creek in the CSO area. Some of these locations are adjacent to trailer parks where children's pools were prohibited, according to residents interviewed by survey teams. A variety of factors may cause the increased reports of swimming in Eagle Creek: relatively good water quality compared to other streams, lack of public swimming pools or splash areas in the area, and cultural acceptance within the neighborhood of swimming in a natural stream.

2.10.1.2.5 White River (Marion County)

Appendices A12a through A12d illustrate reported and observed recreational uses involving water contact along White River as it flows through Marion County.

Appendix A12a illustrates reported and observed activities at the upstream end of White River's CSO-impacted area, downstream of Broad Ripple Park. At the time the survey was taken, there was a lone CSO upstream of Holliday Park on the city's north side. That CSO has since been eliminated. The first recreational uses reported downstream of an existing outfall are found in the Rocky Ripple neighborhood, where fishing, wading, playing by the stream bank and canoeing are regular activities. Swimming also is reported in the Rocky Ripple neighborhood along Ripple Road, though primarily by one individual and his family. Recreational uses, including occasional swimming, also are reported near the Butler University campus and by the Indianapolis Museum of Art. Swimming near the art museum is reported to occur mainly in a pond known as the "Blue Lagoon," which is adjacent to the river on the art museum property. Fishing and canoeing occur throughout this stream reach.

Appendix A12b illustrates reported and observed activities along White River from 38th Street to New York Street. At the upstream end of this stream reach, the river is bounded by several City parks and golf courses; fishing, canoeing and playing by the stream bank are reported here. There is a City boat launch in Riverside Park; historically, water skiing occurred in this area, known locally as Lake Indy. Downstream of the 16th Street dam the most frequent reported use is fishing, although canoeing, wading and playing by the stream bank also are reported along White River State Park downstream of the river's confluence with Fall Creek.

Appendix A12c illustrates reported and observed activities along White River from New York Street to the Belmont AWT plant. The river is less accessible within this reach, and therefore fewer uses are reported. Pockets of reported uses occur at access points just south of Washington Street, at Raymond Street and near Harding Street. Fishing is the predominant activity in this area, although wading, playing by the stream bank, canoeing and boating also occur.

Appendix A12d illustrates reported and observed activities along White River from the Belmont AWT plant to the Southport AWT plant. Fishing is the predominant use in this more industrialized area, although canoeing, wading and playing by the stream bank also are reported in some locations where the public can gain access to the river.

2.10.1.2.6 White River (Downstream of Marion County)

In October 2002, DPW sent written survey instruments to downstream county health departments, parks departments and government offices in Daviess, Greene, Johnson, Knox, Morgan, and Owen counties. Surveys also were sent to McCormick Creek State Park, as well as the Department of Natural Resources Headquarters in

Districts 5-7. Nine completed surveys were returned and included in the City's database.

Appendix A13 illustrates the reported and observed activities along White River from the downstream survey. Recreational uses appear to be clustered around public access points, shown as green dots in **Appendix A13**. The predominant reported uses include fishing, boating, canoeing, playing by the stream bank, and wading. Swimming also is reported near McCormick Creek State Park and at Bloomfield. However, the City knows of no public swimming beaches along the river within this area. Downstream from Bloomfield land use is primarily agricultural and fewer water contact recreational uses were reported to the City.

2.10.1.2.7 Recreational Use Conclusions

Based upon the data gathered, the following conclusions were reached:

- A range of recreational activities are reported to occur all along waterways throughout the CSO area.
- Swimming by a small number of people is reported in a few locations, although prohibited by ordinance. Few areas on tributaries are deep enough to accommodate swimming.
- The non-random intercept survey along CSO-impacted streams shows that the most popular recreational activities are walking/jogging/biking along the waterways, followed by boating/canoeing and fishing; less popular activities are playing at the stream bank, wading and swimming.
- According to follow-up meetings and surveys, full-body contact activities occur with some frequency in the Rocky Ripple area on the White River and on Pleasant Run near Meridian and Bluff. The number of users is small and uses are found during dry-weather or after small storm events that would be controlled by this plan. Full-body contact activities are reported to occur less frequently on other streams. Again, the number of users is small.
- Partial body contact activities are reported to occur on a number of streams. Both children and adults are reported to engage in these activities. More adult use than child use is reported.
- Downstream of Marion County, minimal in-stream recreational activity was reported from the Marion County line to south of Waverly.
- Reports of recreational activity in and around the river begin to increase south of Waverly, with fishing along the river being the most commonly reported activity. Most observed uses are reported south of Gosport.
- Uses are often found in parks and at public access points. However, a lack of parks in residential areas may lead to more stream use, such as on Eagle Creek.
- Cultural norms in a neighborhood can be a key factor influencing use. What may be an accepted recreational stream activity in one neighborhood may be unacceptable in another, due to cultural differences.
- Full-body or partial-body contact activities (although limited) are reported at the most downstream reaches of CSO-impacted streams, and numerous high-volume CSO outfalls are located at the upstream ends of these streams.

It is apparent that individual stream segments have value to the neighborhoods and residents who use them and live along them. However, based on the data gathered, it appears that no one area has obviously superior value to the overall community than any other area along these waterways.

2.10.2 Outstanding State Resource Waters

The City contacted the Indiana Department of Natural Resources (IDNR) to discuss Outstanding State Resource Waters. On May 14, 2001, IDNR sent a letter confirming that there are no Outstanding State Resource Waters in Marion County. Downstream of Marion County, the White River is not an Outstanding State Resource Water.

2.10.3 Threatened or Endangered Species

To date, no state or federal threatened or endangered species have been identified that are being impacted by CSOs. The IDNR and the U.S. Department of Interior's Fish and Wildlife Service (USFWS) were contacted to obtain information on threatened or endangered species, including their habitat.

On May 14, 2001, IDNR forwarded data sheets and a map showing the location of threatened or endangered species in Marion County. After receiving the information, representatives contacted three specialists at IDNR to discuss the habitat of species shown near the waterways:

- Brant Fisher, a non-game aquatic biologist with the Division of Fish and Wildlife, confirmed that there are no threatened or endangered fish or mussels in Marion County.
- Ron Hellmich, data manager with the Division of Nature Preserves, stated that the Virginia Bunchflower was observed near the upper White River at Crows Nest in 1913. While it does not grow in the water, it does inhabit wet woods and meadows of flood plains. Mr. Hellmich also stated that a survey has not been done since 1913 and he is not sure the flower or the habitat to support the flower still exists.
- Katie Smith, non-game supervisor with the Division of Fish and Wildlife, stated that the Kirtland Snake does not live in or around water. This reptile is small, eats earthworms, and prefers to live under rubble.

On July 30, 2001, the USFWS forwarded information that indicated the endangered and threatened species found in central Indiana are the bald eagle and Indiana bat. The reintroduction of the bald eagle in Indiana has been a resounding success. The most recent Midwinter Bald Eagle Survey, conducted by the IDNR in January 2004, counted 124 bald eagles, two golden eagles, and one unidentified eagle. The 10-year average for the midwinter count is 157 eagles. Bald eagles are found along the West Fork of the White River, from its confluence with the Wabash River to north of Marion County. While eagles are dietary generalists, the primary diet for bald eagles is fish, so bald eagles tend to nest in undeveloped forested area along rivers and lakes. Most of the bald eagles counted during the midwinter survey were found along rivers. The 10-year average for the midwinter count indicates that 69 percent of the bald eagles in Indiana have been counted along rivers (IDNR, 2004). The eagle population fell in the 1950s and 1960s, when the eagles consumed fish that had bioaccumulated toxic chemicals. As these toxins were banned and IDNR reintroduced eagles to the state, the bald eagle population began to recover (IDNR, 2004). As the City of Indianapolis implements its LTCP, water quality conditions along the White River will continue to improve eagle habitat. In 2004, bald eagles were seen nesting in Marion County for the first time in many years.

The Indiana bat has not been as successful as the bald eagle. Indiana bats hibernate in caves in winter and disperse to breed and forage in spring and summer, typically in undisturbed forests along streams and lakes. The USFWS reports that there are current records for the Indiana bat in the Fall Creek watershed (USFWS, 2001). According to the USFWS, the most promising habitat would be from 56th Street to Geist Reservoir, upstream of the CSO area.

2.10.4 Public Drinking Water Intakes

Combined sewer outfall 103 flows into Meadow Brook, a tributary of Fall Creek. Meadow Brook’s confluence is just upstream of Indianapolis Water’s Fall Creek intake at Keystone Avenue. The City plans to eliminate overflows at CSO 103 by the end of 2007 through sewer separation and other projects.

2.11 Summary

The White River basin is part of the Mississippi River system and drains 11,349 square miles of central and southern Indiana. Marion County accounts for about 36 percent of the 2.37 million people living in the basin.

From the turn of the century through the mid to late 1970s, published reports have documented extremely poor water quality conditions in the White River due to inadequate wastewater treatment, industrial pollution, and sewage overflows.

Land use in the Indianapolis area is primarily urban. A 1998 U.S. Geological Survey study concluded that urban areas were responsible for degradation of stream water quality in Indianapolis. Outside of Marion County, agriculture is the predominant land use within the White River basin. Pesticides are commonly detected in waters within the basin, particularly following rain events during the application season. Bacteria associated with animal feedlots also are found in the White River as it enters Marion County.

The West Fork of the White River and its two largest tributaries, Fall Creek and Eagle Creek, are the major sources of water for public and industrial supply in Indianapolis. Streamflow in the White River and its tributaries is highly variable and related to precipitation. Flow is generally highest in late winter and early spring. Both high and low streamflows can significantly affect water quality. A physical survey of CSO-impacted waterways in 2001 documented streamflow, depth, substrate and accessibility information, which was used to identify possible opportunities for and obstacles to recreational use in these waterways. Accessible waterways include Upper White River, Pleasant Run, Pogues Run and Fall Creek, although people can gain access to Eagle Creek and lower stretches of White River.

The City of Indianapolis owns and oversees management of the wastewater collection system serving most of Marion County. Both combined and sanitary sewers carry wastewater to three interceptor branches and a centrally located core interceptor sub-network. These interceptors carry wastewater to two advanced wastewater treatment facilities, the Belmont and Southport plants. The combined sewer area, which is located primarily in the older sections of the City of Indianapolis, contains 132 combined sewer outfalls. Outside the combined sewer area, most neighborhoods are served by separate storm and sanitary sewers. However, an estimated 30,000 properties are served by private septic systems. About 95 square miles remain undeveloped and unsewered, including areas in Franklin, Pike, Washington, Decatur and Wayne townships.

Water quality in Marion County has improved significantly since the passage of the Clean Water Act, yet Indianapolis faces many remaining challenges to achieving water quality goals. Although combined sewer overflows are the largest pollution contributor, other sources are responsible for water quality violations, including urban stormwater, leaching septic systems, and upstream pollution sources.

Further, a number of systemic conditions prevent the attainment of recreational use standards in Indianapolis waterways, including the urban character of Marion County, low-flow conditions in many streams, and waste from pets and wildlife.

Studies of Indianapolis waterways and the combined sewer system have resulted in the following key findings:

- Fall Creek and the White River do not meet the dissolved oxygen standard during some rain events. The problem can be severe enough to cause fish kills.
- CSO receiving streams in Marion County have never supported the full-body contact recreational use. IDEM’s 2002 and proposed 2004 303(d) lists of impaired waters in the State of Indiana identify White River, Fall Creek, Eagle Creek, Pleasant Run, Pogues Run, Bean Creek, and State Ditch as being impaired for *E. coli* bacteria. Even streams that are not affected by CSOs are listed as impaired for *E. coli*, including Dollar Hide Creek, Fishback Creek, and Mars Ditch.
- Significant sources of *E. coli* bacteria are found in stormwater runoff. Factors contributing to stormwater bacteria include leaching septic systems, illicit connections to the storm sewer system (including many related to septic systems), urbanization, and domestic animals and wildlife.
- The City has analyzed effluent data from industrial users to rank and prioritize CSOs based on the theoretical potential for significant industrial discharges to enter streams during wet weather events. Although this analysis is theoretical in nature, it can be used during facility planning to identify, prioritize and design specific control projects that will minimize industrial impacts on the receiving streams.

Neither the water quality nor the depth and flow of streams in the CSO area is conducive to full-body contact recreation. A City ordinance prohibits swimming in non-designated waterways in Marion County, including all streams in the combined sewer area. A public notification program and signs posted by the Department of Public Works and Marion County Health Department warn citizens to avoid contact with streams in the CSO area due to sewage pollution.

Nevertheless, water recreation activities by a small number of people are reported throughout the CSO area and downstream of Marion County. Full-body or partial-body contact activities (although limited) are reported at the most downstream reaches of CSO-impacted streams, and numerous high-volume CSO outfalls are located at the upstream ends. While individual stream segments have value to the neighborhoods and residents who use them and live along them, it appears that no one area has obviously superior value to the overall community than any other area along these waterways.

There are no outstanding state resource waters or threatened or endangered species affected by Indianapolis CSOs. One combined sewer outfall discharges into Fall Creek upstream of Indianapolis Water's municipal intake at 38th Street and Fall Creek Parkway. This CSO will be eliminated by the end of 2007.

An integrated, watershed-wide effort is necessary to achieve the ultimate water quality goals in Indianapolis. The City of Indianapolis wants to ensure that affordable investments in water pollution control will yield the greatest benefit possible for human health, the environment and the citizens who live in Marion County.

Section 2 Modification Summary

The 2006 CSO LTCP was updated in 2017 as summarized below:

- Introduction paragraph was added as first paragraph in Section 2.1.
- No other changes were made to the section.

3.0 CSO Abatement Technologies

Contents

3.1 Introduction

In this section, to reflect the transfer of the wastewater system from the City of Indianapolis to CWA Authority, Inc., all CSO Abatement Technologies evaluated before August 26, 2011 are referred to as "City" or "Indianapolis" work and all those evaluated after August 26, 2011 are referred to as work by "the Authority".

This section describes the combined sewer overflow (CSO) control technologies and methods considered to meet water quality goals. This section describes how the technologies work and how individual control technologies were evaluated for their ability to control CSOs. Many different options were considered, including actions to reduce non-CSO pollution in Indianapolis waterways. Section 4.0 documents how *specific combinations* of technologies were evaluated to address CSOs and other pollution sources that impair water quality.

This section is organized as follows:

- Sections 3.2 through 3.9 include technologies identified and evaluated during development of the 2006 CSO LTCP. The sections have been updated to reflect changes to technologies as identified in modifications to the Consent Decree.
- Sections 3.10 and 3.11 include technologies identified and evaluated during the 2017 update to the CSO LTCP.

3.2 Available Control Measures

A three-tiered approach has been used to approach environmental problems. First, how can pollution be eliminated or prevented before it was created? Second, how can the pollution that cannot be prevented be reduced in volume, concentration or frequency? Third, how can the remaining pollution be best captured and treated? This hierarchy of prevention, reduction, treatment was also a part of the overall LTCP for combined sewer overflows.

A combination of different control measures may be needed along each affected river or stream segment in order to reduce or eliminate CSO impacts. These measures might include technologies, operating strategies, public policies and regulations, or other measures that will help reduce water pollution. The control measures must be tailored to each waterway, taking into consideration natural conditions, unique pollution problems, costs, engineering constraints, and public input. Control measures are classified within this section into five categories that follow the prevention-reduction-treatment hierarchy:

- Point and non-point source control measures
- Collection system controls
- Storage technologies
- Wet-weather treatment technologies
- In-stream oxygenation methods

Section 3.3 outlines the City's original source control programs. Sections 3.4 through 3.7 provide background information on control technologies the City considered. These sections describe the general categories, such as storage or treatment, and also identify some representative technologies in each category. Section 3.8 describes the methodology used to screen CSO control technologies and the results of that screening.

3.2.1 Evaluation of CSO Control Technologies

The system improvements outlined in the CSO LTCP are expected to meet water quality standards (WQS), if they are attainable, and comply with national pollution discharge elimination system (NPDES) permit requirements. The purpose of the LTCP is to "provide site-specific, cost-effective CSO controls that will provide for attainment of WQS."[3] Each CSO control technology was evaluated for its ability to achieve the following environmental improvements:

1) Reduce both the frequency and volume of wet-weather overflows
2) Improve dissolved oxygen levels
3) Reduce bacteria
4) Reduce biochemical oxygen demand (BOD)
5) Remove settleable solids
6) Reduce floatables
7) Reduce discharges of toxic materials

The following sections identify how the City screened technologies based on their ability to meet these needs.

3.2.2 2006 Identification of Viable CSO Control Technologies

The City evaluated available technologies and approaches to identify viable options for meeting water quality goals, CSO control goals, and infrastructure needs. **Table 3-1**, *Indianapolis CSO Control Technologies Matrix*, lists each technology considered and evaluates whether it could be used to address the problems. The table has been updated to address division of responsibility between the City and the Authority. The following sections describe some of the most viable options the City identified.

3.3 Source Control Technologies

The following discussion briefly outlines the City's original source control programs. The text has been updated, where needed, to include division of responsibility between the City and the Authority. More detailed information on specific alternatives considered is contained in Section 4.0 and recommended plans for installing source controls are contained in Section 7.0 of this report.

Sewer Service for Unsewered Areas: Failed septic systems can leach bacteria, biological oxygen demand (BOD) and ammonia into local ditches and streams. Connecting these areas to sanitary sewers reduces these pollutant loads during both dry and wet weather. The Authority has a Septic Tank Elimination Program (STEP) that removes septic tanks from service each year.

Industrial Pretreatment: For most stream segments in Indianapolis, industrial pollution is not the most significant pollution problem. However, where industries discharge into the combined sewer system, their contaminants can wash into waterways through CSOs. The Authority's pretreatment program works to reduce these loadings into the environment. The Authority is considering a number of alternatives for reducing the impact of CSO discharges containing industrial wastewaters. Some of these alternatives include requiring industrial users to decrease, hold, or divert flows during wet-weather events; eliminating clear-water flows; reducing or eliminating wastewater flows; upgrading pretreatment equipment; revising pretreatment limits; implementing voluntary proactive programs; increasing sewer discharge fees; and requiring stormwater permits in the CSO area.

Improved Stormwater Drainage: Improving drainage can reduce stormwater inflow into the sewer system, improve existing septic system performance, and reduce road maintenance and capital costs. The City developed a Stormwater Master Plan to address drainage and related water quality issues. The City implemented new regulations to control and treat stormwater runoff from new construction and redevelopment sites. The City explored innovative approaches to controlling and treating stormwater through advances in best management practices (BMP) and technologies such as modular stormwater reclamation and reuse systems. Best management practices seek to preserve natural filtration and pollution removal, such as by planting buffer strips. Currently, the Authority and the City collaboratively work together to improve drainage in the system.

Stream Bank Restoration: Restoring stream banks to more natural conditions can improve water quality, natural beauty and wildlife habitat. Restored stream banks also can improve dissolved oxygen levels and reduce stream temperatures. These activities are most effective along smaller streams.

Sediment Removal in Streams: Sediments are naturally occurring substances on a streambed generated by soil erosion. Sludges are found in sediments when sewage sol-ids settle on the bottom of a stream. Often, removing sediments and sludges creates short-term environmental problems by stirring up the pollutants buried in the streambed. Nature can often remedy these problems on

[3] *U.S. EPA Combined Sewer Overflows – Guidance for Long-Term Control Plan (September 1995), Section 3.2, Page 3-3*

Table 3-1
Indianapolis CSO Control Technologies Matrix

TECHNOLOGIES	ENVIRONMENTAL IMPACTS AND IMPROVEMENTS							IMPLEMENTATION & OPERATION FACTORS
	Flow Reduction	BOD Reduction	DO Enhancement	Settleable Solids Removal	Bacteria Reduction	Floatables Reduction	Other	
SOURCE CONTROL TECHNOLOGIES								
Stormwater Management								
Catch Basin Modifications	High	Low	Low	Low	Low	High		Ongoing CSO Operational Plan; Limited by potential for street & yard flooding (Freezing Potential).The Authority performs within combined service areas; DPW performs within separated sewer areas.
Leaching Catch Basins	Low	Low	Low	Low	Low	Low		Limited by potential for contaminating ground water.
Sump Pump Disconnect	Low	Low	Low	Low	Low	Low		Site specific; More applicable to separate sanitary system; Water has to go somewhere and new storm sewers may be required; Interaction with home owners required.
Catch Basin Cleaning	None	Low	Low	High	Low	High		The Authority performs within combined service areas; DPW performs within separated sewer areas. Ongoing CSO Operational Plan; Labor intensive; requires specialized equipment.
Illicit Connection Control	Low	Low	Low	Low	Low	Low		Same as sump pump.
Roof Leader Disconnect Program	Low	Low	Low	Low	Low	Low		Includes drains and roof leaders; Same as sump pump.
Oil/Water Separator/WQ Inlets	None	Low	Low	High	None	High	Toxics Reduction	Good for restaurants, gas stations and parking lots; highway drainage; Site specific; Labor intensive.
Swales & Filter Strips	Low	Low	Low	Low	Low	High		Site specific; Good BMP; Low operational cost.
Porous Pavement	Low	Low	Low	Low	Low	Low		Not durable and clogs in winter; Oil and grease will clog; High maintenance and related costs.
Parking Lot Storage	High	Low	Low	Low	Low	High		Limited by potential for lot and yard flooding (Freezing Potential); Low operational cost.
Street Storage (Catch Basin Inlet Control)	High	Low	Low	Low	Low	High		Example - Evanston, Illinois; Limited by potential for lot and yard flooding (Freezing Potential) causing hazardous driving conditions; Low operational cost.
Solid Waste Collection/Disposal								
Illegal Dumping Control	None	Low	Low	Low	Low	High		Ongoing City Commitment.
Solid Waste Public Education	None	Low	Low	Low	Low	High		Ongoing City Commitment.
Hazardous Waste Collection	None	Low	Low	Low	Low	Low	Toxics Reduction	Ongoing City Commitment.
Public Education								
Water Conservation	Low	None	None	Low	Low	Low		Partnership with White River Alliance; Online Pledges and Public Education/Awareness.
Catch Basin Stenciling	None	None	None	None	None	High	Toxics Reduction	Inexpensive; Easy to implement; Public education potential.
Community Cleanup Program	None	None	None	None	None	High		Inexpensive; Sense of community spirit; Educational BMP; Aesthetic Enhancement.
Public Education Programs	None	None	None	None	None	High	Toxics Reduction	Ongoing CSO Operational Plan.
Recycling Programs	None	None	None	None	None	High	Toxics Reduction	Ongoing City commitment.
Animal Waste Management	Low	Low	Low	Low	Low	None		Site specific.
Lawn & Garden Maint.	None	None	None	None	None	None	Toxics Reduction	Changes in use of herbicide products and fertilizers.
Adopt-A Stream	None	None	None	None	None	High		Aesthetic Enhancement; Sense of community; Provide better patrol of stream and corresponding banks; coordination required with DNR.
Warning Signage	None	None	None	None	None	None		Ongoing CSO Operational Plan; Public Notification Program.

Table 3-1
Indianapolis CSO Control Technologies Matrix (continued)

TECHNOLOGIES	ENVIRONMENTAL IMPACTS AND IMPROVEMENTS							IMPLEMENTATION & OPERATION FACTORS
	Flow Reduction	BOD Reduction	DO Enhancement	Settleable Solids Removal	Bacteria Reduction	Floatables Reduction	Other	
SOURCE CONTROL TECHNOLOGIES								
Construction Related								
Onsite Control/New Construction	None	None	None	High	None	High		Contractor or owner pays for erosion control; Reduces clogging of catch basins; Reduces sediment and silt loads to stream; Little O&M for City; Enforcement.
Soil Stabilization Measures	None	None	None	High	None	None		Construction Associated; Ongoing City commitment; In building code; Reduces silt loads to stream; Enforcement.
Stabilized Construction Entrance	None	None	None	High	None	None		Ongoing City commitment; In building code and related City construction projects specifications; Enforcement.
Good Housekeeping								
Storage / Loading / Unloading Areas	None	Low	Low	Low	None	Low	Toxics Reduction	Industrial Facilities; Only applies to industry.
Industrial Spill Control	None	High	High	Low	Low	Low	Toxics Reduction	Ongoing CSO Operational Plan; Pretreatment Program regulated by State and City.
Street Sweeping Programs	None	Low	Low	High	Low	High		Labor intensive; Specialized equipment; Doesn't address flow or bacteria.
Litter Ordinance Enforcement	None	None	None	None	None	High		Ongoing CSO Operational Plan; Aesthetic Enhancement; Labor intensive.
Vehicle (Yards) & Equipment Management	None	None	None	None	None	None		Aesthetic Enhance; Labor intensive for monitoring and compliance activities.
Miscellaneous								
Review Industrial Pretreatment Program	Low	High	High	High	Low	High	Toxics Reduction	Ongoing CSO Operational Plan and Ind. Pretreatment Program.
Streambank Stabilization/Restorations	None	None	High	Low	None	None		Restoration of Streambanks; Aesthetically Enhances Stream; Canopy growth provides cool temps; Block U.V.; Reduce Greenway O&M.
Septic Tank Improvements / Barrett Law	None	High	High	Low	High	None		Important for bacteria reduction in localized areas and in streams during dry weather periods; Reduce homeowner O&M.
COLLECTION SYSTEM CONTROL								
O&M/Repair								
Infiltration/Inflow Reduction	High	Low	Low	Low	Low	Low		Controlling infiltration might have minimal impact on CSO volume due to its small magnitude when compared to inflow; Labor intensive; Requires specialized equipment; Particularly effective in separated sewer areas.
Regulator Improvement Program	Low	Low	Low	Low	Low	High		Relatively easy to implement; mechanical controls requires O&M.
Sewer System Cleaning/ Flushing	Low	High	Low	High	Low	High		Ongoing; CSO Operational Plan; Maximizes existing collection system; Reduces first flush effect; Labor intensive.
Sewer / Regulator Maintenance	None	None	None	None	None	High		Inspection, removal of debris and increased flow to plant; Ongoing CSO Operational Plan and O&M.
Outfall Maintenance Program	None	None	None	None	None	Low		Installed flap valves and duckbill valves reducing stream intrusion into sewer collection system.
House Lateral Repairs	High	Low	Low	Low	Low	None		House laterals account for 1/2 the sewer system length and significant sources of I&I; Repairs by homeowners.
Engineering/Structural								
Real Time Control	High	High	High	High	High	Low		Highly automated system; Mechanical control requires O&M; Increases potential for sewer backups.
Sewer Separation	High	Low	Low	Low	Low	High		Advantageous in select areas; Can be disruptive to local neighborhoods; potential for increased storm water pollutant load to water ways.
Outfall Consolidation / Relocation	Low	Low	Low	High	Low	High		Directs flow away from specific area; Low operational cost; May reduce permitting/monitoring; Can be used in conjunction with storage & treatment technologies.

Table 3-1
Indianapolis CSO Control Technologies Matrix (continued)

TECHNOLOGIES	ENVIRONMENTAL IMPACTS AND IMPROVEMENTS							IMPLEMENTATION & OPERATION FACTORS
	Flow Reduction	BOD Reduction	DO Enhancement	Settleable Solids Removal	Bacteria Reduction	Floatables Reduction	Other	
STORAGE TECHNOLOGIES								
Storage Before Sewer								
Industrial Discharge Detention	Low	High	High	High	Low	High	Toxics Reduction	Industry to hold stormwater or combined sewage until after the storm; Example – Indianapolis International Airport and Citizens Water.
Dry Detention Basin	High	Low	Low	Low	Low	High		Siting and land requirements make location selection difficult; Good approach during reconstruction of facilities in congested areas.
Wet Detention Pond	High	Low	Low	High	Low	High		Siting and land requirements make location selection difficult; Good approach during reconstruction of facilities in congested areas.
Storage in Sewer System								
In-Line Storage – Interceptor	High	High	High	High	High	High		Increased O&M costs; Increased potential for basement flooding; Maximizes use of existing facilities.
In-Line Storage – Trunk Sewer	High	High	High	High	High	High		Increased O&M costs; Increased potential for basement flooding; Maximizes use of existing facilities.
Off-Line Storage								
Tunnels	High	High	High	High	High	High		Eliminates land restrictions and costs associated with storage basins; Tunnels can provide large storage volumes with relatively minimal disturbance to the ground surface which can be very beneficial in congested urban areas; Increased O&M costs.
Off-Line Covered Storage Basins	High	High	High	High	High	High		Includes variations of retention; detention and flow-through system; Requires large area for location of underground basin; Increased O&M costs; Potentially high neighborhood disturbance.
Off-Line Open Storage Basins	High	High	High	High	High	High		Includes variations of retention, detention and flow-through systems; Example – Louisville, Kentucky; Requires area for location of above-ground basin; Increased O&M costs; Odor issues are a consideration.
TREATMENT TECHNOLOGIES								
At CSO Facility								
Vortex Separators	Low	*	*	High	Low	High		*BOD reduction and D.O. enhancement varies widely; Increased O&M costs
Vortex Separators w/disinfection	Low	*	*	High	High	High		Example – Columbus, Georgia; *BOD reduction and D.O. enhancement varies widely; Increased O&M costs.
High Rate Treatment	High	High	High	High	None	High		Examples – Actiflo, Densadeg, Microsep; High O&M costs; limited ammonia removal.
High Rate Treatment w/disinfection	High	High	High	High	High	High		Example – Actiflo, Densadeg, Microsep; High O&M costs; limited ammonia removal.
Mechanical Screens	None	None	None	None	None	High		Mechanical device requires additional O&M.
Netting Systems	None	None	None	None	None	High		Labor intensive.
Existing Treatment Facility								
Maximize Flow to AWT Plants	High	High	High	High	High	High		Ongoing CSO Operational Plan and CMOM Program; Low O&M cost.
Increase/Primary Treatment	High	High	High	High	High	High		Increased O&M costs.
Increase/Secondary Treatment with Disinfection	High	High	High	High	High	High		Higher level of treatment; eliminate primary effluent bypass; High O&M costs.
Equalization / Open Storage	High	High	High	High	High	High		Limited space onsite at Belmont AWT; Additional storage options in mines and areas near both AWTs; Odors must be monitored.
New Treatment Facility								
Increase Overall AWT Capacity	High	High	High	High	High	High		New reclamation facility on Fall Creek was considered by City in 2006; High O&M costs; Minimize odors by processing solids at Belmont AWT.
In Stream								
Stream Dam Modification/Removal	None	None	None	None	None	None		Remove old dams; No additional O&M.
Sidestream Aeration	None	None	High	None	None	High		Includes screening; Example - SEPA Project (Chicago); High O&M.

its own, but new sediment and sludge loads may be reduced for this to happen.

Construction Related Controls: When land is cleared for new construction, soils can be washed away into rivers and streams. Federal, state and city regulations require soil erosion control at construction sites.

Housekeeping Practices: Stormwater running off streets, parking lots, and other surfaces can carry solids, oils, grease, industrial chemicals and other pollutants into waterways. Housekeeping practices seek to reduce the amount of pollutants that can be washed away. Examples include street sweeping, litter control, and vehicle and equipment maintenance.

Public Outreach: Public outreach helps raise citizens' awareness of water quality and other environmental issues. It can also encourage people to do their part to reduce pollution from entering our waterways. The Authority has an extensive program described in more detail in Section 5.

Watershed Planning Initiative: In order to meet water quality standards, many local and state government organizations along the White River need to coordinate activities. The City worked with a regional watershed alliance to address water pollution and its many causes.

3.4 Collection System Controls

Collection system controls seek to reduce or better manage the flow within the sewer collection system. The City's early action projects included improvements to regulators within the system, installation of real-time control (RTC) devices, installation of in-line storage devices, infiltration and inflow improvements, localized sewer separation, and sewer system cleaning and flushing.

3.4.1 In-Line Storage (With Real-Time Control)

In-line storage uses the existing pipe capacity of combined sewer trunks and interceptors to temporarily store combined sewage generated by a storm. Inflatable dams or mechanical gates are used to hold sewage in a pipe or sewer trunk. Examples are shown in **Figures 3-1** and **3-2**. When available, in-line storage can be a low-cost way to reduce the volume of CSOs reaching receiving waters.

In-line storage can increase or possibly maximize the flows carried in interceptor networks to the wastewater treatment plant. In-line storage also can reduce the required level of additional CSO controls; capture the heavy pollutant load in the first flush; and optimize combined sewer flows treated at the wastewater treatment facility. The benefits of RTC in sewer systems are often not limited to CSO volume reduction. RTC may play an important role in the following aspects of maintenance/operations:

- Responding to emergency situations and conditions (during either wet- or dry-weather periods) including power loss, infrastructure damage, or equipment failure
- Isolating parts of the system for maintenance or construction
- Reducing energy consumption
- Maintaining flow regime and (sewage) velocities that will prevent/reduce sediment deposition
- Minimizing the wear/tear on equipment
- RTC uses the fill/decant cycles of the entire system to improve storage capacity. By making better use of the existing capacity, spending on new storage facilities can be reduced. Additionally, by controlling the flow within the system, peak rainfalls are managed and treated better. Real-Time Control also can be used to provide control of existing lift stations and future off-line storage structures, creating a global control system that can optimize prediction and control of sewage overflows.

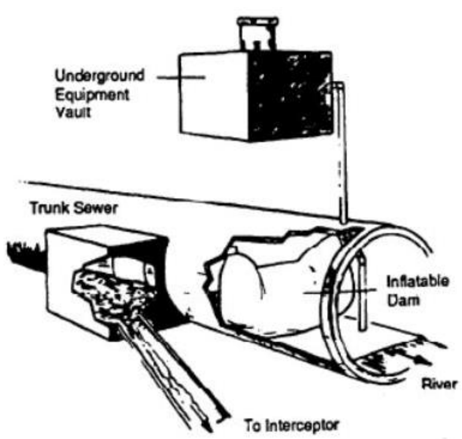

Figure 3-1
Inflatable Dam *(U.S. EPA, 1993)*

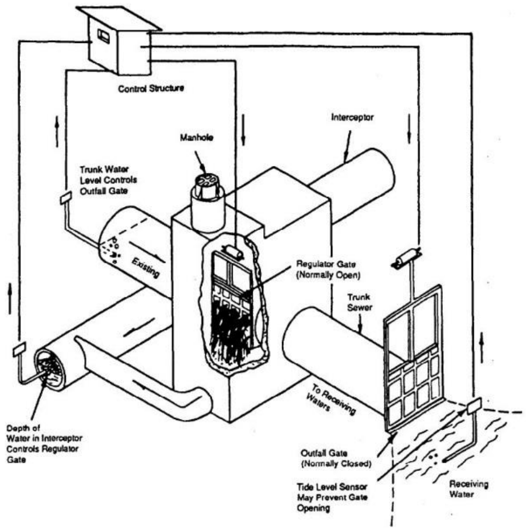

Figure 3-2
Motor-operated Gate Regulator
(U.S. EPA, 1993)

Real-time control also can prioritize overflows in one area over another, balance the hydraulic load in the collection system, reduce backup flows, provide dynamic and stepped storage, manage specific flow constraints, and provide fast dewatering of in-line and off-line storage facilities.

A disadvantage to in-line storage is the potential for either basement or surface flooding, which poses a risk to both public health and safety. To reduce this risk, the system needs emergency procedures and a reliable safety mechanism, which monitors and controls the flow of wastewater during a storm.

Another disadvantage of in-line storage is the potential to accelerate structural failure of the combined sewer system.

Larger storage capacities are often found in the oldest sections of a combined trunk sewer system. Over time, these sewers may have deteriorated and become susceptible to collapse. Therefore, the City assessed the structural conditions of pipes when identifying locations for in-line storage.

In-line storage could potentially cause septic odors, although no such problems have been reported in other cities. Residual solids and floatables might stick to the high sides of the combined sewer when wastewater is allowed to drain back into the interceptor system. Those solids would not be flushed out of the system during normal dry-weather flows, thereby presenting potential odor problems.

In-line storage with real-time control often proves to be a less expensive method to create storage than other technologies. Options considered by Indianapolis are evaluated in more depth in Section 4.

Advantages: Highly automated system that makes better use of existing sewage collection network. Potential for cost savings by utilizing existing pipeline capacity to increase combined sewage storage capacity. Can reduce cost of building new storage facilities. Effective for small, localized rainfall events.

Disadvantages: Increases potential for sewer backups, odor, and structural failures. Less effective for large rainfall events because the collection system is needed for conveyance. Increased operation and maintenance costs due to additional cleaning, odor and corrosion control requirements.

3.4.2 Inflow/Infiltration Abatement

Inflow and infiltration (I/I) is stormwater and ground water that enters a sanitary sewer system. *Inflow* is water entering a sewer system through roof drains, manhole covers, cross connections from storm sewers, catch basins, and surface runoff. *Infiltration* comes from ground water that seeps in through defective pipes, pipe joints, connections, or manhole walls.

I/I reduction can contribute to the LTCP by removing clear water from the upstream sanitary sewers, thereby relieving demands in the downstream interceptors and wastewater treatment plants. The City's I/I abatement program sought to refurbish existing sewers and reduce combined sewer overflows.

The best time to control infiltration and inflow into sewer systems is during sewer construction. A "tight" system can substantially reduce or even eliminate overloaded and surcharged sewers. Good I/I controls also can save money by extending the life of the system, reducing the need for expansion, and lowering operating costs. Updated information on the Authority's I/I abatement program can be seen in Section 3.10.2.1.

Advantages: Helps reduce volume of water entering a system, especially in separated sewer areas. Can reduce the need to build additional capacity. Can reduce sewer backups. By reducing the amount of flow, can extend the life of sewer system and lower operating costs.

Disadvantages: Identifying I/I problems is labor intensive. Requires specialized equipment and ongoing maintenance.

3.4.3 Localized Sewer Separation

Separation is the conversion of a combined sewer system into separate stormwater and sanitary sewers. Separated sewers reduce flows to the wastewater treatment plants by eliminating excess flow from surface runoff during wet-weather periods. While this technology was historically considered the ultimate answer to CSO pollution control, it has lost favor in recent years due to its especially high cost and the major disruptions it creates to traffic and other daily community activities. In addition, sewer separation would greatly increase the discharge of urban stormwater runoff, which contains a variety of pollutants such as sediments, organic matter, bacteria, metals, oils, floatables, and so on. Some stormwater is treated at the wastewater treatment plant when captured in a combined sewer.

Several potential benefits of sewer separation may warrant its consideration in localized areas. These include:

- Reducing upstream flooding and overflows in cases where the existing combined sewers are undersized and back up frequently during storm events
- Providing a more effective and economical option than treatment facilities in remote segments of a combined sewer system serving relatively small areas

Advantages: Eliminates CSOs and prevents untreated sanitary sewage from entering receiving waters. Reduces volume of flow at treatment plant.

Disadvantages: Cost and disruption to community. Requires work on private property. Separated stormwater in urban areas carries many pollutants that would go untreated. Complete separation is difficult to accomplish, whether the combined system is converted into a sanitary sewer or a storm sewer, due to inflow, infiltration, illicit connections and other factors.

3.5 Storage Technologies

Storage technologies provide additional capacity to the system, thus reducing the frequency and volume of combined sewer overflows. Stormwater can be stored before it reaches the sewer (as in detention ponds). Combined sewage can be stored in the system itself, or it can be diverted to an off-line storage tunnel or basin. The following sections describe some technologies that Indianapolis considered in development of the 2006 LTCP.

3.5.1 Off-line Storage/Sedimentation Tanks

Off-line storage tanks store all or part of the CSOs that occur during wet weather. Later, when system capacity becomes available, flows can be sent to the treatment plant. If flows exceed the storage capacity, they will receive some solids separation (and disinfection, if available) before leaving the storage facility.

The size of an off-line storage tank depends upon the capture goals set for each site. Typical CSO control goals include:

- Providing a minimum treatment level for flows up to a specified point
- Fully capturing the first flush and providing partial treatment for later flows
- Reducing the number of annual overflow events and/ or volume of overflow

A typical arrangement includes a regulator, bar screens, settling tank and outfall. If disinfection is considered, it may be implemented either upstream or downstream of the settling tank. Design details such as flow distribution, tank flushing, and facility activation also are affected by the overall goal and hydraulics of the specific site.

Storage tanks are generally fed by gravity and the stored flow is typically pumped back to the interceptor after the storm. If the existing sewers are deep, then the storage tank is deep and construction becomes more expensive.

Advantages: Well suited for early action projects at critical CSO outfalls. Reduces the frequency and volume of overflows at a specific CSO outfall or group of CSO outfalls. Captures the most concentrated first flush portion of CSO events. Reduces the size of downstream conveyance and treatment facilities.

Disadvantages: Relatively high cost compared to the volume captured. Operation and maintenance costs can be high, especially if the application includes provisions for partial treatment and discharge, rather than simple storage and bleed-back to the sewer. Depending on the application, there may be a potential for odor problems.

3.5.2 Storage Tunnels

Deep tunnels capture wet-weather overflows from a system of CSO outfalls within a large geographic area. They are generally constructed in bedrock several hundred feet below the ground surface. They provide a large storage volume with minimal disturbance to the ground surface and convey the captured CSO to a central location. Deep tunnels are generally the preferred technology in densely developed urban areas such as Indianapolis.

Although tunnel construction is challenging, the technology has matured during recent years as numerous installations have been completed. It requires providing work shafts, access structures, vent shafts and drop structures, along with a disposal site for excavation materials. All of these require some disturbance on the surface.

The three most common ways to excavate this type of tunnel are tunnel boring machines, rock header machines, and drill-and-blast methods. Along with the tunnel, a pumping station also must be built to dewater the tunnel to the treatment plant. CSO storage tunnels have been installed in several cities, including Chicago, Milwaukee, Rochester (NY) and Toledo.

Advantages: Large volume of storage with minimal surface disturbance. Can build within existing rights of way. Inoffensive to adjacent property owners. Low maintenance cost relative to open surface storage facilities. Also serves as conveyance facility. Minimizes purchase of large parcels of ground.

Disadvantages: Higher construction costs than open storage facilities. However, the relative cost is dependent on subsurface conditions.

3.6 Wet-Weather Treatment Technologies

Wet-weather treatment technologies are used to remove pollutants from incoming wastewater before it is discharged to the receiving stream. Wet-weather treatment technologies can be used at an individual CSO outfall, at CSO storage facilities, or at an existing or new wastewater treatment facility. Descriptions of technologies considered by the City of Indianapolis are provided below in three categories:

1) Treatment plant technologies
2) Disinfection technologies
3) CSO outfall technologies

3.6.1 Treatment Plant Technologies

To meet long-term wet-weather treatment goals, the City needed to provide additional wet-weather treatment capacity at the Belmont and Southport AWT plants. Technologies considered for wet-weather treatment included:

- Conventional primary clarification (physical treatment)
- Advanced primary clarification (physical/chemical treatment)
- Secondary Treatment (biological treatment)

3.6.1.1 Conventional Primary Clarification

Conventional primary clarification is a physical process that settles solids out of previously screened wastewater. Used at a majority of municipal wastewater plants, this device settles, concentrates and removes solids while allowing clear wastewater (primary effluent) to be discharged for further treatment.

Conventional primary clarification is moderately effective at removing suspended solids and BOD. Typical primary treatment at municipal facilities achieves about 60% removal of suspended solids and 35% removal of BOD. Due to its simplicity and built-in capacity for accumulating settled solids, conventional primary clarification provides a cost-effective method for removing total suspended solids (TSS) and BOD. Accordingly, the city constructed a wet-weather project to expand the Belmont AWT plant primary clarifiers. An additional project was planned to expand wet-weather primary clarification at the Southport AWT plant.

Advantages: Moderately efficient at removing suspended solids and particulate BOD. Provides significant storage capacity for settled solids. Produces a relatively thick settled sludge of low volume. Lower operation and maintenance cost than enhanced high-rate clarification or secondary treatment. Easy to expand.

Disadvantages: Requires more land for construction than high-rate versions of advanced primary clarification (referred to as enhanced high-rate clarification, EHRC). Less efficient than advanced primary treatment at removing TSS and particulate BOD.

3.6.1.2 Advanced Primary Clarification

Enhanced high rate clarification (EHRC) is a form of advanced primary clarification. Although there are several variants of advanced primary clarification processes, all of them rely on the addition of a chemical coagulant such as ferric chloride or alum to achieve greater suspended solids removal than conventional primary clarification. Advanced primary clarification is thus a physical-chemical treatment process. EHRC employs lamella type clarifiers with or without ballasting agents such as micro-sand so that very small units can provide effective suspended solids removal at very high flowrates. One type of EHRC process is illustrated in **Figure 3-3**. Versions of advanced primary treatment employ conventionally sized clarifiers but with supplemental rapid mix tanks and flocculation tanks for chemical addition and coagulation of the raw suspended solids. All such processes remove suspended solids by simple gravity settling and generate a settled sludge stream for further processing. EHRC facilities generate substantially more sludge than conventional primary clarifiers, both because the removal efficiency is higher and because of the large amount of chemical solids generated from chemical addition. The settled sludge solids also do not thicken as well as sludge solids from conventional primary clarifiers.

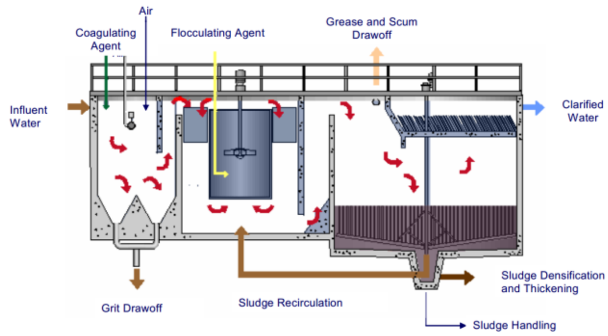

Figure 3-3
Enhanced High Rate Clarification (EHRC) System *(IDI, 1999)*

There are several additional benefits of advanced primary treatment processes, including:

- The chemical coagulants typically used are effective in removing phosphorus (though such removal is not required).
- The iron hydroxide or aluminum hydroxide precipitant formed can be effective co-precipitating agents for trace removal of regulated metals.
- The mild acidity of the chemical reagents can slightly lower the pH of the treated effluent and thereby reduce the concentration of unionized ammonia in the effluent.

Accordingly the City of Indianapolis evaluated advanced primary treatment, including EHRC, for several different applications:

- End of Pipe Treatment: An EHRC facility could be located at an individual CSO discharge point or at a point where several CSOs are consolidated to treat combined sewage before it overflows into the receiving stream.
- Peak Shaving Treatment: An EHRC facility could be used to treat combined sewage that would otherwise be discharged to the stream once storage facilities reach maximum capacity during a wet-weather event. Specific applications of this concept are evaluated in Section 4.

- Wet-weather Treatment at the AWT plants: Advanced primary treatment processes, including EHRC, could be located at the Belmont and Southport AWT plants to treat wet-weather flows in excess of the AWT treatment capacity. Concepts under consideration include: (1) intermediate clarification of the first-stage biological effluent at the Belmont plant; (2) clarification of raw sewage at the Belmont headworks during extreme wet-weather events; and (3) clarification of captured CSO from a proposed deep tunnel during extreme events that exceed expanded biological treatment capacity. See Section 4 for the evaluation of these alternatives.

EHRC has been demonstrated to be very effective at removing suspended solids, with effluent suspended solids concentrations similar to that which can be achieved by suspended growth biological treatment systems (around 20 to 30 mg/L). However, in contrast to biological treatment processes, advanced primary clarification does not remove soluble biodegradable organics. Because the raw sewage at the Belmont plant had a relatively high soluble BOD fraction, total BOD removals from advanced primary clarification would be considerably less than the 50-80 percent reported in the literature.

The City conducted a six-month pilot test at the Belmont AWT plant in 2003 to evaluate alternative processes for advanced primary treatment. The main application tested was for removing suspended solids from an existing first-stage biological process (bioroughing towers) where the soluble BOD is low. The second application tested was for removal of suspended solids from wet-weather overflows at the headworks of the Belmont facility. Pilot plant testing applied to the Belmont first-stage bioroughing system (BRS) effluent in 2003 showed that several variants of advanced primary treatment can reliably achieve effluent suspended solids concentrations equivalent to conventional secondary treatment criteria. Chemical addition of ferric chloride or other coagulants such as alum could be required.

Advantages: Highly efficient at removing suspended solids and particulate BOD. The high-rate technologies require relatively little space. Easy to test and expand. Start-up is relatively fast, taking only about 20 minutes. Reported capital cost savings are said to greatly exceed the increased operating costs, which are incurred only during peak flow events, typically lasting for relatively short and infrequent periods.

Disadvantages: Disadvantages of the EHRC process include the need to frequently start up and shut down the equipment, the need to have an in-plant storage basin for the start-up period, ineffectiveness at removing soluble BOD and ammonia, and increased sludge generation rates from the chemical solids produced and the comparatively poor thickening characteristics of the solids. High rate variants, i.e. EHRC, have essentially no sludge storage capacity and thus would require the addition of large tankage for thickening and storing the solids prior to sludge dewatering, stabilization, and disposal.

3.6.1.3 Secondary Treatment

Secondary treatment systems receive the clarified effluent from conventional primary treatment for biological removal of soluble BOD, as well as remaining suspended solids and particulate BOD (the BOD associated with the suspended solids). Because of the effectiveness of biological treatment for removing soluble organics, secondary treatment provides better effluent quality than advanced primary clarification when treating wet-weather flows. Concepts for essentially doubling the biological treatment flow capacity for the Belmont and Southport facilities were developed. In evaluating these systems, the City considered these factors:

- Performance comparisons of alternative technologies for primary treatment, advanced primary treatment, conventional biological treatment (BOD removal), and advanced biological treatment (BOD and ammonia removal)
- Existing effluent limits in the wastewater NPDES permit and modifications of those limits during wet weather
- Space requirements (the Belmont site has limited space in which to construct new facilities)
- The ability to handle the significant fluctuations in both flow and pollutant loadings associated with wet-weather flows
- Future growth within the service areas

As explained below, the high-flow biological treatment process considered for the Belmont plant differs from that considered for the Southport facility.

3.6.1.3.1 Belmont High-Flow Biological Treatment Process

The Pre-CSO LTCP Belmont facility included two stages of biological treatment that operate in series. The first stage was an attached growth biological roughing process in which biomass (bacteria) grow attached to the surface of plastic media within large vertical towers. The roughing process effectively removes soluble biodegradable organics (BOD) by conversion to biomass. Excess biomass sloughs off the media and enters the second stage biological process. The second stage was a high purity oxygen activated sludge nitrification process for removing ammonia and the remainder of the soluble BOD.

The City planned to modify the two-stage process by upgrading the first-stage to a trickling filter/solids contact (TF/SC) process. In this manner, the first stage would become a secondary treatment process. During dry weather, about half of the primary effluent would be treated by the TF/SC process and then combined with the other half of the primary effluent for second stage biological nitrification treatment. During wet weather, the secondary effluent from the TF/SC process would be progressively uncoupled from the second stage nitrification process as wet-weather flowrates escalate beyond the flow capacity of the second stage. At the extreme condition, the two stages would be completely uncoupled and operated in parallel rather than in series, with the first stage providing secondary treatment of half the wet-weather flow; and the second stage providing advanced treatment for the other half of the wet-weather flow. Collectively, the biological treatment capacity during wet weather would be about twice the current capacity.

In 2012, the City modified the Belmont Plant's two-stage process to a very cost-effective single stage step feed process. The improvements doubled the secondary treatment capacity from 150 MGD to 300 MGD. The improvements included a new Air Nitrification System (ANS) with two (17 MG total) aeration tanks, increased flows through the secondary system, upgraded conveyance system to handle return flows from the new facilities, improvements to the existing Oxygen Nitrification System (ONS) to achieve maximum secondary treatment capacity of 300 MGD and demolition of existing bioroughing towers.

Advantages: Advantages include adapting the existing system to double the biological treatment flow capacity during wet weather. Effluent quality would be superior to stand-alone physical-chemical treatment technologies because soluble BOD is efficiently removed.

Disadvantages: Solids generation would impose a significant additional load on the existing solids processing facilities.

3.6.1.3.2 Southport High-Flow Biological Treatment Process

An alternatives analysis was completed in 2004 for expanding the Southport facility to relieve the Belmont plant from the burden of having to treat captured CSOs. Like the Belmont facility, the Southport facility flowsheet included the same two stages of biological treatment. The facility included an older air activated sludge system with a nitrification capacity of only 30 MGD. The original volume of the aeration tankage was relatively large (in fact, considerably larger than the 120 MGD oxygen nitrification process tankage). With the addition of efficient oxygen transfer equipment and much larger secondary clarifiers, it was believed that effective treatment could be achieved at flowrates up to 150 MGD. Therefore, this would provide capacity at the Belmont plant for future growth within the service area.

As an ancillary benefit, the process would relieve the Belmont plant of about 25 MGD in order to provide enough flow during dry weather to keep the Southport process viable and ready to treat wet-weather surges in flow.
In 2008, the City reviewed the 2004 plan and concluded that the peak flow to the Southport plant could be increased to 250 MGD through the conventional active sludge process. This project was completed in 2017.

Advantages: Highly efficient at removing soluble BOD, particulate BOD and suspended solids. Anticipated to be effective at removing ammonia at flowrates up to about 250 MGD. Requires relatively little new space because the new clarifiers would fit in the same space currently occupied by the existing secondary clarifiers.

Disadvantages: Increased operation and maintenance costs over primary or advanced primary treatment.

3.6.2 Disinfection Technologies

Seasonal disinfection is required from April 1 through October 31 at the Southport and Belmont AWT plants before discharge to the White River. The NPDES discharge permits contains monthly/daily numerical limits for E. coli bacteria. A combination of ultraviolet (UV) disinfection and sodium hypochlorite followed by sodium bisulfite for dechlorination is currently used for disinfection at both the Belmont and Southport AWT plants.

Disinfection also can be used at CSO outfalls to treat discharges. Currently, only one of the permitted outfalls discharging treated combined sewage is equipped for disinfection (Outfall 155). To be cost-effective, disinfection should be applied after solids are removed from the wastewater stream. The City evaluated several technologies for disinfection in the CSO system. These include ultraviolet (UV) disinfection, ozonation, chlorination/dechlorination, and peracetic acid.

The following discussion of disinfection technologies was based on several technical papers including *High-rate Disinfection Techniques for Combined Sewer Overflow* (Stinson and others, 1999) and "Disinfection Efficiency of Peracetic Acid, UV and Ozone after Enhanced Primary Treatment of Municipal Wastewater" (Gehr and others, 2003).

Selecting the best disinfection technology for a specific site involves looking at a number of factors. Criteria to consider include effectiveness, public safety, aquatic toxicity, application to low-quality effluent, required contact time, and cost-effectiveness. Permit limits were also a factor in choosing the City's disinfection approach.

3.6.2.1 Ultraviolet Disinfection

Ultraviolet radiation lamps kill bacteria in water without adding any chemicals. It is the most common alternative to chlorination for wastewater disinfection. Its safety and other advantages have led researchers to look into its possible use for combined sewage overflows. The Columbus Water Works in Columbus, Georgia examined the performance of various wet-weather treatment technologies for the control of CSOs, including UV disinfection. A UV disinfection system using medium pressure, high intensity lamps was located downstream of a filter. The UV system consisted of two banks of 42 bulbs each. Contact times were generally less than two seconds.

Bacteria kill is a function of lamp intensity, contact time (flow), pretreatment quality (light transmittance, TSS, chemical oxygen demand (COD), and ammonia) and temperature. Filter effluent (UV influent) had a transmissivity between 20 and 60 percent. The media filter provided sufficient pretreatment, allowing the UV system to reduce bacteria counts to hundreds or thousands of colonies per 100 mL for flows of 10 to 20 MGD, respectively. These results were for average conditions of TSS at 50 mg/L, 20 percent light transmittance and 25 degrees Celsius water temperature.

The study concluded that UV disinfection of filtered CSO is cost-effective and environmentally sensible for the smaller, more frequent CSO events. The study suggested combined chemical and UV disinfection for more reliable and effective CSO application.

In addition to the Georgia study, four high-rate disinfection technologies, including UV, were pilot-tested to determine their effectiveness in reducing bacteria levels at the Spring Creek, New York wastewater facility. During concurrent side-by-side testing, samples of the influent wastewater and treated effluent from each pilot were collected and analyzed for bacteria and conventional wastewater quality parameters. This study yielded the following observations:

- UV disinfection effectiveness tended to decrease at higher TSS concentrations (TSS greater than 150 mg/L).
- UV and chlorine dioxide technologies provided nearly complete reductions of bacteriophage and naturally occurring enteroviruses as found in wastewater at concentrations on the order of 106 plaque-forming units (pfu)/mL.
- UV disinfection has the distinct advantage of producing no disinfection by-products.
- No additional toxicity was observed in the UV effluent as compared to the pilot influent.

Because UV disinfection depends on light penetration, UV radiation would have limited ability to treat CSO flow due to high suspended solids. CSO waters also contain material that can foul lamps and increase maintenance costs. In addition, a facility using UV disinfection must be designed to handle peak flows unless some form of equalization is provided.

Advantages: Fewer health and safety risks than chlorination. Does not produce chlorine in discharge.

Disadvantages: Less effective when high levels of suspended solids are present. Higher capital and operation and maintenance costs than other disinfection technologies. Large facilities are required for high peak flows.

3.6.2.2 Chlorination / Dechlorination

Chlorination has been used since 1855 to disinfect wastewater in the United States and is the most commonly applied disinfection technology in the country. It is easily available in several forms, inexpensive, and effective against bacteria – although not fully effective against viruses. Disinfection is intended to protect human health; however, chlorination can create serious concerns for communities, operators, and aquatic ecosystems.

Due to the high rates and volumes of wet-weather flows, chlorine treatment often creates a high chlorine concentration, and thus, a high level of toxic by-products and leftover chlorine in the receiving waters.

Recently, regulations have required more wastewater treatment plants and CSO facilities to add a dechlorination process that uses gaseous sulfur dioxide or sodium bisulfite to remove chlorine before it enters the receiving water. On average, dechlorination will add about 30 percent to the cost of chlorination.

Disinfection of high volumes from CSOs would require large quantities of chlorine. The cost and availability of chlorine, the high risks of transportation of toxic chlorine through the community, and risks of gas leaks have led researchers to look for new, alternative disinfection technologies. Hypochlorite is, in general, more expensive than gaseous chlorine. It is, however, easier to handle, more safely stored in on-site tanks, and immediately available for use, but does degenerate over time.

Research indicates that high concentrations of suspended solids can reduce disinfection efficiency by shielding bacteria from the disinfecting agent. However, studies in Boston and Columbus, GA indicated that the major factors influencing chlorine disinfection are the dose, contact time, and mixing intensity.

Advantages: Effective against bacteria. Easily available. Widely used. Inexpensive.

Disadvantages: Longer detention time and dechlorination required. Health concerns. Production of chlorinated byproducts. Public safety and security concerns.

3.6.2.3 Ozonation

Ozone has been used as a disinfectant for almost as long as chlorine, although primarily for treating drinking water. Ozone disinfection is preferred over chlorination in Europe, where it has been used since 1906. In the early 1970s, design engineers in the United States began to evaluate ozone as an alternative to chlorine for wastewater disinfection. However, because ozone is generally more expensive to produce and must be generated on-site and used immediately, it has been considered a less attractive alternative to chlorine than UV disinfection.

Ozonation was used at the Belmont AWT plant from approximately 1980 to 1994. The plant was converted back to chlorination/dechlorination by the White River Environmental Partnership (WREP) in 1995. Ultraviolet disinfection has been added to both the Belmont and Southport AWTs. It is generally acknowledged that ozonation is effective against virtually all organisms in the final effluent, including viruses and protozoan cysts, as well as organisms resistant to chlorination.

Ozone is produced by a corona discharge that is similar to the natural lightning discharge in an electrical storm. Within an ozone generator, a high voltage is imposed across a discharge gap in the presence of an oxygen-containing gas. The resulting electrical discharge produces ozone. The reaction creates substantial quantities of heat that must be quickly removed to keep the ozone from decomposing back into oxygen. To reduce the heat, most commercial ozone generators are water-cooled.

After generation, an oxidation-resistant diffuser provides immediate distribution of ozone into the wastewater effluent stream. Because ozone is a more powerful chemical oxidizing agent than chlorine, it can achieve disinfection at shorter contact times.

Advantages: Shorter contact time than required by chlorination. Increased removal of biological oxygen demand, chemical oxygen demand, and total suspended solids and color. Ozone dissipates rapidly, eliminating acute toxicity to biota. Provides a supersaturated dissolved oxygen concentration to the effluent. Eliminates other pollutants that are not affected by biological treatment.

Disadvantages: Operation and maintenance costs are high because of inherent inefficiencies in process. Ozone must be produced on-site and used immediately. Not commonly used for treating CSOs.

3.6.2.4 Peracetic Acid (PAA)

Peracetic acid (PAA) is produced by the reaction of hydrogen peroxide and acetic acid and is the newest disinfection alternative for applications in North America. There are no known harmful by-products generated by the PAA disinfection process. PAA breaks down to oxygen and acetic acid, and thus, it does not present the risk of an undesired residual in the receiving waters.

Several PAA pilot-scale studies were performed in Europe in the early 1990s. In general, several studies indicate PAA can be an effective disinfectant for wastewater applications. However, although PAA is effective against total coliforms, a recent study showed it to be ineffective against *Giardia* and *Cryptosporidium* parasites. Updated information on this disinfection technology is detailed in Section 3.10.4.1.

Advantages: Environmentally safe.

Disadvantages: Level of effectiveness is questionable compared to the more traditional disinfection operations.

3.6.3 CSO Outfall Technologies

The following technologies could be installed at the site of a CSO outfall to remove some pollutants:

- Enhanced High Rate Clarification
- Swirl concentrators (vortex separators)
- Mechanical screens (weir mounted)
- Netting systems
- Trash racks

Disinfection also could be used in combination with these technologies to treat discharges at CSO outfalls. Currently, only one of the permitted outfalls discharging treated combined sewage is equipped for disinfection (Outfall 155).

3.6.3.1 Enhanced High Rate Clarification

Please see discussion of this technology in Section 3.6.1.2.

3.6.3.2 Swirl Concentrators (Vortex Separators)

Vortex separators (shown in **Figure 3-4**) are physical treatment devices that promote settling of solids from wet-weather flows. They are referred to as “swirl” concentrators because the flow swirls around the inside of the circular basin, causing a vortex at the center. The centrifugal effect forces solids to the outside wall of the basin where velocities are lower and settling can occur. The device concentrates solids and removes them through a drain, while effluent passes over a weir at the top of the device. Since overloading the unit decreases the performance, each unit is provided with an overflow weir to relieve peak flows and protect the unit. One important advantage of a vortex unit is that it operates completely on hydraulics, requiring no moving parts. This allows the unit to operate unattended during a storm event. However, it does require regular cleaning and maintenance between storms.

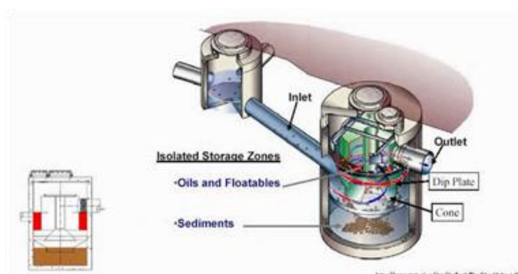

Figure 3-4
Swirl Concentrator (Vortex Separator)

A performance review of swirl concentrators has recently been conducted by the Water Environment Research Foundation (WERF, 2002). Evaluation of the net suspended solids removal from case studies and literature indicate that net removals from 5 to 15 percent are typical for vortex separators.

Advantages: Can operate unattended during a storm. Effective at removing grit, heavy suspended solids and floatables. Can provide detention for disinfection. No moving parts.

Disadvantages: Poor net removal of suspended solids and BOD. No bacterial improvement. Negligible ammonia removal. Frequent maintenance required.

3.6.3.3 Mechanical Screens (Weir-Mounted)

Weir-mounted mechanical screens can remove floatables and some solids from CSOs. They pose several advantages over trash racks or typical mechanical screens. An advantage of this type of screen over trash racks is its ability to be self-cleaning. This can be a significant advantage when compared to the maintenance requirements and the potential for flooding caused by a clogged static screen.

Another advantage of a weir-mounted screen over a typical mechanical screen (climber screen, cog screen, or rake screen) is the low headroom requirement. Most weir screens can be retrofitted into an existing overflow chamber with little to no structural modifications. Typical mechanical screens require a separate chamber to house and protect the screens.

Weir screens can be used in two types of configurations. For weir screens to be considered a low-cost technology for CSO control, they must be installed in an existing overflow chamber on a weir that is typically 5 feet in length or less. Weir screens also can be installed in specially constructed chambers at lengths exceeding 20 feet. However, this technology would not be low cost.

Advantages: Removes floatables. Self-cleaning. Can be retrofitted to existing overflow chambers. Low capital cost. Allows for emergency overflows if screen becomes clogged.

Disadvantages: Not feasible in all CSO outfalls. High operation and maintenance costs. Negligible removal of BOD, TSS, ammonia and bacteria.

3.6.3.4 Netting Systems

Disposable nets can provide basic control to capture floatables at a CSO outfall. Netting systems involve mesh nets that are attached to a CSO outfall to capture floatable material as the CSO discharges into the receiving water. The nets are nylon mesh bags that can be concealed inside the CSO conduit.

Advantages: Captures floatables inexpensively. Can provide a base level of control at some CSO sites.

Disadvantages: High operation and maintenance costs. Negligible removal of BOD, TSS, ammonia and bacteria.

3.6.3.5 Trash Racks

Trash racks or static screens can be located on top of an overflow weir or near the outfall. These devices are inexpensive but usually incur high maintenance costs due to their tendency to become clogged. If these devices bind, serious flooding and sewer backups can occur. They also require manual cleaning on a very frequent basis (usually after every storm) to prevent decreased overflow capacity during later storms.

Static screens were installed in outfall locations around the City of Louisville and became almost completely clogged with leaves from fall runoff. Because of the high maintenance needed to constantly clean the screens, the city decided to remove them.

Advantages: Captures floatables. Low capital cost.

Disadvantages: High operation and maintenance costs. Potential for serious flooding and sewer backups.
Negligible removal of BOD, TSS, ammonia and bacteria.

3.7 In-stream Oxygenation Methods

The following options can be used to add oxygen to a stream at critical points where dissolved oxygen levels tend to be low.

3.7.1 Dam Modifications/Removal

Modifying or removing dams can reduce pockets of low dissolved oxygen in a stream. As water passes over a dam, the turbulence causes oxygen to be added. However, dams also create upstream stagnant pools that can have low dissolved oxygen. Solids also can accumulate behind the dam.

Since the 2006 CSO LTCP approval, Boulevard Place Dam on Fall Creek has been removed to reduce solids accumulation and oxygen depletion. Other dams on White River have been identified for possible removal or modification to reduce solids accumulation and oxygen depletion.

Advantages: Can increase dissolved oxygen and prevent solids from accumulating upstream from the dam. Returns stream to a more natural state. Improves biological habitat. Reduced downstream erosion.

Disadvantages: Removal is temporarily disruptive to stream. Costs vary depending on the stream. Removal of dams adversely impacts steam production.

3.7.2 Sidestream Aeration/Fountains

Sidestream aeration or fountains can be located where the dissolved oxygen in the streams is most critical during storm events. Sidestream aeration involves a high capacity pumping station that pumps a portion of the stream to an elevated pool. The flow is aerated as it cascades over steplike structures back to the stream. Five of these stations were put into operation along the Calumet-Main channel waterway system in Chicago. Fountains also have been used to provide stream aeration and to enhance the aesthetics of the stream.

Advantages: Increases dissolved oxygen at critical points along a stream. Aesthetically pleasing alternative.

Disadvantages: High capital cost. High operation and maintenance requirements. Construction is disruptive to stream.

3.8 2001 -2004 CSO Technology Screening and Evaluation

The history of the CSO Technology Screening and Evaluation has not been modified from the original approved CSO LTCP. As noted in Section 1, the City of Indianapolis submitted its CSO LTCP and Water Quality Improvement Report in April 2001 to the U.S. Environmental Protection Agency (U.S. EPA) and Indiana Department of Environmental Management (IDEM). Based on the City's initial evaluation of available CSO control technologies and the characteristics of the sewer system, the plan called for the construction of new storage/conveyance facilities along most CSO-impacted waterways and upgrades to the AWT plants to manage peak wet-weather flows. The City received comments on the plan from U.S. EPA in June 2001. Comments related to the screening of CSO control technologies included:

- The City must obtain additional CSO monitoring data to calibrate and verify the CSO collection system model and revise its LTCP to reflect those data.
- The City should analyze the cost-effectiveness of measures that would achieve disinfection, as opposed merely to measures that achieve certain levels of capture.
- The cost-benefit of realistic combinations and sizes of controls should have been evaluated, instead of generic, one-technology assumptions.
- The City's cost-benefit analysis for bacteria control should include evaluation of the benefits of reducing bacteria levels, even if the reduced levels are above the water quality standards. For example, an E. coli count of 1,000/100 mL in a water body poses less human health risk than a count of 100,000/100 mL.

The City began meeting with U.S. EPA in August 2001 to begin addressing those comments and others. The negotiations included representatives from IDEM, who submitted their comments on the LTCP in June 2002. The City and regulatory agencies worked together to address the agencies' comments through a step-by-step process, which is described below.

3.8.1 Model Re-Calibration and Verification

In order to address U.S. EPA's comments, the City first had to obtain the agencies' concurrence in and approval of both the CSO collection system model, which is used to estimate CSO flows and size facilities, and the in-stream water quality model, which evaluates the water quality benefits of various CSO control technologies. In the summer of 2001, the City initiated a Supplemental Flow Monitoring and Sampling and Analysis Program. This program utilized twice as many flow monitors and collected end-of-pipe samples to determine constituents found in Indianapolis CSOs. Sufficient data was collected during 2001 to allow for recalibration of the CSO collection system model in early 2002. On June 28, 2002, U.S. EPA sent a letter of approval of the recalibrated CSO collection system model so that the City could proceed to use the model to evaluate CSO control technologies.

Following approval of the CSO collection system model, the in-stream water quality (hydrologic) model was recalibrated by the City and approved by U.S. EPA on August 28, 2002. The models and the recalibration/reverification are described in more detail in the "Indianapolis CSO LTCP Hydraulic and Water Quality Modeling Report."

3.8.2 Re-evaluation of CSO Control Technologies

Pursuant to its June 2001 comments, U.S. EPA asked the City in September 2001 to perform additional evaluation of CSO control technologies for their ability to reduce bacteria discharges to the streams. U.S. EPA representatives said they felt the City had prematurely eliminated remote treatment technologies because of concerns those technologies would not meet dissolved oxygen requirements. The City agreed to perform additional evaluations of 1) systemwide remote treatment facilities and 2) a hybrid alternative that would combine storage/conveyance technologies with remote treatment.

The re-evaluation of control technologies began after the model was re-calibrated, verified and approved by U.S. EPA in the summer of 2002. Because the model re-calibrations resulted in a 10 percent reduction to estimated systemwide CSO volumes, the City needed to re-analyze the storage/ conveyance technology in order to provide a valid side-by-side comparison with the other technologies. The City defined two control technologies that would be evaluated for the basic hybrid technology. Therefore, a total of five control technologies were evaluated:

- <u>Control Technology 1</u> – Storage and conveyance with treatment at AWT plants, plus AWT plant upgrades
- <u>Control Technology 2</u> – Multiple remote EHRC treatment facilities with UV disinfection, plus AWT plant upgrades
- <u>Control Technology 3</u> – Hybrid combination of storage/conveyance sized at 12 untreated overflows per year and EHRC with UV disinfection for greater levels of control, plus AWT plant upgrades
- <u>Control Technology 4</u> – Hybrid combination of storage/conveyance at 12 untreated overflows per year and screening with chlorine disinfection/dechlorination for greater levels of control, plus AWT plant upgrades
- <u>Control Technology 5</u> – Total sewer separation

Individual technologies were developed and screened for five different overflow frequencies: 12 overflows per year, 6 overflows, 4 overflows, 2 overflows, and 0.5 overflows (1 overflow every two years).

The initial screening process, conducted from August to December 2002, evaluated the effectiveness of various technologies without considering costs or cost-benefit comparisons. In January 2003, the City met with U.S. EPA and IDEM to present the following information:

1) A summary of the re-calibrated CSO collection system model results, showing CSO discharge volumes;
2) Results of the analysis and modeling of the updated instream water quality data;
3) Results of the evaluation of the five control technologies on a systemwide and individual stream basis. This evaluation was based upon the following factors:

- Percent annual overflow capture vs. size of storage facilities
- Annual overflow frequency vs. size of storage facilities
- Percent annual overflow capture vs. percent reduction of annual BOD load
- Annual overflow frequency vs. percent reduction of annual BOD load
- Percent reduction of annual *E. coli* bacteria load vs. control technology
- Percent annual overflow capture vs. days of exceedance of the daily maximum *E. coli* bacteria standard (235 colonies/100 mL)
- Annual overflow frequency vs. days of exceedance of the daily maximum *E. coli* bacteria standard (235 colonies/100 mL)

- Percent annual overflow capture vs. days above two *E. coli* bacteria benchmarks (235 colonies/100 mL and 2,000 colonies/100 mL)
- Annual overflow frequency vs. days above two *E. coli* bacteria benchmarks (235 colonies/100 mL and 2,000 colonies/100 mL)

4) Results of the preliminary evaluation of control technologies against additional evaluation criteria related to neighborhood issues, technical issues, operational issues and water quality issues. These criteria, shown in **Table 3-2**, were developed in 2002 with the assistance of advisory committees, U.S. EPA, and IDEM. This evaluation identified issues of concern for each control technology.

The major findings of this analysis were:

- Control Technology 1, storage and conveyance, was the most effective technology for the removal of BOD from CSOs, followed by the hybrid technologies and remote treatment. All four technologies were equally effective in their reduction of *E. coli* bacteria.
- CSO control alone will not reduce the days of exceedance of the *E. coli* daily maximum bacteria standard of 235 *E. coli* colonies/100 mL without implementing a comprehensive program to reduce other bacteria sources throughout the watershed, such as failing septic systems and stormwater discharges.
- CSO control will reduce the days that in-stream *E. coli* bacteria levels are very high (above 2,000, 5,000 or 10,000 colonies/100 mL).
- When considering neighborhood impacts, technical issues, operational issues, and water quality impacts, storage/conveyance and sewer separation had the fewest issues of concern. However, sewer separation would require significantly more work on private property than storage/conveyance facilities and would cause significantly more disruption during the construction phase. Remote treatment and hybrid control technologies have the most issues of concern with regard to neighborhood impacts.
- Total sewer separation would lead to increased pollution from stormwater discharges, a significant source of water quality impairment in Marion County.
- Design storm events cause significant hourly peak flows that must be factored into the sizing of control facilities. These peak flows have a greater impact on facility sizing than overflow volumes. Peak flows are dampened by storage facilities. Conveyance, treatment and pumping facilities that must be sized for peak flows will be large.
- Storage/conveyance and sewer separation are the most established and widely employed technologies for CSO control. Construction of storage/conveyance facilities will require less disruption to neighborhoods than the other control technologies.

This re-evaluation supported the original screening of technologies contained in the 2001 LTCP, which selected storage and conveyance as the preferred technology for CSO control in Indianapolis.

Table 3-2
Evaluation Criteria

Neighborhood Issues
Siting Concerns
How close are facilities to homes, parks, schools, roads, etc.?
How difficult would it be to site this alternative at projected locations?
What effect would this alternative have on the existing area?
Safety and Security
Are there public safety issues associated with the proposed alternative, such as use of chemicals for treatment, creation of habitat for vector/nuisance populations (i.e. mosquitoes and flies)?
Are there security issues, such as potential for vandalism, terrorism, sabotage, etc.?
Neighborhood Disruption (Construction)
How much disruption will be caused to the use of streets, sidewalks, parks, yards, etc., during construction?
How long will the disruption last?
Aesthetics
What visual impact will the alternative have on the existing landscape?
Can the alternative be seen from a home or public gathering place, such as a park?
Can the design of any new facilities consider/incorporate surrounding architecture, landscaping, neighborhood themes, etc.?
How will environmental justice concerns be addressed?
Noise
How much and when will noise occur during construction?
How much noise will be present in the long-term from operating procedures such as pumps, blowers, etc.?
Odor
Are odors expected to be reduced in surrounding areas during long-term operation?
Are odors in the area going to be increased during long-term operation?
Truck Traffic (Operation)
How frequently will trucks travel through a neighborhood for regular operation and maintenance activities?
Technical Issues
Siting Concerns
How close are facilities to homes, parks, schools, roads, etc.?
How difficult would it be to site this alternative at projected locations?
What effect would this alternative have on the existing area?
Pollutant Removals
How well does each alternative perform in removing specific pollutants (BOD, TSS, bacteria, and pathogens)?
Consistent Treatment for Variable Flow
Does the alternative have the ability to consistently treat varying flows from different storm events?
Will the alternative provide sufficient disinfection for bacteria control at various flows?
Solids Handling
What means and methods will be used for removing and storing solids contained in the stormwater and/or overflow?
How frequently will solids have to be removed?
Is the removal and storing method automated or does it require on-site attention or operation?

Table 3-2
Evaluation Criteria (continued)

Proven CSO Technology	
Does historical field data and information from similar installations demonstrate that this technology can work in Indianapolis?	
Does the data demonstrate reliability, acceptable performance, low maintenance, etc.	
Permitting Concerns	
What is the expected length of permitting time?	
How difficult will it be to obtain permits?	
Are there issues that might adversely affect permit compliance?	
Useful Life of Facilities	
What is the expected length of useful life before necessary replacement, upgrade, etc.?	
What are the expected cost of operation and maintenance during the useful life of facilities?	
Operation Issues	
Start-up Capability	
What is the expected time of start-up, length of time to achieve effective CSO control, and expected frequency of start-up?	
Operations	
Will operations require additional staff, special certifications, special equipment, etc.?	
Maintenance	
How frequently will maintenance activities be required? Will it require additional equipment or staff certification?	
How long will the disruption last?	
Reliability	
Does the equipment have the mechanical reliability to maintain effective operation?	
Historical data will be used to evaluate each alternative.	
Water Quality Benefits	
DO Standards Compliance	
Will the alternative achieve dissolved oxygen (DO) compliance, which is necessary for the survival of fish and other aquatic organisms?	
Aquatic & Wildlife Benefits	
In riverbank ecosystems, the foundations of the food chain for aquatic and most terrestrial animal species are aquatic plants, aquatic insects, and other aquatic macro-and microorganisms. These plants and animals also create recreation opportunities and enhance aesthetic value. Does the alternative promote and sustain aquatic and wildlife benefits?	
Peak *E. coli* Level	
Alternatives must control and reduce the levels of *E. coli* to help improve water quality.	
How well will the alternative reduce peak *E. coli* levels in the receiving stream?	
Days of *E. coli* Exceedance	
Currently, bacteria levels in the White River in Indianapolis exceed water quality standards at least half the year. This is not only caused by CSO discharges, but also by stormwater runoff, failing septic tanks, wildlife, upstream contributions, etc. Does the alternative reduce the number of days the standards are exceeded?	

Table 3-2
Evaluation Criteria (continued)

Solids & Floatables Controls
How well will the alternative reduce or prevent floatables (plastic bottles, containers, floating debris, etc.) and other solid waste (toilet paper, tissue, etc.) from sewer overflows from reaching the receiving streams?
Toxicity Reduction
Certain elements and chemical compounds can be toxic to aquatic life even at low concentrations. Can the alternative reduce concentrations of toxic chemicals in sewage overflows?
Pathogens Reduction
How well would the alternative reduce disease-causing bacteria, viruses, parasites, etc. sometimes found in sewer overflows?
Total Residual Chlorine
Alternatives using chlorine disinfection can possibly contribute residual chlorine to surface waters. Large doses of chlorine in the water are detrimental to aquatic flora and fauna. The severity of impacts associated with chlorine is dependent on the concentration of chlorine discharged and the corresponding amount of dechlorination material used to reduce chlorine residue. Is the alternative likely to significantly increase chlorine levels in the receiving stream?
Financial Issues
Present Worth Cost
Present worth cost is the summation of an alternative's total cost in today's dollars. What is the total cost, including initial capital cost, long-term operating cost, etc.?
Capital Cost
What is the cost for initial outlay of money for design, permitting, construction, etc.?
Operating Cost
What is the total cost of operation including labor, power cost, chemical cost, equipment replacement cost, maintenance cost, etc.?
Cost per lb. of BOD Removal
BOD is a pollutant of concern for CSO control as it reduces a body of water's dissolved oxygen. What is the cost per pound of BOD removal, in a form that allows direct comparison between alternatives?
Cost per Percentage of E. coli Removed
E. coli is a parameter of concern for CSO control as it contributes to a water body's ability to be considered safe for human contact. What is the cost per percentage of *E. coli* removed (e.g., $500,000 achieves 90% removal - vs.- $1,000,000 achieves 95% removal)?
Cost per Additional Day Meeting Bacteria Standard
What is the total cost, divided by the number of additional days the regulatory bacteria levels are met beyond the current number of days when levels meet bacteria standards (on a system-wide basis)?
Unit Cost to Treat
Treatment can be accomplished at existing AWT facilities or at new facilities constructed within the collection system. What is the cost per gallon of sewage that receives partial or full treatment prior to discharging effluent into receiving streams that meets NPDES permit limits?

3.8.3 Methodology for Technology Screening by Watershed

Following the results of the 2002 CSO technology re-evaluation, U.S. EPA asked the City to further evaluate technologies by comparing their costs and benefits. In June 2003, the City developed a watershed-based methodology to evaluate both the costs and benefits of the same CSO control technologies.

The methodology involved the following steps:

- Further developing and refining the specific technologies to be evaluated within each watershed
- Further defining, ranking and weighting evaluation criteria
- Running models of the combined system to determine CSO facility sizes and water quality impacts
- Estimating facility sizes and their capital, operation/maintenance and present worth costs (capital plus 20 years' operation/maintenance costs)
- Evaluating the water quality benefits of each technology option
- Numerical scoring of all options at each overflow frequency (12, 6, 4, 2 and 0.5 overflows per year), based upon objective definitions for technical, operating, financial and water quality criteria
- Performing a cost-benefit analysis based upon selected water quality criteria
- Comparing total scores of all options against all evaluation criteria

This methodology is described below and in further detail in *Presentation Supplement for Pleasant Run Alternatives Evaluation* (July 28, 2003).

3.8.3.1 Description of Technologies

The City began the evaluation by developing more specific options within the same five control technologies, but on a watershed basis. For example, under storage/conveyance (Control Technology 1), evaluated options in the Pleasant Run watershed included increased conveyance capacity, storage tunnels, and near-surface storage facilities. These options were screened for the same five overflow frequencies: 12 overflows per year, 6 overflows, 4 overflows, 2 overflows, and 0.5 overflows (one overflow every two years). The first stream evaluated was Pleasant Run, followed by Fall Creek. **Table 3-3** illustrates the control technologies evaluated for Pleasant Run.

The Pleasant Run and Fall Creek watershed evaluations also included the evaluation of partial sewer separation in conjunction with storage/conveyance, remote treatment and hybrid technologies. In order to fully consider all CSO control options, the City evaluated partial separation projects and complete sewer separation to determine what level of sewer separation, if any, would be feasible.

The intent of partial separation projects was not to completely separate the sewers but to separate within a limited area the major public inflow sources (such as catch basins) - those sources that could be easily rerouted from the system. The partial separation concept employed detachment of curbside catch basins within a stretch of each stream to reduce the flow of stormwater within the combined system. Stormwater best management practices to reduce stormwater pollutant impacts to streams were incorporated into these technologies. In Fall Creek, for example, partial separation was considered for approximately 27 percent of the combined sewer area.

Once partial separation projects were defined for a CSO basin, they were modeled to size CSO control facilities for various levels of control. Separation projects were modeled by decreasing the runoff co-efficient (or C-value) in the affected area within each CSO basin. However, an appropriate C-value is difficult to predict since minimal performance data on these types of projects is available. Typical C-values for areas not employing sewer separation in Fall Creek range between 0.3 and 0.5, meaning 30 to 50 percent of rainfall discharges into the combined system as runoff. The C-value is highly dependent upon the number of public and private inflow and infiltration sources impacting the combined system beyond catch basins. Partial separation projects may range from 10 to 50 percent effective in rerouting flows from the combined system (complete sewer separation being 100 percent effective, theoretically).

Table 3-3
Pleasant Run Control Technologies Matrix

	UNTREATED OVERFLOW EVENTS PER YEAR					
	12	**6**	**4**	**2**	**0.5**	**0**
CONTROL TECHNOLOGY 1: Storage and Conveyance						
Conveyance via New **Interceptor** with Treatment at AWT Plants	1	2	3	4	5	NA
Storage Tunnel and Dewatering via New Interceptor with Treatment at AWT Plants	6	7	8	9	10	NA
Near-Surface Storage Facilities and Dewatering via New Interceptor with Treatment at AWT Plants	11	12	13	14	15	NA
Limited Near-Surface Storage Facilities and Conveyance via New Interceptor with Treatment at AWT Plants	16	17	18	19	20	NA
CONTROL TECHNOLOGY 2: Remote Treatment Facilities - Remote EHRC and UV Disinfection						
Remote Treatment via EHRC and UV Disinfection **(5 locations)**	21	22	23	24	25	NA
CONTROL TECHNOLOGY 3: Hybrid Technology - Control Technology 1 with EHRC and UV Disinfection						
Conveyance via New **Interceptor** with Treatment at AWT Plants (12 Overflows) and Remote Treatment via **EHRC and UV Disinfection**	X	26	27	28	29	NA
Storage Tunnel and Dewatering via New Interceptor with Treatment at AWT Plants (12 Overflows) and Remote Treatment via **EHRC and UV Disinfection**	X	30	31	32	33	NA
CONTROL TECHNOLOGY 4: Hybrid Technology - Control Technology 1 with Screening and Chlorine Disinfection/Dechlorination						
Conveyance via New **Interceptor** with Treatment at AWT Plants (12 Overflows) and Remote Treatment via **Screening and Chlorine Disinfection** /Dechlorination	X	34	35	36	37	NA
Near-Surface Storage Facilities and Dewatering via New Interceptor with Treatment at AWT Plants (12 Overflows) and Remote Treatment via **Screening and Chlorine Disinfection**/Dechlorination	X	38	39	40	41	NA
Limited Near-Surface Storage Facilities and Conveyance via New Interceptor with Treatment at AWT Plants (12 Overflows) and Remote Treatment via **Screening and Chlorine Disinfection** /Dechlorination	X	42	43	44	45	NA
CONTROL TECHNOLOGY 5: Total Sewer Separation	NA	NA	NA	NA	NA	46
Note: The number in each cell indicates the **number** of the alternative.						

The facility sizes with partial separation were compared to facility sizes that did not include sewer separation to determine their overall benefit. The model predicted that the flow in the combined system would fall by roughly 20 percent with partial separation. Findings from the modeling analysis were used to size and cost the CSO control facilities. The costing analysis concluded that technologies employing partial separation generally cost more than technologies that did not include sewer separation. Refer to **Figure 3-5** as an example. The least costly alternatives at all levels of control were those that did not employ partial sewer separation.

To complete the analysis, the City evaluated partial separation projects using the evaluation criteria. In general, alternatives that did not employ partial separation received a significantly higher total score when compared to the same alternative with partial separation. Refer to **Figure 3-6** as an example. Additionally, the highest scoring alternative at all levels of control did not employ sewer separation.

Based on the partial separation analysis performed, projects that employed partial separation generally cost more and received lower scores on technical and operating issues than those not employing separation. Partial separation projects might only reduce flow in the combined system by 13 to 25 percent. As a result, the City carried forward the most appropriate CSO controls without partial separation. The City considered and adopted sewer separation projects for small remote CSO areas, and will continue to consider separation as a supplemental project during facility planning of the CSO control projects.

3.8.3.2 Evaluation Criteria

The City used updated evaluation criteria that fell within five categories: technical issues, water quality benefits, financial issues, operating issues and neighborhood issues. The evaluation criteria were presented earlier in **Table 3-2**. At U.S. EPA's request, neighborhood criteria were not used at the watershed-based stage of the evaluation in order to ensure that all technically viable alternatives would survive to the next phase of analysis. Neighborhood issues were used during the alternatives evaluation described in Section 4 of this report.

In order to apply the evaluation criteria to the technologies, the City defined good, fair and poor ratings for each criterion. These definitions enabled the City to rank technologies objectively against their ability to meet each criterion. The City also weighted the criteria, and the five criteria categories, to ensure that the most valued criteria would have more weight in the technology screening. **Table 3-4** illustrates the weighting of criteria categories against each other in a pair-wise comparison.

The pair-wise comparison evaluated each category against the others, assigning numeric scores to quantify the value placed on one category compared to another. For example, in the first row of **Table 3-4**, technical issues ranked much lower in value to the city than water quality benefits, and therefore received a score of "1" when compared with water quality. Continuing along the first row, technical issues ranked much lower than financial issues, with a score of "1", and somewhat lower than operating and neighborhood issues, receiving a "2" when compared to those categories. In the second row, water quality issues ranked much higher than engineering issues (scoring a 5), somewhat higher than operating and neighborhood issues (4), and about the same as financial issues (3). In this way, each category was scored against the others, creating a category weight (sum of all the scores) and a rank (1st through 5th).

Through this process, the City determined that financial issues and water quality benefits were the highest-ranking categories, thus giving them greater weight in the screening of technologies. The financial issues category received a weight of 17 and water quality benefits a 16, compared to 11 for neighborhood issues, 10 for operating issues and 6 for engineering issues.

Within each category, individual criteria also were evaluated through the same pair-wise comparison to develop weighting factors for each individual criterion. The highest ranking criteria resulting from this process were predominantly in the water quality and financial categories, including days of *E. coli* exceedances, dissolved oxygen compliance, present worth cost, and peak *E. coli* levels. Therefore, these criteria received greater weight in the overall scoring of technologies. For the detailed results of the criteria ranking and weighting, see *Presentation Supplement for Pleasant Run Alternatives Evaluation*, July 28, 2003.

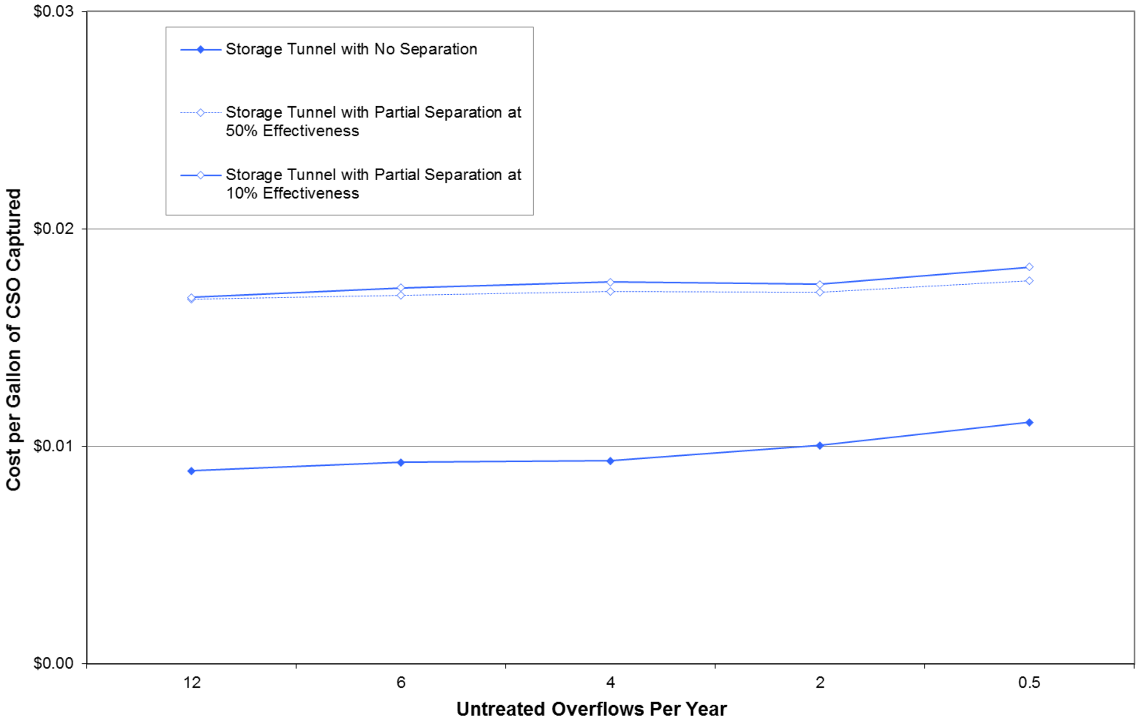

Figure 3-5
Partial Separation: Cost per Gallon of CSO Captured (2006)

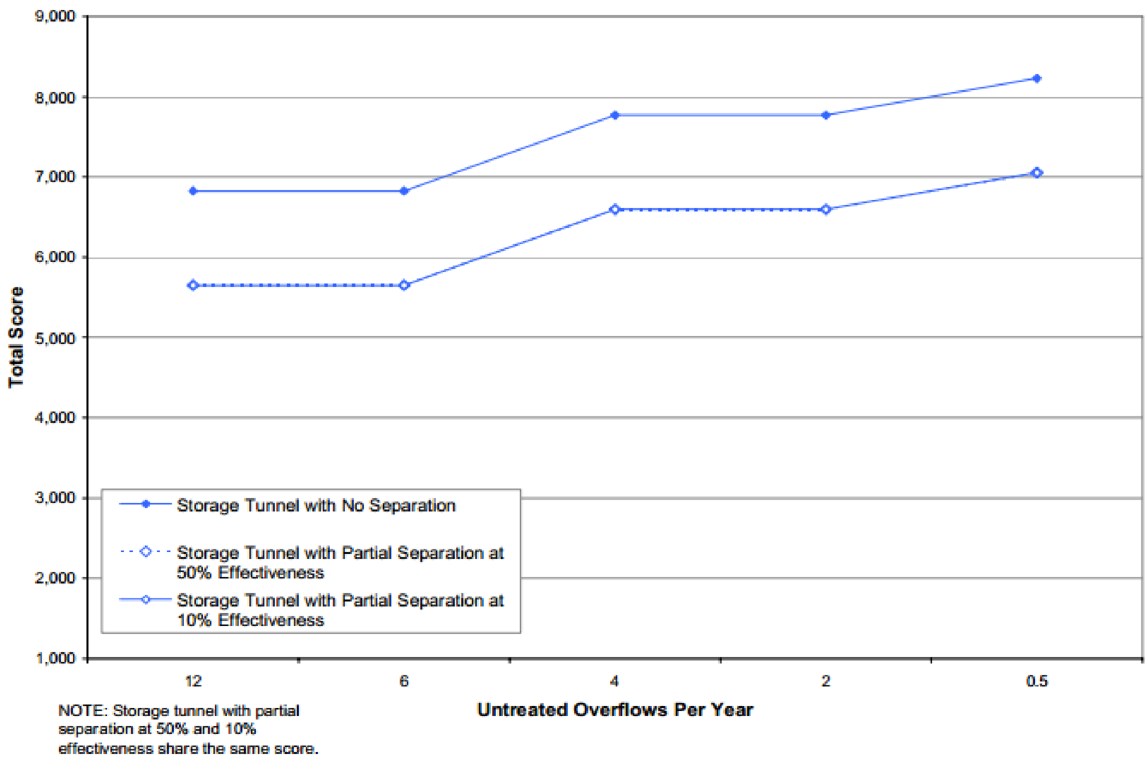

Figure 3-6
Partial Separation: Total Scores by Technology (2006)

Table 3-4
Criteria Category Ranking

Criteria Categories	Technical issue	Water quality benefits	Financial issue	Operating issue	Neighborhood issue	Category Weight (Sum)	Rank
Technical issues		1	1	2	2	6	5
Water quality benefits	5		3	4	4	16	2
Financial issues	5	3		5	4	17	1
Operating issues	4	2	1		3	10	4
Neighborhood issues	4	2	2	3		11	3

Key:
1 Category in row ranks *much lower than* category in column
2 Category in row ranks *somewhat lower than* category in column
3 Category in row ranks *same as* category in column
4 Category in row ranks *somewhat higher than* category in column
5 Category in row ranks *much higher than* category in column

3.8.3.3 CSO Collection System Analysis and Facility Sizing

The City's evaluation reflected additional CSO collection system modeling performed to support the watershed screening process. Hydraulic analysis was carried out using the NetSTORM model of the City's combined sewer system. The model predicted the CSO discharge volumes and flowrates that would have to be managed by each CSO control facility. This output was then used to (1) size and preliminarily site the facilities and develop their associated costs and (2) carry out the in-stream water quality analysis.

3.8.3.4 Water Quality Analysis

Using the updated CSO collection system and the in-stream water quality model, the City evaluated the water quality benefits of the CSO control technologies. The water quality analysis was performed to demonstrate results attained by the current system, to estimate potential non-CSO background improvements to meet dry weather compliance goals, and to evaluate the benefits of various CSO control alternatives. The analysis was based upon the following factors:

- CSO flows and pollutant loading, including percent capture, average annual CSO frequency, average annual CSO volume removed, average annual CSO discharge remaining, and average annual BOD and E. coli loads
- In-stream modeled water quality benefits, including impacts on dissolved oxygen, maximum bacteria concentrations, E. coli geometric mean, compliance with the 235 cfu/100 mL E. coli standard, and ability to reduce the number of days E. coli levels exceed 2,000; 5,000; and 10,000 cfu/100mL targets

3.8.3.5 Cost-Performance Analysis

Costs for the CSO control technologies at various levels of control were evaluated based on the City's April 23, 2004, cost memorandum, "Cost Estimating Procedures for Raw Sewage Overflow Control Plan" located in **Appendix B**. The following costs were generated for evaluation: (1) capital cost, (2) operation and maintenance cost, (3) present worth cost, (4) cost per pound BOD removal, (5) cost per percentage E. coli removal, (6) cost per additional day meeting bacteria standard, and (7) unit cost to treat.

At U.S. EPA's request, the City also generated cost-performance curves to illustrate each alternative's cost per gallon of CSO flow captured, cost per pound of BOD removed, and cost per unit of E. coli bacteria removed. While these cost performance curves provided important information, the ranking and screening of technologies in this step were based upon a process that analyzed the technologies based upon 27 criteria (see **Table 3-2**), weighted and ranked in relation to each other.

3.8.3.6 Total Score Analysis

Using the criteria definitions and the criteria weight factors, the City developed scores for each technology at the five selected levels of control. This score represents a general sense of how well a technology is expected to meet the project goals, but does not necessarily identify the single best technology or combination of technologies for the watershed. In this manner, the City identified the most promising technologies that would be further developed and evaluated in the next step of the alternative evaluation process.

The results of employing the above methodology to analyze technologies for Pleasant Run and Fall Creek are described below.

3.8.4 Pleasant Run Results

Table 3-3 illustrated the CSO control technologies considered in the Pleasant Run watershed at the five selected levels of control. This section summarizes the results of the CSO control technology screening for Pleasant Run.

3.8.4.1 Water Quality Results

Results of the water quality analysis for Pleasant Run are as follows:

- ***BOD and E. coli Loads:*** Pleasant Run's current system contributes approximately 245,000 pounds of BOD and 1.5 x 10^16 cfu of E. coli bacteria per year to Pleasant Run. In general, storage/conveyance removes a greater BOD load from Pleasant Run than remote treatment or total sewer separation. Higher levels of CSO control (0.5 overflows) have the lowest E. coli bacteria loads while the most significant reduction in E. coli bacteria is with total sewer separation.
- ***DO Concentration:*** Pleasant Run currently meets water quality standards for dissolved oxygen. Since dissolved oxygen levels are good in Pleasant Run, no significant improvement in dissolved oxygen occurs with CSO controls.
- ***E. coli Bacteria Concentration:*** Maximum E. coli bacteria counts in Pleasant Run currently fall between 100,000 and 400,000 cfu per 100 mL for a range of evaluation storms. Storage/conveyance (at 4 or 2 overflows) would reduce the peak E. coli levels to at or below 100,000 cfu per 100 mL. Remote treatment has similar results; CSO counts fall below 50,000 cfu per 100 mL at 4 or 2 overflows.
- ***E. coli Geometric Mean:*** Pleasant Run is listed on the 303(d) list as impaired for *E. coli*. Under current conditions, Pleasant Run has a geometric mean of 448 cfu/ 100 mL for *E. coli*. Background improvements, such as septic tank elimination and storm sewer improvements, are expected to achieve compliance with the *E. coli* bacteria standard during dry weather, improving the overall geometric mean to a projected 197 cfu/100 mL. CSO controls would further reduce the geometric mean, ranging from 149 cfu/100 mL at 12 overflows per year to 127 cfu/100 mL at 0.5 overflows. However, the reduction of the geometric mean is dependent on the number of overflows, and not the technology used.
- ***E. coli Days of Exceedance:*** The City's analysis concluded that CSO controls alone will not improve the number of days that Pleasant Run will meet Indiana's 235 cfu/100 mL single sample maximum standard for E. coli. Stormwater discharges will still cause frequent exceedances of this standard. The City's analysis also demonstrated that CSO controls will help reduce the number of days that in-stream E. coli levels exceed the higher targets of 2,000, 5,000, and 10,000 cfu/100 mL.

3.8.4.2 Cost-Performance Results

Cost per Gallon of CSO Flow Captured: Capture includes conveyance, storage and treatment. For any given level of CSO control, such as 12 overflows per year, all technologies will capture the same annual average volume, except for sewer separation. An interceptor with treatment at the AWT plants (Technologies 1-5 on **Table 3-3**) had the best cost performance results for reducing CSO discharges.

Cost per Pound of BOD Removed: The annual BOD removed is highest for storage technologies, which can be dewatered and treated at the AWT plants, whereas Control Technology 2 (treatment with EHRC) has the lowest annual BOD removal rates. An interceptor with treatment at the AWT plants (Technologies 1-5) had the best cost-performance for BOD removal.

Cost per Unit of *E. coli* Bacteria Removed: An interceptor with treatment at the AWT plants (Technologies 1-5) had the best cost-performance for removal of *E. coli* bacteria.

3.8.4.3 Total Score Results

Total scores based on the criteria led to the following general conclusions on the control technologies evaluated:

- Technology 1 (storage and conveyance) ranks highest across all levels of control. A storage tunnel appears to be favored over near-surface storage facilities.
- Storage and conveyance provides reliability, less remote maintenance, improved water quality, and reduced human health risk in Pleasant Run at less cost.
- Some hybrid technologies (Technologies 3 and 4) score relatively well on cost-effectiveness criteria, but not as well as storage and conveyance technologies. These technologies also score poorer on reliability, operating issues and other issues, giving them poor overall scores in comparison to storage and conveyance options in Pleasant Run.
- Due to cost, operating and technical issues, Technology 2 (remote treatment) scores poorly in Pleasant Run.
- Technology 5 (sewer separation) scores poorly on financial issues.[4]

[4] *For additional information on the city's analysis of Pleasant Run CSO control technologies, see the following documents: Methodology for Long-Term Control Plan Alternatives Evaluation, Pilot Study - Pleasant Run Watershed (June 2003); Presentation Supplement for Pleasant Run Alternatives Evaluation (July 28, 2003); Memorandum: Pleasant Run Alternatives Evaluation, Response to EPA/IDEM Questions (September 8, 2003).*

3.8.5 Fall Creek Results

Table 3-5 illustrates the CSO control technologies considered in the Fall Creek watershed.

3.8.5.1 Water Quality Results

Results of the water quality analysis for Fall Creek are as follows:

- ***BOD and E. coli Bacteria Loads:*** Fall Creek's current system contributes approximately 825,000 pounds of BOD and 4.7 x 10^16 cfu of E. coli bacteria per year to Fall Creek. In general, storage/conveyance removes a greater BOD load than remote treatment or total sewer separation. The higher levels of control and total sewer separation show the most significant reduction in E. coli bacteria.
- ***DO Concentration:*** Some segments of Fall Creek did not achieve the state's minimum 4.0 mg/L and the daily average 5.0 mg/L water quality standards for dissolved oxygen. Based on system conditions, a dissolved oxygen concentration of 2.0 mg/L was predicted for the one-year storm. In general, storage and conveyance would improve dissolved oxygen at high levels of control (less than 4 overflows) but do not achieve the standard at low levels of control (12 and 6 overflows) without the addition of oxygen-enhancing methods, such as dam removal or aeration. Remote treatment would meet dissolved oxygen standards at all levels of control. Hybrid technologies with EHRC and UV disinfection would achieve the standard except at 12 overflows, while hybrid technologies with screening and chlorine disinfection/dechlorination would not achieve the standard at any level of control. In-stream aeration, dam modifications and other measures could be employed to improve dissolved oxygen concentrations and meet Indiana water quality standards with any technology.
- ***E. coli Bacteria Concentration:*** Maximum E. coli bacteria counts in Fall Creek fell between 100,000 and 400,000 cfu/100 mL for a range of evaluation storms. Storage/conveyance would not significantly lower maximum E. coli levels,

Table 3-5
Fall Creek Control Technologies Matrix

	UNTREATED OVERFLOW EVENTS PER YEAR					
	12	**6**	**4**	**2**	**0.5**	**0**
CONTROL TECHNOLOGY 1: Storage and Conveyance						
Conveyance via New **Interceptor** with Treatment at AWT Plants	1	2	3	4	5	NA
Storage Tunnel and Dewatering via New Interceptor with Treatment at AWT Plants	6	7	8	9	10	NA
Near-Surface Storage Facilities and Dewatering via New Interceptor with Treatment at AWT Plants	11	12	13	14	15	NA
Limited Near-Surface Storage Facilities and Conveyance via New Interceptor with Treatment at AWT Plants	16	17	18	19	20	NA
CONTROL TECHNOLOGY 2: Remote Treatment Facilities - Remote EHRC and UV Disinfection						
Remote Treatment via EHRC and UV Disinfection **(6 locations)**	21	22	23	24	25	NA
Remote Treatment via EHRC and UV Disinfection **(1 location)** and Conveyance Storage Tunnel	26	27	28	29	30	NA
CONTROL TECHNOLOGY 3: Hybrid Technology - Control Technology 1 with EHRC and UV Disinfection						
Storage Tunnel and Dewatering via New Interceptor with Treatment at AWT Plants (12 Overflows) and Remote Treatment via **EHRC and UV Disinfection**	X	31	32	33	34	NA
Limited Near-Surface Storage Facilities and Conveyance via New Interceptor with Treatment at AWT Plants (12 Overflows) and Remote Treatment via **EHRC and UV Disinfection**	X	35	36	37	38	NA
CONTROL TECHNOLOGY 4: Hybrid Technology - Control Technology 1 with Screening and Chlorine Disinfection/Dechlorination						
Storage Tunnel and Dewatering via New Interceptor with Treatment at AWT Plants (12 Overflows) and Remote Treatment via **Screening and Chlorine Disinfection/**Dechlorination	X	39	40	41	42	NA
Limited Near-Surface Storage Facilities and Conveyance via New Interceptor with Treatment at AWT Plants (12 Overflows) and Remote Treatment via **Screening and Chlorine Disinfection** Dechlorination	X	43	44	45	46	NA
CONTROL TECHNOLOGY 5: Total Sewer Separation	NA	NA	NA	NA	NA	47

Note: The number in each cell indicates the **number** of the alternative.

but would substantially reduce the annual frequency at which excessively high bacteria counts occur. Remote treatment would reduce the levels to below 100,000 cfu/100 mL at control levels greater than 6 overflows.

- ***E. coli Geometric Mean:*** Based on system conditions, Fall Creek achieved an all-weather geometric mean of 372 cfu/100 mL E. coli bacteria. With background improvements such as septic tank elimination, storm sewer improvements, and streambank restoration, the geometric mean was projected to fall to 292 cfu/ 100 mL. In addition to these programs, an estimated 2.5 MGD of flow augmentation was necessary to attain the E. coli geometric mean during dry weather. CSO controls would further reduce the all-weather geometric mean, ranging from 167-172 cfu/100 mL at 12 overflows per year to 144-149 cfu/100 mL at 0.5 overflows. However, none of the CSO controls would achieve the geometric mean standard of 125 cfu/100 mL, due to the impacts of urban stormwater discharges on this waterway.
- ***E. coli Days of Exceedance:*** The City's analysis revealed that CSO controls alone will not improve the number of days that Fall Creek will meet Indiana's 235 cfu/100 mL single sample maximum standard for *E. coli*. The City's analysis demonstrated that CSO controls would help reduce the number of days that in-stream *E. coli* levels exceed the higher targets of 2,000, 5,000, and 10,000 cfu/100 mL.

3.8.5.2 Cost-Performance Results

Cost per Gallon of CSO Flow Captured: A storage tunnel with treatment at the AWT plant (Technologies 1-5 on **Table 3-5**) and with remote treatment at the downstream end of the watershed (Technologies 26-30) had the best cost-performance for reducing CSO discharges.

Cost per Pound of BOD Removed: Similar to Pleasant Run, the annual BOD removed is highest for storage technologies, which can be dewatered and treated at the AWT plant, whereas treatment technologies have the lowest annual BOD removal rates. A storage tunnel (Technologies 1-5) had the best cost-performance for BOD removal.

Cost per Unit of *E. coli* Bacteria Removed: A storage tunnel with treatment at the AWT plants (Technologies 1-5 on **Table 3-5**) and with remote treatment at the downstream end of the watershed (Technologies 26-30) had the best cost-performance for removal of E. coli bacteria.

3.8.5.3 Total Score Results

Total scores based on all criteria led to the following general conclusions on the control technologies evaluated:

- Technology 1 (storage and conveyance) ranked highest across all levels of control. A storage tunnel appeared to be favored over near-surface storage facilities. Storage and conveyance provided reliability, less remote maintenance, improved water quality, and reduced human health risk in Fall Creek at less cost.
- Due to operating and technical issues, Technology 2 (remote treatment) scored poorly in the Fall Creek watershed. However, the remote treatment technologies that are combined with a storage tunnel scored very well on cost-effectiveness criteria for E. coli removal, but not as well on operating and technical issues and BOD removal. These technologies demonstrated one of the lowest costs for all levels of control.
- Some hybrid technologies (Technologies 3 and 4) scored relatively well on cost-effectiveness criteria, but not as well as storage and conveyance figure 2-81technologies. These technologies also scored poorer on reliability, operating issues and other issues, giving them lower overall scores in comparison to storage and conveyance options in the Fall Creek watershed.
- Technology 5 (sewer separation) scored poorly on financial issues and should not be carried forward.[5]

[5] For additional information on the city's analysis of Fall Creek CSO control technologies, see the following documents: Memorandum: Fall Creek Alternatives Evaluation (November 7, 2003); Memorandum: Fall Creek Alternatives Evaluation, Response to EPA/IDEM Questions (December 11, 2003); Memorandum: Fall Creek Alternatives Evaluation, Response to EPA/IDEM Questions (January 23, 2004).

3.8.6 CSO Technology Screening Conclusions

As the City was completing the Fall Creek technology screening process in December 2003 and January 2004, it noted the following trends:

- Storage/conveyance ranked highest at all levels of control due to reliability, water quality and cost-effectiveness.
- Remote treatment scored poorly due to operating and technical issues, but may be viable combined with a tunnel on Fall Creek or storage on Pogues Run. Remote treatment also carries heightened operational and security concerns.
- Hybrid technologies can score well on cost-effectiveness but never scored as well as storage/conveyance by itself. Screening and disinfection is not very effective and has been questioned by the public.
- Sewer separation scores poorly on financial issues but had merits on smaller, remote watersheds.

By late 2003, the City became concerned that the technology screening process was more lengthy than necessary.

Furthermore, the analysis was yielding conclusions similar to those anticipated for each watershed. Rather than proceed with additional analysis of other watersheds, the City proposed, and U.S. EPA and IDEM agreed, that the screening of technologies was complete and the City should move ahead with consideration of CSO control alternatives on a systemwide basis. The analysis of those systemwide alternatives is documented in Sections 4.4 through 4.6.

3.9 2001-2004 CSO Technology Screening and Evaluation Summary

The City of Indianapolis drew from a wide variety of technologies to better control combined sewer overflows. Many of the technologies evaluated here have been tested and proven in other cities. Indianapolis evaluated these technologies based on technical issues, operating issues, financial issues and water quality benefits. Based upon comments received from U.S. EPA, the City re-calibrated its CSO collection system and hydrologic models and re-evaluated technologies providing remote treatment of CSO discharges. This work was conducted from August 2001 through January 2004, beginning with an evaluation of technologies based upon non-cost factors and concluding with a detailed watershed-based analysis of technologies based upon various evaluation criteria, including cost and cost-benefit analyses.

An analysis of technologies in the Pleasant Run and Fall Creek watersheds demonstrated that increased storage and conveyance is the most cost-effective technology for CSO control, with the possible addition of an EHRC facility on Fall Creek. Similarities between Fall Creek and Pogues Run led to the conclusion that an EHRC facility at Pogues Run also should be evaluated further. Based upon the conclusions drawn from Fall Creek and Pleasant Run, the City proposed, and U.S. EPA and IDEM agreed, to consider CSO control alternatives on a more systemwide basis. Section 4 summarizes how Indianapolis evaluated the application of these technologies, and combinations of technologies, to specific streams and the City's advanced wastewater treatment plants. Neighborhood issues were considered in this evaluation, including siting concerns, safety and security, neighborhood disruption during construction, aesthetics, noise, odor, and truck traffic during operation. Neighborhood issues, public opinion, overall cost and water quality benefits all were considered in selecting the best alternative for each watershed and for Marion County as a whole.

3.10 2017 CSO Technology Screening and Evaluation

Since acquiring the wastewater system from the City of Indianapolis, the Authority has reviewed technologies available for CSO control not available or identified during the original CSO LTCP development. The following sections detail the additional technologies evaluated.

3.10.1 Updated and New CSO Technologies

Table 3-6, *2017 CSO Control Technologies Matrix*, summarizes each additional technology considered.

Table 3-6
2017 CSO Control Technologies Matrix

TECHNOLOGIES	ENVIRONMENTAL IMPACTS AND IMPROVEMENTS							IMPLEMENTATION & OPERATION FACTORS
	Flow Reduction	BOD Reduction	DO Enhancement	Settleable Solids Removal	Bacteria Reduction	Floatables Reduction	Other	
Collection System Controls								
Green Infrastructure	High	Low	Low	Low	Low	Low		Site specific; Good BMP; Low operational cost
Wet-Weather Treatment Technologies								
Biological High Rate Treatment	None	High	Low	High	Low	High		Small footprint
Wetlands	High	Low	High	High	Low	High		Low operating expense; requires regular monitoring & inspection
Optional Water Quality Improvements								
Flow Augmentation	None	None	High	None	None	None		Must gain public acceptance. Additional NPDES permit required.
Agricultural Buffers	None	Low	Low	Low	None	Low		Cost effective but limited research data

3.10.2 Collection System Controls

3.10.2.1 Green Infrastructure

Green infrastructure utilizes processes such as infiltration, evapotranspiration and capture and use in order to reduce the amount of stormwater flow being sent to the combined sewer system, particularly in urban areas. This infrastructure can be in the form of small-scale controls, like rain gardens, bioswales and porous pavements, or large-scale controls like riparian buffers, flood plain restoration and wetlands. These controls are designed to collect, store and filter runoff by implementing engineered soil mixes and in some cases, paver systems with gravel. Planning of green infrastructure must take into account important sewershed characteristics such as land use, soil types and topography.

Advantages: Reduces need for downstream storage facilities or treatment technologies. Reduces flow to wastewater treatment plants by eliminating stormwater in combined sewers. Creates and improves wildlife habitats. Reduces potential for flooding. Improves runoff water quality and community aesthetics. Readily adaptable and expandable. Both social and economic benefits.

Disadvantages: Requires maintenance and up-keep in order to stay functional and efficient. Additional structural support may need to be provided for infrastructure such as roof gardens.

3.10.3 Wet-Weather Treatment Technologies

3.10.3.1 Enhanced Biological High Rate Clarification

Enhanced Biological High Rate Clarification is a high rate process which combines biological treatment with Enhanced High Rate Clarification. It provides suspended solids removal and can be utilized as a high rate treatment for excess treatment plant flows during storm events. Pilot studies have demonstrated that the Enhanced Biological High Rate Clarification process can be successfully applied as a high-rate biological treatment system for storm flow.[6] This solution has been shown to reduce phosphorus, soluble BOD and total BOD, while avoiding treatment plant overflows. An example schematic of the Enhanced Biological High Rate Clarification process can be seen in **Figure 3-7** below.

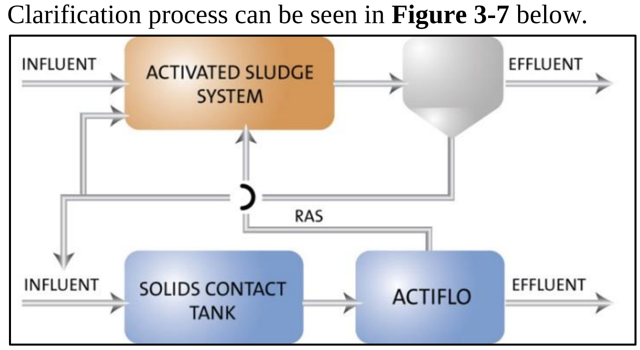

Figure 3-7
Enhanced Biological High Rate Clarification Flow Diagram *(Veolia Water Technologies, 2014)*

[6] *Source: "Wastewater Treatment: Enhanced Biological Treatment of Storm Flows" (Veolia Water Solutions and Technologies, 2010)*

Advantages: Small footprint. High efficiency removal.

Disadvantages: Disadvantages of the process include the need to frequently start up and shut down the equipment, need for biological source at remote site, and increased sludge generation rates from the chemical solids produced and the comparatively poor thickening characteristics of the solids.

3.10.3.2 Wetlands

Natural and constructed wetlands are treatment systems which utilize vegetation, soils and microorganisms to treat wastewater. Wetlands improve water quality by filtering and trapping suspended solids within the planted vegetation. They have the ability to retain excess nutrients and pollutants, such as heavy metals, which might otherwise enter the stormwater system.[7] Wetlands also play an important part in groundwater recharge and flood protection. The vegetation acts as a slow filter which retains incoming water and provides time for infiltration into the soil to occur. Wetlands also have a storage capacity for excess runoff, making them beneficial during storm events.

Advantages: Typically less expensive to construct than traditional treatment plants. Low operating expenses. Creates, improves and supports wildlife habitats. Groundwater recharge and flood protection.

Disadvantages: Requires regular inspections, monitoring and maintenance.

3.10.4 Disinfection Technologies

The Authority currently uses a combination of ultraviolet (UV) disinfection and sodium hypochlorite followed by sodium bisulfite for dechlorination for disinfection at both the Belmont and Southport AWT plants.

3.10.4.1 Peracetic Acid (PAA)

Since the 2006 CSO LTCP approval, peracetic acid has been successfully added to plants utilizing UV disinfection by allowing lamp intensity reduction and less lamp maintenance. Many applications are installed in Europe and Canada, and pilot-scale studies are currently being performed in several states within the U.S. PAA was recently approved as a wastewater disinfectant by the EPA.[8] PAA is unstable for transportation and must be produced on site. A 1-2 log kill of Enterococci and Fecal Coliform requires a contact time of 10-15 minutes. For treating CSOs, PAA requires low concentrations and short contact times which results in a more cost-effective and environmentally friendly disinfectant.

Advantages: Environmentally safe. Works well with UV disinfection. Can have shelf life of one year.

Disadvantages: Not as effective against Giardia and Cryptosporidium. Results in an increase of BOD. Byproducts include acetic acid and hydrogen peroxide, an animal carcinogen. Should not be stored at temperatures above 86 °F.

3.10.5 Optional Water Quality Improvements

The following options could be added to improve overall stream water quality.

3.10.5.1 Flow Augmentation

Flow Augmentation is the addition of stored or treated water into an existing river system during low-flow periods to maintain or improve water quality. During dry seasons rivers flow has a tendency to decrease, which may impact water level, stream aesthetics, wildlife habitats and recreational feasibility. The addition of stored or treated water increases flow to the stream. While this additional flow has the potential for positive effects on stream aesthetics and fish habitats, it can also lead to riverbed erosion and algae growth. A few studies on flow augmentation have been documented.[9]

Advantages: Benefits fish habitats. Possible water quality improvement during low stream flow, less sediment deposition and increased dissolved oxygen due to increased flow. Improved stream aesthetics.

Disadvantages: Possible environmental impacts with temperature, increase in algae growth and erosion. Must gain public acceptance. Few studies documented.

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[7] *Sources: EPA publications, "Wetlands Overview" and "Constructed Treatment Wetlands" (Aug/Dec 2004)*

[8] *Source: "Emerging Technologies: Wastewater Treatment and In Plant Wet Weather Management" (EPA, 2013)*

[9] *Sources: "Water Reuse for Stream Flow Augmentation" (June 2012), "Hydraulic Feasibility Study of Streamflow Augmentation at Fosters Brook, Long Island, New York" (USGS Study)*

3.10.5.2 Agricultural Buffers

Agricultural buffers are strips of dense vegetation which act as filters for field runoff. They are also an effective method of slowing surface water movement and limiting pollutant discharge to treatment systems. Agricultural buffers have been shown to be most effective at trapping particulate pollutants, but are also know to reduce nitrogen and phosphorus concentrations. Their performance varies depending on topography and climate factors, but properly located, designed and maintained buffers have been shown to trap around 50% of sediment from field runoff.[10] For instance, if the topography of the location includes steep slopes, it has the potential to produce greater loading to buffer zones which will decrease the efficiency.

Advantages: Cost effective. Nitrogen and phosphorus concentration reduction. Sediment reduction. Positive effect on soil and wildlife resources. Provides habitats for wildlife.

Disadvantages: Excess amounts of runoff to buffer may result in reduced performance. Buffers must be dedicated to the buffer zone. Limited research data on large-scale effects of buffer implementation. CSO community has no ability to implement or enforce.

3.10.6 Updated Evaluation Tools

The Authority has maintained and continued to develop the City's suite of modeling tools, which have been refined and expanded over the last 20 years to support CSO long term control planning.

The combined sewer interceptor hydraulic model was first developed and calibrated from 1992 to 1996 and recalibrated in 2002 using flow monitoring data. Since 1996, the model has been regularly updated to reflect new sewer system data and expansion into some of the separate sewer areas of the collection system. EPA performed extensive reviews of the 2002 model recalibration effort and approved the model for LTCP development in June 2002. As part of the NPDES permit, the Hydraulic Model Calibration and Verification Plan (DPW, 2003) was developed to document guidelines for when and how the model should be recalibrated. Additional CSO area recalibrations took place from 2006 through 2010 as part of the model expansions in individual CSO watersheds, according to the Hydraulic Model Calibration and Verification Plan guidance. Additional sanitary interceptor recalibrations took place from 2004 through 2012 as part of model expansions for individual sanitary interceptors.

In 2012, the EPA SWMM hydraulic model was converted to InfoWorks ICM to optimize simulation efficiency, data management, integration with GIS, and operational data. As a part of the conversion, the model was refined and recalibrated to incorporate the findings of field investigations and improved record information.

The hydraulic model of the combined sewer interceptor system is currently used to prepare discharge monitoring reports (DMRs) for the combined sewer outfalls, as required by the Authority's NPDES permit.

3.11 2017 CSO Technology Screening and Evaluation Summary

Since 2011, the Authority has evaluated additional technologies and approaches to identify viable options for meeting water quality goals, CSO control goals, and infrastructure needs. The technologies were evaluated based on technical issues, operating issues, financial issues and water quality benefits. However, it was determined that the current recommended plan of the 2006 CSO LTCP remained the most reliable and cost-effective solution.

[10] *Source: "Buffers and Vegetative Filter Strips" (Helmers, Isenhart, Dosskey, Dabney and Strock)*

CSO Abatement Technologies

Section 3 Modification Summary

The 2006 CSO LTCP was updated in 2017 as summarized below:

- Throughout Section 3, all CSO abatement technologies evaluated before August 26, 2011 are referred to as “City” or “Indianapolis” work and those evaluated after August 26, 2011 are referred to as “the Authority” work.
- Section 3.1, Introduction was modified to reflect completed events, outdated information was removed and an introduction paragraph was added.
- Section 3.2, Available Control Measures was modified to reflect completed events.
- Section 3.2.2, Identification of Viable CSO Control Technologies was renamed “2006 Identification of Viable CSO Control Technologies” and modified to reflect completed events.
- Section 3.3, Source Control Technologies was modified to reflect completed events and outdated information was removed.
- Table 3-1, Indianapolis CSO Control Technologies Matrix was modified to reflect completed events.
- Section 3.4, Collection System Controls was modified to reflect completed events.
- Section 3.5, Storage Technologies was modified to reflect completed events.
- Figure 3-3, Pioneer Reservoir Normal Fill and Overflow Path was removed.
- Figure 3-4, Chicago TARP Tunnel was removed.
- Section 3.6, Wet-Weather Treatment Technologies was modified to reflect completed events and outdated information was removed.
- Section 3.7, In-stream Oxygenation Methods was modified to reflect completed events and outdated information was removed.
- Section 3.8, CSO Technology Screening and Evaluation was renamed “2001-2004 CSO Technology Screening and Evaluation” and modified to reflect completed events.
- Figure 3-5, Partial Separation: Cost per Gallon of CSO Captured was renamed “Partial Separation: Cost per Gallon of CSO Captured (2006)”.
- Figure 3-6, Partial Separation: Total Scores by Technology was renamed “Partial Separation: Total Scores by Technology (2006)”.
- Section 3.9, Summary was renamed “2001-2004 CSO Technology Screening and Evaluation Summary” and modified to reflect completed events.
- Section 3.10, 2017 CSO Technology Screening and Evaluation was added to reflect events completed after 2006.
- Figure 3-7, Enhanced Biological High Rate Clarification Flow Diagram was added to new Section 3.10.3.1, Enhanced Biological High Rate Clarification.
- Section 3.11, 2017 CSO Technology Screening and Evaluation Summary was added to reflect events completed after 2006.
- Table 3-6, 2017 CSO Control Technologies Matrix was added to new Section 3.11, Post-CSO LTCP Summary.

4.0 Alternatives Evaluation

Contents:

4.1 Introduction

In this section, to reflect the transfer of the wastewater system from the City of Indianapolis to CWA Authority, Inc., all alternatives evaluated before August 26, 2011 are referred to as "City" or "Indianapolis" work and all those evaluated after August 26, 2011 are referred to as "the Authority" work.

This section describes specific CSO control alternatives considered in developing the CSO LTCP. Section 3 discussed the evaluation of available control technologies that act to reduce or mitigate CSO discharges. This section discusses how the most viable CSO technologies were combined into systemwide plan alternatives and how those alternatives were compared and evaluated against each other to identify a preferred plan. Alternatives selected will be prioritized and phased in over time, as described in Section 7. The performance and cost estimates provided in this section are based on standard engineering practices. As improvements are brought online, the Authority will evaluate their effectiveness and reassess and modify subsequent phases of the program as needed. The Authority may determine that one technology performs better than expected, thus reducing the need for storage volume or additional treatment technologies in a later phase of the program.

This section is organized as follows:

- Sections 4.3 through 4.7 include alternatives evaluated during development of the 2006 CSO LTCP.
- Section 4.8 includes a summary of the selected 2006 CSO LTCP and summarizes amendments to the approved 2006 Consent Decree.

4.2 Evaluation Factors

During evaluation of LTCP alternatives, the following factors were considered:

- Cost-effectiveness,
- CSO control goals,
- Regulatory compliance, and
- Community input.

4.2.1 Cost-Effectiveness

CSO controls represent the largest public works investment ever in the City of Indianapolis, and places a significant financial burden on Indianapolis residents. The CSO program must be designed to achieve the greatest benefits with the lowest reasonable cost. Therefore, reasonable and realistic cost estimates for CSO projects were evaluated against each project's ability to meet goals, regulatory requirements and citizen concerns. Using standard cost-performance analyses, the cost-effectiveness of CSO control alternatives was evaluated to identify the optimum control alternative for improving water quality, protecting public health, and meeting regulatory requirements. A financial capability analysis (based upon U.S. EPA guidance and local and state-based measures of fiscal stress) was conducted in order to determine the financial impact of CSO controls on ratepayers. This analysis is presented in Section 6.

4.2.2 CSO Control Goals

The goals for addressing combined sewer overflows in the LTCP include controlling solids and floatables caused by combined sewer overflows; capturing "first flush" discharges; and meeting state and federal requirements for dissolved oxygen (DO) and bacteria. The selected CSO control program will control solids and floatables, capture the first flush, and meet DO requirements. However, modeling and analysis has shown that even if all CSOs were immediately eliminated, waterways still would not meet the state's current water quality standards for bacteria at all times. While CSOs are a source of bacteria in Indianapolis streams, bacteria exceedances are also caused by many other factors, such as failed septic systems, upstream pollution, urban stormwater runoff, and sewer infrastructure problems such as breaks and backups that must be repaired. Cost-effectiveness was a major factor in evaluating the bacteria benefits of CSO control alternatives, as described below.

4.2.3 Regulatory Compliance

CSO controls were evaluated for their ability to meet both water quality-based and technology-based requirements under the Clean Water Act. In order to identify the optimum CSO control program, Indianapolis's unique conditions were considered, and the effectiveness of various control alternatives and strategies was evaluated, as required by state and federal law.

CSO controls must be designed to comply with discharge requirements in the National Pollutant Discharge Elimination System (NPDES) permits and with water quality standards and regulations developed under the Clean Water Act. These requirements include in-stream water quality standards for dissolved oxygen, *E. coli* bacteria and other pollutants that might be related to CSO discharges. NPDES permit limits will have a significant impact on the cost of the CSO control program.

4.2.4 Community Input

In addition to meeting state and federal regulatory requirements, the LTCP must be designed to be responsive to community input. An extensive process was conducted to gather citizen ideas and opinions on CSO controls. A Raw Sewage Overflow Advisory Committee appointed by Mayor Bart Peterson issued a number of recommendations in 2000 after reviewing public input. Details about public outreach programs are documented in Section 5.

Comments received via letter, the Website, and during numerous public meetings, meetings with committees, and other organizations in Indianapolis were considered. A series of public meetings and discussions with stakeholders on sewage overflow control options were conducted. Issues of importance to the community have been factored into the control plan and schedule in Section 7.

4.3 2006 Source Control Measures

Section 4.3, Source Control Measures, has not been modified from the original 2006 approved CSO LTCP. Updated information can be reviewed from the Combined Sewer Overflow Operational Plan (CSOOP) completed by the Authority in 2013.

The City evaluated a number of structural and non-structural source control measures to determine their ability to help reduce the water quality impacts of CSOs and other non-point sources of pollution in Marion County. These source control measures included:

- Industrial pretreatment program
- Stream bank restoration
- Sewer service for unsewered areas
- Stormwater control and management
- Infiltration/inflow abatement
- Pollution prevention
- Sewer separation
- In-line storage
- Watershed coordinator / riverkeeper

4.3.1 Industrial Pretreatment Program

One of the Nine Minimum Controls required of CSO communities was a review and possible modification of industrial pretreatment requirements. According to U.S. EPA's May 1995 Guidance for Nine Minimum Controls:

> "The objective of this control is to minimize the impacts of discharges into [combined sewer systems] from nondomestic sources (i. e., industrial and commercial sources, such as restaurants and gas stations) during wet weather events, and to minimize CSO occurrences by modifying inspection, reporting, and oversight procedures within the approved pretreatment program."

While approximately 45 percent of significant industrial users (SIU) in Indianapolis are physically located outside the CSO area, the wastewater discharged from most SIUs eventually passes through the combined sewer system. Therefore, the City's pretreatment requirements could have an impact on the pollution entering streams from CSOs.

Since Indianapolis began its pretreatment program in 1985, it recorded substantial improvement in the quality of industrial wastewater discharged to the Indianapolis municipal sewer system. The discharge of some heavy metals was reduced by as much as 90 percent from 1988 levels. Industries made significant improvements in implementing strategies to reduce loadings from their facilities.

The LTCP will significantly reduce the frequency of overflows and, therefore, any industrial impacts on the streams. SIU impacts will be minimized during continued LTCP implementation through the policy described in Section 4.3.1.2. Following full implementation of the LTCP, SIU impacts are expected to be insignificant in relation to the types of storm events causing overflows.

4.3.1.1 Potential Industrial Pretreatment Program Improvements

Indianapolis evaluated a number of alternatives for mitigating the effect of CSO discharges containing industrial wastewater. Each alternative was evaluated for its feasibility, benefits, and the potential burden on industrial users. The alternatives considered by the City are described briefly below:

Decrease Flow: During impending or actual wet-weather events, industrial users would be notified to limit the amount of wastewater discharged to the sewer system. This alternative requires specific knowledge of the CSO structures affected, their location within the sewer system, the industries contributing to that sewer segment, prompt notification to the affected industrial users, and re-notification to allow normal operations to resume. Impacts considered:

- Not feasible for all industries to shut down or modify production or manufacturing activities to limit flows.
- May be applicable to some batch-type processes or groundwater remediation wells.
- Industry reaction time will vary.
- Length of the flow limitation period may be limited due to flow or space availability.
- Potential adverse impacts on the base load to the AWT plants could upset the biological treatment systems.
- Additional costs to industry for shutdown, startup or modification of production processes. Impact on economic development due to flow limitation requirements during wet weather.

Hold All Flows: During storm events or known CSO activity, industries would be required to terminate all processes generating wastewater to the sewer or to hold and store wastewater during the CSO event. This alternative would require shutdown of industrial activity or construction of a holding basin, pond or tank. The same notification procedures would be necessary as described in the “decrease flow” alternative. Impacts considered:

- Not feasible for all industries to shut down or modify production or manufacturing activities to limit flows.
- May be applicable to some batch-type processes or groundwater remediation wells.
- Releasing held flows could cause higher peak loads to the AWT plants, potentially upsetting the treatment process.
- Would require structured release from industries to reduce peak load following a storm event.
- Increased cost to industries to construct holding facilities

Divert Strong Flows: Industries would be required to hold and store only those flows that could have an impact on the quality of water discharged during a CSO event. A comprehensive evaluation by the City of all separable flows at each industry would have been necessary to identify those waste streams to be held during wet weather. Notification procedures would be required. Impacts considered:

- Similar impacts to “Hold All Flows” alternative.
- Would require segregating, quantifying and designating flow streams to isolate “high strength” waste streams.
- Significant cost to city and industry.
- Potential severe impact on base load at AWT plants, possibly upsetting the biological treatment systems.

Eliminate Clear Water Flows: Determine the presence of any clear water or uncontaminated waste streams being discharged to the sewer and require their elimination from the system. These waste streams would consist mainly of non-contact cooling water, foundation sumps, and other collected clear water. However, this alternative could increase concentrations of some pollutants and make it difficult to meet NPDES permit limits at the wastewater treatment plants. Impacts considered:

- Ability to meet NPDES permit limits.
- Increased cost to industry to implement.
- Availability of alternative discharge locations (storm sewers or drainage ways).
- Potential for negative water quality impacts on streams.

Flow Reduction/Zero Discharge: Industries would be encouraged to investigate measures for flow reduction or zero discharge. Because these alternatives tend to be costly, some type of incentive program would be necessary. Impacts considered:

- Loss of significant baseflow and load to AWT plants.
- Increased cost may force industry to look at other options (such as relocation outside of Marion County).

Upgrade Pretreatment: Industries could be required to install and/or upgrade pretreatment equipment to further improve the quality of discharge to the sewer. This could be particularly useful for any target pollutants identified as a water quality concern during CSO events. Impacts considered:

- Removal of AWT plant base load.
- Increased cost to industry.
- May require incentives to implement.
- Would likely impact industries disproportionately depending on pollutant types and concentrations in their discharges.

Revise Pretreatment Limits: For targeted pollutants, effluent limitations promulgated in Chapter 671 of the Indianapolis regulations could be revised to reflect the reduction necessary to protect the water quality of the CSO receiving stream. This could include not only toxins, but also oxygen-demanding pollutants, floatables, and solids. Impacts considered:

- Removal of AWT plant base load.
- Increased cost to industry.
- May require incentives to implement.
- Could likely impact industries disproportionately depending on pollutant types and concentrations in their discharges.

Reroute Industrial Discharges: In some cases, industrial discharges might be rerouted to a separate sewer system or possibly a new CSO relief interceptor. Routing industrial flows to a CSO relief interceptor would eliminate industrial contributions to wet-weather overflows by directing flows to the deep tunnel. However, the interceptor would need to be designed with a downstream diversion structure that would send dry-weather flows to the treatment plants instead of the tunnel. A separate sewer for industrial flows could also be constructed to eliminate industrial impacts on overflows. Impacts considered:

- Need to configure CSO relief interceptors to send industrial flows to treatment plant during dry-weather.
- Increased cost to reroute plant flows and/or construct connector sewers.

Increase Sewer Rates/Fees: Although not a solution per se, an increase in sewer discharge fees would generate additional revenue to fund the cost of CSO improvements, but also may create an incentive for users to reduce discharge volume. Since a major portion of sewer revenues are collected from industrial users, rates must be increased with caution. Rate increases might cause industries to either move production out of Indianapolis or install their own treatment systems. Either scenario would reduce industrial revenues needed to pay for system improvements. Impacts considered:

- Increased cost to industry.
- Impact on economic development.
- Large increases could cause industries to relocate to another community, thus placing a greater burden on residential ratepayers.

4.3.1.2 Pretreatment Permitting Policy

In January 2005, the City issued the Office of Environmental Services Industrial Pretreatment Permitting Policy and Process. The document describes how the City made decisions during LTCP development on new or increased discharges by the industrialized community in the CSO area. It was developed in consultation with the City's Industrial Dischargers Advisory Committee (IDAC). This process, which was necessary for clarification during LTCP development, will be revised and re-evaluated as CSO controls reduce or eliminate industrial impacts. The City's decision-making process included reviewing several factors, such as:

- The number of CSOs between the discharger and the treatment plant
- The frequency of discharges from affected CSOs
- The magnitude of discharges from downstream CSOs (overflow volume/year)
- The potential magnitude of pollutant load from CSOs
- Stream reach characteristics (recreational use and low flow levels)
- Conventional pollutant parameters found in the affected CSOs (BOD, TSS and other)

If a permit application raises major concerns across multiple factors, modifications to reduce CSO impacts may be required. This will include a review of potential solutions with the discharger, including:

- What is physically possible to reduce impacts on CSOs (holding, diverting, treating, or redirecting flows)
- Economic feasibility of various options to the discharger, City or others
- Whether the discharge can be piped or redirected around the CSOs
- Treatability at the advanced wastewater treatment plants, including capacity, economic feasibility and physical feasibility

The City evaluated these factors on a case-by-case basis, looking for opportunities to minimize potential wet-weather impacts from industrial dischargers, where feasible. Examples of City decisions include:

Indianapolis International Airport: The airport's pretreatment permit allows the discharge of de-icing pond fluids into the sewer. The permit requires in-sewer monitors to measure the level of flow in the receiving interceptor. At 80 percent of a pre-determined capacity, the airport is required to cut off flows to the system. At 70 percent, the airport can again discharge into the system.

Indianapolis Water: The City agreed to allow the former Indianapolis Water Company to discharge its alum sludge into the sewer system, but required them to build 10 days of holding tank capacity at the Fall Creek and White River plants. Both the Fall Creek and White River discharges by the Water Company are no longer permitted.

Central Library: The Indianapolis-Marion County Public Library wanted to discharge 5-11 MGD of groundwater into the combined sewer system during construction at its Central Library downtown. To reduce combined sewer impacts, the library was asked to construct a 16-inch force main that took the discharge to a storm sewer near Interstate 65.

Rolls Royce: The company asked to discharge 30,000 gallons per day from remediation lagoons into the sewer system. The City asked Rolls Royce to have capacity to hold flows during wet weather and the company agreed. Rolls Royce receives notifications of CSO overflows and is required to hold flows during those times.

The City's long-term plans sought to provide sufficient capacity in the sewer system and treatment plants to accommodate industrial, commercial and residential growth. Where possible, industries were encouraged to consult with the City in advance when major increases in flow or load are anticipated, so the City could incorporate these plans into its capital improvement program budget and schedule, if necessary. In some cases, industry was asked to provide capital funds to build projects necessary to address industry's needs and the needs of affected streams.

4.3.1.3 Priority Industries

The Indianapolis Pretreatment Program regulated the discharges from approximately 200 industries. Among the regulated users, there were several specific facilities and/or types of industries that could have had a significant impact on the volume and characteristics of flow through a CSO structure. **Table 4-1** shows the 24 significant industrial users with daily discharge flows greater than 100,000 gallons per day (gpd). Values were based upon daily averages from 2003 self-reported industry flow monitoring. **Table 4-2** prioritizes some of these industries based on four specific pollutants of concern. Approximately 10 facilities discharged the majority of the industrial contribution for biological oxygen demand (BOD), total suspended solids (TSS), and ammonia.

Table 4-1
Prioritized Significant Industrial Users by Discharge Volume (2006)

Significant Industrial Users	Discharge Volume (gallons/day)
National Starch	2,799,000
Eli Lilly - LTC	1,581,800
Quaker Oats	617,000
Covanta Indianapolis	518,250
Indianapolis International Airport	500,000
U.S. Filter Corp.	429,000
Hebrew National Kosher Foods	340,000
Reilly Industries - Remediation	325,000
Reilly Industries, Inc.	290,000
Ecological Systems, Inc.	255,000
Citizens Thermal Energy	241,000
Crossroads Dairy	207,000
Citizens Gas □ Coke	206,000
Quemetco, Inc.	201,800
Pepsi Americas	192,110
Cintas Corp.	180,000
Industrial Anodizing Co., Inc.	171,200
Metalworking Lubricants Co.	161,400
HH Sumco, Inc.	154,500
Visteon Corp.	151,000
Sensient Technologies, Inc.	138,000
Colors, Inc.	128,810
ConAgra	128,600
Alsco, Inc.	124,500

Most facilities discharging heavy metals to the sewer system were required to meet stringent federal standards. Section 2.9 discusses the methodology the City used to characterize significant industrial discharges with toxins identified in the waste stream. This EPA-approved analysis was limited due to its theoretical nature, but was useful for prioritizing stream segments for CSO control.

The City continued to address toxic pollutants at the source or in the planning of CSO projects. The City also continued to work with IDAC and individual industries on any modifications to its pretreatment program.

Table 4-2
Prioritized Significant Industrial Users Based on Pollutant Parameters (2006)

Ammonia
Eli Lilly and Company
Reilly Industries
Citizens Gas and Coke Utility
Heritage Environmental Services
Micronutrients, Inc.

Biochemical Oxygen Demand
National Starch and Chemical
Eli Lilly and Company-LTC
Reilly Industries
Indianapolis International Airport
Quaker Oats Company

Total Suspended Solids
National Starch and Chemical
Citizens Gas and Coke Utility
Crossroad Farms
Heritage Environmental Services
Pepsi Americas

Metals
Metalworking Lubricants Co.
Precision Metal Cleaning
Heritage Environmental Services
Diversified Systems, Inc.
South Side Landfill, Inc.

4.3.2 Stream Bank Restoration

Water quality throughout the nation has improved following implementation of the Clean Water Act; however, in recent years, researchers have noticed that overall water quality in the nation's streams, lakes and rivers appears to have reached a plateau. Researchers have targeted non-point source pollution as the cause of this plateau, and linked the primary sources either directly or indirectly to human activity. To continue improvement in water quality, the U.S. EPA Office of Water has recommended ecological restoration (U.S. EPA, 1996). The goal of restoration is to protect remaining natural features, reclaim culturally disturbed areas to more of a natural state, and improve stream quality through stakeholder volunteer activities and cooperation. Such restoration techniques reduce non-point source pollution, improve overall stream quality, and can be implemented concurrent to the hard structure approaches that target point-source discharge reduction.

By restoring stream banks and habitats, non-point source pollution can be reduced. While restoration techniques cannot fully preclude installation of hard structure CSO controls, they may reduce the number and/or size of the hard structures and can enhance the quality of a stream once CSOs have been reduced. The ability of a landscape to perform and sustain natural functions such as conditioning the air and water is heavily dependent upon the ecological health of a region (Patchett and Wilhelm, 1997). By 1876, 60 percent of the land in Marion County had been cleared of its original forests and by 1999, less than two percent of land area contained natural forest structure and species composition (Brothers, 1994), (Mertz and Miller, 1999).

As Marion County was deforested, runoff increased, since the extensive forest no longer intercepted rainfall. As runoff increased, groundwater infiltration decreased, reducing base flow to the streams. As early as 1897, Ryland Brown was writing that the residents of Marion County had never seen streams flood to the levels that they were reaching at the time, nor did anyone remember stream flow being so low during the summer months. Brown wrote that it was believed that the changes in stream flow were in response to the clearing of all the trees. Following the initial clear cutting of Marion County's forests, hydrologic modification continued with extensive drainage improvements, including many miles of field tile to increase the amount of tillable land. This change further increased runoff and decreased infiltration by eliminating depressional storage, or surface ponding, in many areas.

Hydrology of Marion County streams also is affected as the urbanized, developed portion of the City continues to expand, with a resultant increase in the percentage of impervious cover in the county. Impervious cover can be broadly defined as the sum of roads, parking lots, sidewalks, rooftops, and other impermeable surfaces of urban environments (Center for Watershed Protection, 2000). The hydrologic response to increased urbanization is the same as seen for the initial deforestation and agricultural drainage: increased runoff and decreased groundwater infiltration. The impact on urban streams can be seen in both the deepening and widening of the stream channel to adjust to the increased peak flows, and in the decline in water quality that can be attributed to urban stormwater. These impacts were described earlier in Section 2.

The impact of urban stormwater on Indianapolis' streams is apparent in that CSO controls by themselves would not achieve any additional days of compliance with the *E. coli* daily maximum bacteria standard, as described later in Section 4.6. Dry-weather and stormwater sources would still cause exceedances of water quality standards approximately 157 days per year in the White River with CSO controls (ICST, 2004). Therefore, watershed improvements, riparian habitat restoration and stream bank restoration programs are important to enhancing the water quality in Indianapolis' streams.

The forested corridors along the headwaters may have the greatest impact on downstream water quality. In most watersheds, the first- through third-order streams constitute over 90 percent of the lineal stream length (Alliance for the Chesapeake Bay, 1998). A natural riparian forest structure removes nutrients and sediments, and lowers water temperatures before the stream reaches a main third-order channel (USFS, 2000). Some of the core functions of the riparian forest are as follows:

Sediment Control: "The roots of trees hold together the soil to resist the erosive force of water. This keeps sediments and nutrients bound to it, out of the stream." (Alliance for the Chesapeake Bay, 1998)

Habitat Biodiversity: "Roots and fallen logs slow stream flow and create pools that form unique microenvironments. Pools support species of macro-invertebrates different from those in riffles only a few feet away. Fallen debris also traps leaves, twigs, fruit seeds and other material in the stream, allowing it to decay and be used by stream-dwelling organisms." (Alliance for the Chesapeake Bay, 1998)

Food: "The two primary sources of food energy input to streams are litter-fall (leaves, twigs, fruit seeds, and other organic debris) from streamside vegetation and algae production. Studies have shown that in a healthy stream, leaf litter is trapped and consumed in a relatively small area, rarely moving more than 100 yards; therefore, an upstream forest provides little food to a non-forested area downstream." (Alliance for the Chesapeake Bay, 1998)

Temperature Control: "The leaf canopy of trees provides shade that helps to control water temperatures. Maximum summer temperatures in a deforested stream may be 10-20 degrees warmer than in a forested stream. Temperature changes of only 4-10 degrees usually alter the life history characteristics of macro-invertebrates that form an important part of the food web." (Alliance for the Chesapeake Bay, 1998)

"In addition, shaded streams support algal communities dominated by diatoms — a type of algae favored by many species — throughout the year while areas getting more sunlight are dominated by filamentous algae. While crayfish and a few insects will consume filamentous algae, most macro-invertebrate species cannot because they have evolved as specialists for scraping diatoms from the bottom. Where the tree canopy completely covers the water surface, this area will have the greatest impact on improving habitat along the stream, providing maximum control over light and temperature extremes. The dissolved oxygen rates go up in shaded areas of the stream. In addition, in shaded areas the algae concentrations from abnormally high nutrient levels do not bloom as much, hence nighttime dissolved oxygen rates drop less dramatically." (Alliance for the Chesapeake Bay, 1998)

Restoration activities have been ongoing since 1995 and have included wetland rehabilitation, reforestation, prairie establishment, native plant landscaping and management of high quality natural areas. **Figure 4-1** shows restoration projects that were occurring in 2004 along a number of Marion County streams. Such restoration activities are beneficial not only in terms of aesthetics, but can serve as a basis for creating an effective and sustainable watershed protection program for the region. In order to develop such a program, it is important to consider not only the environmental factors but the economic and cultural impacts of various plans as well.

Stream bank restoration could occur in City-owned parks and greenways, or along private land through long-term or perpetual easements developed in partnership with landowners. Research shows that restoration along smaller headwater streams and drainage corridors yields the most benefit in improved water quality, followed by mid-size streams. The key to successful restoration is prevention. It is much easier to protect and manage an existing streamside forest buffer than to attempt to reforest a streamside lawn. The City developed a watershed-based strategy for restoring stream banks and protecting natural areas that contribute to better water quality.

Restoration sites could be selected based on the following criteria:

1) Sites that have existing high quality natural areas,
2) Sites that would best accomplish clean water initiatives and/or habitat restoration,
3) Sites that meet public needs for wildlife observation and other passive recreational uses,
4) Areas where restoration is most likely to be successful, and
5) Areas where restoration could be conducted as part of an existing capital improvement program.

Restoration projects should be designed to require little maintenance as they mature. Projects also could enlist the help of volunteers, including students, conservation groups, religious organizations, scouting groups, business/ corporate groups, and others.

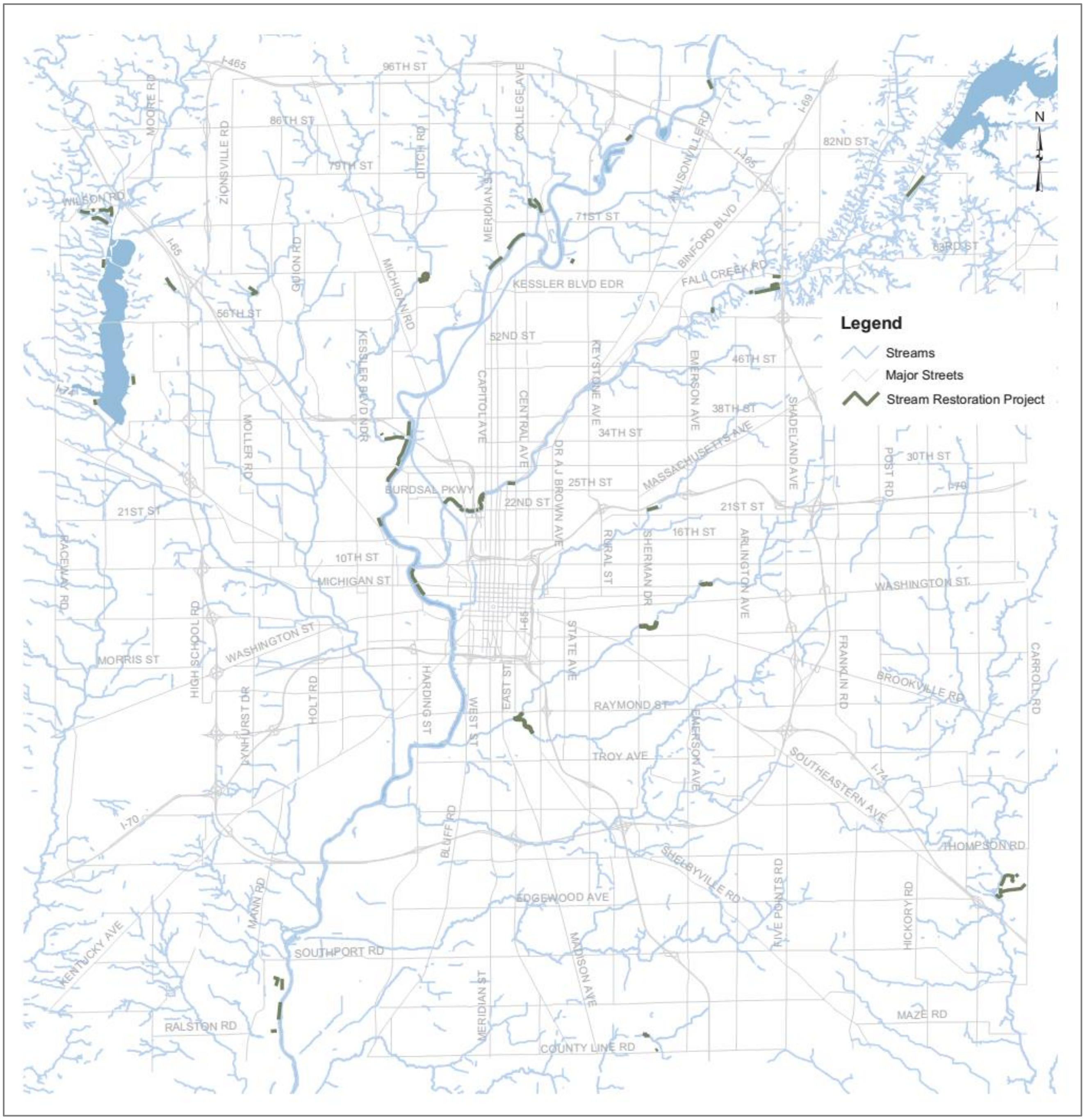


Figure 4-1
Stream Restoration Projects from 1994 through 2004

4.3.3 Sewer Service for Unsewered Areas

Indianapolis has the second-highest concentration (10.3 percent) of homes served by septic systems among U.S. cities (Indianapolis Star, 1996). Jacksonville, Florida, another unified city-county government, was first with 24.1 percent of homes served by septic systems (Indianapolis Star, 1996). Of the 320,000 homes in Marion County, approximately 18,000 are served by septic systems that were targeted for replacement in the 1998 Barrett Law Master Plan. Since the implementation of the Barrett Law Master Plan, another 12,000 properties served by septic systems have been identified that cannot be readily addressed by consolidated sewer service projects. Failed systems leach bacteria into local ditches and streams and could contaminate groundwater wells used for drinking water. In the early 1980s Purdue ran the RWASTE program on all of the soil profiles found in Indiana. According to the site selection criteria in the ISDH rule at the time, 80 percent of the land area in Indiana was unsuitable for conventional septic systems (Purdue, 2000). More recent work by Bill Hosteter of the Natural Resource Conservation Service suggests that approximately 93 percent of the soils in Marion County would have severe limitations for septic systems (Purdue, 2000).

In 1996, a Department of Public Works (DPW) study (Ambient Bacteriological Study of the White River and its Tributaries) noted that most tributaries in Marion County exceed the *E. coli* standard during dry-weather 20 to 40 percent of the time, or more. Pogues Run, Bean Creek, Crooked Creek, and State Ditch exceed the standard more than 60 percent of the time, the study said. Because these exceedances often occur during dry-weather, combined sewer overflows could not be the cause. One factor in these exceedances is likely to be failing septic systems.

Historically, Indianapolis has used the 1905 Indiana Barrett Law to fund sanitary sewer extensions into unsewered areas. Under Barrett Law, local governments charge or assess impacted property owners the costs associated with these construction projects. Construction costs include the installation of the main trunk line to the neighborhood, a lateral stub-out to each property line, mobilization and demobilization of equipment, maintenance of traffic and restoration.

Beginning in 2000, the City worked to make the Barrett Law process less burdensome for homeowners by allowing monthly instead of yearly payments and allowing property owners to finance the project over 10-, 20- or 30-year periods. However, the expense of paying for the Barrett Law assessments were burdensome for many property owners, especially the elderly and those with fixed or low incomes.

For these reasons, the City decided to change its policy and began paying the costs of public sewer construction in neighborhoods on septic systems. Under the Septic Tank Elimination Program, property owners still were responsible for costs of construction on private property, including the cost of connecting their home or business to the new sewer and shutting down the septic system. Property owners who still owed assessments under the old Barrett Law system stopped making payments. The City primarily financed existing and future projects through its sanitary sewer revenues. An affordable loan program was created to help qualified homeowners finance private property costs associated with septic conversion projects.

The City prioritized 161 unsewered areas for conversion to sewers. The master plan ranked each area based on the following criteria: septic failure rate, stream bacteriological impairment, wellfield protection, presence of residential wells, proximity to greenways, petitions from residents or Marion County Health & Hospital Corp., number of residents in favor of the project, cost, downstream capacity, correlation to drainage projects, and areas tributary to combined sewer overflows. The project priority list is periodically reviewed and projects are re-prioritized based on changes in conditions or the need to coordinate the installation of a new sewer system in a neighborhood with other street or utility work that occurs.

The additional dry-weather flow generated from the 18,000 homes in the master plan was projected to be approximately 4.9 MGD. The two AWT plants have sufficient dry-weather capacity to treat this projected additional flow, as discussed later in this section.

The conversion of septic tanks to sanitary sewers allowed for noticeable water quality improvements, particularly during dry-weather. As the City evaluated CSO controls, it also prepared cost-benefit analyses comparing the bacteriological, human health, and receiving stream costs and benefits of sewering unsewered areas in designated priority areas. Elimination of these septic systems in the county would reduce both the bacteria levels and duration of contamination to the streams. The City estimated that sewering these priority areas would reduce exceedances of the *E. coli* bacteria daily maximum standard of 235 cfu/100 mL in the White River from 178 days per year to 172 days per year. For Pleasant Run the improvement was greater, reducing the days of exceedance from 215 days per year to 126 days per year. The improvements in the other tributaries were similar to Pleasant Run. The ability to meet the *E. coli* standard was limited by the impact of stormwater on the streams. However, failing septic systems are a significant dry-weather source of *E. coli* bacteria to Marion County streams. Sewering these areas also will reduce harmful pathogens and bacterial contamination in yards, neighborhood ditches and streams, where people — and especially children — are more likely to come in contact with contaminated water.

4.3.4 Stormwater Control and Management

Stormwater makes up the greatest volume of CSO discharges, making the retention of stormwater a critical component of CSO controls (Metcalf and Eddy, 1991). Poor stormwater control in portions of the county can contribute to CSO discharges in the central portion of the city. In areas with poor stormwater control, standing water may increase inflow and infiltration (I/I) of clear water into sanitary sewers, thereby making the sanitary system the de facto drainage system. A number of sanitary sewers feed into the combined sewer network. I/I may contribute to sewer service problems including manhole surcharging, basement backups, decreased downstream interceptor conveyance capacity, increased CSO occurrences and increased cost of wastewater treatment.

Poor stormwater control can also impact unsewered areas, since standing water over septic fields can prevent drainage fields from working properly. Pollutant discharge from these septic systems can lead to bacterial impairment of streams or ground water. This can also increase the cost of treating surface water and ground water used as a source of drinking water.

In 1998, the City commissioned a Stormwater Master Plan that identified and prioritized stormwater project needs in Marion County, ranging from maintenance activities to capital improvement projects. On February 1, 1998, the Indiana Department of Environmental Management (IDEM) issued NPDES Stormwater Discharge Permit Number INS000001 to the City of Indianapolis. This permit was revised and renewed on October 1, 2004.

To implement the Stormwater Master Plan, improve stormwater runoff quality, and comply with the terms of the NPDES stormwater permit, the City developed a Stormwater Management Program. The Stormwater Management Program focused on the correlation between drainage, stormwater quality, and other wet-weather programs to demonstrate how proactive and coordinated stormwater management might facilitate regulatory compliance and reduce costs.

4.3.4.1 Stormwater Control Requirements

In 2002, the City revised its Stormwater Design & Construction Specifications Manual and stormwater ordinance to help address stormwater quality issues. The revised ordinance and technical manual required the use of best management practices (BMPs) to preserve natural filtration and pollutant removal in city landscapes. These practices include stormwater detention ponds, constructed wetlands, buffer strips, and other stormwater detention and filtration technologies. These practices help reduce pollutants in stormwater, manage and control runoff entering the combined sewer system, and improve the quality of the runoff into area streams.

In Indianapolis, control of stormwater runoff quality was based on a target removal of 80 percent of total suspended solids. The requirements applied to all developments that disturbed areas greater than 0.49 acres in Marion County, except the cities of Beech Grove, Lawrence, Southport and Speedway. By requiring BMPs within the combined sewer area, the City exceeded NPDES stormwater permit requirements and demonstrated its resolve to better control stormwater runoff in order to mitigate combined sewer overflows.

In addition to TSS removal, developers also must design BMPs to treat the first flush of runoff. Based on estimates in relevant literature, including Watershed Protection Techniques and the final report of the Nationwide Urban Runoff Program, BMPs designed to treat the first flush runoff in the Indianapolis area would treat the runoff of any storm of less than 1 inch. In a typical year, approximately 94 percent of rainfall events generate less than 1 inch of rainfall depth. In theory, therefore, an integrated network of BMPs in place throughout the City could control runoff of up to 94 percent of storms annually.

4.3.4.2 Stormwater Master Plan

Drainage and stormwater problems are widespread throughout Marion County. Complaints compiled from the Mayor's Action Center, the Soil and Water Conservation District, elected officials, mail, phone, neighborhood meetings, and the Internet identify problems and issues related to water quality, poor drainage, flooding, stream protection, and other environmental impacts. Under the Stormwater Master Plan, the City used its database of more than 12,000 stormwater and drainage complaints to identify approximately 350 areas with stormwater concerns.

The City's stormwater program investigated all registered complaints using a systematic approach in order to treat each project equally and fairly. Assigned priorities then determined which complaints were incorporated into the City's capital improvement program. In 2004, the capital program included approximately 145 stormwater projects scheduled to be completed from 2004 through 2007.

4.3.4.3 Stormwater Utility

In 2001, the City-County Council created the Marion County Stormwater Utility under Ordinance No. 43-2001. This ordinance became effective on June 6, 2001. Assessments for a stormwater utility fee created by this ordinance began on September 6, 2001, to help fund the utility and needed stormwater capital projects.

Stormwater utility fee credits provided a financial incentive to owners of developed commercial and industrial properties to control and treat stormwater runoff. The credits were available to customers who (1) discharged a portion of their stormwater directly into major waterways without sending it through the public drainage system, or (2) who had facilities or controls in place to temporarily store or treat stormwater runoff, thereby reducing the impact on the drainage system. Property owners received credits on their stormwater utility bills of 5 to 100 percent, depending on the type of stormwater controls they had in place. The City's Stormwater Credit Manual details the policies and procedures applicable to the stormwater user fee credit program and is available online at http://www.indygov.org/stormwater.

4.3.5 Infiltration/Inflow Abatement

Infiltration and inflow is clear water other than wastewater that enters a sewer system. Infiltration is water entering a sewer system through defective pipes, pipe joints, connections, or manholes. Inflow is water entering a sewer system from sources such as roof drains, foundation drains, yard drains, area drains, manhole covers, or cross connections between storm sewers and sanitary sewers. In the City of Indianapolis, studies suggest that more than 50 percent of dry-weather flow in the sanitary sewer system is I/I, and that percentage increases dramatically during wet weather (HNTB, 2004).

For most of the sewers in Marion County the measured wet-weather peak I/I is three to five times the dry-weather average daily flow carried by the sewers. The problem is most serious in the South Fall Creek Interceptor, where the wet-weather peak I/I has been measured at eight times that of dry-weather average daily flow. The large increase in I/I from dry-weather to wet weather suggests that many I/I sources exist in the combined and separate sewers contributing to this combined interceptor. By reducing excessive infiltration and inflow in these tributary sewers, flows coming into the combined sewer system could also be reduced. This would make more capacity available in the downstream interceptors and AWT plants to convey and treat combined sewage.

The City addressed the infiltration and inflow problem in several ways:

Studies: In 1998, Indianapolis completed a *Basin Master Plan* that prioritized sanitary sewer basins requiring possible sewer investigation, rehabilitation, and additional capacity. The highest priority areas generally were located along the oldest separate sanitary sewers. These sewers were located in more fully developed areas, and included the most clear-water sources. Excessive stormwater inflow and groundwater infiltration were common, particularly in areas with poor stormwater control.

In 2004, the *Marion County Sanitary Sewer Master Plan* was completed. This document further evaluated the long-term sanitary interceptor sewer needs for Marion County and provided data on the measured flows, including I/I, in the interceptors.

Sanitary Sewer Rehab: Based on the above two systemwide studies and a series of basin studies conducted in the past, the City evaluated structural and hydraulic conditions in nine of the largest sewer basins.

Four of the nine basins had already undergone repairs (Nora, Castleton, Fall Creek, and Belmont North). Four of the remaining basins (Bridgeport Interceptor, East Marion County Regional Interceptor, Lick Creek 51, and Lick Creek 53) still had rehabilitation projects pending. Additional analysis was completed on the ninth (South Marion County Regional Interceptor).

Both the Indianapolis Department of Public Works (DPW) Engineering and United Water conducted sanitary sewer rehabilitation activities in both the sanitary and combined sewer areas. DPW Engineering was generally responsible for large diameter rehabilitation projects. United Water corrective activities included minor and major maintenance activities and minor capital improvement targets for structural rehab; sanitary, combined and storm mainline rehab; manhole adjustments; and stormwater ditching.

Leak Busters/Grease Busters: The City reinstituted this committee in 2004 to address I/I and grease blockage conditions that can lead to sanitary sewer overflows (SSOs). Participants included staff from DPW Engineering, Operations and Customer Service; Marion County Health Department, the Department of Metropolitan Development; and United Water. Goals included addressing I/I mitigation and enforcement, SSO response and reporting, grease blockages, and illegal connections. Through Leak Busters/Grease Busters the City hoped to reduce:

- Sewer backups into residential, commercial, and industrial establishments
- SSOs from the sewer collection system
- Financial risks associated with overflows and primary effluent overflows at the AWT plants
- Costs for capital improvement projects associated with the sanitary sewer collection system and AWT plants
- AWT plant processing costs

Manhole Inspections: Through the Leak Busters program, the City expanded its manhole inspection and assessment initiatives. DPW and United Water developed protocols and trained additional staff members to perform manhole inspections, conduct assessments, and take corrective action. The goal was to reduce inflow and infiltration at manholes.

Smoke and Dye Testing: The City's smoke and dye testing program kept two engineering consultant firms under contract to assist in investigations of neighborhoods experiencing I/I problems. The Leak Busters program added training for DPW Operations staff in smoke and dye testing techniques. The City's goal was to train two or three Leak Buster crews to investigate I/I problems as necessary. An annual plan coordinated additional efforts between DPW Engineering, Operations and United Water.

Private I/I Removal Project: Private sources of inflow and infiltration were identified as major problems in a number of cities. Indianapolis initiated a study in 1998 (Private Inflow and Infiltration Pilot Project) to evaluate the significance of this issue. Finding and fixing sewer defects on private property has been found beneficial in other communities, including Fort Wayne and Louisville.

The primary goals of the pilot project were to find and fix sewer defects to sanitary sewers on private property and to quantify the amount of clear water removed from the system. The secondary goal was to develop a mechanism to partner with homeowners to fix the defects with public funds. A pilot study in one neighborhood (Windsong at Geist Sewer Evaluation) was established to determine the causes of overflows at lift stations as well as sewer backups into homes. Many sump pump connections were identified; 16 percent of the 200 homes inspected had defects.

Correct Connect: The Correct Connect program was developed in 2004 to educate residents about the problems caused by illegal connections and teach them how to become compliant with existing ordinances. Through the program, residents and partner organizations learned the benefits of disconnecting their illegal connections and were given the tools and/or resources needed to redesign their existing connections. The program provided several ways for the public to get involved, including self-correction, disconnection assistance, volunteer opportunities and neighborhood disconnection events. An educational video, brochures and partnerships with local businesses were part of this campaign.

Inflow and infiltration into the sanitary system was also believed to be contributing to overflows at the three constructed SSO locations (105, 113, and 124). The City worked to identify clear water sources (I/I) and capacity limitations that were contributing to sanitary sewer overflows at these locations. Projects were in planning or design to eliminate these constructed SSOs.

Infiltration and inflow abatement through additional sewer rehabilitation and a private inflow disconnection program would result in reduced amounts of clear water entering the sewer system. Lower I/I occurrences would reduce combined sewer flow and ultimately reduce CSO discharges. Careful consideration must be given to coordinating and prioritizing these projects in conjunction with the CSO LTCP.

Fats, Oils and Grease (FOG) Program: Chapter 671 of the Indianapolis-Marion County Municipal Code requires restaurants, bars and other food service establishments to install a grease interceptor (commonly known as grease traps) in the waste line leading from plumbing fixtures or equipment where grease may be introduced to the sewer system.

{Sec. 671-4(g)} City code also prohibits the discharge to any sewer of any solid or viscous substances that may cause obstruction to sewer flow, such as grease.

Grease interceptors must be properly sized, installed and maintained. In reality, City inspections found that many are not maintained on a regular basis. DPW's Office of Environmental Services (OES), the Department of Metropolitan Development and the Marion County Health Department entered into a memorandum of understanding that gave health department inspectors the authority to inspect grease interceptors in food establishments. Routine inspections were performed every three to 12 months, depending on the complexity of food preparation at each establishment. Violations of city code were referred to OES for follow up under a four-step progressive enforcement procedure. The procedure began with education and was followed by increasing penalties for repeat violations within a 12-month period.

In addition, the City's FOG program included the development of educational materials for owners, kitchen managers and staff in food establishments. These were developed in partnership with groups representing restaurant and tavern owners and other food preparation facilities. Material was included in the associations' training materials for food safety certification. The program's goal was to reduce grease-caused sewer blockages and eliminate the need for targeted cleaning of sewers to prevent grease blockage problems.

4.3.6 Pollution Prevention Programs

Pollution prevention programs help reduce the amount of contaminants and floatables that enter the combined sewer system and the receiving waters via CSOs. Indianapolis implemented a number of pollution prevention programs that addressed these concerns. This section briefly describes the following pollution prevention methods employed in Indianapolis, and potential benefits:

- Street cleaning
- Solid waste collection and recycling
- Product use restrictions
- Control of illegal dumping
- Bulk refuse disposal
- Hazardous waste collection
- Water conservation
- Sediment removal
- Large diameter sewer cleaning

Street Cleaning: Street cleaning practices remove a considerable solids load from the watershed surface, preventing this load from entering receiving streams. Within the "mile square" downtown (the area bordered by East, West, North, and South streets), the city cleans the streets five nights per week (comprising 76.1 curb miles weekly). Most of the areas swept on a daily or weekly basis are within the combined sewer service area. In 2003, the City cleaned more than 37,600 lane miles of streets. This number represents the total lane miles swept and not the total roadway miles. As an example, in the downtown CSO area sweeping both lanes of the same 10 roadway miles weekly will result in 2 lane miles/mile of roadway x

10 road miles x 52 weeks = 1,040 lane miles swept, or approximately 520 road miles annually.

The number of lane miles swept in the CSO area varies slightly from year to year. However, based on 1999 statistics, approximately 84 percent of the total lane miles swept are located in the CSO area and about 16 percent of the total lane miles swept are in the separate sewer area. Since the total pollutant load removed from all streets is approximately 8 million pounds, the City removes an estimated 6.7 million pounds of debris from streets inside the CSO area annually. Outside the CSO area, the City complies with street cleaning requirements in its NPDES stormwater permit.

Street pollutants accumulate at varying rates, depending upon local land use patterns, road surface characteristics, and local weather patterns. Studies have shown that there are certain times when street cleaning is very effective in improving water quality. In areas with defined wet and dry seasons, cleaning prior to the wet season is likely to be beneficial. Street cleaning also has proven effective following snowmelt and heavy leaf fall. However, Nationwide Urban Runoff Program studies show that street cleaning produces no significant reduction in nitrogen or phosphorus concentrations. Other studies performed in California demonstrated that up to 50 percent of the total solids and heavy metals could be removed from urban runoff if the streets are cleaned once or twice a day. When the cleaning activities occur once or twice a month, the removal rate drops to less than 5 percent.

Table 4-3 presents the potential sources of pollution that accumulate on urban streets and the type of pollutants that result from those sources.

While street cleaning has been widely practiced for litter and dust control, its implementation as a stormwater pollution control practice is a fairly recent development. For street cleaning to have a beneficial effect on water quality in urban areas, a schedule of frequent cleaning must be established. The physical removal of particulates and attached fine pollutant particles from the street surface may lessen the pollutant load transferred to receiving waters. The water quality in the receiving streams will be improved due to the lower total solids and heavy metal loads. Aquatic life and other water uses may benefit from the lower turbidity and toxic effects.

Street cleaning is likely to be beneficial in high-density urban areas subject to high levels of traffic, but it may not be applicable in areas where parking cannot be banned periodically. Further, street cleaning may not be beneficial on paved surfaces that are in poor condition or do not have curbs. Implementation of a cost-effective street cleaning program requires careful consideration of both cleaning equipment and cleaning schedule. Street cleaning techniques are typically inefficient in picking up fine solids (less than 43 microns). These fine solids make up only 5.9 percent of the total solids, but account for approximately 25 percent of the oxygen demand and 50 percent of the algal nutrient source in stormwater. Downstream water quality can be greatly improved by using street cleaners to reduce the amount of particulate pollutants in conjunction with BMPs, effective in trapping the fine solids not removed by the street cleaners.

Most of the City’s sweeping contractors use vacuum sweepers. Estimates of the efficiency of street cleaners in removing total dust and dirt on paved surfaces are 90 percent for vacuum devices, assuming a smoothly paved surface and no interference from parked vehicles.

Mechanical street cleaners use rotating brooms and water spray to control dust, moving the dirt into a storage hopper on a moving conveyor. Vacuum-assisted mechanical street cleaners utilize vacuum systems to transport dirt from rotating brooms to the hopper, where the transported dirt is saturated with water. This system has been used in Europe for many years but has seen limited use in the United States.

Table 4-3
Street-Related Sources of Pollution (2006)

Source	Pollutant
Local Soil Erosion	Particulates (inert)
Local Plants and Soils (transported by wind and traffic)	Nitrogen and Phosphorus
Wear of Asphalt Street Surface	Phenoic Compounds
Spills and Leaks from Vehicles	Grease, Petroleum, N-arraffin, and Lead
Spills from Vehicles (oil additives)	Phosphorus and Zinc
Combustion of Leaded Fuels	Lead
Tire Wear	Lead, Zinc, and Asbestos
Wear of Clutch and Brake Linings	Asbestos, Lead Chromium, Copper, and Nickel
Deicing Compounds (traffic dependent); Possible Roadway Abrasion and Local Soils	Chlorides, complex cyanide
Wear of Vehicle and Metal Parts	Copper, Nickel and Chromium

Solid Waste Collection and Recycling: Indianapolis has a number of solid waste collection and recycling programs that support pollution prevention as a CSO control. Litter in the downtown portion of the CSO area is controlled by the widespread use of trash receptacles, which are emptied daily. In particularly high traffic/high profile areas, receptacles are emptied twice per day.

In addition, the City conducts a recycling program for used motor oil by arrangement with several automotive service businesses. Residents can recycle used motor oil by dropping it off at any of 40 locations throughout the county. Additional details about this program can be found in the following subsection on hazardous waste collection.

Product Use Restrictions: By placing restrictions on the use of certain products, pollution from CSOs can potentially be prevented. For example, in April 1994 the City changed its use of herbicides on City-owned property to protect surface water bodies from toxic pollutants. The City identified eight specific herbicides by product name that City employees could not use near surface waters, and identified two specific herbicide products that were determined safe for use near surface waters.

Control of Illegal Dumping: Tires, construction debris and other heavy trash items are sometimes dumped on vacant lots, riverbanks and other uninhabited areas. The City vigorously enforces illegal dumping restrictions. In 2003, the City partnered with the Indianapolis Police Department to support the hiring of two officers dedicated to the pursuit of illegal dumping activities. This increased efforts to curb illegal dumping in the City and prosecute individuals responsible for such illegal activities. In addition, the City has incorporated the collection of roadside trash into its roadside and median mowing contract. In 2003, this program collected approximately 1,300 cubic yards of trash.

Heavy Trash Disposal: The City offers several mechanisms for residents to easily dispose of heavy trash. On a monthly basis, residents can place bulk items for curbside pickup. In addition, the City provides special weekly disposal of heavy trash items at its transfer station for a nominal charge of $2/car and $5/truck.

Hazardous Waste Collection: DPW's Office of Environmental Services (OES) administers the ToxDrop program, which has been incorporated into the City's NPDES Stormwater Permit. The ToxDrop program allows the public and conditionally exempt small quantity generators to properly dispose of used automotive fluids, such as antifreeze and motor oil, as well as household chemicals, solvents, batteries, and paint. Small businesses that generate less than 200 pounds or less than 300 gallons of hazardous waste annually also can use this service with prior approval of the program's administrator.

The ToxDrop program has helped reduce the illegal dumping of hazardous materials and oils on vacant properties and in streams, and illegal dumping into the sanitary sewer system, where it could cause an upset of the wastewater treatment plant. Since its inception, the program has expanded from a twice-per-year event to three permanent sites. Currently, Indianapolis residents may drop off household hazardous waste by appointment Tuesday through Thursday between the hours of 9 a.m. and 11 a.m., or without an appointment on most Saturdays. The ToxDrop facilities are located at Trader's Point collection site (7550 N. Lafayette Road), the Perry Township Government Center (4925 Shelby Street), the West Street Collection Facility (1725 West Street) and at the Indianapolis Police Department Training Academy (9049 E. 10th Street). In 2004, the City also sponsored two special ToxDrop collection events for used electronic equipment. Information on ToxDrop hours and locations is available to residents by telephone, e-mail, or at the City's Internet site. The City spends approximately $450,000 annually on the program.

In 2004, the ToxDrop program collected 623,000 pounds of materials. The amount of waste collected at the ToxDrop sites has increased each year, as the program has expanded and publicized its services (**Figure 4-2**).

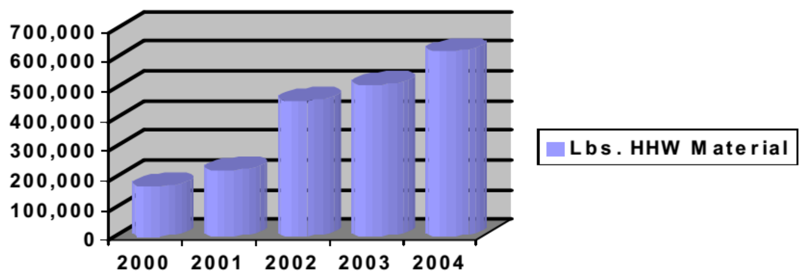


Figure 4-2
Annual Pounds of Hazardous Waste Collected by ToxDrop (2006)

ToxDrop also provides a mobile collection service that set up at various locations around the county on an irregular basis to collect household hazardous waste. This program includes an annual ToxAway Day in conjunction with Earth Day Indiana's annual spring celebration.

In addition, the City established approximately 40 conveniently located commercial vendors that accepted used motor oil from the general public in the county. From May 2003 to May 2004, OES collection centers collected 117 barrels, or approximately 6,435 gallons, of waste oil. OES purchased a storage tank and pumping equipment that allowed further expansion of this program.

The City also administered the greater-Indianapolis regional mercury awareness program for the State of Indiana. This program served the eight counties immediately adjacent to Marion County and was designed to educate citizens on the environmental and health-related dangers associated with mercury and to encourage the proper disposal of mercury- containing items. In 2003 this program collected 2,300 pounds of mercury and mercury containing devices, and 2,100 lineal feet of florescent light bulbs. In addition to this program, OES also collected 42,000 pounds of computer equipment and cell phones. Electronics, especially those containing cathode ray tubes, are complex products that contain a range of metals, such as lead, cadmium and mercury, which can be harmful to the environment if they are improperly disposed of and the metals are allowed to leach into soil and water.

Water Conservation: Indianapolis Water maintained an aggressive program of leak detection and correction in its water distribution system. This program corrected leakage of clean water from water lines, which could infiltrate the sewer system. This program supported the CSO program objectives to minimize clean water entry into the sewer system while potentially minimizing the withdrawal of water from the streams for domestic use. The City's 2002 acquisition of Indianapolis Water enabled improved partnerships to promote water conservation and seek new technologies and methods for reducing unnecessary water usage.

Sediment Removal: While sediments are naturally occurring substances on a streambed generated by soil erosion, sludge is found in sediments when sewage solids settle on the bottom of a stream. The City initiated a program to locate, identify, and quantify the sludge and sediment deposits in the White River and its tributaries. The City sampled and analyzed the deposits prior to removal. If it was determined that removal of the deposits from the receiving streams would not cause other significant environmental problems, the City would then remove selected deposits. In addition, the City continued to require developers to include erosion control plans in stormwater permits for new development projects, and the City code enforcement staff reviewed construction activities in the field to ensure compliance with the City ordinances and reduced the sediment loads to streams.

Large Diameter Sewer Cleaning: The velocity of sewage flow in large diameter combined sewers is very low during dry-weather, thereby resulting in large deposits of solids in the combined system. Large storm events flush the deposits out of the combined sewer and cause large surges of solids at the treatment facilities and, during overflow events, into the streams. A program of regular cleaning can reduce the wet-weather first-flush surges of solids into the streams and the solids processing system at the Belmont and Southport plants.

4.3.7 Sewer Separation

Separating a combined sewer should improve water quality by reducing or eliminating sanitary discharges. However, sewer separation would allow more untreated urban stormwater to flow into city streams. While the increase may at times be offset by the decreased pollution from combined sewer overflows, urban stormwater does carry many pollutants. Without stormwater mitigation, increased loads of heavy metals, sediments, and nutrients may run off into local waterways. A study performed in North Dorchester Bay, Massachusetts, indicated that sewer separation potentially removed only 45 percent of overall fecal coliform, due to increased contributions from non-point sources of bacteria (U.S. EPA 1999). During the development of the District of Columbia Water and Sewer Authority's CSO LTCP, model-predicted biological oxygen demand reduction for complete sewer separation in the Anacostia River basin only equated to a 9 percent decrease from the existing system (DC 2002).

Separating part or all of the combined system into distinct storm and sanitary sewer systems would entail the construction of at least one new sewer system and potential rehabilitation of the reused sewer system, thereby providing a tighter system with a renewed service life. Separating the sewers also provides an opportunity for incidental infrastructure work (road paving and the repair or replacement of miscellaneous utilities, such as water and cable lines) that could be conducted more cost-effectively if it were to coincide with sewer separation.

Complete sewer separation throughout the combined sewer area would, however, be costly and extremely disruptive to the daily commerce and activities in a City of Indianapolis' size, requiring construction under most streets in the central city. The problem is most significant in the downtown area. Separation costs vary considerably due to the location and layout of existing sewers; the location of other utilities that will have to be avoided during construction; other infrastructure work that may be required (such as road repairs); land uses and costs; and the construction method used. Project construction occurring in industrial areas where hazardous materials or wastes may be present will likely increase the project cost.

The actual costs for sewer separation projects are highly variable and must reflect actual site conditions. To estimate costs, the City compiled data from its Septic Tank Elimination Program, where the City brought sanitary sewers into neighborhoods served by septic systems, and from several construction cost opinions for sewer separation projects throughout the county. The data indicated that an estimate of $75,000 per acre (in rural areas) to $100,000 per acre (in urban areas) was a reasonable assumption to use when estimating sewer separation project costs in Indianapolis.

Few U.S. cities of Indianapolis' size are located on waterways as small as the White River. Thus, stormwater, like combined sewer overflows, in Marion County may have a disproportionate impact on the White River and its tributaries, when compared to similar cities on larger bodies of water. Wide-scale mitigation of stormwater impacts prior to discharge to the streams would be extremely difficult in most of the combined sewer area where there is little vacant land for mitigation measures. Although complete sewer separation was one of the options considered during the LTCP alternatives analysis, the City determined that large-scale sewer separation was not the most cost-effective or environmentally beneficial solution for controlling CSOs and reducing bacteria in Marion County streams. This is demonstrated in greater detail in **Section 4.6**.

4.3.7.1 Localized Sewer Separation

Although large-scale sewer separation is not cost-effective, localized sewer separation may be a feasible and cost effective technology for areas with isolated CSOs, areas that are already partially separated, or areas that are undergoing redevelopment.

During development of the City's early action projects to reduce CSOs, localized sewer separation projects were identified in a number of areas. Separation projects were planned for the following outfalls:

CSOs 217 and 218: This project will eliminate isolated overflow points in Mars Hill and other neighborhoods along State Ditch.

CSO 235: This project eliminated the only outfall affecting Lick Creek on the City's Southside.

CSO 275: This project eliminated an overflow point on lower White River through localized sewer separation and upgrades at the AWT plants.

CSO 103: This project will eliminate overflows affecting Fall Creek through sewer separation and rehabilitation in neighborhoods near 39th Street and Sherman Drive.

CSO 017: This project eliminated an outfall at the upstream end of Bean Creek, which flows into Garfield Park.

CSO 046: This project will eliminate an outfall to White River in the Municipal Gardens area.

The City further evaluated each CSO project area during facilities planning to determine if additional localized sewer separation could be achieved and was the most cost-effective solution within the project boundaries consistent with the criteria described below. In addition, the City evaluated the feasibility of localized sewer separation as an incidental infrastructure improvement when reviewing sewer connection permit applications for redevelopment in the combined sewer area using the criteria described below.

4.3.7.2 Criteria for Sewer Separation

The City reviewed the feasibility of sewer separation for each redevelopment in the combined sewer area on a case-by- case basis. In some cases, the City required lift station agreements or placed other operation and maintenance requirements on the developer. If the developer had access to a storm sewer network, they must have a separate storm sewer. If there was no direct discharge point for stormwater on the property, the City reviewed the economics and construction issues associated with connecting to nearby access points.

The City considered the following factors when determining whether sewer separation was appropriate for redevelopment in the combined sewer area:

- Capacity of affected sewers
- Projected flow being added to sewer (average and peak)
- Sewer improvement projects planned and how they will affect capacity
- Sewer separation's impacts on water quality
- Feasibility or ease of separation, including economics and location
- Availability of a practical or feasible direct discharge point for stormwater
- Requirements for best management practices and holding times that might mitigate impacts on the combined sewers

The City reviewed and updated its sanitary sewer design and construction standards, including factors for determining whether sewer separation was appropriate for redevelopment in the combined sewer area. During discussions with stakeholders, DPW agreed that the following factors should be incorporated into the revised standards:

- Capacity in receiving sewer to accept stormwater flow, and planned capital improvement projects identified within the CSO LTCP or other plans
- Impacts on water quality
- Feasibility of separation, including the costs to treat, construct, and manage the sewer system as a separated, or combined, system
- Other appropriate factors

4.3.8 Watershed Coordinator/Riverkeeper

As the City of Indianapolis continued to implement the LTCP, it could have established a riverkeeper for the streams in Marion County. This position, which is similar to a watershed coordinator, would be responsible for integrating the City's many stream-related programs and would provide a visible symbol of the City's commitment to improving water quality.

Decisions about water resources are complicated by the number of municipal, state, and federal agencies that are involved in the decision-making process and the wide variety of interest groups that want to participate. The public may be left with the perception that no one "speaks" for the river. Establishing a riverkeeper to help facilitate and coordinate the activities of the involved parties could help improve communication.

Riverkeepers have been established for a number of U.S. waterways, including the Catawba, Chattahoochee, Kansas, Willamette and Wabash rivers. Most often, riverkeepers are based with nonprofit, non-governmental organizations. The specific duties of a riverkeeper vary. In some parts of the country, the riverkeeper's primary duty is to monitor water quality and water use. In other areas, the riverkeeper's primary role is as a lobbyist and advocate for the stream. Common to all riverkeepers is the role of maintaining a visible presence on the streams.

4.4 2006 Collection System Controls

The history of the collection system controls evaluation has not been modified from the original approved CSO LTCP. Updated information can be reviewed from the Combined Sewer Overflow Operational Plan (CSOOP) completed by the Authority in 2013.

Maximizing storage in the collection system is one of U.S EPA's recommended nine minimum controls for combined sewer systems. The City documented its initial efforts to maximize collection system storage in the CSO Operational Plan (ICST, May 2003). These efforts included adjusting regulator weir heights and improving collection system inspection and maintenance activities. During development of the original LTCP, the City evaluated more complex sewer system modifications such as in-line storage. In-system storage options can reduce capital costs of CSO control by utilizing underused capacity in the existing sewer system. Such systems must be designed carefully to prevent potential complications such as sewer backups, increased solids deposition, and accelerated sewer deterioration.

4.4.1 In-Line Storage Alternatives

Figure 4-3 illustrates assumptions made in evaluating the in-system storage capacity of the combined sewer system. This figure shows that in-system storage extended only to a location upstream (called the storage limit) where the water elevation in the combined sewer trunk or branches equaled the elevation of the outfall pipe or regulator downstream. If an attempt was made to store wastewater above this storage limit, surcharging of manholes and sewage backups into basements may have occurred.

The areas of the combined sewer system best suited for in-system storage are the large, flat combined sewer trunks associated with the larger CSO outfalls. Therefore, when analyzing the available in-system storage volumes, the City gave greater attention to those outfalls with pipe diameters greater than or equal to 84 inches. The City also estimated the in-system storage volume of other diameter ranges greater than or equal to 36 inches, arriving at an estimated 26 million gallons (MG) of total in-system storage in combined sewer trunks greater than 36 inches. **Table 4-4** shows the five CSO outfall diameter ranges studied for this investigation.

Though it was technically possible to store 26 million gallons of wastewater within the combined sewer system, further analysis showed it might not be economically feasible or beneficial to do so. The in-system storage estimate reflects potential storage from 85 CSO outfalls greater than 36 inches in diameter. **Figure 4-4** shows the locations of these outfalls along with their associated tributary areas. Of the 85 outfalls, 75 percent (64 outfalls) were between 36 and 72 inches in diameter.

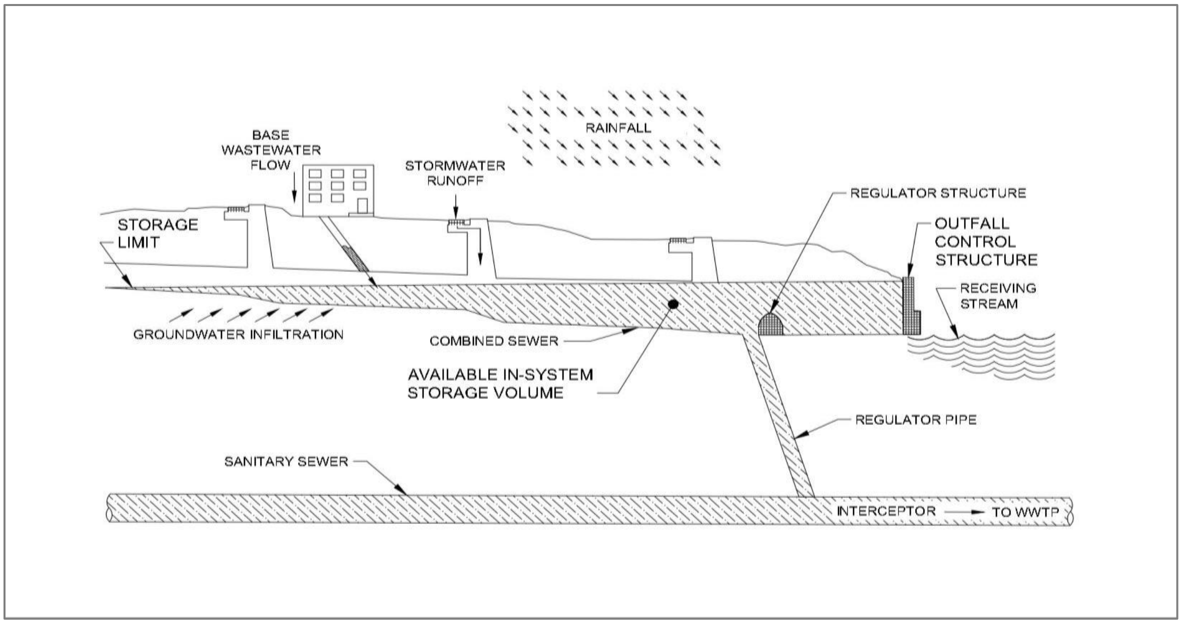


Figure 4-3
Available In-System Storage Volume (2006)

Table 4-4
Available Storage Capacity Within Selected CSO Outfall Diameter Ranges (2006)

Outfall Diameter Range (in.)	No. of Outfalls	Average Length (ft.)	Average Drainage Area (acre)	Average Storage Volume (MG)	Total Length (ft.)	Total Drainage Area (acre)	Total Storage Volume (MG)
36 - < 48	28	1,573	76	0.075	44,044	2,128	2.10
48 - < 60	25	1,799	220	0.112	44,975	5,500	2.80
60 - < 72	11	3,181	200	0.217	34,991	2,200	2.39
72 - < 84	9	4,285	316	0.463	38,565	2,844	4.17
□84	12	4,585	951	1.222	55,020	11,412	14.66
Total	85				217,595	24,084	26.12

The CSO outfalls between 36 inches and 72 inches in diameter contributed only 28 percent (7 million gallons) of the estimated 26 MG in-system storage volume. The other 19 million gallons were found in the 21 CSO outfalls with pipe diameters greater than or equal to 72 inches. **Figure 4-5** demonstrates how available in-system storage volume per outfall increases with increasing CSO outfall diameter and depicts the total in-system storage volume and total number of outfalls associated with each diameter range.

Figure 4-5 also illustrates that the smaller diameter CSO outfalls were greater in total number but produced minimal in- system storage potential. This suggested that retrofitting all outfalls with overflow control structures may not have been economical or cost-effective. In addition, each control structure installed added to the overall risk of mechanical failure, which may have resulted in basement backups.

As noted in Section 3, either mechanical gates or inflatable dams may be used for in-system storage of sewage in a pipe or sewer trunk. As part of its alternatives evaluation, the City evaluated the costs and benefits of both technologies. In addition, the City installed an innovative in-sewer pinch valve technology to manage and direct flows between interceptors. The City's evaluation of each technology alternative is described below.

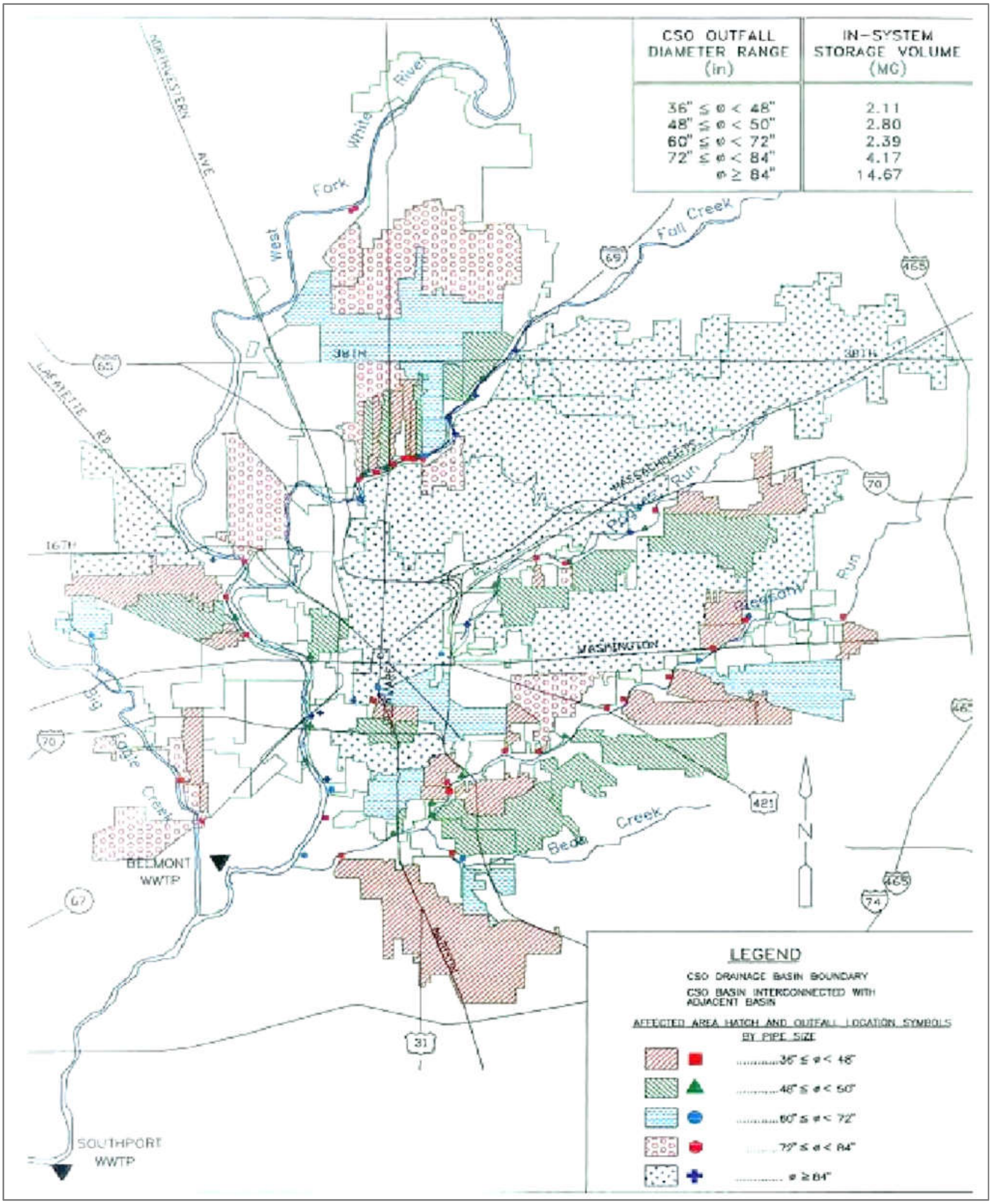


Figure 4-4
CSO Outfall and Tributary Area Location Map for In-System Storage (2006)

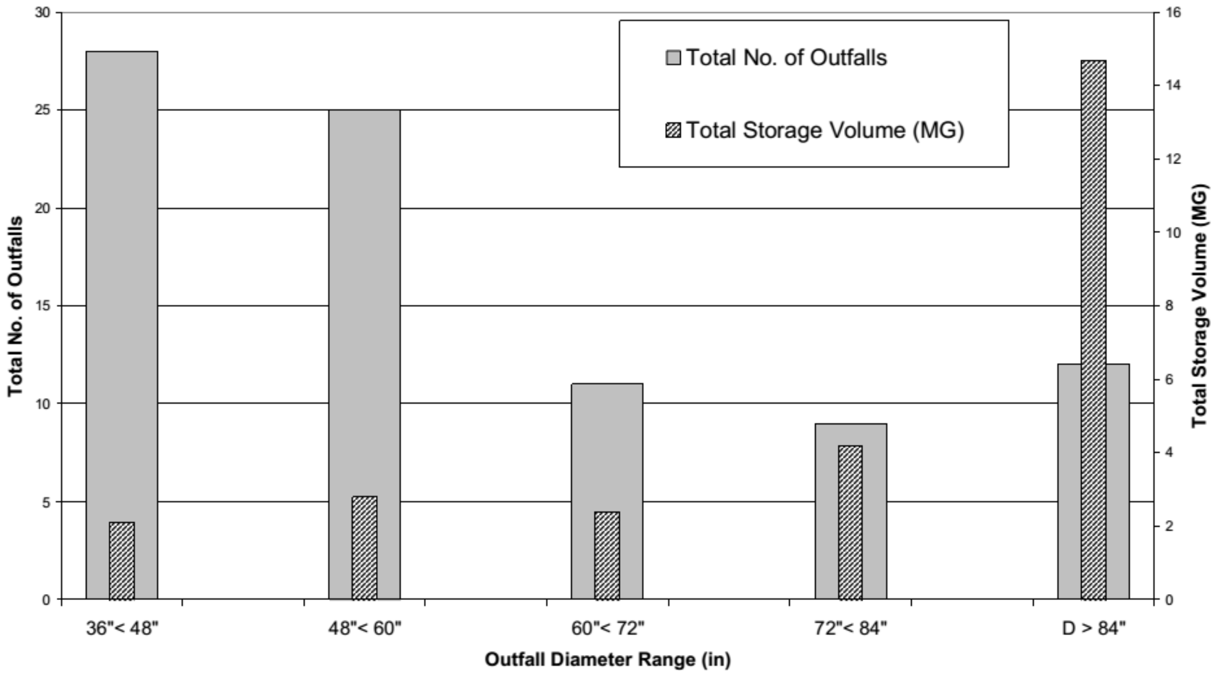


Figure 4-5
In-System Storage Analysis (2006)

4.4.1.1 Mechanical Sluice Gate Control System

A typical mechanical sluice gate system is shown in **Figure 4-6**. As the figure demonstrates, there are two sluice gates required for in-system storage and flow control. The regulator gate, which is normally in the open position, is activated automatically in response to signals from a water depth monitor in the interceptor. When the interceptor is full, the regulator gate will close and regulate the flow The outfall gate, which is normally closed, is activated automatically in response to three different monitors: a river level sensor in the receiving stream, level sensor in the receiving stream, a water depth monitor in the combined sewer trunk, and an extensive rain gauge network that monitors incoming storms. The tide level sensor is used to prevent the outfall gate from opening during high water conditions and creating backwater effects from the receiving stream. The other two monitors are used to prevent upstream basement or street flooding by opening the outfall gate when either the depth in the combined sewer trunk or potential rainfall threatens the storage limit.

Although the sluice gate system is operated automatically, it must be equipped with a manual override in case of equipment failure. Also, since this system's function is critical during wet weather, a backup power source is needed to provide power in case of electrical failure.

There are many advantages in using a mechanical sluice gate system to provide for in-system storage or diversion structures. The CSO outfalls vary in shape (circular, semicircular, rectangular, and various combinations of these) and size (36 inches to 156 inches). A sluice gate system will work regardless of the outfall's shape and size. In particular, special design accommodations can be made for CSO outfalls greater than or equal to 120 inches, with a maximum size of 192 inches.

Sluice gates can also completely seal off large outfalls that may be too large for an inflatable dam. The regulator gate is very beneficial in this type of system because it can help manage flows to the downstream AWT plant. In addition, the sluice gates have a normal life span of 30 to 50 years but require continued maintenance, including periodic cleaning and lubrication of the stem and hoisting

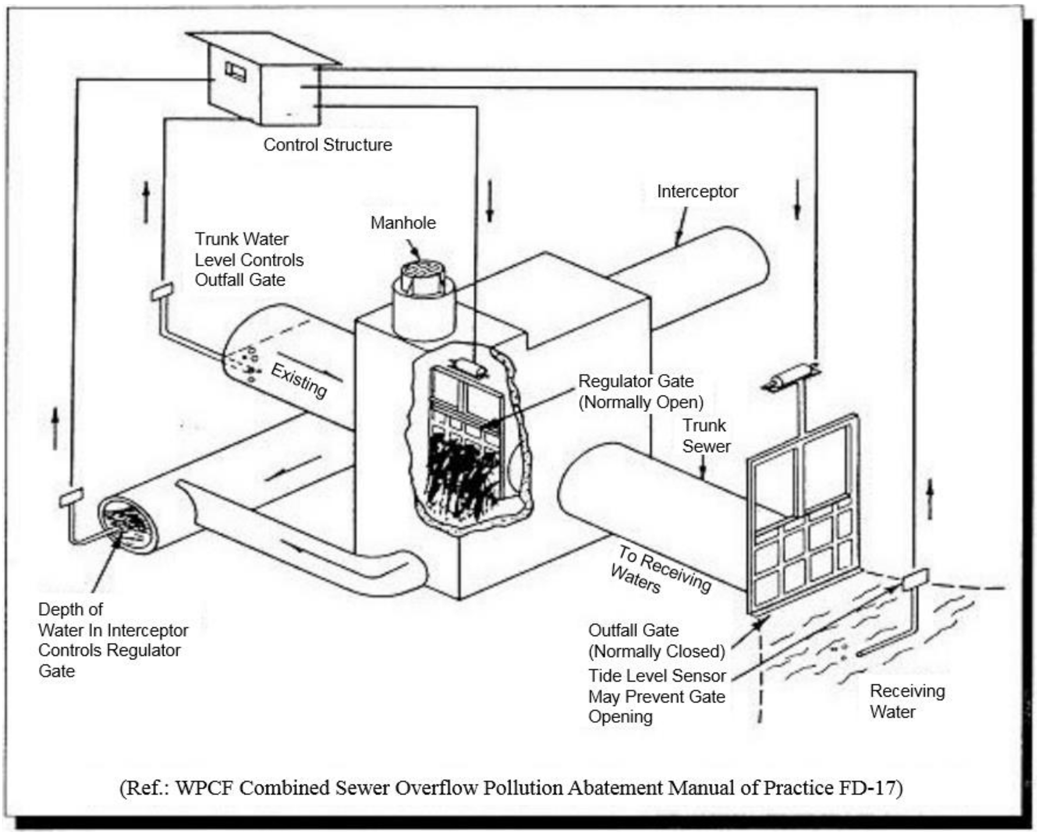


Figure 4-6
Mechanical Sluice Gates

mechanisms. Finally, sluice gates are designed to withstand high water conditions of rising receiving streams.

However, sluice gate systems are complex and have posed significant problems in some communities. Because they are not fail-safe, there is potential for causing basement backup problems. The sluice gate system's electrical and mechanical components require a certain level of maintenance. Maintenance can involve repairs to the actuator, purging or cleaning of the level sensors, and removing debris from the gates and gate openings. Debris also can become trapped underneath the gate and prevent it from closing fully. Auxiliary power sources may be required to open the gates in the event of a power failure.

The City installed a mechanical sluice gate in CSO outfall 058 in 1997 as part of a pilot project to evaluate both mechanical gates and inflatable dams.

4.4.1.2 Inflatable Dams

Inflatable dams are rubberized fabric devices that can be inflated during smaller wet-weather events to hold wastewater within the sewer system and prevent combined sewage from entering the receiving streams. **Figure 4-7** shows a schematic of an inflatable dam in the outfall pipe of a combined sewer.

These dams, which are normally in a semi-inflated position, can be designed to activate automatically from a master control center in response to upstream water levels or surface rainfall data. If monitors indicate that the in-system storage volume may exceed the storage limit, then the dam structure is automatically deflated, and an overflow will occur. In the event of an exhaust valve malfunction or other system breakdown, the dam contains a safety valve that would deflate the dam and prevent backups into basements and streets.

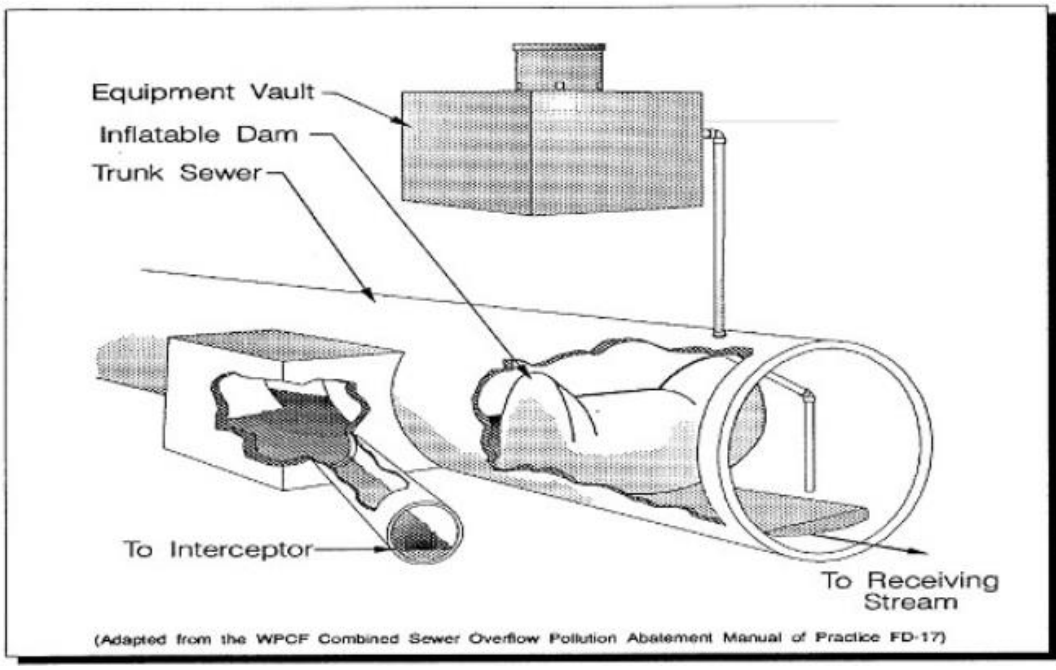


Figure 4-7
Typical Inflatable Dam (2006)

The air supply to inflate the dam, which is either produced by a compressor or supplied from a storage tank, is located on-site in an equipment vault. This on-site equipment vault also contains a manual control to deflate the dam in case of equipment failure.

The City installed an inflatable dam in CSO outfall 053 in 1997 as part of its pilot study of in-system storage technologies. The City also installed additional inflatable dams along Fall Creek, Pleasant Run and Pogues Run, including some dams equipped with real-time control capabilities. The City's experience with inflatable dams demonstrated their viability for in-system control in the collection system.

Since the dams are generally made from a heavy fabric or rubber, they do not require a substantial amount of in-pipe maintenance; however, some maintenance is required for the instrumentation inside the equipment vault. Also, these dams must include pressure relief valves, mechanical deflation controls, and backup manual deflation valves to ensure that basement or street flooding do not occur during a power failure. Finally, installation of the dams does not require major reconstruction of the existing system, therefore limiting the amount of time and manpower needed and making them cost-effective.

Although the fabric and rubber material used in these structures is durable, sharp objects can penetrate them. In addition, since inflatable dams are installed directly inside the combined sewer outfall pipe, they must be able to accommodate the various pipe shapes in the system. An inflatable dam cannot accommodate two pipe shapes: rectangular pipe outfalls with a rise greater than the span and semicircular pipe outfalls that are not rounded at the base.

Another limitation with inflatable dams is that they have a maximum design height of approximately 144 inches, and a minimum design height of approximately 48 inches. If inflatable dams are to be used in combined sewer outfall pipes smaller than 48 inches in diameter, they must be prefabricated in a sleeve and inserted into the existing pipe. They cannot be installed in the field because there would not be enough head clearance for crew members to work. Finally, if high water conditions are a major concern, inflatable dams require special design of the anchoring system to withstand backwater from the receiving stream.

Table 4-5 and **Figure 4-8** compare the costs of mechanical sluice gates relative to inflatable dams in various diameter sewers. These costs constitute budgetary estimates and are based upon manufacturers' equipment prices and other related construction costs. In addition, the budgetary construction unit costs were compared to the Indianapolis Clean Stream Team's (ICST) experience in implementing these types of controls in various cities in the Midwest. Although the overall unit costs did not take into consideration site-specific design requirements, they still offered enough information to evaluate the feasibility of in-system storage. As can be seen from the table and graph, sluice gates are often the most cost-effective technology for smaller diameter pipes, while inflatable dams are usually most cost-effective for the larger diameter pipes.

However, the selection of these controls is generally site-specific and cost is not usually the controlling factor.

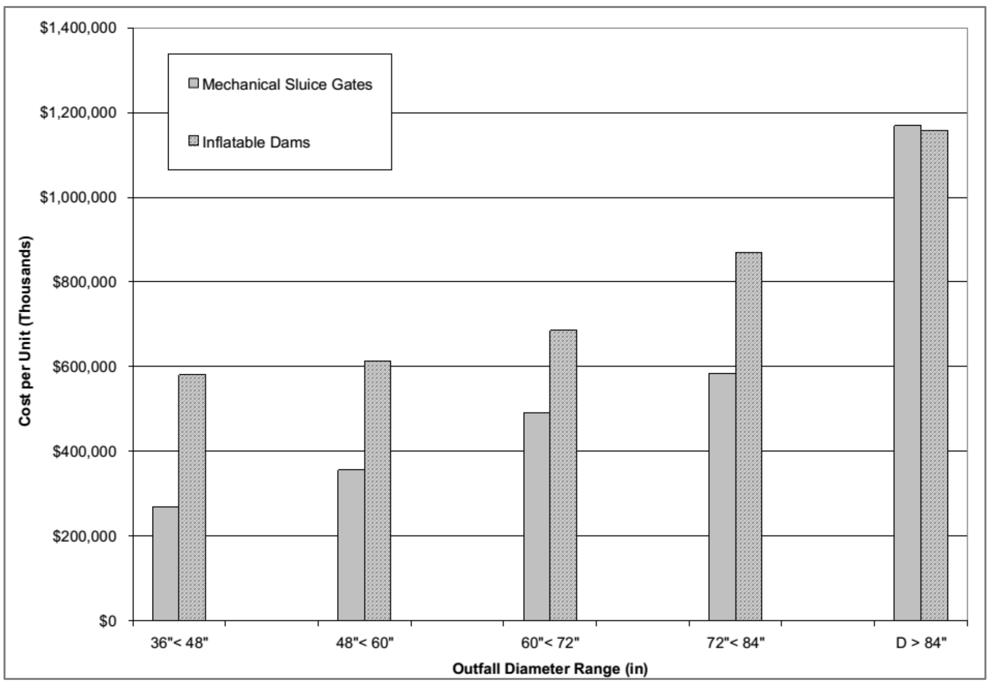


Figure 4-8
Cost Comparison Analysis - In-System Storage Devices (2006)

Table 4-5
Comparisons of Budgetary Costs for In-System Storage Devices (2006)

			Sluice Gates		Inflatable Dams	
Outfall Diameter	**Number of Outfalls**	**Potential In-Line Storage (MG)**	**Estimated Cost per Gal. of Storage**	**Mechanical Sluice Gate Cost per Unit**	**Estimated Cost per Gal. of Storage**	**Inflatable Dam Cost per Unit**
36"<u><</u>D< 48"	28	2.11	□ 4.07	□ 268,728	□ 7.71	□ 580,886
48"<u><</u>D< 60"	25	2.8	□ 3.18	□ 356,404	□ 5.49	□ 614,439
60"<u><</u>D< 72"	11	2.39	□ 2.26	□ 490,411	□ 3.15	□ 685,215
72"<u><</u>D< 84"	9	4.17	□ 1.26	□ 584,502	□ 1.88	□ 870,280
D □84"	12	14.67	□ 0.96	□ 1,169,004	□ 0.95	□1,156,529

4.4.1.3 Pinch Valves

In addition to the use of inflatable dams and sluice gates, the City of Indianapolis won an award in 2004 from the American Public Works Association for the innovative use of pinch valves in large diameter sewers to assist in the diversion of combined sewer flows from one wastewater treatment plant to another.

In a pair of innovative projects, the City accomplished the following achievements:

- First-time installation of large diameter (72") pinch valves in a sewer system
- First-time installation of sluice gates to modulate upstream water levels by controlling inflation pressure in a pinch valve, instead of operating as completely closed or completely open
- Retrofit of valves into existing sewers with no large, expensive valve chambers and no loss of conveyance capacity

Minimum bypass pumping needed during valve installation. The diversion of flow into an under-utilized interceptor is a key component in improving the efficiency of the system. Several locations within the sewer system provided interconnections between interceptors. The City found that if flow were restricted in one interceptor it could be diverted into an interconnecting interceptor with available capacity and sent to a treatment plant with available capacity.

The pinch valve concept was developed as the City evaluated the possibility of diverting flow within two interceptors adjacent to White River. These sites, at 10th Street and McCarty Street, showed great promise but needed to meet two strict criteria to move forward: existing interceptors had to remain in service during construction and the valves could not reduce flow area.

The first in-system control alternative the City examined was an inflatable dam, a proven technology for large diameter installations. To meet the requirement of no loss of flow area, the use of an inflatable dam would have required removing a section of existing 72" interceptor and replacing it with an oversized 84" pipe. When construction would be complete, the clamping plates and concrete fillet would have reduced the flow area of the 84" pipe to that of a 72" pipe. The construction of the inflatable dam also would have required a significant amount of bypass pumping during construction and installation. The construction elements of this option led the City to look for an easier, more cost-effective alternative.

The alternative the City investigated and eventually selected was a 72-inch pinch valve (see **Figure 4-9**) manufactured by Red Valve. The City selected this alternative for two reasons:

1. The pinch valve vault and control structures could be built around the existing live interceptor.
2. When the valve was delivered onsite, the contractor could cut a section of the existing interceptor away, and slip the valve in place. This resulted in approximately 12 hours of bypass pumping during valve installation. These installations took place during evening hours and did not impact the local customers in any significant manner.

Figure 4-9
72-Inch Pinch Valve

The use of this technology was innovative for several reasons. This was a new use for pinch valve technology. Pinch valves had never been used before to control flow within interceptors.

Pinch valve technology allowed the City to regulate the amount of flow diverted. Instead of technologies that divert all or no flow, the City modulated the pinch valve to send some of the diverted flow to an interceptor not using its full capacity. Excess wastewater was allowed through the other interceptor by modulating the inflation pressure of the pinch valve. Operating in this manner, the City made fullest use of the capacity of the existing interceptor system.

Pinch valves also were cost-effective solutions, requiring less labor, less de-watering, less equipment and materials, and easier construction methods. The City estimated pinch valves could save $150,000 to $300,000 per installation when compared to inflatable dams.

4.4.2 Real-Time Control

Mechanical gates, inflatable dams or pinch valves may be employed as part of a highly automated real-time control (RTC) system. RTC is a sophisticated in-line storage method that uses sewer depth and rainfall monitors to control the amount of wastewater being stored, transported, and directed throughout the sewer system. This highly automated system can increase efficiency and holding capacity within the existing sewer system by creating real-time response to rain as it falls over the city. Dams, valves or gates allow sewage to flow from one interceptor into another interceptor during intense rainfall and runoff, and can hold flow back when rain subsides and capacity is needed in another part of the city.

RTC monitors require a power source and telecommunication lines to communicate with a central computer system. The computer system processes the monitoring data every few seconds or minutes, using data to make control decisions at the CSO, such as whether to open or shut the sluice gates or valves, or inflate or deflate the dams.

These instantaneous decisions cannot always rely upon depth data alone but must also incorporate rainfall data. Releasing in-system storage volumes by opening a sluice gate, operating a pinch valve or deflating a dam is not instantaneous. Therefore, incorporating rainfall data into the decision process is necessary to give the system enough time to react to an approaching storm that has intensities or durations that will breach the storage limit, thus preparing the in-system storage release process before basement or surface flooding occurs. Rain gauges must be spaced to accurately monitor the average thunderstorm size of four to five miles. A real-time control system of this type maximizes the full storage capability of the collection system while avoiding upstream basement flooding and spills to the environment, thereby minimizing public health concerns and CSO impacts on the receiving water.

The benefits of RTC in sewer systems are not limited to CSO volume reduction. RTC may play an important role in the following aspects of maintenance/operations:

- Responding to emergency situations and conditions during either wet- or dry-weather periods, including power loss, infrastructure damage, or equipment failure
- Isolating parts of the system for maintenance or construction
- Reducing energy consumption
- Maintaining flow regime and (sewage) velocities that will prevent/reduce sediment deposition
- Reducing equipment wear

RTC facilities also can reduce the potential for either basement or surface flooding. Since rain does not fall evenly over the CSO watershed, flows into the combined sewer system vary from place to place. RTC uses the fill/decant cycles of the entire system to improve storage capacity. By making better use of the existing capacity, the City could reduce spending on new storage facilities.

Additionally, by controlling the flow within the system, peak rainfalls are better managed, allowing more flows to be treated at the AWT plants. RTC also can be used to provide control of existing lift stations and future off-line storage structures, creating a systemwide control system that can optimize the capacity to predict and control sewage overflows.

RTC also can balance the hydraulic load in the collection system, reduce backup flows, provide dynamic and stepped storage, manage specific flow constraints, and provide fast dewatering of in-line and off-line storage facilities.

However, while RTC does potentially increase storage at a relatively low cost, the risk of flooding basements with raw sewage increases as additional RTC devices are installed in the collection system and as storage is attempted in smaller sewers. While RTC reduces capital costs of CSO controls, operation and maintenance costs can be more expensive over the long term. Furthermore, proper operation and maintenance of an RTC system is critical to protecting citizens from basement flooding. Also, flooded buildings pose a significantly higher likelihood of unintentional human contact and resulting health effects than combined sewer overflows into the streams.

4.4.3 SCADA System

To achieve maximum effectiveness, the RTC system must be linked with a communication network. The City completed a study for a Supervisory Control and Data Acquisition (SCADA) system. *Final Report (Draft) SCADA System Development Project, April 2004*, was prepared by Donohue & Associates. This report recommended that the City construct a SCADA system that used a wireless broadband communication system incorporating the countywide microwave structure of the Metropolitan Emergency Communications Agency (MECA). While the term SCADA is used to describe a variety of control system configurations, the most applicable definition describes a monitoring and control system spread over a wide geographical area, where autonomous control units located at remote sites are networked to a central facility using land lines or communication links. A SCADA system consists of three primary elements: remote site equipment, a communication network, and control facility.

SCADA systems collect information from numerous remote sites on either a real-time or periodic basis so that system managers can be aware of system status, identify current operating needs, manage equipment maintenance, and take action to minimize or avert operational upsets. Effective use of SCADA will optimize the use of a wastewater conveyance system while saving operation and maintenance costs.

The proposed SCADA system was intended to provide the capabilities and performance necessary for it to become the cornerstone management tool for the wastewater collection system. This system was to replace the existing wastewater conveyance alarm system. The proposed SCADA system would provide for monitoring and control of wastewater sites located throughout the Marion County area. Implementation of the CSO LTCP added a significant number of new facilities. The recommended SCADA system had the capacity to address anticipated needs for a 10-year planning period. Approximately 250 existing sites were added to the SCADA system. An additional 400 sites could be incorporated in the future as they are constructed.

The SCADA system was constructed in multiple phases. The first phase included installation of system hardware and software, improvements of MECA facilities, addition of broadband radio connection, and equipment enhancements and data collection from selected remote sites. Additional phases of construction included configuration of software for additional sites, addition of point-to-point broadband radio connections and equipment enhancements and data collection from the remaining remote sites. The completed RTC structures were included in the initial SCADA development plan. Additional RTC facilities could be added to SCADA as they were constructed.

4.4.4 Summary

Collection system controls and in-system storage are a viable approach for reducing the volumes of CSOs discharging to receiving streams. To determine the potential effectiveness of this technique, the City screened all its CSO outfalls greater than 36 inches. From this screening, the team found that in-system storage could be achieved cost-effectively by retrofitting outfalls greater than 72 inches with in-system storage devices, such as mechanical sluice gates, pinch valves or inflatable dams.

The City of Indianapolis aggressively moved forward to achieve an early level of CSO control through in-line storage projects. Following pilot testing in the late 1990s, the City completed several inflatable dam installations in 2001-02 in various watersheds to increase system storage and reduce CSO impacts. The City also designed and constructed a number of additional in-line storage projects. In addition to these projects, the use of systemwide RTC and several other in-line storage controls were evaluated. These projects were an integral part of the City's recommended plan for long-term CSO control.

The cost of in-system storage can be considerably less than the marginal cost of adding additional storage to any new storage facilities that may be constructed. Preliminary analysis indicated that under virtually any long-term planning scenario, these devices would prove to be cost- effective. However, real-time control facilities must be carefully designed, operated and maintained to minimize risks of basement backups or flooding. Implementation of a regional, independent, automatic, reactive control RTC strategy, in combination with a SCADA system, was expected to provide the capabilities and performance necessary for managing the wastewater collection system, maximizing in-system storage capacity, and reducing potential risks.

4.5 2006 Evaluation of CSO Control Plan Components

The history of the CSO control plan component evaluation has not been modified from the original approved CSO LTCP. Updated information can be found in Section 4.8.

CSO control planning is an iterative process, in which lessons learned from the analysis of one system component lead to refinements in the analysis and assumptions used for another system component. The City's analysis of CSO control alternatives involved extensive analysis of the following five major system components:

- Deep Tunnel Storage and Conveyance
- Combined Sewer Collection System & Watershed Improvements
- Belmont AWT Plant Improvements
- Southport AWT Plant Improvements
- Interplant Connection

Each of these five components must be planned and designed to be compatible with the conveyance and treatment needs and/or capacities of the other four components. The analysis must include combined sewer flows being captured in the tributaries and in White River for conveyance to and treatment at the Belmont and Southport AWT plants. The City sought to address the following questions in developing the systemwide CSO control plan: How much additional flow will be captured in the collection system? How will it be stored and conveyed to the treatment facilities? What level of treatment will wet-weather flows receive? How will flows between the two treatment facilities be managed?

Figure 4-10 represents the basic components of the wastewater collection and treatment facilities from 2006: the two AWT plants, their respective service areas, and the interplant diversion that enables part of the wastewater from the Belmont service area to be treated at the Southport plant. The dashed arrows in this figure represent the overflows that occured during wet weather from (1) CSO outfalls throughout the combined sewer areas in the Belmont service area, (2) CSOs at the headworks of the two AWT plants, and (3) primary effluent bypasses at the two AWT plants.

The challenges posed for the AWT plants by wet-weather surges and captured CSO flow resulting from CSO control measures led the City to develop the Interplant Connection Facilities Plan (ICST, 2004). This plan investigated approaches to convey all or part of the systemwide captured combined sewage to the Southport facility for treatment. The facility planning effort also developed and evaluated various concepts for expanding the Southport facility to provide effective treatment of the captured combined sewage. Expansion alternatives for the Belmont facility were evaluated previously during preparation of the 2001 LTCP and subsequent pilot studies at the facility.

Figure 4-11 illustrates the general framework of the CSO LTCP used in the Interplant Connection Facility Plan. At the heart of this plan is a deep tunnel for capturing CSOs and a new interplant connection for conveying the captured flow to the Southport plant. The design criteria for the interplant connection and new wet-weather treatment facilities was dependent upon the size and dewatering flow pattern from the deep tunnel, which in turn was dependent upon the extent to which CSO discharges were captured after various improvements were made to the collection system.

This section summarizes the City's iterative analysis of the five system components, focusing on their inter-relationships and their ability to satisfy regulatory requirements and address citizen concerns. **Section 4.6** describes the systemwide CSO control alternatives that resulted from this iterative analysis, and also compares their costs and benefits.

As described in **Section 3**, the City's technology screening and evaluation demonstrated that increased storage and conveyance to upgraded and expanded AWT plants was the most cost-effective technology for CSO control in Indianapolis. The technology evaluation also concluded that a remote treatment facility at the downstream end of the Fall Creek and Pogues Run watersheds, in conjunction with increased storage, warranted further evaluation. Each of these concepts, along with sewer separation, was carried into the alternatives evaluation described below.

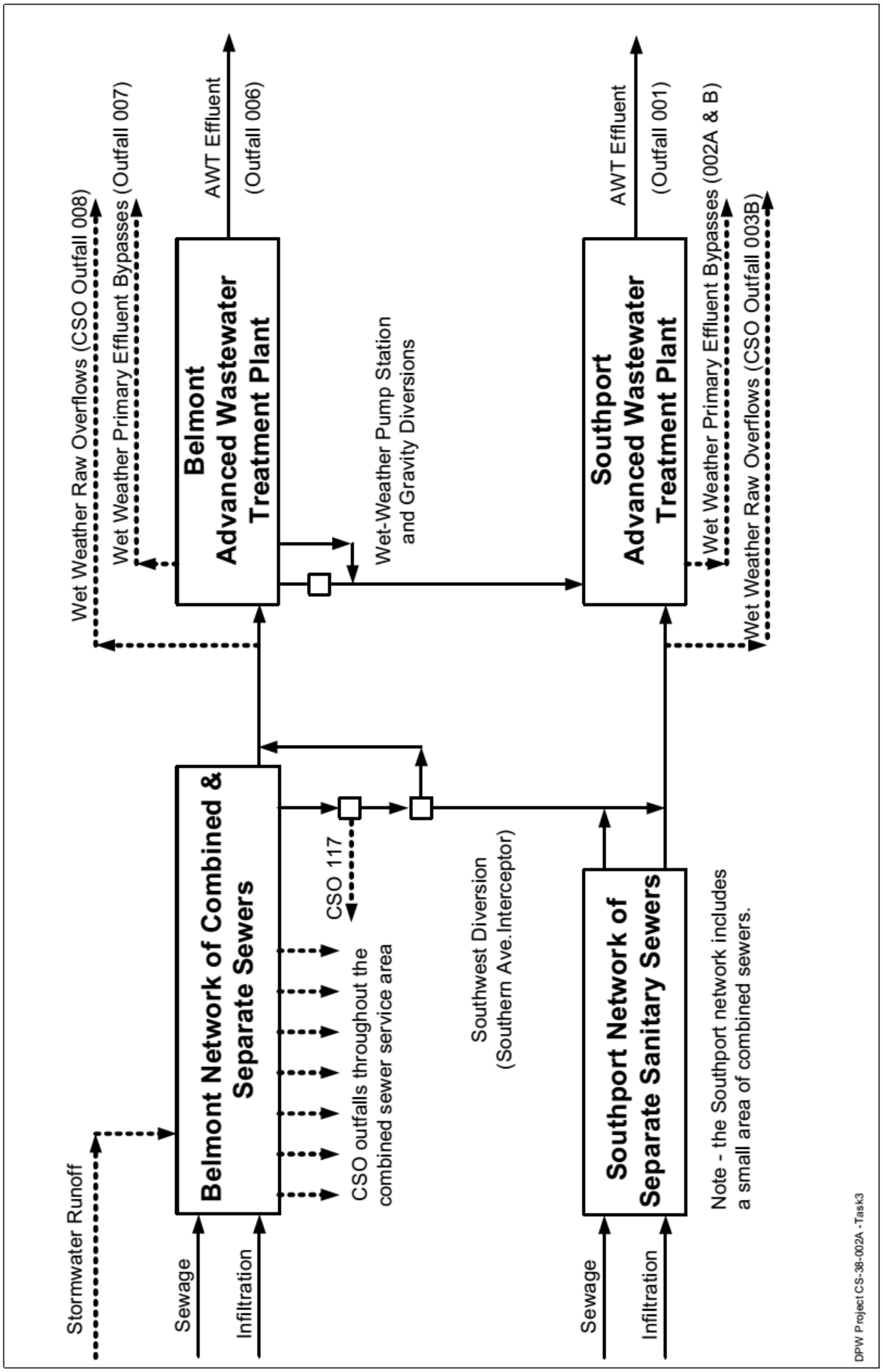
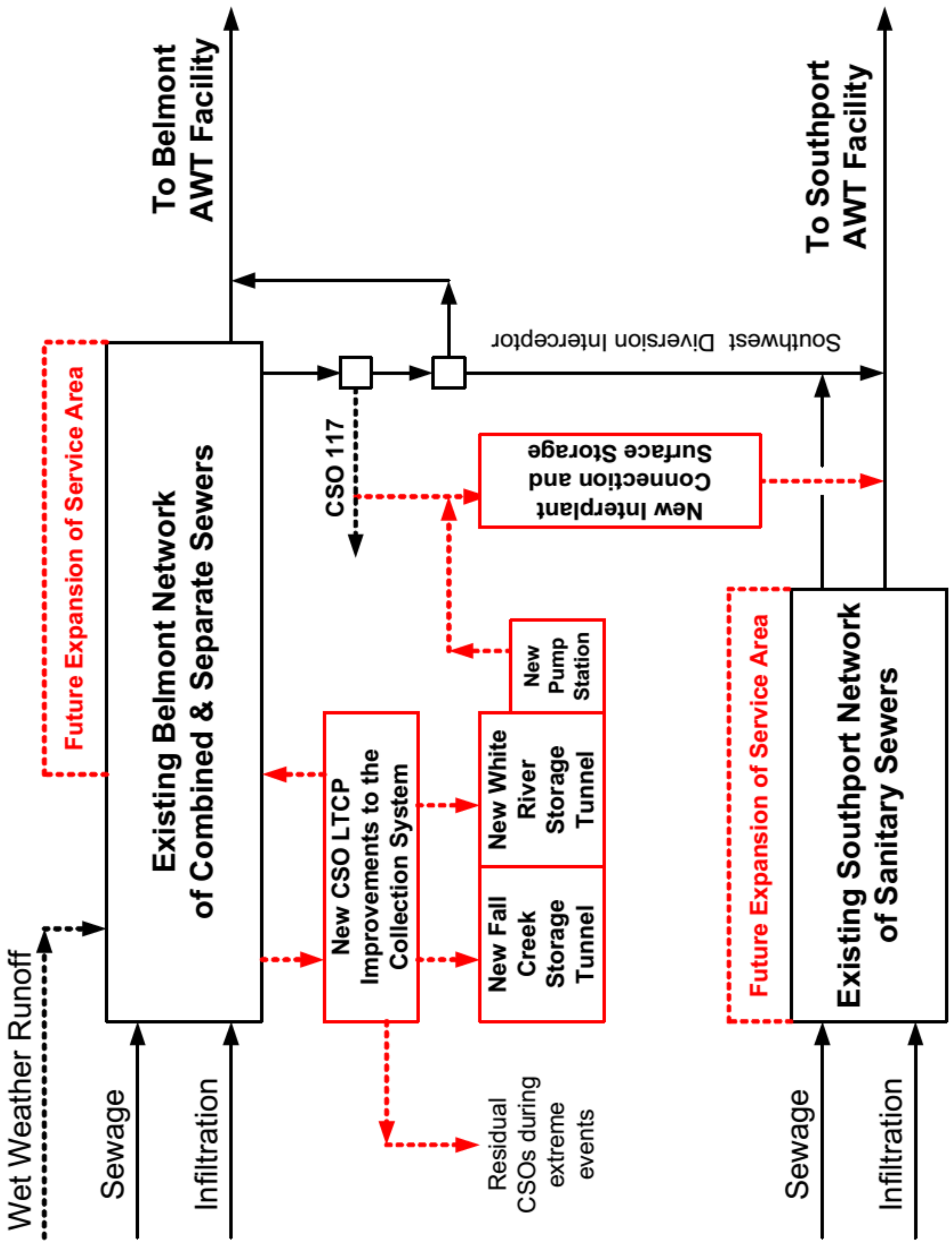


Figure 4-10
Indianapolis Wastewater Collection and Treatment Facilities (2006)



Note - The Southport network includes a small area of combined sewers.

Figure 4-11
Schematic of CSO Long Term Control Plan Variant (2006)

4.5.1 Deep Tunnel Storage and Conveyance

Given the complexity of the overall sewage collection and treatment system, the City used several computer models to simulate the performance of several important building blocks:

1. A 5-year NetSTORM model was used to simulate how the LTCP components for capturing CSOs would have performed had they been in operation from 1996 through 2000.
2. A newly developed deep tunnel model was used to provide preliminary analyses of the various tunnel dewatering rates and volumes for various scenarios. The input flow data to the tunnel model came from the captured CSO output flow data generated by the 5-year NetSTORM model.
3. The integrated tunnel model was used to (1) evaluate the feasibility of a new aboveground equalization basin near CSO 117 (known as EQ Basin 117) and (2) assess the workability of splitting the captured CSO flows between the two AWT plants.
4. Updated versions of the Belmont and Southport "treatment rate vs. storage volume" models were used to examine how additional flow from captured CSO flows and future growth within the service areas would affect headworks pumping capacities, on-site storage volumes and treatment rates needed to achieve specific wet- weather overflow frequencies at the AWT plants.
5. The detailed Stormwater Management Model (SWMM) was used to more fully explore the interplant connection planning objectives. SWMM was also used for continuous simulation of a "representative year" of precipitation data.

Additional information on development and calibration of the SWMM and NetSTORM models can be found in the *Indianapolis CSO LTCP Hydraulic and Water Quality Modeling Development Report* (Department of Public Works - Indianapolis Clean Stream Team (DPW-ICST), 2004).

To determine the flow capacity the interplant connection would need to accommodate the captured CSO flows pumped out of the deep tunnel, the City used captured CSO flowrates from the 5-year NetSTORM simulations as input to the integrated tunnel model. This provided the basis for an analysis of tunnel volume and dewatering rates. For a given set of input flow data, the tunnel model computed the annual average number of overflows that would occur for any combination of tunnel volume and dewatering rate assumed. For a given tunnel-dewatering rate, the tunnel volume was adjusted to obtain overflow event frequencies of 1, 4, 6, 8, 12 and 16 per year.

During the analysis, the City evaluated whether part of the captured CSO flows should be sent to the Belmont plant or whether it should all be sent to the Southport plant. The analysis evaluated, via computer simulations, what would have happened had the tunnel and flow-splitting provisions been in place during the 5-year period from 1996 through 2000.

The results also showed that attempting to split the tunnel flow between the Belmont and Southport AWT plants would be limited, because an expanded Belmont plant would have limited reserve capacity to treat captured CSO flows from the tunnel. Also, provisions for splitting part of the flow to the Belmont facility would not reduce the cost of improvements needed for CSO treatment at the Southport plant. This is because the full 150 MGD rate of tunnel dewatering would frequently be imposed on the Southport facility regardless of efforts to split part of the CSO load to the Belmont plant. Based on this analysis, the City's recommendation was to route the full amount of captured CSO flow to the Southport facility.

Based on an analysis of wet-weather flow data and simulation results for the period 1996-2000, the captured CSO flows from the collection system would approximately double the total wet-weather flow to the treatment plants. The Belmont plant managed almost all the wet-weather flow. Accordingly, a plan for sending all of the captured CSO flows to the Southport plant would result in the Belmont and Southport facilities each receiving about half of the wet-weather flow to the combined sewer system.

In order to determine the flow capacity needed to accommodate the captured CSO flows pumped out of the deep tunnel, an analysis of tunnel volume and dewatering rates was performed during the Interplant Connection Facilities Plan. In this analysis, captured CSO flowrates from alternative NetSTORM simulations were used as input to a tunnel simulation model. The results provided the following insights regarding tunnel volume requirements:

- The tunnel volume needed to achieve relatively low overflow frequencies is significantly reduced as the tunnel dewatering rate is increased.
- The tunnel volume requirement is very sensitive to the level of CSO overflow control. For example, the results suggested that the tunnel volume needed for a control level of one event per year would be nearly twice that needed for a control level of four events per year.
- As the tunnel dewatering rate is increased, a point of diminishing returns is reached where associated reductions of required tunnel volume become small. The knee of the curve for four events per year indicated that benefits decrease when dewatering rates climb higher than 150 MGD. The knee of the curve for eight events per year indicated there would be no benefit for a dewatering flow rate higher than about 75 MGD.

The results for tunnel volume and dewatering rate were not particularly sensitive to whether the CSO from structure 117 was diverted to the tunnel or to the interplant connection sewer. The results also indicated there would be no benefit for the tunnel dewatering rate to be higher than 150 MGD, even for tunnel sizes projected to control overflow frequencies down to one event per year. Thus, the City concluded that the maximum capacity for the interplant connection line would be 150 MGD if it were to accept only the dewatering flow from the tunnel.

4.5.2 Combined Sewer Collection System & Watershed Improvements

Utilizing the interplant facility planning analysis of tunnel volume and dewatering rates, the City proceeded with a more detailed evaluation of CSO controls within the collection system. Within the collection system, the City evaluated a variety of technologies and combinations of technologies for CSO control and abatement. As noted in Section 3 (CSO Abatement Technologies), the technology analysis yielded the following general conclusions:

- Storage/conveyance technologies ranked highest at all levels of control due to reliability, water quality improvements and cost-effectiveness.
- Remote treatment technologies scored poorly due to operating and technical issues, but may be viable combined with a tunnel on Fall Creek or storage on Pogues Run. Remote treatment also carries heightened operational and security concerns.
- Hybrid technologies (storage then treatment) can score well on cost-effectiveness but never scored as well as storage/conveyance by itself.
- Sewer separation scored poorly on financial issues but has merits on smaller, remote watersheds.

Technologies that passed the initial screening described in Section 3 were developed into watershed alternatives during the development of systemwide plans. Three systemwide plans for the collection system were developed:

- CSO Control Plan 1: Storage and conveyance to central treatment facilities in all watersheds
- CSO Control Plan 2: Storage with remote treatment in the Fall Creek and Pogues Run watersheds and storage/conveyance to central treatment facilities in other watersheds
- CSO Control Plan 3: Sewer separation in all watersheds

A physical description of the structural alternatives evaluated for each watershed is provided below in sections 4.5.2.1 through 4.5.2.8. Information on project costs and water quality impacts of the alternatives is provided in Section 4.6, Evaluation of Systemwide CSO Control Alternatives.

Early Action Projects: The City identified a number of early action projects to reduce combined sewer overflows and improve stream water quality prior to finalizing the CSO LTCP. U.S. EPA and IDEM concurred with the City's decision to move these projects forward and to include these projects in the LTCP. Early action projects included in-line storage, off-line storage, sewer separation, and CSO-related AWT plant improvements. Active projects were in various stages of development, including planning, design or construction. All parties recognized that these projects should be advanced because of their benefit to the environment, added capacities created, and resolution of localized problems. These projects provided a foundation for the overall plan and demonstrate the City's commitment to moving forward to improve water quality within local waterways. A detailed listing and breakdown of these projects is included in **Section 7**. The costs and benefits of all CSO control plans described below and in **Section 4.6** include these early action projects.

4.5.2.1 Fall Creek

In the Fall Creek watershed, a deep storage tunnel ranked high in the watershed technology screening described in **Section 3**, as did a relief interceptor. Fall Creek is located approximately four miles from the Belmont AWT plant. The Fall Creek watershed also experiences high peak flowrates. Therefore, the pipe diameter that would be required for a relief interceptor would be close in size to that required for a storage tunnel. Since CSOs in upper Fall Creek contributed a significant amount of combined sewer overflows (roughly 40 percent of the total systemwide), large upstream conveyance pipes would be required. A storage tunnel would provide greater flexibility in developing solutions for the downstream system. For these reasons, a deep storage tunnel was selected for the Fall Creek watershed. The technology evaluation also concluded that a remote treatment facility at the end of the tunnel in the watershed warranted further evaluation.

Two plans were considered in the Fall Creek watershed.

Plan 1: A deep tunnel would be constructed along Fall Creek to store captured CSO flows. The tunnel would begin near 34th Street and Sutherland Avenue and would generally run parallel to Fall Creek in a southwesterly direction, ending near 10th Street and Stadium Drive, where it would connect to the central tunnel.

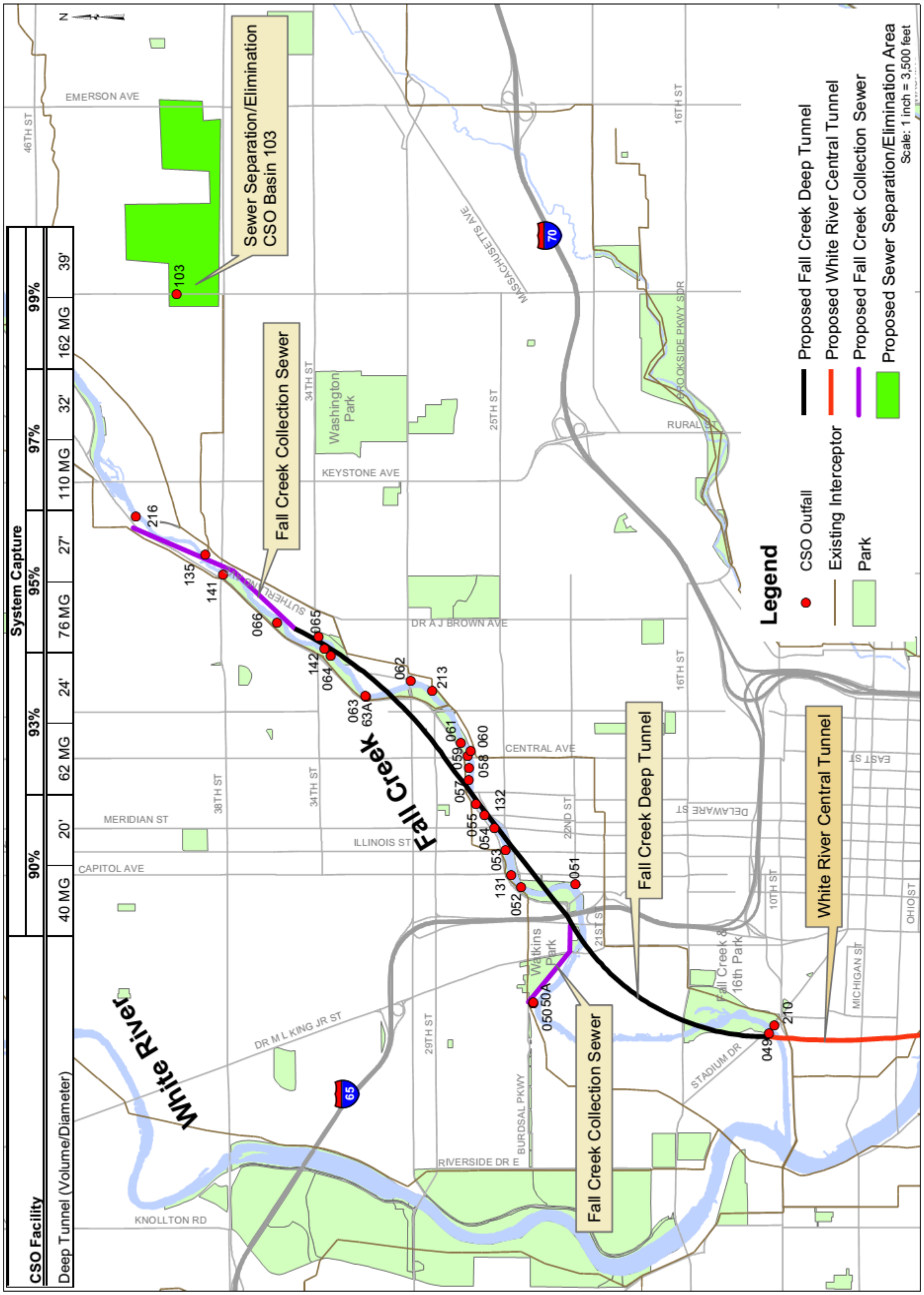
As shown in **Figure 4-12**, the tunnel size would range from 20 feet in diameter for 90 percent system capture (to store 40 million gallons) to 39 feet in equivalent constructible diameter[1] for 99 percent system capture (to store 162 million gallons). The tunnel length would be approximately 18,600 feet (3.5 miles).

Plan 2: A separate deep tunnel would be constructed along Fall Creek to store captured CSO flows (**Figure 4-13**). The tunnel would begin near 34th Street and Sutherland Avenue and end near 10th Street and Stadium Drive, essentially at the same alignment as Plan 1. However, instead of connecting to the central tunnel, a pump station would be constructed at the southern terminus to dewater the tunnel and convey the stored flow to the sewer collection system and a remote treatment facility. The treatment facility, located near the confluence of Fall Creek and White River, would include mechanical screens, pumping facilities, enhanced high rate clarification (EHRC) and ultraviolet (UV) disinfection. The treated effluent would be discharged into the White River. The facility would be sized to dewater the tunnel within two days.

The estimated tunnel diameter and storage volume for Plan 2 would match Plan 1, described above. The Plan 2 tunnel length would be approximately 18,800 feet (3.6 miles). The remote treatment facility peak flow capacity would range from 20 MGD for 90 percent system capture to 81 MGD for 99 percent system capture.

Collection sewers would be required under both Plan 1 and Plan 2 to capture and convey CSO flows from upstream outfalls into the deep tunnel. Two collection sewers were sized in the Fall Creek watershed: one to collect captured CSO flows from CSOs 216, 135, 141 and 066 located upstream of the tunnel's northern terminus, and a second to collect captured CSO flows from CSOs 050 and 050A near Watkins Park. Additional collection sewers would be required to group CSOs along the deep tunnel to reduce the number of tunnel shafts. For Plan 2 only, a collection sewer was also sized to collect captured CSO flows from CSOs 043 and 044 within the White River watershed, as shown in **Figure 4-13**.

[1] Equivalent diameter refers to the tunnel or pipe diameter with the same surface area as the constructible box structure.



CSO Facility	System Capture									
	90%		93%		95%		97%		99%	
Deep Tunnel (Volume/Diameter)	40 MG	20'	62 MG	24'	76 MG	27'	110 MG	32'	162 MG	39'

Figure 4-12
Fall Creek Plan 1 (2006)

CSO Facility	System Capture 90%		93%		95%		97%		99%	
Deep Tunnel (Volume/Diameter)	40 MG	20'	62 MG	24'	76 MG	27'	110 MG	32'	162 MG	39'
Deep Pumping & Remote Treatment Facilities	20 mgd		31 mgd		38 mgd		55 mgd		81 mgd	

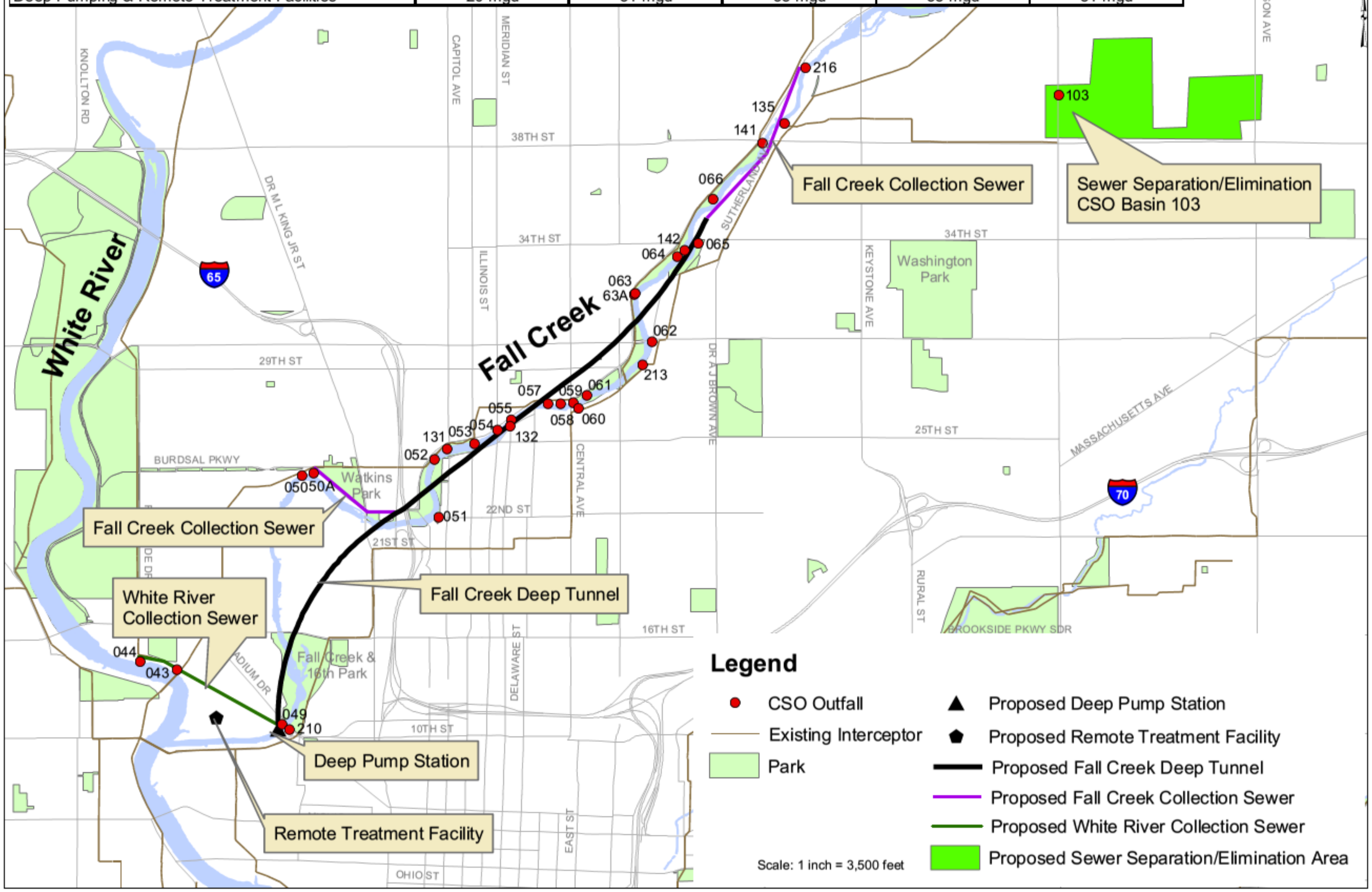


Figure 4-13
Fall Creek Plan 2 (2006)

4.5.2.2 Pogues Run

In the Pogues Run watershed, the City's completed and ongoing projects, outfall-specific solutions, and localized capturing and redirection of CSOs controled the majority of overflows. During early phases of the City's CSO control program, Indianapolis took an aggressive approach toward addressing urban flooding, stormwater quality, and CSO impacts along Pogues Run. Several projects along Pogues Run were already constructed and operational. Another project converted one of two existing underground conduits into a combined sewage conveyance/storage facility. The technology evaluation also concluded that a remote treatment facility at the end of the watershed in conjunction with a storage tunnel warranted further evaluation.

Two plans were evaluated for Pogues Run.

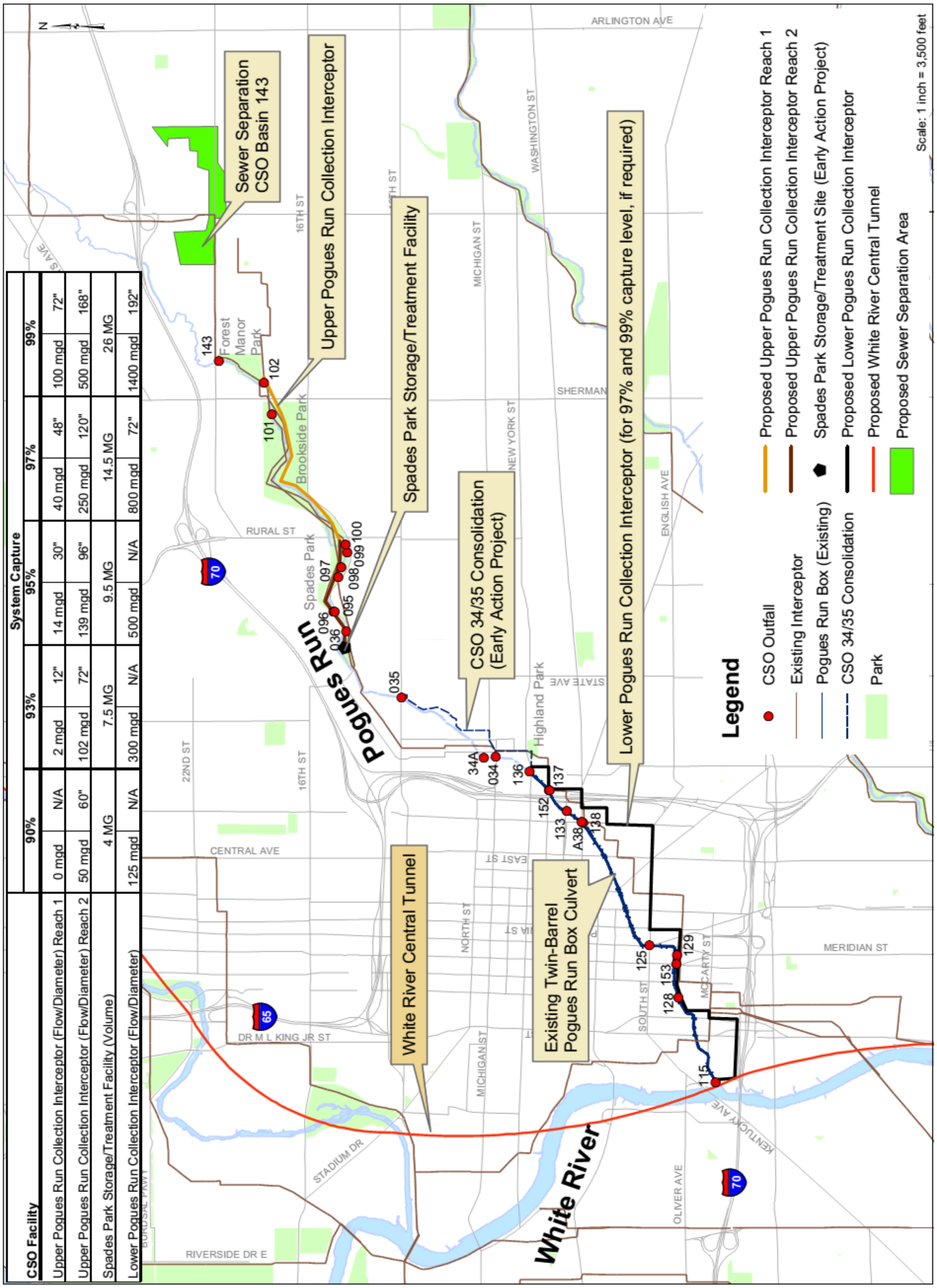
Plan 1: One of the two barrels of the existing underground Pogues Run box culvert would be converted to store/convey captured CSO flows from various outfalls along lower Pogues Run to a central tunnel (Figure 4-14). The existing barrel has adequate hydraulic capacity to carry CSO flows to the central tunnel for system capture levels of 90, 93, and 95 percent. For capture levels of 97 and 99 percent, a collection sewer would be constructed to capture and convey CSO flows along lower Pogues Run, as shown on **Figure 4-14**. This interceptor would begin at the upstream end of the Pogues Run box culvert, near New York Street and Dorman Street. The interceptor would run parallel to Pogues Run in a southwesterly direction and would end at Ray Street and White River to convey CSO flows into the central tunnel. The interceptor would range from 72 inches in diameter for 97 percent system capture (to convey 50 MGD) to 192 inches in equivalent pipe diameter for 99 percent system capture (to convey 400 MGD), as shown on **Figure 4-14**. The interceptor length would be approximately 14,700 feet (2.8 miles).

Figure 4-14 also shows additional CSO control facilities within the Pogues Run watershed. An off-line storage facility would be constructed in or near Spades Park for outfalls located in upper Pogues Run. The facility would range in size from 4.0 to 9.5 MG, depending on the level of control selected. Solids and floatables would be removed through a screening system. A collection interceptor would be constructed to convey captured CSO flow to the storage/treatment facility from CSOs 102, 101, 100, 099, 098, 097, 096, 095, and 036. The interceptor maximum size would range from 60 inches in diameter for 90 percent system capture to 168 inches in equivalent pipe diameter for 99 percent system capture, as shown on **Figure 4-14**. The interceptor length would be approximately 9,000 feet (1.7 miles). If capture levels of 97 or 99 percent are required, the city will evaluate during facility planning whether to extend the collection interceptor described above for lower Pogues Run in order to reduce the storage basin size required in Spades Park. The captured CSO flows would be stored in a subsurface storage facility and pumped back into the existing interceptor at the end of a storm event.

Sewer separation would be implemented within the combined sewer area tributary to CSO 143, thus eliminating this remote CSO upstream of Forest Manor Park.

Plan 2: A deep tunnel would be constructed along Pogues Run to store captured CSO flows as shown on **Figure 4-15**. The tunnel would begin at the upstream end of the existing Pogues Run box culvert, near New York Street and Dorman Street. The tunnel would then run parallel to the Pogues Run box culvert in a southwesterly direction, ending near Ray Street and the White River. A pump station would be constructed at this terminus point to dewater the tunnel and convey the stored flow to a remote treatment facility. This facility would be located near the confluence of Pogues Run and White River. The remote treatment facility would include mechanical screens, pumping facilities, EHRC, and UV disinfection. The treated effluent would be discharged into the White River. The facility would be sized to dewater the tunnel within two days.

Collection sewers would be required to capture and convey CSO flows into the deep tunnel. The tunnel size would range from 20 feet in diameter for 90 percent system capture (to store 20 million gallons) to 40 feet in equivalent constructable diameter for 99 percent system capture (to store 100 million gallons). The tunnel length would be approximately 10,900 feet (2.1 miles). The remote treatment facility peak flow capacity would range from 10 MGD for 90 percent system capture to 50 MGD for 99 percent system capture.



CSO Facility	System Capture 90%		93%		95%		97%		99%	
Upper Pogues Run Collection Interceptor (Flow/Diameter) Reach 1	0 mgd	N/A	2 mgd	12"	14 mgd	30"	40 mgd	48"	100 mgd	72"
Upper Pogues Run Collection Interceptor (Flow/Diameter) Reach 2	50 mgd	60"	102 mgd	72"	139 mgd	96"	250 mgd	120"	500 mgd	168"
Spades Park Storage/Treatment Facility (Volume)	4 MG		7.5 MG		9.5 MG		14.5 MG		26 MG	
Lower Pogues Run Collection Interceptor (Flow/Diameter)	125 mgd	N/A	300 mgd	N/A	500 mgd	N/A	800 mgd	72"	1400 mgd	192"

Figure 4-14
Pogues Run Plan 1 (2006)

CSO Facility	System Capture 90%		93%		95%		97%		99%	
Upper Pogues Run Collection Interceptor (Flow/Diameter) Reach 1	0 mgd	N/A	2 mgd	12"	14 mgd	30"	40 mgd	48"	100 mgd	72"
Upper Pogues Run Collection Interceptor (Flow/Diameter) Reach 2	50 mgd	60"	102 mgd	72"	139 mgd	96"	250 mgd	120"	500 mgd	168"
Spades Park Storage/Treatment Facility (Volume)	4 MG		7.5 MG		9.5 MG		14.5 MG		26 MG	
Lower Pogues Run Deep Tunnel (Volume/Diameter)	20 MG	18'	33 MG	23'	43 MG	26'	66 MG	33'	100 MG	40'
Deep Pumping & Remote Treatment Facilities	10 mgd		17 mgd		22 mgd		33 mgd		50 mgd	

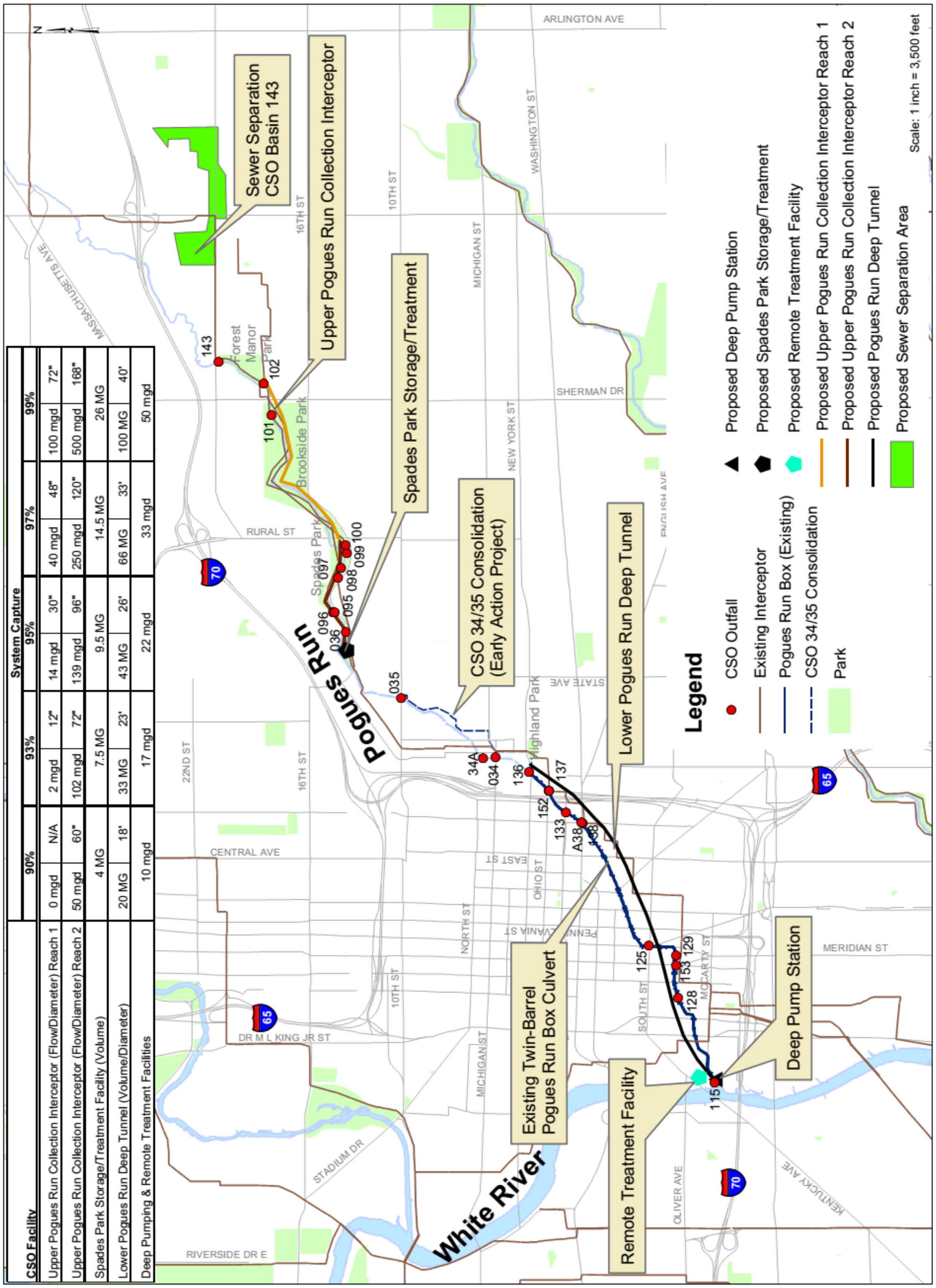


Figure 4-15
Pogues Run Plan 2 (2006)

One of the two barrels of the existing underground Pogues Run box culvert would be utilized to store captured CSO flows from outfalls along lower White River. Initial studies indicate that the barrel has approximately 10 million gallons of storage volume available. The remaining CSO volume would be rerouted to the deep tunnel described above.

As with Plan 1, Plan 2 would include additional CSO control improvements in the Pogues Run watershed, including a Spades Park satellite storage/treatment facility and a collection interceptor to convey flows to the Spades Park facility. As shown in **Figure 4-15**, interceptor alignment, diameter, and length would match those in Plan 1. Sewer separation would be implemented to eliminate CSO 143 upstream of Forest Manor Park.

4.5.2.3 Pleasant Run/Bean Creek

In the Pleasant Run watershed, a relief interceptor ranked high in the watershed technology screening described in **Section 3**, as did a deep storage tunnel. Because Pleasant Run was located near the proposed central tunnel and AWT plants, storage in the central tunnel became more favorable than storage along Pleasant Run. Additionally, roughly half of the overflows on Pleasant Run occured at the downstream end of the watershed near the central tunnel. For these reasons, a relief interceptor was selected to convey flows from Pleasant Run to the central tunnel.

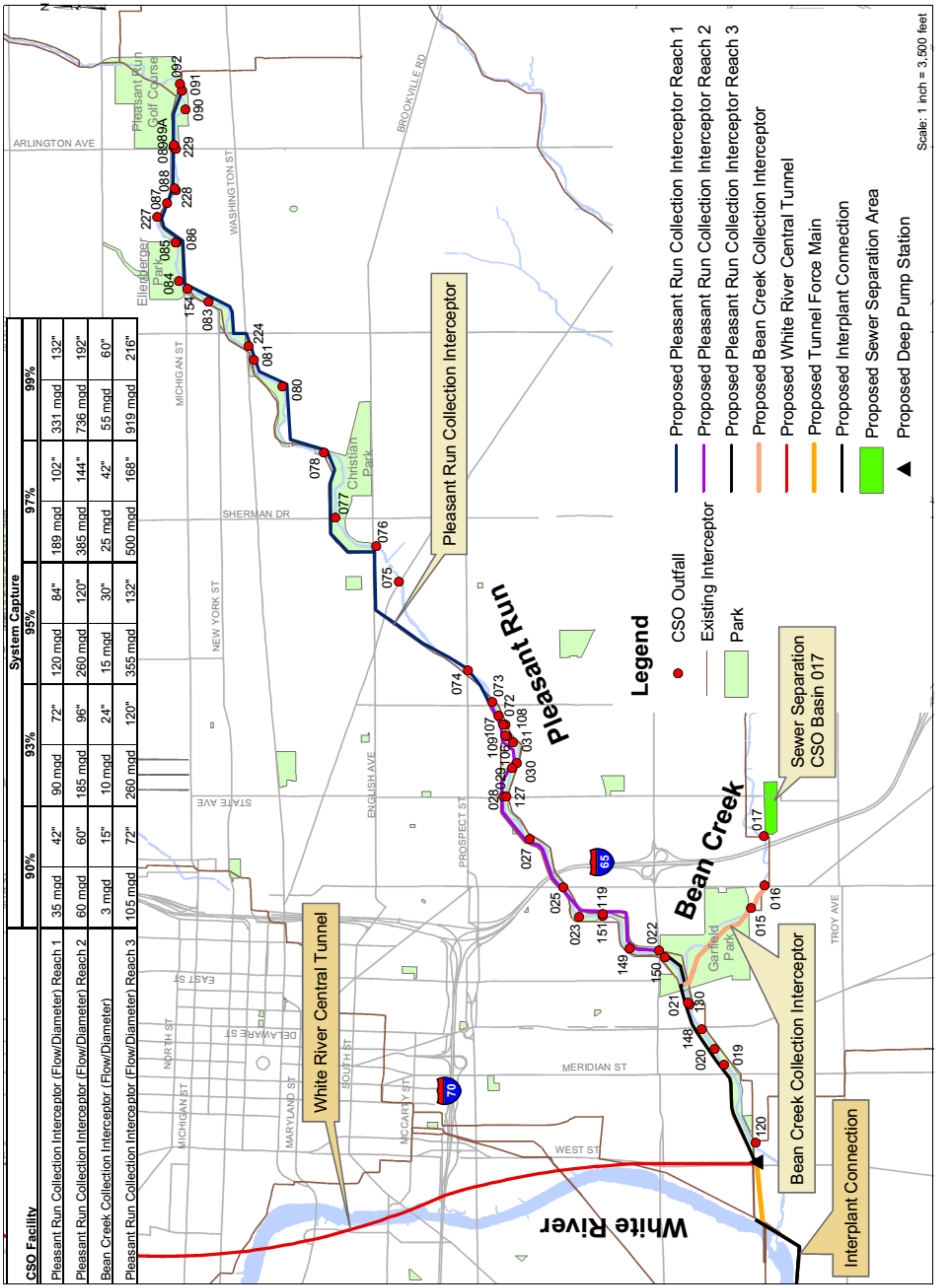
Under both Plan 1 and Plan 2, a collection interceptor would be constructed to capture and convey CSO flows from various outfalls along Pleasant Run (Figure 4-16). This interceptor would begin at the upstream end of Pleasant Run, within the Pleasant Run Golf Course. The interceptor would then run parallel to Pleasant Run in a southwesterly direction and would connect with the central tunnel at Bluff Road and Southern Avenue. The interceptor maximum size would range from 72 inches in diameter for 90 percent system capture (to convey 105 MGD) to 216 inches in equivalent pipe diameter for 99 percent system capture (to convey 920 MGD), as shown on **Figure 4-16**. The interceptor length would be approximately 42,600 feet (8.1 miles). A collection interceptor would also be required to capture CSO flows from outfalls along Bean Creek and convey them to the proposed Pleasant Run interceptor. In addition, sewer separation would be implemented within the combined sewer area tributary to CSO 017, eliminating this remote CSO on Bean Creek. The city is also considering installation of a separate smaller diameter interceptor, parallel to the new relief interceptor, to serve Citizens Gas and other industries along the interceptor corridor. However, this interceptor was not included in the 2006 LTCP cost estimates for Pleasant Run.

4.5.2.4 Eagle Creek

The Eagle Creek watershed has only five CSOs, which are fairly distant from each other. Thus, consolidating the CSOs for off-line storage or remote treatment was not cost-effective. For these reasons, a collection interceptor was selected for the Eagle Creek watershed.

Under both Plan 1 and Plan 2, a collection interceptor would be constructed, beginning at Eagle Creek and Vermont Street (**Figure 4-17**). The interceptor would run generally parallel to Eagle Creek in a southeasterly direction and would end at the Belmont AWT plant headworks facility. Approximately half of the diverted flow would be conveyed to the Belmont AWT plant via the Eagle Creek collection interceptor, and the remainder would be conveyed to the Southport AWT plant via the existing West Marion County interceptor. The interceptor size would range from 48 inches in diameter for 90 percent system capture (to convey 45 MGD) to 108 inches in diameter for 99 percent system capture (to convey 220 MGD), as shown on **Figure 4-17**. The interceptor length would be approximately 24,900 feet (4.7 miles).

The interceptor was planned in conjunction with the Belmont West cutoff interceptor to divert flow from the Belmont North and Belmont West interceptors to the Southport AWT plant.



CSO Facility	System Capture									
	90%		93%		95%		97%		99%	
Pleasant Run Collection Interceptor (Flow/Diameter) Reach 1	35 mgd	42"	90 mgd	72"	120 mgd	84"	189 mgd	102"	331 mgd	132"
Pleasant Run Collection Interceptor (Flow/Diameter) Reach 2	60 mgd	60"	185 mgd	96"	260 mgd	120"	385 mgd	144"	736 mgd	192"
Bean Creek Collection Interceptor (Flow/Diameter)	3 mgd	15"	10 mgd	24"	15 mgd	30"	25 mgd	42"	55 mgd	60"
Pleasant Run Collection Interceptor (Flow/Diameter) Reach 3	105 mgd	72"	260 mgd	120"	355 mgd	132"	500 mgd	168"	919 mgd	216"

Figure 4-16
Pleasant Run Plan 1 and 2 (2006)

CSO Facility	System Capture 90%		93%		95%		97%		99%	
Eagle Creek Collection Interceptor (Flow/Diameter)	45 mgd	48"	80 mgd	72"	100 mgd	84"	140 mgd	96"	220 mgd	108"

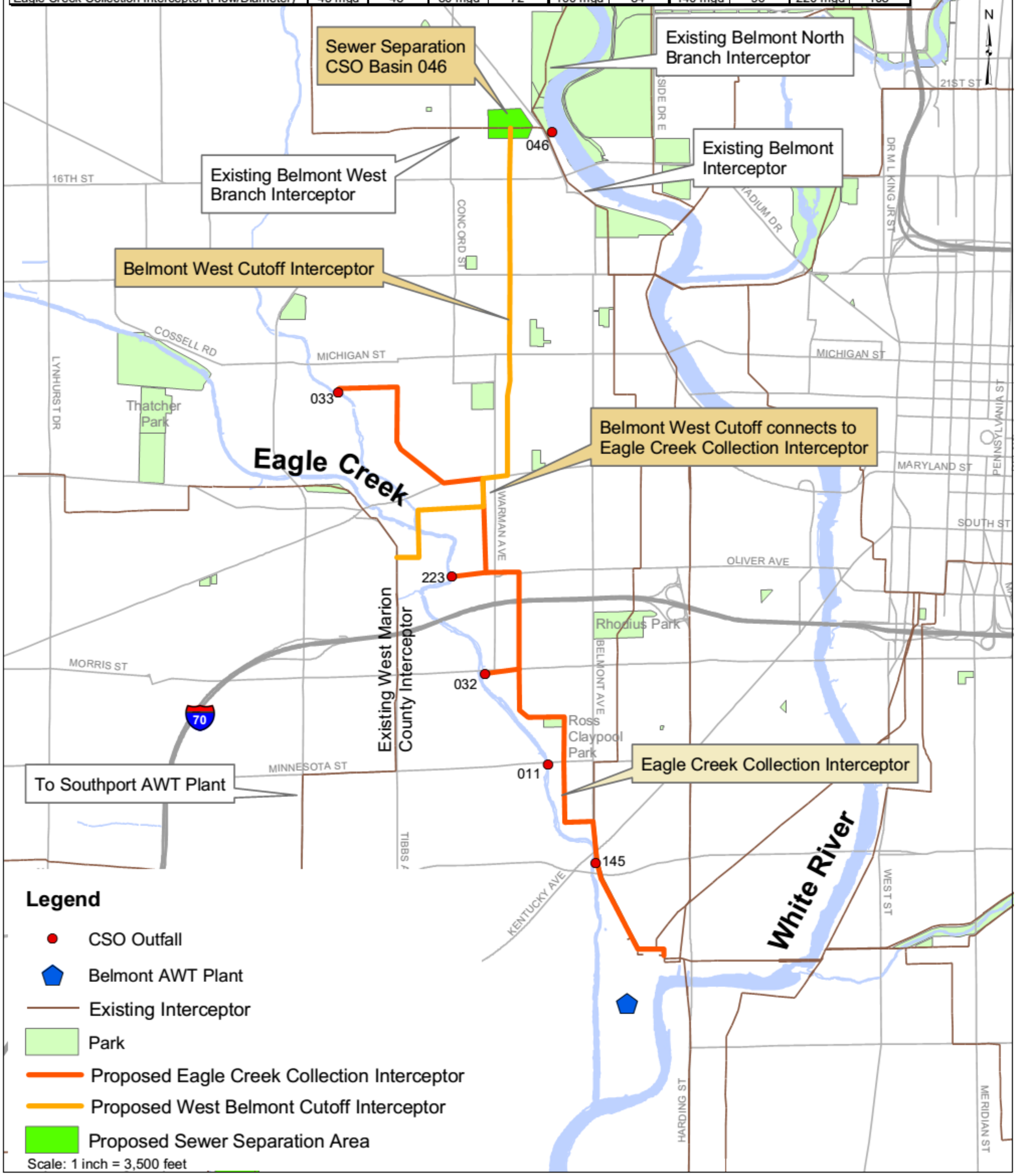


Figure 4-17
Eagle Creek Plan 1 and 2 (2006)

4.5.2.5 White River

In the White River watershed, the City's ongoing projects stored and treated CSOs located in upper White River and eliminated CSO 275 by sewer separation in lower White River. The White River runs through the center of Indianapolis' system. For this reason, a central tunnel was selected for the White River watershed to store and convey captured CSO flows from the tributaries and from captured White River CSOs to upgraded and expanded AWT plants.

Two plans were evaluated for White River.

Plan 1: The central tunnel for White River would begin near 10th Street and Stadium Drive, at the terminus of the deep storage tunnel for the Fall Creek watershed as shown on **Figures 4-18** and **19**. The tunnel would run parallel to White River in a southerly direction and would end at Bluff Road and Southern Avenue, near the Southwest Diversion Structure. A pump station would be constructed near this structure to dewater the tunnel and convey the stored flow into the interplant connection for ultimate treatment at the Southport AWT plant. The tunnel size would range from 14 feet in diameter for 90 percent system capture (to store 20.5 million gallons) to 55 feet in equivalent constructible diameter for 99 percent system capture (to store 342 million gallons), as shown on **Figure 4-18**. The tunnel length would be approximately 19,300 feet (3.7 miles).

Two collection sewers would be required in the White River watershed to collect CSOs remotely located from the central tunnel: one to collect captured CSO flows from CSOs 043 and 044 and a second to collect captured CSO flows from CSOs 045, 042, 041, 147 and 040 (**Figure 4-19**). Additional collection sewers may be required to group CSOs along the central tunnel to reduce the number of tunnel drop shafts. At higher capture rates (97 and 99 percent), headworks overflows from CSO 008 also would need to be conveyed to the central tunnel.

In addition, sewer separation is planned to eliminate CSO 046. A satellite storage/treatment facility would also be constructed for CSO 205 at the Riviera Club facility along upper White River.

Plan 2: A separate deep central tunnel would be constructed along White River (**Figures 4-20** and **21**). The tunnel would begin at Ray Street and White River, south of the confluence of Pogues Run and White River. The tunnel would generally parallel White River in a southerly direction and would end at Bluff Road and Southern Avenue, near the Southwest Diversion Structure. As with Plan 1, a pump station would dewater the tunnel and convey flows to the interplant connection. The tunnel size would range from 14 feet in diameter for 90 percent system capture (to store 8 million gallons) to 58 feet in equivalent constructible diameter for 99 percent system capture (to store 182 million gallons). The tunnel length would be approximately 9,200 feet (1.7 miles).

Two collection sewers would be required to collect CSOs located away from the central tunnel: one to collect captured CSO flows from CSOs 037, 038 and 039 and a second to collect captured CSO flows from CSOs 045, 042, 041, 147 and 040 as shown on **Figures 4-20** and **21**. Additional collection sewers may be required to group CSOs along central tunnel to reduce the number of tunnel drop shafts. At higher capture rates (97 and 99 percent), headworks overflows from CSO 008 also would need to be conveyed to the central tunnel.

As with Plan 1, sewer separation for CSO 046 and satellite storage/treatment for CSO 205 would also be included in Plan 2 for White River.

4.5.2.6 State Ditch/Lick Creek

Sewer separation was employed in State Ditch and Lick Creek as part of the City's early action projects to eliminate CSOs 217, 218 and 235 in these watersheds.

CSO Facility	System Capture 90%		93%		95%		97%		99%	
Deep Tunnel (Volume/Diameter)	20.5 MG	14'	67 MG	25'	113.5 MG	32'	200 MG	43'	342 MG	55'
Deep Pumping Facilities	185 mgd		180 mgd		175 mgd		165 mgd		185 mgd	
CSO 008 Deep Tunnel (Flow/Diameter)	0 mgd	N/A	0 mgd	N/A	0 mgd	N/A	130 mgd	8'	300 mgd	12'

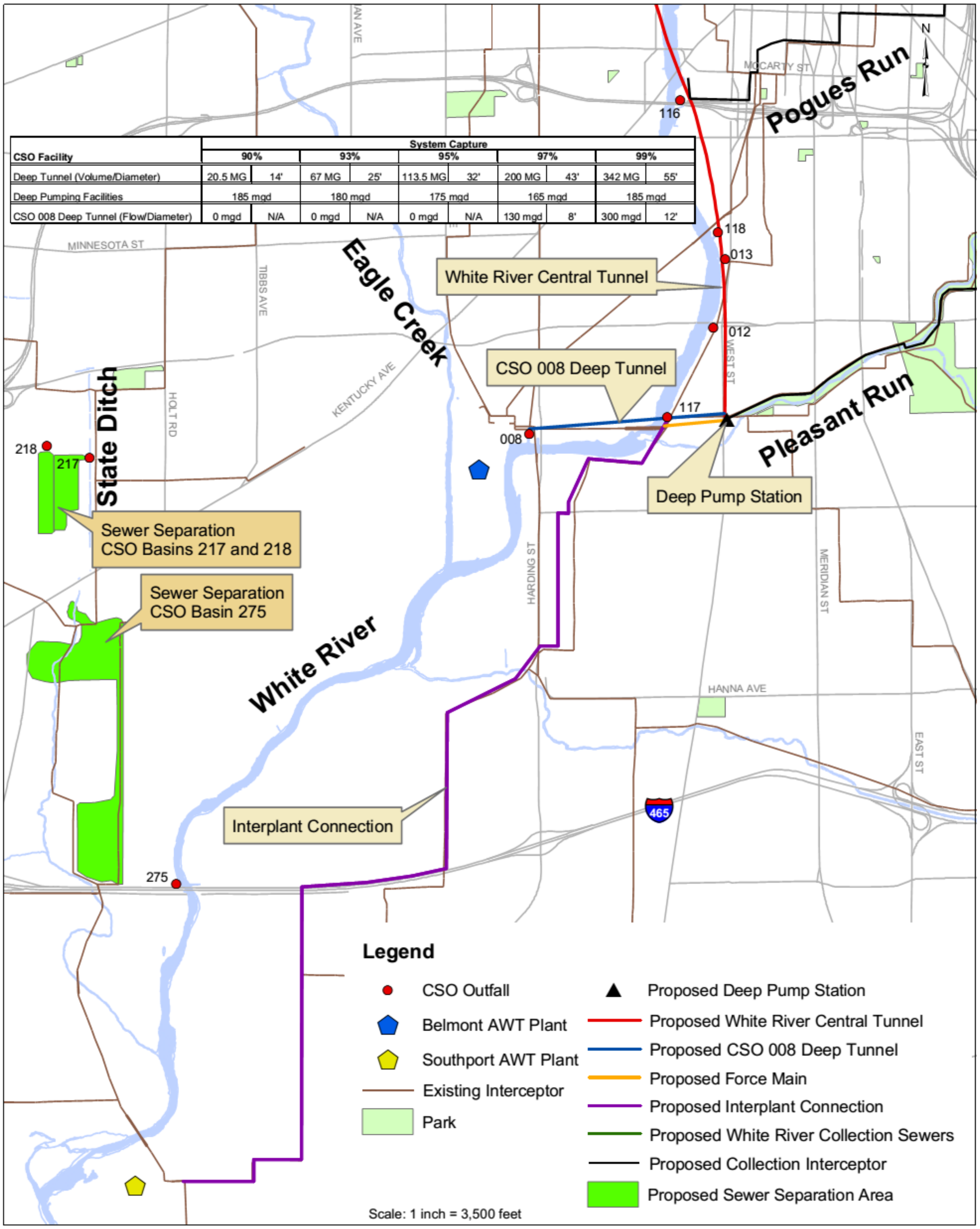
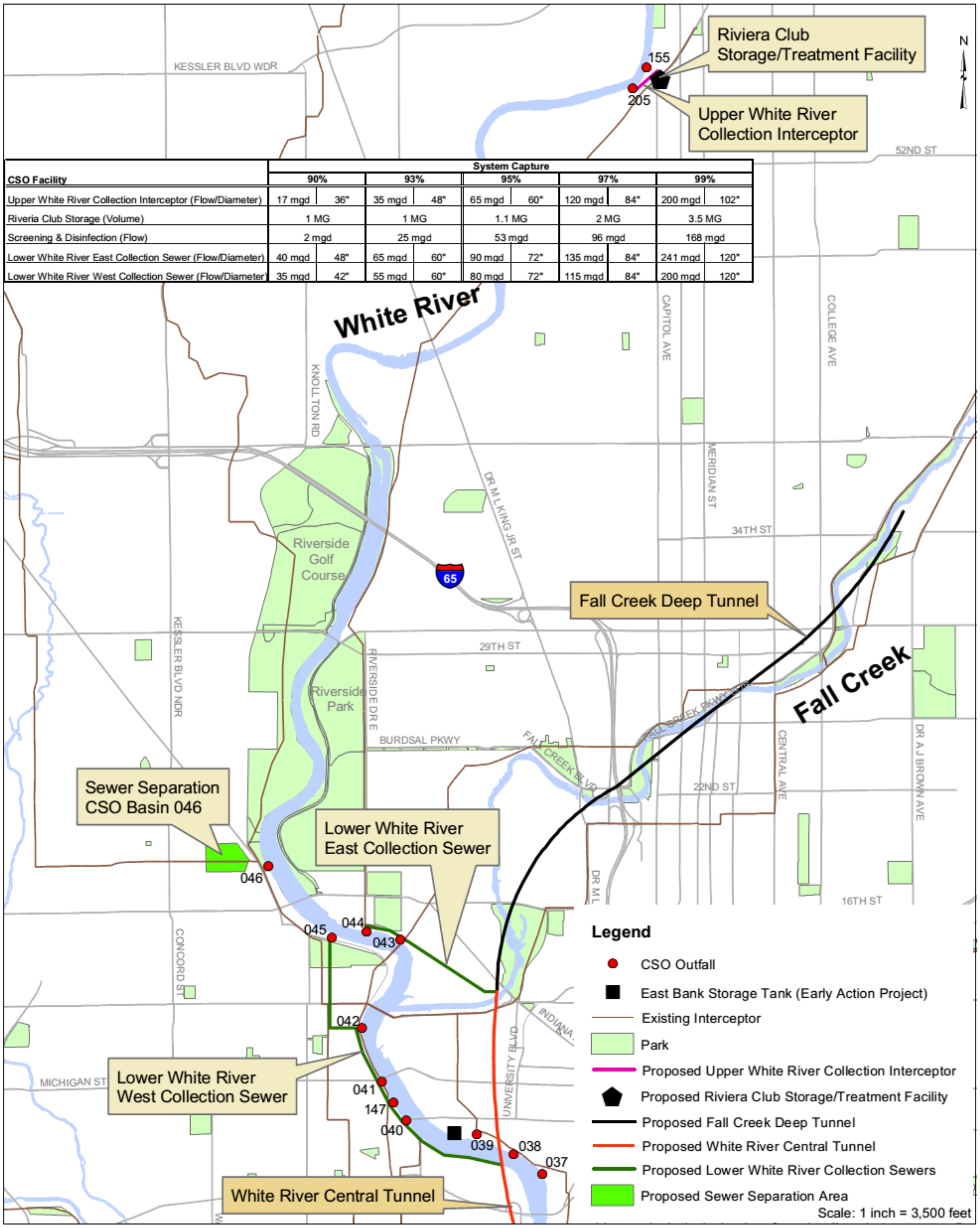
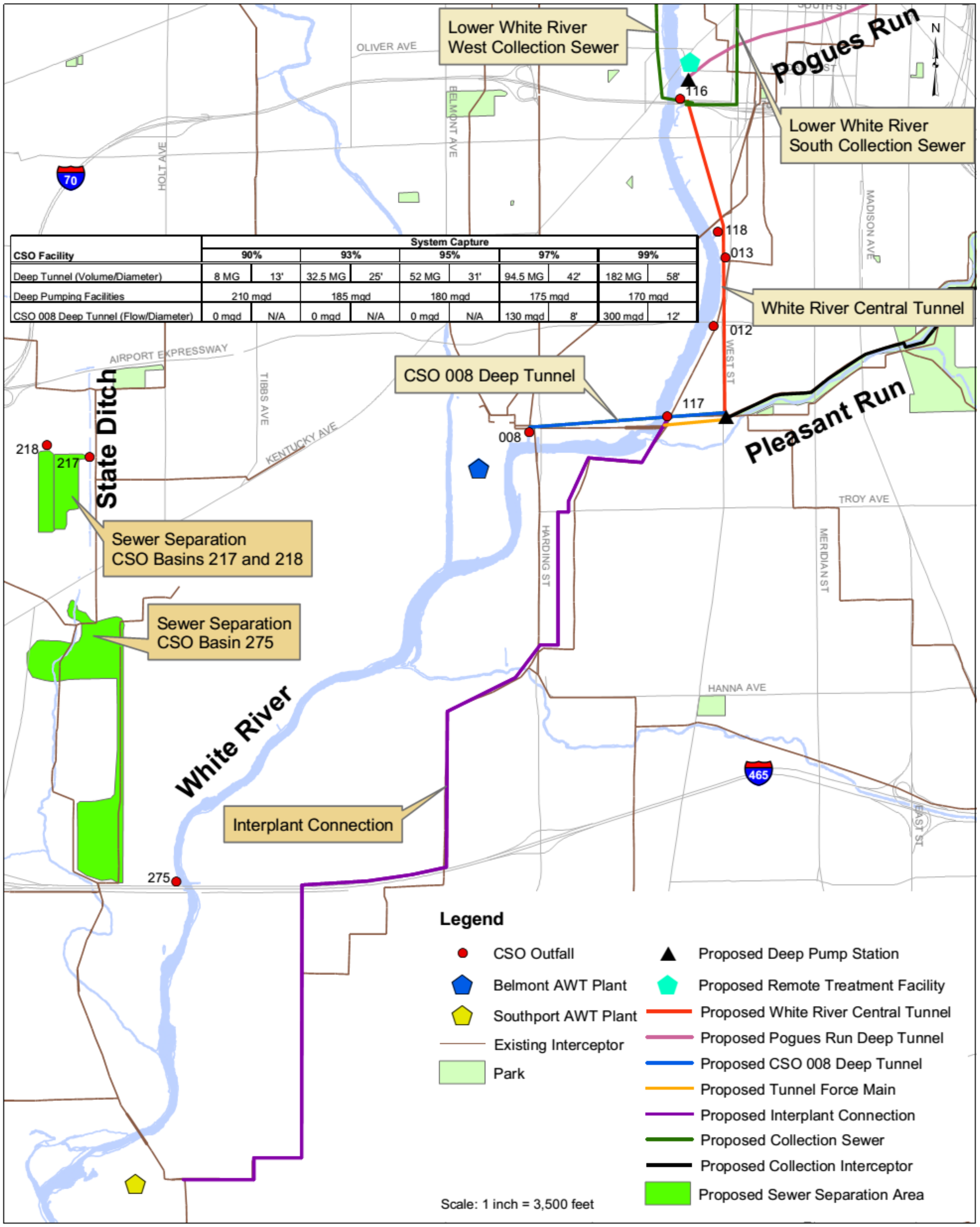


Figure 4-18
White River Plan 1 (2006)
(Map 1 of 2)



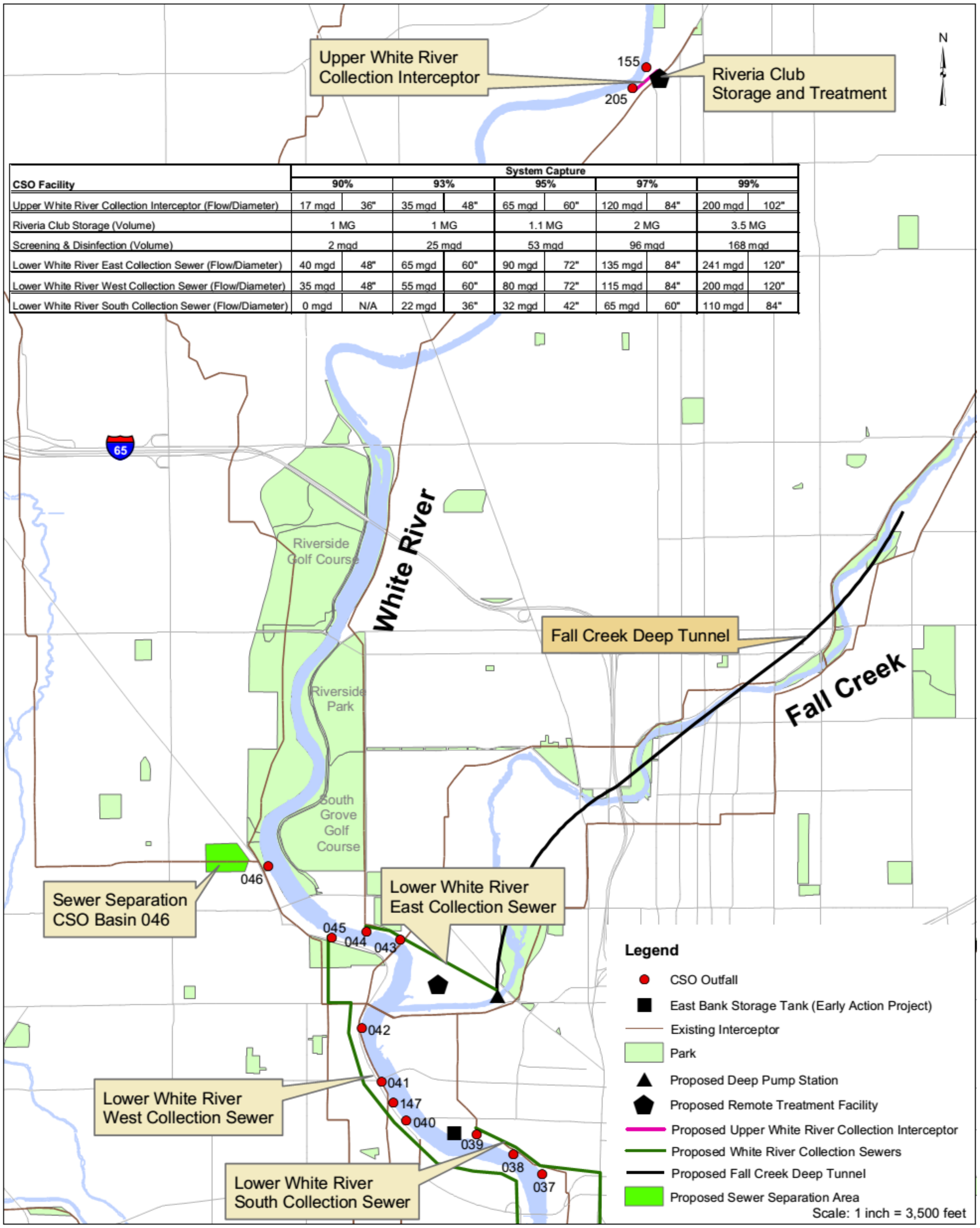
CSO Facility	System Capture 90%		93%		95%		97%		99%	
Upper White River Collection Interceptor (Flow/Diameter)	17 mgd	36"	35 mgd	48"	65 mgd	60"	120 mgd	84"	200 mgd	102"
Riveria Club Storage (Volume)	1 MG		1 MG		1.1 MG		2 MG		3.5 MG	
Screening & Disinfection (Flow)	2 mgd		25 mgd		53 mgd		96 mgd		168 mgd	
Lower White River East Collection Sewer (Flow/Diameter)	40 mgd	48"	65 mgd	60"	90 mgd	72"	135 mgd	84"	241 mgd	120"
Lower White River West Collection Sewer (Flow/Diameter)	35 mgd	42"	55 mgd	60"	80 mgd	72"	115 mgd	84"	200 mgd	120"

Figure 4-19
White River Plan 1 (2006)
(Map 2 of 2)



CSO Facility	System Capture									
	90%		93%		95%		97%		99%	
Deep Tunnel (Volume/Diameter)	8 MG	13'	32.5 MG	25'	52 MG	31'	94.5 MG	42'	182 MG	58'
Deep Pumping Facilities	210 mgd		185 mgd		180 mgd		175 mgd		170 mgd	
CSO 008 Deep Tunnel (Flow/Diameter)	0 mgd	N/A	0 mgd	N/A	0 mgd	N/A	130 mgd	8'	300 mgd	12'

Figure 4-20
White River Plan 2 (2006)
(Map 1 of 2)



CSO Facility	System Capture 90%		93%		95%		97%		99%	
Upper White River Collection Interceptor (Flow/Diameter)	17 mgd	36"	35 mgd	48"	65 mgd	60"	120 mgd	84"	200 mgd	102"
Riveria Club Storage (Volume)	1 MG		1 MG		1.1 MG		2 MG		3.5 MG	
Screening & Disinfection (Volume)	2 mgd		25 mgd		53 mgd		96 mgd		168 mgd	
Lower White River East Collection Sewer (Flow/Diameter)	40 mgd	48"	65 mgd	60"	90 mgd	72"	135 mgd	84"	241 mgd	120"
Lower White River West Collection Sewer (Flow/Diameter)	35 mgd	48"	55 mgd	60"	80 mgd	72"	115 mgd	84"	200 mgd	120"
Lower White River South Collection Sewer (Flow/Diameter)	0 mgd	N/A	22 mgd	36"	32 mgd	42"	65 mgd	60"	110 mgd	84"

Figure 4-21
White River Plan 2 (2006)
(Map 2 of 2)

4.5.2.7 Complete Sewer Separation

As noted earlier, CSO Control Plan 3 included separation of existing combined sewers in all watersheds to eliminate combined sewer overflows as shown on **Figure 4-22**. Existing combined sewers would be converted to either a separate sanitary sewer or a separate storm sewer. The selection would be based on many factors, including the size of the combined sewer, its connection to the interceptor, number of lateral connections and other factors. In some instances, the existing combined sewer may need total replacement. A new sewer system (sanitary or storm) would be constructed. Sanitary flows would be conveyed to the AWT plants and would receive advanced treatment. This plan did not include expansion of the AWT plants; however, it is likely that the plants would continue to receive higher flows during wet-weather periods due to infiltration into the sanitary system. Further analysis would have been required to determine whether secondary capacity would need to be expanded to match primary capacity and eliminate the PE Bypass. The stormwater flows would be conveyed to stormwater best management practices, such as ponds and sand filters, prior to ultimate discharge into streams.

4.5.2.8 Additional Watershed Improvement Projects

The City was committed to improving the quality of the streams and rivers that originate or flow through Marion County. As described earlier in Section 2, other pollution sources originating within Marion County also have a significant impact on the water quality of CSO receiving streams. Upstream sources also contribute to poor stream quality. For these reasons, the City evaluated other control alternatives that might enhance or supplement the benefits of structural CSO controls. These additional controls included measures to eliminate failing septic systems, install stormwater controls, remove illicit connections, restore streambanks, and remove polluted sediments. The City's evaluation of these controls was described earlier in Sections 4.3.2 through 4.3.6.

The City also evaluated flow augmentation alternatives to improve dry-weather *E. coli* compliance and dam modifications/aeration to ensure dissolved oxygen compliance. **Figure 4-23** shows the projected location of needed facilities while **Table 4-6** presents a list and projected cost of these projects. Some options for flow augmentation and dissolved oxygen enhancement are listed below.

4.5.2.8.1 Dry-Weather *E. coli* Compliance

Flow Augmentation in Fall Creek, Pogues Run, Pleasant Run, and Eagle Creek. The relationship between urbanization and stream base flow is poorly understood (CWP, 2002). The combination of high peak flows associated with storm runoff and very low flow conditions at other times tends to describe the hydrology of many urban streams. Current theory suggests that by the time low baseflow conditions are observed in an urban stream, the local water table has fallen and alternate methods for restoring baseflow to the stream must be considered. In Indianapolis, low flow conditions in Fall Creek, Pogues Run, Pleasant Run, and Eagle Creek during dry-weather in late summer and fall appeared to correlate with excessive *E. coli* bacteria concentrations in the streams. This suggested that these streams did not have adequate baseflow to absorb the ambient pollutant load and that flow augmentation should be considered to improve dry-weather bacteria compliance. A number of methods have been studied for baseflow augmentation. Some methods being considered include:

Effluent Reuse: This would involve pumping highly treated effluent into each stream by constructing an effluent force main from the Belmont AWT plant. One possible alignment for the proposed Belmont effluent force main would parallel White River north to its confluence with Pleasant Run, then follow Pleasant Run northeast to Rural Street, then north along the Rural Street/Keystone Avenue corridor to Fall Creek. This alignment would provide the opportunity to supplement the flows in both Pleasant Run and Pogues Run. A separate Belmont effluent force main would be constructed to augment flow in Eagle Creek. During low-flow periods, these effluent force mains could improve dry- weather *E. coli* bacteria compliance by delivering 2.5 MGD of Belmont effluent into Fall Creek, 0.5 to 2 MGD in Pogues Run, 0.1 MGD in Pleasant Run, and 2.25 MGD in Eagle Creek. This effluent could be re-aerated via a cascade aerator as it discharges into each stream, or possibly discharged into a constructed wetland.

The quality of the Belmont effluent would need to be further evaluated prior to considering its reuse for flow augmentation in the low-flow tributary streams. Specifically, concentrations of dissolved solids (mainly from sodium, sulfates, calcium and chlorides), nitrogen,

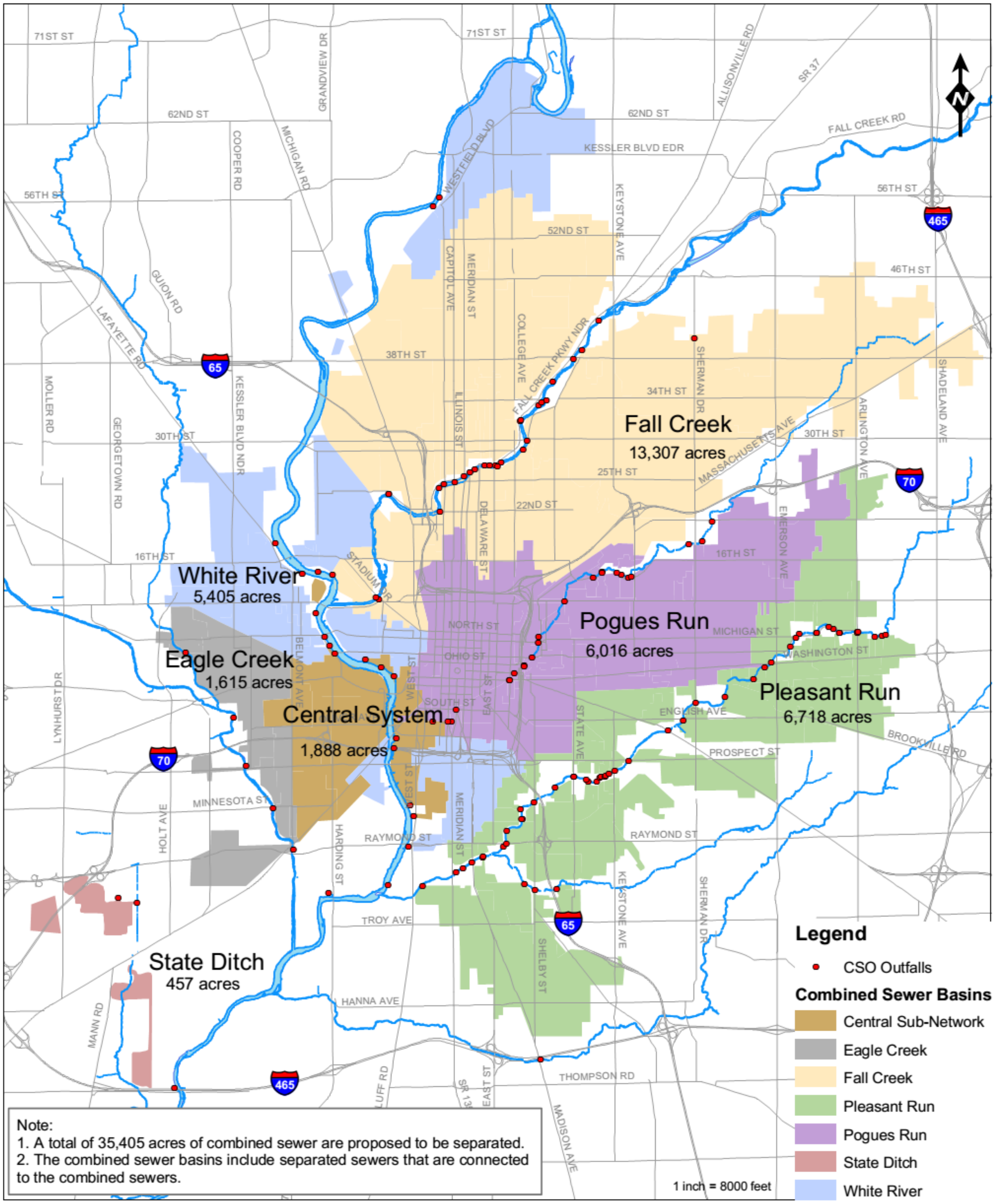


Figure 4-22
Total Sewer Separation Plan 3 (2006)

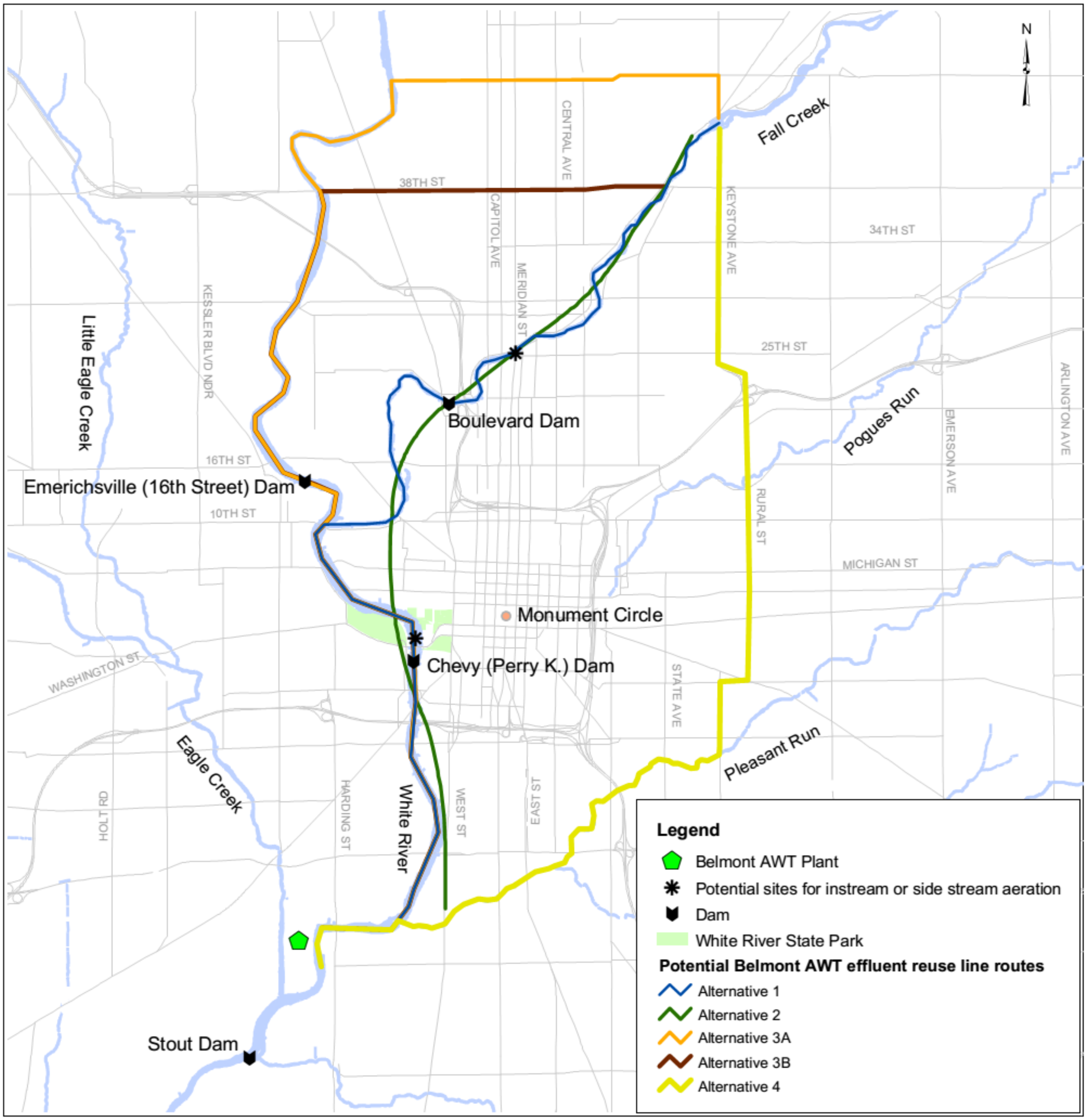


Figure 4-23
Watershed Improvement Projects (2006)

Table 4-6
Watershed Improvement Cost Estimate (2006)

City Project #	Project Description	Watershed	Project Cost
TBD	Accelerated Septic Tank Elimination Project	All	□32,400,000
TBD	Stormwater Capital Improvement Plan	All	TBD
TBD	Streambank Restoration and Sediment Removal	All	□4,000,000
TBD	Illicit Connection Removal	All	TBD
TBD	Flow Augmentation in Tributaries	All	□20,795,500
CS-18-027	Fall Creek Temporary Aeration and White River Temporary Aeration	Fall Creek □White River	□373,000
CS-18-028	Removal of Boulevard Dam	Fall Creek	□750,000
CS-24-025	White River Permanent Aeration	White River	□3,000,000
CS-38-001	Stout Dam Modification	White River	□2,000,000
		Total Cost	□63,400,000

phosphorus and BOD would be evaluated to determine their impacts on the tributaries and to assess the feasibility of effluent reuse to augment tributary stream flows.

Groundwater Wells: Another method being considered would establish deep groundwater wells in the headwaters of each stream sized to provide the required flow.

Headwater Basins: The Pleasant Run and Pogues Run watersheds have a potential for preserving and naturalizing the forested headwaters of both streams. If the upstream catchments of these streams were expanded and the runoff was routed into constructed wetlands, flow could be moderated and baseflow increased. The City had success with this type of project by constructing two linked basins mid-stream on Pogues Run to moderate stormwater flows. During the 2003 Labor Day storms, these basins prevented downstream flooding and slowly released flow into the Pogues Run channel as the storm passed. Headwater basins work in a similar fashion, but are designed to hold stormwater and rainfall further upstream. The slow percolation of the water through the constructed wetland cleans the water and increases the baseflow into the stream by slowing runoff into the main channel.

Water Releases: The downstream flow of Eagle Creek and Fall Creek was determined by discharges from dams at Eagle Creek and Geist reservoirs and water withdrawals by Indianapolis Water (Fall Creek) and the Town of Speedway (Eagle Creek). The $Q_{7,10}$ flow for Fall Creek above the Keystone Dam was 24 MGD, while Indianapolis Water withdrew up to 30 MGD at the Keystone Dam for the Indianapolis public water supply. During low flow periods, as little as .08 MGD fell over the dam. Water quality modeling suggested that the addition of 2.5 MGD would be adequate to improve *E. coli* compliance at the Keystone Dam. Either an increase in flow from the reservoir or a reduction in the removal of water at the Keystone Dam could have provided the needed additional flow. Water releases from Eagle Creek Reservoir were tied to flow conditions in White River and the public water supply requirements of the Town of Speedway. Flow over the dam was adjusted to maintain a minimum downstream flow at the USGS gauge of 2.5 MGD. The Town of Speedway withdrew approximately 2.5 MGD from Eagle Creek above the Indianapolis CSO area to supply its public water utility. Studies suggested that an additional 2.25 MGD is needed in the CSO area to improve *E. coli* compliance during dry-weather in Eagle Creek. Some combination of increased flow from the reservoir or reduced withdrawals could have provided the needed flow.

Fall Creek Wastewater Treatment Plant: Another option considered in 2000-01 was a water reclamation facility located in upper Fall Creek. This facility became less attractive when analysis showed that upgrades at the central AWT plants could provide the added treatment required for the conveyed and captured CSO flows at less cost and with fewer operational concerns.

As the City moved into the design phase with LTCP projects, these flow augmentation options were considered in the context of the complete design and coupled with other watershed improvements to improve the overall water quality and aesthetics of the streams. For cost-estimating purposes, the City assumed flow augmentation would be accomplished through an effluent reuse force main at a cost of $21 million.

4.5.2.8.2 Dissolved Oxygen Enhancement

Dam Modifications in Fall Creek. In order to improve dissolved oxygen compliance, the City evaluated the possibility of dam removal on Fall Creek. The Indianapolis Power & Light/City of Indianapolis Dam at Boulevard Place (Boulevard Dam) had no known use. Elimination of this dam would help to moderate the dissolved oxygen problems observed in Fall Creek upstream of Boulevard Dam. Elimination or modification of the Boulevard Dam would be subject to approval and coordination with the dam's owner and regulatory authorities.

Dam Modifications in White River. The City also recorded dissolved oxygen sags upstream of both the Chevy and Stout dams along the White River during wet-weather events. The City evaluated possible modifications to those dams to improve dissolved oxygen levels. Possible modifications included upgrading the Chevy Dam and making alterations to an underwater structure along the Stout Dam that diverted flow into the Indianapolis Power & Light intake area during low flows. Any modifications would have to be coordinated closely with the dam owners and regulatory authorities.

Aeration in Fall Creek. In order to increase the dissolved oxygen levels in Fall Creek and White River, the City also evaluated side stream aeration and in-stream fountains. Although the 2000-2002 weekly and monthly sampling presented in **Figure 2-41** show Fall Creek upstream of the Boulevard Dam in compliance with the dissolved oxygen standard of 4.0 mg/L, studies have shown that the dissolved oxygen levels in this location were often critically low. The City evaluated an in-stream fountain west of the Meridian Street Bridge on Fall Creek. This evaluation concluded that an in-stream fountain would increase the dissolved oxygen levels prior to full implementation of CSO controls while beautifying the area.

Aeration in White River. After an overflow occurs during wet weather, the dissolved oxygen content of the White River can fall significantly. In order to help relieve this condition, permanent and temporary aeration stations could be installed. These are both aesthetically pleasing and beneficial to the river during low dissolved oxygen conditions. The temporary aeration facility could consist of a truck- or trailer-mounted pump with a float-mounted spray head and suction device. This unit could be used to provide portable, temporary aeration in areas where low dissolved oxygen conditions typically occur during low flow periods. The pump/aeration spray and suction unit could be pushed or floated into the stream. The pump would draw water from the river and aerate it by spraying it into the air. A side stream aeration facility or in-stream fountain located in White River above the Chevy Dam also would help increase the dissolved oxygen levels in the river. This project would enhance the overall stream quality while providing an aesthetically pleasing feature along the White River State Park. Similar projects in other cities have proven to be very successful in increasing dissolved oxygen concentrations.

4.5.3 Belmont AWT Plant Improvements

Collection system controls and deep tunnels constructed under Plan 1 or Plan 2 would convey CSO flows to the existing wastewater treatment facilities. Improvements to both facilities would be required, as described below for the Belmont AWT plant and Subsection 4.5.4, discussing needed Southport AWT plant improvements.

4.5.3.1 Overview

The Belmont AWT plant had a design average flow capacity of 120 MGD with a peak hourly flow capacity of 270 MGD through primary treatment, but only 150 MGD of peak hourly flow capacity for secondary and advanced treatment (two- stage biological nitrification, filtration and effluent disinfection). The Belmont AWT plant served the combined sewer system and thus experienced substantial surges of flow during wet weather. Wet-weather flowrates that exceeded the headworks pumping capacity overflowed as combined sewage from CSO Outfall 008. Wet-weather flowrates that exceeded secondary treatment capacities were discharged through the primary effluent Bypass at Outfall 007. Collectively, the annual wet-weather volume of combined sewage and primary effluent discharged from the Belmont AWT plant accounted for nearly half of the total CSO impact on Marion County streams. The PE Bypass was the single largest source of BOD imposed on White River during wet weather. Accordingly, the objectives for wet-weather improvements to the Belmont plant were to:

1. eliminate the non-emergency need for a primary effluent bypass, and
2. reduce the headworks combined sewer overflows.

Initial concepts for the two strategies were described in the 2001 CSO LTCP and Water Quality Improvement Report. The City updated, reviewed and discussed the report with both IDEM and U.S. EPA Region V. As a result of the IDEM/EPA review, the City modified its analysis of the wet-weather treatment alternatives, as described below.

Alternatives for achieving these two objectives were developed and compared in an engineering analysis completed in 2001 (WREP, 2001).[1] The assessment considered the tradeoffs between adding wet-weather storage basins and increasing the rate of treatment. Additional analysis was completed in 2002 and 2004. For additional information, see the following reports:

- System Analysis of CSO LTCP Improvements (CDM, 2002).
- The Interplant Connection Facility Plan (ICST, 2004).
- Bio-roughing System Clarification and High Rate Clarification Pilot Studies (Shrewsberry, 2004).

The recommended concepts for expanded and upgraded wet-weather treatment processes at the Belmont plant would maintain the existing design average capacity at 120 MGD, but expand the peak hourly capacity through conventional secondary treatment to 300 MGD. A flow schematic of the key components is shown in **Figure 4-24** and the general layout is illustrated in **Figure 4-25**.

Additional wet-weather pumping capacity would be provided at the headworks to reduce wet-weather overflows to Outfall 008. This would most likely be accomplished by retrofitting the original headworks pump station that was abandoned when the current headworks was constructed. Wet-weather storage basins, constructed as early action projects, will serve to reduce PE bypasses during the interim period needed for upgrading the first-stage bio-roughing process to secondary treatment. The storage basins will ultimately be used to collect captured CSO flow from the expanded headworks pumping facility for bleed-back to the expanded treatment system and/or transfer to the Southport plant. Collectively, these improvements were expected to eliminate PE bypasses and reduce headworks overflow events. Additional headworks pumping capacity and some form of high rate chemical treatment (such as a 150 MGD EHRC process or screening/disinfection) may have been needed if more stringent levels of CSO control were required. For cost-estimating purposes in the 2006 LTCP, a 150 MGD EHRC facility was presumed along with associated chemical sludge storage and processing equipment.

4.5.3.2 PE Bypass

The City's analysis showed that doubling the wet-weather rate of treatment to eliminate the non-emergency need for PE bypasses would also optimize the volume of on-site storage needed to reduce the headworks overflows. The degree of treatment needed for the primary effluent bypasses was evaluated under four different categories of treatment: primary treatment (the base case), advanced primary treatment (removal of suspended solids only), conventional biological treatment (removal of suspended solids and soluble BOD), and advanced biological treatment (removal of suspended solids, soluble BOD and ammonia-nitrogen). The City performed a desktop analysis based on actual plant flowrates and concentrations from 1996-2000 to enable comparison of the four likely effluent qualities. Analysis of the blended effluent quality from the existing and supplemental treatment processes indicated the need for some form of biological treatment for effective removal of soluble BOD during wet weather, but that ammonia removal was not necessary.

The study also identified that the least-cost method for achieving conventional secondary treatment of the PE Bypass would be to upgrade the existing 150-MGD first-stage trickling filter bio-roughing process. During dry-weather flow conditions, the upgraded first stage would continue to operate in series (in line) with the existing second stage oxygen activated sludge nitrification process.

[1] White River Environmental Partnership (WREP), "Wet Weather Primary Effluent Bypass Elimination Technical Memoranda 1-4," prepared by D. Hackworth and R. Roper for Indianapolis DPW, March 2001. This document was included in Appendix A of the 2001 LTCP.

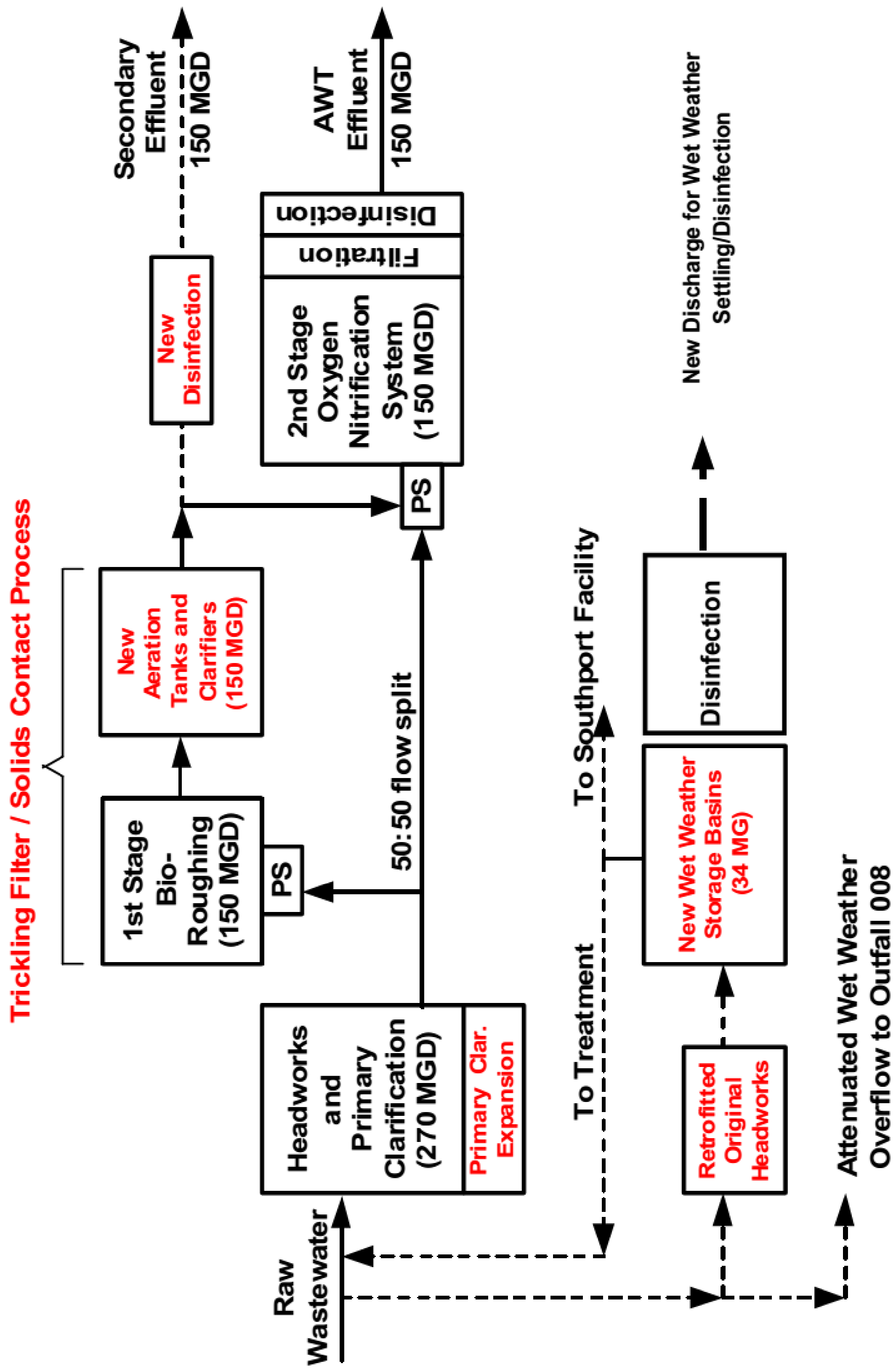


Figure 4-24
Wet-weather Treatment Improvements Recommended for the Belmont AWT Plant (2006)

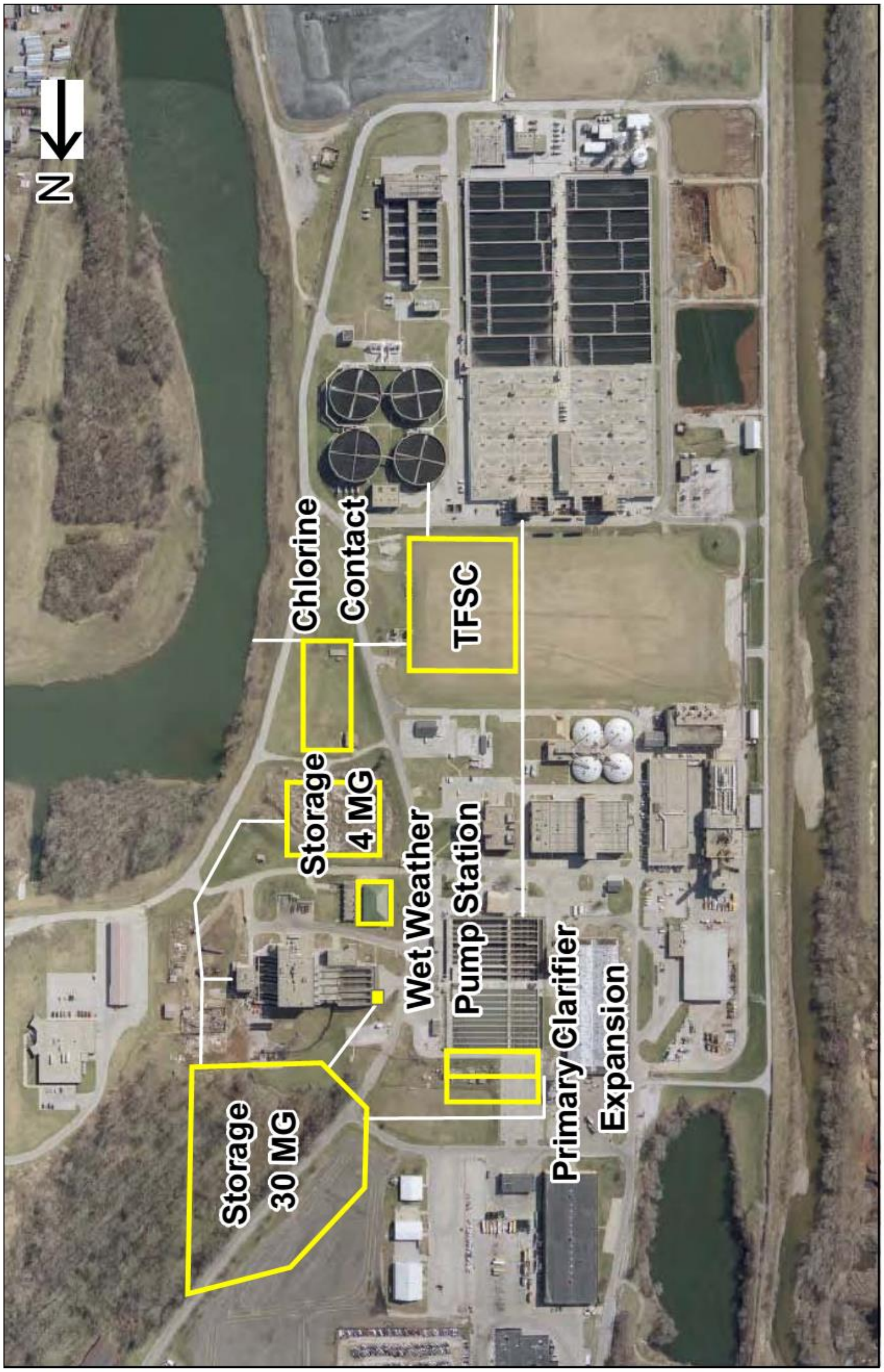


Figure 4-25
General Layout of Belmont AWT Plant Wet-weather Treatment Improvements (2006)

During wet weather, however, the two stages would be progressively uncoupled when the instantaneous flowrates reach and exceed the 150 MGD capacity of the individual stages. At the extreme condition, the two stages of biological treatment would be uncoupled completely for operation in parallel (side by side). The existing second stage would provide 150 MGD of advanced biological treatment and the upgraded first stage would provide 150 MGD of conventional secondary treatment. Recommended improvements to the existing first-stage bioroughing process included the addition of intermediate clarifiers for effective removal of suspended solids. The PE Bypass outfall (007) would remain in place for plant emergencies.

A more rigorous assessment of the tradeoffs between on-site storage volume and rate of treatment was summarized in the report "*System Analysis of CSO Long Term Control Plan Improvements"* (CDM, 2002). The analysis examined a variety of systemwide scenarios based on the 2001 LTCP. Each scenario was evaluated in terms of its effect on storage volumes and treatment rates needed at the Belmont and Southport facilities. The results provided updated estimates needed to support the preliminary design of the wet-weather storage basins and related early action improvements at both facilities. The results also demonstrated that provisions of the 2001 LTCP would impose too much captured CSO flows on the Belmont plant and that there was available treatment capacity at the Southport AWT plant. This reinforced the long-standing concept that a new interplant connection sewer was needed to convey captured CSO flows to the Southport plant. It also led to the conclusion that the Southport facility would need to play a larger role in the CSO LTCP than had been envisioned in 2001.

4.5.3.2.1 Wet-weather Storage Basins

Construction of wet-weather holding basins began in January 2004. The basins included a 4 MG basin south of plant headworks, a 30 MG basin north of plant headworks, and an expansion of the primary clarifiers to provide the firm capacity needed to accommodate peak flowrates of 300 MGD. Initially, the 4 MG and 30 MG basins would be used to capture about half of the annual average PE Bypass events. Following construction of additional biological treatment capacity to eliminate the PE bypasses, the basins would be available to store combined sewer overflows from CSO 008 that exceed Belmont's nominal 300 MGD capacity, or possibly be utilized as flow-through basins for clarification of wet-weather flows.

4.5.3.2.2 Bio-roughing Process Upgrade

The City conducted extensive pilot testing at the Belmont AWT plant in 2003 to evaluate several chemical clarification methods for removing suspended solids from the effluent of the existing trickling filter bio-roughing system (BRS). The goal of the bio-roughing solids clarification concept was to provide the equivalent of secondary biological treatment of wet-weather primary effluent bypasses using the existing bio-roughing system for soluble BOD removal and new clarification equipment for suspended solids removal.

The results from the pilot program showed that chemically assisted clarification technologies such as ACTIFLO and DensaDeg were able to consistently achieve effluent TSS concentrations below 45 mg/L when applied to the trickling filter bio-roughing effluent. However, chemical requirements and associated sludge generation rates were relatively severe for this particular application. Conventional clarification of the BRS effluent without some form of chemical or biological coagulation of the suspended solids was shown to be unreliable.

BOD_5 removal estimates based on piloted TSS removals suggested that traditional monthly secondary standards for BOD_5 (i.e., 30 mg/L monthly average limits) could not reliably be achieved by chemically assisted clarification methods. This is because chemically assisted clarification had essentially no effect on reducing the relatively high Belmont soluble BOD concentration. Therefore, the City concluded that the wet-weather treatment process at the Belmont plant must be more aggressive in terms of removing soluble BOD_5.

Accordingly, the City proposed a trickling filter/solids contact (TF/SC) process, in which new solids clarifiers following the bio-roughing towers would be supplemented with biological contact and reaeration tanks. In other words, the existing bio-roughing process would be upgraded to a TF/SC process, a well-established and highly economical secondary treatment method. The City proposed the TF/ SC process at the Belmont AWT plant for the following reasons:

- The TF/SC process is an effective secondary biological treatment process that will help eliminate uncertainty associated with the variability in soluble BOD loads.

- The TF/SC process has a demonstrated track record (with approximately 100 secondary plants in operation in North America).
- The TF/SC process can be used during dry-weather to reduce the organic load imposed on the oxygen nitrification system (ONS), thereby providing expanded dry- weather as well as wet-weather organic load capacity.
- Technical assessments of full-scale TF/SC facilities by wastewater treatment professionals have concluded that clarifier sizing can be reduced compared to that suggested by Ten States Standards.
- The TF/SC process might provide an effective backup for secondary treatment, should the ONS need to be taken off-line.
- The solids generation rates from the TF/SC process are substantially less than that from advanced primary treatment processes that require high chemical doses.

The design criteria for the TF/SC upgrade would be based on state-of-the-art technical assessments such as that recently reported by Parker and others (2001). Collectively, the improvements would enable up to 300 MGD of effective secondary biological treatment at the Belmont facility during wet weather, thereby doubling the current 150 MGD peak hourly capacity.

The CSO LTCP includes treatment of the PE Bypass as a high priority project. The PE Bypass is the single largest discharge point for BOD_5 and TSS imposed on the White River. As shown in **Table 4-7**, the PE Bypass contributed a pollutant load to White River during 50 to 60 rain events per year that was nearly equal to the final effluent outfall (Outfall 006) during the course of the entire year. Treatment of wet- weather flows through a TF/SC process would improve receiving water quality by preventing the discharge of nearly 2.3 million pounds of pollutants (BOD and suspended solids) per year into the river.

4.5.3.2.3 Wet-Weather Flow Disinfection

The effluent from the TF/SC process would be disinfected during wet-weather discharges by chlorination/ dechlorination. Existing abandoned chlorine contact tanks (having a capacity of approximately 120 MGD) would be uncovered, possibly rehabilitated and expanded to 150 MGD by raising the wall height. The condition of the concrete chlorine contact tanks was unknown. Hydraulically, it was better to route the clarified flows to the east through these chlorine contact tanks for discharge to the White River via the original Belmont outfall.

The City budgeted for physical recombination and applied for $17.5 million in State Revolving Fund funding to cover total project costs. Discharging disinfected effluent through the original Belmont outfall was preferred by the City based on hydraulics and costs. For long term control planning, rehabilitating and expanding the existing chlorine contact tanks to 150 MGD and discharging disinfected effluent through the original Belmont outfall would be used as an early action project (or baseline condition).

It is important to note that the PE Bypass structure at Outfall 007 would not be eliminated due to IDEM's requirement to retain it as an emergency plant bypass and possible future use consistent with 40 CFR 122.41 (m).

4.5.3.2.4 NPDES Permit Modification Request

On July 30, 2004, the City submitted a written request for an NPDES permit modification for the Belmont AWT plant that would include upgraded wet-weather treatment facilities and a new wet-weather outfall. The request came after detailed study by the City to determine the improvements needed to provide increased hydraulic and biological treatment capacity at the Belmont AWT plant to further reduce the effects of wet-weather discharges on the White River.

The analysis presented in Appendix A of the 2001 LTCP assessed the level of treatment necessary to meet water quality standards during CSO events. It concluded that the appropriate degree of treatment falls somewhere between advanced primary treatment and full secondary treatment. Moreover, the assessment concluded that nitrification of wet-weather flows that exceed the existing AWT plant nitrification capacity would not be necessary due to the dilute influent ammonia concentrations observed during these events. The City requested that the NPDES permit for the Belmont AWT plant be modified to authorize discharge of secondary effluent from a new Outfall 005 during wet weather. The authorization to discharge would

Table 4-7
Primary Effluent Bypass BOD and TSS Loads (2006)
Trickling Filter / Solids Contact Process - Belmont AWT Plant

Belmont Outfall	Flow MG/Yr	BOD (lbs/Year)		TSS (lbs/Year)	
		Existing	Future w/TF/SC	Existing	Future w/TF/SC
PE Bypass (Outfall 007)	1,190	1,174,000	0	1,429,000	0
New Wet Weather Outfall 005	637	N/A	133,000	N/A	159,000
AWT Effluent (Outfall 006)	35,040	1,286,000	N/A	1,724,000	N/A

TF/SC - Trickling Filter/Solids Contact

Average Belmont AWT Effluent BOD for 1997-2004	4.4	mg/L
Average Belmont AWT Effluent TSS for 1997-2004	5.9	mg/L
Secondary Limits - TF/SC - cBOD5 - monthly average	25	mg/L
Secondary Limits - TF/SC - TSS - monthly average	30	mg/L

Notes:
1. TF/SC - Trickling Filter /Solids Contact secondary treatment process.
2. The Belmont AWT effluent for the period 1997 - 2004 averaged 96.0 MGD, 4.4 mg/L BOD, and 5.9 mg/L TSS.
3. Outfall 007 (PE Bypass) existing volume and loads are based on 1997-2004 averages from 50-60 rain events per year.
4. The estimates of TF/SC discharges to new Outfall 005 were based on an annual average flow of 637 MG and CBOD and TSS concentrations of 25 mg/L and 30 mg/L, respectively. The flow reduction was projected from the use of new wet weather storage basins.
5. The 637 MG estimate of annual average secondary effluent flow to new Outfall 005 does not take into account additional volumes

Table 4-8
Requested Limits for Internal Outfall 105 (2006)

	Monthly Avg.	Weekly Avg.	Daily Minimum	Daily Maximum
$CBOD_5$ (mg/L)	25	40	--	--
TSS, (mg/L)	30	45	--	--
pH, SU	--	--	6.0	9.0

Requested Limits for Wet Weather Outfall 005 (2006)

	Monthly Avg.	Weekly Avg.	Daily Minimum	Daily Maximum
$CBOD_5$ (mg/L)	Report	Report	--	--
TSS, (mg/L)	Report	Report	--	--
pH, SU	--	--	6.0	9.0
E. coli (colonies/100 mL)	125	--	--	235
Total Res. Chlorine (mg/L)	0.01	--	--	0.02

be related to precipitation events or snowmelts that cause hydraulic loading beyond the current 150 MGD capacity of the ONS portion of the AWT facility. IDEM, through a draft permit, approved in concept a request for secondary treatment limits based on the treatment limits shown in **Table 4-8** for outfall 005 and internal outfall 105.

4.5.3.3 Reduction of Headworks Overflows

In order to reduce headworks overflows at the Belmont AWT plant, the City planned to construct a new screening facility and rehabilitate the original Belmont headworks to serve as a 150- to 300-MGD wet-weather pump station. The aggregate headworks pumping capacity would thus be increased to 450 to 600 MGD. This project would require reopening or replacing the original

Belmont sewers that were abandoned and plugged when the new headworks was constructed in the late 1980s. The flows would be pumped via new raw sewage pumps in the original Belmont pump station that is currently abandoned.

Planning estimates indicated the Belmont headworks would need to be expanded by 160 MGD to achieve an average of 12 headworks overflows per year, 250 MGD for 6 headworks overflows per year, and 300 MGD for 4, 2, and 0.5 headworks overflows per year. Captured flow would be pumped to the 30 MG and 4 MG wet-weather storage basins for bleedback into the expanded treatment system. The design for the 30 MG holding basin included provisions for dewatering the basin to the Southport plant. The treatment-versus-storage modeling results presented in the interplant connection report suggested that average headworks overflow frequencies could be reduced to 4 to 6 per year, provided that none of the captured flow from the deep tunnel is imposed on the Belmont plant.

To reduce headworks overflow frequencies to an average of 2 and 0.5 untreated overflows per year, an additional 150 MGD treatment train would likely be needed such as EHRC, chlorination/dechlorination, and effluent reaeration. The EHRC units would treat excess flows from the basins that could not be bled back into the treatment system or sent to the Southport facility.

Because this process would be operated intermittently, it would need to be preceded by the 30 MG flow equalization basin to enable smooth startup. Utilization of such a process treatment train would likely be very limited (only a few times per year). Moreover, considering that overflow from the wet-weather storage basins would probably be well clarified, the application of EHRC would likely provide somewhat redundant treatment. Application of EHRC has thus lost favor as a key component of the LTCP for the Belmont facility. A more plausible backup option would be to pump excess volume to an entry shaft of the deep tunnel. However, that would make the tunnel storage volume requirement larger and more costly.

Additional options were considered for further reducing Belmont wet-weather overflows to Outfall 008. These included (1) utilizing the Southwest Diversion and Interplant Connection to convey flows to the Southport plant, (2) reversing flow in the siphon located between Outfall 008 and the Southwest Diversion Structure, and (3) constructing a new sewer from Outfall 008 to the interplant connection.

For long term control planning, pumping captured flow to the 30 MG and 4 MG wet-weather storage basins was considered the baseline level of improvements needed to achieve annual average headworks overflow frequencies of 4 to 6 per year. Alternatives to further reduce the frequency of untreated CSO overflows include allowing the wet- weather storage basins to clarify and overflow to additional disinfection facilities during extreme events, adding EHRC and disinfection for extreme events, or transfer to the tunnel during extreme events. These high control alternatives were further evaluated through NetSTORM modeling to develop facility costs for LTCP purposes.

4.5.3.4 Provisions for Future Capacity

To account for projected future growth, the City evaluated growth projections for Marion County during preparation of the *Interplant Connection Facility Plan* (ICST, 2004). Sanitary sewer master planning reports and historical data were analyzed to estimate how dry-weather system flowrates might increase in the future. This enabled the analysis of wet-weather treatment improvements needed at the Belmont and Southport facilities to account for future increases in dry-weather flow from the service areas.

The master planning reports predicted “ultimate” build-out conditions. The City concluded that these estimates of future flow increases most likely overstated what will actually happen over the following 20 years, because the areas studied were unlikely to all develop at the same time. Nevertheless, the estimates showed that flow increases in the Southport service area were likely to be larger than those in the Belmont service area, and that the flow increase could be substantial.

The historical method employed in the *Interplant Connection Facility Plan* (ICST, 2004) analyzed the rate over time system flowrates have increased at the Belmont and Southport facilities. The starting point for this analysis was 1967, the first full year of secondary treatment operations at the Southport plant. The data for “treated flow” for the early years of operation were obtained from the annual reports of operation on file at the Belmont facility; and data for more recent years were developed from the effluent flow data from monthly operating reports. Care was taken in this analysis to ensure that the data did not erroneously include in-plant recycle flows or double count flow diverted from Belmont to Southport. The results, in **Figure 4-26**, show that flowrates at the Belmont plant have not changed significantly over the past 36 years. All of the increase in flow has occurred at the Southport plant alone. This observation was not surprising because the original intent of the Southport plant was to relieve the Belmont plant from excess flows.

The City created a linear regression analysis of the annual flow data to develop a more realistic projection of future system flowrates. **Figure 4-27** shows the results. The line of “best fit” is from the linear regression equation shown in the insert. The strong influence of weather conditions on groundwater infiltration rates is largely responsible for much of the remaining variability. Nevertheless, the regression analysis showed a relatively steady increase in flow equivalent to about 13.5 MGD per decade. For the current system flowrate of about 182 MGD (for year 2002 using the regression equation), the regression analysis suggested that by year 2023, the system annual average flowrate could increase to about 211 MGD, a flow increase of about 29 MGD over the following 20 years. Although the future is uncertain, the project team allocated 10 MGD of growth to the Belmont plant and 20 MGD to the Southport plant for facilities planning purposes.

The Southport plant was projected to receive an annual average of 25 MGD of additional flow over the following 20 years, 5 MGD of which was assumed to come from the Belmont service area and 20 MGD from the Southport service area. The annual average flow of 25 MGD was translated to a peak hourly flowrate of 50 MGD using a peaking factor of 2.0. The City believed this allocation for peak hourly flow from future growth in the service area to be conservative in relation to the peaking factors apparently employed for the design of the current facilities.

In accordance with these projections, the design flow criteria for the upgraded and expanded Southport plant includes a provision for treatment of up to 25 MGD continuously diverted away from the headworks of the Belmont plant. This is, in part, to ensure that the Belmont plant has ample hydraulic capacity for accommodating future growth within the service area. It is also to ensure the biological wet-weather treatment process planned for the Southport plant has enough flow to enable it to be viable during dry-weather periods.

4.5.3.5 Sludge Management

Sludge processing equipment for the two AWT plants were consolidated at the Belmont plant. The operations included sludge thickening, dewatering and incineration. Considering that the concentration of suspended solids in the “first flush” of captured CSO flows is generally very high, the additional solids load imposed on the sludge processing facilities may be substantial, especially considering the short time period during which they are generated. Also, it was concluded that provisions to transfer and process the biosolids that accumulate in deep tunnel storage must be addressed.

Although a comprehensive facility plan for managing the increased solids generation was not yet completed, provisions needed to include the following: (1) removing the Southport primary sludge load from Belmont primary clarifiers and processing the solids by some other method; (2) processing the additional biosolids that will be generated from the Belmont and Southport wet-weather treatment processes; (3) processing the additional primary solids and grit generated from treatment of captured CSO flows from the Belmont headworks; and (4) processing the additional primary solids generated from treatment of captured CSO flows at Southport from the deep tunnel. The plans called for dewatering the storage tunnel to Southport for treatment, but directing the final tunnel flows with the heaviest concentration of solids to Belmont to achieve higher efficiency in solids transport and treatment. Space was reserved at the Belmont site for needed sludge processing improvements.

4.5.3.6 Summary of Recommended Belmont AWT Plant Improvements

The list of Belmont plant improvements needed for eliminating the wet-weather primary effluent bypasses and reducing headworks overflows was as follows:

- New 30 MG and 4 MG wet-weather storage basins for flow equalization
- New equalization basin outfall pipe to wet-weather disinfection facility
- Two new primary clarifiers to supplement the existing clarifiers

- New aeration tanks and intermediate clarifiers to upgrade the existing trickling filter bio-roughing process to a 150 MGD TF/SC secondary treatment process
- Rehabilitation and expansion of an existing abandoned chlorine contact tank to provide 150 MGD disinfection capacity for the TF/SC effluent
- Retrofitting the original Belmont plant outfall for discharge of the disinfected TF/SC effluent during wet weather
- Rehabilitation and expansion of original, abandoned Belmont headworks facility for a peak wet-weather capacity of 150-300 MGD with new screening and aerated grit removal
- Reopening and replacement of original, abandoned Belmont sewers
- New sewer from Outfall 008 for flow diversion
- New sludge handling facilities
- New process/yard piping

The project (capital) cost for improvements to the Belmont AWT plant described in this section was $172 million, as shown in **Table 4-9**. This recommended approach was subject to more detailed design analysis and value engineering.

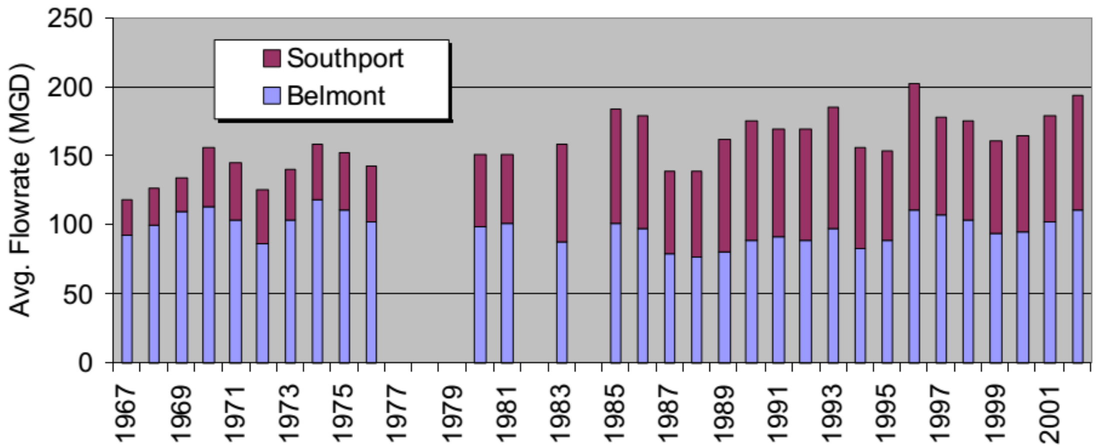


Figure 4-26
Annual Average System Flowrates (2006)

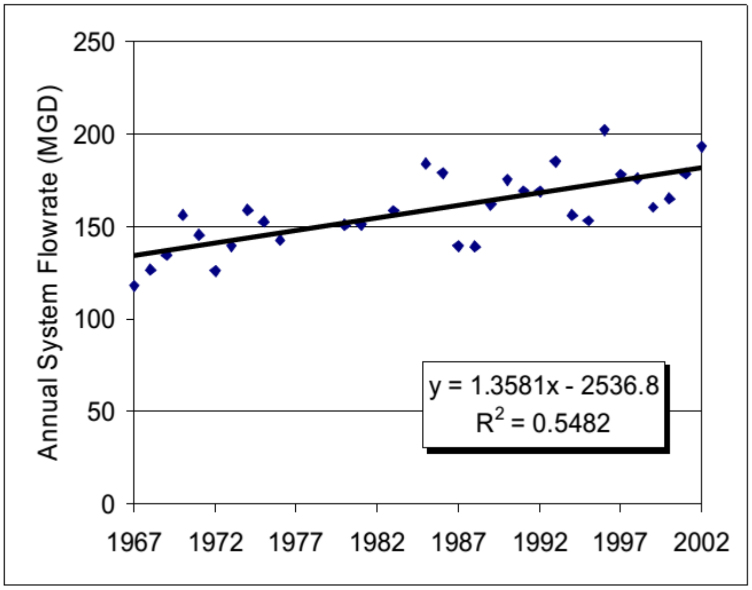


Figure 4-27
Regression Analysis of System Annual Flowrates (2006)

Table 4-9
Belmont AWT Plant Cost Estimate[1](2006)

Description	Capital Cost
New Headworks Facility with Screens	38,700,000
New Grit Facility w/Flow Split	8,900,000
New Intermediate Clarifiers	49,400,000
New Return Sludge Pumping	14,400,000
Effluent Disinfection - Chlorination/Dechlorination	13,000,000
Solids Contact/Reaeration [1]	7,100,000
Belmont Anaerobic Digester Facility (BE-78-001)	29,200,000
Yard Piping and Valves	11,300,000
TOTAL CAPITAL COST	172,100,000

1 - based on costs developed for the BRSC Design Criteria Report

4.5.4 Southport AWT Plant Improvements

4.5.4.1 Overview

Although flows directed to the Southport AWT plant were primarily from separate sanitary sewers, some combined sewage flows to Southport from the Belmont service area and the Southport combined sewer service area. The existing Southwest Diversion interceptor allowed flexibility in balancing the normal dry-weather flows between the two plants. It also helped to ensure that the aggregate capacity of the two plants was maximized during wet weather before CSOs occurred in the collection system and at the plants. In addition, the City continued to pump sewage from the Belmont headworks to the Tibbs interceptor via updated facilities. This resulted in about a third of the Southport plant dry-weather flow originating from the combined sewer service area.

During the development of the *Interplant Connection Facilities Plan*, it became clear that the Southport plant would need to play an even greater role in relieving the Belmont plant from the burden of treating CSO flows. Assuming the plant would be required to help achieve a low frequency of wet-weather overflow events, the facilities plan indicated that the Belmont plant, even with upgraded and expanded treatment facilities, would not be capable of accommodating much of the captured CSO flow. The facility plan also indicated that, unless methods such as sewer separation or satellite CSO treatment are remarkably successful, the Southport plant could ultimately be called upon to provide treatment of captured CSO flow at rates equivalent to the peak capacity of the plant (150 MGD).

The *Interplant Connection Facilities Plan* presented a detailed evaluation of wet-weather treatment alternatives at the Southport plant to accommodate the additional wet-weather loads, which potentially could include the entire volume of CSO captured with the new LTCP facilities. Accordingly, the analysis focused on alternative strategies for processing the captured CSO flows from the deep tunnel along with provisions for dealing with current wet-weather flow surges and for future growth in the service area.

The analysis began with a screening of alternatives for splitting captured CSO flow between the two plants. This analysis concluded that all captured CSO flow should be conveyed to the Southport plant for the following reasons:

- Wet-weather flow capacity would seldom be available at the Belmont plant for sharing the load
- Options available for treating additional wet-weather flow at Belmont would be limited
- Treatment and permitting requirements at a third location, such as along Fall Creek, would be challenging
- The Southport plant offers many possibilities, including space for consolidated treatment of captured CSO flows

The City, therefore, developed and evaluated alternatives that would enable the Southport plant to treat current wet-weather flow surges, future captured CSO flows, and additional dry-weather flow from future growth within the service area.

4.5.4.2 Existing Facilities

As a starting point, the City conducted a process analysis of the existing Southport AWT facilities. The analysis included a review of plant flowrates, raw sewage pollutant loadings, and performance analyses of the various treatment processes that comprise the plant. The activities for performing this analysis included the following:

- Assembly of a 7.5-year daily database of treatment process operating data
- Field trips to inspect the Southport and Belmont plants
- Literature review of plant design records, operating manuals and annual reports
- Meetings and discussions with the plant operators
- Process performance analyses

The Southport AWT plant had a design average flow capacity of 125 MGD and a design peak flow capacity of 150 MGD. The plant may ultimately be called upon to treat captured CSO flows at rates equivalent to its peak capacity. The City therefore considered strategies for essentially doubling the rate at which the Southport facility can effectively treat wastewater.

The City first conducted a process analysis that yielded the following insights:

- The process flow sheet for the Southport AWT plant is complex. Future improvements to the facility should strive to simplify the process flow sheet.
- Wet-weather overflows and/or bypasses occur at the Southport plant about eight times per year, although these was significantly reduced by the addition of the new 75 MGD headworks pump station and 25 MG wet-weather flow storage basin.
- The minimum dry-weather sanitary flow to the Southport facility was about 50 MGD, and the peak infiltration rate in interceptors to the Southport plant appeared to be about 45 MGD. Thus at times, infiltration nearly doubled the dry-weather flow to the Southport plant.
- During wet-weather flow conditions, the peak daily effluent flowrates reached the 150 MGD design capacity for the overall facility. In addition, the facility design average flowrate of 125 MGD was reached or exceeded several times per year, undoubtedly from maximized treatment of wet-weather flows when groundwater infiltration is high.

- Raw sewage loads for BOD, TSS and ammonia-N were generally within the original design criteria of the facility. However, high TSS loads are imposed on the Southport plant when the Belmont gravity diversion line was used; and extremely high soluble BOD loads were imposed by deicer wastes from the Indianapolis airport.
- Although the primary clarifiers seem to function reasonably well, they were nearly 40 years old, are too shallow to meet current design standards, and had no reserve capacity to treat flowrates in excess of 150 MGD.
- The bio-roughing towers appeared to be functioning properly and within the acceptable hydraulic and organic loads.
- ONS could recoup about 10 MGD of allocated flow capacity if the tertiary filtration backwash and other inplant return streams were dealt with in some other fashion. Methods considered include a dedicated flow equalization tank and/or treatment in the air nitrification system (ANS).
- The ANS has an aggregate aeration tank volume about 25 percent larger than that for oxygenation nitrification system (ONS): 20.2 MG versus 16.2 MG. However, the ANS clarifiers were only about 28 percent the size of the ONS clarifiers and were very shallow, thereby limiting the effective capacity of the ANS.
- The BOD and TSS loads imposed on the ONS sometimes exceeded the design criteria. The ONS design criteria were conservative so that performance had been reliable.

4.5.4.3 CSO Treatment Alternatives

The following four concepts were developed to expand the Southport plant to a peak capacity of 375 MGD, achieving an additional 225 MGD of treatment:

Concept 1: Retrofit the ANS to provide 75 MGD of biological treatment and construct a 150 MGD physical-chemical process to treat the captured CSO flows.

Concept 2: Retrofit the ANS to provide 150 MGD of biological treatment and construct a 75 MGD expansion of the oxygen nitrification process.

Concept 3: Retrofit the ANS to provide 225 MGD of biological treatment.

Concept 4: Retrofit the ANS to provide 150 MGD of biological treatment (including half of the 150 MGD of captured CSO flows) and construct a 75 MGD physical-chemical process to treat the more dilute half of the captured CSO flows.

Each concept would effectively remove suspended solids and associated particulate BOD. However, Concept 1 would provide no removal of soluble BOD or ammonia-N; Concept 2 would remove both soluble BOD and ammonia-N; and Concept 3 would remove soluble BOD but not ammonia. Concept 4 would remove soluble BOD and ammonia for the first 150 MGD of captured CSO flow but not for the remaining 75 MGD.

Table 4-10 shows the general ranking of the four concepts based on the comparisons of major treatment plant attributes. The ranking consisted of comparing the concepts of effluent quality, operation and maintenance issues, expandability, future regulations, and cost. In this ranking system, “1” is the highest rating; the concept with the lowest aggregate score is the preferred concept. As can be seen, Concept 4 was at or near the top for all criteria considered. For a description of the ranking system, see Section 9.8 of the *Interplant Connection Facilities Plan*.

Table 4-10
Ranking Analysis of Alternative Concepts (2006)

	Concept 1	Concept 2	Concept 3	Concept 4
Effluent quality	3	1	3	2
Ease of operation	2	3	4	1
Sludge processing	2	3	4	1
Compatibility	1	1	2	1
In-plant recycle streams	1	1	1	1
Energy	2	4	3	1
Expandability	2	1	3	2
Adaptability to future	3	1	2	1
Capital cost	2	3	1	2
Score (low score is best)	**18**	**18**	**23**	**12**

4.5.4.4 Summary of Recommended Southport AWT Plant Improvements

Based upon the screening analysis described above, the City selected Concept 4 as the basis for expanding the Southport AWT plant in accordance with the CSO LTCP.

The City recommended that the Southport facility be expanded to enable a peak hourly flowrate of 425 MGD through conventional primary treatment and, after flow equalization, a peak treatment capacity of 375 MGD through the rest of the facility. The 375 MGD peak capacity represented a 225 MGD increase over the current peak capacity of 150 MGD. Of the 375 MGD total, 300 MGD would receive biological treatment and the remaining 75 MGD, if needed, would be treated by some form of advanced primary treatment such as enhanced high rate clarification. The need for the 75 MGD advanced primary treatment process was contingent on a more rigorous analysis of the maximum dewatering rate needed for the deep tunnel. However, results from modeling studies predicted that the 75 MGD process would only be needed for dealing with especially large events that occured only about once every two years, on average.

The recommended plan for expanding the Southport facility was as follows and as shown in **Figure 4-28** (process flow sheet) and **Figure 4-29** (general layout of expanded facilities):

Construction of all new headworks, including screening and aerated grit removal.

This recommendation was based on the nearly three-fold increase in capacity and the importance of a blended raw wastewater for downstream process reliability. If needed and affordable, the portion of the captured CSO flows that was treated by advanced primary treatment would be segregated from the mainstream to ensure effluent soluble BOD remains low.

Supplement the existing primary clarifiers with new primary clarifiers.

These improvements would be conservatively designed to treat a peak hourly flow of 275 MGD and an average flow of 125 MGD. This sizing would allow for one of the existing cluster of ANS primary clarifiers to be occasionally out of service for maintenance. The existing primary clarifiers would generally be on line all the time at a relatively low flow in readiness for treating wet-weather surges up to 150 MGD. Including 75 MGD of primary treatment recommended for the EHRC process, the overall primary treatment capacity with all units in operation would be 500 MGD. A portion of this capacity could be set up for 75 MGD of advanced primary treatment so as to avoid the complexity that would otherwise result from a stand-alone EHRC facility.

Retrofit the existing 30 MGD ammonia nitrification system to provide 150 MGD of aggressive biological treatment during peak wet-weather flow periods, including efficient nitrification at flows up to about 120 MGD.

The existing aeration tanks would be fitted with new fine bubble air diffusers and the aeration blowers would be replaced or supplemented as needed. The existing ANS final clarifiers would be replaced with larger circular or rectangular units having a peak capacity of 150 MG. The surface area requirement would be 125,000 square feet.

Leave the existing oxygen nitrification system intact, but revise the rated capacity upward to 100 MGD average (compared to 95 MGD average) and 150 MGD peak (compared to 125 MGD).

The basis of the improved rating would be demonstrated performance, upgraded primary clarification to reduce the solids loading, recognized design criteria, and elimination of flows imposed on the ONS from filter backwashing.

The planned 75 MGD wet-weather pump station and 25 MG wet-weather holding basins for flow equalization would reduce by 50 MGD the peak hourly flow through the headworks, preliminary treatment and primary treatment. The peak flowrates imposed on downstream biological facilities would thus be 300 MGD. These projects were part of the City's early action projects.

Collectively, the improvements to ANS and ONS would enable up to 300 MGD of effective biological treatment at the Southport plant, thereby doubling the current 150 MGD capacity. The flow sheet would be simplified, and the system would enable flow surges from over half of the captured CSO events to be absorbed in the mainstream plant without special provisions for starting up additional process equipment.

The design average flow capacity for biological nitrification would increase to 150 MGD, even though the design requirement would be only 125 MGD average. Thus there would be a built-in safety factor of 25 MGD for future growth in addition to the 25 MGD allocated over the following 20 years.

The recommended plan for biological treatment would satisfy all but 75 MGD of the 375 MGD peak treatment rate. As noted earlier, the remainder, if needed, would be treated via advanced primary treatment. One concept for accomplishing this is illustrated in **Figures 4-28** and **4-29**. For that option, a 75 MGD EHRC process would be used to treat the most dilute part of captured CSO flows in excess of the 75 MGD treated biologically. Because this process would be operated intermittently, it would need to be preceded by a 15 MG holding basin to enable smooth startup. The basin would also need to be fitted with preliminary treatment equipment such as swirl concentrators to remove grit, heavy solids and floatables. Installation of a 75 MGD primary settling basin within or adjacent to the holding basin would also be needed.

The final sizing of the EHRC process depends on the needed tunnel volume and the captured CSO dewatering rate. If this rate were 75 MGD rather than 150 MGD, then the EHRC process would not be needed.

The project (capital) cost for improvements to the Southport facility described in this section was $249 million, as shown in **Table 4-11**. This recommended concept was subject to more detailed process analysis, cost comparisons and value engineering.

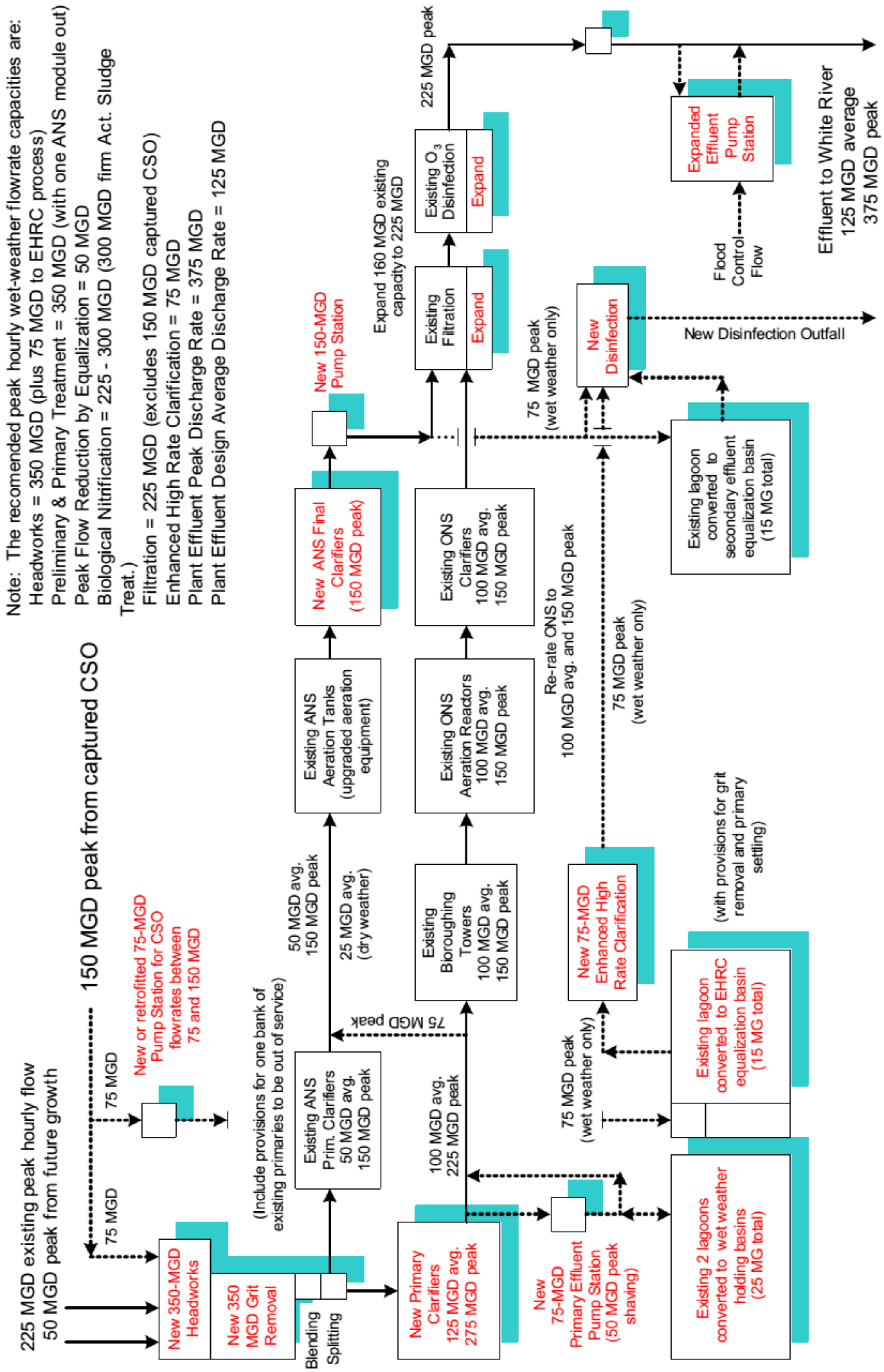


Figure 4-28
Southport Facility Process Flow Sheet (2006)

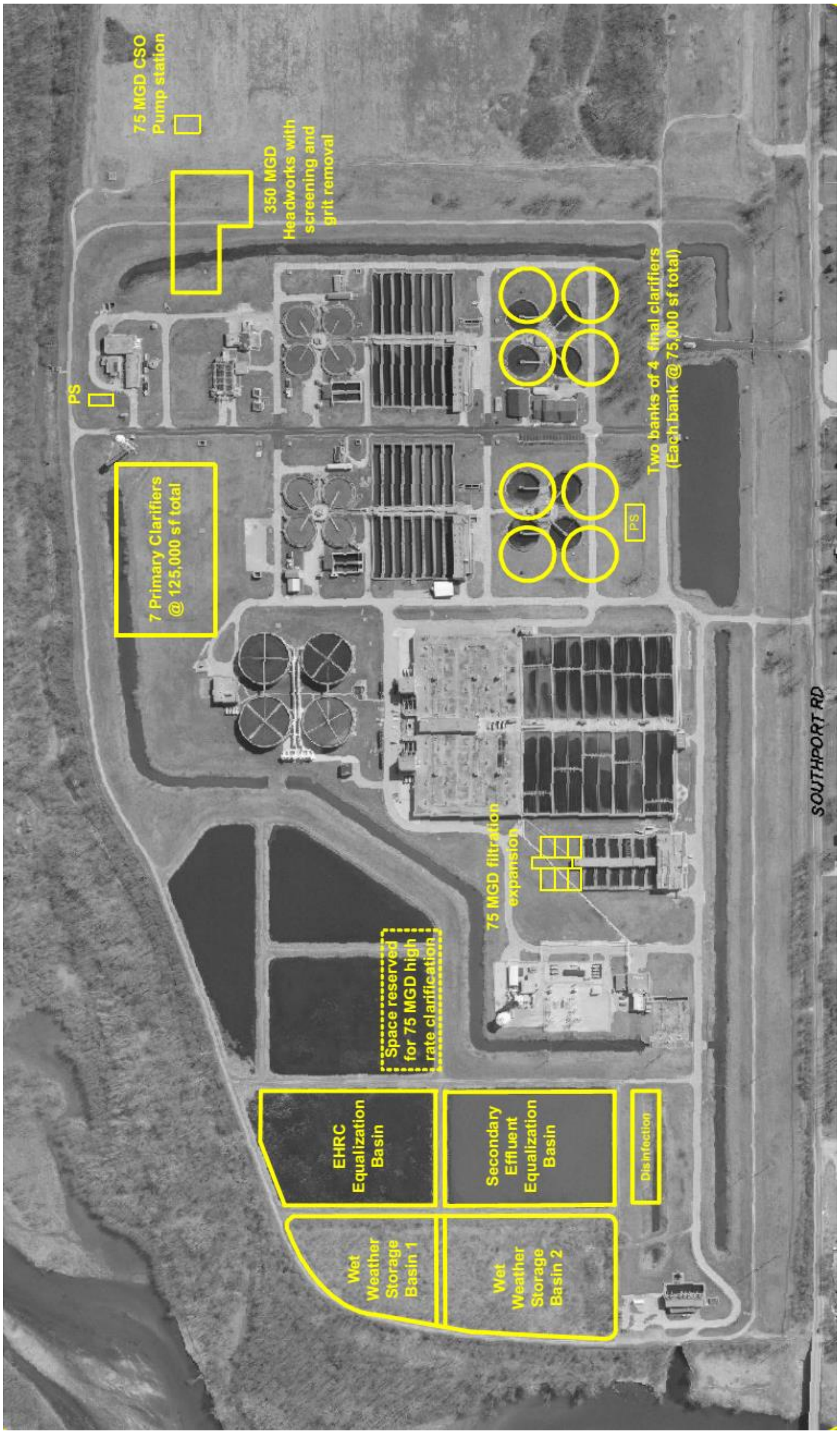


Figure 4-29
Southport Facility Expansion and CSO Treatment (2006)

Table 4-11
Southport AWT Plant Cost Estimate[1] (2006)

Description	Capital Cost
Raw Wastewater (Captured CSO) Pump Station for EHRC (75-MGD firm capacity)	13,100,000
New 350-MGD Headworks Facility w□Screening	45,400,000
New 350-MGD Grit Removal Facility with Blending and Flow Split	13,700,000
New 125-MGD□275-MGD Primary Clarifiers (125,000 sf)	51,900,000
New 15-MG EHRC Basin w□grit removal and primary settling	6,700,000
New 75-MGD EHRC Facility	22,100,000
New ANS Aeration Equipment	8,000,000
New ANS Return Activated Sludge (RAS) Pumping	5,900,000
New ANS Final Clarifiers (8 units each □ 155’ diameter)	54,800,000
New Effluent Pump Station on ANS (150-MGD firm capacity)	6,000,000
New 15 MG – Sec. Effluent Equalization Basin w□Aerators	5,600,000
Add Supplemental Disinfection Process (chlorination □dechlorination)	7,300,000
Yard Piping and Valves	9,000,000
TOTAL CAPITAL COST	249,400,000

[1] - Based on costs developed for the Interplant Connection Facilities Plan

4.5.5 Interplant Connection

4.5.5.1 Interplant Connection Alternatives

Five alternative concepts for the interplant connection were developed and evaluated in the *Interplant Connection Facility Plan*. The five concepts are illustrated in **Figure 4- 30**.

Concept 1: Captured overflow from CSO 117 would be pumped to Equalization (EQ) Basin 117. The captured CSO flows from EQ Basin 117 and from the new Fall Creek–White River tunnel would be conveyed to the Southport plant via the new interplant connection sewer. This was the preliminary concept for the interplant connection.

Concept 2: Captured CSO flows from Structure 117 would be sent to the deep tunnel. EQ Basin 117 would be relatively large (60 MG) and would receive the dewatering flow from the deep tunnel.

Concept 3: Captured CSO flows from Structure 117 would be sent directly to the interplant connection, which would flow to a 275 MGD pumping station at Southport.

Concept 4: Captured CSO flows from Structure 117 would be routed directly to the tunnel. Two versions of Concept 4 were considered that differed only in the size of the interplant connection sewer. Concept 4a assumed a 108-inch- diameter interceptor, while Concept 4b assumed a 144-inch- diameter interceptor with a substantially larger conveyance capacity. This would enable reserve capacity in the event the need later arises to send more wet-weather flow to the Southport plant in addition to the 150 MGD of captured CSO flows from the tunnel. The tradeoff between Concept 4a and 4b was that Concept 4a was the lowest cost but does not allow for additional capacity. Concept 4b was most costly but has the flexibility of excess capacity.

Concept 5: The Fall Creek-White River deep tunnel would be extended all the way to the Southport plant in place of constructing a conventional gravity sewer (Southport Extension Tunnel). This concept was developed based on the range of tunnel volumes resulting from the deep tunnel model. A single new pump station (150 MGD) would be located at the Southport plant to dewater the deep tunnel and convey the captured CSO flows to expanded Southport treatment operations.

As shown in **Figure 4-30**, Concepts 1 through 4 included provisions for splitting captured CSO flows between the Belmont and Southport AWT plants.

For all five concepts, the City reviewed physical characteristics of the land where the interplant connection sewer would be constructed, including topography, geology, hydrology, flood hazard areas, land use, and groundwater. A schematic plan and profile for an initial route was prepared and then evaluated for technical, economical, environmental and constructability factors. Because several conflicts arose, the City selected for detailed study a revised alignment along the selected route from the Interstate 465 north right of way to the Southport AWT facility. **Figure 4-31** shows the revised route alignment.

The assumed routing of the tunnel system in the *Interplant Connection Facility Plan* follows Fall Creek and the White River. The tunnel was about 10 miles long from its start at 42nd Street and Fall Creek to CSO 117. Extending the tunnel to the Southport plant for Concept 5 would increase its length by another 5.6 miles (Southport Extension Tunnel). The tunnel diameters examined varied from 16 feet to 31 feet. Depths varied from 120 feet to 200 feet.

4.5.5.2 Facility Sizes and Capacities

Year 2002 flow data for monitored CSO outfalls were reviewed to gain a better understanding of the importance of CSO 117 relative to other CSO outfalls. The field monitoring data showed that the annual overflow volume from CSO 117, though significant, was not especially large compared to several of the other CSO outfalls. Nevertheless, if the overflow from CSO 117 was captured and bled back to the collection system, a large equalization basin (30 MG to 60 MG) and a large pumping station (125 MGD capacity) would be needed. On the basis of the computer modeling results, the City assumed the peak instantaneous overflow rate from CSO 117 to be 125 MGD.

The needed capacity for the interplant connection depended on whether it would be used for capturing CSO 117 alone, for conveying the tunnel dewatering flow alone, or for conveying both CSO 117 and the tunnel dewatering flow. As previously stated, the maximum dewatering rate for the tunnel likely would not exceed 150 MGD, and CSO 117 peak overflow rates likely would not exceed 125 MGD. Thus, if the interplant connection were used for conveying the tunnel dewatering flow alone, the peak capacity needed would be 150 MGD. A peak capacity of about 275 MGD would be needed if the interconnection were sized to convey both CSO 117 overflows and the tunnel dewatering, as in Concept 3.

A drawback to sizing the interplant connection for the combined flowrate was that it would nearly double the required capacity of the CSO treatment facility. Moreover, there would be little reason for segregating CSO 117 from the deep tunnel because, as was shown by results from the tunnel model, it had very little influence on the required tunnel volume and dewatering rate.

Concept 5 involved extending the tunnel to the Southport plant rather than building a conventional interplant connection sewer (Southport Extension Tunnel). The reasoning was that for a particular tunnel volume requirement, the incremental cost increase to build a longer tunnel of smaller diameter to the Southport facility might be offset by the savings from the avoided construction of the interplant connection sewer and a redundant pumping station. Because the tunnel volume was not yet known, the analysis considered a broad range of tunnel volumes to allow assessment of tradeoffs between terminating the tunnel near CSO 117 versus terminating it at the Southport plant.

4.5.5.3 Cost Comparisons of Alternatives

Cost estimates were developed using procedures intended to provide sufficient level of detail to support facility planning-level comparisons of alternative project approaches.

Estimates of probable capital and operating costs were developed for Concepts 1 through 5. To provide a common basis of comparison, the costs included the overall tunnel, rather than just the extension from CSO 117 to the Southport AWT plant. The cost estimates were developed over a range of tunnel volumes to see if future decisions regarding the tunnel volume requirements would affect which concept was preferred for the interplant connection. **Figure 4-32** shows the results from the capital cost comparisons.

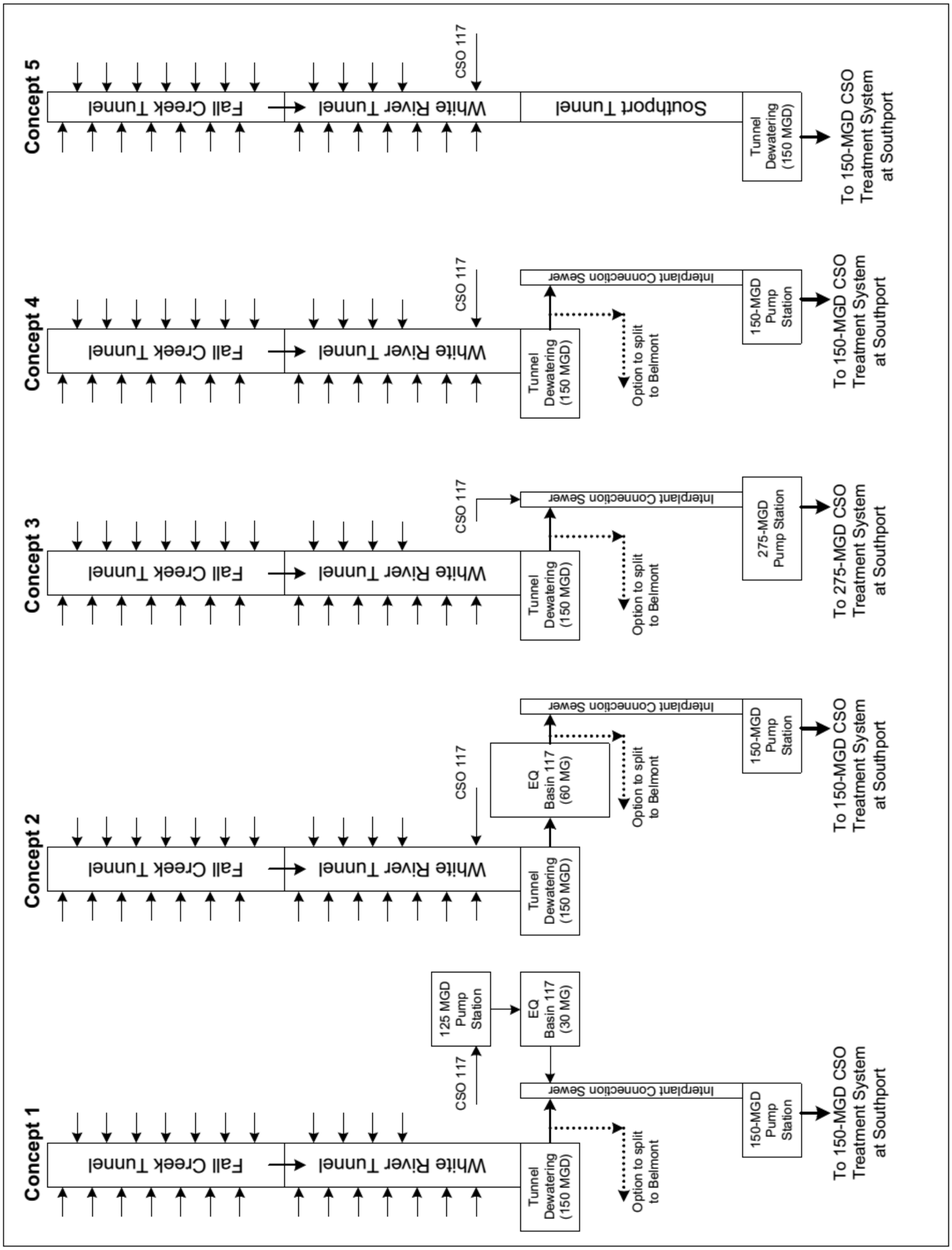
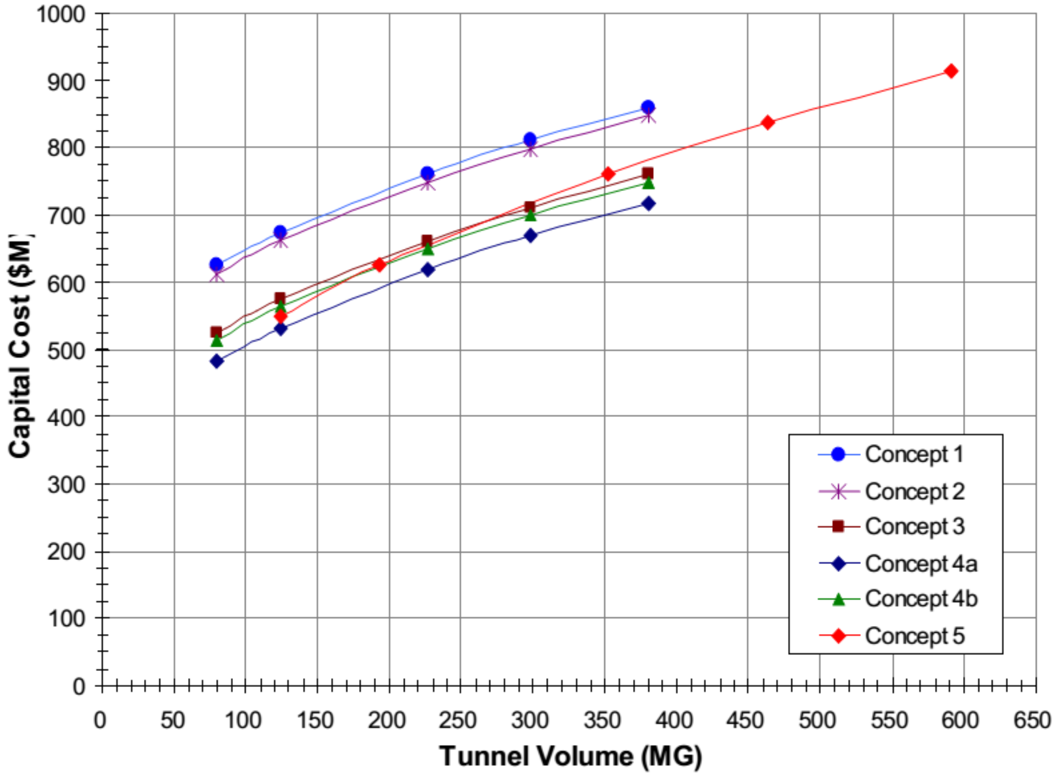


Figure 4-30
Alternative Concepts for the Interplant Connection (2006)

Figure 4-31
Proposed Routing of the Interplant Connection (2006)



Note: The capital cost is comprised of the components for each concept as shown in Figure 4-30, which includes the deep tunnel, pumping facilities, and interplant connection.

Figure 4-32
Capital Cost Comparison of Interplant Connection Concepts (2006)

4.5.5.4 Conclusions

The following conclusions were drawn from the cost comparative analyses:

Concept 1 was screened out due to overall cost and complexity. A complex system of pumping and equalization would be required to simply capture CSO 117. In addition, tunnel volume would not be significantly reduced.

Concept 2 was also screened out due to overall cost and complexity. The capital cost for a 60 MGD EQ Basin would provide limited benefits because the basin would have limited effect on reducing either the capacity of the CSO treatment system or the tunnel volume.

Concept 3 was screened out because it would require a sewer capacity of 275 MGD compared to only 150 MGD for Concept 4b. More importantly, it would require a 275 MGD CSO treatment system rather than a 150 MGD CSO treatment system.

Concepts 4a and 4b both met the project criteria and were among the least expensive options. **Figure 4-33** suggests that Concept 4a is the least cost alternative; however, it does not provide expansion capacity above the proposed tunnel-dewatering rate.

Concept 5 was screened out because (1) uncertainty as to whether existing underground stone quarries between the Belmont and Southport AWT plants would physically block the likely routing; (2) long delays in implementing the interplant connection because it would be tied in with the rest of the deep tunnel project; (3) limited operational flexibility; and (4) relatively little likelihood that the concept would cost less than the conventional methods of Concepts 4a and 4b.

The project criteria were satisfied by both Concept 4a and 4b, with 4a having the lower cost. However, considering the resulting benefit of reserve capacity, the City determined that Concept 4b would be moved forward into design. If no major construction issues developed during the detailed design phase related to the increased diameter, construction of 4b would be recommended.

In summary, the recommended concept for the interplant connection consisted of a 144-inch-diameter interceptor that would originate near CSO 117 (east of the Belmont plant on the east side of White River). It would terminate near the headworks of the Southport plant. The interceptor would have a capacity of approximately 345 MGD and a length of approximately 33,000 feet (**Figure 4-31**). Additional capacity was added to the 150 MGD needed in the screening analysis in order provide reserve storage/conveyance capacity and to send additional flow to the Southport plant, if necessary. Initially the interceptor would store and convey CSO captured from Structure 117. After the deep tunnel system was constructed, the new interceptor would convey CSO captured in the tunnel. The project (capital) cost for the interplant connection was estimated to be $140 million.

4.6 2006 Evaluation of Systemwide CSO Control Alternatives

The history of the Systemwide CSO control alternatives evaluation has not been modified from the original approved CSO LTCP. Modification to control alternatives since 2006 can be found in Section 4.8.

Based upon its analysis of the five system components described above, the City developed 11 systemwide LTCP term control plan options and conducted an evaluation of each option's costs and benefits. The options fell into three overall plan concepts:

CSO Control Plan 1: Storage/conveyance in all watersheds and AWT plant improvements

CSO Control Plan 2: Remote treatment/storage in Fall Creek and Pogues Run watersheds and storage/conveyance in other watersheds with AWT plant improvements

CSO Control Plan 3: Sewer separation in all watersheds

4.6.1 Systemwide Plan Descriptions

4.6.1.1 CSO Control Plan 1

This plan would employ storage/conveyance in all watersheds combined with AWT plant improvements. Controls were evaluated at five levels of control: 90, 93, 95, 97 and 99 percent capture. Percent capture is a U.S. EPA measure of the annual wet-weather sewage flow that is captured and treated before discharge. For example, "90 percent capture" means that the alternative will capture 90 percent of the total volume of flow collected in the combined sewer system during precipitation events on a system-wide, annual average basis (not 90 percent of the volume currently being discharged). These levels of control correspond to annual average overflow frequencies of 12, 6, 4, 2 and 0.5 (one overflow every two years), respectively. The collection system alternatives correspond to the Plan 1 options described earlier in Section 4.5.2 and illustrated in **Figure 4-33**.

Plan 1 included collection of outfalls on a regional basis using deep tunnels and conveyance facilities. It also included near-surface collection conduits and satellite near- surface storage/treatment facilities for remotely located outfalls. The deep tunnels would serve primarily as storage facilities and the stored flows would be pumped out to the AWT facilities at the end of a storm event. The AWT facilities would be expanded and upgraded to provide treatment of wet-weather flows.

The key features of Plan 1 were:

- A central tunnel system from along Fall Creek and White River, with a pumping facility located near South- west Diversion Structure.
- Collection interceptor conduits for remote outfalls along Fall Creek and White River to covey wet-weather flows into central tunnel system.
- Satellite storage/disinfection facilities for remotely located outfalls along upper White River and upper Pogues Run.
- Collection interceptor conduits along Pogues Run and Pleasant Run (and Bean Creek) to convey wet-weather flows into central tunnel system.

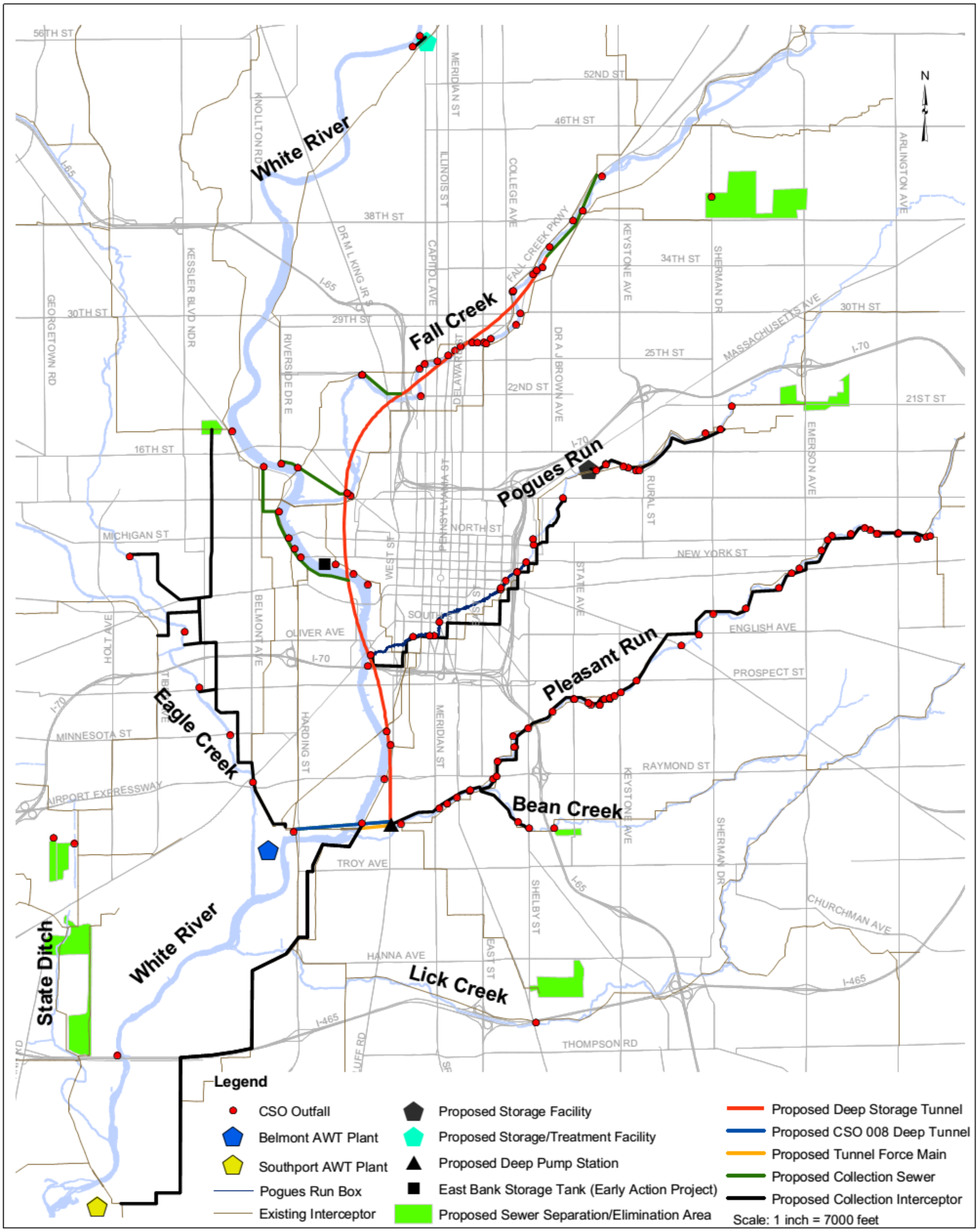


Figure 4-33
CSO Control Plan 1 (2006)

- A collection interceptor conduit along Eagle Creek to convey wet-weather flows to Belmont AWT plant.
- The interplant connection interceptor conduit from the
- Southwest Diversion Structure to the Southport AWT plant to convey pumped out stored flows from tunnel, following a rain event.
- Belmont AWT plant improvements.
- Southport AWT plant improvements.
- Local sewer separation projects to eliminate isolated overflows on State Ditch, Lick Creek and the upstream ends of Fall Creek, Pogues Run and Bean Creek.
- Watershed improvements and early action projects are described below in Sections 4.6.1.4 and 4.6.1.5.

4.6.1.2 CSO Control Plan 2

This plan would employ storage with remote treatment in Fall Creek and Pogues Run watersheds and storage/conveyance to expanded AWT facilities in the remaining major watersheds, evaluated at five levels of control: 90, 93, 95, 97 and 99 percent capture. The levels of control correspond to annual average overflow frequencies of 12, 6, 4, 2 and 0.5, respectively. The collection system alternatives correspond to the Plan 2 options described earlier in Section 4.5.2 and illustrated in **Figure 4-34**.

Plan 2 included collection of outfalls on a regional basis using deep tunnels and treatment facilities. It also included near-surface collection conduits and satellite near-surface storage/treatment facilities for remotely located outfalls. The deep tunnels would serve primarily as storage facilities and the stored flows would be pumped out to the remote treatment facilities or to the AWT plants at the end of a storm event. The AWT plants would be expanded and upgraded to provide treatment of wet-weather flows.

The key features of Plan 2 were:

- A separate tunnel system, pumping facility and remote treatment facility for Fall Creek and Pogues Run watersheds.
- A separate tunnel system for White River watershed with a pumping facility near Southwest Diversion Structure.
- Collection interceptor conduits for remote outfalls along Fall Creek, Pogues Run and White River to covey wet- weather flows into each tributary tunnel system.
- Satellite storage/treatment facilities for remotely located outfalls along upper White River and upper Pogues Run.
- Collection interceptor conduits along Pleasant Run (and Bean Creek) to convey wet-weather flows into White River tunnel system.
- A collection interceptor conduit along Eagle Creek to convey wet-weather flows to Belmont AWT plant.
- The interplant connection interceptor conduit from the Southwest Diversion Structure to the Southport AWT plant to convey pumped out stored flows from tunnel, following a rain event.
- Belmont AWT plant improvements.
- Southport AWT plant improvements.
- Local sewer separation projects to eliminate isolated overflows on State Ditch, Lick Creek and the upstream ends of Fall Creek, Pogues Run and Bean Creek.
- Watershed improvements and early action projects described below in Sections 4.6.1.4 and 4.6.1.5.

4.6.1.3 CSO Control Plan 3

CSO Control Plan 3 included separation of existing combined sewers in all watersheds to eliminate combined sewer overflows (shown previously in **Figure 4-22**). The existing AWT plants would be hydraulically adequate to provide treatment of sanitary flows including predicted future flows and would not be upgraded and expanded. The interplant connection also would not be required.

For Plan 3, the existing combined sewers would be converted to either a separate sanitary sewer or a separate storm sewer. The selection would be based on many factors, including the size of the combined sewer, its connection to the interceptor, number of lateral connections and other factors. In some instances, the existing combined sewer may need total replacement. A

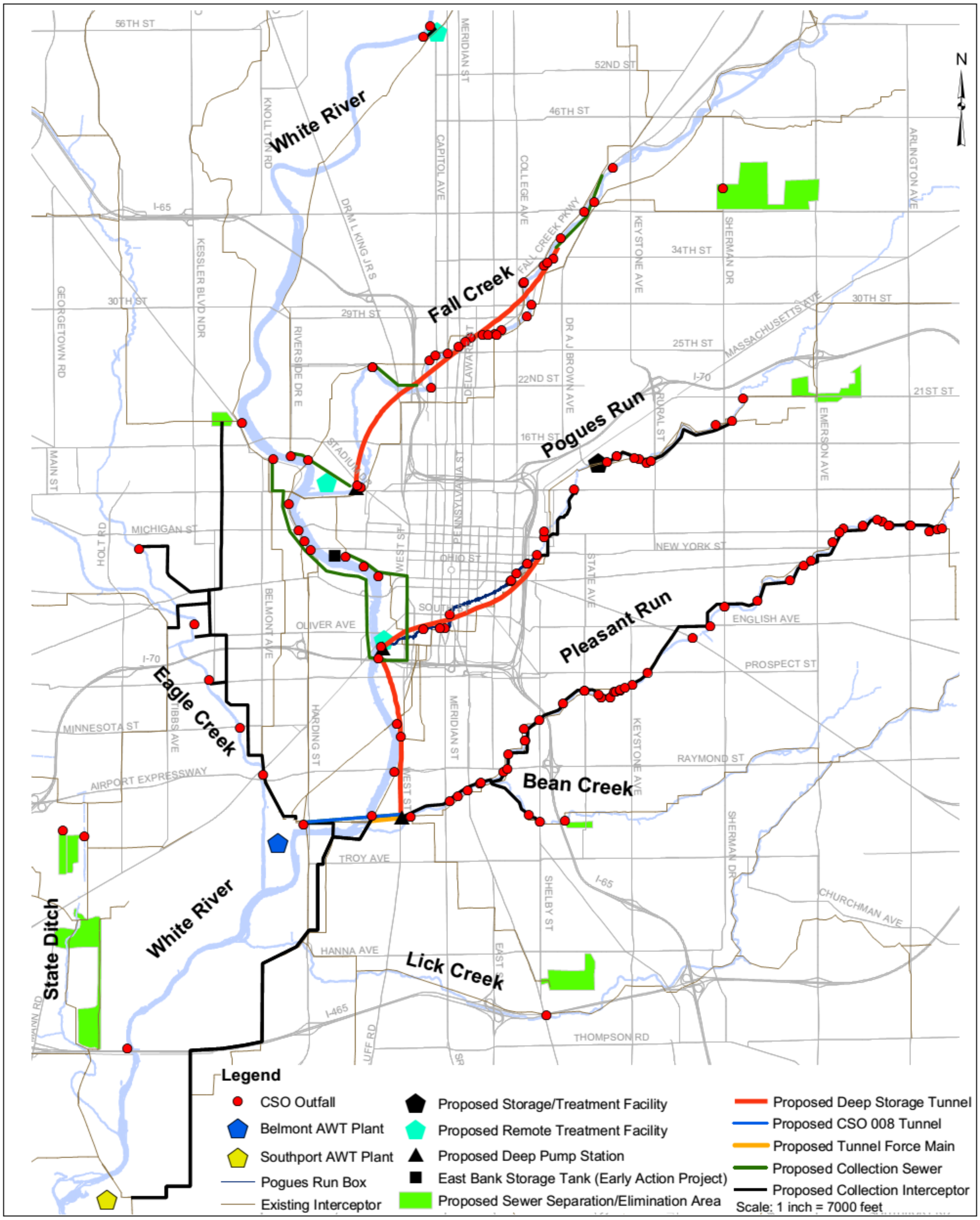


Figure 4-34
CSO Control Plan 2 (2006)

new sewer system (sanitary or storm) would be constructed. Sanitary flows would be conveyed to the AWT plants and would receive advanced treatment. This plan did not include expansion of the AWT plants; however, it was likely that the plants would have continued to receive additional flows during wet-weather periods due to infiltration into the sanitary system. The stormwater flows would be conveyed to stormwater best management practices, such as ponds and sand filters, prior to ultimate discharge into streams.

The key features of Plan 3 were:

- Total sewer separation in all watersheds, including Fall Creek, Pogues Run, Pleasant Run, Eagle Creek, State Ditch and White River.
- The stormwater flows would be conveyed to stormwater best management practices, such as ponds and sand filters, prior to ultimate discharge into streams.
- The interplant connection project would not be constructed.
- The Belmont and Southport AWT plants would not be expanded.
- Watershed improvements described below in Section 4.6.1.5.

The 11 systemwide control plan options (five options for Plan 1, five for Plan 2 and one for Plan 3) are summarized and compared to current capture and overflow conditions in **Table 4-12**.

Table 4-12
Summary of Systemwide CSO Control Plan Options (2006)

	Percent Capture	Days of Untreated Overflows per Year
Current Conditions	63□	60
Plan 1: Storage and Conveyance Facilities	90□	12
	93□	6
	95□	4
	97□	2
	99□	0.5
Plan 2: Storage and Conveyance with Remote Treatment	90□	12
	94□	6
	95□	4
	98□	2
	99□	0.5
Plan 3: Total Sewer Separation	100□	0

4.6.1.4 Early Action Projects

The City's analysis of Plan 1 and Plan 2 incorporated the costs of early action projects, including:

- Major combined sewer improvement and rehabilitation projects from 1995 to 2002
- In-system storage projects at CSO 080, 084, 118, 053, 058, 101, 063, 063A and 065
- Re-routing of CSO 205 to Lift Station 507
- Modifications to Lift Station 507 to eliminate CSO 156
- Elimination of CSOs 103, 217, 218, 275 and 235
- West Belmont cut-off sewer project
- East Bank storage tank to mitigate overflows at CSO 039
- Consolidation sewer at CSOs 034/035 and conversion of half of Pogues Run conduit to CSO storage tunnel
- Vortex separator pilot project at CSO 045
- Real-time control projects
- Interceptor capacity improvement projects
- Pogues Run and Lake Sullivan wetlands
- Flow equalization basins, Belmont facility storage basin, raw sewage pumping, and other Belmont and Southport AWT plant improvements

Where applicable and quantifiable, the benefits of these projects were incorporated into the NetSTORM model to produce projected water quality benefits for the systemwide CSO control plans.

4.6.1.5 Watershed Improvements

The City's analysis of the systemwide CSO control plans also incorporated the costs and benefits of additional non-CSO improvements to further enhance water quality and stream aesthetics. As noted earlier in Section 4.5.2.8, these improvements would address non-CSO sources of pollution in the watersheds or maximize the benefits of the selected CSO control plan. These improvements included:

- Building sewers for neighborhoods now served by septic systems
- Implementing projects to reduce flooding and improve stormwater drainage
- Restoring streambanks and removing polluted sediments from streams
- Disconnecting downspouts, sump pumps and other illicit connections that take up sewer capacity
- Adding flow to tributaries to improve stream appearance and wildlife habitat (Plans 1 and 2 only)
- Improving oxygen levels in streams by adding aeration on Fall Creek and White River, removing Boulevard Dam on Fall Creek and modifying Stout Dam on White River (Plans 1 and 2 only)

Even though these measures were not a required component of the LTCP and were implemented at the City's discretion, the water quality modeling performed to evaluate the effectiveness of the systemwide CSO control plans assumed the completion of these projects to improve water quality.

4.6.2 Estimated Costs

Once the components of the systemwide plans were developed, the City developed a methodology to size and cost the CSO control facilities and to determine their associated water quality benefit.

The first step involved modifying the City's existing NetSTORM collection system hydraulic model to reflect recently completed CSO control projects and future flows. These modifications included adding details from the projects completed, ongoing and future confirmed system upgrades, and future flow projections within the sewer network. This modified model provided the foundation on which the systemwide plans were developed.

The future flow projections were drawn from the *Interplant Connection Facilities Plan* (ICST, 2004), which projected flow increases of 10 MGD for the Belmont AWT plant service area and 20 MGD for the Southport AWT plant service area over a 20-year planning period. These flow increases were allocated to individual interceptors by calculating ratios from the ultimate build-out average dry-weather flow projections presented in the draft *Marion County Sanitary Sewer Master Plan* (HNTB, 2004).

The second step involved performing hydraulic modeling of the systemwide plans. Hydraulic analysis was conducted based on a 50-year rainfall series using the NetSTORM model. The model produced flowrates and volumes used to size the CSO control facilities for both Plan 1 and Plan 2.

Key CSO control facilities were identified for Plan 1 and Plan 2 and preliminarily sited. Once preliminary sites were selected and hydraulic modeling results were available, CSO control facilities were sized accordingly. Planning costs for CSO control facilities were then estimated using the City's *Cost Estimating Procedures for CSO Control Alternatives Evaluation* (ICST, 2004), which was based on U.S. EPA references, where available, adjusted to local conditions. The local conditions were estimated as contingencies including site adjustment factors, land, engineering, administration and inspection, and unknown factors. The present worth costs were given in March 2004 dollars and based on a 20- year period.

Plan 1: The estimated capital and present worth costs for CSO Control Plan 1 at different capture levels are summarized in **Table 4-13** and illustrated in **Figure 4-35**, showing a breakdown in cost for the five major system components. Note that tunnel and collection system costs were the most sensitive to increases in the overall level of control. A detailed cost estimate for each capture level analyzed is included in **Appendix C**. The project (capital) cost for Plan 1 ranged from $1.315 billion for 90 percent system capture to $2.961 billion for 99 percent system capture. The present worth cost ranged from $1.444 billion for 90 percent system capture to $3.027 billion for 99 percent system capture. These costs included $63.4 million for watershed improvement projects described in Section 4.5.2.8.

Plan 2: The estimated capital and present worth costs for CSO Control Plan 2, at different capture levels, are summarized in **Table 4-14** and illustrated in **Figure 4-36**, showing a breakdown in cost for the five major system components. As with Plan 1, tunnel and collection system costs were the most sensitive to increases in the overall level of control. A detailed cost estimate for each capture level analyzed is included in **Appendix C**. The project (capital) cost for Plan 2 ranged from $1.394 billion for 90 percent system capture to $2.901 billion for 99 percent system capture. The present worth cost ranged from $1.545 billion for 90 percent system capture to $3.032 billion for 99 percent system capture. At all levels of control, Plan 2 was a more expensive option than Plan 1.

Plan 3: The estimated capital and present worth costs for CSO Control Plan 3 are summarized in **Table 4-15**. The planning level costing was performed using the total combined sewer service area acreage for individual watersheds. A detailed cost estimate is included in **Appendix C**. The project (capital) cost for Plan 3 was estimated to be $6.025 billion. The present worth cost was $6.201 billion, the most expensive CSO control option evaluated.

4.6.3 Water Quality Impacts

In-stream water quality modeling was performed to demonstrate results attained by the City's system and to evaluate the projected benefits of various systemwide CSO control measures. In conjunction with full structural controls, the City evaluated watershed improvements that enhance or supplement the benefits of CSO controls and help improve water quality. In particular, this evaluation focused on reductions in *E. coli* bacteria and dissolved oxygen impacts described in Section 2 (Existing Conditions).

The following subsections summarize the predicted environmental benefits of the CSO control alternatives, with and without watershed improvements. Where the text, tables and graphs refer to the "existing" sewer system, this is defined as the sewer system prior to 2002, when a number of early action projects were initiated.

4.6.3.1 CSO Volume Reduction

Table 4-16 summarizes the percent capture, annual average overflow frequencies, overflow volume removed, and residual overflows discharged into the receiving streams for the proposed Plan 1 CSO control facilities. Results were shown by watershed. The White River values represented the sum of all the tributary values plus the direct discharges to White River itself. The first row (watershed percent capture) indicated the percent captured by the pre-2002 (existing) system and proposed CSO control facilities. The second row (CSO volume removed) indicated the average annual CSO volume removed by the proposed CSO control facilities. The third row (CSO volume discharged) indicated the average annual CSO

Table 4-13
CSO Control Plan 1 Cost Estimate (2006)

Description	Cost ($M)				
	System Capture				
	90%	**93%**	**95%**	**97%**	**99%**
Tributaries					
Fall Creek	158	179	197	227	441
Pogues Run	77	100	113	154	264
Pleasant Run	50	99	130	189	282
Eagle Creek	18	24	32	60	75
Tributaries Capital Cost Subtotal	303	401	472	630	1063
White River and Central System					
Upper White River	10	19	29	46	70
Lower White River □ Central System	234	287	321	650	1014
White River and Central System Capital Cost Subtotal	245	306	350	696	1083
AWT System					
Interplant Connection	140	140	140	140	140
Belmont AWT	154	165	172	172	172
Southport AWT	221	221	221	221	249
AWT System Capital Cost Subtotal	514	525	533	533	562
Early Action Plans Capital Cost Subtotal	189	189	189	189	189
Watershed Improvements Capital Cost Subtotal	63	63	63	63	63
TOTAL CAPITAL COST	**1315**	**1484**	**1607**	**2111**	**2961**
Present Worth Operation and Maintenance Cost	110	119	126	145	188
Present Worth Replacement Cost	93	97	100	104	115
Present Worth Salvage Value	-75	-89	-99	-152	-236
TOTAL PRESENT WORTH COST	**1444**	**1612**	**1734**	**2208**	**3027**

Table 4-14
CSO Control Plan 2 Cost Estimate (2006)

Description	Cost ($M)				
	System Capture				
	90%	**94%**	**95%**	**98%**	**99%**
Tributaries					
Fall Creek	191.9	225.7	253.3	302.3	547.4
Pogues Run	173.1	217.8	245.5	308	496.1
Pleasant Run	50.1	98.9	130.2	189.1	282.2
Eagle Creek	17.7	23.5	31.8	60.4	75.4
Tributaries Capital Cost Subtotal	432.8	565.9	660.8	859.8	1,401.00
White River and Central System					
Upper White River	10.3	18.6	28.6	46.3	69.7
Lower White River □ Central System	183.3	205.9	221.6	388	645.2
White River and Central System Capital Cost Subtotal	193.6	224.5	250.2	434.3	714.9
AWT System					
Interplant Connection	140	140	140	140	140
Belmont AWT	153.7	164.7	172.1	172.1	172.1
Southport AWT	220.6	220.6	220.6	220.6	220.6
AWT System Capital Cost Subtotal	514.3	525.3	532.7	532.7	532.7
Early Action Plans Capital Cost Subtotal	189.3	189.3	189.3	189.3	189.3
Watershed Improvements Capital Cost Subtotal	63.3	63.3	63.3	63.3	63.3
TOTAL CAPITAL COST	**1,393.4**	**1,568.3**	**1,696.4**	**2,079.4**	**2,901.2**
Present Worth Operation and Maintenance Cost	130	140.1	149.5	172.2	221.2
Present Worth Replacement Cost	100.4	106.5	111.4	119.7	130.1
Present Worth Salvage Value	-77.6	-91.2	-100.9	-136.1	-219.1
TOTAL PRESENT WORTH COST	**1,545.4**	**1,722.6**	**1,855.2**	**2,234.2**	**3,032.3**

Table 4-15
CSO Control Plan 3 Cost Estimate (2006)

Description	CSO Area (acres)	Cost ($M)
Tributaries		
Fall Creek	13,307	2,305.00
Pogues Run	6,016	1,042.10
Pleasant Run	6,718	1,076.60
Eagle Creek	1,615	258.8
State Ditch	457	79.3
Tributaries Acreage and Capital Cost Subtotal	28,113	4,761.80
White River		
Central Sub-Network	1,888	327.1
White River	5,405	936.3
White River Acreage and Capital Cost Subtotal	7,293	1,263.40
AWT System		
Interplant Connection	-	0
Belmont AWT	-	0
Southport AWT	-	0
AWT System Capital Cost Subtotal		0
Early Action Plans Capital Cost Subtotal	-	0
Watershed Improvements Capital Cost Subtotal	-	0
TOTAL ACREAGE AND CAPITAL COST	**35,406**	**6,025.20**
Present Worth Operation and Maintenance Cost	-	175.5
Present Worth Replacement Cost	-	0
Present Worth Salvage Value	-	-1,154.10
TOTAL ACREAGE AND PRESENT WORTH COST	**35,406**	**5,046.60**

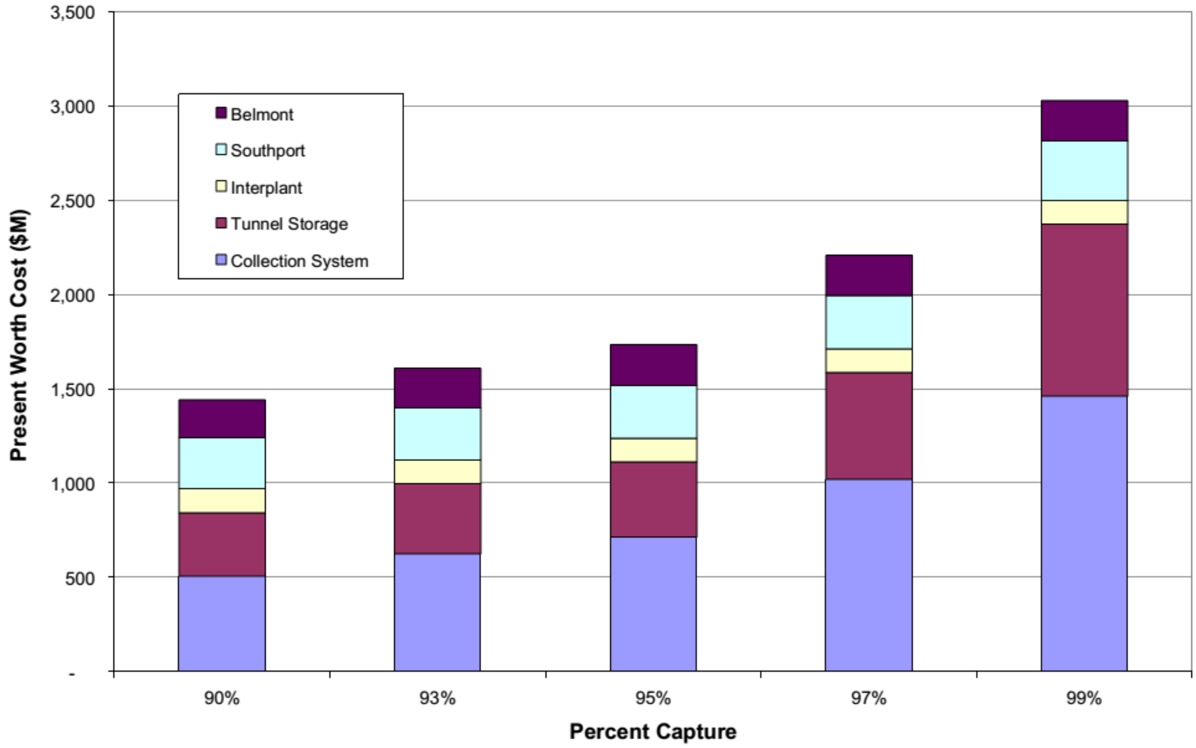


Figure 4-35
CSO Control Plan 1 Cost Estimate by Percent Capture (2006)

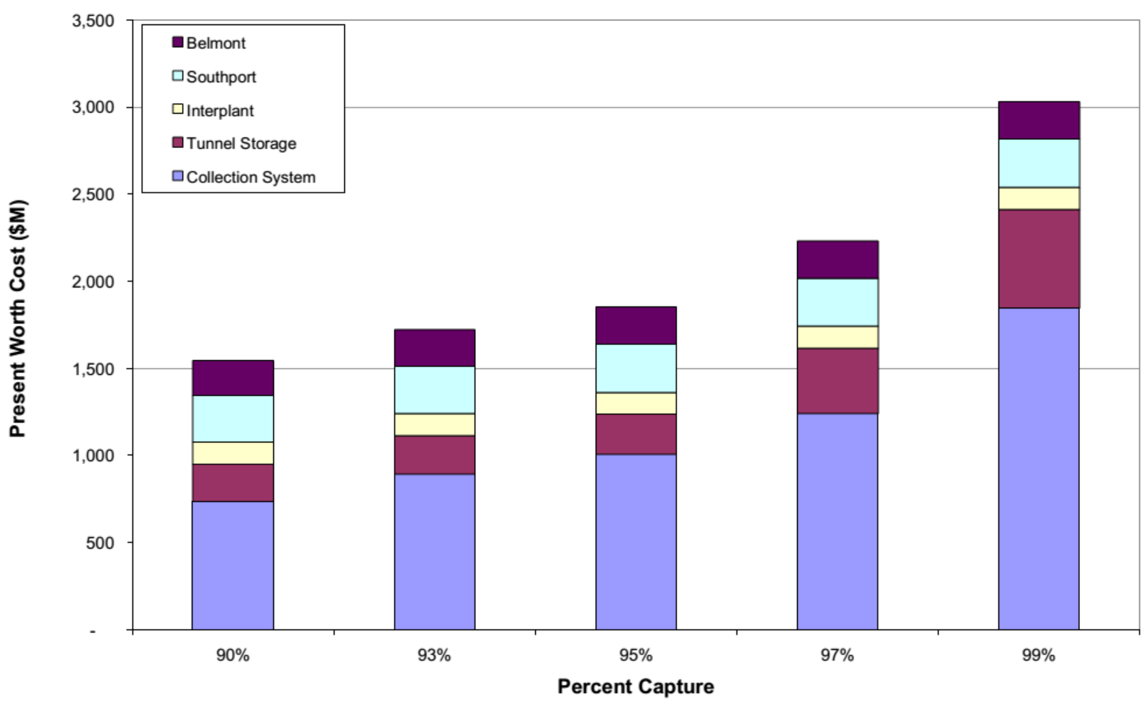


Figure 4-36
CSO Control Plan 2 Cost Estimate by Percent Capture (2006)

volume discharged to the stream with the proposed CSO control facilities in place. For Plan 1, estimated annual volume discharged to the stream was reduced to 1,542 million gallons at 90 percent system capture and 140 million gallons at 99 percent system capture, compared to the pre-2002 system discharge of 7.866 billion gallons (including the primary effluent bypass at the AWT plants).**Table 4-17** summarizes the same information for the Plan 2 CSO control facilities. For Plan 2, estimated annual volume discharged to the stream was reduced to 1,514 million gallons at 90 percent system capture and 135 million gallons at 99 percent system capture.

Figure 4-37 graphically illustrates this same information. The first group of bars (Pre-2002) shows annual overflow volume produced by the pre-2002 sewer system. The PE bypass volume was represented by a solid gray bar and the collection system volume by a thatched gray bar. The next five groups compared the estimated collection system overflow volumes for the five control level alternatives (90- 99 percent capture). Under all five levels of control, the PE Bypass overflow volume would be eliminated. Under Plan 3, all sewers would be separated, eliminating the discharge of combined sewage into receiving streams. By capturing the first flush and reducing the frequency of overflows, all alternatives would significantly reduce or eliminate odors, floating sewage, and trash in neighborhood streams.

4.6.3.2 BOD Residual Loads

Figure 4-38 illustrates the residual BOD loads to the White River and tributaries and how various levels of additional CSO control would reduce residuals even further. Similar to **Figure 4-37**, the first group of bars (pre-2002) shows annual BOD load based on the pre-2002 sewer system. The next five groups show the estimated performance for the five control alternatives. As shown in the graph, Plan 1 performed better than Plan 2 at all levels of control in reducing BOD loads, due to higher levels of treatment at the AWT facilities. For Plan 1, estimated residual BOD loads ranged from 1,190,000 pounds at 90 percent capture to 370,000 pounds at 99 percent capture. For Plan 2, estimated residual BOD loads ranged from 1,560,000 pounds at 90 percent capture to 920,000 pounds at 99 percent capture. Plan 3 (sewer separation) would result in residual BOD loads of 510,000 pounds/year. Although sanitary sewage would receive AWT-level treatment under Plan 3, stormwater would continue to carry significant BOD loads to the waterways.

4.6.3.3 Dissolved Oxygen Impacts

As described in Section 2 (Existing Conditions), the dis- solved oxygen levels in White River and Fall Creek can fall to critically low levels during summer storm events that occur during low flow periods, most notably immediately upstream of existing dams. Combined with dam removal or instream aeration, CSO controls resulting in at least 90 percent system capture would achieve dissolved oxygen standards on White River and Fall Creek. Alternatively, DO standards could be met on both streams under 93 percent system capture, if combined with dam removal on Fall Creek and dam modification on White River.

Based upon water quality modeling results, all alternatives evaluated would eliminate dissolved oxygen violations in White River and Fall Creek when both CSO controls and watershed improvements (dam removal/modification and aeration) are employed. Therefore, all alternatives were expected to prevent CSO-related fish kills and reduce stress on fish and other aquatic wildlife related to suppressed dis- solved oxygen levels, especially if the watershed improvements were implemented. The City planned to remove Boulevard Dam in Fall Creek, modify Chevy and Stout dams in White River, and provide aeration within White River and Fall Creek to ensure attainment of the dissolved oxygen standard.

4.6.3.4 *E. coli* Bacteria Impacts

The state's geometric mean standard for *E. coli* bacteria is 125 cfu per 100 mL. Based upon 2000-2002 sampling data, White River's geometric mean value exceeded 460 cfu/100 mL. Modeling predicted that CSO controls would improve the geometric mean value in the White River and its tributaries, but the standard would not be achieved. With the addition of watershed improvements, the geometric mean could be further reduced, although not enough to achieve the standard in all watersheds except the Pogues Run watershed. **Table 4-16** summarizes the existing geometric mean for each stream and how the alternatives would improve this value, both with and without watershed improvements. **Figure 4-39** displays the White River results graphically, showing all three plan options and each level of control evaluated. For Plan 1 and Plan 2, the estimated *E. coli* geometric mean ranged from 234 cfu per 100 mL at 90 percent system capture to

Table 4-16
Estimated CSO Volume Reductions for Plan 1 (2006)

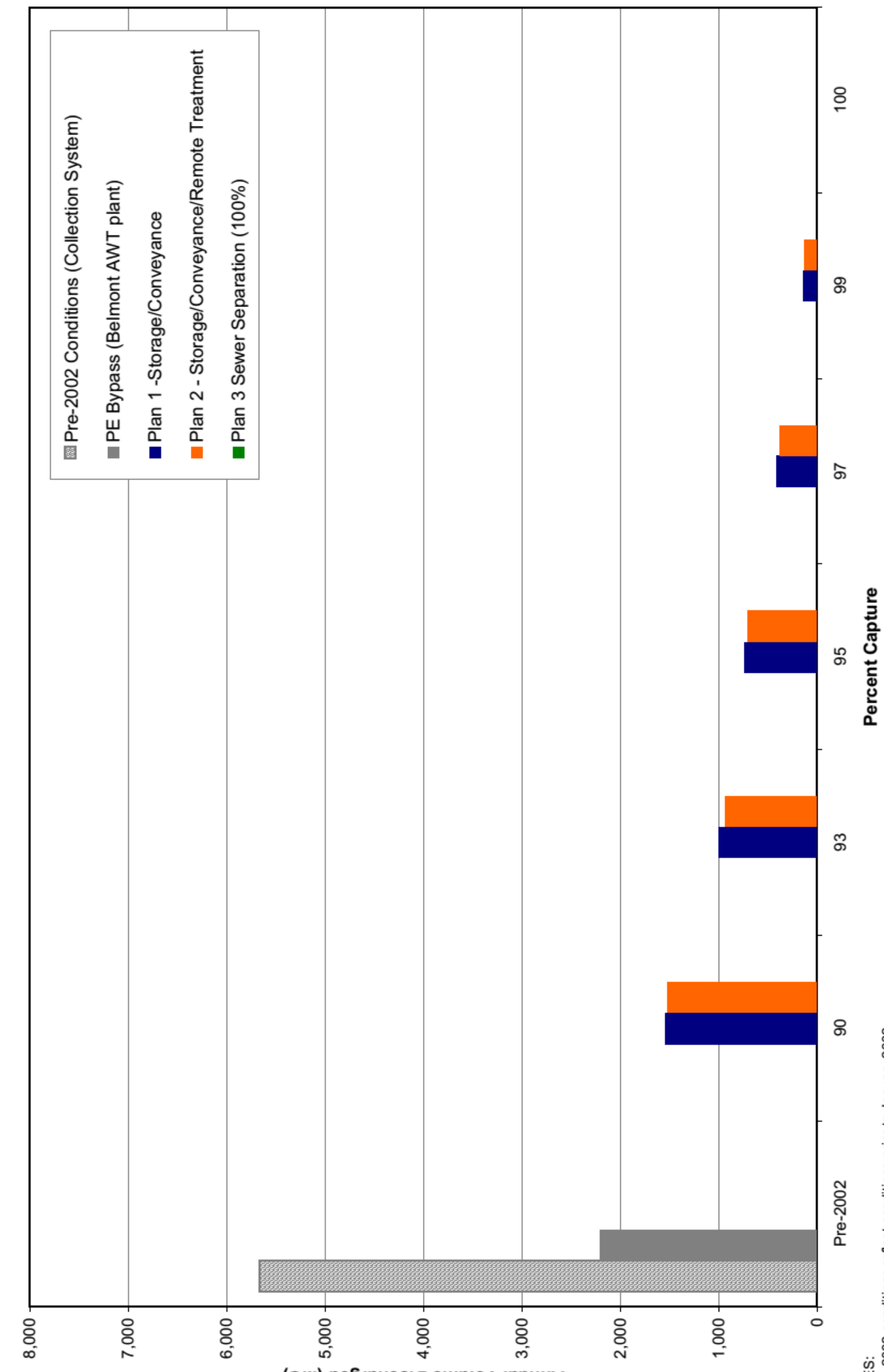
Watershed	Systemwide Percent Capture				
	90%	93%	95%	97%	99%
Fall Creek					
Watershed Percent Capture of CSO Volume	88□	93□	95□	97□	99□
Average Annual CSO Volume Removed (MG)	1,170	1,369	1,449	1,559	1,628
Average Annual Residual CSO Volume Discharged (MG)	498	299	219	110	40
Average Annual Untreated Overflow Events	12	6	4	2	0.5
Pogues Run					
Watershed Percent Capture of CSO Volume	89□	94□	96□	98□	99□
Average Annual CSO Volume Removed (MG)	759	911	977	1,035	1,082
Average Annual Residual CSO Volume Discharged (MG)	341	189	124	66	19
Average Annual Untreated Overflow Events	12	6	4	2	0.5
Pleasant Run					
Watershed Percent Capture of CSO Volume	94□	97□	98□	99□	99.6□
Average Annual CSO Volume Removed (MG)	207	281	304	326	351
Average Annual Residual CSO Volume Discharged (MG)	155	81	57	36	10
Average Annual Untreated Overflow Events	12	6	4	2	0.5
Eagle Creek					
Watershed Percent Capture of CSO Volume	92□	96□	97□	98□	99□
Average Annual CSO Volume Removed (MG)	31	48	53	58	63
Average Annual Residual CSO Volume Discharged (MG)	35	18	13	8	3
Average Annual Untreated Overflow Events	12	6	4	2	0.5
White River[1]					
Watershed Percent Capture of CSO Volume	90□	93□	95□	97□	99□
Average Annual CSO Volume Removed (MG)	4125	4664	4924	5256	5526
Average Annual Residual CSO Volume Discharged (MG)	1542	1002	742	410	140
Average Annual Untreated Overflow Events	12	6	4	2	0.5

[1] White River data includes totals for entire CSO system.

Table 4-17
Estimated CSO Volume Reductions for Plan 2 (2006)

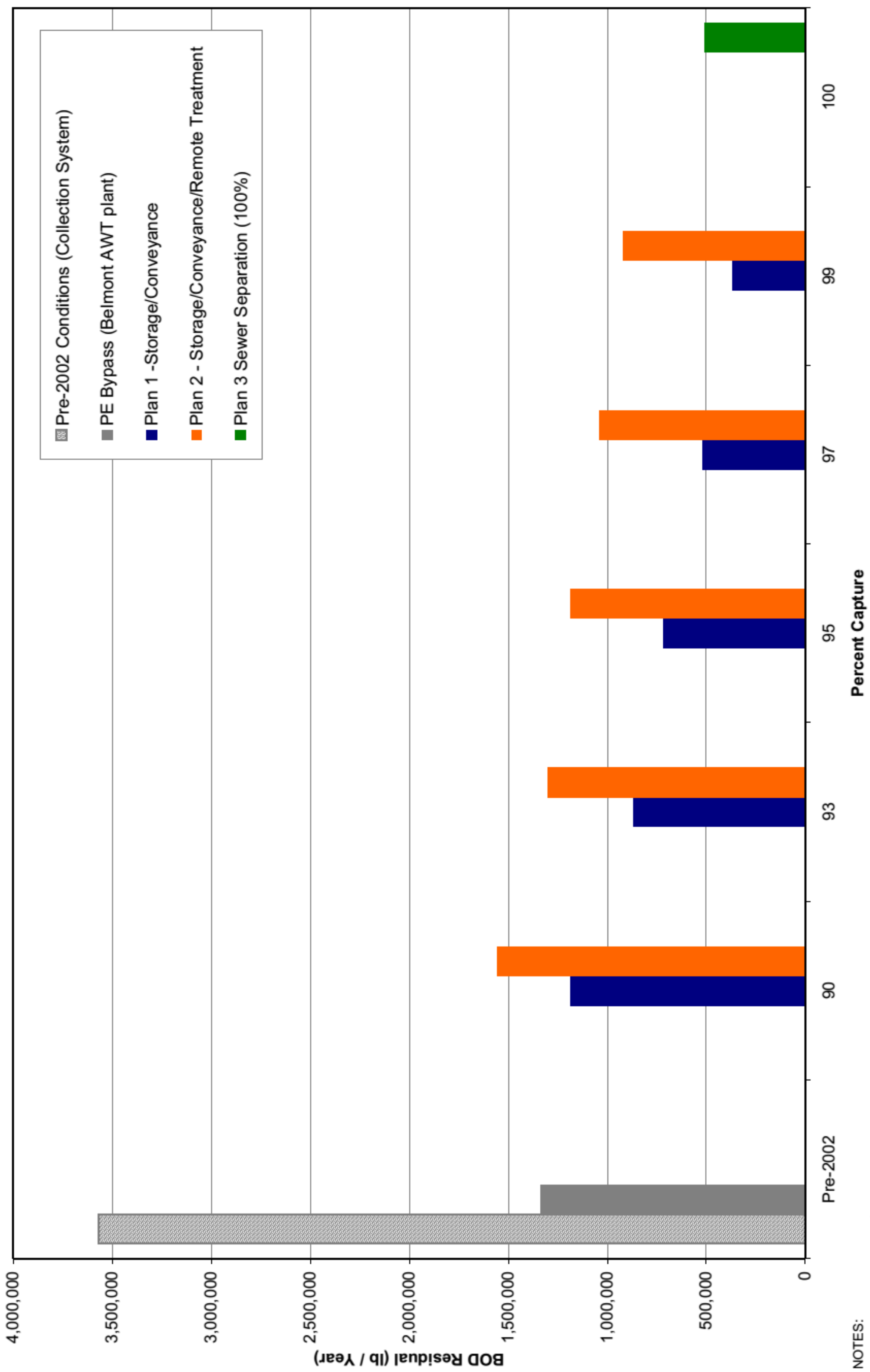
Watershed	Systemwide Percent Capture				
	90%	**94%**	**95%**	**98%**	**99%**
Fall Creek					
Watershed Percent Capture of CSO Volume	88□	93□	95□	97□	99□
Average Annual CSO Volume Removed (MG)	1,170	1,369	1,449	1,559	1,628
Average Annual Residual CSO Volume Discharged (MG)	498	299	219	110	40
Average Annual Untreated Overflow Events	12	6	4	2	0.5
Pogues Run					
Watershed Percent Capture of CSO Volume	87□	92□	94□	97□	99□
Average Annual CSO Volume Removed (MG)	687	852	924	1,016	1,072
Average Annual Residual CSO Volume Discharged (MG)	414	248	176	85	29
Average Annual Untreated Overflow Events	12	6	4	2	0.5
Pleasant Run					
Watershed Percent Capture of CSO Volume	94□	97□	98□	99□	100□
Average Annual CSO Volume Removed (MG)	207	281	304	326	351
Average Annual Residual CSO Volume Discharged (MG)	155	81	57	36	10
Average Annual Untreated Overflow Events	12	6	4	2	0.5
Eagle Creek					
Watershed Percent Capture of CSO Volume	92□	96□	97□	98□	99□
Average Annual CSO Volume Removed (MG)	31	48	53	58	63
Average Annual Residual CSO Volume Discharged (MG)	35	18	13	8	3
Average Annual Untreated Overflow Events	12	6	4	2	0.5
White River					
Watershed Percent Capture of CSO Volume	90□	94□	95□	98□	99□
Average Annual CSO Volume Removed (MG)	4152	4729	4958	5293	5531
Average Annual Residual CSO Volume Discharged (MG)	1514	937	708	373	135
Average Annual Untreated Overflow Events	12	6	4	2	0.5

[1] White River data includes totals for entire CSO system.



NOTES:
1. Pre-2002 conditions reflect conditions prior to January 2002.
2. The actual percent capture at 93% and 97% for Plan 1 is 93.4% and 97.3% and for Plan 2 is 93.8% and 97.5% respectively. For comparison purposes, these were rounded to the same whole number.

Figure 4-37
Annual Volume Discharge by Percent Capture (2006)



NOTES:
1. Pre-2002 conditions reflect conditions prior to January 2002.
2. The actual percent capture at 93% and 97% for Plan 1 is 93.4% and 97.3% and for Plan 2 is 93.8% and 97.5% respectively. For comparison purposes, these were rounded to the same whole number.

Figure 4-38
Annual BOD Reduction by Percent Capture (2006)

203 cfu per 100 mL at 99 percent system capture. When watershed improvements are employed, the mean was expected to fall to 190 cfu per 100 mL at 90 percent system capture and 164 cfu per 100 mL at 99 percent system capture. Sewer separation with watershed improvements was expected to achieve a geometric mean of 168 cfu per 100 mL.

Indiana's single sample maximum standard for *E. coli* bacteria is 235 cfu per 100 mL to protect full-body recreational uses. The City's analysis revealed that CSO controls alone would slightly improve the number of days that the White River and its tributaries would meet the single sample standard. However, current background and non-point sources prevent the streams from achieving these standards at all times, even if all CSOs were eliminated. **Table 4-19** summarizes the estimated number of days each CSO-impacted stream would exceed the single sample standard, including a comparison of existing (pre-2002) conditions with varying levels of CSO control. **Figure 4-40** graphically shows how each of the CSO control alternatives could affect bacteria exceedances in the White River. The data represent the number of days each year that bacteria levels are predicted to exceed the 235 cfu/100 mL standard when factoring all current sources of bacteria, including CSOs, upstream sources, and stormwater runoff. Under Plan 1 and Plan 2, CSO controls alone would reduce from 178 to 157 the number of days per year that White River would exceed the standard. The addition of watershed improvements would further reduce the days of exceedance to 135 days per year, on average. Sewer separation, in comparison, would reduce the days of exceedances to 137 per year.

Under all alternatives, *E. coli* bacteria concentrations in White River and its tributaries were expected to decrease during wet weather. To demonstrate this reduction, U.S. EPA suggested including targets of 2,000, 5,000, and 10,000 cfu per 100 mL as additional evaluation tools to measure reductions in peak *E. coli* levels in the streams. The City's analysis demonstrated that CSO controls would significantly reduce the number of days that instream *E. coli* levels exceeded these higher targets. Table 4-20 summarizes the estimated number of days *E. coli* levels would exceed 2,000 cfu/100 mL in CSO-impacted streams. Plan 1 and Plan 2 show similar results, reducing the number of days White River exceeds 2,000 cfu/100 mL from 69 per year to 16-4 days, depending on the level of control and whether other improvements are made to reduce bacteria sources in the watershed. The performance at the 95 percent capture level with watershed improvements was equivalent to the 97 percent capture level without watershed improvements – both achieving seven days that exceed 2,000 cfu/100 mL in White River. Similarly, the 93 percent capture with watershed improvements was expected to provide benefits equal to 95 percent without watershed improvements – both achieving nine days that exceeded 2,000 cfu/100 mL in White River. Total sewer separation, including watershed improvements and BMPs for bacteria reduction, was predicted to achieve seven days that exceeded 2,000 cfu/100 mL in White River.

The City's modeling of higher peak values of 5,000 and 10,000 cfu revealed that CSO controls would result in one day exceeding the 5,000 and 10,000 cfu values for each day of overflow. For example, the 95 percent capture alternative would achieve an annual average of four overflows per year and four days exceeding 5,000 and 10,000 cfu/100 mL on White River.

The City's analysis demonstrated that a combination of control measures would be required to improve water quality and provide greater protection of public health along Indianapolis waterways. These measures would include additional storage (both within the existing combined sewer system and in new structures), additional conveyance, additional treatment capacity at the AWT plants, and watershed improvements. However, because the City could not achieve the *E. coli* single sample maximum at all times, a Use Attainability Analysis (UAA) was pursued and state approval of a wet-weather use subcategory for those storm events was sought. For more information on the UAA, see Section 9.

Table 4-18
Estimated *E. coli* Bacteria Impacts (Geometric Mean in cfu/100mL) (2006)

Watershed	Systemwide Percent Capture[1]						
	Existing	90%	93%	95%	97%	99%	100%
Fall Creek							
Without Watershed Improvements	361	228	211	206	201	198	210
With Watershed Improvements	361	168	156	152	148	146	157
Pogues Run							
Without Watershed Improvements	606	213	193	186	180	175	356
With Watershed Improvements	606	109	99	95	92	90	230
Pleasant Run							
Without Watershed Improvements	495	357	329	320	312	306	305
With Watershed Improvements	495	149	137	133	130	127	127
Eagle Creek							
Without Watershed Improvements	285	262	256	253	250	249	253
With Watershed Improvements	285	196	189	187	185	183	187
White River							
Without Watershed Improvements	466	234	218	212	207	203	207
With Watershed Improvements	466	190	176	172	167	164	168

Notes:
1. The actual percent capture at 93 and 97 for Plan 1 is 93.4 and 97.3 and for Plan 2 is 93.8 and 97.5, respectively. For comparison purposes, these were rounded to the same whole number. Plan 3, Total Sewer Separation, is 100 capture.
2. Indiana's monthly geometric mean standard is 125 cfu 100 mL.

Table 4-19
Estimated *E. coli* Bacteria Impacts (Geometric Mean in cfu/100mL) (2006)

Watershed	Systemwide Percent Capture[1]						
	Existing	90%	93%	95%	97%	99%	100%
Fall Creek							
Without Watershed Improvements	188	170	170	170	170	170	178
With Watershed Improvements	188	134	134	134	134	134	142
Pogues Run							
Without Watershed Improvements	177	156	155	155	155	154	231
With Watershed Improvements	177	60	59	59	59	58	170
Pleasant Run							
Without Watershed Improvements	215	214	214	214	214	214	214
With Watershed Improvements	215	100	100	100	100	100	100
Eagle Creek							
Without Watershed Improvements	200	198	197	197	197	197	199
With Watershed Improvements	200	146	145	145	145	145	147
White River							
Without Watershed Improvements	178	157	157	157	157	156	157
With Watershed Improvements	178	135	135	135	135	134	137

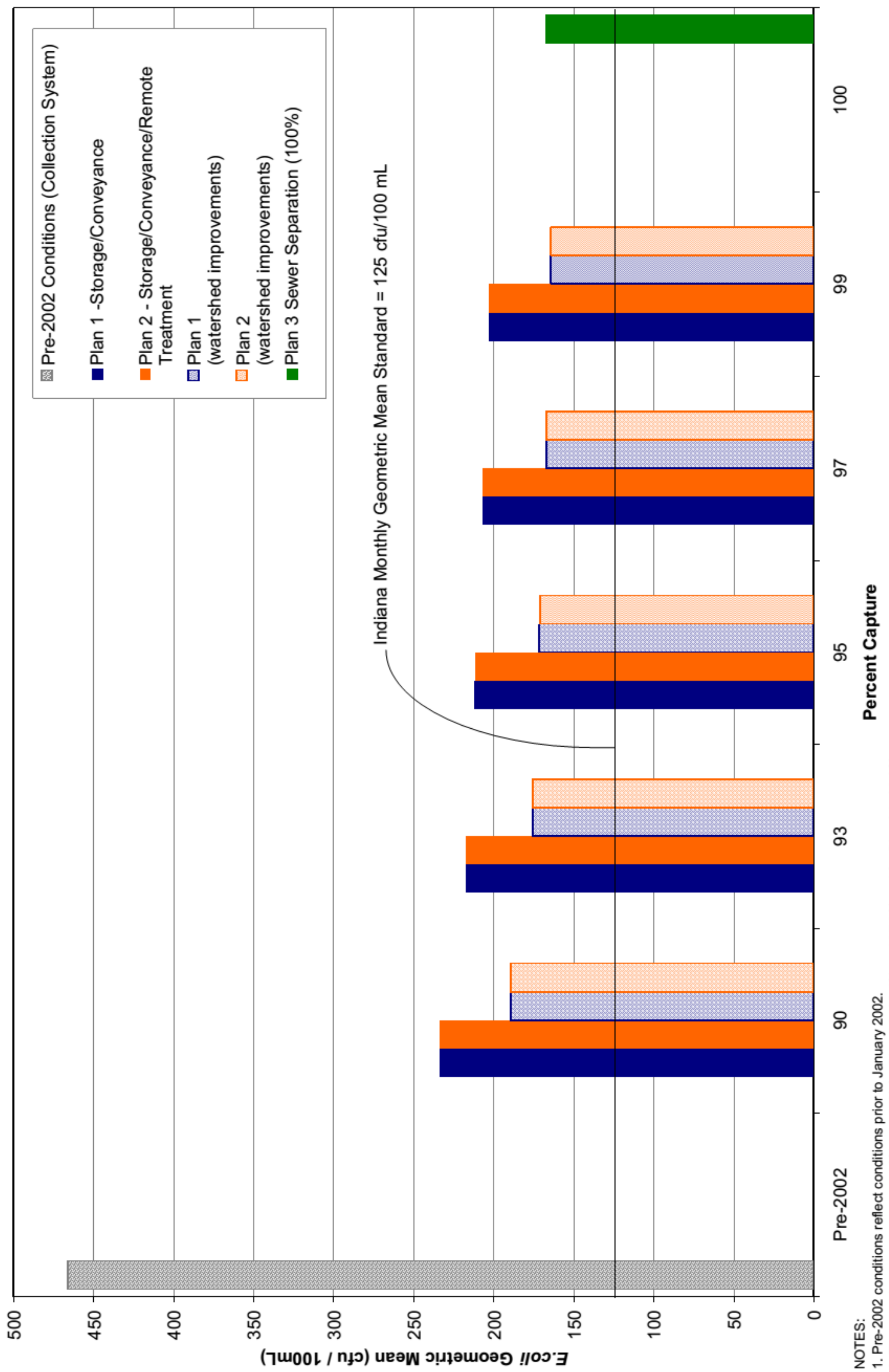
Notes:
1. The actual percent capture at 93 and 97 for Plan 1 is 93.4 and 97.3 and for Plan 2 is 93.8 and 97.5, respectively. For comparison purposes, these were rounded to the same whole number. Plan 3, Total Sewer Separation, is 100 capture.
2. Indiana's TMDL criteria equals no more than 36.5 days per year over 235cfu 100mL.

Table 4-20
Estimated *E. coli* Bacteria Impacts (Days over 2000 cfu/100 mL) (2006)

Watershed	Systemwide Percent Capture[1]						
	Existing	90%	93%	95%	97%	99%	100%
Fall Creek							
Without Watershed Improvements	63	12	7	5	3	2	0
With Watershed Improvements	63	12	6	4	2	1	0
Pogues Run							
Without Watershed Improvements	77	13	7	5	4	2	5
With Watershed Improvements	77	12	6	4	2	1	0
Pleasant Run							
Without Watershed Improvements	50	21	17	15	14	13	5
With Watershed Improvements	50	12	6	4	2	1	0
Eagle Creek							
Without Watershed Improvements	35	25	22	21	20	19	21
With Watershed Improvements	35	16	11	10	8	7	10
White River							
Without Watershed Improvements	69	16	11	9	7	7	9
With Watershed Improvements	69	14	9	7	5	4	7

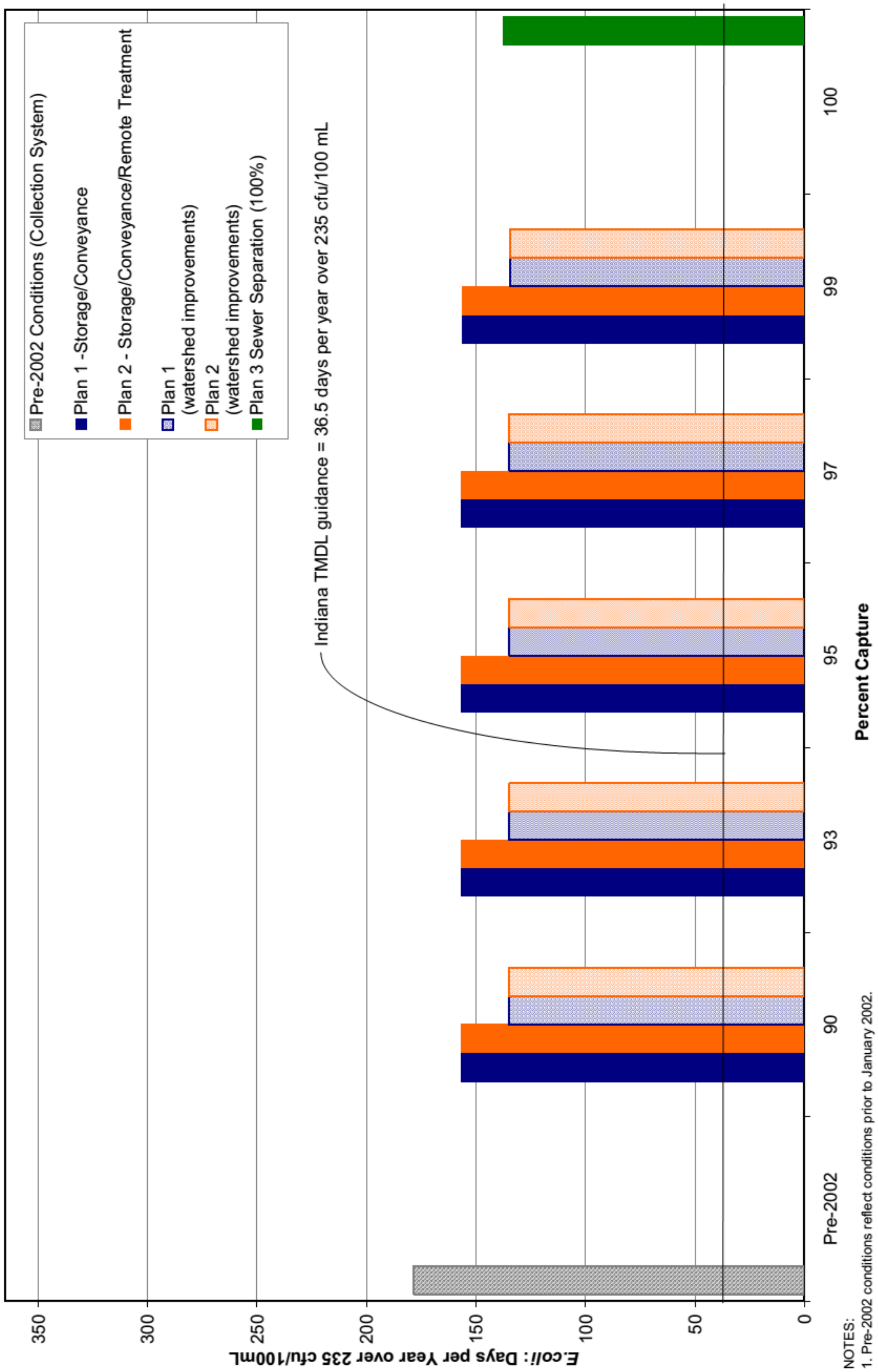
Notes:

1. Estimated bacteria impacts for Plan 1 and Plan 2 were identical for at all levels of control. The actual percent capture at 93□ and 97□ for Plan 1 is 93.4□ and 97.3□ and for Plan 2 is 93.8□ and 97.5□, respectively. For comparison purposes, these were rounded to the same whole number. Plan 3, Total Sewer Separation, is 100□ capture.
2. Indiana's TMDL criteria equals no more than 36.5 days per year over 235cfu□100mL.



NOTES:
1. Pre-2002 conditions reflect conditions prior to January 2002.
2. The actual percent capture at 93% and 97% for Plan 1 is 93.4% and 97.3% and for Plan 2 is 93.8% and 97.5% respectively. For comparison purposes, these were rounded to the same whole number.

Figure 4-39
White River Watershed Plan Options and Level of Control Evaluated: Percent Capture and *E. coli* Levels (2006)



NOTES:
1. Pre-2002 conditions reflect conditions prior to January 2002.
2. The actual percent capture at 93% and 97% for Plan 1 is 93.4% and 97.3% and for Plan 2 is 93.8% and 97.5% respectively. For comparison purposes, these were rounded to the same whole number.

Figure 4-40
White River Watershed Plan Options and Level of Control Evaluated:
E. coli **Bacteria Exceedances (2006)**

4.6.4 Other Evaluation Factors

4.6.4.1 Cost-Effectiveness

CSO controls represent a significant public works investment that placed a financial burden on Indianapolis residents. The CSO control program must be designed to achieve significant and tangible benefits with affordable costs. To analyze these costs and benefits, the City developed a variety of cost-benefit curves.

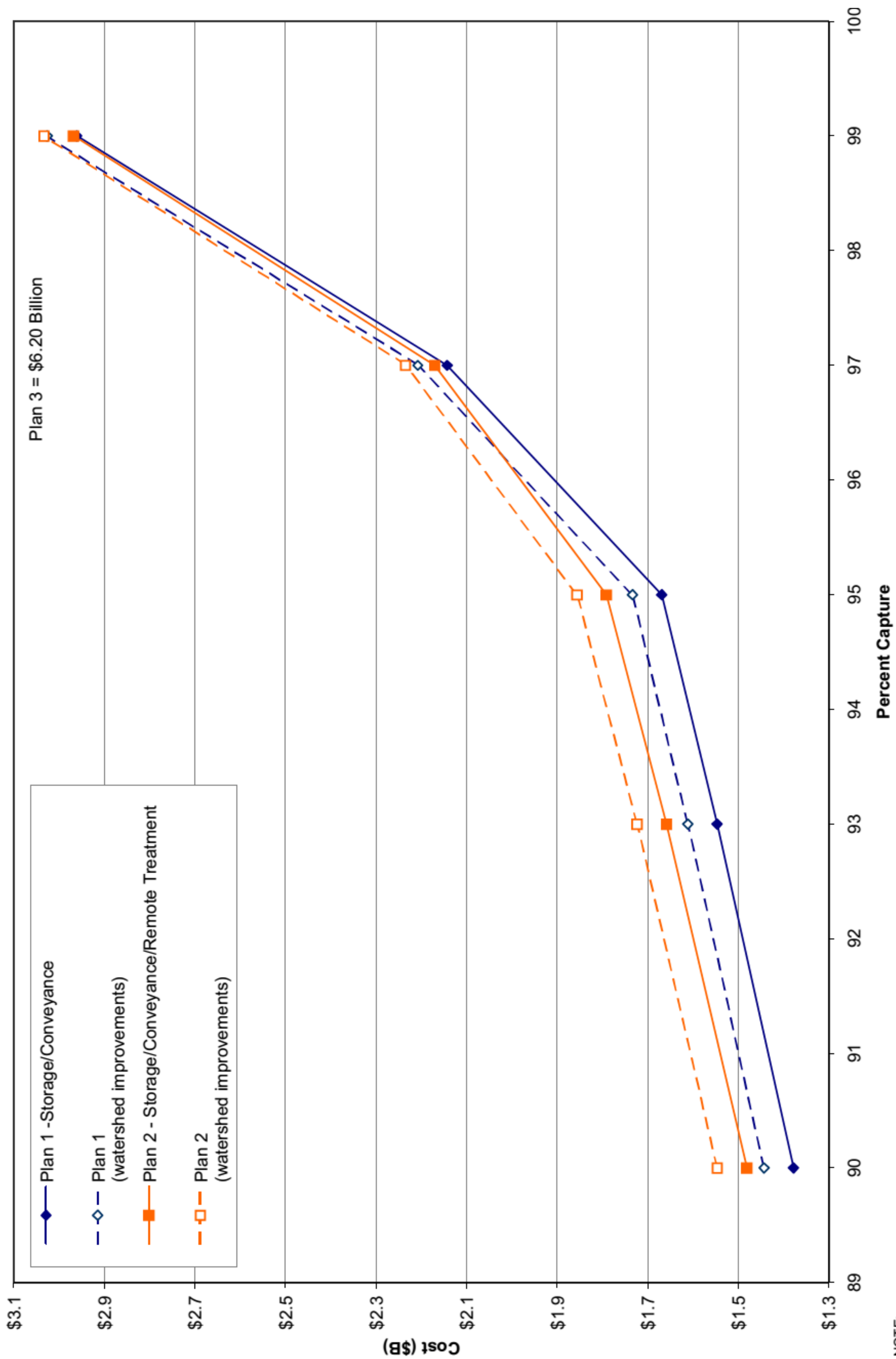
Cost-benefit curves were used to compare similar alternatives over a range of design conditions or capture levels. Typically, these comparisons indicated that for lower levels of control, small increments of increased cost would result in large increments of improved performance. For high levels of control, large increments of increased cost typically resulted in increasingly smaller increments of improved performance. The optimal point, or “knee-of-the-curve,” is a point where the incremental change in the cost of the control alternatives per change in performance of the control alter- native changes most rapidly, indicating that the slope of the curve is changing from shallow to steep or vice versa.

Present worth costs for each alternative are presented in **Figure 4-41** against CSO percent capture level. Costs were presented for CSO controls alone and in conjunction with additional watershed improvements. The least cost alternative was CSO Control Plan 1 (storage and conveyance) at 90 percent capture while CSO Control Plan 3 (sewer separation) was the highest cost. Across the different CSO control levels, CSO Control Plan 1 was always the lowest cost alternative. Plan 3 was extremely expensive at more than $6 billion. For CSO Control Plan 1 and CSO Control Plan 2, the City determined that the systemwide knee-of-the-curve was at 95 percent capture, with the knee of the curve for Fall Creek at 97 percent capture.

Figure 4-41 shows another cost-benefit curve based on the expected reduction in days exceeding the *E. coli* bacteria standard of 235 cfu per 100 mL. Days of exceedance were presented for CSO controls alone and controls in conjunction with additional watershed improvements. As described earlier, under current conditions, Indianapolis would not meet in-stream water quality standards for bacteria during wet weather even with elimination of all CSOs. Increasing the system percent capture level from 90 to 99 percent would only achieve one additional day of compliance with the standard. The figure illustrates that greater water quality benefits can be achieved through a combined program of controlling CSOs and implementing other projects to address additional bacteria sources in the watersheds.

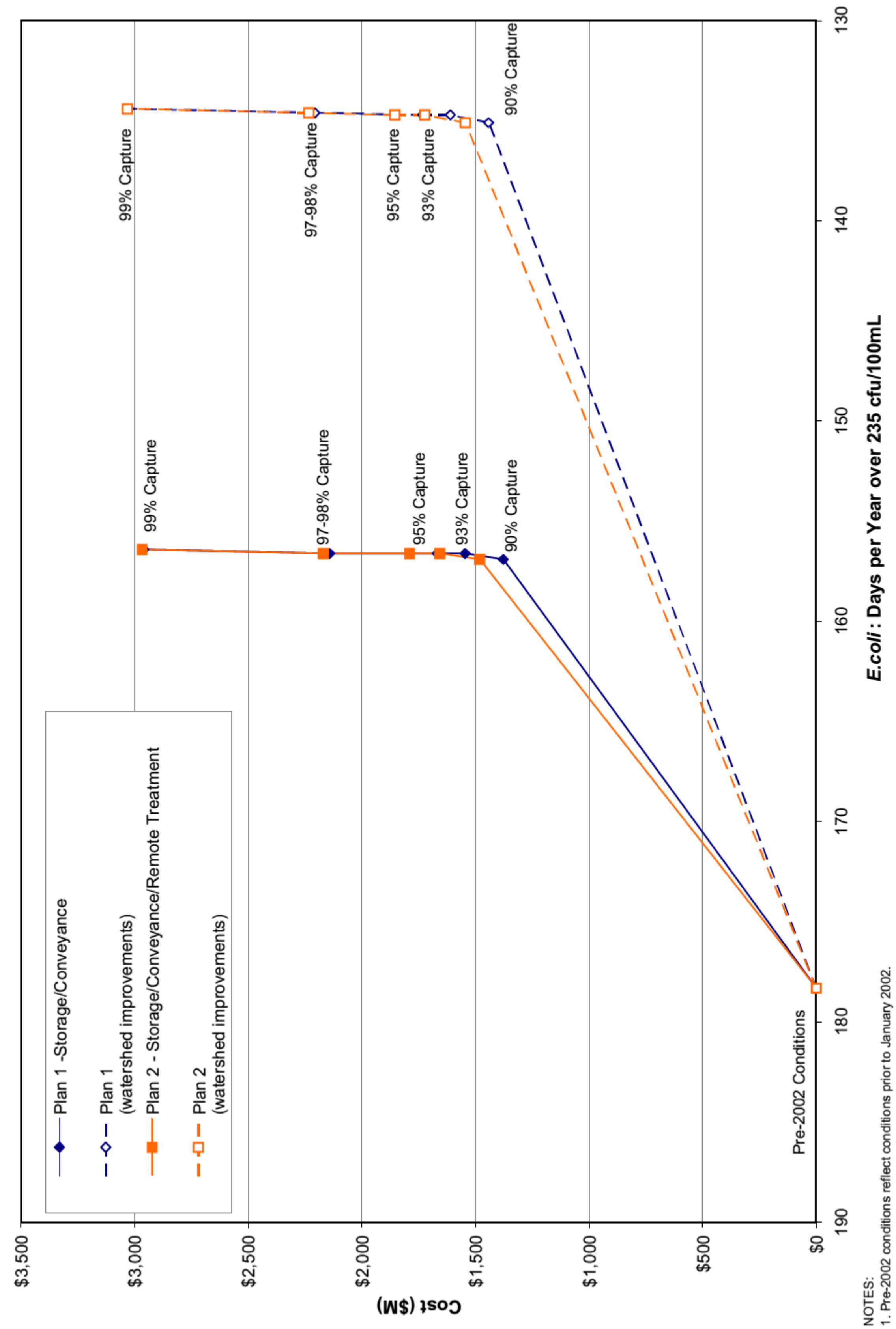
A similar illustration is included in **Figure 4-42**, where days over 10,000 cfu per 100 mL are presented. The figure illustrated the rapidly increasing incremental costs associated with achieving fewer days beyond 95 percent capture. For example, in order to improve performance from four days per year to one every two years, the City would have to spend an additional $1.297 billion (2006 dollars). When evaluating cost and bacteria performance, the City determined that the systemwide knee of the curve was at 95 percent capture, with the knee of the curve for Fall Creek at 97 percent capture.

In line with the watershed technology screening, the City also evaluated the following cost-benefit curves: cost per gallon of CSO captured, cost per pound of BOD removed, and cost per unit of *E. coli* bacteria removed per year. The results are presented in **Figure 4-44**, **Figure 4-45**, and **Figure 4-46**, respectively. For Plan 1 and Plan 2, the City determined that the systemwide knee of the curve is at 95 percent capture, with the knee of the curve for Fall Creek at 97 percent capture.



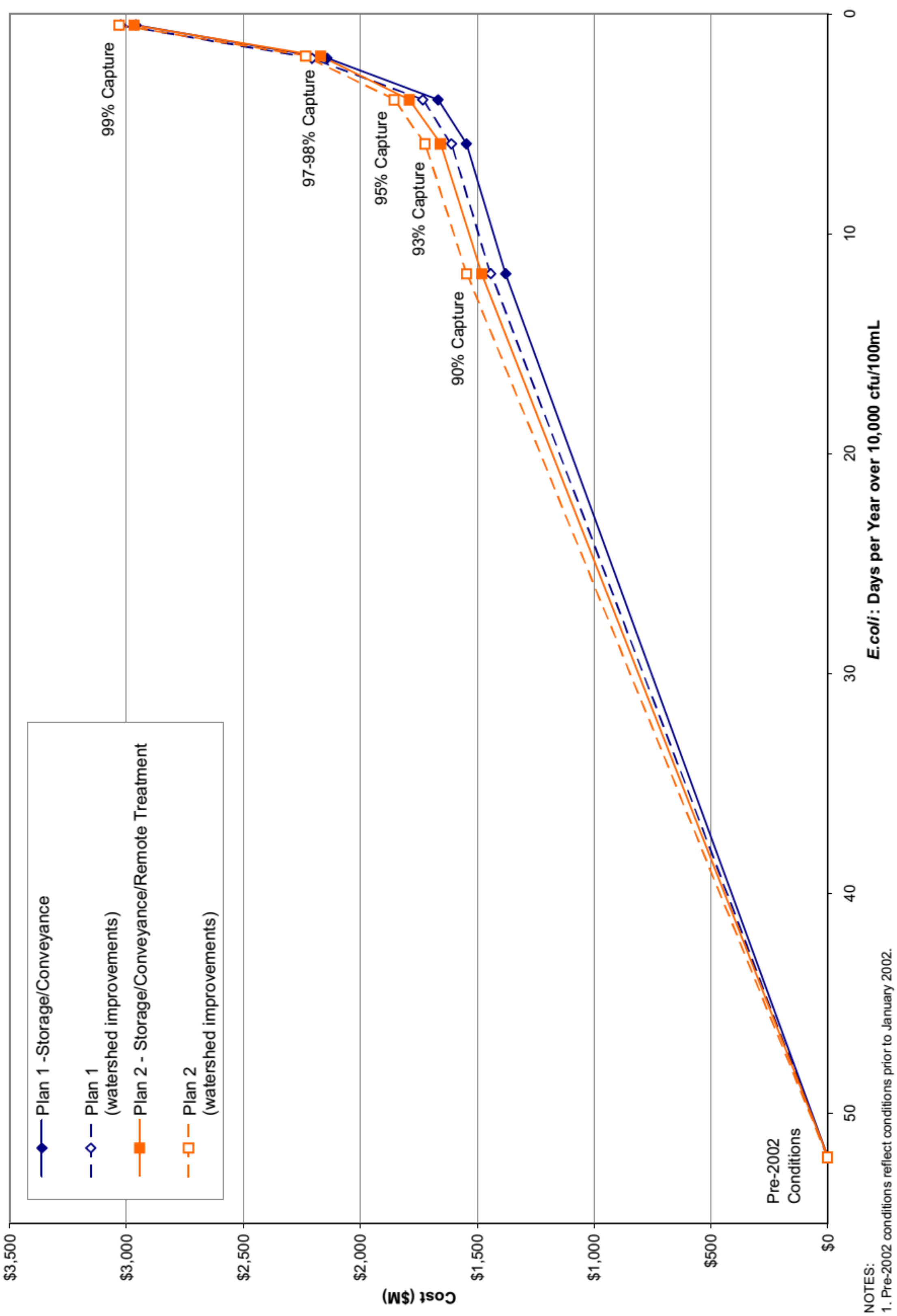
NOTE:
1. The actual percent capture at 93% and 97% for Plan 1 is 93.4% and 97.3% and for Plan 2 is 93.8% and 97.5% respectively. For comparison purposes, these were rounded to the same whole number.

Figure 4-41
Present Worth Costs for Each Alternative by Percent Capture (2006)



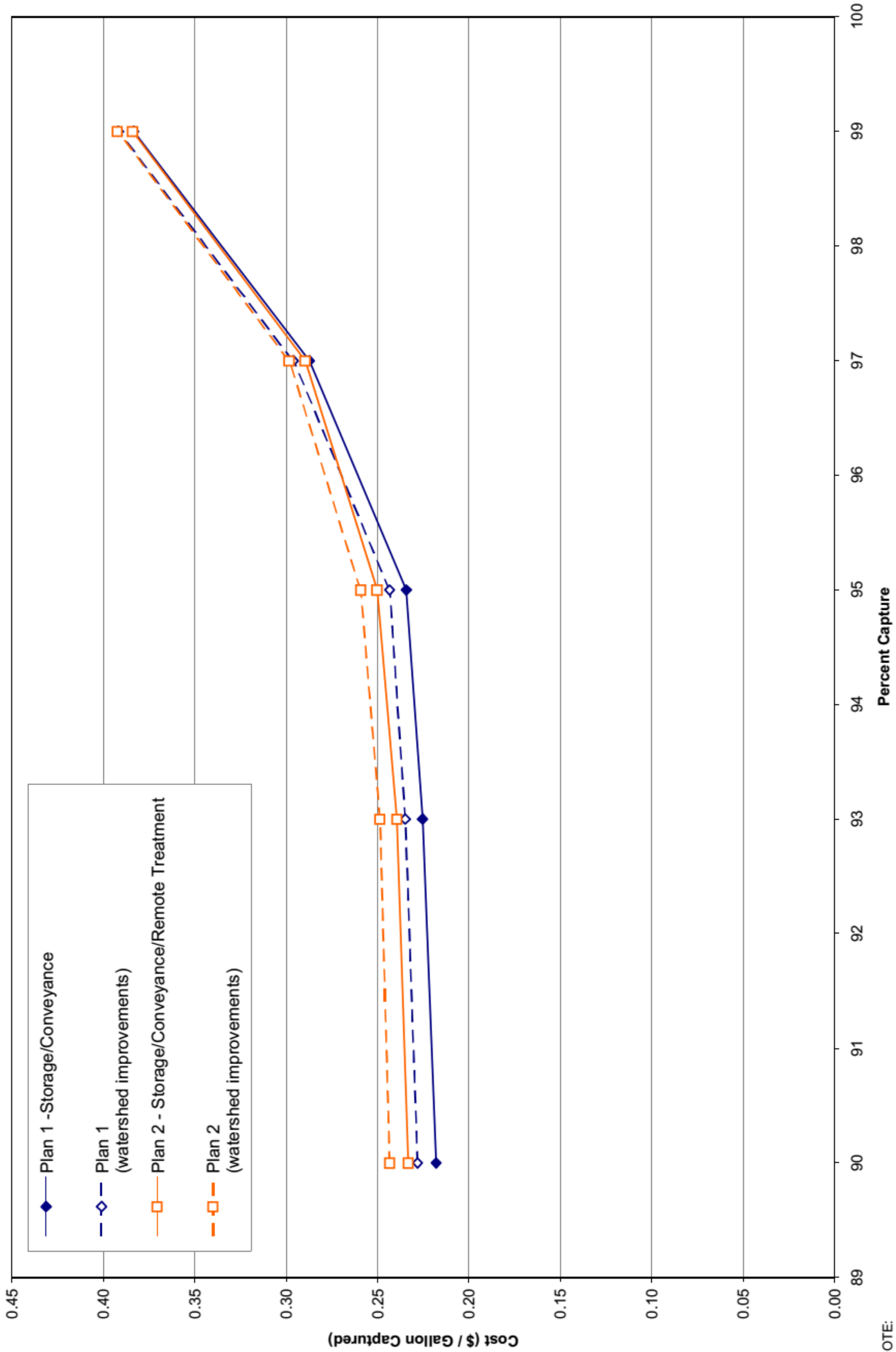
NOTES:
1. Pre-2002 conditions reflect conditions prior to January 2002.
2. The actual percent capture at 93% and 97% for Plan 1 is 93.4% and 97.3% and for Plan 2 is 93.8% and 97.5% respectively. For comparison purposes, these were rounded to the same whole number.

Figure 4-42
Present Worth Costs for Each Alternative by *E. coli* Days per Year Over 235 cfu/ 100mL (2006)



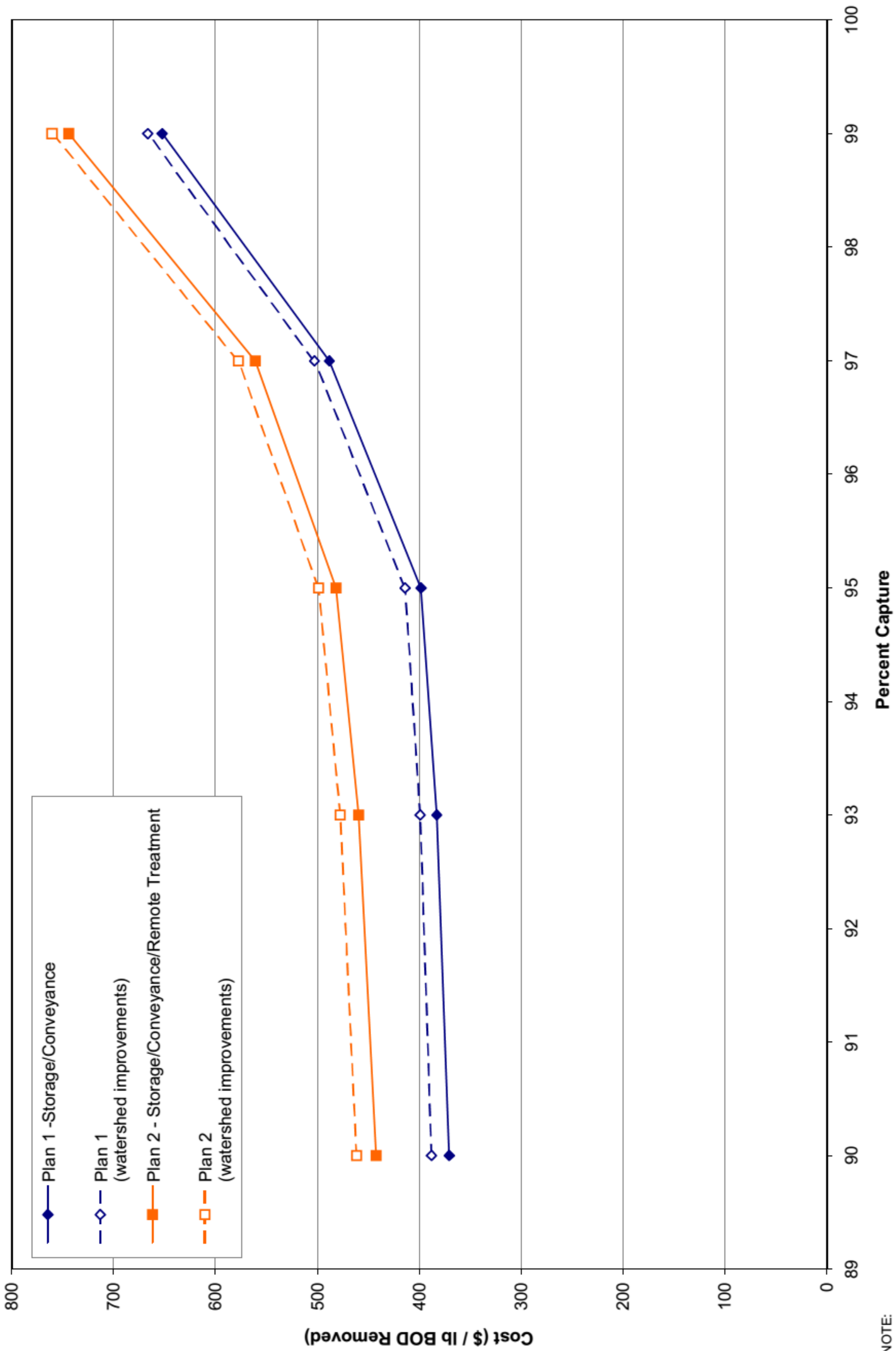
NOTES:
1. Pre-2002 conditions reflect conditions prior to January 2002.
2. The actual percent capture at 93% and 97% for Plan 1 is 93.4% and 97.3% and for Plan 2 is 93.8% and 97.5% respectively. For comparison purposes, these were rounded to the same whole number.

Figure 4-43
Present Worth Costs for Each Alternative by *E. coli* Days per Year Over 10,000 cfu/100mL (2006)



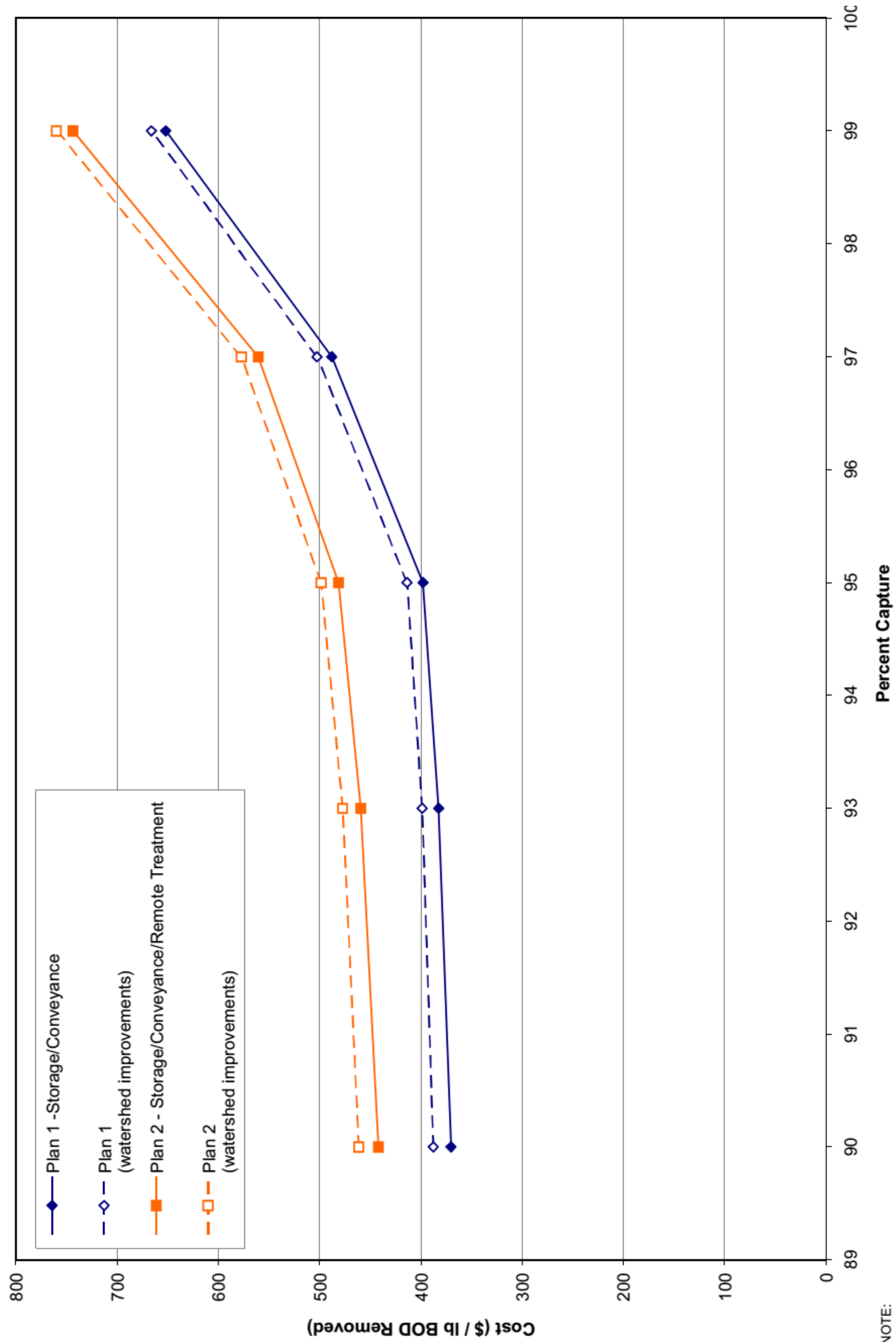
NOTE:
1. The actual percent capture at 93% and 97% for Plan 1 is 93.4% and 97.3% and for Plan 2 is 93.8% and 97.5% respectively. For comparison purposes, these were rounded to the same whole number.

Figure 4-44
Present Worth Costs ($ / Gal. Captured) for Each Alternative by Percent Capture (2006)



NOTE:
1. The actual percent capture at 93% and 97% for Plan 1 is 93.4% and 97.3% and for Plan 2 is 93.8% and 97.5% respectively. For comparison purposes, these were rounded to the same whole number.

Figure 4-45
Present Worth Costs ($ / lb BOD Removed) for Each Alternative by Percent Capture (2006)



NOTE:
1. The actual percent capture at 93% and 97% for Plan 1 is 93.4% and 97.3% and for Plan 2 is 93.8% and 97.5% respectively. For comparison purposes, these were rounded to the same whole number.

Figure 4-46
Present Worth Costs ($M / unit *E. coli* Bacteria Removed) for Each Alternative by Percent Capture (2006)

4.6.4.2 Higher CSO Control in Tributaries

Some members of the City's advisory committees advocated placing a higher priority on controlling CSOs in the tributaries because they were neighborhood streams where they presumed that people, especially children, were more likely to come into contact with the water. Ultimately, water quality conditions in the White River would be improved both by controlling CSOs along the tributaries and by controlling CSOs that directly discharge to the White River.

For this reason, the City considered alternatives that would achieve a higher percent capture on the tributaries and a lower corresponding percent capture in the White River. For example, one alternative might have included 95 percent capture within the tributaries (roughly 4 untreated overflows per year) and 93 percent capture in the White River (roughly 6 overflows). To accommodate this, the project team was able to determine costs for such plans without performing additional modeling or detailed cost estimating by interpolating from the costs developed for the established systemwide plans.

U.S. EPA and IDEM specifically requested cost estimates for 93 percent system capture in White River and 95, 97, and 99 percent system capture in the tributaries for CSO Control Plan 1. They were also interested in the cost for 93 percent system capture in White River and 99 percent capture on the tributaries for CSO Control Plan 2. The present worth costs for the mixed plans requested by the U.S. EPA and IDEM are included in **Figure 4-47**. The resulting cost fell between the 93 and 95 percent capture levels; in all cases, the costs fell closer to the higher capture level cost. For example, the cost for 93 percent capture in White River and 99 percent capture on the tributaries for Plan 1 fell closer to the cost to provide 99 percent capture systemwide. Therefore, lowering controls on White River was not determined to be a method to significantly reduce program costs, or to transfer CSO control investments to the tributaries in order to gain greater protection in the smaller streams. Providing lesser protection on White River also would lessen protection of downstream users, raise environmental equity concerns and lessen protection for increasing recreational use within Marion County.

4.6.4.3 Neighborhood Issues

The systemwide CSO control alternatives evaluation included community input regarding neighborhood issues. Those neighborhood issues included the following:

Siting Concerns: How close are facilities to homes, parks, schools, roads, and so on? How difficult would it be to site this alternative at projected locations? What effect would this alternative have on the existing area?

Safety and Security: Are there public safety issues associated with the proposed alternative, such as use of chemicals for treatment, creation of habitat for vector/nuisance populations (such as mosquitoes and flies)? Are there security issues, such as a potential for vandalism, terrorism, sabotage, and so on?

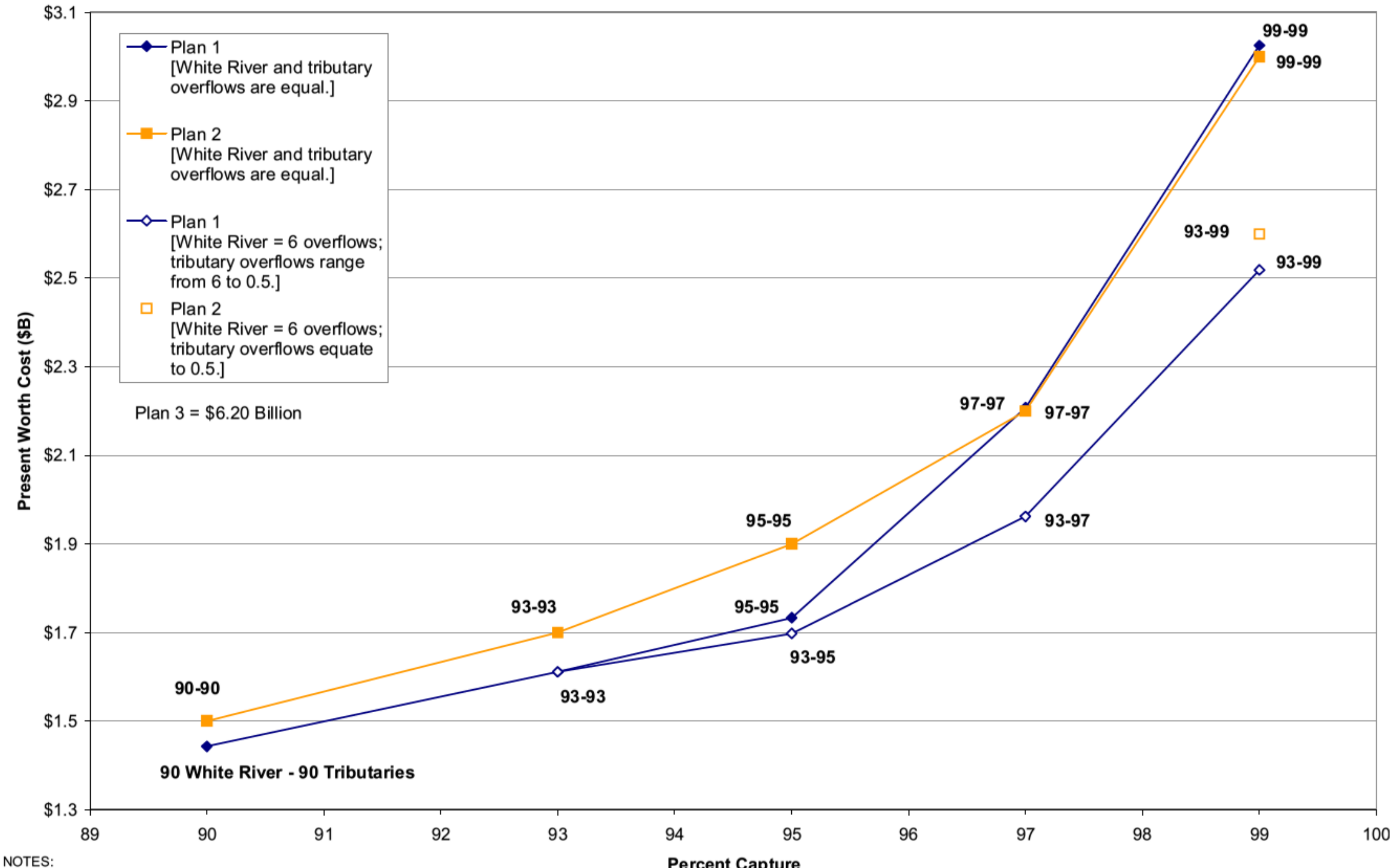
Disruption to Neighborhood (Construction): Disruption may include physical disturbance, rerouting, temporary blocking of facilities, and so on. How much disruption will be caused to the use of streets, sidewalks, parks, and yards
during construction? How long will the disruption last?

Aesthetics: How will the alternative have a visual impact on the existing landscape? Can the alternative be seen from a home or public gathering place, such as a park? Can the design of any new facilities consider/incorporate surrounding architecture, landscaping, neighborhood themes, and so on? How will environmental justice concerns be addressed?

Noise: How much and when will noise occur during construction? How much noise will be present in the long-term from operating procedures such as pumps, blowers, etc.?

Odor: Are odors expected to be reduced in surrounding areas during long-term operation? Are odors in the area going to be increased during long-term operation?

Truck Traffic (Operation): How frequently will trucks travel through a neighborhood for regular operation and maintenance activities?



NOTES:
1. Present worth cost presented includes watershed improvements.
2. Plan 2 cost for 6 overflows on White River and 0.5 overflows on tributaries shown only as requested by EPA at April 26, 2004 meeting.
3. The actual percent capture at 93% and 97% for Plan 1 is 93.4% and 97.3% and for Plan 2 is 93.8% and 97.5% respectively. For comparison purposes, these were rounded to the same whole number.

Figure 4-47
Present Worth Costs for Mixed Plans by Percent Capture (2006)

Advisory committee members and City staff evaluated the criteria through a pairwise comparison to develop weighting factors for each individual criterion. The summed criteria weighting factors were converted to a percent. Results of the criteria weighting are presented in **Table 4-21**. Safety and security received the highest weight while neighborhood disruption and truck traffic ranked lowest.

Once the weights were established, the systemwide CSO control alternatives were evaluated for each individual criterion. The alternatives were evaluated without regard to different levels of CSO control. For example, when considering siting concerns, committee members and City staff determined that CSO Control Plan 3 (sewer separation) ranked highest when compared to CSO Control Plan 1 (storage and conveyance) and CSO Control Plan 2 (storage, conveyance, and remote treatment). Results of this ranking are presented in **Table 4-22**.

Through this weighting and ranking, committee members and City staff determined that CSO Control Plan 1 (storage and conveyance) received the highest overall ranking based upon neighborhood issues. In comparison, the remote treatment facilities in CSO Control Plan 2 created concerns over siting, noise, odor, truck traffic during operation and aesthetics. Sewer separation raised concerns over neighborhood disruption, and to some extent siting, aesthetics and truck traffic.

Table 4-21
Neighborhood Issues Criterion Ranking (2006)

	Neighborhood Issues									
Criteria	Siting Concerns	Safety and Security	Neighborhood Disruption (Construction)	Aesthetics	Noise	Odor	Truck Traffic (Operation)	Sum	Criteria Weight	Rank
Siting Concerns		1	3	2	1	1	3	11	13.1%	4
Safety and Security	3		3	3	1	1	3	14	16.7%	3
Neighborhood Disruption (Construction)	1	1		1	1	1	2	7	8.3%	7
Aesthetics	2	1	3		1	1	2	10	11.9%	5
Noise	3	3	3	3		2	3	17	20.2%	1
Odor	3	3	3	3	2		3	17	20.2%	1
Truck Traffic (Operation)	1	1	2	2	1	1		8	9.5%	6
							TOTAL	84	100%	

Key:
1 □ lower than
2 □ same as
3 □ higher than

Table 4-22
Neighborhood Issues Plan Ranking (2006)

Criteria		Criteria Description	Rank Plan 1	Plan 2	Plan 3
13.1%		**Siting Concerns**	1	2	2
-	1	How close are facilities to homes, parks, schools, roads, etc.?	1	3	1
-	2	How difficult would it be to site this alternative at projected locations?	1	2	3
-	3	What effect would this alternative have on the existing area?	1	2	3
Score Subtotal			3	7	7
16.7%		**Safety and Security**	1	3	1
-	1	Are there public safety issues associated with the proposed alternative, such as use of chemicals for treatment, creation of habitat for vector nuisance populations (i.e. mosquitoes and flies)?	1	3	1
-	2	Are there security issues, such as potential for vandalism, terrorism, sabotage, etc.?	1	3	1
Score Subtotal			2	6	2
8.3%		**Neighborhood Disruption (Construction)**	1	2	3
-	1	How much disruption will be caused to the use of streets, sidewalks, parks, yards, etc., during construction?	1	1	3
-	2	How long will the disruption last?	1	2	3
Score Subtotal			2	3	6
11.9%		**Aesthetics**	1	3	2
-	1	How will the alternative have a visual impact on the existing landscape?	1	3	3
-	2	Can the alternative be seen from a home or public gathering place, such as a park?	2	3	1
-	3	Can the design of any new facilities consider incorporate surrounding architecture, landscaping, neighborhood themes, etc.?	1	3	1
-	4	How will environmental justice concerns be addressed?	1	3	1
Score Subtotal			5	12	6
20.2%		**Noise**	1	3	1
-	1	How much and when will noise occur during construction?			
-	2	How much noise will be present in the long-term from operating procedures such as pumps, blowers, etc.?	2	3	2
Score Subtotal			2	3	2
20.2%		**Odor**	2	3	1
-	1	Are odors expected to be reduced in surrounding areas during long- term operation?			
-	2	Are odors in the area going to be increased during long-term operation?	2	3	1
Score Subtotal			2	3	1
9.5%		**Truck Traffic (Operation)**	1	3	2
-	1	How frequently will trucks travel through a neighborhood for regular operation and maintenance activities?	1	3	2
Score Subtotal			1	3	2
Total Score			1.2	2.8	1.5
RANK			1	3	2

4.6.4.4 Seasonality of Overflows

Advisory committee members also asked the City to analyze when predicted overflows were likely to occur. For example, were most overflows likely to occur in the winter months when people were not likely to be exposed, or in the summer months? The City used hydraulic model runs to estimate how the sewer system would perform throughout the year if CSO control facilities were built, based on varying levels of capture. The analysis was based upon 54 years of rainfall data.

The results of this analysis are summarized in **Table 4-23**. The chart shows that under pre-2002 conditions, the system overflowed 60 times per year, on average. This value ranged from a low of 45 overflows/year to a high of 79 overflows/year, depending on wet weather events. During the recreational season of April 1 through October 31, overflows occurred 37 times/year, on average. This value ranged from a low of 24 overflows/year to a high of 50/year during the recreational season.

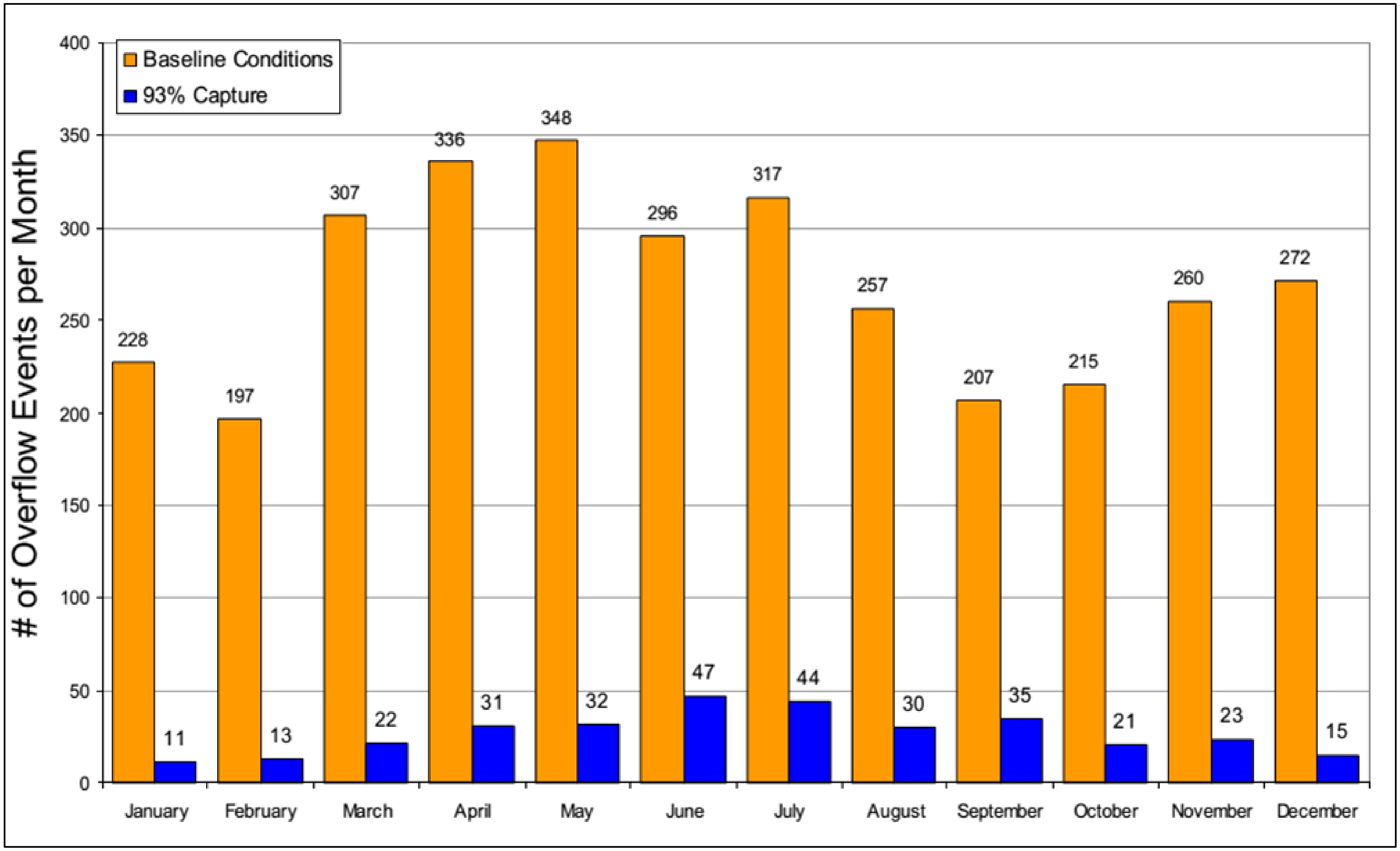
Values were also shown in the table to predict how the system would respond to storms at 93 percent, 95 percent or 97 percent capture. At 93 percent capture, facilities were expected to overflow an estimated six times per year, but would range from a low of one event to 12 events per year during the 54-year period that was studied. At 95 percent, the annual average was four events per year, but the range was from zero (0) events to ten (10), depending on weather conditions each year. At 97 percent, the annual average was two, but the annual range was from zero (0) to six (6). Because larger storm events tended to occur in the summer months, approximately 70-75 percent of the annual average overflows would occur during the recreational season, as the City's analysis showed.

The City also developed graphs showing estimated overflow events distributed by month. An "overflow event" is defined as a storm or precipitation event that causes one or more untreated overflows from the combined sewer system. Overflows may occur from more than one outfall pipe and into more than one stream in a single "overflow event." The graphs demonstrate how the system would per- form each month, based upon the 1950-2003 rainfall record in Indianapolis. **Figures 4-48** through **4-50** compare current conditions to a specific level of control: 93, 95 or 97 percent capture.

At 93 percent capture, an estimated 324 overflow events would occur over the 54-year time period, with the greatest number of events occurring in the April-September timeframe. The distribution of events changed from the current conditions because larger storms tends to occur in summer months. Similarly, at 95 percent and 97 percent capture the number of events in each month fell. However, the winter months were the biggest beneficiaries of going from 95 to 97 percent capture.

Table 4-23
Distribution of Modeled Overflow Events: Annual vs. Recreational Season (2006)

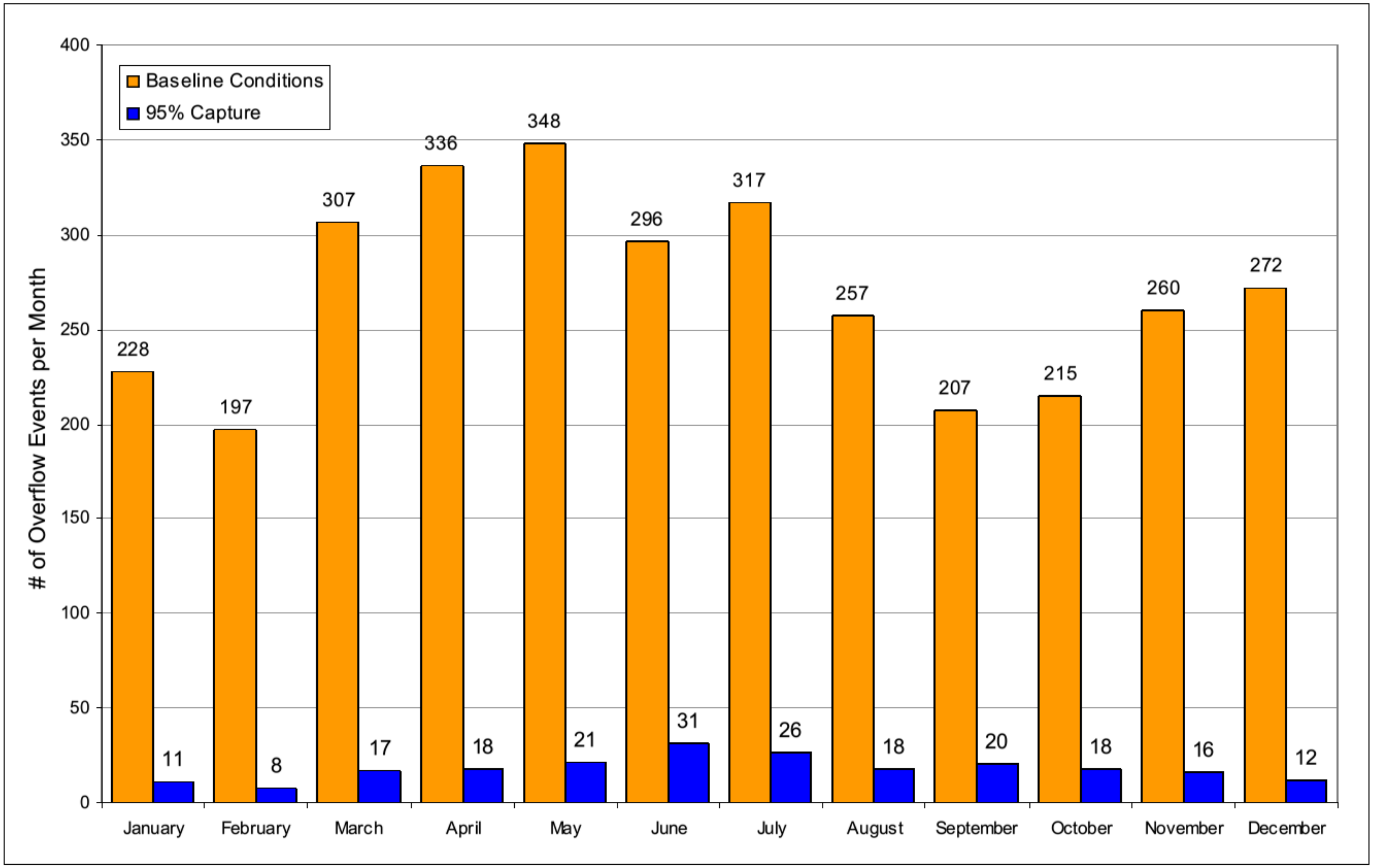
Percent Capture	Avg. No. of Overflow Events/Year	Annual Overflow Events: (Range)	Avg. No. OF Events During Rec. Season/Year	Rec. Season Overflow Events: (Range)
63% (Baseline)	60	45-79	37	24-50
93%	6	1-12	4.4	0-10
95%	4	0-10	2.8	0-6
97%	2	0-6	1.5	0-5



Source: 1950-2003 NetSTORM simulation. Baseline conditions and systemwide Plan 1, 93% capture level of control.

Note: (1) For baseline conditions, there are 3,240 events presented over 54 years of record for an annual average frequency of 60 events per year.
(2) For the 93% capture level of control, there are 324 events presented over 54 years of record.
(3) It is estimated that at least one CSO outfall structure would discharge for the plotted number of events each month.

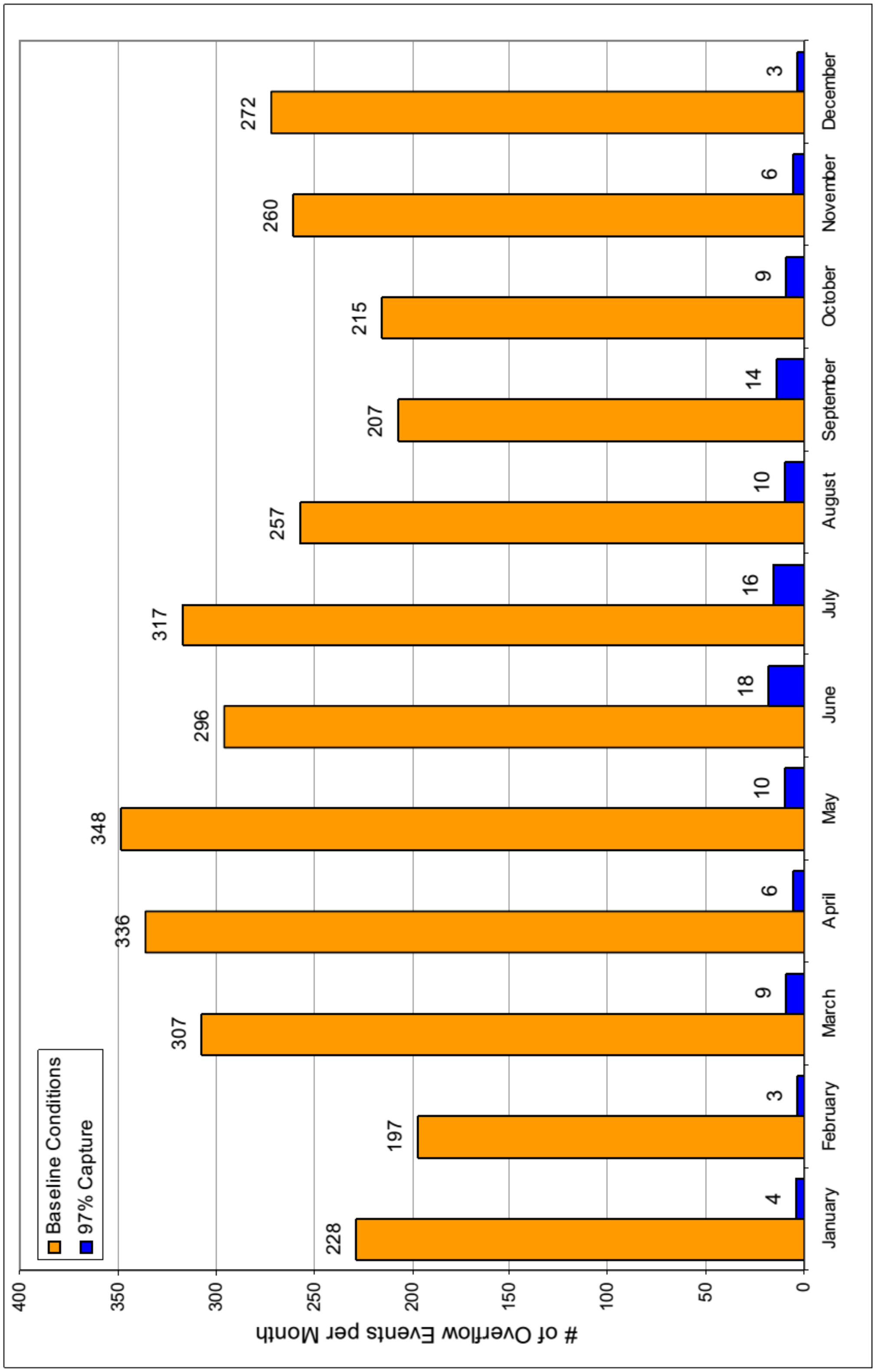
Figure 4-48
Current Conditions Compared to 93% Capture Level of Control (2006)



Source: 1950-2003 NetSTORM simulation. Baseline conditions and systemwide Plan 1, 95% capture level of control.

Note: (1) For baseline conditions, there are 3,240 events presented over 54 years of record for an annual average frequency of 60 events per year.
(2) For the 95% capture level of control, there are 216 events presented over 54 years of record.
(3) It is estimated that at least one CSO outfall structure would discharge for the plotted number of events each month.

Figure 4-49
Current Conditions Compared to 95% Capture Level of Control (2006)



Source: 1950-2003 NetSTORM simulation. Baseline conditions and systemwide Plan 1, 97% capture level of control.

Note: (1) For baseline conditions, there are 3,240 events presented over 54 years of record for an annual average frequency of 60 events per year.
(2) For the 97% capture level of control, there are 108 events presented over 54 years of record.
(3) It is estimated that at least one CSO outfall structure would discharge for the plotted number of events each month.

Figure 4-50
Current Conditions Compared to 97% Capture Level of Control (2006)

4.7 2006 LTCP Summary

In summary, the long term control planning process was iterative and ultimately resulted in five overall components:

- Constructing a deep tunnel to capture CSO flows from the White River and its tributaries.
- Making site-specific improvements to the collection system within the individual watersheds, to eliminate, consolidate or direct CSO flows to the deep tunnel.
- Improvements at the Belmont AWT plant to eliminate primary effluent bypasses and reduce headworks over- flows.
- Unlocking capacity at the Southport AWT plant to treat captured CSO flows from the central tunnel.
- Constructing an interplant connection between the Belmont and Southport AWT plants with its main purpose to convey captured CSO flows from the deep tunnel to the Southport AWT plant.

These components were developed into three systemwide plan concepts:

CSO Control Plan 1: Storage/conveyance in all water-sheds and AWT plant improvements, evaluated for five levels of control: 90, 93, 95, 97 and 99 percent capture.

CSO Control Plan 2: Remote treatment/storage in Fall Creek and Pogues Run watersheds and storage/conveyance in other watersheds, with AWT plant improvements, evaluated under five levels of control: 90, 93, 95, 97 and 99 percent capture.

CSO Control Plan 3: Sewer separation in all watersheds.

The City's analysis of the costs, water quality impacts and other evaluation factors yielded the following general conclusions:

- Plan 1 was the lowest-cost alternative among the three plan concepts evaluated. Plan 3 was the most expensive. Plan 1 ranked first relative to neighborhood issues identified by City staff and citizen advisory committees.
- At each level of control evaluated, Plan 1 and Plan 2 achieved similar results for CSO volume reduction, dissolved oxygen impacts, and *E. coli* bacteria impacts. Plan 1 performed better than Plan 2 at BOD reduction, due to the higher level of treatment provided at the AWT plants.
- Plan 3 (sewer separation) was the only option that would eliminate CSO overflows; however, its $6.2 billion cost would need to be evaluated against the City's financial capability. Sewer separation also raised concerns regarding disruption to the community and increased loads of untreated stormwater to the streams.
- No CSO control alternative would achieve the state's recreational water quality standards for *E. coli* bacteria at all times. However, CSO controls would reduce the number of days that *E. coli* values exceeded higher targets of 2,000, 5,000 or 10,000 cfu/100 mL.
- Other pollutant sources within and outside Marion County also have a significant impact on the water quality of CSO receiving streams. For these reasons, the city evaluated other control alternatives that might enhance or supplement the benefits of structural CSO controls. These additional controls included measures to eliminate failing septic systems, install stormwater controls, remove illicit connections, restore streambanks, remove polluted sediments, increase flow and improve dissolved oxygen levels in the streams.
- Because the City could not achieve the *E. coli* single sample maximum at all times, it prepared a Use Attainability Analysis (UAA) and sought state approval of a wet-weather use subcategory for those storm events that would exceed the capacity of CSO control facilities.
- The City determined that cost-benefit analyses based on units of *E. coli* removed, pounds of BOD removed and CSO gallons captured placed the systemwide knee of the curve at 95 percent capture, with the knee of the curve for Fall Creek at 97 percent capture.
- The City also evaluated the potential costs and benefits of achieving higher levels of control in the tributaries vs. White River and analyzed the seasonal and monthly distribution of predicted overflow events under varying levels of control.

The results of this analysis were presented to Marion County residents during a public outreach process in

October 2004, as described in Section 5. The costs also were used in developing the City's financial capability analysis, as described in Section 6. Both public input and financial capability were used to help select the recommended plan described in Section 7.

4.8 Post-LTCP Approval Summary

A summary of the selected 2006 LTCP alternative and the amendments to the approved 2006 Consent Decree is included in **Sections 4.8.1** and **4.8.2** below.

4.8.1 Selected 2006 LTCP Alternative

CSO Control Plan 1 was selected based on the alternative evaluation described in this section, the public input described in Section 5 and the financial impacts and affordability analysis discussed in Section 6. It was determined to be the most cost-effective, provided the best performance on neighborhood issues and operability, and achieved the greatest reduction in biological oxygen demand (BOD). It was also the public's preferred plan, as described in Section 5.

The key features of the 2006 selected plan were as follows:

- Central tunnel system along Fall creek and the White River, with a pumping facility located near the Southwest Diversion Structure at the Belmont AWT
- Collection interceptor for remote outfalls along Fall Creek and the White River to convey wet-weather flows into the central tunnel system
- Satellite storage facilities for remotely located outfalls along upper White River and upper Pogues Run
- Collection interceptors along Pogues Run, Pleasant Run and Bean Creek to convey wet-weather flows into the central tunnel system
- Collection interceptor along Eagle Creek to convey wet-weather flows to the Belmont AWT plant
- An interplant connection interceptor from the Southwest Diversion Structure to the Southport AWT plant to convey stored tunnel flows to the Southport plant for treatment
- Local sewer separation projects to eliminate isolated overflows on State Ditch, Lick Creek, White River and the upstream ends of Fall Creek, Pogues Run and Bean Creek
- Belmont AWT plant improvements
- Southport AWT plant improvements
- Early action projects
- Watershed improvements

The 2006 selected plan would achieve 97 percent capture on Fall Creek and 95 percent capture on White River, Pleasant Run/Bean Creek, Pogues Run and Eagle Creek. An illustration of this plan can be seen in **Figure 4-51**.

The 2006 LTCP implementation schedule incorporated CSO control measures into four phases over 20 years with expected completion in December 2025. A list of the 2006 LTCP control measures can be seen in **Table 4-24**

Table 4-24
2006 LTCP Control Measures

CSO Control Measure		Description
1	White River Screen at IUPUI (CSO 039)	Horizontal screen with automatic clearing for removal of floatables
2	Fall Creek Inflatable Dams (CSOs 063, 063A, and 065)	Construction of three inflatable dams
3	Modifications to Lift Station 507 at Riviera Club	Modifications to CSO 156 to take advantage of available storage volume in LS 507
4	Real-time Overflow Controls in Neighborhoods (CSOs 080, 084,118)	Construction of three inflatable dams
5	Pogues Run Inflatable Dam at Brookside Park (CSO 101)	Construction of one inflatable dam
6	White River East Bank Storage Tank at IUPUI White River State Park	Overflow storage for CSO 039
7	Belmont Advanced Wastewater Treatment (AWT) Plant Improvements -- WetWeather Storage and Primary Clarifiers	Wet-weather storage basins (30 and 4 MG), two new primary clarifiers, and new process yard piping
8	Lower Pogues Run Improvements - Minimize Overflows near IPS Schools	Consolidation of outfalls 034 and 035 to Pogues Run Tunnel. Consolidation sewer is approximately 5200 feet of pipe
9	Belmont AWT -- Gravity Belt Thickeners	Installation of four gravity belt thickeners
10	Sewer Separation - White River and Thompson Road (CSO 275)	Separation and rehabilitation of sewers to reduce stormwater flow and minimize CSO 275
11	Sewer Separation - Lick Creek (CSO 235)	Separation and rehabilitation of sewers to reduce storm water flow and minimize CSO 235
12	Real Time Overflow Control Study, Phase II	Develop next phase of RTC to further maximize the existing combined sewer system
13	Rerouting of Overflows on Upper White River to Lift Station 507 at Riviera Club (CSO 205)	Relocation of CSO 205 outfall to Lift Station 507. Includes rehabilitation of upstream sewers to eliminate clearwater infiltration
14	Riviera Club Improvements to Overflow Storage Tank	Add wet-weather disinfection to existing satellite storage facility
15	Fall Creek Tunnel, Collector Pipes and Watershed Projects	Deep storage tunnel, consolidation sewers, elimination of CSO 103, dam removal, aeration
16	Interplant Connection	Interceptor originating near CSO 117 and terminating near the headworks of the Southport facility
17	Belmont AWT - WetWeather Treatment (Trickling Filters Solids Contact: New aeration tanks and intermediate clarifiers)	Provide secondary biological treatment of the Belmont PE Bypass
18	Lower Pogues Run Improvements - Continued	Conversion of existing Pogues Run Box into CSO storage facility ranging from 1.5 to 10 MG and interceptor
19	Pogues Run - Sewer Separation at Forest Manor Park (CSO 143)	Sewer separation that minimizes CSO 143
20	White River Tunnel (Central Tunnel and Pump Station) and Watershed Projects	Central tunnel and pump station, consolidation sewers, sewer separation, dam modifications, and aeration

Table 4-24
2006 LTCP Control Measures (continued)

CSO Control Measure		Description
21	Belmont AWT – Wet Weather Chlorination □ Dechlorination (Chlorine Disinfection Tank and Re-establish Existing Outfall)	New wet-weather disinfection system and new discharge to White River
22	Southport Advanced Wastewater Treatment Plant Improvements -- Air Nitrification System (ANS) Expansion	Expansion of ANS from 30 MGD to 150 MGD, fine bubble aeration, new blowers, new final clarifiers, and new process□yard piping
23	Southport Advanced Wastewater Treatment Plant Improvements -- Wet Weather Disinfection	New disinfection facility, pump station, 25 MG equalization basin with aerators, and new process□yard piping
24	Southport Advanced Wastewater Treatment Plant Improvements -- Primary Clarifier Expansion	Expansion of primary clarification facility, and new process□yard piping
25	Belmont Advanced Wastewater Treatment Plant Improvements -- Headworks and Grit Removal including Screens	Rehabilitation of the original headworks, new process□yard piping and supplemental disinfection from existing equalization basins
26	Southport Advanced Wastewater Treatment Plant Improvements -- Headworks	Expansion of headworks, screening, grit removal, and new process□yard piping
27	Southport Advanced Wastewater Treatment Plant Improvements -- CSO Pump Station	New pump station for additional dewatering of captured CSO from the Interplant Connection
28	Southport Advanced Wastewater Treatment Plant Improvements -- EHRC Facility	New enhanced high rate clarifiers, and new process□yard piping
29	Pleasant Run Overflow Collector Pipe (CSO Collector Pipe)	Collection interceptor and sewer separation. Collection interceptor is approximately 46,000 feet of pipe
30	Eagle Creek Overflow Collector Pipe (CSO Collector Pipe and Belmont West Cutoff)	Collection interceptor and relief interceptor. Collection interceptor and relief interceptor are approximately 40,000 feet of pipe
31	Upper Pogues Run Improvements	Off-line storage facility, collection interceptor. Collection interceptor is approximately 9000 feet of pipe

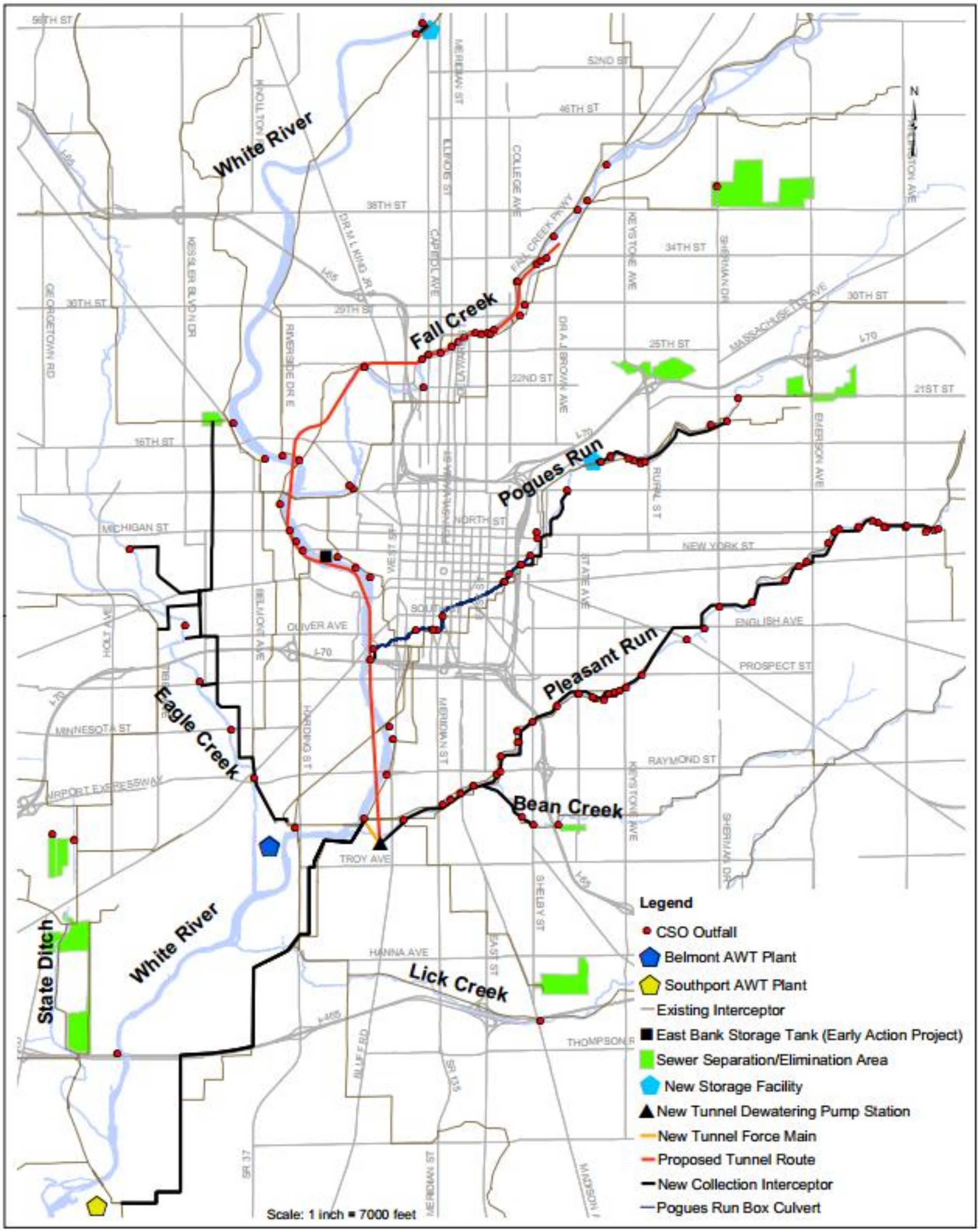


Figure 4-51
2006 Systemwide Selected CSO Plan

4.8.2 Modifications to 2006 LTCP

The CSO LTCP was accepted and incorporated into the approved Consent Decree in 2006. Two amendments that provided value engineering modifications by lowering costs and enhancing CSO capture to the selected LTCP were incorporated into the Consent Decree in 2009 and 2010. The Authority assumed responsibility for the Consent Decree through the Asset Purchase Agreement on August 26, 2011, and was named as a party to the Consent Decree through the third amendment, approved in 2012. The three Consent Decree amendments are examined in greater detail below.

4.8.2.1 CD Amendment 1

The first amendment to the 2006 Consent Decree, approved in 2009, made modifications to three CSO Control Measures. These revisions included:

- CSO Control Measure 16: Modified to require the construction of a conveyance and storage tunnel, constructed approximately 200 feet below ground (the Deep Rock Tunnel Connector or DRTC), instead of a shallow interceptor.
- CSO Control Measures 27 and 28: Modified to include changes to Southport AWT CSO Pump Station and Enhanced High Rate Clarification (EHRC) based on revisions to Control Measure 16.

A list of the 2006 LTCP control measure modifications approved as a component of Amendment 1 can be seen in **Table 4-25**. Additional information regarding the modifications is detailed in Amendment 1 to the 2006 Consent Decree, which is included in **Appendix F**.

Table 4-25
Amendment 1 Modifications to 2006 LTCP Control Measures

CSO Control Measure			Description
16	Original	Interplant Connection	Interceptor originating near CSO 117 and terminating near the headworks of the Southport facility
	Modification	Deep Rock Tunnel Connector, Deep Tunnel Pumping Station and Screening Facilities, and Connection of CSO 008 to the Deep Rock Tunnel Connector	Deep rock tunnel originating near CSO 117 and terminating near the headworks of the Southport facility, deep tunnel pumping station and screening facilities located near the Southport treatment facility, and structures necessary to tie CSO 008 flows into the Deep Rock Tunnel Connector
27	Original	Southport Advanced Wastewater Treatment Plant Improvements -- CSO Pump Station	New pump station for additional dewatering of captured CSO from the Interplant Connection
	Modification	Southport Advanced Wastewater Treatment Plant Improvements -- CSO Pump Station	New pump station for additional dewatering of captured CSO from the *Deep Rock Tunnel Connector*
28	Original	Southport Advanced Wastewater Treatment Plant Improvements -- EHRC Facility	New enhanced high rate clarifiers, and new process-yard piping
	Modification	Southport Advanced Wastewater Treatment Plant Improvements -- EHRC Facility	New enhanced high rate clarifiers, and new process-yard piping *(EHRC treatment for dewatering of captured CSO from the Deep Rock Tunnel Connector)*

4.8.2.2 CD Amendment 2

The second amendment to the 2006 Consent Decree, approved in 2010, made additional modifications to the CSO Control Measures. An engineering review of the LTCP was completed in May 2009 using advanced modeling capabilities which resulted in the following modifications:

Collection System and Tunnels

- *CSO Control Measures 15, 16 and 20:* As a result of modifications to Control Measure 16, additional CSO capture and treatment strategies were realized and modified. The expanded tunnel system is expected to achieve additional storage capacity, which will increase the capacity at the Southport AWT. The Deep Rock Tunnel Connector (DRTC) pump station will require a modified peak pumping rate. A one-mile extension to the DRTC would allow for the early capture of CSO 118.
- *CSO Control Measures 18 and 29:* The deep tunnel system up the Lower Pogues Run and Lower Pleasant Run will be extended, rather than completing the Lower Pogues Run box conversion project.
- *CSO Control Measure 30:* An alternative route for the Belmont West Cutoff to the Eagle Creek Interceptor was proposed which will now use the Belmont North Relief Interceptor to convey flows leading to the Belmont AWT.
- *CSO Control Measure 31:* Ranges for the storage volumes and flow rates of the facilities for the Upper Pogues Run improvements were revised following detailed modeling efforts.

Southport AWT

- *CSO Control Measure 22:* Modifications were made to the AWT Plant Improvements including secondary treatment system expansion.
- *CSO Control Measure 23:* The wet weather disinfection improvements will no longer include a pump station and a 25 MG equalization basin with aerators.
- *CSO Control Measure 24:* The primary clarification facility expansion has been replaced with facility enhancement.
- *CSO Control Measure 26:* The total peak secondary treatment and disinfection treatment rates will be 250 MGD to stay consistent with NPDES permitting and the peak headworks pumping rate will be 345 MGD.
- *CSO Control Measure 27:* The new pump station for additional dewatering of captured CSO will not be constructed. CSO Control Measure 27 has been deleted from the CD.
- *CSO Control Measure 28:* New enhanced high rate clarifiers and new process/yard piping will not be constructed. CSO Control Measure 28 has been deleted from the CD.

Belmont AWT

- *CSO Control Measure 25:* Modifications were made to the influent peak wet weather flow rates at the Belmont AWT, as well as the route of the existing West Weather Pumping Station to the existing Wet Weather Storage Basin No. 1.
- *CSO Control Measures 32:* Added the construction of a Primary Effluent Pump Station to transfer excess primary effluent flow from the Belmont AWT to the Southport AWT facility and a new Plant Drain Pump Station to convey plant drain flows to primary treatment during wet weather.
- *CSO Control Measures 17 and 21:* The Trickling Filter/Secondary Clarifier process will be replaced with an Air Nitrification System (ANS) process.

A list of the 2006 LTCP control measures modifications approved as a component of Amendment 2 can be seen in **Table 4-26**. Additional information regarding the modifications is detailed in Amendment 2 to the 2006 Consent Decree, which is included in **Appendix F**.

4.8.2.3 CD Amendment 3

The third amendment to the 2006 Consent Decree approved the sale of the City's wastewater utility assets to the CWA Authority, Inc. on August 26, 2011. A copy of Amendment 3 to the 2006 Consent Decree is included in **Appendix F**.

Table 4-26
Amendment 2 Modifications to 2006 LTCP Control Measures

CSO Control Measure			Description
15	Original	Fall Creek Tunnel, Collector Pipes and Watershed Projects	Deep storage tunnel, consolidation sewers, elimination of CSO 103, dam removal, aeration
	Modification	Fall Creek Tunnel, Collector Pipes and Watershed Projects	Deep storage tunnel, consolidation sewers, elimination of CSO 103 and dam removal
16	Amendment 1	Deep Rock Tunnel Connector, Deep Tunnel Pumping Station and Screening Facilities, and Connection of CSO 008 to the Deep Rock Tunnel Connector	Deep rock tunnel originating near CSO 117 and terminating near the headworks of the Southport facility, deep tunnel pumping station and screening facilities located near the Southport treatment facility, and structures necessary to tie CSO 008 flows into the Deep Rock Tunnel Connector
	Modification	Deep Rock Tunnel Connector, Deep Tunnel Pumping Station and Screening Facilities, and Connection of CSO 008, CSO 117 and CSO 118 to the Deep Rock Tunnel Connector	Deep rock tunnel originating near CSO 118 and terminating near the headworks of the Southport facility, deep tunnel pumping station and screening facilities located near the Southport treatment facility, and structures necessary to tie CSO 008, CSO 117 and CSO 118 flows into the Deep Rock Tunnel Connector
17	Original	Belmont AWT - Wet-Weather Treatment (Trickling Filters Solids Contact: New aeration tanks and intermediate clarifiers)	Provide secondary biological treatment of the Belmont PE Bypass
	Modification	Belmont AWT - Wet-Weather Treatment (New aeration tanks)	Provide secondary biological treatment of the Belmont PE Bypass
18	Original	Lower Pogues Run Improvements - Continued	Conversion of existing Pogues Run Box into CSO storage facility ranging from 1.5 to 10 MG and interceptor
	Modification	Lower Pogues Run Improvements	Deep Storage Tunnel and consolidation sewers
20	Original	White River Tunnel (Central Tunnel and Pump Station) and Watershed Projects	Central tunnel and pump station, consolidation sewers, sewer separation, dam modifications, and aeration
	Modification	White River Tunnel (Central Tunnel) and Watershed Projects	Central tunnel, consolidation sewers, sewer separation and dam modifications
21	Original	Belmont AWT – Wet Weather Chlorination Dechlorination (Chlorine Disinfection Tank and Re-establish Existing Outfall)	New wet-weather disinfection system and new discharge to White River
	Modification	Belmont AWT – Wet Weather Chlorination Dechlorination (Chlorine Disinfection Tank and Re-establish Existing Outfall)	New wet-weather disinfection system and new discharge to White River (Total of 300 MGD peak disinfection treatment capacity consistent with applicable disinfection requirements of NPDES permit)
22	Original	Southport Advanced Wastewater Treatment Plant Improvements -- Air Nitrification System (ANS) Expansion	Expansion of ANS from 30 MGD to 150 MGD, fine bubble aeration, new blowers, new final clarifiers, and new process yard piping
	Modification	Southport Advanced Wastewater Treatment Plant Improvements - Secondary Treatment System Expansion	Expansion of Secondary Treatment System from 150 MGD to 250 MGD
23	Original	Southport Advanced Wastewater Treatment Plant Improvements -- Wet Weather Disinfection	New disinfection facility, pump station, 25 MG equalization basin with aerators, and new process yard piping
	Modification	Southport Advanced Wastewater Treatment Plant Improvements -- Wet Weather Disinfection	New disinfection facility and new process yard piping

Table 4-26
Amendment 2 Modifications to 2006 LTCP Control Measures (continued)

CSO Control Measure			Description
24	Original	Southport Advanced Wastewater Treatment Plant Improvements -- Primary Clarifier Expansion	Expansion of primary clarification facility, and new process yard piping
	Modification	Southport Advanced Wastewater Treatment Plant Improvements -- Primary Clarifier Expansion	Enhancement of primary clarification facility, and new process yard piping
25	Original	Belmont Advanced Wastewater Treatment Plant Improvements -- Headworks and Grit Removal including Screens	Rehabilitation of the original headworks, new process yard piping and supplemental disinfection from existing equalization basins
	Modification	Belmont Advanced Wastewater Treatment Plant Improvements -- Raw Wastewater Pumping Capacity Expansion	Rerouting of the existing Wet Weather Pump Station (WWPS) to the existing wet weather storage basin (WWSB No. 1)
26	Original	Southport Advanced Wastewater Treatment Plant Improvements -- Headworks	Expansion of headworks, screening, grit removal, and new process yard piping
	Modification	Southport Advanced Wastewater Treatment Plant Improvements -- Headworks	Expansion of headworks, screening, grit removal, and new process yard piping (Total peak secondary and disinfection treatment rateof 250 MGD, consistent with NPDES permit, and peak pumping rate of 345 MGD)
27	Amendment 1	Southport Advanced Wastewater Treatment Plant Improvements -- CSO Pump Station	New pump station for additional dewatering of captured CSO from the Deep Rock Tunnel Connector
	Modification	Deleted	Deleted
28	Amendment 1	Southport Advanced Wastewater Treatment Plant Improvements -- EHRC Facility	New enhanced high rate clarifiers, and new process yard piping (EHRC treatment for dewatering of captured CSO from the Deep Rock Tunnel Connector)
	Modification	Deleted	Deleted
29	Original	Pleasant Run Overflow Collector Pipe (CSO Collector Pipe)	Collection interceptor and sewer separation. Collection interceptor is approximately 46,000 feet of pipe
	Modification	Pleasant Run Deep Tunnel and Overflow Collector Pipe	Deep tunnel, connection sewers, collection interceptor and sewer separation. Tunnel connects to area of White River and DRTC Tunnels and extends to the area of CSO 084
30	Original	Eagle Creek Overflow Collector Pipe (CSO Collector Pipe and Belmont West Cutoff)	Collection interceptor and relief interceptor. Collection interceptor and relief interceptor are approximately 40,000 feet of pipe
	Modification	Eagle Creek Overflow Collector Pipe (CSO Collector Pipe Belmont West Cutoff via the Belmont North Relief Interceptor System)	Collection interceptor system and relief interceptor to achieve Performance Criteria
31	Original	Upper Pogues Run Improvements	Off-line storage facility, collection interceptor. Collection interceptor is approximately 9000 feet of pipe
	Modification	Upper Pogues Run Improvements	Off-line storage facility, collection interceptor to achieve Performance Criteria
32	New	Belmont Advanced Wastewater (AWT) Plant Improvements	Rerouting of in-plant recycle flows from the headworks to primary treatment via the Plant Drain Pump Station (PDPS). Diversion of the primary effluent from Belmont AWT to Southport AWT via the Primary Effluent Pump Station (PEPS).

Section 4 Modification Summary

The 2006 CSO LTCP was updated in 2017 as summarized below:

- Throughout Section 4, all alternatives evaluated before August 26, 2011 are referred to as “City” or “Indianapolis” work and all alternatives evaluated after August 26, 2011 are referred to as “the Authority” work.
- Section 4.1, Introduction was modified to reflect completed events, outdated information was removed and an introduction paragraph was added.
- Section 4.3, Source Control Measures was renamed “2006 Source Control Measures” and modified to reflect completed events.
- Figure 4-2, Marion County Drainage Complaints was removed.
- Section 4.4, Collection System Controls was renamed “2006 Collection System Controls” and modified to reflect completed events.
- Section 4.5, CSO Control Plan Evaluation was renamed “2006 CSO Control Plan Evaluation” and modified to reflect completed events.
- Section 4,6, Evaluation of CSO Control Plan Components was renamed “2006 Evaluation of CSO Control Plan Components” and modified to reflect completed events.
- Section 4.7, Summary was renamed “2006 LTCP Summary” and modified to reflect completed events.
- Section 4.8, Post-LTCP Approval Summary was added to reflect events completed after 2006.
- Figure 4-51, 2006 Systemwide Selected CSO Plan was added to new Section 4.8, Post-LTCP Approval Summary.
- Table 4-24, 2006 LTCP Control Measures was added to new Section 4.8, Post-LTCP Approval Summary.
- Table 4-25, Amendment 1 Modifications to 2006 LTCP Control Measures was added to new Section 4.8, Post-LTCP Approval Summary.
- Table 4-26, Amendment 2 Modifications to 2006 LTCP Control Measures was added to new Section 4.8, Post-LTCP Approval Summary.

5.0 Public Participation

Contents:

5.1 Introduction

In this Section, to reflect the transfer of the wastewater system from the City of Indianapolis to CWA Authority, Inc., all public participation activities performed before August 26, 2011 are referred to as "City" or "Indianapolis" work and all public participation activities performed after August 26, 2011 are referred to as "the Authority" activities.

Public participation is a vitally important element of long term planning for CSO controls. The Authority feels strongly that rate payers' input should help guide decision making because the rate payers will both enjoy the benefits of improved water quality and pay the costs associated with controlling CSOs and other wastewater-related pollution sources. This section describes the state and federal requirements for obtaining and incorporating public input into a long-term CSO control plan. It summarizes public participation activities conducted by the Authority as well as those conducted by the City prior to August 26, 2011.

5.2 State and Federal Requirements

The U.S. Environmental Protection Agency's 1994 CSO strategy and subsequent guidelines emphasized that the public should be informed about CSO control alternatives before the city selected the specific CSO controls in its LTCP. These guidelines suggest the use of public meetings, advisory groups, public education, and other tools to educate and involve the public in water quality decisions. "The extent to which each type of control measure is utilized with each alternative can be based on public input. The implementation schedule and method of financing can also be selected or modified based on public input," says EPA's *Combined Sewer Overflows: Guidance for Long-Term Control Plan*. The guidance also recommends a number of public informational meetings leading up to at least one formal public hearing at which public comments, questions, and responses are recorded.

Public participation also is emphasized in IDEM's April 1996 *Amended Combined Sewer Overflow Strategy* and September 2001 Combined Sewer Overflow LTCP and Use Attainability Analysis Guidance Document. The guidance recommends that CSO communities implement a public participation program that includes public advisory committees, public meetings and hearings, public education and involvement, and community notification of overflow events, as required by P.L.140-2000 Sec. 23 (c).

5.3 Public Participation Process and Methods

Prior to 2011, the City conducted extensive public outreach programs to involve the public in the review and development of alternatives for controlling combined sewer overflows. This outreach was conducted in the following phases:

Phase I: Formation of the Wet Weather Technical Advisory Committee (1996). This committee was composed of technical experts and community activists with an interest in water quality and wet-weather issues. It provided involvement of key stakeholders and professionals in the analysis of stream conditions and control alternatives.

Phase II: Formation of Mayor's Raw Sewage Overflow Advisory Committee and public education/input sessions (2000). The mayor's committee was composed of a broad cross-section of the community, including business leaders, environmental activists, neighborhood representatives, and representatives of legal, financial, engineering, construction, labor and other professions. It guided the city as it conducted an extensive series of public education meetings in 2000, followed by public input sessions throughout the community. The committee analyzed the input received and provided recommendations to the mayor on how to proceed in developing the LTCP.

Phase III: Publication of draft LTCP and 30-day public comment period and public hearing (2001). The City's draft plan was distributed widely in the community and comments were accepted in writing, via the City's Web site or telephone hotline, and at a public hearing.

Phase IV: Stream use survey and neighborhood outreach meetings to identify ways in which residents use CSO-impacted waterways in Marion County (2002). The City conducted non-random intercept surveys followed by neighborhood meetings to collect information from stream corridor users, neighborhood leaders and environmental and recreational groups.

Phase V: Creation of the Indianapolis Clean Stream Team public outreach and education program (2003). This comprehensive outreach program was designed to build public support and understanding of CSO and other water quality issues. The program developed program fact sheets, PowerPoint presentations for neighborhood meetings, a newsletter, neighborhood signage for construction sites, and organized two media events to showcase CSO early action projects. The City also provided an urban water education curriculum and classroom assistance to three middle schools in the Indianapolis Public Schools system.

Phase VI: Implementation of outreach activities on the revised LTCP, included: continuing the involvement of advisory committee members, building general community awareness of the issues, hosting watershed-based education/input sessions, documenting public input and incorporating it into the City's plan, and a offering 30-day comment period on the draft recommended plan.

5.4 Advisory Committees

The City of Indianapolis formed two committees to advise the City on combined sewer overflow issues: the Wet Weather Technical Advisory Committee and the Mayor's Raw Sewage Overflow Advisory Committee. In 2002, the committees were merged into one committee, called the Clean Stream Team Advisory Committee, to provide unified advice and public input.

5.4.1 Wet Weather Technical Advisory Committee

In 1996, the City formed a Wet Weather Technical Advisory Committee to serve two purposes. First, it provided independent technical advice and expertise as the City and its consulting engineers conducted studies and prepared models to support long-term CSO control planning. Second, it provided a public forum in which City staff could report progress during the early stages of CSO control planning and obtain feedback on other wet-weather-related issues.

Committee meetings addressed the following CSO related topics: *E. coli* stream monitoring, flow characterization, sewer system modeling, water quality modeling, treatment plant alternatives, CSO abatement technologies, stream reach characterization and evaluation, LTCP options and costs, and public participation on developing the LTCP. In addition, the committee provided a forum for discussing state and federal policies and legislation, stormwater master planning, Barrett Law programs to sewer unsewered areas, zoning for floodplains, review of U.S. EPA and IDEM comments on the 2001 LTCP, and public education on wet-weather issues. Minutes from advisory group meetings since September 2000 are included in **Appendix D-1**.

5.4.2 Mayor's Raw Sewage Overflow Advisory Committee

On July 24, 2000, former Mayor Peterson appointed an advisory committee to help gather public input on the sewage overflow problem. The purpose of the committee was to:

1. Review the consultants' report on the City's options for controlling combined sewer overflows and improving water quality in Indianapolis
2. Review opinions and feedback received from Marion County residents during a three-month public participation process
3. Advise the mayor on how the City should proceed in developing a LTCP for combined sewer overflows

The committee included neighborhood representatives and business leaders, as well as individuals with expertise in accounting, environmental law, engineering, and geology.

The Mayor's Raw Sewage Overflow Advisory Committee met six times between July 24 and November 15, 2000. The committee also formed subcommittees on sensitive areas and level of control, which each met once to develop recommendations in specific areas. The committee advised the City and its consultants on the public participation process, and reviewed and discussed public comments collected during the public education and input sessions. A number of committee members also attended an optional tour of the city's wastewater treatment plant, CSO receiving streams, and CSO technologies undergoing pilot testing. During their meetings, the committee also discussed or reviewed information on the following issues: conditions of the existing sewer system, other cities' CSO programs, other communities receiving sewage treatment services from Indianapolis, the Chicago CSO tunnel project, the septic conversion program, stormwater master plan, and EPA's Section 308 request to the City. The committee also reviewed information on the City's financial capability assessment and costs associated with the different CSO control alternatives. Copies of the Mayor's Raw Sewage Overflow Advisory Committee meeting minutes are included in **Appendix D-1**.

5.4.3 Clean Stream Team Advisory Committee

Interested members of the Wet Weather Technical Advisory Committee and the Mayor's Raw Sewage Overflow Advisory Committee were combined in 2002 to create the Clean Stream Team Advisory Committee.

Copies of meeting minutes are located in **Appendix D-1**.

5.5 Public Education Activities

The City and the Authority believe that public education is necessary to inform about CSOs, their impacts, and government efforts to address those impacts. Therefore, the Authority has maintained and expanded a comprehensive program designed to educate citizens; seek public input; inform neighborhoods about construction projects; notify residents of overflow events; and report on progress in reducing sewage overflows and improving water quality.

5.5.1 WaterWise Campaign

During early planning and study of combined sewer overflows in Indianapolis, the City instituted a wet-weather public education effort, known as the "WaterWise Campaign." The program's goals were to:

- Inform citizens of wet-weather pollution impacts and controls, including the effects of combined sewer overflows, sanitary sewer overflows, and other pollution sources such as non-point runoff
- Involve citizens in the solution by educating citizens on how they can help and obtaining their input on how funds should best be utilized

The WaterWise program used educational videos, brochures, sewer bill inserts, media kits and a Web site to educate citizens about wet-weather issues. Educational topics included activities to protect water quality, combined sewer overflows, disconnecting downspouts from sanitary sewers, and how to adopt a neighborhood stream.

The City also conducted a baseline awareness survey in April 1999 to determine public awareness of wet-weather issues and attitudes toward funding or supporting water quality improvement projects. The telephone survey was administered to 418 Indianapolis home dwellers by the Public Opinion Laboratory at Indiana University-Purdue University at Indianapolis.

5.5.2 Public Notification Program

In response to requests from the public, the City of Indianapolis developed a CSO public notification program in 2002. This program was the first of its kind in the state and was implemented prior to the Water Pollution Control Board's passage of a rule requiring such programs in all CSO communities. The Authority has maintained and expanded the CSO public notification program. The overall objectives and goals of the CSO Public Notification Program are to:

- Notify affected and interested persons when sewage overflows are likely to occur
- Educate affected and interested persons as to the health hazards and impacts associated with sewage in our waterways
- Enable affected and interested persons to take the appropriate steps to protect themselves from hazards associated with sewage in waterways
- Comply with 327 IAC 5-2.1 (Combined Sewer Overflow Public Notification Rule)

The program includes daily monitoring of weather reports, notification of interested parties that have requested e-mail notification, notification on the Citizens Energy Group website, notification on social media and extensive website information and reports to IDEM on monthly Discharge Monitoring Reports.

Since 2011, the Authority has conducted extensive public education efforts to inform the public about CSOs and their associated health risks. The Authority believes public notification and education should emphasize that urban streams are not currently safe for swimming and fully body recreational activities. The Authority has posted a warning sign at each of the CSO Outfalls and maintains these signs in order to inform the public of these potential hazardous areas. The public access signs warn of sewage pollution and that swimming and wading are not permitted. These signs contain both English and Spanish messages as well as universal symbols.

In addition, the Marion County Health Department installed permanent warning signs at more than 30 locations where the public might be in contact with the receiving streams in the combined sewer area. Signs have been placed at the following locations:

- Eagle Creek
- Fall Creek
- Little Eagle Creek
- Pleasant Run
- Pogues Run
- White River
- State Ditch

The Authority's existing signage program provides continuous and effective public notification of CSO impacts at the locations where people come in contact with the streams and are most exposed to potential CSO related health risks. For this reason, the Authority continues to support MCHD's effort to maintain CSO health warning signs.

The Authority also believes that public notification should be part of a broader effort to inform citizens about CSOs, their impacts, and the Authority's efforts to address those impacts. Therefore, the Authority continues to implement a comprehensive program designed to educate citizens; seek public input; inform neighborhoods about construction projects; notify residents of overflow events; and report on the progress in reducing sewage overflows and improving water quality.

The Authority believes that all aspects of the public awareness program will work together to keep the citizens of Indianapolis informed of the progress the Authority is making to reduce the CSO impacts. A summary of the Authority's current public outreach program can be found in **Section 5.9**.

5.5.3 Clean Stream Team Outreach and Education Program

The Clean Stream Team's outreach and education program was designed to build public support and understanding of CSO and other water quality issues. The program utilized a variety of methods and materials to inform about progress toward addressing raw sewage overflows. Activities included program and project fact sheets, PowerPoint presentations for neighborhood meetings, a quarterly newsletter distributed to more than 1,500 people, neighborhood signage for construction sites, and media events to showcase CSO early action projects. Samples of outreach materials can be found in **Appendix D-1**.

5.5.4 Middle School Water Education Program

DPW and the Indianapolis Clean Stream Team launched a middle school water education program during the 2003-4 school year in three Indianapolis Public Schools (IPS) middle schools: Harshman, John Marshall and McFarland.

Initially, the City used a curriculum and Team WET Schools program developed by the Council for Environmental Education in Houston, Texas. The program worked with teachers to incorporate urban water education into science, social studies, history and other subjects. The activities promoted learning about a range of water issues, from ecology and pollution prevention to wastewater treatment and water stewardship.

The schools were chosen because of their interest in the program and their focus on science and the environment. John Marshall and McFarland Middle Schools had Environmental Science Academy magnet programs, which focused on water issues for a significant portion of the year. Harshman Middle School had a science and technology magnet program and was located on the banks of Pogues Run, which created a unique interest in clean water issues among the teachers.

A designation ceremony was held at John Marshall Middle School on September 29, 2003, to kick off the program. Mayor Bart Peterson, IPS School Board Vice President Dr. Mary Busch and Principal Jamyce Banks participated in the event, as well as many student volunteers.

Two training sessions for teachers were provided on October 7 and 9, 2003. On October 7, seven teachers were trained at Harshman Middle School from a diverse cross-section of subject areas: Special Education, Science, Title I, Language Arts and Mathematics. At John Marshall on October 9, three teachers were trained from each of the remaining two schools, John Marshall and McFarland. All but one of the teachers trained at John Marshall were science teachers, with one reading teacher.

The Council for Environmental Education (CEE) worked with a consultant from IPS to map the WET in the City curriculum and activities to Indiana state academic standards. At the training sessions, the IPS consultant spoke about how these activities support their standard-based curriculum. CEE presented abbreviated versions of several activities, in which teachers participated, and teachers prepared and presented their own activities in the afternoon. Evaluations were received, and comments were very positive overall.

In 2005, the City decided to convert the WET in the City program to the State of Indiana Project WET program in the same middle schools. Volunteers from the Indianapolis Clean Stream Team, Department of Public Works and area engineering firms were identified to support the schools and provide teacher training. Teachers could request volunteers as needed to support their classroom activities.

5.6 2000-2001 Public Participation Activities

5.6.1 Release of July 2000 CSO Report

On July 11, 2000, Indianapolis Mayor Bart Peterson held a press conference along Pleasant Run to release a comprehensive report on the city's CSO problems: *Improving Our Streams in the City of Indianapolis: A Report on Options for Controlling Combined Sewer Overflows*. The report represented seven years of research conducted by the city Departments of Public Works and Capital Asset Management (DCAM) and a team of consultants. It was designed to present scientific and technical information in a readable and understandable format, so any interested Indianapolis citizen could participate in the decision-making. The mayor also announced plans to form an advisory committee to review the report and make recommendations to the city. He released a schedule of upcoming public education meetings, public input sessions, and advisory committee meetings. The press conference was covered by all local news media outlets, including the Indianapolis Star; television stations WRTV, WISH, WTHR, and WXIN; radio station WIBC; and other news organizations. Press clippings associated with this announcement can be found in *City of Indianapolis Combined Sewer Overflow Long-Term Control Planning: Summary of Public Education Sessions*. (See **Appendix D-1** of this report.)

In addition, the report was distributed to the 25 Indianapolis-Marion County public libraries and the following organizations: Indiana Chamber of Commerce, Marion County Health Department, City-County Council, DPW-DCAM Board, Friends of the White River, Indiana Environmental Institute, Improving Kids Environment, Hoosier Environmental Council, Audubon Society, Congresswoman Julia Carson, U.S. Geological Survey, Indiana Department of Environmental Management, Indiana House of Representatives, Indiana Senate, and the School of Public and Environmental Affairs at Indiana University-Purdue University at Indianapolis.

The City used three methods to provide the public easy access to information on the combined sewer overflow issue: public libraries, a Web site, and a dedicated telephone hotline. Copies of the City's study and the public meeting schedule were placed in Indianapolis-Marion County Public Library branches. In addition, the City created a special Website (www.indygov.org/dpw/cso) for accessing information on sewer overflows. The Web site included: a downloadable copy of the CSO report, a downloadable copy of the CSO issues booklet, public meeting dates and times, related links to the U.S. Environmental Protection Agency and Indiana Department of Environmental Management, and a feedback form for citizen comments and questions. The telephone hotline (317-706-2622) included recorded messages with the dates, times and locations of upcoming public meetings, as well as how to obtain written materials on the sewage overflow issue. The public also could leave recorded comments or questions on the hotline.

5.6.2 July 2000 Public Education Meetings

From July 24-31, 2000, the City hosted six public education meetings throughout Marion County to explain the options outlined in the consultants' report and to answer questions. Meeting sites were selected to ensure that most Marion County residents were within a 15- or 20-minute drive of at least one meeting location.

Meetings were advertised in two press releases from the mayor's office, on government cable Channel 16's calendar of events, as well in a mailing to 600 neighborhood associations, environmental groups, organizations, and elected officials, including state legislators and township assessors and trustees. Mailings also were sent to officials in the excluded cities of Lawrence, Beech Grove and Greenwood, who received sewage treatment services from the City of Indianapolis at the time. The City also included CSO information in quarterly sewer bill inserts sent to 240,000 residents during July and August. The inserts included a reference to the Web site and telephone number, where a schedule of meetings was available. Meetings were publicized in The Indianapolis Star, local television and radio newscasts, and smaller neighborhood newspapers.

In all, 164 citizens attended the education sessions. In order to reach even more citizens, the July 25 CSO education meeting was taped by city-owned cable Channel 16, WCTYTV, which reaches 250,000 households in Marion County. The session was rebroadcast in its entirety 33 times between July 27 and August 9, 2000. Videotapes of the education session also were mailed to 99 neighborhood associations in Marion County.

5.6.3 August 2000 Public Input Meetings

Following the July education sessions, the City hosted five facilitated public input sessions during August 2000 to collect public feedback on the issues and options identified for fighting sewage overflows. The August 21 meeting was taped by Channel 16, WCTY-TV and televised on the City's cable television stations numerous times during the months of August and September. The telecasts included references to the City's Web site and telephone number.

Additional information on the public education and input sessions, including comments recorded at each meeting, can be found in *City of Indianapolis Combined Sewer Overflow Long-Term Control Planning: Summary of Public Education Sessions,* and *City of Indianapolis Combined Sewer Overflow Long-Term Control Planning: Summary of Public Input Sessions,* both located in **Appendix D-1** of this report.

5.6.4 Advisory Committee Recommendations

After reviewing public input and information provided by the City, the Mayor's Raw Sewage Overflow Advisory Committee offered the following recommendations:

A. Overall Recommendations

1. The LTCP should be designed to achieve the greatest benefits to the health of Indianapolis citizens, and also should address the needs identified by citizens and the CSO Advisory Committee, within the constraints of state and federal law. The City should try to complete the overall project in less than 20 years.

2. The City should take a holistic approach to improving water quality in Indianapolis, addressing sewage overflows, septic systems, stormwater and other issues as part of a watershed-based plan. The plan should consider all factors that contribute to contamination, and optimize various pollution reduction projects to achieve the greatest improvement in water quality and human health.

3. Financing for the LTCP and other options should be fair and equitable.

B. Priority Areas

1. The tributaries are a higher scheduling priority than White River.
2. The City should place highest scheduling priority on areas where people, especially children, come in contact with a stream. This would include placing the highest priority on stream segments along parks, wading areas used by children, and adjacent to school properties. The next priority is designated greenways, followed by stream segments adjacent to neighborhoods, followed by popular fishing holes.
3. In determining where to start the work, the City should select the watershed where projects would

have the most impact for the greatest number of people.

4. In prioritizing the solutions within each watershed, the City should select the most practical and cost effective options first. In other words, begin with solutions that achieve "the biggest bang for our buck." In some instances, the City may want to place a higher priority on eliminating outfalls that are most upstream.

5. The City should address sewage overflows on several fronts at once. For example, if the engineering and construction work necessary to address a heavily contaminated section of a stream is long and involved, the City should pursue planning and engineering on that section while constructing improvements in another location that requires a less complicated solution.

6. The City also should consider the status of projects already underway and work to finish them as quickly as possible.

C. Level of Control

1. The City should select CSO control targets to achieve maximum environmental and human health benefits in an affordable and technically sound manner.

2. The City should develop better information comparing the benefits of sewage overflow controls to stormwater and septic system controls.

D. Other Options for Improving Water Quality

1. The City should accelerate the conversion of septic systems to sewers. At the same time, the City should aggressively seek legislative improvements or other alternatives to the Barrett Law process.

2. The City should revisit the idea of creating a stormwater utility to fund stormwater control projects, but should improve land use and zoning practices to prevent the utility from funding undesirable development.

3. The reclamation facility along Fall Creek is an important solution for cleaning Fall Creek. In developing a strategy for Fall Creek, the City should first select (with citizen input) a location for the reclamation facility that would make the most positive impact on the stream, then determine what storage methods and facilities are needed to supplement the benefits of the reclamation facility, followed by additional processes and practices to improve Fall Creek's water quality.

4. The City should seriously consider the problems that may exist in installing real-time controls in very old sewer pipes that may not be able to handle the pressure from sewage pressing against the pipe walls.

5. In addition to addressing bacteria and dissolved oxygen problems, the City should improve erosion control by enforcing existing laws and programs.

E. Neighborhood Concerns

1. The City should hold public meetings in neighborhoods to get input from citizens and business owners who will be affected by construction projects. Before setting meeting dates, the City should contact neighborhood associations to avoid conflicts with other meetings or events that will attract many neighborhood citizens. When practical, use existing neighborhood association meetings to keep citizens informed.

2. After meeting dates are established, the City should use flyers, door hangers, street signs, the news media, and other methods to announce the location, time and topic of the meeting at least two weeks in advance. The City also should notify neighborhood association presidents, City-County Councilors, and ward and precinct committee chairs via postcard or e-mail, four to six weeks in advance, if possible.

3. During facility planning, the City should present options to the neighborhood; be prepared to explain the costs and benefits; be honest about any drawbacks; and provide opportunities for citizens to see similar facilities already built elsewhere.

4. During construction, the City should provide a mechanism to raise issues and problems, such as providing a contact name and phone number or creating an advisory committee that includes the contractor, city and community representatives. The city should work to maintain access to businesses and institutions, minimize disruption, and keep the neighborhood informed throughout the project.

5. Any new facilities or structures must be "neighborhood friendly." Specifically, they should look attractive, blend into the neighborhood, minimize odors, and limit noise and lighting. Before introducing an idea to a neighborhood, city staff

should ask, "Would we want this facility/structure next to our house?"

F. Building Community Support

1. The City should develop an aggressive marketing campaign designed to build public confidence through ongoing, timely and accurate information about the CSO project. The campaign could include a website, speakers bureau, partnerships with radio and television stations, public education materials, public service announcements and other marketing tools.
2. The project needs a carefully designed message identifying sewage overflows as a serious problem that we all share, with affordable solutions that have broad community support. The campaign should communicate the impact on sewer user fees, including comparing Indianapolis's rates to other cities' rates. The campaign also should identify things individuals can do to reduce sewage overflows.
3. During implementation, the City should work with the business community, Marion County Health Department and others to raise awareness of sewage overflow issues and link the project's benefits to improved economic development and quality of life.

5.6.5 Public Comment on 2001 Draft LTCP

5.6.5.1 Public Comment Process

The City of Indianapolis provided a 31-day public comment period from Tuesday, March 13, 2001, to Thursday April 12, 2001, to allow for public review and comment on the plan. The City issued a press release and used the local news media and the city's Web site to publicize the availability of the plan. Comments were accepted both verbally through a public hearing and in writing, via standard mail or e-mail. The City also met with the Wet Weather Technical Advisory Committee to discuss the plan and take their comments. A summary of the public comment process, transcript of the public hearing, and copies of all written comments received are located in **Appendix D-1** of this report.

5.6.5.2 Major Issues Raised

The City received a wide variety of comments during the 2001 public comment period. The primary issues raised can be divided into the following general categories:

1. Ensuring a holistic watershed approach
2. Establishing higher or more rapid sewer user fee increases
3. Accelerating the time frame for completion
4. Increasing the combined sewage capture rate
5. Revising the affordability calculation
6. Revising the process used to convert septic systems to sewers
7. Addressing technical issues, such as a request for better data or additional study, elaboration on specific points, and corrections to factual errors.

The City issued the following responses to those issues following the 2001 public comment period:

Question/Comment: The City of Indianapolis should take a holistic, watershed approach to fixing the problem.

2001 Answer: The plan does take this into consideration, including projects to address combined sewer overflows, septic systems, and a portion of the pollution from stormwater runoff. Stormwater runoff and septic systems are two of the three major components that must be addressed to improve water quality in Indianapolis. The plan includes nearly $11 million to improve the stormwater system and $32 million to accelerate the septic conversion program from 60 years to 20 years. Each of these will supplement the work done to reduce combined sewer overflows in Marion County. Combined, they offer a cost-effective and affordable solution for improving water quality.

Question/Comment: The implementation schedule should be 10 years rather than 20.

2001 Answer: Based on an analysis of the financial capability of citizens, the City has determined the 20-year implementation plan would be the most prudent and affordable approach. Reducing the project time from 20 to 10 years would result in dramatically higher sewer user fees in the short-term, and would not allow for a gradual change in the monthly rates consumers pay. A ten-year timeframe would place undue hardship on all Marion County residents from an inconvenience standpoint and would increase sewer user fees at a much higher rate than desired. In addition, a 20-year timeframe allows for prudent facility planning, measured progress, and necessary adjustments as new technologies become available or control structures are put online and tested for effectiveness.

Question/Comment: The City should revise the Barrett Law process for converting septic systems to sewer service.

2001 Answer: The City received two types of comments on septic system conversions. Residents of areas currently on septic wanted the city to pay the entire cost of converting septic systems to sewer. Residents who had already converted to the sewer system at their own cost did not want to subsidize someone else's septic conversion costs. The City estimates the cost of providing sewer service to 18,000 properties now on septic systems to be $300 million. Including the entire cost of converting these systems to the sanitary sewer system would increase the cost of the LTCP by nearly one third. For nearly 100 years under the Barrett Law, property owners realizing improvements such as sanitary sewers in their neighborhoods have been responsible for paying their portion of the project. Obligating all Indianapolis residents to cover this cost would be unfair to property owners who have paid their fair share in the past, and would result in even higher sewer user fees across the board. However, the City has proposed changes to the Barrett Law process to make the payments more affordable and less burdensome on property owners. Instead of a 10-year loan with annual payments, the city is proposing a 20- or 30-year low-interest loan with monthly payments. The Board of Public Works has approved this plan.

Question/Comment: Affordability calculation should be based on all of Marion County, not just Center Township.

2001 Answer: In basing the financial capability assessment on Center Township, the City of Indianapolis was sensitive to the effects of higher sewer user fees on this portion of the City's residents. Center Township accounts for 22 percent of the homes in Marion County, but the median household income is far below that of the remaining eight townships within the county. Considering the entire county in determining the cost and affordability of the LTCP would place an excessive burden on the residents of Center Township and other low-income or fixed-income residents. Other communities, including Boston, Massachusetts, and Onodaga County, New York, have based their affordability analysis on low-income communities within the sewer service area. While Unigov united the nine Marion County townships into one city, it did not erase the economic disparities between the inner city and the surrounding suburbs. These factors must be taken into account in developing a plan that is affordable and fair.

Question/Comment: The 85 percent capture level is not enough. We should look to 92 or 96 percent capture to solve the problem.

2001 Answer: The higher the capture rate, the higher the cost. But simply looking at the overall cost of implementation of the LTCP is not enough. The City analyzed the cost per day of compliance and determined the 85 percent capture scenario provides us the best return for our dollar. Increasing the capture rate to 92 or 96 percent would increase the costs by fifty percent, but only provide a handful of days in improved compliance. Therefore, in order to keep costs to the ratepayers reasonable and to achieve the highest capture rate for the most affordable option, the City of Indianapolis chose the 85 percent capture rate in the 2001 LTCP.

Question/Comment: Ramp up the sewer user fee increase at a greater rate.

2001 Answer: The City has requested increasing sewer rates by approximately 17 percent, or $1.94 per month for the average residential user, during the first five years of the project. This rate increase will provide the funding necessary to design and begin construction on a wide variety of projects. Given the need for facility planning, bidding, and neighborhood communication, the City estimates it can spend no more than $185 million in the first five years of the project. Furthermore, the City's research indicates that Indianapolis residents already face an additional $10.25 per month in other fixed service and utility costs, such as electricity, natural gas, drinking water, and a potential stormwater utility fee. The City sees no fee increases that the city cannot spend right away. As the project moves forward, the City will ask for incremental increases in the sewer user fees as it can spend those additional revenues benefit to burdening ratepayers with substantial sewer user.

Question/Comment: The plan needs better data, additional study, additional elaboration, or factual corrections.

2001 Answer: The City received a number of technical comments from the Wet Weather Technical Advisory

Committee. Where appropriate, these comments and factual corrections have been addressed in the plan. Because the LTCP is a continuing and evolving process, there will be many other opportunities for input and refinement as CSO controls are designed and constructed. However, the City does not believe that additional study is needed or warranted before finalizing the LTCP. In the past, the city was criticized for doing too much study and not moving forward to implement CSO control projects. The City has attempted to balance the need for sufficient and accurate information against the tendency to over-study a problem. We believe we have struck the right balance and can proceed with finalizing the plan and implementing water quality improvement projects. The City will continue to gather information during facility planning and incorporate new data into the final design of CSO control structures. Indianapolis is committed to the public participation process and will continue to incorporate public comments into the plan during the process.

5.7 2004 Outreach on LTCP Alternatives

5.7.1 General Community Outreach

Beginning in the spring of 2004, the City began conducting a general outreach program to raise community awareness about raw sewage overflows and to encourage people to attend public meetings, visit the Web site or otherwise get involved. This community outreach program was intended to give all community members an opportunity to provide input on the options for controlling raw sewage overflows and other pollution problems. Outreach methods included:

1. **Community Outreach/Speaker's Bureau:** Brief presentations on the CSO control issue and the opportunities for public input were provided to a number of community groups. These groups included the Marion County Alliance of Neighborhood Associations, Indianapolis Chamber of Commerce Infrastructure Committee, ACEC Indiana, Central Indiana Building Trades Council, the Board of Public Works, the Public Works Committee of the City-County Council, the Sierra Club, and other organizations. The City and Clean Stream Team also staffed an educational booth at the Earth Day Indiana festival in April 2004.
2. **Educational Video:** An educational video was produced for use at community meetings and broadcast numerous times on the city-owned cable television station, WCTY's Government TV2. This 8-minute video provided information on the CSO problem, described city activities, and encourage public participation in the LTCP process.
3. **Media:** The Indianapolis Star reported on combined sewer overflow issues in a front-page story on Sunday, September 26, 2004.

5.7.2 Watershed Meetings

From October 14-26, 2004, the Department of Public Works and the Indianapolis Clean Stream Team hosted five public meetings throughout Marion County to collect citizen feedback on the LTCP options. Meeting sites were selected to ensure that most Marion County residents were within a 15- or 20-minute drive of at least one meeting location. The meeting locations were also targeted by watershed.

Meeting Promotion: The City actively promoted the public meetings through a number of communication methods. The centerpiece of the outreach effort was a special 12 page edition of the *Stream Line* newsletter, which included an insert card (**Figure 5-1**) on which could register their opinions on key questions. The newsletter was mailed on October 12 and 13 to more than 1,400 people and emailed to more than 400. People who were unable to attend one of the meetings could get the same information and feedback opportunities through the newsletter or Web site. A copy of the newsletter is included in **Appendix D-1**.

CLEAN STREAM DECISION-MAKING CARD

1. Neighborhood Impacts: Please rank the following items 1-7 in importance to you as they pertain to sewer repairs (use No. 1 to indicate your first priority):

_____ Noise in long-term operation
_____ Odor during long-term operation
_____ Security issues, such as possibilities of vandalism and sabotage
_____ Siting issues, such as proximity of facilities to homes, parks and schools
_____ Aesthetics: How facilities and improvements look in the neighborhoods
_____ Truck traffic during long-term operation
_____ Neighborhood disruption during construction

2. Environmental Benefits and Cost Impacts: Please rank the following items 1-6 in importance to you:

_____ Reducing the number of gallons that overflow each year
_____ Reducing the number of times that sewers overflow each year
_____ Making waterways safer for people who use them
_____ Making waterways healthier for fish and other wildlife
_____ Keeping the cost per gallon reasonable and cost-effective (i.e., don't spend beyond the point of diminishing returns)
_____ Keeping sewer rates affordable for most families and businesses

City of Indianapolis
Bart Peterson, Mayor

INDIANAPOLIS CLEAN STREAM TEAM

3. While long-term sewer rates are very difficult to predict, the city has estimated the impact on sewer rates from overflow control projects. At the end of 20 years, how much would you be willing to pay to clean our waterways?

_____ $44 - $46 per month (90 percent capture)
_____ $47 - $49 per month (93 percent capture)
_____ $49 - $51 per month (95 percent capture)
_____ $58 per month (97 percent capture)
_____ $73 per month (99 percent capture)
_____ $132 per month (100 percent capture)
_____ Other _____________________

4. In implementing the plan, the city could spend more resources and place higher standards on some streams than others. What is your opinion (check one)?

_____ All streams should be treated the same
_____ Smaller streams should be a higher priority than the White River
_____ Some small streams should receive higher protection than other small streams. If so, which ones? _____________________
_____ Some streams should receive a higher level of control because it is cost-effective to do so.

5. Now that you've considered neighborhood issues, environmental benefits and cost impacts, which plan do you prefer?

_____ Plan 1: Storage/conveyance
_____ Plan 2: Storage/conveyance with remote treatment facilities
_____ Plan 3: Total sewer separation

6. (Optional) Name _____________________
Address _____________________
Email _____________________
Annual Household Income: Less the $50,000 _____
$50,000 - $100,000 _____
More than $100,000 _____

Figure 5-1
Stream Line Insert Card

Other methods used to promote the meetings included:

- WCTY-TV promoted the meetings on their televised community calendar. They also videotaped the first meeting and broadcast it 12 times between October 19th and 23rd, and 16 times between November 3rd and 8th. A press conference to celebrate the completion of the East Bank CSO storage tank and announce the watershed meetings was held on October 12 and attended by WIBC radio, WISH-TV and WRTV-6.

- A press release also was sent to local news media. All three stations and The Indianapolis Star ran stories and several included the indycleanstreams.org Website. A second story on potential rate increases related to the CSO control options also ran on October 21 in the Indianapolis Star.

- Hundreds of invitations were emailed to neighborhood groups, a DPW email list, Sierra Club members, Hoosier Canoe Club, CSO public notification list, industrial pretreatment permit holders, and companies and individuals on DPW's list of potential engineering and construction contractors. Each of those email lists likely generated relay emails to additional groups and individuals. The invitation is shown in **Figure 5-2**.

- More than 50 flyers promoting the meetings were distributed to DPW and Department of Metropolitan Development offices. The flyer is shown in **Figure 5-3**.

- Flyers were sent to 23 Marion County libraries for posting to their community events boards.

CITY OF INDIANAPOLIS

Clean Stream Program

REDUCING SEWAGE OVERFLOWS: YOUR INPUT NEEDED

- **Are you interested in reducing raw sewage overflows into our streams?**
- **How much are you willing to pay to solve this 100-year-old problem?**
- **Are smaller streams a higher priority than the White River?**

The City of Indianapolis is finalizing a plan to reduce raw sewage overflows into our rivers and streams, and we need your input. Five public meetings are scheduled to get citizen feedback on plans to overhaul the city's sewer infrastructure to reduce raw sewage overflows.

PUBLIC MEETING SCHEDULE

Thursday, October 14	Garfield Park Multipurpose Room	2450 S. Shelby St.	7:00 PM
Tuesday, October 19	Julia Carson Government Center, Rm A	300 E. Fall Creek Parkway, N. Drive	7:00 PM
Thursday, October 21	Christamore House Auditorium	502 N. Tremont	6:00 PM
Monday, October 25	Brookside Park Auditorium	3500 Brookside Parkway S. Drive	7:00 PM
Tuesday, October 26	Riviera Club	5640 N. Illinois Street	7:00 PM

If you can't attend one of these meetings, you can go to indycleanstreams.org from October 14-30 to learn about the options and provide your input.

The final plan will be subject to the approval of the U.S. Environmental Protection Agency and the Indiana Department of Environmental Management.

www.indycleanstreams.org
317.327.8720

Figure 5-2
Public Meeting Invitation

CITY OF INDIANAPOLIS

Clean Stream Program

REDUCING SEWAGE OVERFLOWS: YOUR INPUT NEEDED

City Seeks to Reduce Sewer Overflows and Improve Neighborhoods

- Are you interested in reducing raw sewage overflows into our streams?
- How much are you willing to pay to solve this 100-year-old problem?
- Are smaller streams a higher priority than the White River?

The Indianapolis Department of Public Works and its Clean Stream Team will present information on three options for reducing sewage overflows. Meetings will be held in neighborhoods most affected by raw sewage overflows.

PUBLIC MEETING SCHEDULE

Thursday, October 14	Garfield Park Multipurpose Room	2450 S. Shelby St.	7:00 PM
Tuesday, October 19	Julia Carson Government Center, Rm A	300 E. Fall Creek Parkway, N. Drive	7:00 PM
Thursday, October 21	Christamore House Auditorium	502 N. Tremont	6:00 PM
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317.327.8720

City of Indianapolis DPW Department of Public Works

INDIANAPOLIS CLEAN STREAM TEAM

Figure 5-3
Public Meeting Flyer

- More than 250 flyers were posted at various locations (grocery stores, banks, coffee shops, etc.) throughout Marion County with a focus on areas near the meeting sites and along waterways.
- Display advertisements (shown in **Figure 5-4**) were placed in each of the following newspapers: Indiana Herald, Nuvo Weekly, New Palestine Press, Hendricks County Flyer, Westside Flyer, Westside Community News, Danville Republican, Mooresville/Decatur Times, Noblesville Ledger, Topics (North Central Edition), Greenwood Challenger, Southside Challenger, Zionsville Times-Sentinel, East Side Herald, Northeast Reporter, Franklin Township Informer, Southside Times, The Press, Indianapolis Recorder.

Figure 5-4
Public Meeting Display Advertisement

- The indycleanstreams.org Web site was updated with content from the special edition of the Stream Line. Public comment was accepted through the site as well. The updated Web site home page is shown in **Figure 5-5**.

The public meetings were held in the evening at the following locations:

Date	Location (No. of Attendees)
Oct. 14	Garfield Park Multipurpose Room (23)
Oct. 19	Julia Carson Government Center (9)
Oct. 21	Christamore House Auditorium (8)
Oct. 25	Brookside Park Auditorium (48)
Oct. 26	Riviera Club (52)

Information tables were available at each watershed meeting. They included:

- **Watershed Tables:** Five displays gave an overview of each major watershed: Fall Creek, Pleasant Run, Pogues Run, Eagle Creek and White River. Each display included a vicinity map of the watershed as well as photos to illustrate diversity in stream characteristics (flow, vegetation, etc.). A watershed notebook was available at each table that included physical stream characteristics maps, recreational use data, CSO control project fact sheets and other watershed-specific information. Recreational use survey data was also included for each specific watershed.
- **"Ask an Engineer" Table:** This table provided information to help citizens understand how CSO control facilities would be designed, constructed or operated. Technical information, including treatment plant information, water quality data and graphs were available, as well as photos of equipment and facilities. The staff at the table also had access to copies of EPA and IDEM correspondence to reference if needed.
- **General Information Table:** The educational trade show booth display was the key attraction at this table. Attendees could pick up program fact sheets, FAQ sheets and other information about the city's water quality programs. Attendees also could sign up to be added to the team's mailing list.
- **"Join the Team" Table:** Attendees could sign a pledge form to take action to reduce raw sewage overflows and receive a Clean Stream Team sticker, window cling or bumper sticker.

The public meeting included the educational video described earlier and a 90-minute PowerPoint presentation that followed the outline of the Stream Line newsletter. The presentation covered the following general topics:

Figure 5-5
Clean Stream Team Website with CSO Control Options

- **Background Information**: This portion of the presentation described the causes of sewer overflows; the scope of the problem nationally, in Indiana and in Indianapolis; the frequency of overflows and number of gallons that overflow in an average year; waterways affected; E. coli bacteria levels upstream and downstream of the overflow areas (both geometric mean and percent of time meeting single sample standard); projects underway to reduce overflows; and roles of the government agencies involved.
- **How Can We Reduce Overflows**: During this portion of the presentation, participants learned about the different technologies that the city analyzed for reducing overflows and improving water quality. This included in-system storage technologies, building new storage facilities or larger sewers, separating sewers, and expanding or building new treatment facilities. The general advantages and disadvantages of each technology were discussed. This portion of the presentation included showing samples of the city's treatment plant influent, primary effluent and final effluent. The presentation noted the need to make other improvements to improve water quality, including:
- Building sewers for neighborhoods now served by septic systems
- Implementing projects to reduce flooding and improve storm water drainage
- Restoring stream banks and removing polluted sediments from streams
- Disconnecting downspouts, sump pumps and other illegal connections that take up sewer capacity
- Adding flow to tributaries to improve stream appearance and wildlife habitat
- Improving oxygen levels in streams by adding fountains/aeration on Fall Creek and White River, removing Boulevard Dam on Fall Creek and modifying two dams on White River
- **The Options: Plans 1, 2, 3**: During this portion of the presentation, participants learned how the various technologies had been combined into three systemwide plan options by the City, with input from advisory committee members and review by U.S. EPA and IDEM. Key differences and similarities between Plan 1 and Plan 2 were described, using maps illustrating the plan options. The five different levels of control were presented and correlated to rainfall amounts for a 24 hour storm event. Participants reviewed a map showing the scope of sewer separation under Plan 3.
- **The Benefits and Costs – Comparing the Plans:** Participants were shown information comparing the plan options based upon their impacts on neighborhood concerns, reducing overflows, protecting human health and improving wildlife health. Participants received information on total plan costs, cost per gallon, and the average homeowner's monthly sewer rates at the end of 20 years to pay for CSO controls**. Figure 5-6** shows the information used to show the advisory committees' ranking of neighborhood issues. **Figure 5-7** shows the information used in the Stream Line newsletter and PowerPoint presentation to compare the benefits and costs of the plan options.

  Participants were given information on a plan suggested by U.S. EPA to evaluate different levels of control on some streams than others. The example provided was 2 overflows per average year on Fall Creek and Pogues Run and 3 overflows per average year on White River, Pleasant Run and Eagle Creek. The example was compared to the other systemwide plans using the table shown in **Figure 5-8**.
- **Priority Areas:** Participants were given a brief overview of the results of the City's stream use surveys, which indicated that the most popular activities are walking, jogging, bicycling, and playing by the stream banks. Less frequent activities are fishing, wading, and swimming. All waterways are used for recreation, including White River and smaller streams. However, with no swimming beaches or high-use water contact areas, the City has concluded that no one waterway is more important than another to the entire community.
- **Next Steps:** Participants were given a schedule for completion of the plan and also were invited to join the Clean Stream Team by signing a pledge card promising to participate in activities to protect City waterways.

	PLAN 1	PLAN 2	PLAN 3
NOISE	1st	3rd	1st
ODOR	2nd	3rd	1st
SAFETY AND SECURITY	1st	3rd	1st
SITING CONCERNS	1st	2nd	2nd
AESTHETICS	1st	3rd	2nd
TRUCK TRAFFIC DURING OPERATION	1st	3rd	2nd
NEIGHBORHOOD DISRUPTION DURING CONSTRUCTION	1st	2nd	3rd
THE COMMITTEE'S OVERALL RANKING OF NEIGHBORHOOD ISSUES	1st	3rd	2nd

Figure 5-6
Ranking of Neighborhood Issues

	REDUCING OVERFLOWS			PROTECTING HUMAN HEALTH		IMPROVING WILDLIFE HEALTH	MANAGING COSTS		
	AVERAGE % OF FLOW CAPTURED AND TREATED ANNUALLY	AVERAGE # OF UNTREATED OVERFLOWS PER YEAR	ADDITIONAL GALLONS OF SEWAGE CAPTURED/TREATED PER YEAR	DAYS WATERWAYS ARE SAFE FOR SWIMMING (<235 E. COLI COLONIES/100 ml)	DAYS WATERWAYS HAVE VERY HIGH BACTERIA LEVELS (> 10,000)	AQUATIC AND WILDLIFE BENEFITS	TOTAL COST (CONSTRUCTION + OPERATIONS FOR 20 YEARS)	TOTAL COST PER GALLON OF OVERFLOW CAPTURED	AVERAGE HOMEOWNER'S MONTHLY SEWER RATES (AT END OF 20 YEARS)*
CURRENT CONDITIONS	63%	60	-	187 days	52 days	3RD	$0	-	$12.85
PLAN 1	90%	12	6.33 billion	230 days	12 days	1ST	$1.44 billion	22.8 cents	$44.00
	93%	6	6.86 billion	230 days	6 days		$1.61 billion	23.5 cents	$47.00
	95%	4	7.12 billion	230 days	4 days		$1.73 billion	24.3 cents	$49.00
	97%	2	7.46 billion	230 days	2 days		$2.21 billion	29.6 cents	$58.00
	99%	0.5	7.73 billion	231 days	0.5 days		$3.03 billion	39.2 cents	$73.00
PLAN 2	90%	12	6.35 billion	230 days	12 days	2ND	$1.55 billion	24.4 cents	$46.00
	94%	6	6.93 billion	230 days	6 days		$1.72 billion	24.8 cents	$49.00
	95%	4	7.16 billion	230 days	4 days		$1.86 billion	26.0 cents	$51.00
	98%	2	7.49 billion	230 days	2 days		$2.23 billion	29.8 cents	$58.00
	99%	0.5	7.73 billion	231 days	0.5 days		$3.03 billion	39.2 cents	$73.00
PLAN 3	100%	0	7.87 billion	228 days	0 days	2ND	$6.2 billion	78.8 cents	$132.00

*Monthly sewer rate estimates include today's rates plus the amount needed to fund sewage overflow projects. Other rate increases will be needed in future years to keep the rest of our system in good condition.

Figure 5-7
Comparison of Costs and Benefits of Systemwide Plan Options

AVERAGE % OF FLOW CAPTURED AND TREATED ANNUALLY	AVERAGE # OF UNTREATED OVERFLOWS PER YEAR	ADDITIONAL GALLONS OF SEWAGE CAPTURED /TREATED PER YEAR	DAYS WATERWAYS ARE SAFE FOR SWIMMING (<235 E. COLI COLONIES/100 ML)	DAYS WATERWAYS HAVE VERY HIGH BACTERIA LEVELS (> 10,000 COLONIES/100 ML)	AQUATIC AND WILDLIFE BENEFITS	TOTAL COST (CONSTRUCTION + OPERATIONS FOR 20 YEARS)	TOTAL COST PER GALLON OF OVERFLOW CAPTURED	AVERAGE HOMEOWNER'S MONTHLY SEWER RATES (AT END OF 20 YEARS)
96%	3 OR 2	7.37 billion	230 days	3 OR 2 days	1ST	$2.05 BILLION	27.8 CENTS	$53-54

Figure 5-8
Comparison Costs and Benefits of U.S. EPA Suggested Plan

After each general topic, participants were invited to ask questions. Those questions and related answers were posted to the Clean Stream Team Web site. During the presentation, participants were asked periodically to answer questions on the insert card in the Stream Line newsletter. The card, which was shown earlier in **Figure 5-1**, could either be turned in at the end of the meeting or mailed by October 30.

5.7.3 Public Outreach Results

The City received 153 response cards or Web site feedback forms through this public outreach program. Responses to each question on the response card are summarized below. The responses do not always add up to 153 because some respondents did not answer all the questions.

1. **Neighborhood Impacts:** Participants were asked to rank seven neighborhood issues in importance as they pertain to sewer repairs. Results are shown below in order of preference, with the average score for each choice (lower scores represent a higher ranking).

- **1st:** Odor during long-term operation (2.04 average)
- **2nd:** Siting issues, such as proximity of facilities to homes, parks and schools (3.39)
- **3rd:** Noise in long-term operation (3.48)
- **4th:** Aesthetics: How facilities and improvements look in the neighborhoods (3.75)
- **5th:** Truck traffic during long-term operation (4.66)
- **6th:** Security issues, such as the possibilities of vandalism and sabotage (5.14)
- **7th:** Neighborhood disruption during construction (5.26)

The histograms in **Figure 5-9** break down the responses for each choice, showing how many participants gave each issue a 1 ranking, 2 ranking, and so on.

2. **Environmental Benefits and Cost Impacts:** Participants were asked to rank six choices that pertain to environmental benefits and cost impacts. Results are shown below in order of preference, with the average score for each choice shown in parentheses. There was very little variation between the top-ranking and bottom-ranking choices for this question.

- **1st:** Making waterways safer for people who use them (3.23 average)
- **2nd:** Reducing the number of gallons that overflow each year (3.31)
- **3rd:** Reducing the number of times that sewers overflow each year (3.48)
- **4th:** Keeping the cost per gallon reasonable and cost-effective (don't spend beyond the point of diminishing returns (3.49)
- **5th:** Making waterways healthier for fish and other wildlife (3.50)
- **6th:** Keeping sewer rates affordable for most families and businesses (3.69)

The histograms in **Figure 5-10** break down the responses for each choice, showing how many participants gave each issue a 1 ranking, 2 ranking, and so on.

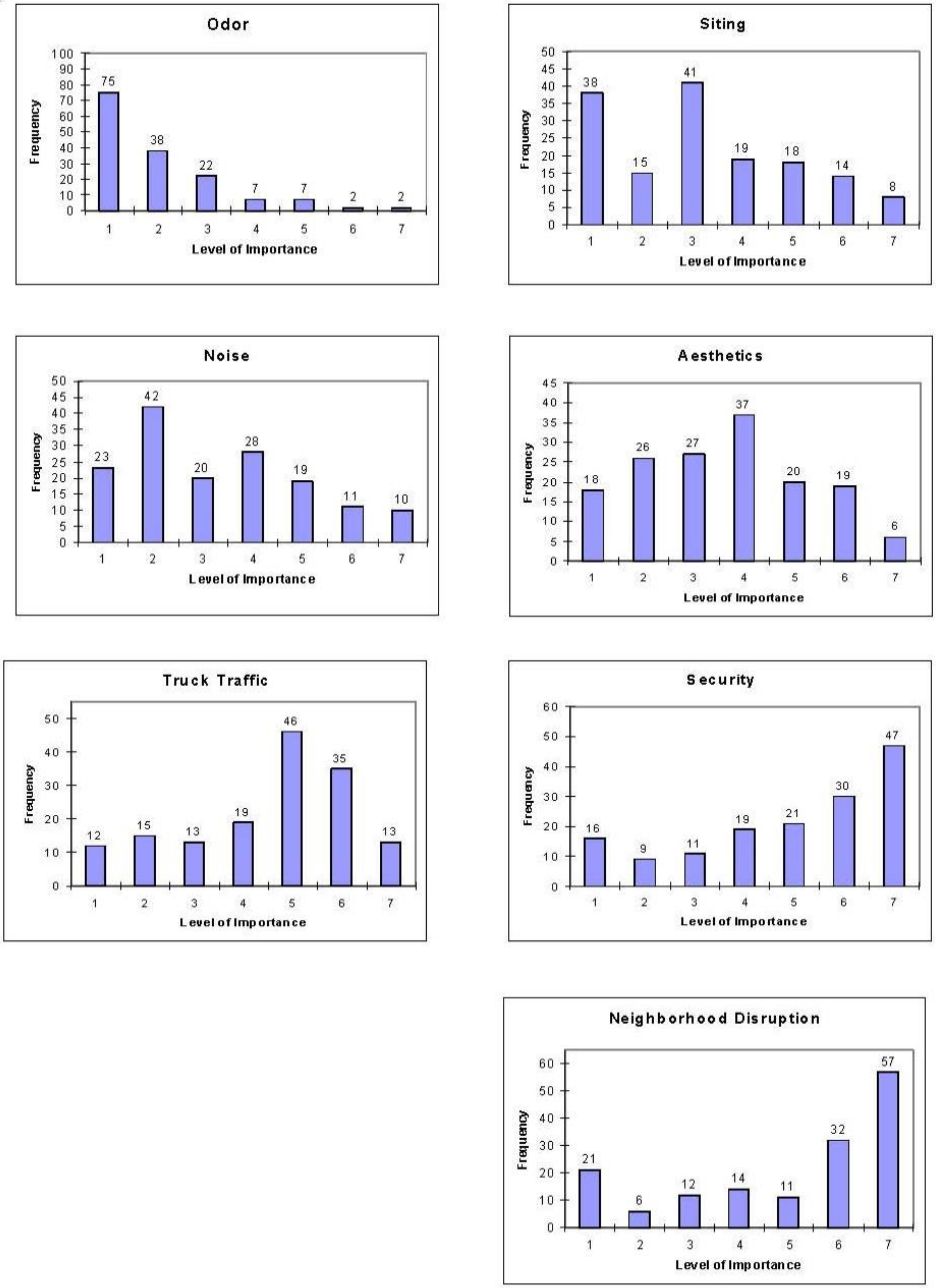


Figure 5-9
Neighborhood Impacts Histograms

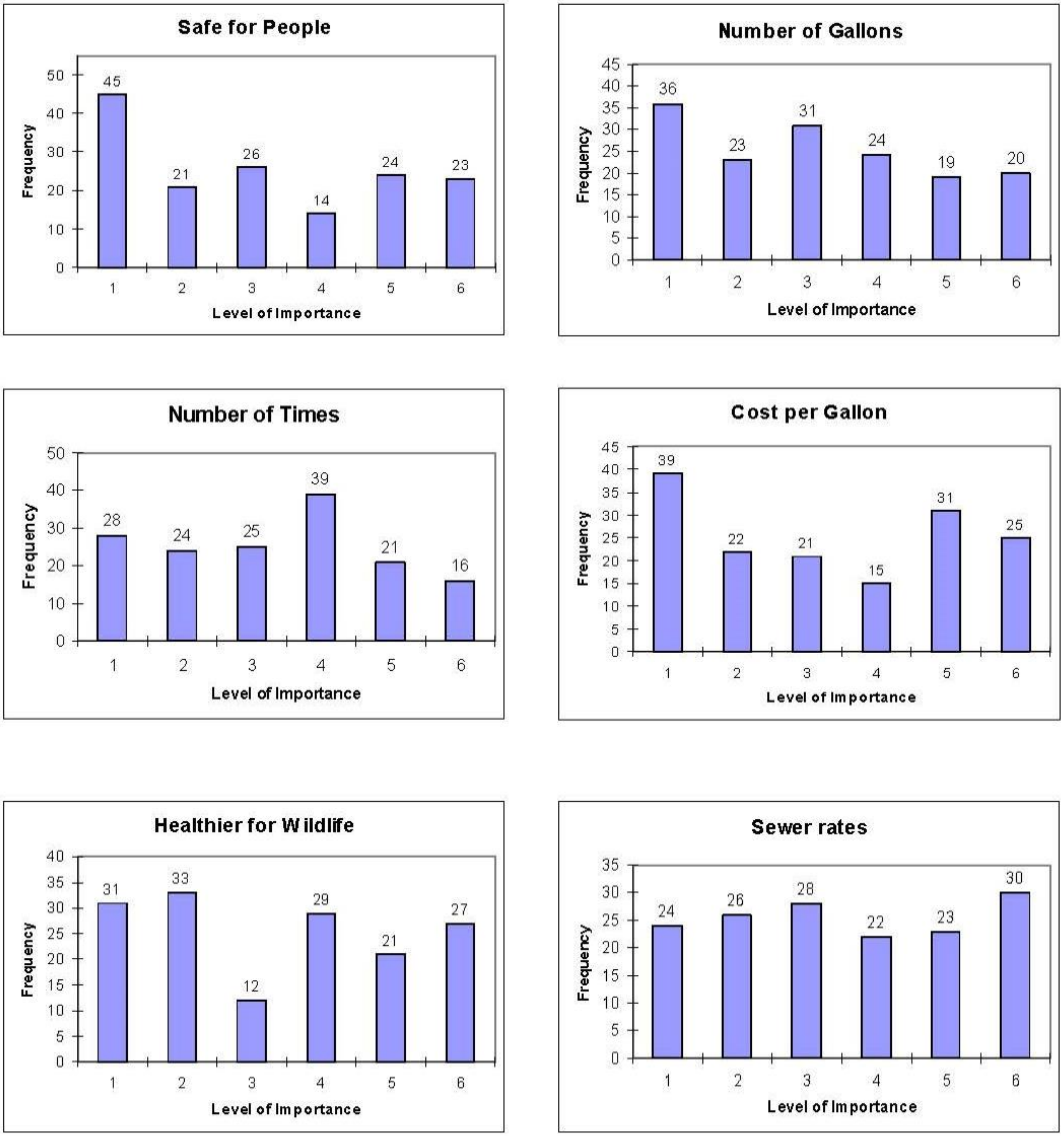


Figure 5-10
Environmental Benefits and Cost Impacts Histograms

3. **Cost and Level of Control:** While long-term sewer rates are very difficult to predict, the City has estimated the impact on sewer rates from overflow control projects. Participants were asked, "At the end of 20 years, how much would you be willing to pay to clean our waterways?" The City provided future rate estimates that included current sewer rates plus the amount needed to fund sewer overflow projects at different levels of control. Results are shown in **Table 5-1**. The top vote-getter, with 40 percent of all votes, was $49-51 per month (95 percent systemwide capture).

4. **Priority Areas:** In implementing the plan, the City could provide different levels of control for different streams, based upon their recreational use, cost-effectiveness of controls or importance to the community. Participants were asked to check one of four choices to express their opinion. Results are shown in **Table 5-2**. The most popular choice (receiving 38 percent of all votes) was "All streams should be treated the same." A large number of participants also wanted to give smaller streams a higher priority than White River (27 percent) and some streams a higher level of control because it is cost-effective to do so (22 percent).

5. **Preferred Plan:** Participants were asked to indicate which systemwide plan they prefer. Eighty-five participants (59 percent of votes) preferred Plan 1 (Storage/Conveyance), 38 chose Plan 2 (Storage/Conveyance with Remote Treatment Facilities), and 22 chose Plan 3 (Total Sewer Separation).

Table 5-1
Question: At the end of 20 years, how much would you be willing to pay to clean our waterways?

Percent Capture	Average Homeowner's Monthly Sewer Rate at End of 20-years	Votes Received	Percent of Total
90□	□44-46	23	15□
93□	□47-49	12	8□
95□	□49-51	59	40□
97□	□58	20	13□
99□	□73	14	9□
100□	□132	6	4□
Other		15	10□

Table 5-2
Question: In implementing the plan, the city could spend more resources and place higher standards on some streams than others. What is your opinion?

Choice	Votes Received	Percent of Total
All streams should be treated the same	56	38□
Smaller streams should be a higher priority than the White River	40	27□
Some small streams should receive higher protection than other small streams	19	13□
Some streams should receive a higher level of control because it is cost-effective to do so	32	22□

5.7.4 Advisory Committees

The Clean Stream Team Advisory Committee advised the city on how to publicize the watershed meetings and present information in an understandable way. Following the meetings, advisory committee members were asked to review the public responses and provide their input on level of control. Most committee members favored the 95 percent capture option and also urged the city to address the septic conversion program along with CSOs. Some committee members favored a higher level of control. For complete committee comments, see **Appendix D-1** for the minutes of the November 17, 2004, meeting.

5.8 2006 Public Comment Period

5.8.1 Release of Plan for Public Comment

On July 19, 2006, Mayor Bart Peterson announced the city had reached a tentative agreement with state and federal agencies on a revised 20-year plan to greatly reduce raw sewage overflows into Marion County waterways, ensuring continued progress in improving the quality of life in many Indianapolis neighborhoods. The announcement was covered by The Indianapolis Star, all four local television news stations and four radio stations. The story also was carried by the Bureau of National Affairs' *Daily Environment Report*. The city's press release and samples of press coverage are included in **Appendix D-1**.

At the media event, the mayor also announced the beginning of a 30-day public comment period, which began July 19 and ended August 18. During the comment period, the plan was available for review on-line at www.indycleanstreams.org and in hard copy at all 26 Indianapolis-Marion County Public Library branches; the Department of Public Works office at 604 N. Sherman Drive; and the Indianapolis Clean Stream Team office at 151 N. Delaware, Suite 900. Electronic copies of the plan on CDRom also could be obtained by calling 317-327-8720. A copy of the flyer sent with the plan is included in **Appendix D-1**.

The City also mailed the 20-page executive summary to 1,564 individuals and organizations on the Clean Stream Team mailing list. Another 87 key stakeholders also received the executive summary and the full plan on CD-Rom. The city also distributed numerous copies of the CD-Rom and Executive Summary through meetings with neighborhood groups, businesses and other interested parties. An email blast on the plan's availability was sent to 415 email addresses. The email blast and a sample cover letter are included in **Appendix D-1**. A special edition of the StreamLine newsletter was released the week of July 31 to announce the tentative agreement and public comment period. See **Appendix D-1** for a copy of the StreamLine newsletter.

5.8.2 Public Hearing & Comment Process

Twenty-seven people attended a public hearing at 7 p.m. on Thursday, August 3, at Good Hall on the University of Indianapolis campus, 1400 E. Hanna Ave. The hearing included a 25-minute presentation on the proposed plan. The City also provided fact sheets describing both the full plan and watershed-specific plans. Questions and comments about the plan were taken during the hearing. Of the five people who offered public comments, all spoke in support of the proposed plan. The City-owned cable television station, WCTY-TV, taped the hearing for rebroadcast on its two cable stations. The hearing sign-in sheet, agenda, fact sheets and transcript are included in **Appendix D-1**.

In addition to the hearing, the City accepted written comments on the plan on-line at www.indycleanstreams.org, via facsimile or U.S. mail. Twenty-three individuals or organizations commented in writing. A copy of all written comments and the City's response is included in **Appendix D-1**.

5.8.3 Summary of Comments and Responses

As noted above, all five of the official comments at the public hearing were in support of the plan. Fifteen of the 23 written comments supported the plan's adoption, as well.

Three written comments opposed the plan, including a senior citizen who supported addressing the problem but opposed the plan's cost to ratepayers. The remaining five written comments were either neutral or asked specific questions without taking a position on the plan's adoption. The comments the City received raised eight major issue areas, with some comment letters touching on multiple issues. The major issue areas were:

- Elimination of Overflows

- Septic Tank Elimination Program
- Public Notification of New Sewer Connections
- Use of Sanitary Sewer Funds
- Cost Concerns
- Water Conservation & Stormwater Management
- Use Attainability Analysis/Existing Use
- Technical Issues or Questions

A summary of the issues raised and the City's response is provided below:

Elimination of Overflows: Four comments expressed support for the complete elimination of all overflows or for going beyond the planned 95-97 percent capture level of control.

City Response: The City's plan will dramatically improve our rivers and streams and protect public health. The City's goals for the sewer plan are:

- Reducing sewer overflows when people are most likely to be in the streams,
- Improving our streams to support fish and other aquatic wildlife,
- Improving the quality of life in our neighborhoods by reducing odors and capturing the unsightly materials found in overflowing sewers, and
- Coming into compliance with state and federal Clean Water Act permit requirements.

Eliminating overflows through sewer separation is not required under the Clean Water Act and is not necessary to meet the above goals. In fact, because urban stormwater run-off is contaminated with a variety of pollutants, sewer separation is less environmentally beneficial than capturing a high level of combined sewage and conveying it to the advanced wastewater treatment plants. Overflows will only occur during very large storms when people aren't using the streams for recreation. Also, sewer separation is three times more expensive and would push residential sewer bills to unaffordable levels. This expense cannot be justified and would not produce better water quality conditions. During public outreach in October 2004, most residents preferred overflow control at the 95-97 percent capture level.

Septic Tank Elimination Program: Five comments requested that the City include its Septic Tank Elimination Program in a federal consent decree and/or complete the 18,000 septic conversion projects sooner than 20 years.

City Response: We agree that septic systems are a priority. Our Septic Tank Elimination Program is designed to address the worst neighborhoods and greatest public health threats first. However, septic tank elimination needs to be considered within the context of the City's many clean water infrastructure needs, including raw sewage overflows, sewer backups into streets and basements, treatment plant repairs, aging sewers needing rehabilitation, and fast-growing areas needing more sewer capacity. All pieces of the puzzle need to fit together. We need to ensure that solving a problem in one neighborhood doesn't transfer it to another area. Our 20-year schedule to eliminate 18,000 septic systems throughout Marion County is both appropriate and protective of public health. Furthermore, the City believes there is no legal justification for including the Septic Tank Elimination Program in a federal consent decree.

Public Notification of New Sewer Connections: Three comments asked the City to include in the plan and a federal consent decree its commitment to provide public notification of new sewer connections that might affect downstream capacity.

City Response: The Department of Public Works has made a commitment to provide to interested persons on a regular basis information on sewer connection applications that may affect downstream sewer capacity. However, it is not necessary to address this or any other City permit matter or ordinance in order to reach agreement with U.S. EPA on a consent decree relative to CSO discharges.

Use of Sanitary Sewer Funds: Four comments expressed concern that sanitary sewer funds had been borrowed upon to fund public safety needs. The comments asked that sanitary general funds be reserved exclusively for sanitary sewer and treatment needs.

City Response: Sanitary funds were recently approved to be loaned to Marion County to temporarily cover the cost of leasing 200 additional jail beds to address jail overcrowding and critical public safety needs. This loan, as approved in City-County Special Ordinance No. 5, 2006, must be repaid no later than June 30, 2007. This short-term loan will not affect our ability to deliver sewer improvement projects within the required schedule.

Cost Concerns: One comment came from a senior citizen who said she could not afford the projected $55-60 sewer bills and asked about state funding to help pay for projects.

City Response: The City sympathizes with these concerns and worked hard to protect ratepayers' interests during negotiations with state and federal regulators. It's important to point out that rates will rise gradually over 20 years. While cleaning up our streams is the right thing to do, we also have no choice but to meet requirements imposed by the U.S. Environmental Protection Agency and the Clean Water Act. We agree that state and federal funding should help pay for these projects. Unfortunately, at this time local ratepayers are being required to bear the burden. While the state and federal governments offer low-interest loans for sewer projects, funding for those programs has been reduced dramatically in recent years. Federal grants, once widely available through a construction grants program, are now only available through Congressional "earmarks" on federal spending bills. Many local, state and national organizations are working with Congress to create a federal trust fund for clean water infrastructure, much as we now have federal trust funds for highways and airports. To learn more about this issue, visit www.cleanwateramerica.org. The City will pursue any alternative funding options that may become available in order to lessen the burden on ratepayers.

Water Conservation & Stormwater Management: One comment asked the City to encourage water conservation and to use constructed wetlands or rain gardens to slow the flow of stormwater into the sewer system.

City Response: The City agrees that water conservation measures and improved stormwater management are important elements to improved water quality and water resource management. For this reason, the City requires property owners disturbing more than a half-acre of land in the combined sewer area to install stormwater best management practices (i.e., wetlands, stormwater drainage swells, etc.) as part of their development project. By requiring BMPs within the combined sewer area, has exceeded its stormwater permit requirements and demonstrated its resolve to better control stormwater runoff in order to mitigate combined sewer overflows. Our analysis of long-term sewer overflow solutions did not rely on these efforts, however, because water conservation, rain garden programs and similar approaches require voluntary efforts by property owners with benefits that cannot be guaranteed. This does not preclude the City from encouraging water conservation and better stormwater management as it implements the long term plan.

Use Attainability Analysis/Existing Use: Two comments questioned the City's analysis of existing use under the Use Attainability Analysis. In particular, they questioned whether a recreational use is an "existing use" if people are known to use the waters for recreation. One comment said actual use is not relevant to the determination of an "existing use" and the other comment took the opposing view, saying actual use is relevant.

City Response: The City has worked with IDEM to achieve a decision on the interpretation of "existing use," which is concept written in federal regulations to protect waterways that have "actually attained" a beneficial use. On June 27, 2005, IDEM issued a letter to the City agreeing that there are no existing uses that would preclude a refinement of the designated recreational use during severe wet-weather events and resultant CSOs. The text in the LTCP merely summarizes the existing use submittal presented to IDEM and the agency's decision. IDEM's decision enabled the City to move forward with a Use Attainability Analysis to determine what recreational uses can be attained on CSO-impacted waterways. The UAA also will go through a public comment and review process before the designated recreational use can be modified. We look forward to working with IDEM, EPA and interested stakeholders during this process.

Technical Issues or Questions: Six written comments asked about the plan's benefits to specific streams or neighborhoods or raised questions about technical details of the plan.

City Response: The City provided residents with information on specific streams and neighborhoods to answer the questions they raised. The response to these and other issues is included in **Appendix D-1**.

5.9 Post CSO LTCP Approval Public Participation

5.9.1 Advisory Group

The City's Clean Stream Advisory Committee continued to meet regularly after CSO LTCP approval to provide independent advice on technical and policy issues associated with CSO control planning and implementation. Presentations made to the Clean Stream Team Advisory Committee are included in **Appendix D-2**.

The Clean Stream Team Advisory Committee has since been replaced with the Authority's Wastewater Technical Advisory Group (TAG), which provides a bimonthly technical forum about the operations of the sewage treatment facilities and collection system, as well as plans for maintenance and improvements. The committee includes both citizen and industry representatives who monitor the performance of the plants and provide technical advice.

5.9.2 Authority's Ongoing Public Education and Outreach

Since acquiring the wastewater system from the City of Indianapolis, the Authority has continued public outreach efforts to:

- Enhance community understanding of the need for Consent Decree investments
- Educate the community on the benefits of Consent Decree investments
- Educate citizens about the cost of Consent Decree projects
- Ensure residents or businesses impacted by Consent Decree construction have accurate information about the projects
- Affirm the Authority's commitment to preserving and protecting the environment

A full range of communication mediums are being used to communicate the Authority's ongoing public outreach efforts, including earned media, web-based and social media, public meetings, brand advertising and corporate reports. Examples of activities include:

- Display booths at area community fairs and events
- Water and Wastewater Treatment Plant tours
- Interactive Deep Rock Tunnel exhibit at the Indiana State Museum
- Presentations to impacted neighborhood associations and community organizations
- Media events highlighting efforts to protect public health and the environment
- Public outreach meetings to convey short-term and long-term impacts on communities
- Public meetings for the Septic Tank Elimination Program project
- Press conferences to highlight significant milestones during construction of the Indianapolis Tunnel System
- Updating the Citizens' website with detailed information about consent decree project progress, as well as the digindytunnel.com website
- Hosting a community tree planning day as part of the CSO 033 Project
- Annual inflow/infiltration program which includes an informative brochure, webpage for customer reference and mailed letters
- Annual Fats, Oils and Grease Outreach program which includes media outreach, bill insert and mailing to restaurant association
- Regular briefings held for City Council leadership to discuss tunnel system
- Regular briefings with Mayor's Neighborhood Liaison (MNL) to discuss consent decree projects
- Regular consent decree updates provided to the public through Facebook and Twitter forums
- Regular briefings with the Water Technical Advisory Group, Advanced Wastewater Technical Advisory Team and the Citizens Stakeholder Alliance
- CSO project tours for community leaders
- Consent Decree projects featured in the Authority's Annual Sustainability Report
- Periodic letters to community leaders with Consent Decree updates

The Authority continues to inform the residents of construction progress and water quality improvements. During construction, the Authority communicates with neighborhood residents and business on the construction schedule and work being conducted in their neighborhood to minimize negative impacts on day to day activities. **Appendix D-2** includes a list of outreach and community activities completed by the Authority.

5.9.3 Amendments to Consent Decree

The CSO LTCP was modified via Amendment 1 (2009) and Amendment 2 (2010) of the Consent Decree. Prior to approval of the modifications the public was given a 30 day period to review and comment on the modifications.

Similarly, a 30 day public review and comment period was provided for Amendment 3 (August 26, 2011), which addressed the transfer in wastewater utility assets from the City to the Authority.

The amendments to the Consent Decree were covered by multiple local and national media outlets. Press clippings associated with the amendments to the Consent Decree can be found in **Appendix D-2**.

5.10 Summary

The public will both enjoy the benefits of improved water quality and be required to pay the costs of controlling CSOs and other pollution sources. For this reason, the City and the Authority have made significant investments in involving the public in LTCP decision-making. These programs have included:

- Formation of two advisory committees on CSO-related issues (consolidated in 2002 into one committee)
- Stream use surveys and neighborhood outreach meetings to gather information on how residents use CSO impacted waterways
- The state's first public notification program for CSO overflows
- Clean Stream Team program fact sheets, quarterly newsletter, neighborhood signage for construction sites, outreach to schools and media events to publicize CSO control projects
- Production of an educational video on CSO issues and speaking engagements with interested community organizations
- Watershed-based meetings in October 2004 to review CSO control alternatives and obtain citizen input into preferred technologies, level of control, rate impacts and stream priorities
- Public comment period on a draft LTCP in July-August 2006
- Public comment on CSO LTCP modifications via Amendments 1, 2 and 3
- Continued community involvement

The plan was influenced significantly by the input of advisory committee members and the general public. Both the public and key stakeholders were given an opportunity to comment on CSO control alternatives, stream prioritization and assumptions used in developing the plan. In addition, the City consulted advisory committee members, environmental advocacy groups, downstream communities and the general public during its survey of recreational uses of the White River and tributaries in CSO impacted areas.

Further documentation of the city public outreach process can be found in **Appendix D-2**.

Section 5 Modification Summary

The 2006 CSO LTCP was updated in 2017 as summarized below:

- Throughout Section 5, all public participation activities performed before August 26, 2011 are referred to as "City" or "Indianapolis" work and all public participation activities performed after August 26, 2011 are referred to as "the Authority" activities.
- Section 5.1, Introduction was modified to reflect completed events, outdated information was removed and an introduction paragraph was added.
- Section 5.2, City County Government was removed.
- Section 5.3, State and Federal Requirements was renumbered 5.2 and was modified to reflect completed events.
- Section 5.4, Public Participation Process and Methods was renumbered 5.3 and was modified to reflect completed events.
- Section 5.5, Advisory Committees was renumbered 5.4 and was modified to reflect completed events and outdated information was removed.
- Section 5.6, Public Education Activities was renumbered 5.5 and was modified to reflect completed events, outdated information was removed and updated continuing public education efforts were added.
- Section 5.7, 2000-2001 Public Participation Activities was renumbered 5.6 and was modified to reflect completed events information.
- Section 5.8, 2004 Outreach on LTCP Alternatives was renumbered 5.7 and was modified to reflect completed events.
- Section 5.9, 2006 Public Comment Period was renumbered 5.8 and was modified to reflect completed events.
- Section 5.9, Post CSO LTCP Approval Public Participation was added to reflect events completed after 2006.
- Section 5.10, Future Public Participation was removed.
- Section 5.11, Summary was renumbered 5.10 and was modified to reflect completed events and outdated information was removed.

6.0 Financial Capability Assessment

Contents:

6.1 Introduction

As part of the Authority's CSO LTCP update, this Section provides an update to the Financial Capability Analysis (FCA) to evaluate the ability to finance the final recommendations and the impact of the financial burden on individual households in the Authority's service area. The CSO Control Policy "…recognizes that financial considerations are a major factor affecting the implementation of CSO controls…[and]…allows consideration of…financial capability in connection with the [LTCP] effort…and negotiation of enforceable schedules." The CSO Control Policy also specifically states that "…schedules for implementation of the CSO controls may be phased based on…financial capability."

The City of Indianapolis initially submitted its FCA as part of the 2006 CSO LTCP. The FCA was updated in 2010, however coordination for approval of the FCA was halted due to the Authority's acquisition of the wastewater system. On August 26, 2011, the City of Indianapolis transferred the wastewater system to the Authority. This section of the CSO LTCP describes the methodology and results of applying U.S. EPA's (EPA) financial capability process to the LTCP, including Amendments 1, 2 and 3 of the Consent Decree.

In developing this FCA, the Authority estimates the future financial burden of the CSO program given other planned and required wastewater system and long term Integrated Planning needs. Integrated Planning costs are defined as all Clean Water Act required expenditures that burden rate payers, including stormwater, flood control, stream stabilization and wellhead protection costs.

6.2 IDEM Requirements and EPA Guidance

6.2.1 IDEM Requirements

Indiana Department of Environmental Management (IDEM) requires all permittees that are not expected to attain compliance with Water Quality Standards (WQS) at the end of the plan implementation period to update their CSO LTCP every five years as described in Indiana Code (IC) 13-18-3-2.4.

Per IC 13-18-3-2.4, "An NPDES permit holder shall review the feasibility of implementing additional or new control alternatives to attain water quality standards. The NPDES permit holder shall conduct such a review periodically, but not less than every five (5) years after approval of the long-term control plan by the department."

In a letter dated August 17, 2012 to all CSO communities in Indiana, IDEM clarified IC 13-18-3-2.4. The letter stated the following:

"…CSO communities must review the feasibility of implementing additional or new control alternatives to attain WQS no less than every five years after approval of their CSO LTCP. In order to meet this requirement, CSO communities must submit a certification statement to IDEM documenting that a CSO LTCP review was completed, and whether or not implementing additional controls to attain WQS would be cost effective. The statement must be accompanied by an updated Financial Capability Analysis."

6.2.2 EPA FCA Guidance

The EPA's 1997 FCA Guidance Document (1997 Guidance) uses a two-phased approach in the assessment of the financial capability of a municipality. Phase 1, or the Residential Indicator (RI), is used to determine the average financial burden of the cost of environmental compliance on individual households in the service territory. The RI is intended to reflect the Residential Share of current and planned wastewater treatment and CSO control costs needed to meet the requirements of the Clean Water Act. Phase 2 is developed to evaluate the financial capacity or resources of the community.

Two calculations are used to develop the Phase 1 RI. The first calculates Cost Per Household (CPH). The current and projected annual capital and operations and maintenance (O&M) costs, adjusted to current dollars, are summed to determine the total current and projected wastewater treatment and CSO costs. This number is then multiplied by the portion of total costs paid by residential customers to determine the Residential Share of total wastewater treatment and CSO costs. The Residential Share number is then divided by total number of households in the service area to determine the annual CPH.

The second calculation determines the percentage of annual median household income (MHI) that is spent on wastewater and CSO control costs. The CPH is divided by the MHI, which is adjusted to current dollars using the average annual national Consumer Price Index for Urban Consumers (CPI-U) inflation rate for the past five years to determine the annual wastewater and CSO control costs per household as a percentage of adjusted median household income, or the RI. The EPA views an RI above 2% as having a "high" financial impact on residential users, as illustrated by **Table 6-1** below.

Table 6-1
Financial Impact Benchmarks for the Residential Indicator

Financial Impact	Residential Indicator (CPH as % MHI)
Low	Less Than 1.0 Percent of MHI
Mid-Range	1.0 – 2.0 Percent of MHI
High	Greater than 2.0 Percent of MHI

Phase 2, or Financial Capability Indicator, is developed to evaluate the financial capacity or resources of the community. The Financial Capability Indicator uses the following six indicators:

- Bond Ratings
- Overall Net Debt as a Percent of Full Market Property Value
- Unemployment Rate
- Median Household Income
- Property Tax Revenues as a Percent of Full Market Property Value
- Property Tax Collection Rate

A numerical score is assigned to each of these indicators, and the overall score is used to develop the Financial Capability Indicator. EPA views a Financial Capability Indicator below 1.5 as indicative of a weak overall community financial condition, as illustrated by **Table 6-2**:

Table 6-2
Financial Capability Indicators

Financial Impact Financial Capability Indicator	Overall Score
Weak	Below 1.5
Mid-Range	Between 1.5 and 2.5
Strong	Above 2.5

In the final step of the assessment, the Residential Indicator and the Financial Capability Indictors are combined to assess the overall burden associated with funding CSO controls. The financial capability matrix, developed by EPA and shown in **Table 6-3**, is used to determine the overall level of burden on the permittee and its residents.

Table 6-3
Financial Capability Matrix

Permittee Financial Capability Indicators Score	Residential Indicator (Cost Per Household as a % of MHI)		
	Low (Below 1.0%)	Mid-Range (Between 1.0 and 2.0%)	High (Above 2.0%)
Weak (Below 1.5)	Medium Burden	High Burden	High Burden
Mid-Range (Between 1.5 and 2.5)	Low Burden	Medium Burden	High Burden
Strong (Above 2.5)	Low Burden	Low Burden	Medium Burden

6.2.2.1 EPA FCA Framework (2014)

In 2012, EPA released its "Integrated Municipal Stormwater and Wastewater Planning Approach Framework." The framework defined Integrated Planning as a tool that *"…assists municipalities on their critical paths to achieve the human health and water quality objectives of the Clean Water Act by identifying efficiencies in implementing requirements that arise from distinct wastewater and stormwater programs, including how to best make capital investments."*

Subsequent to the 2012 Integrated Planning Framework, EPA released the 2014 Financial Capability Assessment Framework (EPA, 2014) to clarify the "*…flexibilities built into the existing guidance that local governments or authorities can use in assessing their financial capability, and the relationship between that assessment and consideration of schedules for permit and consent decree implementation.*" In addition to the standard calculations in the two-phase approach described above, EPA's guidance also allows permittees "*to submit any additional documentation that would create a more accurate and complete picture of their capability*."

The 2014 FCA Framework provides detail of costs that can be included as part of the FCA. It states, "*EPA will consider all CWA costs presented in the analysis described in the FCA Guidance"* such as "*…stormwater and wastewater; ongoing asset management or system rehabilitation programs; existing, CWA related capital improvement programs; collection systems and treatment facilities; and other CWA obligations required by state or other regulators. Where the costs of multiple CWA obligations are included in an FCA, each of those costs should be enumerated separately, so as to provide an understanding of how each contributes to the overall analysis."*

6.3 Key Assumptions

6.3.1 Project Schedule

Based on the requirements of the Consent Decree, LTCP CSO control measures must be operational no later than 2025. In alignment with this requirement, the FCA analysis assumes a planning period through the year 2025.

Following a rate increase implemented by the City in 2015 to fund the City of Indianapolis Stormwater, Flood Control and Stream Stabilization Capital programs, the City of Indianapolis launched a major 20-year capital infrastructure initiative to address flood control, drainage issues, capture and conveyance of stormwater overflows and other major issues. Although the capital plan for the Integrated Planning costs extends through 2035, only Integrated Planning capital costs through 2025 were included, to capture the impact of those costs to Indianapolis' users during the LTCP period.

6.3.2 Funding Sources

Funding for the LTCP is assumed to be through a combination of Pay Go and Revenue Bonds. Pay Go is a term used to reference that portion of capital that will be cash funded as opposed to bond financed. Over time, the Authority's internal cash flow models have assumed a transition from a capital investment program for wastewater that is largely bond-financed to one that is increasingly funded by Pay Go funds supported by rate increases. Subject to regulatory approval and concern for the financial impact to ratepayers, the Authority expects to transition to a 100% pay go funded capital program by 2025.

Separately, the long-term model developed by the City and presented to the City-County Council to fund the City of Indianapolis Stormwater Capital Plan calls for 60% of the planned capital improvements to be bond funded and 40% to be Pay Go funded over time.

6.3.3 Interest Rate and Term

The FCA analysis assumes that all future borrowings for wastewater will have a 4.8% average interest rate and level debt service with 30-year maturities. EPA's Guidance document provides for an annualization methodology for calculating future debt service but the schedule has a maximum 20-year debt maturity, a standard debt calculator is used to project future annual debt service. For stormwater, the analysis assumes 20-year debt maturities with an average 4.0% borrowing cost, and uses the EPA Annualization Factor to calculate future debt service costs.

6.3.4 Inflation

This analysis assumes the use of 2017 dollars, and all costs are expressed in 2017 dollars. Where needed, the study uses monthly and annualized data for the CPI-U published by the U.S. Bureau of Labor Statistics (BLS) for all urban consumers, which covers 89% of the U.S. population and includes changes in prices of goods and services, including user fees for items such as water and sewer service and sales and excise taxes. Based on published CPI-U numbers for July 2012 – July 2017, the calculated average annual CPI-U inflation rate is 1.0133%.

6.3.5 Residential Share

The total Residential Share of wastewater revenue is 53.24%. This number is based on the analysis of percentages of Total Revenue by user category from Fiscal Year (FY) 2016 billing data. Fiscal year is defined as October 1 through September 30. Revenue directly represents the share of utility expenses that are borne by residential customers. **Table 6-4** provides a breakdown of revenue by category. The Residential Share was calculated by combining residential and multi-family percentages.

Table 6-4
2016 Wastewater Revenue by User Category

Customer Category	Revenue ($)	Percent of Total Revenue
Residential	105,139,286	47.51%
Commercial	58,458,584	26.41%
Industrial	22,084,112	9.98%
Industrial Surcharge	12,841,053	5.80%
Multi-Family	12,673,784	5.73%
Satellite	6,034,549	2.73%
Satellite Surcharge	449,043	0.20%
Other (FOG, Grease, Misc.)	3,636,024	1.64%

6.3.6 Total Households

The number of Total Households is 290,641. This includes total Residential Customers plus the total number of multifamily housing units. Satellite Communities are not included in the Total Household count.

The average monthly number of billing instances for residential customers in the Fiscal Year 2016 Authority billing data is 214,987. The total number of multifamily housing units is based on data compiled by the National Multi-Family Housing Council. According to the National Multi-Family Housing Council, 75,654 apartment units were occupied in Indianapolis as of October 2016. By combining the average number of monthly residential bills and multifamily housing unit data, the total number of households of 290,641 is derived.

6.4 Financial Capability Assessment Phase 1 – Residential Indicator

Per EPA guidance, the Phase 1 analysis includes two worksheets:

- Worksheet 1 – Cost per Household
- Worksheet 2 – Residential Indicator, the percentage of annual median household income that is spent on wastewater and CSO control costs.

6.4.1 Cost per Household – Worksheet 1

The Cost Per Household Calculation summarizes current operating and maintenance expenses excluding depreciation and total existing annual debt service expenses. Projected incremental annual costs for operations and maintenance and the cost of financing for future capital are also incorporated. Combined, this represents the total projected annual costs for current and projected LTCP and Integrated Planning capital program expenses.

6.4.1.1 Current Costs

Annual debt service for FY 2018 expense was the basis for current Annual Debt Service input. The 2017 annual expense for Payment In lieu of Taxes (PILOT) payments and the annual expenditure for Pay Go, or rate funded capital, are both included in annual operating expenses. As part of the Asset Purchase Agreement executed in 2010 for the Wastewater system, the Authority entered into a legal commitment to make scheduled PILOT payments to the City of Indianapolis through 2039, as well as to assume responsibility for payments related to outstanding General Obligation (GO) debt of the Sanitary District. The GO debt service payment in 2017 is $7.68 million. The PILOT payment for FY 2017 is $21.9 million.

6.4.2 Projected Wastewater Treatment and CSO Costs

6.4.2.1 Projected Annual Debt Service

The Authority's CIP model projects over $1.7 Billion in capital expenditures would be needed during the 2017 to 2025 LTCP period. Of this, $226.7 million in 2017 projects have been funded with a combination of the Series 2017 Bond proceeds and available Pay Go funds.

This leaves $1.5 Billion in 2018 to 2025 CIP projects to be funded; including $932 million in Consent Decree related projects, $120 million in funding for the Septic Tank Elimination Program (STEP), $419 million for System Improvements, and $8 million in Miscellaneous capital. As noted in Section 6.3.2, the Authority anticipates shifting from a primarily bond-financed strategy to one that relies upon rate-generated revenue to fund capital by 2025. The Authority projects approximately $935 million in new capital investments will be bond financed over the 2018 to 2025 period. The Authority is projecting a long-term borrowing rate of 4.8%, through the balance of the LTCP period. Debt service costs include 1% for cost of issuance and funding for a Reserve Lien Fund, as required under the Authority's bond documents for First Lien debt. This results in additional projected annual Debt Service costs of $65.4 million for wastewater. Integrated Planning capital expenditures will add another $13.3 million annually to debt service expense and $ 4.9 million for incremental Integrated Planning annual Pay Go capital costs.

6.4.2.2 Combined Current and Projected Costs

Current costs of $317.7 million with projected future costs of $157.5 million result in a Total Current and Projected Cost estimate of $457.2 million.

6.4.2.3 Residential Share of Costs

From the Key Assumptions section above, Residential Share has been established at 53.24%.

6.4.2.4 Cost per Household

Dividing the Residential Share of the Wastewater Treatment (WWT) and CSO control costs by the number of households approximates the annual cost per household of $870.44 as presented in **Table 6-5**.

6.4.3 Development of the Residential Indicator (Worksheet 2)

6.4.3.1 Median Household Income

The five year average MHI for Indianapolis is $41,987 and for Center Township, where many of the CSOs occur, is $27,572. **Figure 6-1** provides a map of City of Indianapolis, showing the location of Center Township and the CSO service area. The 2011 - 2015 American Community Survey (ACS) published by US Census was used for the MHI. The 2015 ACS MHI is adjusted for inflation per the 1997 Guidance results in a projected 2017 MHI of $43,114 for the City and $28,312 for Center Township. By comparison, the US national MHI (2015 ACS in 2017 dollars) is $55,335 and the state of Indiana MHI in 2017 dollars is $50,577. The US national and state MHIs are over 28% and 17% higher than that of Indianapolis residents, respectively. However, for Center Township residents this income disparity is stark, with an MHI at only 51% of US MHI levels. This is shown graphically in **Figure 6-2**. MHI in Center Township, Indianapolis and Marion County declined from 2010 to 2017 and has stagnated throughout the time that the CSO LTCP has been in effect, particularly compared to state and national averages.

The cost of the LTCP also has a disproportionate impact upon the poorest populations in Indianapolis. Indianapolis has a significantly greater percentage of its population living in poverty; 21.3% versus 13.5% for the nation as a whole, or 58% higher than the U.S. average. Forty-eight percent of Indianapolis' population has annual incomes below $40,000. The CSO area comprises a limited geographic footprint within the City, but it includes some of the oldest and least affluent areas of Indianapolis within Center Township. With 21.3% of Indianapolis residents with incomes at or below U.S. national poverty level of $24,399, the economic burden of the LTCP will be significant, with a projected Residential Indicator of 3.58% or higher for these less affluent populations.

6.4.3.2 Residential Indicator

The calculations necessary to reach the RI are shown in **Table 6-6**. Based on 1997 Guidance, the Residential Indicator benchmark rating is High at 2.02. The Residential Indicator is higher for those living in Center Township.

Table 6-5
Cost Per Household
Worksheet 1

Line Number	Description	Cost
Current Wastewater Treatment (WWT) Costs (FY 2017) [a]		
100	Annual Operations and Maintenance Expenses (Including O&M, PILOT, and Pay Go, Excluding Depreciation)	$ 146,459,000
100a	Annual O&M and Pay Go Capital for Integrated Planning Costs	$ 32,221,722
101	Annual Debt Service (Principal and Interest) [b]	$ 132,908,494
101a	Annual Debt Service (Integrated Planning Capital) [c]	$ 6,077,124
102	* SUBTOTAL* (Lines 100 + 100a + 101 + 101a)	$ 317,666,340
Projected Wastewater Treatment (WWT) and CSO Costs (FY 2025)		
103	Estimated Incremental Annual Operations and Maintenance Expenses (including Pay Go, PILOT and O&M but excluding Depreciation)	$ 73,970,399
103a	Incremental Annual O&M and Pay Go Capital for Integrated Planning Costs	$ 4,855,020
104	Annual Debt Service (Principal and Interest)	$ 65,387,787
104a	Annual Debt Service (Integrated Planning Capital) [c]	$ 13,298,562
105	* SUBTOTAL* (Lines 103 + 103a + 104 + 104a)	$ 157,511,769
106	Total Current and Projected WWT and CSO Costs (Line 102 + Line 105)	$ 475,178,108
107	Residential Share of Total WWT and CSO Costs (53.24% of Line 106)	$ 252,984,825
108	Total Number of Households in Service Area	290,641
109	Cost Per Household (Line 107/Line 108)	$ 870.44

[a] FY is defined as October 1 through September 30
[b] Includes 2017 Bond Issue 2018 Payment
[c] Integrated Planning includes cost for stormwater, flood control, stream stabilization and wellhead protection.

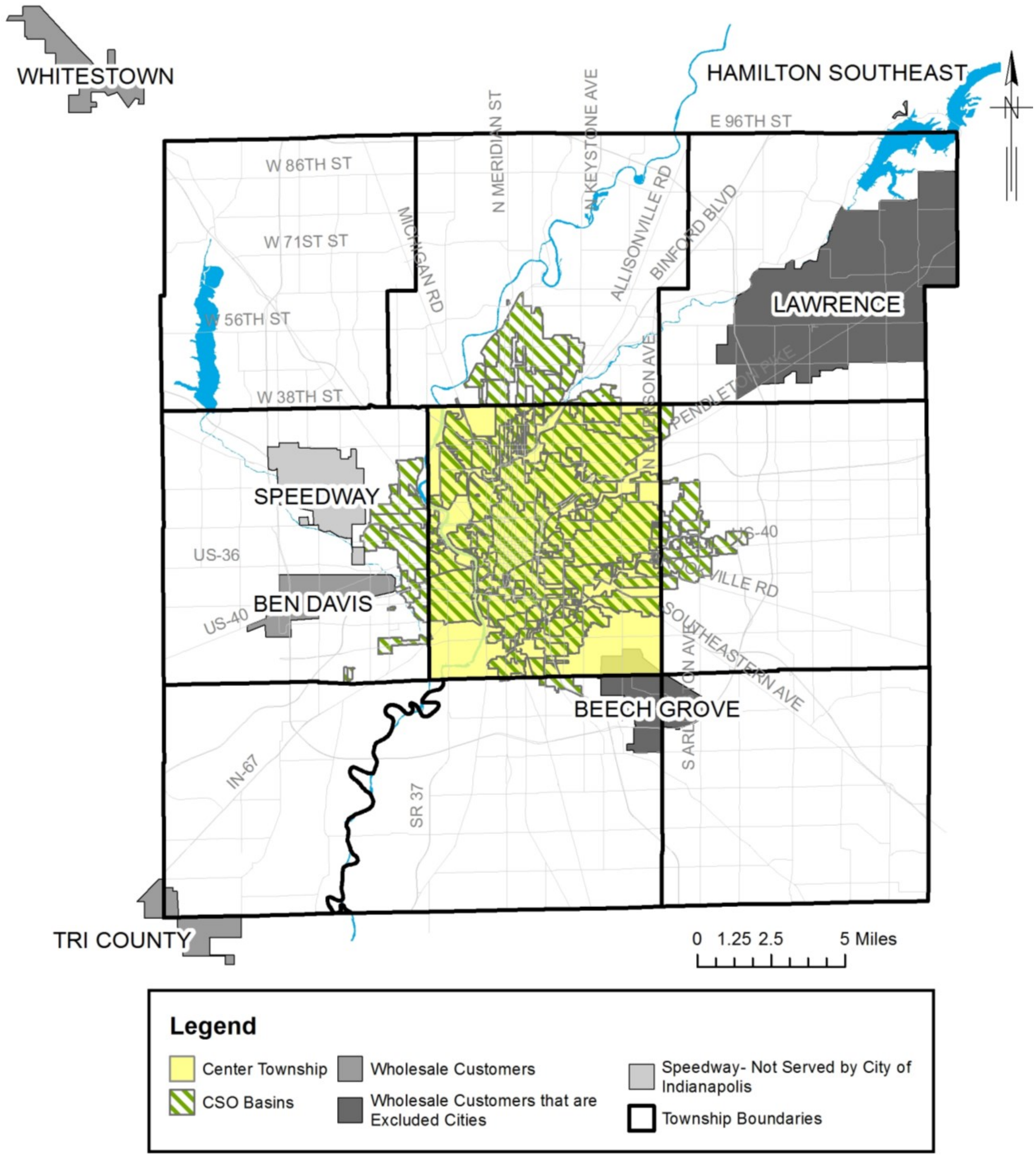


Figure 6-1
Center Township and Indianapolis' CSO Area

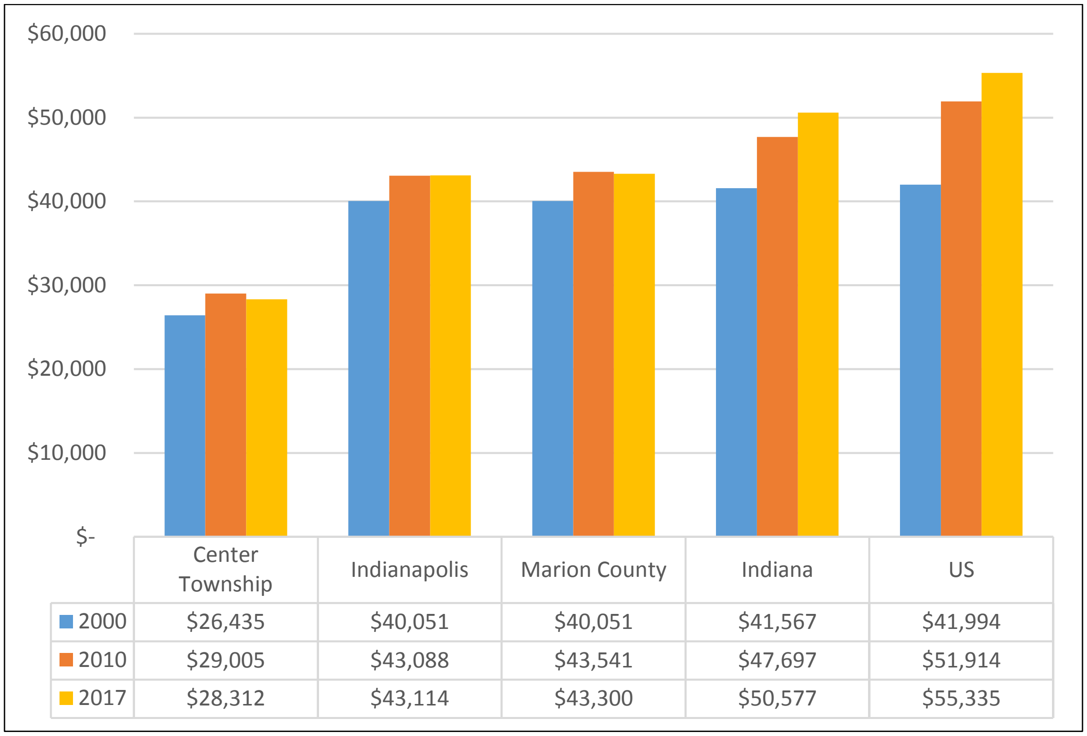


Figure 6-2
Median Household Income Trends

Table 6-6
Residential Indicator
Worksheet 2

Line Number	Description	Cost
Median Household Income (MHI)		
201	Census Year MHI (ACS 2011-2015)	$ 41,987
202	MHI Adjustment Factor (using annual 5 year CIP – U)	1.0133
203	Adjusted MHI (Line 201 x Line 202) (2017 dollars)	$ 43,114
Cost Per Household (CPH)		
204	Annual WWT and CSO Cost per Household (CPH) (Line 109)	$ 870.44
Residential Indicator (RI)		
205	Annual WWT and CSO Control Cost per household as a percentage of Adjusted Median Household Income (CPH as % MHI) ((Line 204/Line 203) x100)	**2.02%**
	Score	**HIGH**

6.5 Financial Capability Assessment Phase 2 – Financial Capability Indicators

The purpose of Phase 2 is to evaluate various representative financial factors of the community to assess a picture of its relative affluence and level of financial resources to fund a major capital program. These factors fall into three broad categories: (1) debt, which includes both the existing bond ratings and the debt burden of the permittee as measured by debt as a percentage of market value of property; (2) socioeconomic indicators, which compare unemployment rates and MHI as a percentage of the national rate; and (3) financial 'management' indicators, drawing upon property tax collection rates and property taxes as a percent of market value.

The Phase 2 financial capability indicator is determined by scoring selected indicators that reflect the debt burden, socioeconomic conditions and financial operations of the community. The current debt burden is assessed, as well as the ability to issue new debt to finance CSO controls, by evaluating the bond rating and the overall net debt as a percentage of full market property value. Socioeconomic conditions are evaluated by determining the unemployment rate and MHI.

The financial operations are evaluated by assessing property tax collection efficiency and property tax revenues as a percentage of full market property value. Each of these factors are assigned a rating of "Weak", "Mid-Range" or "Strong" based on national benchmarks identified in the 1997 Guidance.

The scoring system used to develop the financial capability indicator assigns a numerical score to the national benchmarks as follows in **Table 6-7.**

Table 6-7
National Benchmark Rating Scores

National Benchmark Rating	Score
Weak	1
Mid-Range	2
Strong	3

6.5.1 Worksheet 3 – Bond Rating

To assess the current debt burden and the ability to issue new debt, Worksheet 3 provides the most recent bond ratings for the Authority. Per 1997 Guidance, Worksheet 3 focuses on the Authority itself, which is not a municipality, has no taxing authority and does not have a General Obligation bond rating, so that category is noted as N/A. Using ratings from the Series 2016A and Series 2016B bonds, the Authority has a Strong rating score overall. However, in its 2016 report, Fitch noted that "approximately 80% of the current CIP is expected to be funded with bond proceeds…. The system's debt ratios are very high, with debt per customer of $7,109 and debt per capita at $1,786, exceeding twice the 'A' category median for other utility credits." If the Authority is not able to use a higher percentage of pay go capital in future years and is forced to borrow the majority of funding needed for capital, this may ultimately affect the Authority's strong A credit rating. **Table 6-8** below summarizes Worksheet 3 based on the Authority's respective bond ratings.

6.5.2 Worksheet 4 – Net Debt as Percent of Full Market Property Value

Worksheet 4 evaluates the combined debt outstanding of the Authority, the City and its overlapping debt issuing entities within the City of Indianapolis in the context of property tax values, using property values as a proxy measure for wealth and resources. This is intended both as a gauge of local debt burden on residents within the service area and of the financial capacity of the affected population to absorb additional debt. This calculation is based upon the outstanding par, which means face value of a bond, as compared to its market value, amount of the First and Second Lien debt of the Authority for the wastewater system and the overlapping amount of debt of the municipality, including libraries, school districts, hospitals, airports and the City itself. These numbers do not include the cost of interest payments on the debt. The fair market property value number is derived from the City of Indianapolis' 2016 Consolidated Annual Financial Report (CAFR) and includes the combined fair market values of properties within the Sanitary District's taxing area in Marion County.

Table 6-8
Bond Rating
Worksheet 3

Line Number	Description	Rating Agency		
		Fitch	**S & P**	**Moody's**
301	General Obligation (GO) Rating	N/A	N/A	N/A
302	Revenue Rating	A (Positive)	AA (Stable)	A1
303	Summary Bond Rating	Strong	Strong	Strong
	Score	**Strong - 3**		

Line 401: Direct Net Debt
This includes the current principal or par amount of debt outstanding, for both First and Second Lien debt for the wastewater system, not including annual interest costs. This debt may not be repaid with property taxes; revenues from rates paid by customers are the main source of repayment for this debt.

Line 402: Debt of Overlapping Entities
This includes City of Indianapolis and Qualified Entity debt, as well as debt of the school corporations, libraries, hospitals townships, the airport and other taxing districts with overlapping jurisdictional debt. It includes debt that is repaid from property tax and other tax assessments as well as dedicated revenue sources. It does include prior debt of the Sanitary District and Water system, which the Authority assumed responsibility for when it purchased both the water and wastewater systems from the City in 2011.

Table 6-9 shows the result of Worksheet 4 for analysis of Overall Net Debt as a percent of Full Market Property Value.

The overall measurement for Net Debt as a Percent of Full Market Property Value is Weak, which at 18.5% is almost four times the 5% (five percent) threshold measure for determining "weak". This analysis suggests that when including the debt of overlapping jurisdictions, the debt burden for Indianapolis residents is very high. In its published ratings report, Standard & Poor's noted the "high direct debt" of Indianapolis as a factor contributing to the downgrade of the City's debt rating in 2013.

Table 6-9
Overall Net Debt as a Percent of Full Market Property Value
Worksheet 4

Line Number	Description	Cost
401	Par Value of Direct Net Debt (CWA Authority, First and Second Lien)	$ 1,861,236,839
402	Debt of Overlapping Entities (Proportionate Share of Multijurisdictional Debt)	$ 4,733,484,686
403	Overall Net Debt	$ 6,594,721,525
404	Market Value of Property	$ 35,579,190,000
405	Overall Net Debt as a percent of Full Market Property Value (403/404)	18.54%
	Score	**Weak-1**

6.5.3 Worksheet 5 – Unemployment Rate

The unemployment rate for the Authority's service area, using the Indianapolis Area as the focus and data from the Bureau of Labor Statistics, averaged 4.4% for 2016, while the unemployment rate for the Indianapolis Metropolitan Statistical Area (MSA) and the US for the same time period was 3.6% and 4.9%, respectively. The Indianapolis MSA includes Indianapolis, Carmel and Anderson. This calculation puts the Authority in the Mid-Range for its unemployment rate score, as shown in **Table 6-10**.

Table 6-10
Unemployment Rate
Worksheet 5

Line Number	Description	Percentage
501	Unemployment Rate – Marion County (2016)	4.40%
502	Unemployment Rate - MSA (2016)	3.60%
503	Average National Unemployment Rate (2016)	4.90%
	Above/Below National Average Unemployment	-0.50%
	Score	**Mid-Range - 2**

6.5.4 Worksheet 6 – Median Household Income

Worksheet 6 compares the differentials between local and national levels of Median Household Income (MHI), as a measure of the local community's relative economic well-being. Per the 1997 Guidance, communities with an MHI of more than 25 percent below the national MHI are rated as Weak. Communities within 25 percent of the MHI are rated as Mid-range and communities at more than 25 percent above the national MHI are rated as Strong. As shown in **Table 6-11**, the Indianapolis MHI is rated as Mid-range with income at -22.1% below national MHI levels.

Indianapolis' income and its income growth since 2010 have been weak when compared to national and state levels. This proximity to the threshold for the 25% income differential, which marks a Weak MHI score, suggest that Indianapolis is close in one evaluation category that could have a material impact on the overall FCA scoring. The City's lower income levels are consistent with Indianapolis' much higher levels of poverty, with the local poverty rate at 21.3%, versus 14.5% in Indiana and 13.5% nationally. The scoring also does not address the fact that this income disparity has worsened substantially over time. In 2000, the difference between local MHI and national levels was $1,943 whereas the gap is now more than six times higher at $11,902. Since 2000, local income levels have stagnated with average annual growth of 0.3% while the U.S. as a whole has seen income grow at an average annual rate of 1.7%.

6.5.5 Worksheet 7 – Property Tax Revenue as a percent of Full Market Value

Worksheet 7, shown in **Table 6-12** provides a measure of comparative property tax burden and gives an indication of the ability of the community to support additional debt. Although this measure does not recognize that the Authority does not have the ability to impose taxes to fund its capital improvements or the CSO LTCP program, the analysis for Worksheet 7 has been prepared in accordance with 1997 Guidance. As shown in **Table 6-12,** the City of Indianapolis receives a Strong rating for this indicator. It should be noted that under a change to the State's Constitution in 2009, property tax rates in Indiana were capped, prohibiting levies in excess of 1% for residential property, 2% for farms and nursing homes and 3% for business properties. As a result of this constitutional limitation, almost all Indiana communities will fall into the Strong category for Property Tax Revenues as a Percent of Full Market Property Value.

Table 6-11
Median Household Income
Worksheet 6

Line Number	Description	Cost
601	Median Household Income - Permittee (line 203)	$ 43,114
602	Census Year National MHI	$ 53,889
603	MHI Adjustment Factor (line 202)	1.0133
604	Adjusted National MHI (602*603) 2017 dollars	$ 55,335
	Percent Difference of Adjusted National MHI	-22.09%
	Score	**Mid-Range - 2**

Table 6-12
Property Tax Revenues as a Percent of Full Market Property Value
Worksheet 7

Line Number	Description	Cost
701	Full Market Value of Real Property (404)	$ 35,579,190,000
702	Property Tax Revenues	$ 193,413,000
703	Property Tax Revenue as a percent of Full Market Property Value (702/701)	0.54%
	Score	**Strong - 3**

6.5.6 Worksheet 8 – Property Tax Revenue Collection Rate

Worksheet 8 provides a measure of the property tax collection rate and the efficiency of the tax collection system. It also provides an indication of the acceptability of tax levels to residents. A Weak property tax collection rate means a community has a diminished ability to fund programs and services. As shown in **Table 6-13** below the service area is rated as Strong.

Table 6-13
Property Tax Revenue Collection Rate
Worksheet 8

Line Number	Description	Cost
801	Property Tax Revenue Collected (Line 702)	$ 193,413,000
802	Property Tax Levied	$ 194,983,000
803	Property Tax Revenue Collection Rate (801/802)	99.2%
	Score	**Strong - 3**

6.5.7 Worksheet 9 – Summary of Financial Capability Indicators

The average score for the permittee financial indicator is calculated by dividing the sum of the scores by the number of entries.

Table 6-14 below summarizes the factors used to develop the financial capability indicator. The overall financial capability for the service area corresponds to a Mid-range score.

Table 6-14
Summary of Permittee Financial Capability Indicators
Worksheet 9

Line Number	Indicator	Column A - Actual Value	Column B - Score
901	Bond Rating	STRONG	3
902	Overall Net Debt as a percent of Full Market Property value	WEAK	1
903	Unemployment Rate	MID-RANGE	2
904	Median Household Income	MID-RANGE	2
905	Property Tax Revenues as a percent of Full Market Property Value	STRONG	3
906	Property Tax Revenue Collection Rate	STRONG	3
907	Permittee Indicators Score	MID-RANGE	**2.33**

6.5.8 Worksheet 10 – Overall

The financial capability assessment combines the results from both the residential and permittee financial capability indicators to determine the overall burden imposed on the residents.

The financial capability matrix score is shown in **Table 6-15**. As shown in the **Tables 6-15** and **6-16** below, the service area is projected to have a High burden.

Table 6-15
Financial Capability Matrix Score
Worksheet 10

Line Number	Indicator	Column A – Actual Value	Column B - Score
1001	Residential Indicator Score (Line 205)	HIGH	**2.02%**
1002	Permittee Financial Capability Indicators Score (Line 907)*	MID-RANGE	**2.33**
1003	Financial Capability Matrix Category		**High Burden**

Table 6-16
Financial Capability Matrix

Permittee Financial Capability Indicators Score	Residential Indicator (Cost Per Household as a % of MHI)		
	Low (Below 1.0%)	Mid-Range (Between 1.0 and 2.0%)	High (Above 2.0%)
Weak (Below 1.5)	Medium Burden	High Burden	High Burden
Mid-Range (Between 1.5 and 2.5)	Low Burden	Medium Burden	High Burden
Strong (Above 2.5)	Low Burden	Low Burden	Medium Burden

6.6 Summary

The Authority is not requesting a change at this time; the Authority intends to implement the plan as scheduled and agreed upon while seeking to add environmental and financial value through consistent evaluation. The Authority seeks to deliver the greatest benefit while reducing costs to rate payers -- specifically, the 48% of Marion County (158,124 households) that have annual household incomes below $40,000.

The combined Financial Capability Score is projected to have a High burden upon the community, based upon increasing debt service burden and higher O&M costs associated with the additional CIP coming on line. When focusing on the population living in poverty, which is over twenty percent of all the Authority's Service Area residents, the Residential Indicator is 3.58%. Center Township residents, where much of the CSO area exist, have an adjusted 2017 MHI of $28,312 with a and the RI for those households at 3.07%. Other elements that could potentially increase the burden further include Residential Share increasing, greater than projected costs for O&M, new additional major capital projects, and higher than anticipated borrowing costs for future debt.

The Authority recognizes the high financial burden on ratepayers as a major factor in implementation of the LTCP. Additional mandated controls to attain water quality standards will result in a higher burden on Indianapolis residents and beyond the financial capability of residents.

No change to schedule is requested with this LTCP update. With continued value engineering and innovation to reduce costs while meeting environmental and Consent Decree needs, the Authority continues to implement the LTCP and initiate actions necessary to be in full compliance with Consent Decree milestones.

Section 6 Modification Summary

The 2006 CSO LTCP was updated in 2017 as summarized below:

- The section was completely rewritten as the financial capacity of service territory changes over time.

7.0 Selected Long Term Control Plan

Contents:

7.1 Introduction

In this Section, to reflect the transfer of the wastewater system from the City of Indianapolis to CWA Authority, Inc., all selections and evaluations performed before August 26, 2011 were completed by the "City" or "Indianapolis". Selections and evaluations performed after August 26, 2011 were done by "the Authority" and will be referred to as such in this report.

This section describes the CSO LTCP that has been selected. The selected plan is based on the alternatives evaluation described in Section 4, the public input described in Section 5, and the financial impacts and affordability analysis discussed in Section 6. Some elements of the selected plan have been modified since the 2006 Consent Decree. Three amendments to the Consent Decree were approved in 2009, 2010 and 2013. The text, tables and figures that follow summarize the selected LTCP including the modifications to the Consent Decree.

7.2 Selection of Plan

Section 4 described the three systemwide CSO control plans that have been evaluated. CSO Control Plan 1, which consists of storage and conveyance in all watersheds and Advanced Wastewater Treatment (AWT) plant improvements, is the most cost-effective plan, provides the best performance on neighborhood issues and operability, and also achieves the greatest reduction in biological oxygen demand (BOD). Plan 1 also was the public's preferred plan, as described in Section 5.8. For these and other reasons, CSO Control Plan 1 was determined to be the best solution for the City of Indianapolis. This subsection describes how CSO Control Plan 1 was evaluated and selected.

7.2.1 Selection Factors

As noted earlier in Section 1.6.2, the CSO LTCP goal is to restore beneficial uses and protect streams from CSO discharges when people are most likely to use them. Other goals include controlling solids and floatables, capturing "first flush" discharges, and meeting state and federal aquatic life requirements for dissolved oxygen. In selecting the correct level of control, the following factors were taken into consideration:

- Restoring Attainable Uses
- Cost-Effectiveness
- Public Acceptance
- Affordability

Section 4.6.4.1 describes the cost-effectiveness of each plan in detail. A range of parameters to evaluate the cost-effectiveness of each level of control were considered.

7.2.2 Evaluation of Short-listed Alternatives

The City initially evaluated CSO Control Plan 1 at the following levels of control: 90, 93, 95, 97 and 99 percent capture. The level of control is a systemwide average for all watersheds. U.S. EPA proposed an additional level of control: 96 percent capture on White River, Pleasant Run, and Eagle Creek, and 97 percent capture on Fall Creek and Pogues Run. This proposal was based on the perceived relatively low cost per gallon to achieve higher levels of control on Fall Creek and Pogues Run. The present worth cost of U.S. EPA's 96/97 percent plan would be $2.05 billion (in 2004 dollars).

U.S. EPA and IDEM also requested the evaluation of higher levels of capture on tributary watersheds while maintaining 93 percent capture on the White River. The evaluation determined that maintaining a lower level of control on the White River would not significantly reduce program costs, and the alternative was not carried forward for public comment or detailed technical review.

Finally, U.S. EPA requested a plan that would achieve 97 percent capture on Fall Creek and 95 percent capture on other watersheds be considered, again due to the cost-effectiveness of achieving higher capture on Fall Creek. The present worth capital and operation/maintenance cost of the 97/95 percent capture plan would be $2.06 billion (in 2016 dollars). This increased level of capture does not result in additional uses above the 95 percent level of control.

Cost-Effectiveness: The optimal point in the evaluation of cost-effectiveness is referred to as the "knee of the curve," which is the point where an alternative transitions from increasing to decreasing benefit for each additional dollar spent. When presented graphically, the "knee of the curve" is the point where the slope of the curve is changing from shallow to steep. As presented in Section 4.6.4.1, it was determined that the knee of the curve for most comparisons described above is at the 95 percent capture level of control. However, on Fall Creek it was determined that the knee of the curve falls closer to the 97 percent capture level of control.

Restoring Attainable Uses: Although the 97/95 percent capture level of control does not meet Indiana's current recreational water quality standards, further CSO control would not restore additional uses.

Public Acceptance: Section 5.8 describes the City's 2004 public outreach activities to present the three CSO control plan options to the public. The outreach included watershed meetings, neighborhood meetings, mailing of a 12- page newsletter and comment card, information on the City's Web site, and various presentations to the news media. As part of the outreach, members of the public were asked to rank neighborhood issues and cost and benefit factors. As summarized in Section 5.8.3, citizens who responded preferred the 95 percent capture level of control.

In addition, when asked whether the City should spend more resources and place higher standards on some streams than others, the public response was mixed. The largest number of residents (38 percent) wanted to treat all streams equally. However, a significant number of respondents favored putting a higher priority on some streams than others, based on different distinguishing factors.

Affordability: Implementing the LTCP will place a significant financial and economic burden on the City of Indianapolis. In 2006, wastewater revenue requirements were expected to increase by about 12 percent per year, on average. This significantly impacted industrial, commercial and residential sewer rates. Particular concern was and still is placed on the ability of financially disadvantaged residents in Center Township and those living below the poverty level to afford sewer service. Based upon U.S. EPA guidance, the calculation of the residential burden for the retail service area reached the medium burden category in 2006 and again in 2016. In Center Township and for people living below poverty level, the burden fell into the high burden category.

Because it was unclear whether this anticipated level of increases over the long term could be sustained, this LTCP proposes the following approach to address the costs and schedule:

1) Pursuit of grant funds and low-interest loans to minimize the economic impact; and
2) Re-assessment of the capital program and rates every 3-5 years.

7.2.3 Selected CSO LTCP

The LTCP that was selected in 2006 will achieve 97 percent capture on Fall Creek and 95 percent capture on other waterways. The selected plan is expected to reduce the average annual overflow frequency from 60 storms per year to approximately two storms per year on Fall Creek and four storms per year on other waterways, based on average rainfall statistics for Indianapolis. This is a very high level of CSO control that will achieve many benefits to Indianapolis neighborhoods, waterways and quality of life. The elements of the selected plan are summarized in Section 7.3, and the benefits of the plan are discussed in Section 7.4.

A number of the elements of the original selected plan have been modified since the approval of the CSO LTCP. Three amendments to the Consent Decree have been approved to document changes to the selected plan. Sixteen (16) of the thirty-one (31) original Control Measures have been modified, and a thirty-second Control Measure was added through amendments. The remainder of this section describes the selected plan as modified through the amendments of the Consent Decree.

7.3 CSO Control Measures

7.3.1 Summary of Systemwide Control Measures

The selected plan will employ storage/conveyance facilities in all major watersheds combined with advanced wastewater treatment plant improvements. Facilities will be designed to achieve 97 percent capture on Fall Creek and 95 percent capture on White River, Pleasant Run/Bean Creek, Pogues Run and Eagle Creek. Sewer separation has been employed along Lick Creek, State Ditch and other isolated outfall locations. The selected plan is illustrated in **Figure 7-1**, as modified by the Authority.

The selected plan will collect flow from outfalls on a regional basis using conveyance facilities connected to a deep tunnel system. The deep tunnel system will serve primarily as a storage facility, and the stored flows will be pumped out to the AWT plants at the end of a storm event. The AWT facilities have been expanded and upgraded to provide treatment of wet-weather flows. The plan also includes near-surface collection conduits and satellite near-surface storage facilities to control remotely located outfalls on upper White River and Upper Pogues Run.

The key features of the selected plan are:

- Deep tunnel system including Fall Creek, White River, Pogues Run, Pleasant Run and Eagle Creek
- Collection interceptors and consolidation sewers along all reaches to convey remote outfall flow into the deep tunnel system
- Satellite storage facilities for remotely located outfalls along upper White River and Upper Pogues Run Deep Rock Tunnel Connector (DRTC) originating east of the Belmont AWT Plant and terminating near the Southport AWT Plant to convey deep tunnel flows to a deep tunnel pump station and screening facilities at the Southport AWT Plant for treatment.
- Local sewer separation projects to eliminate isolated overflows on State Ditch, Lick Creek, White River and the upstream ends of Fall Creek, Pogues Run, Bean Creek and Eagle Creek
- Belmont AWT plant improvements
- Southport AWT plant improvements
- Early action projects described below and in Section 4.6.1.4.
- Watershed improvements, as described in Section 4.6.1.5, will be implemented at the Authority's discretion.

7.3.1.1 Early Action Projects

Beginning in 1995, the City instituted a number of early action projects to reduce combined sewer overflow frequency and volume in a number of watersheds. These projects were accelerated in 2001 after completion and submittal of the City's initial LTCP to U.S. EPA and IDEM. Early action projects have been incorporated into cost estimates, projected benefits and implementation schedule for the LTCP. All of early action projects originally identified in 2006 have been completed and are listed in this section under their designated stream reach.

7.3.1.2 Program Costs

Table 7-1 (LTCP Project Costs by Watershed) lists the components by watershed, as well as the estimated capital, operation and maintenance and program costs associated with the LTCP. The total present worth cost of the selected LTCP is estimated to be $2.06 billion (in January 2016 dollars) over its 20-year implementation period. Watershed projects are estimated with a present worth cost of an additional $59.6 million (in January 2016 dollars). Design and performance criteria and project schedule are described later in Section 7.5.

7.3.2 Fall Creek Control Measures

The Fall Creek watershed required a careful examination of unique hydrological dynamics and citizen preferences for addressing CSO issues in the stream. The selected plan for Fall Creek cost-effectively maximizes capture of CSO flows through construction of a deep underground storage tunnel and associated collection sewers.

Because groundwater is such an important resource for the City of Indianapolis, the City will take all necessary steps to prevent groundwater contamination during construction and operation of the deep tunnel system

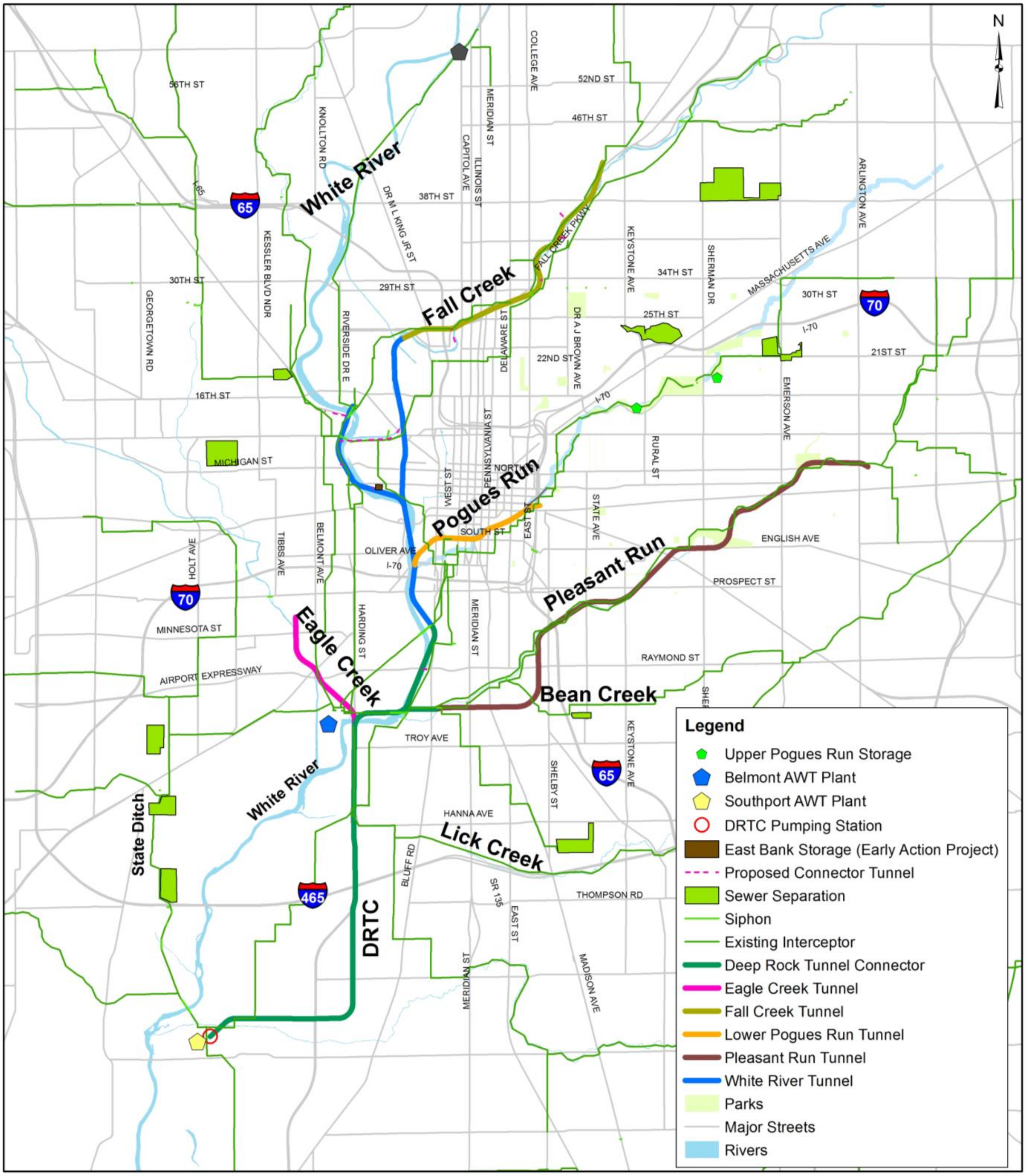


Figure 7-1
Systemwide Selected CSO Plan (2017)

Table 7-1 LTCP
Component Cost by Watershed

	Capital Cost (Millions) – 2016[a]	
Fall Creek		
Fall Creek Tunnel and Collector Pipes		
Storage Tunnel	$	201.3
Collector Pipes	$	43.5
*Removal of Boulevard Dam**	$	0.6
In-System Storage at CSOs 063, 063A and 065*	$	4.7
CSO 103 Rehabilitation*	$	0.8
CSO Pilot Project - Inflatable Dam at CSO 053*	$	0.6
CSO Pilot Project - Net at CSO 135 and sluice gate at CSO 058*	$	0.4
Fall Creek Netting at CSO 062*	$	1.2
Eliminate SSO 105 and SSO 124*	$	8.5
FALL CREEK TOTAL COSTS	**$**	**261.7**
Pogues Run		
Upper Pogues Run Improvements		
Upper Pogues Run Collection Interceptor	$	-
Off-Line Storage Facility (Spades Park)	$	42.5
Lower Pogues Run Improvements		
Lower Pogues Run Tunnel System	$	160.6
In-Line Storage at CSO 101*	$	1.3
Consolidation of 034 and 035 Outfalls*	$	19.9
Sewer Separation at CSO 143*	$	3.8
Pogues Run Wetlands*	$	20.9
POGUES RUN TOTAL COSTS	**$**	**248.9**
Pleasant Run		
Pleasant Run Interceptor, (CSO Collector Pipe)		
Pleasant Run Collection Interceptor	$	-
Pleasant Run Industrial Flow Interceptor	$	-
Bean Creek Collection Interceptor	$	-
*Sewer Separation at CSO 017**	$	0.4
CSO Pilot Project - In-line netting at CSO 149*	$	0.3
Pleasant Run Deep Tunnel System	$	319.8
PLEASANT RUN TOTAL COSTS	**$**	**320.6**
Eagle Creek		
Eagle Creek Interceptor (CSO Collector Pipe)		
Collection Interceptor to Belmont WWTP (Constructed as Deep Tunnel per Six-Month Report No. 16)	$	29.6
*Belmont North Relief Interceptor**	$	22.5
*CSO 033 Separation**	$	3.0
EAGLE CREEK TOTAL COSTS	**$**	**55.1**
Lick Creek and State Ditch		
Sewer Separation at CSO 235*	$	0.3
Sewer Separation at CSOs 217 and 218*	$	4.3
LICK CREEK AND STATE DITCH TOTAL COSTS	**$**	**4.6**

Table 7-1 LTCP
Component Cost by Watershed (continued)

	Capital Cost (Millions) – 2016[a]	
White River		
Central Tunnel and Pump Station		
Storage Tunnel	$	191.4
Collection Sewers	$	43.9
*Sewer Separation at CSO 046**	$	0.5
Rerouting of CSO 205 to Lift Station No. 507*	$	1.2
Modifications to Lift Station No. 507 (Elimination of CSO 156)*	$	7.1
White River Overflow Storage and Primary Treatment (East Bank)*	$	6.4
Sewer Separation at CSO 275*	$	1.9
White River Screen at CSO 039*	$	0.9
Additional Barrel Harding/White River Inverted Siphon*	$	1.8
Siphon at 10th and White River	$	3.3
CSO Pilot Project - Vortex at CSO 045*	$	1.7
WHITE RIVER TOTAL COSTS	**$**	**260.2**
Advanced Wastewater Treatment Plants		
Belmont AWT Plant		
Belmont Gravity Belt Thickeners, PEPS, Headworks*	$	13.5
Wet-Weather Chlorine Disinfection Tank and Retrofit of Existing Outfall*	$	14.7
Belmont AWT Improvements		
*Yard Piping and Valves**	$	1.5
Belmont Septage Receiving Area Pumping Station*	$	5.3
Belmont Vacuum-Swing Adsorption (VSA) Expansion & Ozonation Rehabilitation*	$	22.9
Pre-Aeration to Primary Clarifier Conversion at Belmont AWT Plant*	$	3.8
Restore Pump Bypass to Southport AWT Plant*	$	0.8
New Secondary Improvements (Aeration Tanks and Intermediate Clarifiers)*	$	75.4
New Primary Improvements*	$	42.5
BELMONT AWT PLANT TOTAL COSTS	**$**	**180.3**
Southport AWT Plant		
Southport AWT Improvements		
*New 150-MGD Final Effluent Pump Station**	$	4.4
Add Supplemental Disinfection Process (chlorination /dechlorination)	$	17.8
*Southport Sludge Lagoon Conversion**	$	3.7
All New Secondary Improvements	$	63.1
All New Primary Improvements (Headworks and Primary)	$	62.6
SOUTHPORT AWT PLANT TOTAL COSTS	$	151.5
Interplant Connection		
Deep Rock Tunnel Connector	$	232.8
Deep Rock Tunnel Connector Pump Station	$	100.7
INTERPLANT CONNECTION TOTAL COSTS	$	333.4
Systemwide Projects		
Real Time Controls (Phase I and II)*	$	7.5
Combined Sewer Improvements 2001*	$	6.7

Table 7-1 LTCP
Component Cost by Watershed (continued)

	Capital Cost (Millions) – 2016[a]	
1995 CSO Operational Plan Phase I*	$	1.3
Miscellaneous Rehabilitation Projects in 2002*	$	1.6
SYSTEMWIDE PROJECT TOTALS COSTS	$	17.1
LTCP Implementation Costs	$	107.1
TOTAL CAPITAL COST (LTCP PROGRAM COST)	$	1,941.1
Systemwide Present Worth Operations and Maintenance Costs	$	117.7
Total Present Worth Cost in 2016 dollars (LTCP)	**$**	**2,058.8**
Watershed Projects		
Accelerated Septic System Conversion Program	$	30.6
Streambank Restoration	$	6.0
TOTAL CAPITAL COST (WATERSHED PROJECT COST)	$	53.8
Watershed Project Present Worth Operations and Maintenance Costs	$	5.8
Total Present Worth Cost in 2016 dollars (Watershed Projects)	$	59.6
Total Present Worth Cost in 2016 dollars (LTCP with Watershed Projects)	**$**	**2,118.4**

* Denotes Completed Projects
[a]All Project Costs including Completed Projects shown in January 2016 dollars for consistency with the January 2016 Consent Decree Cost Report submitted to comply with Section VI.C.16 of the Consent Decree

along Fall Creek, White River, Pogues Run, Pleasant Run and Eagle Creek. The Groundwater Management Plan includes the following components: 1) reviewing available groundwater data to evaluate where groundwater impacts might occur along the preliminary tunnel alignments; 2) developing a calibrated groundwater model to evaluate alternatives for tunnel construction in the bedrock; 3) developing a groundwater risk registry and mitigation controls to be considered during construction and future operation; and 4) reviewing specialized construction techniques to protect groundwater.

The plan also includes information on recommended groundwater monitoring both during and after tunnel construction to verify groundwater protection.

Although not a required component of the LTCP, supplemental non-CSO watershed improvements such as dam removal have been implemented to provide additional benefits to water quality, aquatic life and aesthetics during both dry and wet weather.

The following early action projects and CSO control measures have been implemented:

- Rehabilitation of sewers to eliminate CSO 103
- Netting at CSOs 062 and 135,
- Automatic sluice gate at CSO 058
- Elimination of SSOs 105 and 124.
- In-System Storage: Four (4) inflatable dams have been constructed at CSOs 053, 063, 063A and 065.

The Authority is in the process of implementing the following CSO control measures:

- Deep Tunnel System and consolidation sewers: An 18 foot diameter deep tunnel will be constructed along Fall Creek to store and convey captured CSO flows. The deep tunnel system will begin near 34th Street and Sutherland Avenue and will generally run parallel to Fall Creek in a southwesterly direction, connecting to the White River tunnel and finally the DRTC to create a single continuous underground storage facility. The proposed alignment of the tunnel (shown in **Figure 7-2**) has been modified from the original Plan 1 configuration, shown in Section 4.5.2, to reflect more recent facility planning conducted in 2011. Construction of few consolidation sewers have been completed and additional consolidation sewers are required to group CSOs along Fall Creek and direct them to the deep tunnel system. This project is currently under design and is expected to achieve full operation in 2025.

The following non-CSO project has been implemented to improve water quality:

- Dam Removal: Boulevard Dam has been eliminated to help moderate the dissolved oxygen problems observed in Fall Creek upstream of the dam.

Figure 7-2 shows the location and alignment of the Fall Creek control measures.

7.3.3 Pogues Run Control Measures

Efforts have been made to address urban flooding and CSO impacts along Pogues Run, with several control measures along the stream already constructed. The selected plan for Pogues Run will complement existing control measures to improve the quality of Pogues Run and to convey CSO discharges away from areas such as schools and parks. The following early action projects and CSO control measures have been completed on Pogues Run:

- In-Line Storage at CSO 101: As part of its early action projects, the city has constructed an inflatable dam with real time controls at CSO 101 to reduce overflows in Brookside Park.
- Consolidation and conveyance of 034/035 Outfalls: Overflows from CSOs 034, 034A and 035 have been consolidated and rerouted away from four local schools to the Pogues Run Tunnel.

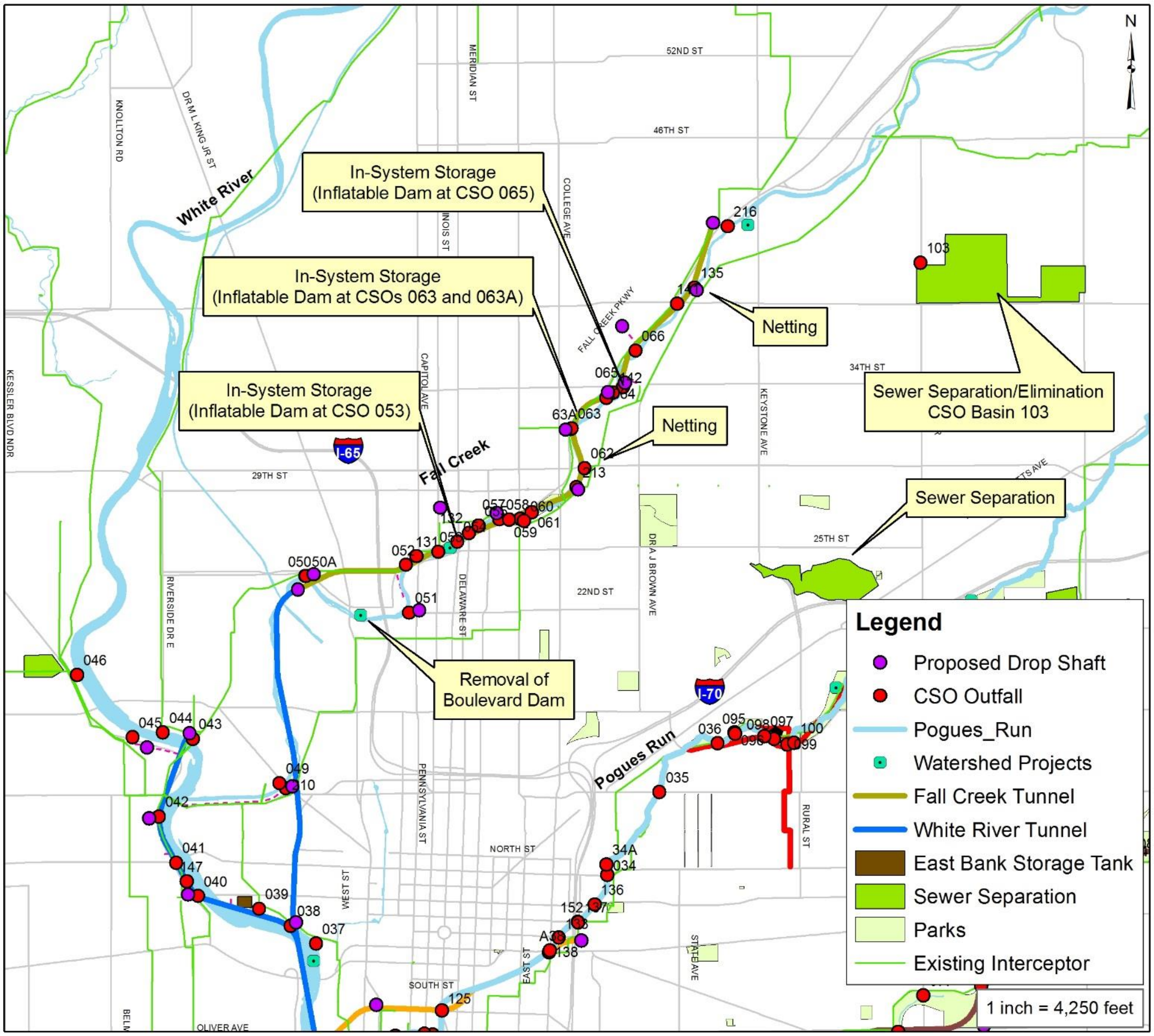


Figure 7-2
Fall Creek Watershed Control Measures

- Sewer separation of CSO 143: Sewer separation has been implemented within the combined sewer area tributary to CSO 143, thus eliminating this remote CSO upstream of Forest Manor Park
- Pogues Run I-70/Emerson Ave. and Brookside Park basins. This is a constructed wetland and retention pond built to control flooding, improve water quality and enable use of one barrel of the Pogues Run Conduit (PRC) for CSO conveyance.

  The Authority is currently in the process of implementing the following CSO control measures:

- Lower Pogues Run Improvements: The lower portion of Pogues Run is enclosed in an underground, double- barrel conduit (PRC), which extends under downtown Indianapolis for approximately 2.2 river-miles. A new 18 foot diameter deep tunnel consisting of connection tunnels, drop shafts and collection consolidation sewers will be constructed in Lower Pogues run to capture CSOs from six (6) outfall locations. A portion of the existing PRC will be converted to act as a collection consolidation sewer to capture CSOs 136/152 and convey flow to the new Pogues Run Tunnel. Two drop shaft locations will convey flows from CSOs 128, 125, 138A and 133 to the new Pogues Run Tunnel. The deep tunnel will tie into the White River Tunnel connecting into the DRTC conveying flows to the Southport AWT Plant. This project is currently under construction and is expected to achieve full operation in 2021.
- Upper Pogues Run Improvements: A 2.0 MG storage facility located near CSO 100 will be constructed. Flow from the storage facility will be pumped to downstream consolidation sewers when capacity is available. The large diameter CSO 101 and 099 sewers will provide additional storage during wet weather to reduce the volume needed for the storage facility at Brookside park. Consolidation sewers will convey and store wet weather flow along Forest Manor, Brookside, and Spades parks. Wet weather flow from the remaining CSOs will be addressed by adjusting weir heights within each CSO's diversion structure to maximize system storage and divert flow to other consolidation sewers with additional capacity.

Figure 7-3 shows the location and alignment of the Pogues Run control measures.

7.3.4 Pleasant Run/Bean Creek Control Measures

The selected plan for Pleasant Run addresses CSO discharges by providing a deep tunnel to convey captured CSO flow to the deep tunnel system. The following early action projects and CSO control measures for Pleasant Run and Bean Creek have been completed:

- Sewer Separation Tributary to CSO 017: The combined sewer area tributary to CSO 017 has been separated, eliminating this remote CSO along Bean Creek.
- In-line netting has been installed at CSO 149 to control solid and floatable materials.
- Two inflatable dams have been installed at CSOs 080 and 084 to provide in system storage.

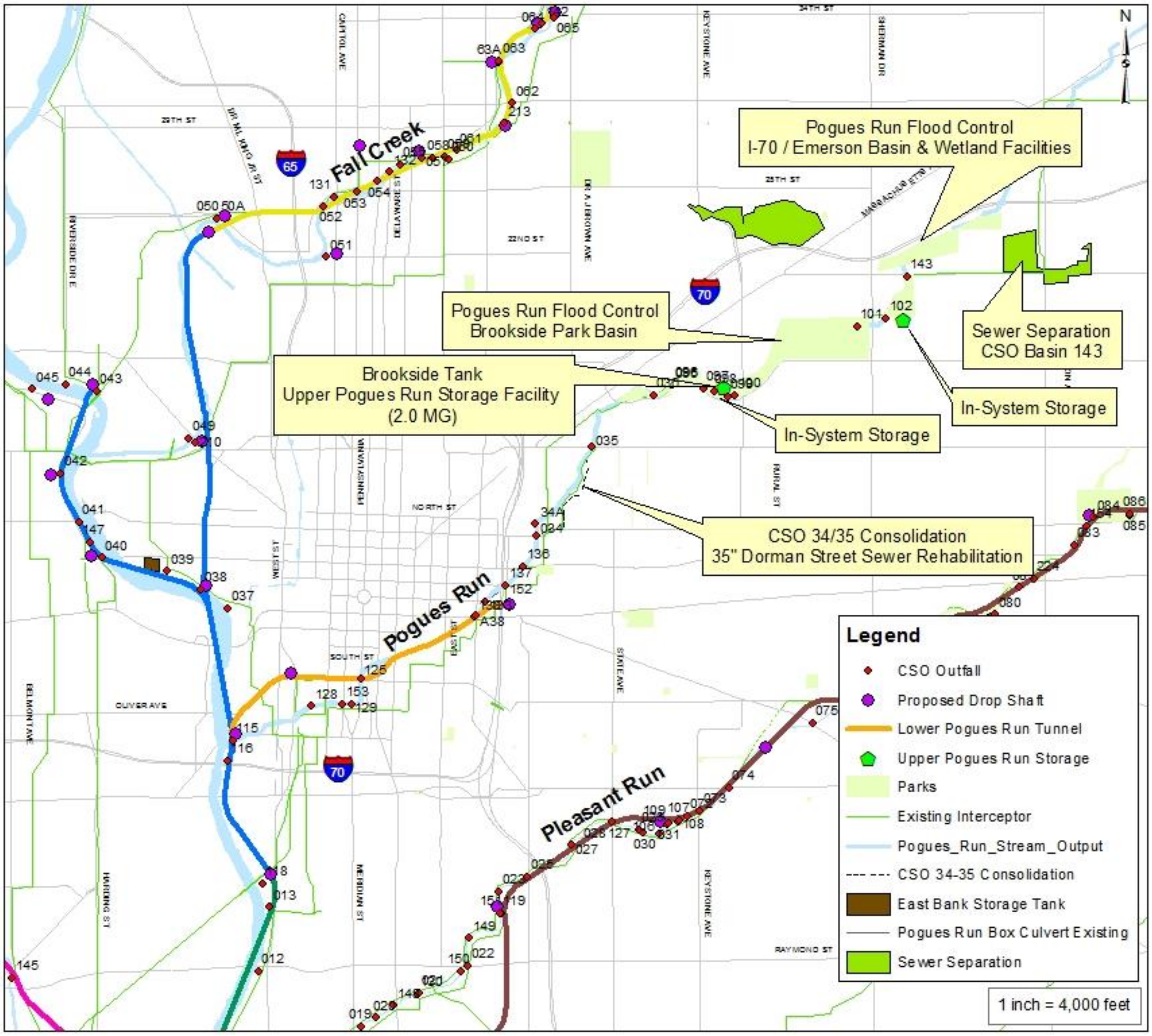


Figure 7-3
Pogues Run Watershed Control Measures (2017)

The Authority is currently implementing the following control measures for Pleasant Run and Bean Creek:

- Deep Tunnel: A combination of an 18 foot diameter deep tunnel and 72 inch shallow tunnel will be constructed to provide capture of CSOs along Pleasant Run and Bean Creek. The Pleasant Run Deep Tunnel will tie into the DRTC. Existing interceptor capacity will be utilized to reduce the number of direct CSO connections to the deep tunnel from 50 to 30. The Pleasant Run Deep Tunnel will collect flow from 30 CSOs and will provide flow relief for the existing Pleasant Run Interceptor at three locations and flow relief for Bean Creek Interceptor at one location. An additional branch collection interceptor will capture CSO flow from outfalls along Bean Creek. The proposed alignment of the Pleasant Run Deep Tunnel and collection interceptor is shown in **Figure 7-4**. This project is in the design stage and is expected to achieve full operation in 2025.

7.3.5 Eagle Creek Control Measures

The selected plan for Eagle Creek provides a deep tunnel to connect into the DRTC where flow can be stored and conveyed to the Southport AWT Plant. Sewer separation has been completed to capture flow from CSO 033. The Authority will implement the following CSO control measure for Eagle Creek:

- Deep Tunnel: An 18 foot diameter deep tunnel will be constructed, connecting into the DRTC. The Eagle Creek deep tunnel will reduce overflows from 223, 032, 011, and 145 located along the Eagle Creek.

Figure 7-5 shows the approximate location and alignment of the Eagle Creek control measures. All control measures have been designed and implemented or are under construction and are expected to achieve full operation in 2018.

7.3.6 Lick Creek and State Ditch Control Measures

Sewer separation has been employed in State Ditch and Lick Creek as part of the early action projects to eliminate CSOs 217, 218, and 235 in these watersheds. Affected neighborhoods are shown in **Figure 7-1**.

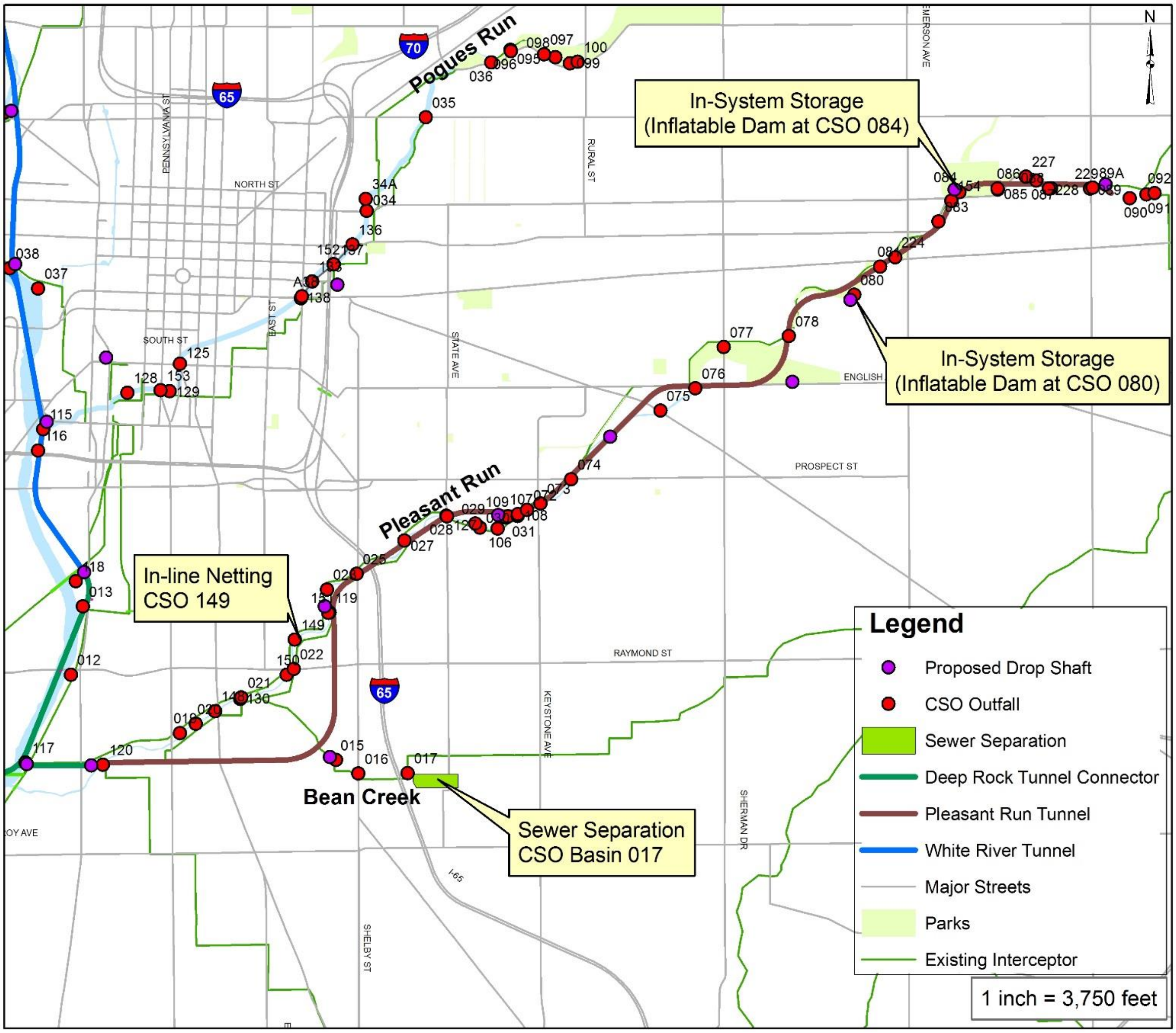


Figure 7-4
Pleasant Run Watershed Control Measures

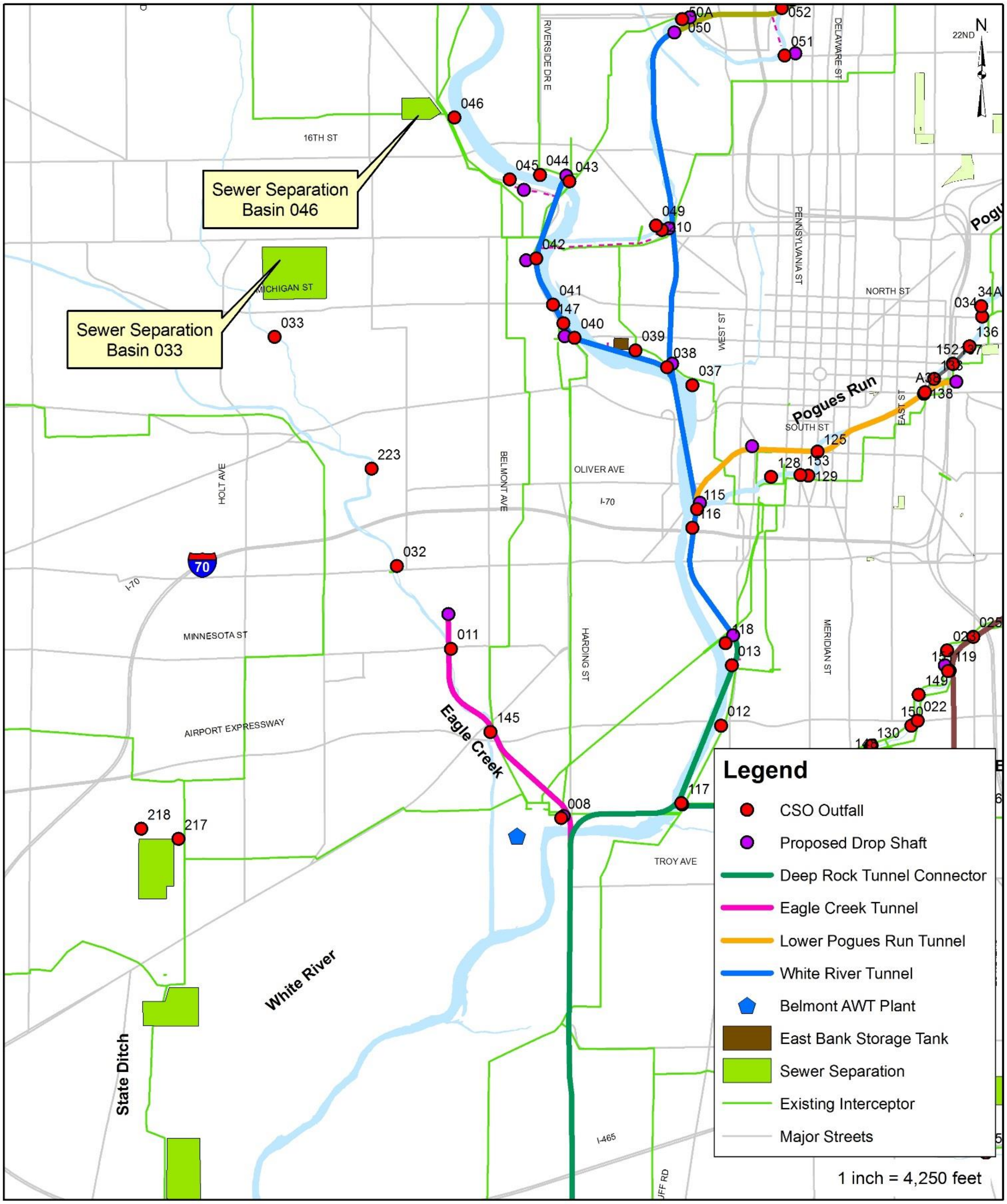


Figure 7-5
Eagle Creek Watershed Control Measures

7.3.7 White River Control Measures

Efforts have been made to address CSO impacts along the White River, with several control measures along the stream already completed. The selected plan for White River complements already constructed projects to further control CSOs and improve the quality of White River. The following CSO control measures and early action projects have been completed for White River:

- Riviera Club CSO Abatement: The existing storage tank for CSOs 205 and 155 at the Riviera Club facility along upper White River was modified to incorporate settling and disinfection. A collection sewer captures flows from CSO 205 and conveys them to the storage facility.
- CSO 046: Combined sewer area tributary to CSO 046 has been separated, eliminating this remote CSO along White River near Lafayette Road and 19th Street.
- Modifications to Lift Station 507: In an early action project, the City modified Lift Station 507 at the Riviera Club to take advantage of available storage volume, and eliminated CSO 156 through sewer separation.
- Rerouting of CSO 205 to Lift Station 507: In an early action project, CSO 205 was rerouted to Lift Station 507 at the Riviera Club. This project included rehabilitation of upstream sewers to eliminate clearwater infiltration.
- Sewer Separation at CSO 275: In another early action project, the City separated the combined sewer area tributary to CSO 275, eliminating this remote CSO along White River near 4900 South Foltz Street.
- White River Screen at CSO 039: The City installed a horizontal screen with automatic cleaning to remove floatables at this location in an early action project.
- White River Overflow Storage and Primary Treatment (East Bank): The City constructed a 3.0 MG underground, self-cleaning storage tank to provide overflow storage and primary treatment for CSO 039.
- Additional barrel for the Harding/White River inverted siphon.
- Pinch valves at Morris and Meikel and 10th and White River.
- Inflatable dam at CSO 118.
- A vortex separator pilot project at CSO 045.

The Authority will implement the following CSO control measures for White River:

- Deep Tunnel: The White River Deep Tunnel will be an 18 foot diameter tunnel that connects to the Fall Creek Deep Tunnel, creating one continuous tunnel that runs parallel to White River in a southerly direction and ties into the DRTC. The Pogues Run Tunnel will be connected to the deep tunnel system along the White River tunnel. Consolidation sewers will be required to group CSOs along White River and direct them to the deep tunnel system. Some consolidation sewer construction has been completed. The White River Deep Storage Tunnel is under construction and will achieve full operation in 2021.

Although not a required component of the LTCP, at the Authority's sole discretion, the following non-CSO project may be implemented as needed to improve water quality conditions:

- **Dam Modifications:** To improve dissolved oxygen levels, the Authority may upgrade the Perry K Dam and alter an underwater structure along the Stout Dam that diverts flow into the Indianapolis Power & Light intake area during low flows.

Figures 7-6A and **7-6B** show the approximate location and alignment of the White River control measures.

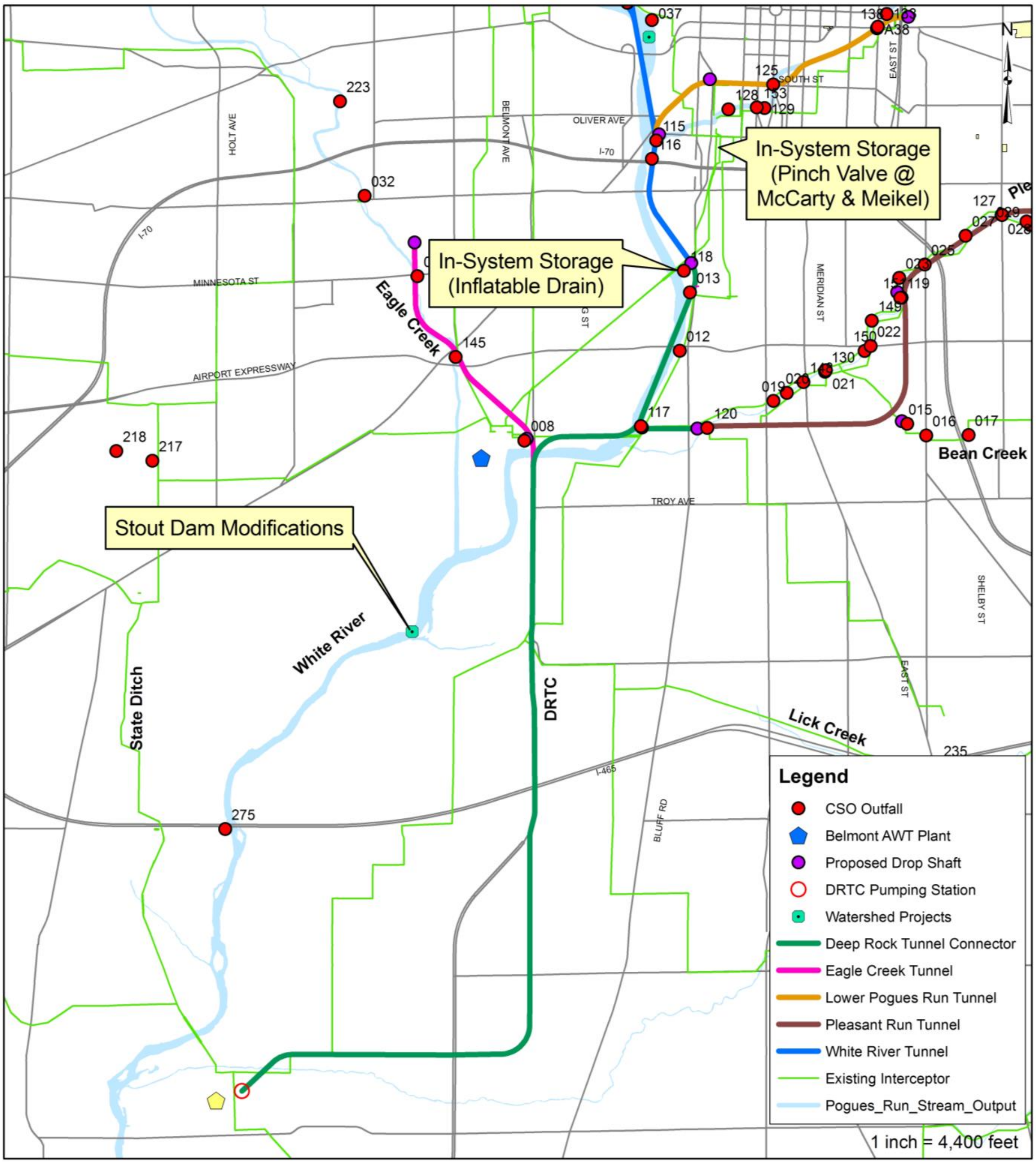


Figure 7-6a
White River Watershed Control Measures
Map 1 of 2

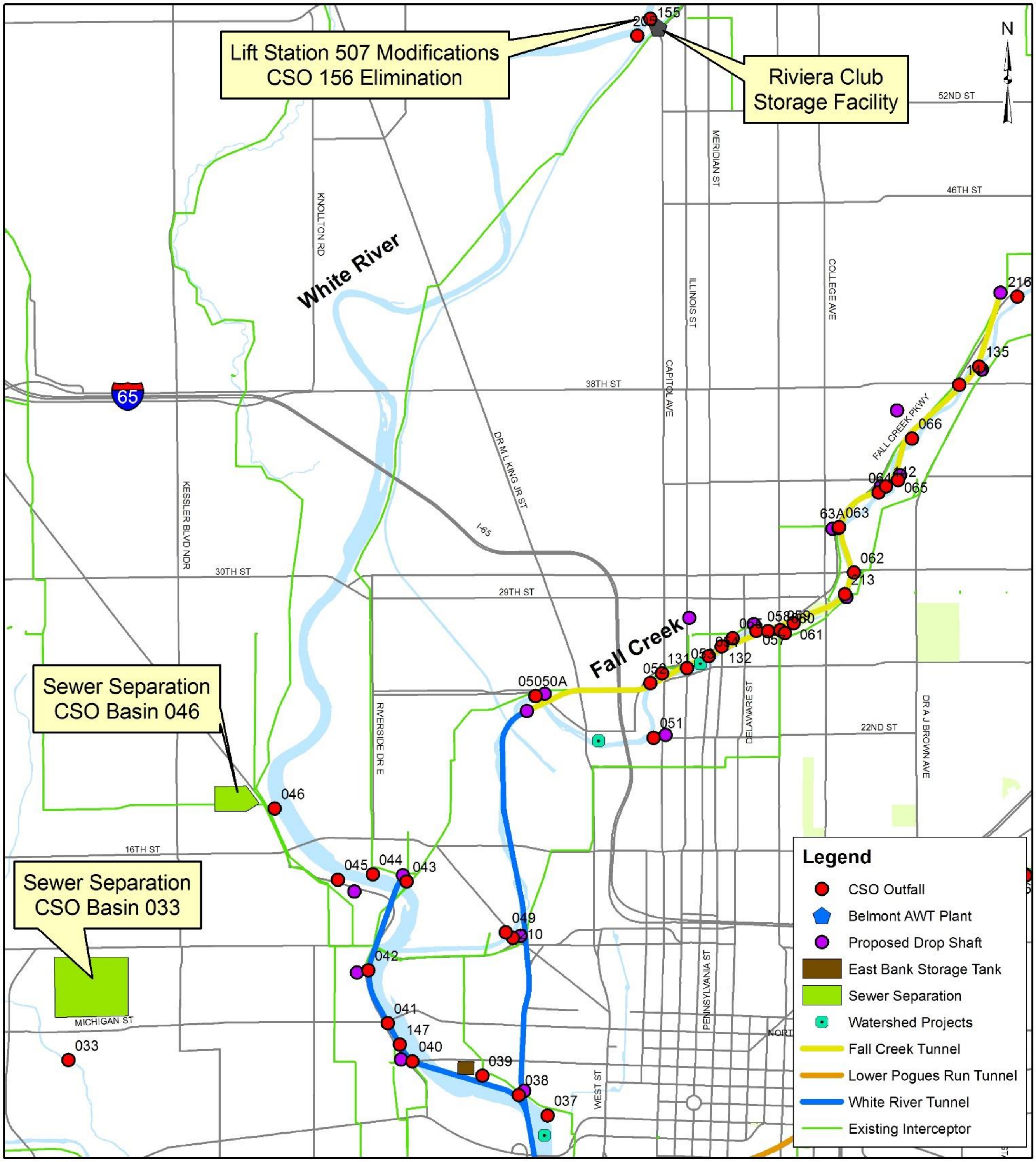


Figure 7-6b
White River Watershed Control Measures
Map 2 of 2

7.3.8 Treatment Plant Control Measures

7.3.8.1 Belmont AWT Plant Control Measures

The Belmont AWT plant had a design average flow capacity of 120 MGD with a peak hourly flow capacity of 270 MGD through primary treatment, but only 150 MGD of peak hourly flow capacity for secondary and advanced treatment (two stage biological nitrification, filtration and effluent disinfection). The Belmont AWT plant predominantly serves the combined sewer system and therefore experienced substantial surges of flow during wet weather. Wet-weather flows that exceeded the headworks pumping capacity overflow as combined sewage from CSO Outfall 008. Wet-weather flows that exceed secondary treatment capacities are discharged through the primary effluent (PE) Bypass at Outfall 007.

Collectively, the annual wet-weather volume of combined sewage and primary effluent discharged from the Belmont facility accounted for nearly half of the total CSO volume discharged to Marion County streams. The PE Bypass was the single largest source of BOD imposed on the White River during wet weather. Accordingly, the objectives for wet-weather improvements to the Belmont plant were to:

1) eliminate the non-emergency need for a primary effluent bypass, and
2) reduce the headworks combined sewer overflows.

The selected concepts for expanded and upgraded wet-weather treatment processes at the Belmont facility maintained the existing design average capacity at 120 MGD, but expanded the peak hourly capacity through conventional secondary treatment to 300 MGD. The following control measures have been constructed at the Belmont AWT to improve wet-weather treatment:

- Early Action Projects: These projects include several operational improvements to better equip the Belmont AWT plant to receive wet-weather flows, including a septage receiving area pumping station, pre-aeration to primary clarifier conversion, and restoring the pump bypass to the Southport AWT plant.
- Gravity Belt Thickeners with Dissolved Air Flotation system.
- The existing Wet Weather Pump Station (WWPS) has been rerouted to the existing wet weather storage basin to utilize existing assets to capture and store wet-weather flow.
- A new Primary Effluent Pump Station (PEPS) capable of transferring excess primary effluent flows from the Belmont AWT to the Southport AWT to balance flow during both dry weather and wet weather.
- A new plant drain pump station to reroute in-plant recycle flows to primary treatment during wet weather.
- Two new wet-weather storage basins that reduced primary effluent bypasses during the interim period needed for upgrading the first-stage bio-roughing process to biological treatment. These storage basins ultimately are used to collect captured CSO flow from the expanded headworks pumping facility for bleed-back to the expanded treatment system and/or transfer to the Southport plant.
- Two new primary clarifiers to supplement the existing clarifiers.
- New aeration tanks with Air Nitrification System (ANS) that operates in series with existing Oxygen Nitrification System (ONS) to achieve peak wet-weather secondary treatment capacity of 300 MGD.
- New process/yard piping.
- New UV disinfection system capable of treating 170 MGD. Flows exceeding UV system capacity are diverted to the wet weather chlorination/ dechlorination system for disinfection.
- Wet-Weather Chlorination/Dechlorination: Rehabilitation of the existing tank that was originally constructed as an ozone contact tank. The modified tank is used as a chlorination/ dechlorination tank for disinfection of wet weather flows above 170 MGD up to 300 MGD. However, due to the NPDES permit requirement for constant disinfection, a continuous side stream of 10 to 15 MGD is sent from secondary treatment through chlorination/dechlorination.

Figure 7-7 shows the location and alignment of the Belmont AWT plant control measures. Construction at the Belmont AWT was completed from 2007-2012.

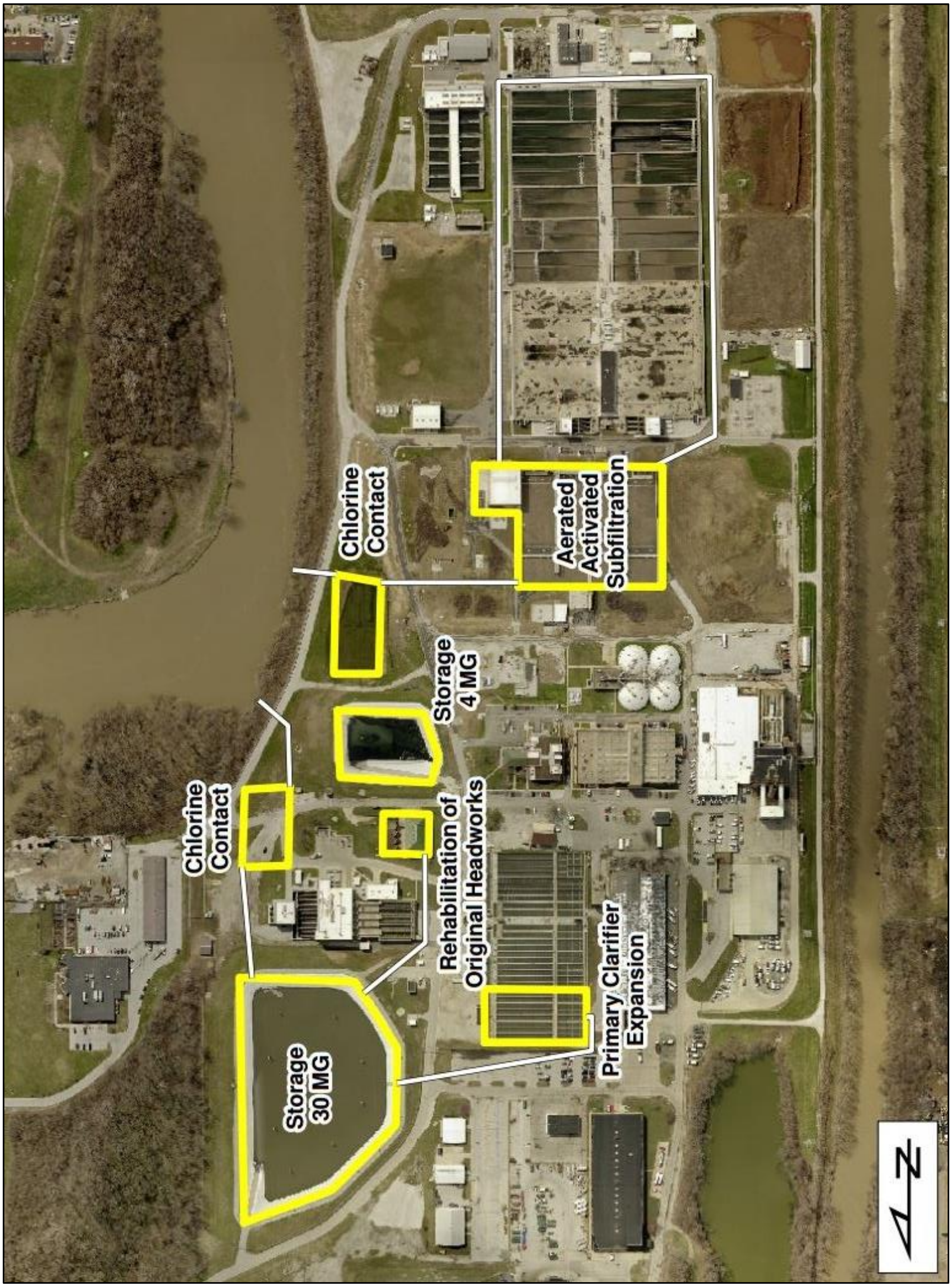


Figure 7-7
General Layout of Belmont AWT Plant Treatment Improvements

The Authority is in the process of implementing the following control measures at the Southport AWT:

- Wet-weather pump station and wet- weather holding basins for flow equalization to reduce the peak hourly flow through the headworks, preliminary treatment and primary treatment.

The Authority is in the process of implementing the following control measures at Southport AWT:

- Expansion of existing headworks facilities is based on the anticipated increase in capacity and the importance of a blended raw wastewater for downstream process reliability.
- Rebuild and refurbish the existing ANS final clarifiers, located at the south side of the plant, with new equipment and convert into primary clarifiers capable of treating up to 180 MGD at peak wet weather.
- Rehab existing primary clarifiers, located at the north side of the plant, to treat flows above 180 MGD up to 250 MGD. During normal flow conditions the south primary clarifiers will treat all influent plant flow.
- Retrofit the existing 30-MGD ANS to provide 200 MGD of biological treatment during peak wet-weather flow periods with an anticipated annual average of 120 MGD. The existing aeration tanks will be fitted with new fine bubble air diffusers and the aeration blowers will be replaced or supplemented as needed. New ANS return activated sludge pumps will be added.
- Leave the existing oxygen nitrification system (ONS) intact, but revise the rated capacity upward to 125 MGD average (compared to 95 MGD average) and 250 MGD peak (compared to 125 MGD). The basis of the improved rating will be demonstrated performance, upgraded primary clarification to reduce the solids loading, recognized design criteria, and elimination of flows imposed on the ONS from filter backwashing.
- New UV disinfection system capable of treating 170 MGD. Expansion of the existing 160-MGD filtration process to 225 MGD capacity.
- Repurpose existing ozone contact tanks, originally intended for ozone disinfection, to treat wet weather flows above 170 MGD up to 250 MGD using chlorination/dechlorination disinfection. A side stream from secondary treatment sent through chlorination/ dechlorination may be implemented to ensure efficient operations.
- Expansion of the existing effluent pump station to meet the new effluent capacity.

New process/yard piping to connect new and revised systems. **Figure 7-8** shows the approximate location and alignment of the Southport AWT plant control measures. The Southport AWT plant expansion is expected to achieve full operation in 2017.

7.3.8.2 Southport AWT Plant Control Measures

Alternatives were developed and evaluated that enabled the Southport AWT plant to treat wet-weather flow surges, future captured CSO flows, and additional dry-weather flow from future growth within the service area.

The Southport facility is currently being expanded to enable a peak hourly flowrate of 250 MGD through conventional primary treatment and, after flow equalization, a peak secondary treatment capacity of 250 MGD. The 250-MGD peak capacity represents a 100-MGD increase over the current peak capacity of 150 MGD.

The following control measures have been constructed and implemented at the Southport AWT to improve wet-weather treatment:

7.3.8.3 Deep Rock Tunnel Connector

The original Interplant Connection control measure was modified to the Deep Rock Tunnel Connector (DRTC) control measure through an amendment to the Consent Decree. The DRTC consists of a 18 foot diameter deep tunnel that will originate near CSO 117 and terminate near the headworks of the Southport AWT Plant as shown on **Figure 7-9**. Flows from CSO outfall locations 118, 117 and 008 will be captured and conveyed for treatment via the DRTC. A deep tunnel pumping station and associated screenings facilities will be constructed in conjunction with the DRTC. The DRTC will provide

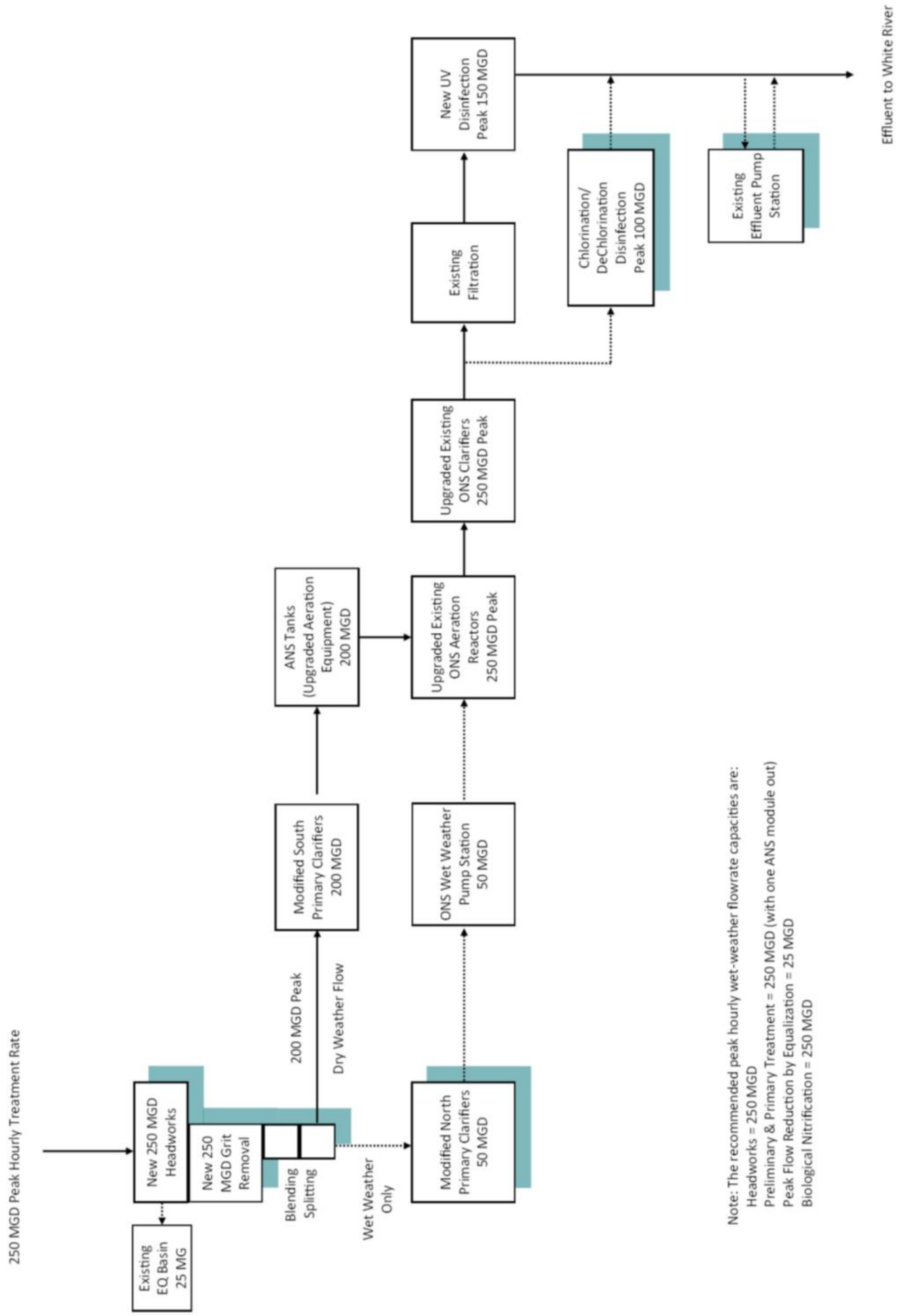


Figure 7-8
Southport AWT Plant Improvements Schematic

Figure 7-9
Deep Rock Tunnel Connector Alignment

storage and a minimum peak conveyance and dewatering capacity of 90 MGD of CSO flow to the Southport AWT Plant. Fall Creek, White River, Lower Pogues Run, Pleasant Run and Eagle Creek feed into the DRTC and will complete the Indianapolis deep tunnel system. Along with the DRTC, the deep tunnel system will provide a total effective storage volume of 250 MG. The DRTC is expected to achieve full operation in 2017.

7.3.9 Systemwide Watershed Improvement Control Measures

In order to maximize the benefits to water quality, stream aesthetics and human health, the Authority anticipates proceeding with additional non-CSO improvements referred to as "watershed improvement projects." As noted earlier in Section 4.5.2.8, these improvements are designed to address non-CSO sources of pollution in the watersheds or maximize the benefits of the selected CSO control plan. These improvements are anticipated to include:

- At the Authority's sole discretion, building sewers for neighborhoods now served by failing septic systems. This program includes constructing sewer main extensions to provide sewer service to homes on failing septic systems. Neighborhood projects for the Septic Tank Elimination Program (STEP, formerly Barrett Law) are prioritized in the Project Planning Prioritization Methodology and Process (3PMAP) report. Through 2016, 13,100 homes have been provided connections to the public sewer. Based on current target funding for the STEP program $6 million per year, the high priority STEP program is expected to conclude in 2025. The costs shown in **Table 7-1** represent the cost of accelerating septic conversions from a 60-year program to a 20-year program. Full capital costs of the septic conversion program are not included in the LTCP costs, but they were factored into the financial capability analysis as anticipated costs.
- Continuing implementation of real-time controls (RTC) and in-system storage to improve the Authority's ability to manage flows within the existing sewer system. The RTC program first evaluated the ability to modify or upgrade large lift stations to take advantage of existing storage opportunities. Secondly, the program focused on other existing control devices to maximize potential low-cost in-line storage opportunities. A detailed description of the in-line storage projects is included in the December 2013 CSO Operational Plan.
- Continuing implementation and refinement of the Authority's industrial pretreatment permitting policy and process, which documents how the Authority makes decisions on new or increased discharges by the industrial pretreatment community, particularly in the combined sewer area. As part of the on-going pretreatment program, the Authority regularly surveys industrial facilities to determine if the discharge should be regulated through an industrial discharge permit. The Authority continues to evaluate alternatives for mitigating the impact of CSO discharging containing industrial wastewater. It is the policy and goal of the Authority to encourage economic growth and vitality and to be able to compete both globally and regionally for new employers and employees. The Authority's LTCP will accommodate future growth by providing sufficient sewer system capacity and treatment plant baseload capacity to accommodate anticipated industrial, commercial and residential growth in Marion County, in addition to required wet-weather capacity.
- Combined sewer improvements and rehabilitation projects are ongoing.

While these improvements are not directly related to state or federal CSO control requirements, they show the City and Authority's willingness to go beyond minimum requirements to improve water quality in neighborhood streams.

7.4 LTCP Benefits

7.4.1 Environmental Benefits

This section describes how the selected plan is expected to improve use attainment and environmental conditions in Marion County and downstream areas. Environmental benefits include restoring beneficial uses, pollutant load reductions, BOD removal, improvements in dissolved oxygen (DO) and *E. coli* bacteria, capture of solids and floatables, and containment of the first flush.

The Authority will design and implement the plan to ensure that CSOs will not cause dissolved oxygen violations in the White River and Fall Creek. For this reason, the selected plan is expected to fully restore aquatic life uses by preventing CSO-related fish kills and reducing stress on fish and other aquatic wildlife. By capturing the first flush and achieving 95 percent capture of CSOs and an expected 4 overflow events in the average year (97 percent and an expected 2 overflow events on Fall Creek), the selected plan also will significantly reduce or eliminate odors, floating sewage, and trash in neighborhood streams.

The Authority uses average annual statistics for the White River and its tributary watersheds to describe the plan's environmental benefits. The findings are based on analyses using the hydraulic model and precipitation data from 1996 through 2000. The 1996 to 2000 precipitation period was identified as a recent period consistent with the long-term rainfall record, which has the following statics:

- Annual precipitation averages 39.7 inches
- Four storm events are equal to or greater than a 3-month storm (equivalent to 1.00 inch of rain in a 3-hour period or 1.57 inches in a 24-hour period)
- Two storm events are equal to or greater than a 6-month storm (equivalent to 1.27 inches of rain in a 3-hour period or 1.99 inches in a 24-hour period)

7.4.2 CSO Volume and Frequency Reduction

Figure 7-10 compares the systemwide average annual overflow volumes for pre-2002 sewer system conditions and the selected plan. **Figure 7-11** presents the same comparison for each individual watershed. The selected plan is expected to reduce the average annual CSO volume from 4.1 billion gallons to 0.2 billion gallons, which is a 95 percent reduction in CSO volume. Under U.S. EPA guidelines, the City calculated the plan's percent capture as the volume captured and treated during wet-weather conditions divided by the total volume of flow in the combined sewer system during wet-weather conditions. The volume captured and treated includes flow captured and treated under pre-2002 conditions. The total volume of flow is the sum of the volume captured and treated and the overflow volume. When this calculation is applied, the selected plan will achieve 97 percent capture in the Fall Creek watershed and 95 percent in other watersheds, compared to a systemwide 66 percent capture under pre-2002 conditions. All non-emergency Primary Effluent Bypass overflows at the Belmont AWT plant have been eliminated, which accounted for 2.0 billion gallons on an average annual basis.

In years that have higher precipitation amounts and/or more large storms than in a typical year, the percent capture achieved may be less than 95 percent (97 percent for Fall Creek). Conversely, in years that have less precipitation and/or fewer large storms than in a typical year, the percent capture achieved may be more than 95 percent (97 percent for Fall Creek).

As discussed in Section 4.6.4.4, the frequency of overflow events is expected to range from zero to six events on Fall Creek and zero to 10 events on other CSO receiving waters in any given year, depending on the frequency, severity and distribution of rainfall in Marion County. The selected plan is expected to reduce the average annual overflow frequency from 60 storms per year to approximately two storms per year on Fall Creek and four storms per year on other waterways, based on average rainfall statistics for Indianapolis. Each of these large storms could cause at least one and probably most of the individual overflow points to discharge within the sewer system – creating what is known as an "overflow event."

Figure 7-12 illustrates the modeled analysis of overflow frequency based upon rainfall data collected from 1950-2003. The bars labeled "baseline conditions" show the number of overflow events that would have occurred each year with the sewer system performing under pre-2002 conditions. The bars labeled "selected LTCP" predict overflow frequency with a 95/97 percent capture plan in place. The graph shows results for both Fall Creek at 97 percent capture and White River and other tributaries at 95 percent capture. The current conditions model predicts that 216 overflow events would have occurred on White River during the 54 - year record of storms, for an annual average of four events. Actual events would have varied from zero to 10 per year, depending on rainfall and snowmelt conditions. On Fall Creek, frequency would have ranged from six to zero. This represents a dramatic decrease from current conditions.

Precipitation patterns in some years may cause more than four overflow events (or two on Fall Creek), but the percent capture may be greater than 95 percent (97 percent on Fall Creek). Conversely, some years may have fewer than four overflows (two on Fall Creek), but the percent capture may be less than 95 percent (97 on Fall Creek).

Larger storms and back-to-back storms tend to occur more frequently in the spring and summer months in Indianapolis, causing overflows to persist in those months. However, high stream flows during and after those larger storms will cause waterways to be more unsafe as well as unattractive for recreational use.

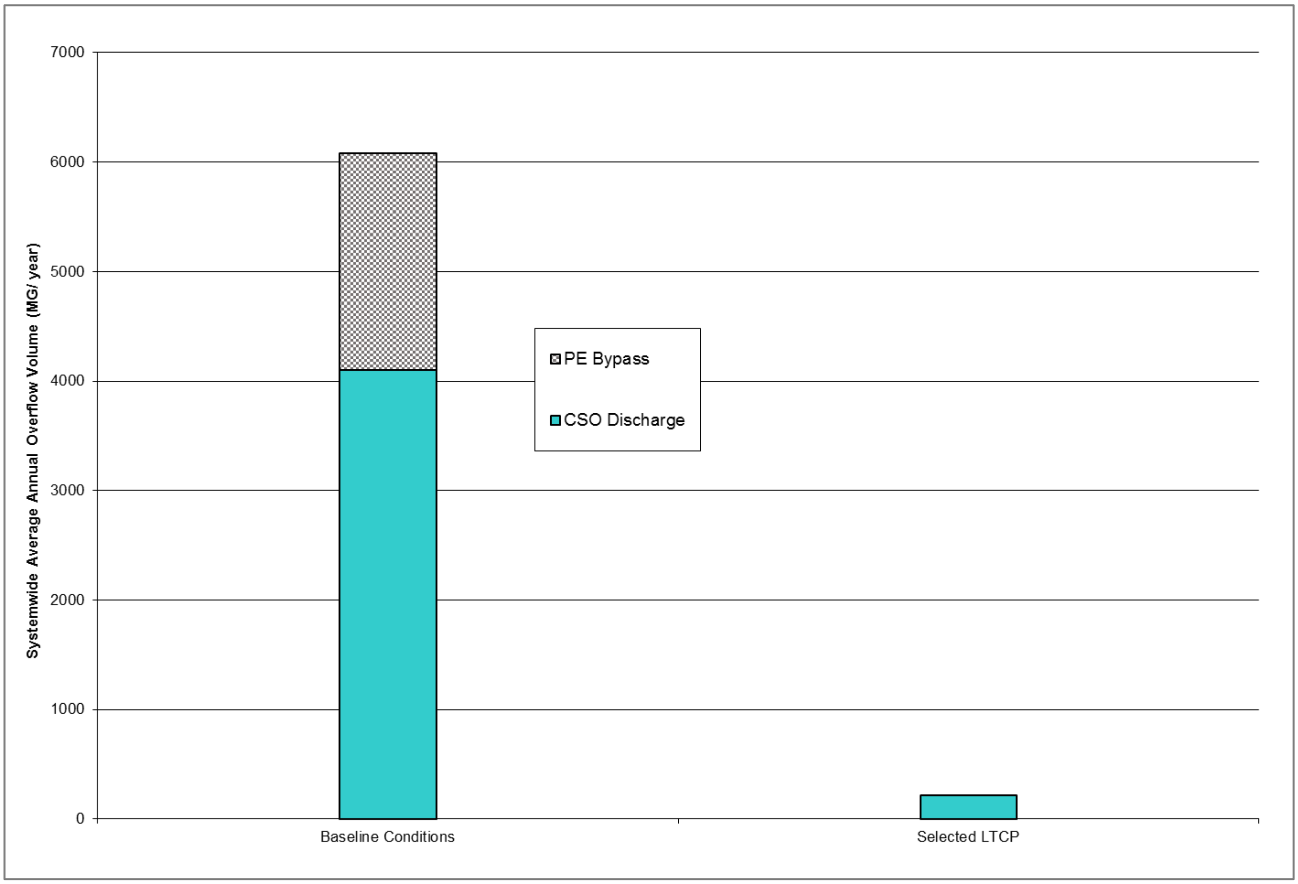


Figure 7-10
Modeled Comparison of Average Annual CSO Volume
for Baseline Conditions and the Selected Amended LTCP

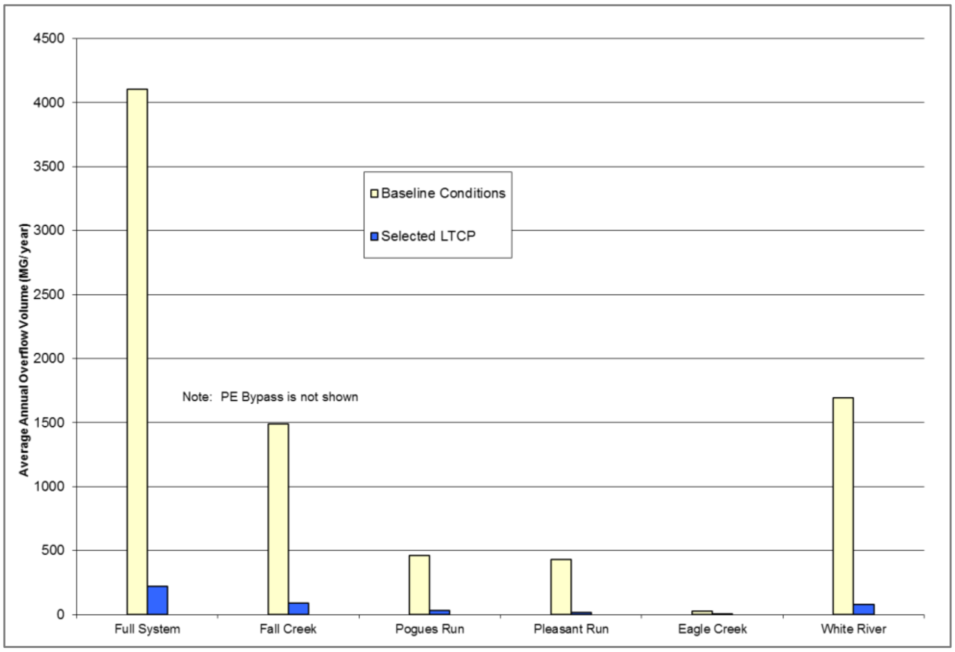
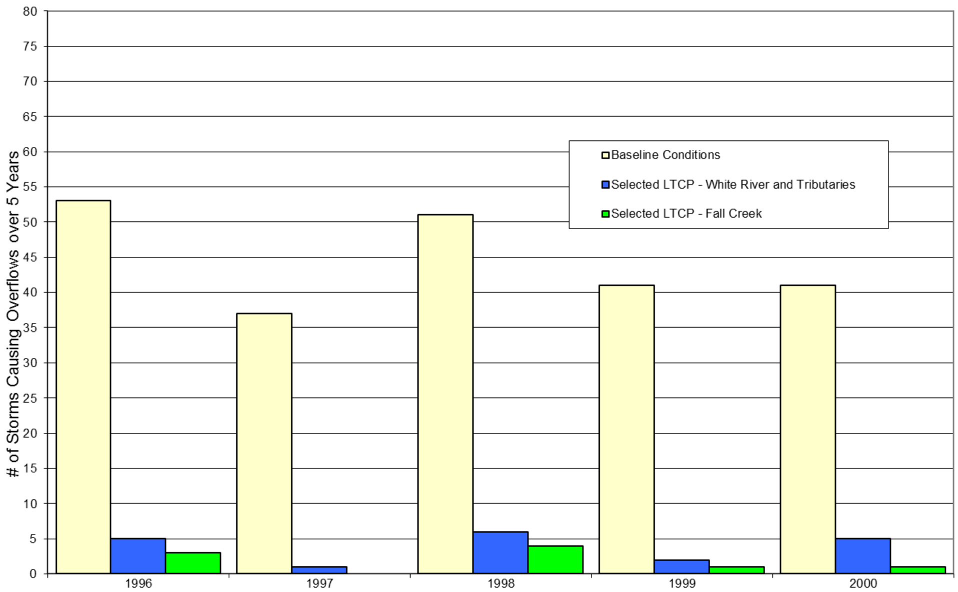


Figure 7-11
Modeled Comparison of Average Annual CSO Volume for Baseline Conditions and the Selected Amended LTCP by Individual Watershed



Source: 1996-2000 InfoWorks ICM Simulation. Baseline Conditions and Selected LTCP.

Note: (1) For baseline conditions, there is an average annual frequency of 45 overflow events per year. The distribution of the events is based on the 1996-2000 precipitation record.

(2) It is estimated that at least one CSO outfall structure would discharge for the listed number of dates each year.

(3) Per the 1996-2000 simulation, one residual CSO event is expected to occur outside the recreation season.

Figure 7-12
Estimated Overflow Events Per Year. 1996-2000, Recreation Season Baseline Conditions vs. Selected Amended LTCP

7.4.3 Dissolved Oxygen Standard Attainment

The selected plan is expected to eliminate violations of the 4.0 mg/L dissolved oxygen standard by achieving 95 percent capture in White River and 97 percent capture on Fall Creek. The Boulevard Dam in Fall Creek has been removed, and Chevy and Stout dams in White River may be modified if needed, to ensure attainment of the dissolved oxygen standard. This is expected to ensure sufficient dissolved oxygen to support a vigorous aquatic community in affected waterways.

7.4.4 Recreational Use Attainment

The ability of streams to attain the state's recreational use designation is partially dependent upon meeting the *E. coli* bacteria standard. The *E. coli* bacteria performance of the Indianapolis system was evaluated for three different criteria:

- Average annual *E. coli* bacteria load discharged by CSOs,
- Monthly geometric mean standard of 125 cfu/100 mL,
- Indiana TMDL reference criteria of no more than 36.5 days per year over 235 cfu/100 mL,

The selected plan will reduce *E. coli* bacteria discharges to the White River and its tributary watersheds through CSO Control Measures. Although not a required component of the LTCP, the watershed improvement projects are designed to achieve additional reductions to *E. coli* bacteria loads, particularly from dry-weather sources and stormwater run-off. These watershed improvement projects will restore more days of recreational use than CSO controls alone.

Table 7-2 compares the estimated *E. coli* bacteria geometric mean for the pre-2002 conditions and the selected plan. CSO controls and watershed improvement projects are expected to make significant reductions in the *E. coli* bacteria impacts over the geometric mean of all waterways. In **Tables 7-2** and **7-3**, the presented impacts of watershed projects assume all non-CSO sources of bacteria are brought to compliance with the established TMDLs (IDEM, 2004). This load reduction is far beyond what is expected from the projects identified in Section 7.3 and **Table 7-1**. The City's water quality analysis determined that other sources of *E. coli* bacteria would prevent additional CSO controls from bringing waterways into compliance with the state's geometric mean standard of 125 cfu/100 mL.

Table 7-3 compares the estimated number of days each waterway would exceed the single sample standard of 235 cfu/ 100 mL for pre-2002 conditions and the selected plan. Although CSO controls and watershed improvements are expected to reduce the number of days over 235 cfu/100 mL, other bacteria sources are expected to prevent the waterways from attaining compliance with the state's TMDL criteria of no more than 36.5 days per year over 235 cfu/100 mL. It should be noted that for all waterways, the watershed improvement projects provide a greater reduction in the number of days over 235 cfu/100 mL than CSO controls. This is because the presented impacts of watershed projects assume all non-CSO sources of bacteria are brought to compliance with the established TMDLs (IDEM, 2004). By implementing watershed improvement projects beyond those documented in Section 7.3 and **Table 7-1**, the City and other responsible parties for instream *E. coli* bacteria are expected to achieve more days of recreational use attainment, particularly during dry weather when people are more likely to be using the streams. Full recreational use attainment at all times during wet weather is currently prevented by high wet-weather stream flows, human-caused conditions and urban stormwater pollution that cannot all be remedied through additional CSO controls.

Table 7-4 has been deleted from the text.

7.5 Implementation Schedule

A 20-year schedule allowed the Authority to construct control measures in a planned and orderly manner; limit disturbance to neighborhoods; coordinate with other watershed improvement projects; accurately evaluate the effectiveness of each project; secure necessary rights of ways; coordinate technical, manpower and material needs; and manage the financial burden on ratepayers.

The plan and implementation schedule is to be reviewed every five years, as required by state law. This review will allow the Authority to incorporate new data, adopt new technologies that might become available and adapt the plan to fit changing circumstances or regulatory requirements. As part of the review of the plan and implementation for the 2017 update, the Authority determined that the current plan and implementation schedule remained the most cost effective and appropriate plan for the Authority and its rate payers.

The following sub-sections discuss the factors taken into consideration when the project schedule was developed. As discussed in Section 6, the financial capability of citizens to pay for the program also was a significant concern in the development of the LTCP. If financial circumstances change or capital costs are higher than expected, the Authority has the ability to seek approval to extend the schedule.

Table 7-2
Estimated *E. coli* Bacteria Impacts (1996-2000 Recreation Season Months over Geometric Mean Standard of 125 cfu/100mL)

Watershed	Baseline Conditions	Selected LTCP
Fall Creek		
Without Watershed Improvements	35	2
With Watershed Improvements	22	0
Pogues Run		
Without Watershed Improvements	35	7
With Watershed Improvements	35	0
Pleasant Run		
Without Watershed Improvements	35	10
With Watershed Improvements	35	0
Eagle Creek		
Without Watershed Improvements	35	17
With Watershed Improvements	22	0
White River		
Without Watershed Improvements	35	30
With Watershed Improvements	31	0

Notes:

Indiana's monthly *E. coli* geometric mean standard is 125 cfu/100 mL.

Watershed improvements represent all non-CSO loads brought to compliance with the TMDLs for the White River, Fall Creek, Pleasant Run, and Bean Creek (IDEM, 2004).

This load reduction is beyond the projects presented in Table 7-1.

Source: 1996-2000 Simulation of Citizens' Water Quality Model (60 Months)

Table 7-3
Estimated E. coli Bacteria Impacts (1996-2000 Average Recreation Season Days Per Year with Single Sample over 235 cfu/100 mL)

Watershed	Baseline Conditions	Selected LTCP
Fall Creek		
Without Watershed Improvements	116	17
With Watershed Improvements	74	3
Pogues Run		
Without Watershed Improvements	128	56
With Watershed Improvements	122	4
Pleasant Run		
Without Watershed Improvements	154	43
With Watershed Improvements	122	2
Eagle Creek		
Without Watershed Improvements	133	59
With Watershed Improvements	69	2
White River		
Without Watershed Improvements	138	132
With Watershed Improvements	84	5

Notes:

Indiana's daily maximum *E. coli* standard is 235 cfu/100 mL.

Watershed improvements represent all non-CSO loads brought to compliance with the TMDLs for the White River, Fall Creek, Pleasant Run, and Bean Creek (IDEM, 2004).

This load reduction is beyond the projects presented in Table 7-1.

Source: 1996-2000 Simulation of Citizens' Water Quality Model (60 Months)

7.5.1 Prioritization and Scheduling Criteria

Once the CSO control program and associated projects were selected, each project was reviewed to determine both the project's priority and the sequence of construction. Criteria for prioritizing projects within each watershed were based on citizen concerns, advisory committee recommendations, and environmental concerns. In addition, the Indianapolis Clean Stream Team (ICST) added several additional criteria to incorporate concerns expressed by U.S. EPA and IDEM during LTCP discussions. The following criteria were used to develop the LTCP implementation schedule:

Construction Sequencing: All projects were reviewed from a logical engineering and construction perspective to determine project relationships and develop the sequence in which the projects should be constructed. A project ranking was developed based upon practical construction considerations, such as the need to construct downstream facilities prior to upstream facilities. All interdependent projects were ranked in order of their logical completion. In most tributaries, several projects that are independent of any other projects in that tributary were identified. Several projects were moved ahead in the schedule to achieve an early level of CSO control. Completed and ongoing early action projects, such as the AWT plant expansions, also were incorporated into the schedule.

Tributary Priority: The tributaries were given a higher scheduling priority than White River. Independent projects that would benefit a tributary were ranked higher.

Contact with Public: The highest scheduling priority was placed on areas where people, especially children, come in contact with a stream. This included placing the highest priority on stream segments along parks, wading areas used by children, and adjacent to school properties. The next priority was designated greenways, followed by stream segments adjacent to neighborhoods, followed by popular fishing holes. A number of early action projects were designed to address these areas.

Impacts Greatest Number of People: In determining where to start the work, the watershed where projects would have the most impact for the greatest number of people was selected.

Water Quality Impacts: Higher priority was placed on projects that would provide the greatest water quality benefits. This is first measured by projects and actions that can restore beneficial uses and second by projects that can reduce pollutant load. For example, projects that would significantly reduce *E. coli* or prevent further depression of DO were ranked highest. Projects that would significantly reduce BOD, nitrogen series, phosphorous series, and algae or the projects that would benefit impaired biotic communities were also given higher priority.

Pollutant Load Reduction Priorities: Higher priority was placed on projects that would reduce overflows at significant BOD and TSS pollutant load contributor sites, including the Primary Effluent Bypass at the Belmont AWT plant.

Potential Toxicity: By applying the methodology described in Section 2 to characterize the theoretical potential for CSO impacts from significant industrial users, higher priority was placed on projects that would address those potential problems.

Concurrent Design and Construction: Where possible, it was sought to address sewage overflows on several fronts at once. For example, if the engineering and construction work necessary to address a heavily contaminated section of a stream is lengthy and involved, a project in another location was selected that requires a less complicated solution to be constructed quickly, while pursuing planning and engineering on the more difficult section.

7.5.2 Implementation Steps

Based on these considerations, the total LTCP construction sequencing order and an implementation schedule for each project was developed. The implementation schedule typically included the following steps:

Project Definition/Scoping: This step comprises the next activity following approval of the LTCP and includes developing additional definition of the project necessary for planning stage decisions to be made. At this stage, the approximate size and scope of the project and its location are defined.

Facility Planning/Pre-engineering: A facility plan is prepared, containing schematic layouts, sketches and preliminary design criteria. Examples of the facility planning process would include performing planning level geotechnical investigations and developing proposed alignments for the tunnels, setting bases for design, establishing system hydraulics, siting shafts, regulators and pumping stations, and other elements needed to define the functional needs and interaction of the system.

Design: This step consists of preparing designs and preparing contract documents (plans and specifications) to obtain bids for the project construction. Following completion of the design the project is advertised for bidding, bids are obtained and reviewed, a bidder is selected, a construction contract is awarded, and a notice to proceed is issued to the contractor indicating that work can begin.

Permits and Land Acquisition: During the design phase, necessary permits and approvals required for construction are obtained from various regulatory agencies. In addition, land is acquired as needed for rights of way or easements for project construction, operation, and maintenance.

Construction: This step includes building the facility in accordance with the design plans, specifications, contract documents, and actual field conditions. Construction oversight also occurs to ensure that plans and specifications are followed.

Startup/System Integration: Upon completion of testing and startup, the project construction is considered complete and the project is in operating order. After final cleanup and any outstanding issues such as land restoration, the Authority reviews the project to make certain that all specifications were followed, and then accepts the project and closes out the process. At this milestone, the facility is operational and is performing the function for which it is intended. Construction may extend beyond this milestone for items such as addressing claims arising during construction or warranty issues.

Public Outreach: Public outreach takes place at key points throughout this process, including facility planning, design and construction. Outreach is designed to communicate project goals and both short-term and long-term impacts, and to identify and address neighborhood concerns.

The team examined each project to estimate the amount of time that would be required to complete the key components. In some projects, the team determined that several engineering or construction periods could be conducted concurrently. Once the amount of time was allocated for each period, the times were summed to develop the total project design and construction period. Once all projects were sequenced, project interrelationships established, and project duration estimated, the final LTCP program implementation phasing schedule was developed.

7.5.3 LTCP Program Implementation

Figure 7-13 shows the LTCP Program Implementation Phasing Schedule. The implementation schedule incorporates the ongoing early action projects (Phase 1) as well as long-term CSO control measures implemented in four phases over 20 years (Phase 2 through 5). Phase 1 is already complete and extended from 2000-2005, Phase 2 is complete and extended from 2006-2010, Phase 3 is completed and extended from 2011-2015, Phase will extend 4 from 2016-2020, and Phase 5 from 2021-December 2025. Completion of early action projects and control measures milestones are noted in the Authority's six month status reports.

Table 7-5 lists the LTCP control measures chronologically, and also includes design criteria, performance criteria and critical milestone dates for each project or group of projects. The LTCP consists of the following commitments:

- Implementing the CSO control measures listed in **Table 7-5** according to the design criteria and performance criteria specified,
- Meeting the schedule for critical milestones established in **Table 7-5**, subject to a revision to water quality standards and the scheduling factors identified in Section 7.5.4 below, and
- Re-assessing the LTCP every five years to determine whether modifications to the control measures or schedule are warranted.

Upon full implementation, the CSO Control Measures listed in **Table 7-5** will still result in residual overflows during large storm events. Either a revision to Indiana's current water quality standards or some other legal mechanism is necessary to authorize those residual overflows. In Section 9 of the LTCP, the City requested a revision to the applicable water quality criteria consistent with this level of control through the establishment of a CSO wet weather limited use subcategory supported by a Use Attainability Analysis (UAA). Since the initial submission of the LTCP and UAA US EPA and IDEM indicated that approval of the UAA rule component of any LTCP was highly unlikely until full implementation of the CSO LTCP program is near completion. Throughout discussions related to the formal submittal, review, and approval of a UAA rulemaking, agencies have noted that there was a reasonably high potential for changes in the information used in the assessment of the factors used to support the UAA. Additionally, in an August 2011 letter US EPA indicated that additional information may be needed to bolster the administrative record supporting a review and approval of the UAA.

Based on the above discussion, it was concluded that the IDEM requirement to update the CSO LTCP was not intended to require an update to the UAA until such time of a formal request for a UAA rulemaking.

The following definitions were used in developing **Table 7- 5**:

CSO Control Measures: CSO Control Measures are structural measures designed to reduce or mitigate the volume, frequency or pollutant levels in combined sewer overflows, consistent with the LTCP's 95 or 97 percent capture level of control.

	CSO Control Measure (Significant Projects)	Schedule Phase 1 2000-2005	Phase 2 2006-2010	Phase 3 2011-2015	Phase 4 2016-2020	Phase 5 2021-2025
1	White River Screen at IUPUI (CSO 039)					
2	Fall Creek Inflatable Dams (CSOs 063, 063A, and 065)					
3	Modifications to Lift Station 507 at Riviera Club					
4	Real-time Overflow Controls in Neighborhoods (CSOs 080,084,118)					
5	Pogues Run Inflatable Dam at Brookside Park					
6	White River East Bank Storage Tank at IUPUI/White River State Park					
7	Belmont Advanced Wastewater Treatment (AWT) Plant Improvements - Wet-Weather Storage and Primary Clarifiers					
8	Lower Pogues Run Improvements - Minimize Overflows near IPS Schools					
9	Belmont AWT - Gravity Belt Thickeners					
10	Sewer Separation - White River and Thompson Road (CSO 275)					
11	Sewer Separation - Lick Creek (CSO 235)					
12	Real Time Overflow Control Study, Phase II					
13	Rerouting of Overflows on Upper White River to Lift Station 507 at Riviera Club (CSO 205)					
14	Riviera Club Improvements to Overflow Storage Tank					
15	Fall Creek Tunnel, Collector Pipes and Watershed Projects					
16	Deep Rock Tunnel Connector, Deep Tunnel Pumping Station and Screenings Facilities, and Connection of CSO 008, CSO 117 and CSO 118 to the Deep Rock Tunnel Connector					
17	Belmont AWT - Wet-Weather Treatment (New Aeration Tanks)					
18	Lower Pogues Run Improvements					
19	Pogues Run - Sewer Separation at Forest Manor Park (CSO 143)					
20	White River Tunnel (Central Tunnel) and Watershed Projects					
21	Belmont AWT - Wet Weather Chlorination/Dechlorination (Chlorine Disinfection Tank and Re-establish Existing Outfall)					
22	Southport Advanced Wastewater Treatment Plant Improvements - Secondary Treatment System Expansion					
23	Southport Advanced Wastewater Treatment Plant Improvements - Wet Weather Disinfection					
24	Southport Advanced Wastewater Treatment Plant Improvements - Primary Clarifier Expansion					
25	Belmont Advanced Wastewater Treatment Plant Improvements - Raw Wastewater Pumping Capacity					
26	Southport Advanced Wastewater Treatment Plant Improvements - Headworks					
27	Deleted					
28	Deleted					
29	Pleasant Run Overflow Collector Pipe					
30	Eagle Creek Overflow Collector Pipe (CSO Collector Pipe Belmont West Cutoff via the Belmont North Relief Interceptor System)					
31	Upper Pogues Run Improvements					
32	Belmont Advanced Wastewater Treatment (AWT) Plant Improvements					
●	*Completion of Bidding Process*					
◆	*Achievement of Full Operation*					

Figure 7-13
Program Phasing Implementation Schedule

Table 7-5
CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones

CSO Control Measure[1]		Description[2]	Design Criteria[2]	Performance Criteria	Critical Milestones[3]
1	White River Screen at IUPUI (CSO 039)	Horizontal screen with automatic clearing for removal of floatables	Provide instantaneous peak screening flow rate of 63 MGD	Capture most floatables greater than 4 mm in size	Bid Year - 2001 Achievement of Full Operation - 2002
2	Fall Creek Inflatable Dams (CSOs 063, 063A, and 065)[4]	Construction of three inflatable dams	Provide in-system storage capacity of approximately 4.6 MG	Consistent Operation[5]	Bid Year - 2001 Achievement of Full Operation - 2006
3	Modifications to Lift Station 507 at Riviera Club	Modifications to CSO 156 to take advantage of available storage volume in LS 507	Maximize in-system storage	Diversion of flow from CSO 156 to LS 507. When incorporated with the rest of the White River watershed, achieve 95 percent capture and 4 overflow events[6]	Bid Year - 2002 Achievement of Full Operation - 2002
4	Real-time Overflow Controls in Neighborhoods (CSOs 080, 084, 118)[4]	Construction of three inflatable dams	Provide in-system storage capacity of approximately 0.5 MG	Consistent Operation[5]	Bid Year - 2002 Achievement of Full Operation - 2003
5	Pogues Run Inflatable Dam at Brookside Park (CSO 101)[4]	Construction of one inflatable dam	Provide in-system storage capacity of approximately 0.4 MG	Consistent Operation[5]	Bid Year - 2003 Achievement of Full Operation - 2004
6	White River East Bank Storage Tank at IUPUI White River State Park[4]	Overflow storage for CSO 039	Provide Storage capacity of 3 MG	When incorporated with the rest of the White River watershed, achieve 95 percent capture and 4 overflow events[6]	Bid Year - 2003 Achievement of Full Operation (CSO 039 Only) - 2004
7	Belmont Advanced Wastewater Treatment (AWT) Plant Improvements -- Wet-Weather Storage and Primary Clarifiers	Wet-weather storage basins (30 and 4 MG), two new primary clarifiers, and new process yard piping	When incorporated with the rest of the Belmont improvements, provide peak primary and biological treatment rate of 300 MGD	When incorporated with the rest of the Belmont improvements, facility complies with current NPDES permit	Bid Year - 2003 Achievement of Full Operation - 2007
8	Lower Pogues Run Improvements - Minimize Overflows near IPS Schools	Consolidation of outfalls 034 and 035 to Pogues Run Tunnel. Consolidation Sewer is approximately 5200 feet of pipe	Provide approximate instantaneous peak flowrate of 40 MGD upstream. Provide approximate maximum instantaneous peak flowrate of 150 MGD downstream	When incorporated with the rest of the Pogues Run watershed, achieve 95 percent capture and 4 overflow events[6]	Bid Year - 2004 Achievement of Full Operation - 2006
9	Belmont AWT -- Gravity Belt Thickeners	Installation of four gravity belt thickeners	Produce a thickened sludge concentration of 5 total solids (TS)	Reduction of sludge volumes and improved sludge dewatering operations	Bid Year - 2006 Achievement of Full Operation - 2008

Table 7-5
CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones (continued)

CSO Control Measure[1]		Description[2]	Design Criteria[2]	Performance Criteria	Critical Milestones[3]
10	Sewer Separation - White River and Thompson Road (CSO 275)	Separation and rehabilitation of sewers to reduce stormwater flow and minimize CSO 275	Storm drains designed as per Indianapolis Stormwater Standards. Sanitary sewer designed as per Indianapolis Sanitary Standards and Ten State Standards.	Separation of sewers to minimize CSO 275	Bid Year - 2006 Achievement of Full Operation - 2008
11	Sewer Separation - Lick Creek (CSO 235)	Separation and rehabilitation of sewers to reduce stormwater flow and minimize CSO 235	Storm drains designed as per Indianapolis Stormwater Standards. Sanitary sewer designed as per Indianapolis Sanitary Standards and Ten State Standards.	Separation of sewers to minimize CSO 235	Bid Year - 2006 Achievement of Full Operation - 2008
12	Real Time Overflow Control Study, Phase II	Develop next phase of RTC to further maximize the existing combined sewer system	Evaluate RTC for combined sewer system	Complete Study	Commence Study - 2007 Complete Study - 2008
13	Rerouting of Overflows on Upper White River to Lift Station 507 at Riviera Club (CSO 205)	Relocation of CSO 205 outfall to Lift Station 507. Includes rehabilitation of upstream sewers to eliminate clearwater infiltration	Provide approximate instantaneous peak flowrate of 25 MGD	When incorporated with the rest of the White River watershed, achieve 95 percent capture and 4 overflow events[6]	Bid Year - 2008 Achievement of Full Operation - 2010
14	Riviera Club Improvements to Overflow Storage Tank	Add wet-weather disinfection to existing satellite storage facility	Provide approximate instantaneous peak disinfection flow rate of 53 MGD	When incorporated with the rest of the White River watershed, achieve 95 percent capture and 4 overflow events[6]	Bid Year - 2009 Achievement of Full Operation - 2011
15	Fall Creek Tunnel, Collector Pipes and Watershed Projects	Deep storage tunnel, consolidation sewers, elimination of CSO 103 and dam removal	Provide a total effective[11] storage volume of 250 MG in the Fall Creek, White River, Pogues Run, Pleasant Run and DRTC tunnel system[10]	When incorporated with the rest of the Fall Creek watershed, achieve 97 percent capture and 2 overflow events on Fall Creek Watershed[6]	Bid Year - 2006 Achievement of Full Operation - 2025
16	Deep Rock Tunnel Connector, Deep Tunnel Pumping Station and Screenings Facilities, and Connection of CSO 008, CSO 117 and CSO 118 to the Deep Rock Tunnel Connector	Deep rock tunnel originating near CSO 118 and terminating near the headworks of the Southport facility[8], deep tunnel pumping station and screenings facilities located near Southport treatment facility, and structures necessary to tie CSO 008, CSO 117 and CSO 118 flows into the Deep Rock Tunnel Connector	Provide a total effective[11] storage volume of 250 MG in the Fall Creek, White River, Pogues Run, Pleasant Run and DRTC tunnel system[10] with a minimum peak conveyance and dewatering capacity of 90 MGD CSO flow to Southport	Maximize delivery of flow from White River Tunnel to Southport AWT Plant, Optimize capture of CSO 008, CSO 117, and CSO 118	Bid Year - 2011 Achievement of Full Operation - 2017

Table 7-5
CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones (continued)

CSO Control Measure[1]		Description[2]	Design Criteria[2]	Performance Criteria	Critical Milestones[3]
17	Belmont AWT - Wet-Weather Treatment (New Aeration Tanks)	Provide secondary biological treatment of the Belmont PE Bypass	Provide in series peak biological treatment rate of 300 MGD	When incorporated with the rest of the Belmont improvements, facility complies with current NPDES permit	Bid Year - 2009 Achievement of Full Operation - 2012
18	Lower Pogues Run Improvements	Deep Storage Tunnel and consolidation sewers[8]	Provide a total effective[11] storage volume of 250 MG in the Fall Creek, White River, Pogues Run, Pleasant Run and DRTC tunnel system[10]	When incorporated with the rest of the Pogues Run and White River watersheds, achieve 95 percent capture and 4 overflow events[6]	Bid Year - 2011 Achievement of Full Operation - 2021
19	Pogues Run - Sewer Separation at Forest Manor Park (CSO 143)	Sewer separation that minimizes CSO 143	Storm drains designed as per Indianapolis Stormwater Standards. Sanitary sewer designed as per Indianapolis Sanitary Standards and Ten State Standards.	Separation of sewers to minimize CSO 143	Bid Year - 2010 Achievement of Full Operation - 2012
20	White River Tunnel (Central Tunnel) and Watershed Projects	Central tunnel, consolidation sewers, sewer separation and dam modifications[8]	Provide a total effective[11] storage volume of 250 MG in the Fall Creek, White River, Pogues Run, Pleasant Run and DRTC tunnel system[10]	When incorporated with the rest of the White River watershed, achieve 95 percent capture and 4 overflow events[6]	Bid Year - 2010 Achievement of Full Operation - 2021
21	Belmont AWT - Wet Weather Chlorination / Dechlorination (Chlorine Disinfection Tank and Re-establish Existing Outfall)	New wet-weather disinfection system and new discharge to White River	Additional peak disinfection treatment rate of 150 MGD for a total of 300 MGD peak disinfection treatment capacity consistent with applicable disinfection requirements of current NPDES permit[12]	When incorporated with the rest of the Belmont improvements, facility complies with current NPDES permit	Bid Year - 2010 Achievement of Full Operation - 2012
22	Southport Advanced Wastewater Treatment Plant Improvements - Secondary Treatment System Expansion	Expansion of Secondary Treatment System from 150 MGD to 250 MGD	When incorporated with the rest of the Southport Improvements, provide secondary and disinfection treatment rate of 250 MGD consistent with applicable disinfection requirements of current NPDES permit. Provide maximum pumping rate of 345 MGD[12]	When incorporated with the rest of the Southport improvements, facility complies with current NPDES permit	Bid Year - 2012 Achievement of Full Operation - 2017

Table 7-5
CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones (continued)

CSO Control Measure[1]		Description[2]	Design Criteria[2]	Performance Criteria	Critical Milestones[3]
23	Southport Advanced Wastewater Treatment Plant Improvements - Wet Weather Disinfection	New Disinfection facility and new process/yard piping	When incorporated with the rest of the Southport Improvements, provide secondary and disinfection treatment rate of 250 MGD consistent with applicable disinfection requirements of current NPDES permit. Provide maximum pumping rate of 345 MGD[12]	When incorporated with the rest of the Southport improvements, facility complies with current NPDES permit	Bid Year - 2012 Achievement of Full Operation - 2017
24	Southport Advanced Wastewater Treatment Plant Improvements - Primary Clarifier Expansion	Enhancement of primary clarification facility, and new process/yard piping	When incorporated with the rest of the Southport Improvements, provide total peak primary treatment capacity as required to support secondary treatment design, and peak secondary disinfection treatment capacity of 250 MGD consistent with applicable disinfection requirements of current NPDES permit. Provide maximum pumping rate of 345 MGD[12]	When incorporated with the rest of the Southport improvements, facility complies with current NPDES permit	Bid Year - 2012 Achievement of Full Operation - 2017
25	Belmont Advanced Wastewater Treatment Plant Improvements -- Raw Wastewater Pumping Capacity Expansion	Rerouting of the existing Wet Weather Pump Station (WWPS) to the existing wet weather storage basin (WWSB No. 1)	When incorporated with the rest of the Belmont improvements, provide total peak primary and biological treatment rate of 300 MGD. Provide peak pumping rate of 330 MGD[12].	When incorporated with the rest of the Belmont improvements, facility complies with current NPDES permit	Bid Year - 2011 Achievement of Full Operation - 2012
26	Southport Advanced Wastewater Treatment Plant Improvements -- Headworks	Expansion of headworks, screening, grit removal, and new process/yard piping	When incorporated with the rest of the Southport Improvements, provide total peak secondary and disinfection treatment rate of 250 MGD consistent with applicable disinfection requirements of current NPDES permit. Provide peak pumping rate of 345 MGD[12]	When incorporated with the rest of the Southport improvements, facility complies with current NPDES permit	Bid Year - 2012 Achievement of Full Operation - 2017
27[9]	Deleted	Deleted	Deleted	Deleted	Deleted
28[7,9]	Deleted	Deleted	Deleted	Deleted	Deleted

Table 7-5
CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones (continued)

CSO Control Measure[1]		Description[2]	Design Criteria[2]	Performance Criteria	Critical Milestones[3]
29	Pleasant Run Deep Tunnel and Overflow Collector Pipe	Deep tunnel connection sewers, collection interceptor and sewer separation. Tunnel connects to area of White River and DRTC Tunnels and extends to the area of CSO 084[8]	Provide a total effective[11] storage volume of 250 MG in the Fall Creek, White River, Pogues Run, Pleasant Run and DRTC tunnel system[10]	When incorporated with the rest of the Pleasant Run watershed, achieve 95 percent capture and 4 overflow events[6]	Bid Year - 2010 Achievement of Full Operation - 2025
30	Eagle Creek Overflow Collector Pipe (CSO Collector Pipe Belmont West Cutoff via the Belmont North Relief Interceptor System)	Collection interceptor system and relief interceptor to achieve Performance Criteria[8] (Constructed as Deep Tunnel per Six-Month Report No. 16)	Provide instantaneous peak flowrate of 38 MGD in the Belmont North Relief Interceptor System. Provide instantaneous peak flowrate of 25 to 50 MGD at the downstream end of the Eagle Creek Overflow Collector Pipe	When incorporated with the rest of the Eagle Creek and White River watersheds, achieve 95 percent capture and 4 overflow events[6]	Bid Year - 2013 Achievement of Full Operation - 2018
31	Upper Pogues Run Improvements	Off-line storage facility, collection interceptor to achieve Performance Criteria[8]	Provide instantaneous peak flowrate of 40 to 80 MGD. Provide storage volume of 1 to 3 MG	When incorporated with the rest of the Pogues Run watershed, achieve 95 percent capture and 4 overflow events[6]	Bid Year - 2017 Achievement of Full Operation - 2021
32	Belmont Advanced Wastewater Treatment (AWT) Plant Improvements	Rerouting of in-plant recycle flows from the headworks to primary treatment via the Plant Drain Pump Station (PDPS). Diversion of the primary effluent from Belmont AWT to Southport AWT via the PEPS.	When incorporated with the rest of the Belmont AWT improvements, provide total peak primary and secondary treatment rate of 300 MGD. Provide peak headworks pumping rate of 330 MGD.	When incorporated with the rest of the Belmont improvements, facility complies with current NPDES permit	Bid Year - 2008 Achievement of Full Operation - 2009

(shaded) Completed

Footnotes:

[1] Upon full implementation, the CSO Control Measures listed in Table 7-5 are expected to result in 95 percent capture and 4 CSO events on the White River, Pleasant Run, Pogues Run and Eagle Creek and 97 percent capture and 2 CSO events on Fall Creek, as evaluated in accordance with footnote 6. Either a revision to Indiana's current water quality standards or some other legal mechanism is necessary to authorize overflows due to storms exceeding those levels of control.

[2] Footnote 2 deleted.

[3] The term "Bid Year" means "Completion of the Bidding Process.".

[4] The CSO control measure is not expected to achieve 95 or 97 percent capture on its own and will work in conjunction with other CSO control measures at the specified CSO outfalls to achieve the performance criteria.

[5] Consistent Operation: Performs as designed on a regular basis. Failure to perform correctly is infrequent.

[6] CSO Control Measures will be designed to achieve Performance Criteria of 97 percent capture for the Fall Creek watershed and 95 percent capture for other CSO receiving waters, and 2 CSO events for the Fall Creek watershed and 4 CSO events for each of the other CSO receiving waters in a "typical year." "Typical year" performance, and achievement of Performance Criteria, shall be assessed in accordance with Section 8.4 (Post Construction Monitoring) using the average annual statistics generated by the collection system model for the representative five- year simulation period of 1996 to 2000 (or another five-year simulation period subsequently proposed by the city and approved by IDEM and U.S. EPA).

[7] Footnote 7 deleted.

[8] The collection interceptor may be installed as multiple interceptors with the combined capacity as described in the Design Criteria.

[9] Control Measures 27 and 28 deleted.

[10] Control Measures 15, 16, 18, 20, and 29 have a combined Design Criteria of 250 MG of "effective" (as defined below) storage in the Fall Creek, White River, Pogues Run, Pleasant Run and DRTC Tunnel System. This total effective available system storage of 250 MG includes adits and dearation chambers, which are tunnel connections from drop shafts to the mainline tunnels.

[11] 'Effective' as identified for Control Measures 15, 16, 18, 20, and 29 is defined as the storage volume that will be designed and operated to ensure 250 MG of wet-weather flow may be reliably stored in the tunnel system provided Indianapolis has received sufficient precipitation to capture 250 MG of wet-weather flow in a single event or two or more sequential events.

[12] Control Measures 21, 22, 23, 24, 25, and 26 have flowrates as noted within the Design Criteria for each Control Measure. Control Measures 22, 23, 24, and 26 have a secondary treatment capacity of 250 MGD and a disinfection capacity of 250 MGD (consistent with applicable disinfection requirements of the City's current NPDES permit), which includes in-plant return flows. Control Measures 21 and 25 have a secondary treatment capacity of 300 MGD and a disinfection capacity of 300 MGD (consistent with applicable disinfection requirements of the Authority's current NPDES permit), which includes in-plant return flows.

Design Criteria: Design criteria are those criteria upon which the selected CSO control measures shall be designed to achieve the required level of control. (See footnotes 2 and 6 of **Table 7-5**). All selected LTCP projects will be designed in accordance with good engineering practices to ensure that corresponding facility-specific, watershed-wide and systemwide performance criteria will be achieved.

Performance Criteria: Performance criteria are those criteria used to assess the performance of CSO control facilities and improvements in water quality of receiving streams due to implementation of CSO control measures. These include any of the following: conveying the design flow rates, meeting any and all applicable permit requirements, and/or achieving the targeted percent capture and overflow frequency in a typical year.

Critical Milestone: Significant dates by which progress in implementing the LTCP will be tracked. For each major CSO Control Measure shown in **Table 7-5**, the Critical Milestones tracked will be Completion of Bidding Process and Achievement of Full Operation.

Completion of Bidding Process (Bid Year): The year by which: (1) the Authority (post August 2011) or the City (pre August 2011) has appropriately allocated funds for a specific CSO Control Measure (or portion thereof), (2) the bid for the specific CSO Measure has been accepted and awarded by the Authority (post August 2011) or the City (pre August 2011) for the construction of the CSO Control Measure, and (3) a notice to proceed has been issued and remains in effect.

Achievement of Full Operation: The completion of construction and installation of equipment or infrastructure such that the system has been placed in full operation, and is expected to both function and perform as designed, plus completion of shakedown and related activities, as well as completion of in-situ modified operations and maintenance manuals. This specifically includes all control systems and instrumentation necessary for normal operations and all residual handling systems. Certain specified CSO Control Measures set forth in **Table 7-5** consist of separate components. For those specified CSO Control Measures, "Achievement of Full Operation" shall not be achieved until that last component is completed.

7.5.4 Scheduling Factors

Several financial, institutional, legal and technical factors controlled the time required to implement the LTCP. This plan represents the largest single public works program ever undertaken in the City of Indianapolis. Based on experience with early action projects, unforeseen circumstances will affect any strict schedule established for such a large and complex program in an urban environment, particularly when the work involves subsurface construction.

Time requirements in the implementation schedule have been based on information compiled during the planning process, experience with similar projects and estimates of future field conditions. During implementation, the Authority will identify and resolve any uncertainties and adjust the schedule accordingly. Additionally, changes in laws, requirements or regulations could require different time requirements than anticipated. Listed below are some of the principal criteria, standards, regulations, laws, guidelines and assumptions upon which the LTCP and schedule are based. Changes to any of the following may support a request for a modification of the LTCP and the implementation schedule:

1. The Clean Water Act, 1994 CSO Policy and U.S. EPA guidance for CSOs and for performing water quality standard reviews and revisions.

2. State of Indiana Water Quality Standards.

3. The Authority's NPDES permits.

4. Future judicial or administrative orders.

5. The financial capability of the City of Indianapolis and the Authority remains equal to or better than that indicated in the financial capability assessment in the LTCP.

6. The Authority's bond rating is not lower than that indicated in the financial capability assessment in the LTCP and the interest rate for bonding is not higher than that indicated in the financial capability assessment.

7. All approvals, permits and land acquisitions can be obtained in the time frames shown in the implementation schedule.

8. Facility Planning: Facility planning has been completed for all of the control measures and control measures are either completed, in detailed design or under construction.

9. Land is acquired or easements or rights to use the land are obtained from landowners, including the Indiana Department of Transportation (INDOT), Indy Parks and railroads, without unreasonable restrictions, for the following facilities:

Fall Creek:

- Alignment for the Fall Creek Tunnel generally southwest along Fall Creek.
- Alignment for the CSOs 216, 135, 141 and 066 collection sewer generally along Fall Creek Greenway.
- Alignment for CSO 050 and 50A collection sewer generally along Fall Creek through Indy Parks' Watkins Park.
- Rights to cross Tunnel under Interstate 65 and railroad (depending on route).
- Rights to align CSOs 126, 135, 141, and 066 collection sewer near railroad.

Pogues Run:

- Site for storage facility near Spades Park.
- Alignment for tunnel is generally along Pogues Run starting near Forest Manor Park.
- Alignment for sewer separation in CSO 143 basin.
- Rights to cross tunnel under railroad.

Pleasant Run:

- Alignment for tunnel generally along Pleasant Run starting in Pleasant Run Golf Course and running through Pleasant Run Greenway, Ellenberger Park, Christian Park and Garfield Park.
- Alignment for tunnel generally along Bean Creek starting near Shelby Street and running through Garfield Park.
- Alignment for sewer separation in CSO 017 basin.
- Rights to cross Pleasant Run tunnel under railroad at three locations and align along cemetery.

Eagle Creek:

- Alignment of tunnel generally along streets near Eagle Creek by Indy Parks' and Ross Claypool Park. Rights to cross tunnel under railroad at three locations and align along cemetery.

White River:

- Alignment for collection sewer for CSO 205 generally along White River or canal.
- Site for CSO storage facility near Riviera Club lift station.
- Alignment for the central tunnel generally along White River through White River State Park and downtown Indianapolis.
- Rights to cross tunnel under Interstate 70 and railroad and along cemetery.
- Alignment of CSOs 043 and 044 collection sewer generally along White River near Bush Stadium over to the tunnel.
- Alignment of CSOs 045, 042, 041, 147 and 040 collection sewer generally along White River through Reverend Mozel Sanders Park and White River State Park.
- Alignment for sewer separation in CSO 046 basin.
- Rights to cross CSOs 043 and 044 collection sewer under railroad.
- Rights to cross CSOs 045, 042, 041, 147 and 040 collection sewer under railroad.
- Alignment for DRTC and site deep pumping facility.
- INDOT, Indy Parks, railroads and other landowners allow temporary construction access, without unreasonable restrictions, to perform investigations, surveys, and to construct the facilities at locations as identified above.
- The technical bases related to construction conditions and technology for construction of the CSO control facilities.
- Plans of the state or federal governments that impact the siting, operation or other functional requirements of the CSO control facilities.
- The actual costs of CSO control projects (based on construction bids or conditions encountered during construction) that significantly change the financial capability analysis.
- Technical, legal and institutional conditions that require more time than anticipated or planned.

7.6 Summary

Following the assessment of the sewer system and CSO receiving waters, analysis of alternatives, gathering of public input, and analysis of financial capability, a LTCP that reflected an affordable and attainable level of control has been chosen. The plan restores attainable uses by providing cost-effective control of CSOs and protection of public health during recreational periods. A number of factors influenced the decision, including dry- and wet-weather realities of the system and receiving waters, regulatory requirements, public acceptance, affordability and cost-effectiveness. It has been concluded that the selected CSO Control Plan 1 (storage/ conveyance) with modifications as documented in Amendments 1 and 2 of the Consent Decree at 97/95 percent capture represents the knee- of-the-curve for cost-effectiveness for a number of benefits, including percent capture and reducing high levels of *E. coli* bacteria in affected streams. The selected plan establishes a high level of CSO control and also seeks to control dry-weather sources of bacteria that limit recreational uses for substantial periods during the recreational season. Additional CSO control would not restore additional uses of the waterways.

The LTCP consists of the following commitments:

- Implementing the CSO control measures listed in **Table 7-5** according to the design criteria and performance criteria specified as modified by Amendments 1 and 2 to the Consent Decree,
- Meeting the schedule for critical milestones established in **Table 7-5**, and
- Re-assessing the LTCP every five years to determine whether modifications to the control measures or schedule should be sought.

Upon full implementation, the CSO Control Measures will still result in residual overflows during large storm events. Either a revision to Indiana's current water quality standards or some other legal mechanism is necessary to authorize those residual overflows.

The selected plan will employ storage/conveyance facilities in all major watersheds combined with treatment plant improvements. Flows from outfalls will be collected using conveyance facilities connected to a deep tunnel system. The deep tunnel system will serve primarily as a storage facility, and the stored flows will be pumped out to the AWT facilities at the end of a storm event. The AWT facilities were expanded and upgraded and a deep rock tunnel connector (DRTC) is currently under construction to provide biological treatment of wet-weather flows. The plan also includes collection sewers and satellite underground storage facilities to control remotely located outfalls along upper White River and Pogues Run. Sewers along Lick Creek, State Ditch and other isolated outfall locations have been separated.

To achieve maximum benefits to public health and the environment, The Authority have implemented and anticipates that it will continue to implement programs to replace failing septic systems, meet state and federal stormwater management requirements, restore streambanks to more natural conditions, implement real-time flow controls within the sewer system. While these improvements are not a required component of the LTCP, are at the Authority's discretion and are not directly related to state or federal CSO control requirements, they show the willingness to consider going above and beyond requirements to improve water quality in neighborhood streams.

The selected plan will attain the dissolved oxygen aquatic life standard, restore attainable recreational uses, significantly reduce overflow frequency and pollutant loads, prevent CSO-caused exceedances of dissolved oxygen standards, reduce *E. coli* bacteria standard violations, control solids and floatables, and contain the first flush of sewage. The selected plan will significantly improve wet-weather ambient conditions for fish and other aquatic wildlife. By capturing the first flush and achieving 97 or 95 percent capture of CSO flows, the selected plan also will significantly reduce or eliminate odors, untreated sewage, and trash in neighborhood streams.

The program is currently being implemented in four five-year phases. A 20-year schedule allows sufficient time to construct control measures in a planned and orderly manner; minimize disturbance to neighborhoods; accurately evaluate the effectiveness of each project; secure necessary rights of way; coordinate technical, manpower and material needs; as well as ease the financial burden on ratepayers.

During implementation, unforeseen circumstances may arise during construction, particularly when the work involves subsurface construction. The Authority will need to identify and resolve any uncertainties and seek to adjust the schedule accordingly. Additionally, changes in laws, requirements or regulations could require different time requirements than currently anticipated.

Section 7 Modification Summary

The 2006 CSO LTCP was updated in 2017 as summarized below:

- Throughout Section 7, all CSO control measures completed before August 26, 2011 are referred to as “City” or “Indianapolis” work and those completed after August 26, 2011 are referred to as “Authority” work.
- Section 7.1, Introduction was modified to include language on Amendments to the Consent Decree and an introduction paragraph was added.
- Section 7.2.2, selected LTCP costs were updated 2016 dollars and the cost and schedule language has been updated.
- Section 7.2.3, paragraph added to address modifications to control measures and the Consent Decree due to amendments.
- Section 7.3.1, key features of the selected plan were modified to reflect changes to the Consent Decree due to amendments.
- Figure 7-1, Systemwide Selected CSO Plan was modified to reflect changes to the control measures and LTCP per amendments.
- Section 7.3.1.1, Early Action Projects were updated to reflect completed events and early action projects were moved to their corresponding stream reach.
- Section 7.3.1.2, Program Costs have been updated to reflect 2016 dollars.
- Section 7.3.2, Fall Creek control measures have been updated to reflect completed work and changes made to the selected LTCP per amendments.
- Section 7.3.3, Pogues Run control measures have been updated to reflect completed work and changes made to the selected LTCP per amendments.
- Table 7-1, LTCP Component Cost by Watershed have been updated to reflect 2016 dollars and to reflect modifications made to LTCP per amendments.
- Figure 7-2, Fall Creek Watershed Control Measures was modified to reflect changes to the control measures and LTCP per amendments.
- Section 7.3.4, Pleasant Run/Bean Creek control measures have been updated to reflect completed work and changes made to the selected LTCP per amendments.
- Section 7.3.5, Eagle Creek control measures have been updated to reflect completed work and changes made to the selected LTCP per amendments.
- Figure 7-3, Pogues Run Watershed Control Measures was modified to reflect changes to the control measures and LTCP per amendments.
- Figure 7-4, Pleasant Run Watershed Control Measures was modified to reflect changes to the control measures and LTCP per amendments.
- Section 7.3.6, Lick Creek and State Ditch control measures have been modified to reflect completed work.
- Section 7.3.7, White River control measures have been updated to reflect completed work and changes made to the selected LTCP per amendments.
- Figure 7-5, Eagle Creek Watershed Control Measures was modified to reflect changes to the control measures and LTCP per amendments.
- Section 7.3.8.1, Belmont AWT Plant Control Measures have been updated to reflect completed work, changes made to the selected LTCP per amendments and cost in 2016 dollars

- Figure 7-6a, White River Watershed Control Measures Map 1 of 2 was modified to reflect changes to the control measures and LTCP per amendments.
- Figure 7-6b, White River Watershed Control Measures Map 2 of 2 was modified to reflect changes to the control measures and LTCP per amendments.
- Section 7.3.8.2, Southport AWT Plant Control Measures have been updated to reflect completed work, changes made to the selected LTCP per amendments and cost in 2016 dollars
- Figure 7-7, General Layout of Belmont AWT Plant Treatment Improvements was modified to reflect changes to the control measures and LTCP per amendments.
- Section 7.3.8.3, Interplant Connection have been updated to reflect completed work, changes made to the selected LTCP per amendments and cost in 2016 dollars.
- Section 7.3.9, Systemwide Watershed Improvement control measures have been updated to reflect completed work and changes made to the selected LTCP per amendments.
- Figure 7-9, Deep Rock Tunnel Connector Alignment has been created to replace previous Figure 7-9 on the interplant connection.
- Section 7.5, Implementation Schedule has been modified to reflect changes to the LTCP schedule per amendments.
- Section 7.5.3, LTCP Program Implementation has been modified to reflect changes to the previous 2007 UAA.
- Figure 7-13, Program Phasing Implementation Schedule has been modified to reflect changes to the LTCP per amendments.
- Section 7.5.4, scheduling factors have been updated per amendments.
- Table 7-5 CSO Control Measures, Design Criteria, Performance Criteria, and Critical Milestones has been modified to reflect design changes to control measures based on amendments as well as schedule modifications.
- Section 7.6, Summary has been updated to reflect completed work and modifications to the LTCP per amendments.

8.0 Post-Construction Monitoring Program

Contents:

8.1 Introduction

In this Section, to reflect the transfer of the wastewater system from the City of Indianapolis to CWA Authority, Inc., all work done before August 26, 2011 was completed by the "City" or "Indianapolis". Work done after August 26, 2011 was completed by "the Authority" and will be referred to as such in this report.

As was the City's approach, the Authority's watershed approach to improving water quality includes a targeted water quality monitoring program that enables the Authority to understand overall stream conditions and track changes in water quality over time. The City currently conducts monthly sampling for its MS4 permits.

When implemented, the CSO control measures will improve water quality. This section describes the Authority's program for conducting post construction monitoring studies related to CSO control measures. The Post-Construction Monitoring Program will document the effectiveness of the Authority's overall CSO control program in achieving design requirements and water quality goals. The CSO Post-Construction Monitoring Program includes the following elements:

- Actions to determine whether CSO control measures are meeting the Performance Criteria in **Table 7-5**;
- Actions to assess the environmental benefits attributable to CSO control measures and to determine whether the Authority's CSO discharges are complying with the water quality-based requirements of the Authority's NPDES permits;
- A monitoring schedule, sampling locations, and associated monitoring procedures to collect data related to the Performance Criteria and the impacts from CSOs on dissolved oxygen and *E. coli* levels in CSO-impacted receiving streams; and
- Evaluation and analysis of the monitoring data to determine whether CSO control measures are achieving the desired results and for reporting progress to regulatory agencies and the public.

The program will monitor the performance of CSO control measures on a watershed basis, as well as assess the program's overall effectiveness in improving water quality and capturing sewage (i.e., 97 percent capture/2 overflow events on Fall Creek and 95 percent capture/4 overflow events on White River, Pogues Run, Pleasant Run and Eagle Creek in a typical year.) The frequency of CSO overflow events will vary year-to-year because of variation in annual rainfall. Where the level of control is 4 overflow events per typical year, actual overflow frequency is expected to range from 0 to 10 overflow events per year; where the level of control is 2 overflow events per typical year, the actual frequency is expected to range from 0 to 6 overflow events per year. The Authority will compile monitoring results, submit milestone reports to the regulatory agencies, and report progress to the public.

8.1.1 Regulatory Requirements

U.S. EPA requires CSO communities to conduct a post-construction monitoring program during and after LTCP implementation "to help determine the effectiveness of the overall program in meeting [Clean Water Act] requirements and achieving local water quality goals." This program should collect data that measure the effectiveness of CSO controls and their impact on water quality, and should utilize existing monitoring stations used in previous studies of the waterways and sewer system in order to compare results to conditions before controls were put in place. The program should include a map of monitoring stations, a record of sampling frequency at each station, a list of data to be collected, and a quality assurance/quality control (QA/QC) plan.

In U.S. EPA's December 2001 Report to Congress: Implementation and Enforcement of the Combined Sewer Overflow Control Policy, the agency noted the difficulty of establishing a monitoring and tracking program for CSO control programs. "Monitoring programs need to be targeted and implemented in a consistent manner from year to year to be able to establish pre-control baseline conditions and to identify meaningful trends over time as CSO controls are implemented," the report said. "In practice, it is often difficult, and in some instances impossible, to link environmental conditions or results to a single source of pollution, such as CSOs. In most instances, water quality is impacted by multiple sources, and trends over time reflect the change in loadings on a watershed scale from a variety of environmental programs." The report also noted that weather conditions and rainfall totals vary significantly from storm to storm and year to year, making comparisons difficult.

8.1.2 Purpose and Scope

The post-construction monitoring program will collect data needed to document stream improvements that can be attributed to implementation of CSO control measures by the Authority, to evaluate whether CSO control measures have met Performance Criteria, and to evaluate whether the Authority's CSOs comply with the NPDES permits. In order to enable comparisons to historic data, the Authority will integrate the required CSO post-construction monitoring program into its current ongoing monitoring programs. The scope of the post-construction monitoring program includes preparation and execution of a monitoring plan, as well as evaluation of the effectiveness of CSO control measures. Watersheds or receiving waters included in this plan are Fall Creek, Pogues Run, Pleasant Run, Bean Creek, Eagle Creek, Little Eagle Creek, Lick Creek, and White River. The monitoring program has been developed based upon the following scope of work:

- Document Current Baseline Conditions: During planning and preparation of the LTCP, a comprehensive watershed assessment documenting water quality conditions in major CSO-impacted receiving streams, as well as estimated pollutant loads for all major watersheds was completed. This assessment established baseline conditions within watersheds and in-stream water quality data, as documented in Section 2.
- Identify Parameters of Concern: Various CSO control measures were evaluated to analyze their ability to improve receiving stream water quality for specific parameters of concern, as described in Section 4. During the development of the LTCP and discussions with U.S. EPA and IDEM, dissolved oxygen and *E. coli* bacteria were identified as the parameters of concern. The Authority will use dissolved oxygen and *E. coli* bacteria (or other applicable pathogen or pathogen indicator as described below) to measure the effect of its long term CSO control measures on receiving streams.
- Prepare and Execute Post-Construction Monitoring: The monitoring program will evaluate whether specific CSO control measures are performing as designed and constructed. It identifies how the Authority will collect data needed to document stream improvements and any pollutant reduction achieved through implementation of CSO control measures. Sections 8.2 through 8.7 describe the Authority's post-construction monitoring plan.
- Report Results to State and Federal Agencies: The results of the monitoring program will be reported to the U.S. EPA and IDEM. After completion of the CSO projects in a particular watershed, the Authority will prepare milestone reports that evaluate whether the constructed projects have achieved the desired results. Section 8.6 presents the Authority's approach for tracking and reporting on the achievement of design and performance criteria described in **Table 7-5**.
- Provide Public Information on Water Quality: Information from the monitoring program will be available to Indianapolis citizens, businesses, neighborhood associations and environmental organizations. This information will allow the public to be better informed and educated about the Authority's water quality improvement programs and water quality issues.

8.2 Program Elements

The Authority will construct long-term CSO control measures according to the implementation schedule presented in **Table 7-5** in Section 7. Upon Achievement of Full Operation in each watershed, the CSO control measures will be monitored and evaluated on a watershed basis to determine whether the Performance Criteria in **Table 7-5** have been achieved and the effect on receiving stream water quality.

8.2.1 Performance Criteria

Performance Criteria are those used to assess the performance of CSO control facilities, and CSO control measures will be designed and constructed to meet the Performance Criteria established in **Table 7-5**. The

Authority will monitor CSO outfalls as described in this section to demonstrate that the Performance Criteria have been met.

Table 8-1 illustrates how the CSO Control Measures in **Table 7-5** will be monitored and assessed by watershed. The Authority will carry out this evaluation by collecting precipitation and CSO outfall monitoring data for 12 months following the Achievement of Full Operation of all CSO control measures in each watershed. Following collection system model validation using the monitoring data, a continuous simulation based upon a five-year simulation period will determine "typical year" performance within the watershed for CSO volume, overflow frequency and percent capture. The Lower Pogues Run and Eagle Creek watersheds require completion of the Lower White River watershed to fully achieve their performance criteria. For this reason, monitoring data will be collected for the Lower Pogues Run and Eagle Creek watersheds after Achievement of Full Operation in both the Lower White River and the tributary watershed (i.e., Lower Pogues Run or Eagle Creek).

8.2.2 Water Quality Measures

Water Quality Measures are those used to assess the impacts of residual overflows that occur as well as improvements in water quality of receiving streams due to implementation of CSO control measures. The Authority will use as its water quality measures dissolved oxygen and *E. coli* bacteria (or other pathogen indicator, to the extent applicable water quality standards have been revised to include a different applicable pathogen indicator). In discussions with the regulatory agencies during the development of the LTCP, these parameters were identified as the parameters of concern.

Dissolved Oxygen (DO): the Authority will collect DO data within the watershed indicative of in-stream water quality. This data may come from a combination of in-stream continuous monitoring stations and/or monitoring locations maintained by the City/USGS.

E. coli Bacteria: Instream *E. coli* data from the monitoring stations maintained by the City/USGS will be available for use by the Authority for post construction monitoring. It is unlikely that CSO controls alone will result in attainment of Indiana's *E. coli* standards for primary contact recreation due to numerous *E. coli* sources in the environment. Therefore, there are no numeric targets for *E. coli* as a water quality measure. Rather, the Authority will analyze trends in both dry weather and wet-weather *E. coli* values and compare them to historic monitoring data and modeling predictions to determine improvement in water quality and to determine that residual CSO discharges do not interfere with applicable recreational uses. A different pathogen indicator other than *E. coli* may be requested by IDEM in accordance with this paragraph to the extent the applicable water quality standards are revised to include a different pathogen indicator.

8.3 Post-Construction Monitoring and Data Collection

8.3.1 Monitoring Schedule

The post-construction monitoring schedule, shown in **Table 8-1**, will be conducted as required by the Authority's Consent Decree.

8.3.2 Monitoring Stations

Starting with a list of monitoring locations from which data has been historically collected, the Authority will select stations for sampling and data collection needed to document stream improvements attributed to the implementation of CSO control measures. Monitoring sites historically were chosen to allow assessment of various water quality improvement programs, such as the City's Stormwater Program, AWT Plant NPDES Permit Program and the development of the Total Maximum Daily Load. During Post Construction Monitoring, the water quality monitoring program will be used to satisfy those obligations.

Table 8-1
Post-Construction Monitoring for CSO Control Measures by Watershed

Watershed	CSO Control Measure	CSO Outfalls	12-Month Monitoring Data		Typical Year Performance			Overflow Frequency Performance Criteria Achieved (Yes/No)	Percent Capture Performance Criteria Achieved (Yes/No)	Comments
			CSO Volume (MG)	Overflow Frequency by Watershed	CSO Volume (MG)	Overflow Frequency by Watershed	Percent Capture (%)			
Upper White River	Riviera Club Improvements to Overflow Storage Tank Includes CSO Control Measure # 3, 13, 14	155, 205	1.54	5 events / yr	11	<4 events / yr	> 95%	Yes	Yes	Performance Criteria Achieved
Fall Creek	Fall Creek Tunnel, Collector Pipes and Watershed Projects Includes CSO Control Measure # 2, 15	210, 049, 050, 050A, 051, 052, 053, 131, 054, 055, 132, 057, 058, 059, 060, 061, 213, 062, 063, 63A, 064, 065, 066, 142, 141, 135, 216, 103								
Lower Pogues Run	Lower Pogues Run Improvements Includes CSO Control Measures # 8, 18	115, 125, 128, 153, 129, 138, A38, 133, 137, 152, 136, 034, 34A, 035								
Lower White River	White River Tunnel (Central Tunnel) and Watershed Projects Includes CSO Control Measures # 1, 4, 6, 7, 9, 10, 11, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27, 28	003, 008, 012, 013, 118, 117, 116, 037, 038, 039, 040, 147, 041, 042, 043, 044, 045, 046, 217, 218, 235, 275								
Pleasant Run and Bean Creek	Pleasant Run Overflow Collector Pipe Includes CSO Control Measures # 4, 29	120, 019, 020, 148, 021, 130, 149, 150, 022, 119, 151, 023, 025, 027, 127, 028, 029, 030, 106, 031, 109, 108, 107, 072, 073, 074, 075, 076, 077, 078, 080, 081, 224, 083, 154, 084, 085, 086, 227, 087, 088, 228, 229, 089, 089A, 090, 091, 092, 015, 016, 017								
Eagle Creek	(CSO Collector Pipe and Belmont West Cutoff via the Belmont North Relief Interceptor System) Includes CSO Control Measure # 30	145, 011, 032, 223, 033								
Upper Pogues Run	Uppose Pogues Run Improvements Includes CSO Control Measures # 5, 19, 31	036, 095, 096, 097, 098, 099, 100, 101, 102, 143								

[1] CSO Control Measures are listed in LTCP Table 7-5 along with Achievement of Full Operation (AFO) dates.

[2] Monitoring Schedule: Monitoring will be conducted, upon completion of construction, for a series of rainfall events, until the later of (a) 12 months or (b) a sufficient number of rainfall events consistent with design criteria have occurred so that sufficient sampling data has been obtained.

[3] Typical year performance criteria of 97 percent capture and 2 overflow events (for Fall Creek) or 95 percent capture and 4 overflow events (all other CSO receiving waters) is based on average annual statistics over a representative five-year simulation period using the collection system model. "Typical year" performance shall be assessed based upon the average annual statistics generated for the representative five year simulation period of 1996 to 2000 (or another five year simulation period agreed to by the Authority, IDEM, and U.S. EPA) using the collection system model.

[4] Milestone reports on the achievement of performance criteria will be prepared for each watershed, as described in Section 8.6.1.

In the City's monitoring program, the following criteria were followed to select monitoring locations:

- Ability of monitoring stations to measure effectiveness of planned CSO control measures
- Proximity of receiving stream monitoring points to planned CSO control measures
- Ability to keep monitoring stations at the same locations used to establish baseline conditions (to aid in proper comparison of water quality results)
- Ability of monitoring stations to represent watershed characteristics and evaluate multiple factors, including land use, point sources, non-point sources, industrial sources, and so on
- Ability of monitoring stations to equally represent the different watersheds within the city for each station type
- Selection of major CSO outfalls for monitoring purposes to document measurable CSO reduction as a result of the controls (discharge volume, hydraulic control points, geographical area, and so on)
- Ability of monitoring stations to integrate and assess effectiveness of the Authority's multiple monitoring programs
- Site accessibility and local site conditions

The Authority will use a network of in-stream monitoring locations to measure continuous DO, water temperature, treatment plant effluent discharge, CSO activation and CSO flow. The data from the monitoring stations maintained by City/USGS will also be available for use by the Authority for Post Construction Monitoring. **Table 8-2** shows the current locations of monitoring stations within Marion County, together with the reasons for selection, monitoring types, monitoring frequencies, and monitoring parameters. Current locations of monitoring stations and CSO outfall stations are shown in **Figure 8-1** and **Figure 8-2**, respectively. Existing rainfall monitoring stations, located throughout Marion County, are also shown in **Figure 8-2**. Not all stations monitor all parameters, but the collective data provides information to assist and inform the Authority and assess water quality. CSO activation data is required by the Authority's NPDES permit and reported semi-annually by the Authority.

Receiving stream monitoring will be required in each watershed as described in **Table 8-1** following the Achievement of Full Operation of CSO Control Measures.

Table 8-2
CSO and Stream Monitoring[1] for CSO Control Measures by Watershed

Site ID	Location	Receiving Stream	Rationale	Real-time water quality	Real-time discharge	Intermittent water quality	Monitoring Frequency	Monitoring Protocols
1	82nd & WR	WR	Located upstream of the combined sewer service area at the north end of Marion County, representing the White River water quality without any effects of the Indianapolis CSO pollutants. Helps to evaluate the loads and flows into Indianapolis from the upstream basins, including Hamilton County			X	As-needed for PCM.	DO, pH, Temp, SpC, Wthr, Q, Wa, *E. coli*
2	Morris St & WR	WR	Located downstream of the Fall Creek and Pogues Run watersheds to evaluate the cumulative effectiveness of the CSO control measures in these watersheds on the White River water quality			X DO, pH, Temp, SpC, Wthr, Q, Wa, *E. coli*	As-needed for PCM.	
3	Harding St & WR	WR	Located upstream of the Belmont AWT plant to evaluate the cumulative effectiveness of the CSO control measures in the Fall Creek, Pogues Run, Pleasant Run and White River watersheds			X	As-needed for PCM.	DO, pH, Temp, SpC, Wthr, Q, Wa, *E. coli*
4	Tibbs-BantaR Landfill & W	WR	Located upstream of the Southport AWT plant to evaluate the cumulative effectiveness of the CSO control measures in the Fall Creek, Pogues Run, Pleasant Run and White River watersheds and the Belmont AWT plant improvements			X Wa, *E. coli*	As-needed for PCM.	DO, pH, Temp, SpC, Wthr, Q,
5	Southwestway Park & WR	WR	Located downstream of the Southport AWT plant to evaluate the cumulative effectiveness of the CSO control measures in the Fall Creek, Pogues Run, Pleasant Run, Eagle Creek and White River watersheds and Belmont and Southport AWT plant improvements			X	As-needed for PCM.	DO, pH, Temp, SpC, Wthr, Q, Wa, *E. coli*
6	Waverly & WR	WR	Located downstream in Morgan County to evaluate the cumulative effectiveness of the all CSO control measures in the City of Indianapolis, Marion County	X		X	As-needed for PCM.	Monthly: DO, pH, Temp, SpC, Wthr, Q, Wa, *E. coli* Real-Time: Continuous DO, pH, Temp, SpC
7	Meridian St & PI R	PI R	Located to evaluate the cumulative effectiveness of the CSO control measures in the Pleasant Run and Bean Creek watersheds before confluence with White River	X		X Wthr, Q, Wa, *E. coli*	As-needed for PCM.	Monthly: DO, pH, Temp, SpC, Real-Time: Continuous DO, pH, Temp, SpC
8	New York St & Po R	Po R	Located to evaluate the cumulative effectiveness of the CSO control measures in the upper Pogues Run (Spades Park Facility) before entering the existing box culvert			X DO, pH, Temp, SpC, Wthr, Q, Wa, *E. coli*	As-needed for PCM.	
9	Garfield Park & BC	BC	Located to evaluate the effectiveness of the CSO control facility in the Bean Creek watershed before confluence with Pleasant Run			X DO, pH, Temp, SpC, Wthr, Q,	As-needed for PCM.	Wa, *E. coli*
10	16th St & FC	FC	Located to evaluate the effectiveness of the CSO control measures in the Fall Creek watershed before confluence with White River			X DO, pH, Temp, SpC, Wthr, Q,	As-needed for PCM.	Wa, *E. coli*
11	Raymond St & BEC	BEC	Located to evaluate the effectiveness of the CSO control measures in the Eagle Creek watershed before confluence with White River			X DO, pH, Temp, SpC, Wthr, Q,	As-needed for PCM.	Wa, *E. coli*
12	96th St & WC	WC	Located upstream of the combined sewer service area at the north end of Marion County, representing the Williams Creek water quality before entering into Indianapolis. Helps to evaluate the loads and flows into Indianapolis from the upstream basins, including Hamilton County			X Wa, *E. coli*	As-needed for PCM.	DO, pH, Temp, SpC, Wthr, Q,

Table 8-2 *(continued)*
CSO and Stream Monitoring1 for CSO Control Measures by Watershed

Site ID	Location	Receiving Stream	Rationale	Real-time water quality	Real-time discharge	Intermittent water quality	Monitoring Frequency	Monitoring Protocols
13	16th St & PI R	PI R	Located upstream of the combined sewer service area, representing the Pleasant Run water quality without any effects of the CSOs			X	As-needed for PCM.	DO, pH, Temp, SpC, Wthr, Q, Wa, *E. coli*
14	21st St & Po R	Po R	Located upstream of the combined sewer service area, representing the Pogues Run water quality without any effects of the CSOs			X	As-needed for PCM.	DO, pH, Temp, SpC, Wthr, Q, Wa, *E. coli*
15	Southern Ave & BC	BC	Located to evaluate the cumulative flows and loads from Bean Creek before confluence with Pleasant Run			X	As-needed for PCM.	DO, pH, Temp, SpC, Wthr, Q, Wa, *E. coli*
16	71st St & FC	FC	Located upstream of the combined sewer service area, representing the Fall Creek water quality without any effects of the CSOs			X	As-needed for PCM.	DO, pH, Temp, SpC, Wthr, Q, Wa, *E. coil*
17	Dandy Trail & BEC	BEC	Located upstream of the combined sewer service area, representing the Eagle Creek water quality without any effects of the CSOs			X	As-needed for PCM.	DO, pH, Temp, SpC, Wthr, Q, Wa, *E. coli*
21	IPL & WR	WR	Area of historic low DO concern in White River	X			As-needed for PCM.	Real-Time: Continuous DO, pH, Temp, SpC
22	Emerson Way & FC		Located upstream of combined sewer service area, representing the Fall Creek water quality without any effects of the CSOs			X	As-needed for PCM.	DO, pH, Temp, SpC, Wthr, Q, Wa, *E. coli*
31	Sherman Dr & LC	LC	New site for Rivers, upstream of CSO Outfall in stream w impacts. Also has USGS gage stn adjacent. Added after a 5 yr site eval procedure.			X	As-needed for PCM.	DO, pH, Temp, SpC, Q, Wa, *E. coli*
32	Harding St & LC	LC	Located just upstream of confluence with White River, representing the Lick Creek water quality			X	As-needed for PCM.	DO, pH, Temp, SpC, Wthr, Q, Wa, *E. coli*
43	30th St & WR	WR	Located upstream of the combined sewer service area, representing the White River water quality without any effects of the CSOs (except the proposed Riviera Club Storage/Treatment Facility in Upper White River watershed)			X	As-needed for PCM.	*E. coli*
45	Vermont St. & Po R	Po R	Replacement for Site 8, Po R at NY St. Lost access to sampling point due to Po R tunnel construction and site improvements post construction. New site is only 530' NE of old site and is safer to sample. Also has USGS gauge stn.			X	As-needed for PCM.	DO, pH, Temp, SpC, Q, Wa, *E. coli*
46	Brookside Park & Po R	Po R	To evaluate the effectiveness of the Pogues Run CSO Reduction and Flood Control Project- Brookside Park Detention Basin			X	As-needed for PCM.	*E. coli*
47	Emerson R Ave & Po	Po R	To evaluate the effectiveness of the Pogues Run CSO Reduction and Flood Control Project-Emerson Avenue Detention Basin			X DO, pH, Temp, SpC, Wthr, Q,	As-needed for PCM.	Wa, *E. coli*
48	SR37/Belmont Ave & Little Buck Creek	LBC	Representing Little Buck Creek water quality			X	As-needed for PCM.	DO, pH, Temp, SpC, Q, Wa, *E. coli*

Table 8-2 *(continued)*
CSO and Stream Monitoring[1] for CSO Control Measures by Watershed

Site ID	Location	Receiving Stream	Rationale	Real-time water quality	Real-time discharge	Intermittent water quality	Monitoring Frequency	Monitoring Protocols
49	10th St & LEC	LEC	Located upstream of the combined sewer service area, representing the Little Eagle Creek water quality without any effects to the CSOs.			X	As-needed for PCM.	DO, pH, Temp, SpC, Wthr, 0, Wa, E. coil
50	Maze Rd & Buck Creek	BC	Representative of a watershed with significant development not sampled. Has a USGS gauge station nearby.			X	As-needed for PCM.	Same as all Rivers sites
51	Cold Spring Rd & Crooked Creek	CC	Representing Crooked Creek water quality.			X	As-needed for PCM.	Same as all Rivers sites
57	I-465 & WR	WR	Replacement for Site 4, TB Landfill. Lost access due to access issues and reconstruction of undercut bank (was a wading only site). Safety issue too. Backup site when TB Landfill was flooded, frozen, or closed. Within 1.8 miles of TB Landfill.			X	As-needed for PCM.	Same as all Rivers sites
58	Southport Rd & WR	WR	Replacement for Site 4, Southwestway Pk. Lost access due to construction of MECA tower after 9/11 (security concerns) and after DNR found a Bald Eagle nesting nearby at Cottonwood Lakes. Safety issue as well since this was a wading only site as well. Backup site for Site 5 when flooded, frozen, or closed.			X	As-needed for PCM.	Same as all Rivers sites
81	Boulevard PI & FC	FC	Area of historic low DO concern in Fall Creek	X			As-needed for PCM.	Real-Time: Continuous DO, pH, Temp, SpC
82	16th St & WR	WR	Above area of historic low DO concern/majority of CSOs in White River	X			As-needed for PCM.	Real-Time: Continuous DO, pH, Temp, SpC
85	Old Washington St & WR	WR	Area of historic low DO concern in White River	X			As-needed for PCM.	Real-Time: Continuous DO, pH, Temp, SpC
86	Keystone Ave & WR	WR	Located upstream of the combined sewer service area at the north end of Marion County, representing DO conditions in White River without any effects of the Indianapolis CSOs	X			As-needed for PCM.	Real-Time: Continuous DO, pH, Temp, SpC
103	Keystone Ave & FC	FC	Located upstream of combined sewer service area, representing DO conditions in Fall Creek without any effects of the CSOs	X			As-needed for PCM.	Real-Time: Continuous DO, pH, Temp, SpC
138	Bridgeport Rd & East Fork White Lick Creek	East Fork WLC	New site for Rivers, representative of watershed not sampled in past. Also became important when Indianapolis Airport Authority pulled out of SWMP after rechannelizing airport drainage. Also concerns with deicing ops impacts. Used to have USGS gauge station. Upstream of IAA. Added after a 5 year site evaluation procedure.			X	As-needed for PCM.	Same as all Rivers sites
139	Mooresville Rd & East Fork White Lick Creek	East Fork WLC	New site for Rivers, representative of watershed not sampled in past. Also became important when Indianapolis Airport Authority pulled out of SWMP after rechannelizing airport drainage. Also concerns with deicing ops impacts. Used to have USGS gauge station. Downstream of IAA. Added after a 5 year site evaluation procedure.			X	As-needed for PCM.	Same as all Rivers sites

Table 8-2 *(continued)*
CSO and Stream Monitoring1 for CSO Control Measures by Watershed

Site ID	Location	Receiving Stream	Rationale	Real-time water quality	Real-time discharge	Intermittent water quality	Monitoring Frequency	Monitoring Protocols
USGS-1	Nora & WR	WR	USGS Gauging Station #03351000		X		Continuous	River Flow, Water Stage
USGS-2	Broad Ripple & WR	WR	USGS Gauging Station #03351060		X		Continuous	Water Stage Only
USGS-3	Michigan St & WR	WR	USGS Gaging Station #03352750		X		Continuous	River Flow, Water Stage
USGS-4	Morris St & WR, River Mile 230.3 (2.6 miles downstream of FC, 3.4 miles upstream of BEC, and 4.0 miles upstream of IPL Dam)	WR	USGS Gaging Station #03353000 (White River at Indianapolis)		X		Continuous	River Flow, Water Stage
USGS-6	Millersville Rd & FC, River Mile 9.2	FC	USGS Gaging Station #03352500		X		Continuous	Stream Flow, Water Stage
USGS-9	Lynhurst Dr & BEC, River Mile 7.9	BEC	USGS Gaging Station #03353500		X		Continuous	Stream Flow, Water Stage
USGS-10	Little Eagle Creek at Speedway, IN	LEC	USGS Gaging Station #03353600		X		Continuous	Stream Flow, Water Stage
USGS-11	Pleasant Run at Arlington Avenue	PI R	USGS Gaging Station #03353120		X		Continuous	Stream Flow, Water Stage
USGS-12	Lick Creek at Keystone Ave.	LC	USGS Gaging Station #03353620		X		Continuous	Stream Flow, Water Stage
CSO 003	Southport AWT Plant	WR	Monitoring required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
CSO 008	Belmont AWT Plant	WR	Monitoring required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
USGS-13	WR at Raymond St	WR	USGS Gaging Station #03353000		X		Continuous	Temperature, Streamflow, Water Stage
USGS-14	PR at Vermont St	Po R	USGS Gaging Station #03352988		X		Continuous	Streamflow, Water Stage
CSO 016	Shelby St & Willow Dr	PI R via BC	Located in the city's Garfield Park. Monitoring also required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
CSO 039	New York St & Beauty Ave	WR	Significant CSO point in White River watershed. Monitoring required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
CSO 042	Saint Clair St & Lynn Ave	WR	Significant CSO point in White River watershed. Monitoring required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
CSO 045	WRPWD & Belmont Ave	WR	Significant CSO point in White River watershed. Monitoring required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)

Table 8-2 *(continued)*
CSO and Stream Monitoring1 for CSO Control Measures by Watershed

Site ID	Location	Receiving Stream	Rationale	Real-time water quality	Real-time discharge	Intermittent water quality	Monitoring Frequency	Monitoring Protocols
CSO 051	Capitol Ave & 22nd St	FC	Significant CSO point in Fall Creek watershed. Monitoring also required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
CSO 053	FCPND & Illinois St	FC	Monitoring required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
CSO 055	28th St & Talbot St	FC	Monitoring required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
CSO 065	Sutherland Ave & 34th St	FC	Significant CSO point in Fall Creek watershed. Monitoring required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
CSO 066	Fall Creek Blvd & Balsam Ave	FC	Monitoring required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
CSO 084	PLRPND & Michigan St	Pl R	Significant CSO point in Pleasant Run watershed. Monitoring also required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
CSO 100	BPSD & Rural St	Po R	Significant CSO point in Pogues Run watershed. Monitoring required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
CSO 101	Sherman Dr & BPND	Po R	Significant CSO point in Pogues Run watershed. Monitoring required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
CSO 108	PLRPSD & Saint Paul St	Pl R	Monitoring required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
CSO 117	Southern Ave & White River	WR	Significant CSO point in White River watershed. Monitoring required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
CSO 118	WRPED & West St	WR	Significant CSO point in White River watershed. Monitoring required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
CSO 125	Meridian St & South St	Po R	Significant CSO point in Pogues Run watershed. Monitoring required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
CSO 145	Old Raymond & Belmont	BEC	Monitoring required per NPDES permits		X		As-needed for PCM.	Flow, Level, Velocity (onset, duration, and volume of overflow)
CSOs 012, 013, 116, 115, 037, 038, 040, 147, 041, 042, 043, 044, 045, 155, 205	Various Locations - White River Watershed	WR	Monitoring of CSO activation of all remaining CSOs in White River watershed		X		As-needed for PCM.	CSO Activation Monitoring

Table 8-2 *(continued)*
CSO and Stream Monitoring1 for CSO Control Measures by Watershed

Site ID	Location	Receiving Stream	Rationale	Real-time water quality	Real-time discharge	Intermittent water quality	Monitoring Frequency	Monitoring Protocols
CSOs 210, 049, 050, 050A, 052, 131, 054, 132, 057, 058, 059, 060, 061, 213, 062, 063, 63A, 064, 142, 141, 135, 216	Various Locations - Fall Creek Watershed	FC	Monitoring of CSO activation of all remaining CSOs in Fall Creek watershed		X		As-needed for PCM.	CSO Activation Monitoring
CSOs 128, 153, 129, 138, A38, 133, 137, 152, 136, 034, 34A, 035, 036, 095, 096, 097, 098, 099, 102	Various Locations - Pogues Run Watershed	Po R	Monitoring of CSO activation of all remaining CSOs in Pogues Run watershed		X		As-needed for PCM.	CSO Activation Monitoring
CSOs 120, 019, 020, 148, 021, 130, 149, 150, 022, 119, 151, 023, 025, 027, 127, 028, 029, 030, 106, 031, 109, 108, 072, 073, 074, 075, 076, 077, 078, 080, 081, 224, 083, 154, 084, 085, 086, 227,087, 088, 228,229, 089, 089A, 090, 091, 092	Various Locations - Pleasant Run Watershed	PI R	Monitoring of CSO activation of all remaining CSOs in Pleasant Run watershed		X		As-needed for PCM.	CSO Activation Monitoring
CSO 015	Various Locations - Bean Creek Watershed	BC	Monitoring of CSO activation of remaining CSO in Bean Creek watershed		X		As-needed for PCM.	CSO Activation Monitoring

Table 8-2 *(continued)*
CSO and Stream Monitoring1 for CSO Control Measures by Watershed

Site ID	Location	Receiving Stream	Rationale	Real-time water quality	Real-time discharge	Intermittent water quality	Monitoring Frequency	Monitoring Protocols
CSOs 011, 032, 223, 033	Various Locations - Eagle Creek Watershed	SEC	Monitoring of CSO activation of all remaining CSOs in Eagle Creek watershed		X		As-needed for PCM.	CSO Activation Monitoring
Outfall 001	Southport AWT Plant	WR	Monitoring of final effluent, after receiving AWT treatment at Southport AWT Plant. Monitoring required per NPDES Permit		X		As-needed for PCM.	Flow (24 hour total)
						X	As-needed for PCM.	pH, E. coli, DO (Grab 12/24 hour)
Outfall 006	Belmont AWT Plant	WR	Monitoring of final effluent, after receiving AWT treatment at Belmont AWT Plant. Monitoring required per NPDES Permit		X		As-needed for PCM.	Flow (24 hour total)
						X	As-needed for PCM.	pH, E. coli, DO (Grab 12/24 hour)

LEGEND

River/Tributary Abbreviations:

BC	Bean Creek
BEC	Big Eagle Creek
FC	Fall Creek
LBC	Little Buck Creek
LC	Lick Creek
LEC	Little Eagle Creek
Pl R	Pleasant Run
Po R	Pogues Run
WC	Williams Creek
WLC	White Lick Creek
WR	White River

Analytical Parameter Abbreviations:

Parameter[1]	Symbol
Dissolved Oxygen	DO
pH	pH
Temperature	Temp[2]
Specific Conductivity	SpC
Weather	Wthr[3,4]
Flow	Q[5]
Water Appearance	Wa[6]
E. coli	*E. coli*

(Footnotes)

[1]The following monitoring protocols are optional: ph, SpC, flow (Q), water appearance, weather conditoins and other weather comments.

[2]Approximate Air Temp, Code: 0=No Data, 1=Hot, >80 deg F, 2=Warm, 60-79 deg F, 3=Cool, 40-59 deg F, 4=Cold, 20-39 deg F, 5=Very Cold, <20-39 deg F, 5=Very Cold, <20 deg F

[3]Weather Conditions, Code: 0=No Data, 1=Clear/Sunny, 2=PtlySunny/Partly Cloudy/Fair, 3=Cloudy, 4=Lt Rain, 5=Rain, 6=Lt Snow, 7=Snow

[4]Other Weather Comments, Code: 1=Windy, 2=Humid/Muggy

[5]Flow (Q): 1=Low, 2=Moderate, 3=High

[6]Water Appearance (Wa): 1=Clear, 2=Cloudy, 3=Murky, 4=Muddy

Monitoring locations are subject to change and will be identified as necessary to provide compliance with PCM requirements.

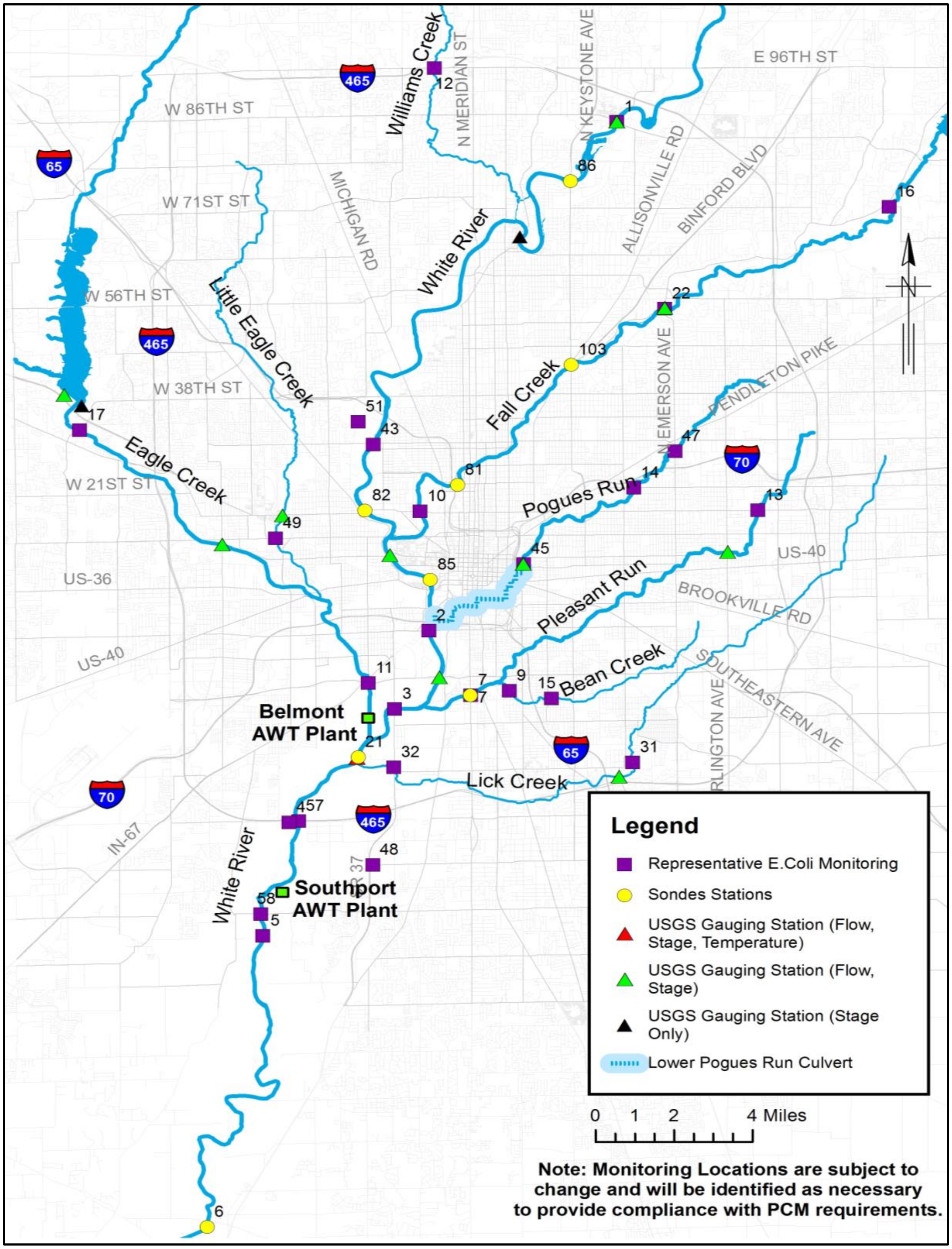
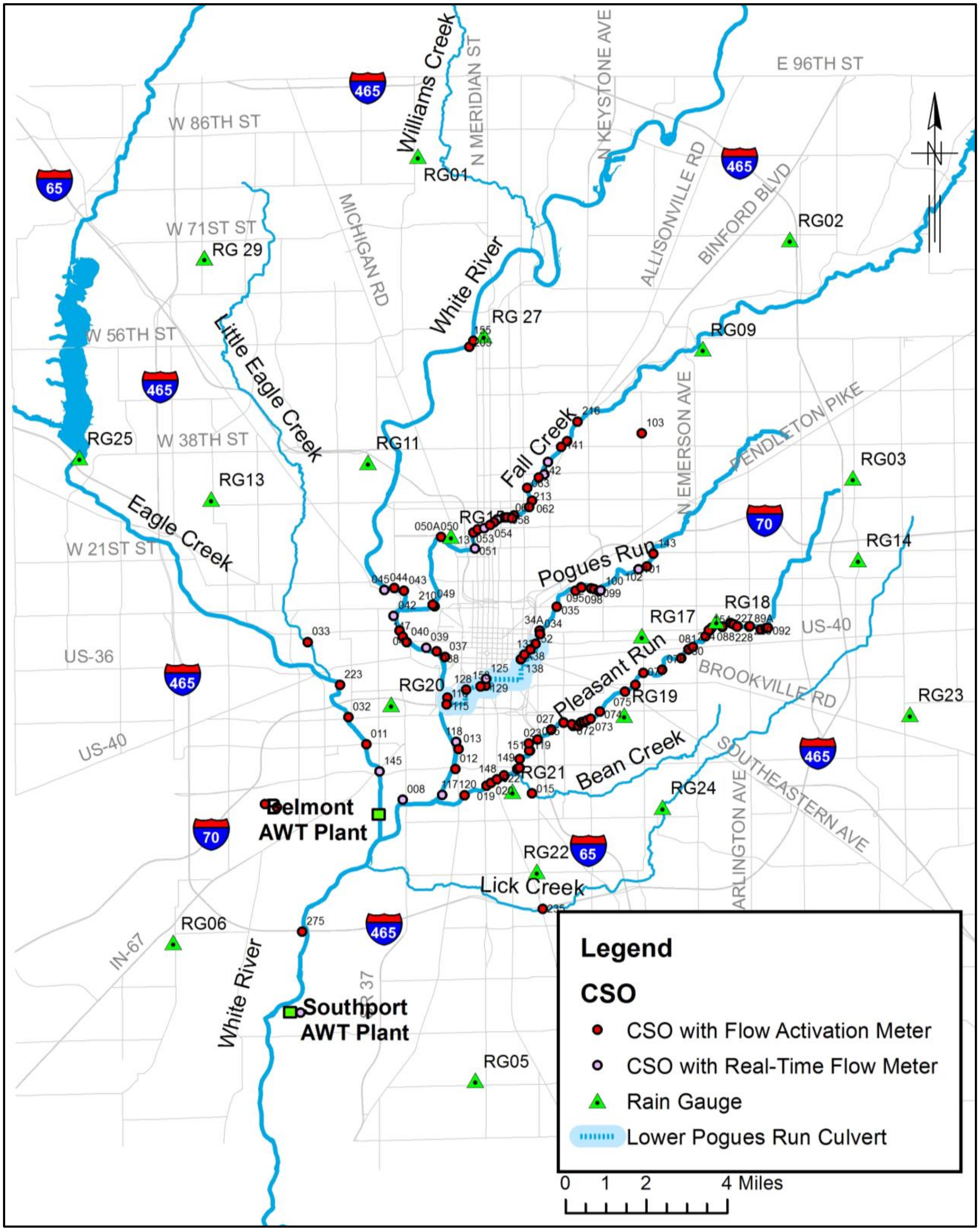


Figure 8-1
Receiving Stream Monitoring Stations



Note: Monitoring locations shown are general locations.

Figure 8-2
CSO Outfall and Rainfall Monitoring Stations

8.3.3 Stream Monitoring

This task will include monitoring flow in receiving streams. United States Geological Survey (USGS) currently operates and maintains 15 current conditions stream gauging stations in Marion County, three of which are on streams that do not receive CSO discharges. Of the remaining 12 stations, 10 are current conditions streamflow discharge and water stage gauging stations and two are current conditions water stage only gauging stations. Many gauging stations are managed together by USGS and the Authority through a cooperative agreement. Standard USGS equipment, procedures, and protocols will be used for long-term stream monitoring.

In the event streamflow monitoring is discontinued by USGS at some locations, adequate historic data is available to estimate streamflow discharge using manual water depth measurements.

8.3.4 CSO Outfall Monitoring

Data collected through CSO outfall monitoring will evaluate whether the Performance Criteria are being achieved after implementation of the planned CSO control measures.

The Belmont AWT Plant NPDES Permit requires the Authority to monitor 19 CSO outfalls throughout the city. The Authority monitors onset, duration, and overflow volume at these CSOs with continuously recording flow meters (area-velocity flow meters). The Authority will continue to monitor these CSOs using current or updated outfall monitoring procedures and equipment. The Authority will maintain field logs documenting installation activities, calibration methods, field truthing equipment and maintenance, and data downloads.

The Authority will monitor remaining outfalls using the CSO activation monitoring system. Rainfall monitoring will occur for each storm event during the post construction monitoring period to record each storm event using the Authority’s current program (rain gauges and the radar rainfall system). Selected storm events will be used for analysis. See Section 8.3.7 for the details of the rainfall monitoring.

8.3.5 Water Quality Monitoring

During data collection efforts to support Post Construction Monitoring and any additional, discretionary monitoring, the Authority will follow standard data collection, quality control and laboratory analysis protocols and procedures, including the components listed below.

Sample and Field Data Collection Procedures:

Pre Sampling Procedures:

- Select personnel and identify responsibilities
- Train personnel in safety and confined space entry; verify first aid and wet-weather training, CPR, currency of vaccinations, etc.)
- Prepare site access and obtain legal consents
- Acquire necessary scientific sampling or collecting permits
- Develop formats for field sampling logs and diaries
- Train personnel in pre sampling procedures (purging supply lines, instrument calibration)
- Check equipment availability, acquisition, and maintenance
- Schedule sample collection
- Prepare pre-sampling checklist

Sampling Procedures:

- Prepare document for sampling procedures
- Evaluate staff qualifications and provide training
- Establish sampling protocols
- Establish quality control procedures (equipment checks, replicates, splits, etc.)
- Collect samples in required sample containers
- Label sample containers identifying sample number, date, time, location, etc.
- Preserve samples per required procedures (for example, “on ice” or chemical preservatives)
- Obtain field measurements for streamflow discharge

- Collect samples and perform field tests for DO, temperature, pH, and conductivity
- Complete field logs and diary entries including sampling dates, times, sample identification number, equipment calibration, monitoring results, weather conditions, and other pertinent observations in support of sample collection
- Follow sample storage and transport requirements and deliver samples to laboratory
- Complete sample tracking and chain-of-custody reports and audit reports
- Perform quality control and quality assurance

Post Sampling Follow Up:

- File sample logs and diaries
- Clean and maintain equipment
- Handle and dispose of chemical wastes properly
- Review documentation and audit reports

Laboratory Analysis:

Preparation Prior to Sample Analysis:

- Verify use of proper analytical methods
- Schedule analyses
- Verify sample numbers
- Define a recording system for sample results
- Apply a system to check each sample through the lab
- Maintain and calibrate equipment
- Prepare quality control solutions

Sample Analysis:

- Analyze samples using appropriate methods and protocols
- Validate use of reference samples, duplicates, blanks, etc.
- Perform quality control and quality assurance compliance
- Archive samples
- Handle and properly disposal of chemical wastes
- Prepare bench sheets and complete analysis reports

Data Record Verification:

- Review coding sheets, data loggers
- Review and refine data verification procedures and compliance with project plan
- Verify analysis of splits within data quality objectives
- Assign data quality indicators and explanations

8.3.6 AWT Plant Effluent Monitoring

Existing final effluent locations at Belmont (Outfall 006) and Southport (Outfall 001) AWT plants will be monitored as required under applicable NPDES permits.

8.3.7 Rainfall Monitoring

The Authority has 22 rain gauge monitoring stations across the CSO service area. During validation of the CSO system model, it has been demonstrated that the existing rain gauge network provided sufficient data. As such, the Authority will continue to monitor rainfall using rain gauge stations. Rainfall monitoring will occur for each storm event during the post-construction monitoring period to record each storm event. The 22-gauge network and the radar rainfall system will be used to characterize rainfall in each sub-basin.

8.4 Data Retrieval, Management and Analysis

Data retrieval, management and analysis are an integral part of any monitoring program. The Authority currently has a system to store, retrieve, and analyze the existing data. This post-construction monitoring program was developed to use the existing database and to evaluate new data to measure effectiveness of CSO control measures utilizing current modeling tools. The program activities are designed to ensure collection of appropriate data, establish consistency of sampling methods and data acquisition, and define performance standards for maintaining data integrity. All necessary measures will be taken to validate, track, store and manage the collected data to ensure that monitoring objectives are attained.
Specific sampling protocols are administered and conducted by experienced personnel responsible for the

existing database and model and familiar with sampling protocols in support of the ongoing monitoring program for the City of Indianapolis. As data are generated during post-construction monitoring, the program may need to be revised to accommodate alternative data collection techniques or data evaluation approaches to meet monitoring objectives. Any revisions or additions to the data retrieval or management aspects of such program will be made after consulting with IDEM and U.S. EPA.

The Authority has developed a dynamic model that fully integrates the hydrology and hydraulics of the combined sewer system (collection system model). The Authority will utilize sound engineering judgement and best industry practices, and take the following steps, to update and utilize the collection system model to determine whether the Authority has achieved compliance with the Performance Criteria set forth in **Table 7-5**.

1. Collect data for the 12-month post-construction monitoring period in each watershed in accordance with Section 8.2.1.
2. Perform quality assurance and quality control of the data collected in Step 1.
3. Utilize the Model in its previously-calibrated state and the rainfall data collected during the monitoring period, to run a continuous simulation of CSO discharges for the 12 month post-construction monitoring period.
4. Compare the continuous simulation outputs to the CSO monitoring data for the 12-month post-construction monitoring period to determine whether re-calibration of the collection system model is needed. Model re-calibration will be not be needed if the model achieves at least the same degree of calibration as was achieved for pre-CSO Long-Term Control conditions during the LTCP development process, and there is a high degree of agreement between the model output and CSO monitoring data for activation frequency for the 12-month post-construction monitoring period. Otherwise, model re-calibration will be needed in accordance with Steps 5-7.
5. If re-calibration is needed, select two or more appropriate rainfall events from the 12-month post-construction monitoring period for model recalibration.
6. Develop an initial data set for use with the model and perform successive applications of the model with appropriate parameter adjustment until there is a high degree of agreement between the model output and the CSO monitoring data for the 12-month post-construction monitoring period. In making such adjustments, the Authority will consider the inherent variability in both the collection system model and in flow monitoring data, and will exercise sound engineering judgement and best industry practices so as to not compromise the overall representativeness of the model.
7. Once the model has been re-calibrated in accordance with Step 6, the Authority will verify the re-calibrated model by again utilizing the model and the rainfall data collected during the 12-month post-construction monitoring period, to run another continuous simulation for the 12-month post construction monitoring period. The Authority will again compare the continuous simulation outputs to the CSO monitoring data for the 12-month post-construction monitoring period as described in Step 4, to determine whether additional re-calibration of the collection system model is needed. Re-calibration will be determined to be adequate if the model achieves at least the same degree of calibration, as was achieved for pre-CSO Long-Term Control conditions during the LTCP development process, and there is a high degree of agreement between the model output and CSO monitoring data for activation frequency for the 12 month post-construction monitoring period. Otherwise, further re-calibration will be needed in accordance with these Steps 5-7 until the model achieves at least the same degree of calibration as was achieved for pre-CSO Long-Term Control conditions during the LTCP development process, and there is a high degree of agreement between the model output and CSO monitoring data for activation frequency for the 12-month post-construction monitoring period.
8. Once the Authority has satisfactorily re-calibrated the model in accordance with Steps 5 through 7 (or shown that re-calibration is not necessary in accordance with Step 4), the Authority will then utilize the original or recalibrated model (if recalibration was necessary in accordance with Steps 4-7) to run a continuous simulation for the years 1996-2000 (or other representative five-year period agreed to by IDEM and USEPA) to determine

whether the Authority has achieved the Performance Criteria set forth in **Table 7-5**.

9. The Authority shall be deemed to have achieved the Performance Criteria if the five-year simulation shows 97% or greater capture on the Fall Creek watershed and 95% or greater capture on the White River, Pogues Run, Pleasant Run and Eagle Creek watersheds; and that there were a total of 12 or fewer CSO events into the Fall Creek watershed and 24 or fewer CSO events into each of the four remaining watersheds for the five-year period. Otherwise, the Authority shall be deemed to have not achieved the Performance Criteria until the Authority runs a continuous simulation for the years 1996-2000 (or other representative five-year period agreed to by IDEM and USEPA) with a satisfactorily calibrated or re-calibrated model that demonstrates that both the percent capture and overflow frequency Performance Criteria have been achieved.

10. The overflow frequency performance criterion is based upon a "typical year," calculated using the 5-year continuous simulation of the collection system model, as described above. The CSO Control Measures will be designed to achieve 2 CSO events per "typical" year for the Fall Creek watershed and 4 CSO events per "typical" year for each of the other four watersheds. If the modeled overflow frequency for the five-year period exceeds 12 for the Fall Creek watershed and/or 24 for the four remaining watersheds, then the Authority may submit an analysis that will include: (1) the volume, frequency and factors causing the additional overflow frequency, (2) any impact on water quality, including designated uses, from the additional overflow frequency, (3) control options, if any, to reduce the frequency toward 24/12 (as appropriate), (4) associated costs from any additional control options, (5) any expected benefits from such control options and (6) a recommendation as to whether additional control measures are necessary to protect designated uses.

11. The use of the five-year overflow occurrence numbers of 24 and 12, which equate to average annual overflow frequencies of 4.8 and 2.4, is appropriate due to the inherent 20 percent variability in model predictions.

One key performance criteria for the LTCP is percent capture. Percent capture is a U.S. EPA measure of the annual wet-weather sewage flow that is captured and treated before discharge. For example, "95 percent capture" means that the LTCP will capture 95 percent of the total volume of flow collected in the combined sewer system during wet-weather conditions on a system-wide, annual average basis (not 95 percent of the volume currently being discharged). On a system-wide basis, 95 percent capture is expected to equate to four storms causing overflow events in an average year. However, year-to-year variability in rainfall is such that some years may have more than four or less than four overflow events. The Authority wants to clearly inform people that "four overflow events per year" is a long-term average based upon typical rainfall, and not a calendar-year regulatory requirement. Based upon 54 years of historic rainfall data, some dry calendar years might have no storms causing overflow events while wet years would have as many as 10 overflow events for 95 percent capture and six overflow events for 97 percent capture. The predicted system performance for overflow frequency was shown previously in **Figures 7-12** through **7-14**. **Figure 8-3** illustrates how percent capture will be measured.

The Authority also plans to use its hydraulic models to evaluate the effectiveness of LTCP controls and to fine tune planning and implementation of specific CSO control projects. This will allow the Authority to determine how various scenarios might affect evolving management and control strategies along Indianapolis streams.

8.5 Quality Control

Quality control procedures are in place and may be updated periodically to ensure consistent delivery of quality work and products for all activities included under the post construction monitoring program. The quality control procedures include the following:

- Documentation of receiving streamflow monitoring and field measurement activities. Assurances that flow data generated are valid and representative, including streamflow discharge estimates.

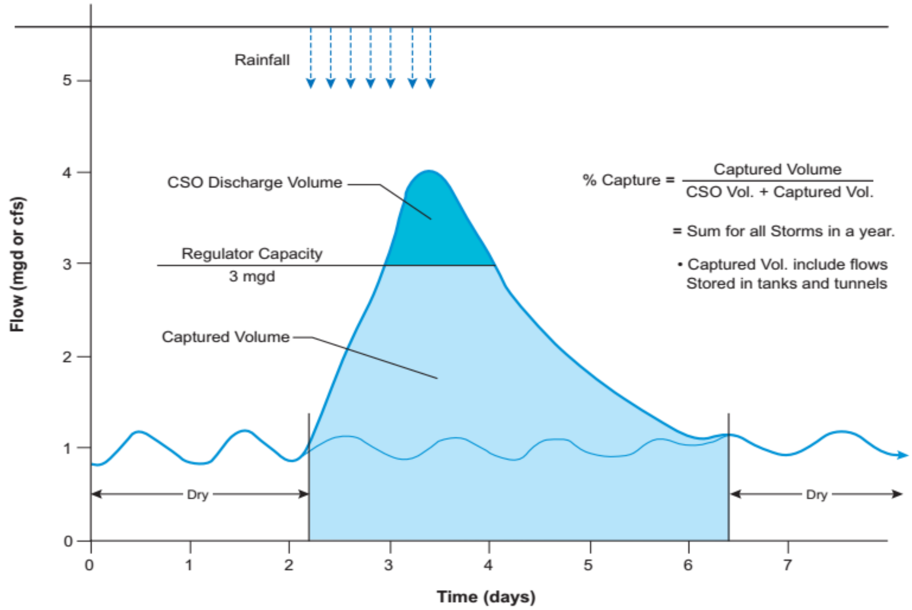


Figure 8-3
Sample Percent Capture Hydrograph

- Documentation of CSO outfall monitoring activities including installation activities, calibration records, field-truthing equipment and maintenance, and data downloads. Assurances that flow data generated are valid and representative.
- Documentation of field sampling activities including sampling dates, times, sample identification numbers, equipment calibration, monitoring results, weather conditions, and any other pertinent observations in support of the sample collection. Completion of tracking forms, chain-of-custody forms and sampling equipment maintenance records.
- Documentation of laboratory analysis activities including sample checking, analytical methods and protocols, use of reference samples and duplicates, sample archiving, data verification and coding, equipment calibration and maintenance and data downloads.
- Documentation of rainfall monitoring activities including equipment calibration and maintenance records, precipitation records, and data downloads. Assurances that precipitation data generated are valid and representative.
- Documentation of data retrieval, management and analysis activities including data entry practices and data validation (e.g., entry range limits, duplicate entry checking), data tracking, data formatting, data analysis, and data reporting.
- Quality control reviews of all internal and external deliverables.

8.6 Data Evaluation and Progress Reporting

As noted earlier in Section 1, water quality in the White River basin is affected by sources other than combined sewer overflows. To ensure that public resources are spent responsibly, the LTCP is an integral part of a watershed-based strategy that considers all water pollution sources and the most cost-effective means of achieving water quality goals. The Authority is implementing several programs with a goal of improving water quality conditions, including the CSO LTCP, septic tank elimination program and the City managed stormwater management program. Implementation of these programs will result in measurable improvements to water quality.

The post-construction monitoring program will evaluate whether CSO controls are performing as designed and expected. It also will assess water quality conditions in CSO receiving streams to compare to baseline conditions described in Section 2. Because of the interconnected nature of the Authority's programs and waterways, water quality improvements may be attributable to more than one of the Authority's water quality improvement programs.

8.6.1 Milestone Reports

After Achievement of Full Operation of all LTCP projects in a specified watershed, the Authority will prepare and submit a report to the U.S. EPA and IDEM. The report for each watershed will be submitted within two years following Achievement of Full Operation of the applicable CSO project(s). The reports will include only the CSO measures implemented and data related to the following information:

- Description of stream section and CSO control being evaluated
- CSO Monitoring and Rainfall Monitoring Results
- Receiving Stream Monitoring Results
- Effluent Testing Results
- Water Quality Monitoring Results (including the extent to which the Authority's CSOs into that watershed are complying with water quality-based requirements of the Authority's NPDES permits)
- Evaluation of CSO Control Measures (including whether or not the measures meet the Performance Criteria specified in **Table 7-5**)
- Significant Variances and Impacting Factors (with regard to verification of level of control and water quality impacts)
- Re-Evaluation and Corrective Actions (if necessary)
- Status of CSO Control Measures (reporting on the status of construction schedule, and so on)

Within five years following Achievement of Full Operation of all LTCP projects, the Authority shall submit a final Post-Construction Monitoring Report to U.S. EPA and IDEM, containing the information described above with respect to each watershed, plus additional information relevant to those matters that Indianapolis is aware of that has become available subsequent to completion of the watershed reports. The purpose of the Final Post-Construction Monitoring Report shall be to document how well the Authority's entire combined sewer system is performing as a whole, following completion of all LTCP projects, and shall include an assessment of whether the improvements are meeting Performance Criteria, and whether the Authority's CSO discharges are complying with the water-quality based requirements of the Authority's NPDES permits.

The reports will identify deficiencies or performance limiting factors in system design, process, operations, and/or maintenance that may limit the overall effectiveness of the CSO control measures in achieving their intended performance. Necessary corrective measures will be documented. The Authority will evaluate alternative operating strategies for the implemented controls prior to considering structural modifications. If improvements or additional facilities and processes are needed to meet applicable requirements, the Authority will identify them in the report.

8.6.2 Progress Reports to Public

The Authority will prepare periodic public progress reports describing progress in the design, construction, and effectiveness of water quality improvement projects. These reports will be designed to provide information to Indianapolis residents on water quality improvements and the benefits gained by controlling CSOs, sewering unsewered areas, and implementing stormwater best management practices. The reports will be available on the Authority's Website and to the news media, interested organizations, and in meetings with interested parties. The Authority also will continue its public notification and education program, which is described in Section 5.

8.7 PCM Milestone Reports Submitted

The Authority is 12 years into the twenty year implementation. The following PCM milestone reports have been submitted to U.S. EPA to date:

- The Upper White River watershed was the first CSO basin to achieve full operation for all CSO control measures in December 2011 to improve in-stream water quality and reduce combined sewer overflows. The post-construction monitoring phase was initiated in December 2011 as required by Authority's Consent Decree and completed in December 2012. The Authority completed model recalibration and verification to assess the Consent Decree performance criteria of four overflow events and 95 percent capture in a typical year. With the model verification, the authority confirmed that the Upper Whiter River watershed has achieved its Consent Decree performance criteria. The Authority submitted a Post Construction Monitoring Milestone Report for the Upper White River Watershed to the U.S. EPA on December 4, 2013.

Once the control measures of the remaining watersheds reach full operation, they will proceed with their respective Post Construction Monitoring programs and submit a Milestone report to the US EPA.

8.8 Summary

The Authority's post-construction monitoring program will determine the effectiveness of the CSO control program in achieving performance requirements and water quality goals. The program includes the following elements:

- Activities to determine whether CSO control measures are meeting Performance Criteria;
- Measures to assess the environmental benefits attributable to CSO control measures and other water quality improvements, and to determine whether the Authority's CSO discharges are complying with the water quality based requirements of the applicable NPDES permit;
- A monitoring schedule, monitoring locations, and associated monitoring procedures to collect data related to the Performance Criteria; and
- Evaluation and analysis of the monitoring data to determine whether CSO control measures are achieving the desired results and for reporting progress to regulatory agencies and the public.

The Authority's post-construction monitoring program addresses U.S. EPA and IDEM requirements for monitoring the performance of CSO control measures. The Authority will use the Performance Criteria in **Table 7-5** as performance measures to gauge the effectiveness of long-term CSO control measures. The Authority will coordinate with the City to use its existing river monitoring locations to measure stream flow, water stage, continuous DO, and water temperature. The Authority use a network of in-stream monitoring locations to measure continuous DO, water temperature, treatment plant effluent discharge, CSO activation and CSO flow. In addition, the Authority may, at its discretion, continue its monthly in-stream water quality sampling program for a variety of parameters. The Authority will submit milestone reports to the U.S. EPA and IDEM, as required, following completion of construction of all LTCP projects in a watershed. In addition, the Authority will prepare public reports describing progress in the design, construction, and effectiveness of water quality improvement projects. The Authority also will continue to implement its program to educate citizens on water quality issues and notify them of actual or impending CSO occurrences.

Section 8 Modification Summary

The 2006 CSO LTCP was updated in 2017 as summarized below:

- Throughout Section 8, all CSO control measures completed before August 26, 2011 are referred to as "City" or "Indianapolis" work and those completed after August 26, 2011 are referred to as "Authority" work.
- Section 8.1, Introduction was modified to include a paragraph with language on the transfer of the wastewater system from the City of Indianapolis to CWA Authority, Inc.
- Table 8-1, Post-Construction Monitoring for CSO Control Measures by Watershed was modified to reflect changes to the CSO control measures per amendments.
- Table 8-2, CSO and Stream Monitoring for CSO Control Measures by Watershed, was modified to reflect current monitoring protocols.
- Section 8.7 was added to summarize the PCM Milestone reports submitted to date.

9.0 Use Attainability Analysis

Contents:

9.1 Introduction

This section was developed and submitted as a component of the 2007 CSO LTCP. In January of 2007 IDEM provided approval of the CSO LTCP except for this section (Section 9) of the report. In December of 2007 IDEM provided a letter stating that the Use Attainability Analysis (UAA), "provided sufficient information to propose changing the designated recreation use…to the "Combined Sewer Overflow (CSO) wet weather limited designated use."

In the intervening time US EPA and IDEM indicated that approval of the UAA rule component would likely be suspended until full implementation of the CSO LTCP program is near completion. Throughout discussions related to the formal submittal, review, and approval of a UAA rulemaking, the agencies have noted that there is potential for changes in the information used in the assessment of the factors to support approval of a UAA. The Authority continues to evaluate water quality and support development and implementation of a UAA for impacted receiving waters. The August 2011 letter from US EPA has been included in **Appendix E**.

Based upon the above discussion, it was concluded that the IDEM requirement to update the CSO LTCP was not intended to require an update to the UAA until such time of a formal request for a UAA rulemaking. Accordingly, it was determined to defer the update of Section 9 until a later date. At that time Section 9 - Use Attainability Analysis, including the relevant factors provided in 40 CFR § 131.10(g), will be updated, as needed, to address any receiving waters that cannot comply with the water quality requirements for applicable designated use as the result of residual discharges from the Authority's combined sewer system.

9.1.1 Purpose & Objectives

The selected LTCP will achieve an extremely high level of CSO control, resulting in the capture of 95-97 percent of wet-weather sewer flows after full program implementation. This is an extraordinary level of control of urban stormwater throughout the CSO area.

Substantially reduced residual CSOs will occur during storms that exceed the LTCP design and performance criteria. These will result in limited periods when CSOs combine with other pollutant sources (and issues, such as stream flow/velocity) to make urban waters unsuitable for recreational use. Federal and state laws provide a process for refining designated uses (in this case recreation) through a Use Attainability Analysis (UAA).

This Section 9 describes state and federal requirements associated with a UAA, presents the UAA itself, and requests approval of a refinement to the recreational designated use in waterways impacted by Indianapolis CSOs.

The city's UAA is founded on two fundamental realities. First, the effects of urbanization preclude the attainment of the recreational use after large storm events because of:

1) the presence of non-CSO sources of bacteria (including loadings from upstream sources, wildlife and domestic animals near and in the urban streams) that will always prohibit the attainment of the recreational water quality standard during any substantial wet weather event, and
2) stormwater runoff volumes generated during large wet weather events result in high flows in the stream networks, creating unsafe conditions that preclude the attainment of the recreational use. While urbanization has exacerbated these unsafe conditions in some Indianapolis streams, the higher intermittent flows generated under natural conditions would also preclude attainment of the recreational use.

In addition, substantial and widespread social and economic impacts would be caused by controls beyond those approved by IDEM and U.S. EPA: (1) capturing 95 percent to 97 percent of wet-weather sewer flows for treatment, (2) addressing failed septic systems, (3) implementing stormwater runoff controls, and (4) eliminating illicit discharges.

The city has gathered extensive information and data to support this UAA. This information is contained in the following documents:

- Stream Reach Characterization and Evaluation Report (SRCER) (March 2000 initial report and 2003 update)
- Total Maximum Daily Load (TMDL) studies of the White River, Fall Creek and Pleasant Run (September 2003)
- Information to Support an Existing Use Determination (April 2005)
- CSO LTCP
- CSO Operational Plan (CSOOP) (May 2003)

The conclusion of this UAA is that the recreational use is not attainable during and for a period of time following wet weather events that exceed the high level of CSO control provided for in the CSO LTCP. The rest of Section 9 provides the bases for this conclusion.

Finally, it bears noting that the streams in question do not meet recreation standards during significant periods of dry weather. This is of particular concern to the city given that these dry weather periods are when most of the limited use of these streams is likely to occur. The city is addressing this challenge through watershed initiatives, such as septic system elimination and flow augmentation of the streams during dry weather to reduce pollutant levels

9.1.2 Regulatory Requirements for UAA

Federal regulations specify that a UAA should be "a structured scientific assessment of the factors affecting the attainment of the use, which may include physical, chemical, biological, and economic factors as described in [40 CFR] Sec. 131.10(g)."[13] 40 C.F.R. § 131.10(g) provides that states may establish sub-categories of a use if the State can demonstrate that attaining the designated use is not feasible because:

1) Naturally occurring pollutant concentrations prevent the attainment of the use; or
2) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or
3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place; or
4) Dams, diversions, or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in attainment of the use; or
5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
6) Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.

[13] 40 CFR 131.3(g).

9.1.2.1 EPA Policy and Guidance Documents

EPA's Combined Sewer Overflow (CSO) Control Policy[14] states that one of its key elements is the "development of the long-term plan …[in coordination] with the review and appropriate revision of water quality standards and implementation procedures on CSO-impacted waters to ensure that the long-term controls will be sufficient to meet water quality standards." As part of the analysis, "States should evaluate whether the designated use could be attained if CSO controls were implemented."[15] In 2002 the EPA published national guidance on coordinating the development of CSO LTCP with water quality standards reviews.[16] This document acknowledges the unique relationship between CSOs, designated uses and water quality standards in CSO-impacted water bodies. The guidance calls for a water quality standards review in conjunction with LTCP

[14] *Federal Register* 18688, April 19, 1994
[15] EPA CSO Control Policy at III.B, paragraph 2
[16] Guidance: Coordinating CSO Long Term Control Planning with Water Quality Standards Reviews; EPA #833R01002, July 2001.

development and specifies that appropriate and attainable standards should be established for CSO-impacted waters.

9.1.2.2 State Requirements

Indiana law has been developed consistent with EPA's regulation and guidance. During its 2005 session, the Indiana General Assembly approved Senate Enrolled Act (SEA) 620, which was signed into law by Gov. Mitch Daniels on April 21, 2005. Among other provisions, Senate Enrolled Act 620 provides for:

- A CSO Limited Wet Weather Use subcategory for CSO impacted waters with an approved LTCP; and
- An October 1, 2006, deadline for the Water Pollution Control Board to adopt rules to implement the new subcategory.

Under SEA 620, the requirements for the CSO wet weather limited use subcategory are based upon the water quality-based requirements in an approved CSO LTCP. The CSO wet weather limited use subcategory and water quality-based requirements may remain in effect for up to four days after the discharge ends. The subcategory is available if: a) the department has approved a community's CSO LTCP, b) the LTCP is incorporated into the NPDES permit or an order of the IDEM commissioner, c) a UAA is performed and approved, and d) the approved LTCP has been implemented. The UAA's conclusions also must be reviewed every five years. Federal requirements under 40 CFR 131.10, 40 CFR 131.20, and 40 CFR 131.21 also must be met.

9.2 Current Recreational Standards and Water Quality Conditions

The State of Indiana currently applies a single primary contact recreational use designation to all its waters. While appropriate for some waters during certain periods, this designation clearly is not attainable in all waters, all of the time – especially during and following wet weather events. To support this designated use, Indiana has adopted the following *E. coli* numeric water quality standards, which are in effect from April to October:

- Geometric mean of 125 colony-forming units per 100 milliliters (cfu/100 mL) based upon five equally spaced samples taken in a one-month period
- Single sample maximum of 235 cfu/100 mL

These water quality criteria are intended to protect full-body immersion bathing (also referred to as swimming). The state currently applies these criteria to all waters, whether or not they are used as bathing beaches.

Many Indiana water bodies have not and do not currently meet the swimming use standard and are considered non-attaining. For example, in 2002 IDEM listed more than 2,900 miles (34 percent) of evaluated stream miles in nonattainment for the recreational use due to bacteria levels. The White River and all Marion County streams affected by CSOs are included in this list of non-attaining waterways.

9.3 Determination of Existing Use

Under federal regulations at 40 CFR 131.3(e), a water body's designated use cannot be removed if it is an "existing use," defined as a "use *actually attained* in the water body on or after November 28, 1975." (Emphasis added.) The city conducted an extensive evaluation to document that recreation is not an existing use during the time when residual CSO events are expected to occur after implementation of the CSO LTCP.

- Before removing a designated recreational use, there must be a determination that there are no "existing uses" of affected waterways that would preclude approval of a UAA. After discussions with and review by advisory committee members, the City of Indianapolis submitted data to IDEM in October 2004 to demonstrate that there are no existing full-body or partial-body contact recreational uses, as defined in 40 CFR 131.3(e), within CSO-affected waterways. The waterways were defined as:
- Fall Creek (Keystone Avenue to White River)
- Eagle Creek, including Big Eagle Creek (Tibbs Avenue to White River) and Little Eagle Creek (Vermont Street to Eagle Creek)
- Pogues Run (New York Street to White River)
- Pleasant Run (9th Street to White River) and its main tributary, Bean Creek (State Street to Pleasant Run)
- White River (56th Street to State Road 58 near Elnora)

Following discussions in 2005 with IDEM staff, the city revised and resubmitted its final existing use information to the agency on April 5, 2005.[17] This document can be found in **Appendix E** of the LTCP and is hereby incorporated by reference. In its final submittal, the city requested that IDEM find no existing use during specific storm events that are likely to cause overflows following full implementation of the LTCP. The city's submittal included data and modeling analyses for both 3-month and 1.7-month storm events.[18]

The city's demonstration of "no existing use" was based upon a number of factors, including:

- The water quality standards that protect the recreational use have never been "actually attained" during and following CSO and other wet weather discharges (as well as for extensive periods during dry weather);
- Recreational activities (such as swimming and wading) are not known to occur during large storm events, such as those exceeding a 1.7-month storm.
- CSO-impacted waterways are especially unsuitable for recreational use during and following large storm events due to high *E. coli* bacteria levels and high stream flows/velocities. For example, the city discovered that sampling records of the U.S. Geological Survey documented that USGS field personnel would not wade into the streams to obtain samples during or following many storm events. Instead, samples were taken from the safety of bridges above the streams or other methods that did not expose staff to high flows within the streams.
- The city has implemented a proactive and effective public outreach program to prevent and control access to waterways during and after wet-weather events.

Based upon this and other information provided, the City of Indianapolis concluded that full-body and partial-body contact recreation had not been attained under 40 CFR 131.3(e) during storm events exceeding the 1.7-month storm. On June 27, 2005, IDEM responded with a letter that agreed that primary contact recreation was not an existing use for the 3-month storm event. The letter read:

> "Based on the data provided by Indianapolis, IDEM accepts that primary contact recreation is not an existing use during a 3-month storm event for the portions of the CSO receiving streams the city has identified: Fall Creek, Eagle Creek, Pleasant Run, Pogues Run, and the White River. Since primary contact recreation is not an existing use under 3-month storm event flow conditions, Indianapolis may proceed with a use attainability analysis to determine the attainable recreational use for these waters."

The city's LTCP and UAA seek a subcategorization of the use during the limited periods when the waters in question will be affected by residual CSO discharges due to storm events exceeding our LTCP criteria. The 3-month storm event is consistent with a level of control of 95 percent capture, or better, during the average year for the streams in question. While the capture of CSO discharges during larger storm events will not provide any additional protection for recreational uses, the city has committed to protection above 95 percent capture for Fall Creek due to a request by U.S. EPA.

9.4 The Wet Weather Limited Use Subcategory Is Necessary and Appropriate

The wet weather limited use subcategory pursuant to both federal regulations and Indiana's SEA 620 is both necessary and appropriate for the streams that will receive residual CSO discharges under the city's approved LTCP. A wet weather limited use subcategory is supported based upon four of the six factors provided in 40 CFR Sec. 131.10(g):

- Natural, ephemeral, intermittent, or low-flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met.
- Human-caused conditions or sources of pollution prevent the attainment of the use and cannot be

[17] *Information to Support an Existing Use Determination for CSO-Impacted Portions of Marion County Streams,* City of Indianapolis-ICST, April 5, 2005.

[18] The 1.7-month and 3-month storm events were based on a 24hour, Huff evaluation storm. The 1.7-month storm would be expected to occur seven times in Marion County in a typical rainfall year; the 3-month storm would be expected to occur four times in a typical year. These design storms were chosen because they are generally consistent with the expected level of control in the city's LTCP in the average year.

remedied or would cause more environmental damage to correct than to leave in place.

- Hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in attainment of the use.
- Controls more stringent than those required by sections 301(b) and 306 of the Clean Water Act would result in substantial and widespread economic and social impact.

Each of these factors is discussed in more detail below.

9.4.1 Natural or Intermittent High Flow Conditions

Factor 2 under 40 CFR Sec. 131.10(g) allows consideration of "natural, ephemeral, intermittent, or low-flow conditions or water levels [that] prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met." In Indianapolis, this factor applies to the intermittent high flow conditions that accompany large storm events that would exceed the LTCP level of control.

Under this factor, the city estimated the flow conditions that would have occurred in the streams under "natural" conditions, prior to the addition of man-made dams, reservoirs and water withdrawals. As noted in Section 2 of the LTCP, natural flows of the White River, Fall Creek and Eagle Creek are affected by regulation of reservoirs and by water withdrawals for municipal drinking water supply by Indianapolis Water.

The city estimated natural 3-month storm event peak flows for White River, Fall Creek, Pleasant Run, Pogues Run and Eagle Creek. These estimates were based on a loading rate of 10.4 cfs per square mile drainage area, which was determined by reviewing historical USGS data for watersheds for limited urbanization. These estimated natural peak flows are compared in **Table 9-1** to modeled peak instream flows under current, urbanized conditions, drawn from *Information to Support an Existing Use Determination* (ICST, 2005).

Also shown in Table 9-1 are the flows above which USGS staff generally do not wade into these streams to measure stream discharge. As noted in the city's *Existing Use* submittal, when stream flows are low, trained USGS employees measure stream discharge by wading into the stream. When stream flows are high or potentially dangerous, USGS hydrologists make discharge measurements using acoustic Doppler current meters, a bridge crane or from a tethered boat. To develop safety criteria for Indianapolis waterways and the White River, the city reviewed field data showing when USGS staff waded into the stream to take flow measurements and when they used another method that didn't involve water contact. The 90th percentile of the wading set was established as a point beyond which it isn't safe for the general public to recreate. This was based on the understanding that USGS staff are trained and equipped with flotation devices. For Pleasant Run the 90th percentile fell at 16 cfs but the data indicate that the 16 cfs result is probably due to the nature of Pleasant Run being a low-flow stream most of the time. Therefore, the city increased the safety criteria to 160 cfs for the UAA analysis, based on a clear cutoff of wading vs. non-wading activity at 160 cfs.

Figures 9-1 through **9-4** show the wading vs. non-wading activity by USGS staff on the relevant streams, the criteria developed for each stream, and the maximum stream flows expected for a 3-month storm after LTCP implementation. The data are plotted against the safety factor (depth x velocity) in order to provide a better graphical representation. Although USGS hydrologists occasionally wade at higher flows than shown in Table 9-1, they are equipped with a personal flotation device and have extensive wading safety training and experience. It would not be safe for an inexperienced person to wade or recreate in the stream at such high flows.

In all instances, both the urbanized and natural peak flows in these waterways during a 3-month storm event significantly exceed the flows considered safe by USGS staff for wading. The lone exception is Pogues Run, in which the estimated natural flows at 100 cfs are less than the 160 cfs level above which USGS staff do not enter the

Table 9-1
Instream Peak Flow: Comparison of Urbanized to Natural Conditions

Watershed	Total Acreage	Urbanized (Modeled) 3-month SCS Storm Instream Peak Flow (cfs)[1]	Estimated Natural 3-month Event Instream Peak Flow (cfs)[2]	Flows Considered Unsafe for Wading by USGS Staff (cfs)[3]	Notes
Fall Creek	193,275	500	3,100	>340	Urbanization has reduced instream peak flow due to Geist Dam.
Pleasant Run	15,165	510	200	>160	Urbanization has increased instream peak flow. Instream velocity under natural conditions may be too high for recreation.
Pogues Run	8,156	565	100	>160	Urbanization has increased instream peak flow.
Eagle Creek	135,231	620	2,200	>140	Urbanization reduces instream peak flow due to Eagle Creek Dam.
White River[4,5]	875,321	700	14,200	>540	Urbanization reduces instream peak flow in part due to water withdrawal and multiple dams. 3-month Natural peak flow is based on the entire White River watershed.
White River[5] (with CSO Tributaries)	1,227,148	2,500	19,900	>540	Urbanization reduces instream peak flow in part due to water withdrawal and multiple dams. 3-month Natural peak flow is based on the entire White River watershed.
White River[5] at Petersburg	7,120,000	2,700	115,700	>540	Urbanization reduces instream peak flow in part due to water withdrawal and multiple dams. 3-month Natural peak flow is based on the entire White River watershed.

[1] Instream peak flows are from model simulations presented in *Information to Support an Existing Use Determination* (ICST, 2005). The peak flows presented above correspond to the watershed's downstream location except for the White River without CSO tributaries.

[2] Estimated Natural 3-month Event peak flows were calculated by the city based on a loading rate of 10.4 cfs per square mile drainage area determined by a review of historical USGS data for watersheds with limited urbanization.

[3] Flows considered unsafe for wading by USGS staff were calculated by the city and presented in *Information to Support an Existing use Determination* (ICST, 2005). The presented flows for Eagle Creek is from the Lynhurst station, and the presented flows for the White River are from the Morris Street station. The Existing Use document listed Pleasant Run and Pogues Run calculated flows at "16 cfs." However, that value was a typographical error and should have read "160 cfs" as shown in the table above.

[4] Modeled 3-month SCS Storm instream peak flow for the White River without tributaries is reported from upstream of the confluence with Fall Creek.

[5] For large watersheds such as the White River, the 3-month peak streamflow based on the historical flow data record is expected to be produced by a long-duration storm event, and should significantly exceed the streamflow produced by a short duration 3-month SCS storm.

water. Peak flows in Pogues Run under existing urbanized conditions were modeled above 500 cfs, however.

The city's analysis demonstrates two findings:

1) Natural in-stream peak flows in all waterways but Pogues Run during a 3-month storm event (or larger events) are not safe for recreational activities due to high stream velocities; and

2) Urbanization and manmade dams and reservoirs have affected natural flows in the streams, reducing natural peak flows in some waterways and increasing them in others. This finding will be discussed in more detail below in the discussion of human-caused conditions and hydrologic modifications.

9.4.2 Human-Caused Conditions

Not surprisingly in these urban waters, there are human caused conditions and sources of pollution that prevent full attainment of the recreational use during and after wet weather events. Factor 3 under 40 CFR Sec. 131.10(g) allows consideration of "human-caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place." The city's analysis has found that the recreational use cannot be attained during greater than 3-month storm events due to the effects of urbanization that cannot be corrected without causing more environmental damage. These effects include:

- Increased *E. coli* bacteria pollution
- Unsafe stream flows after large storms

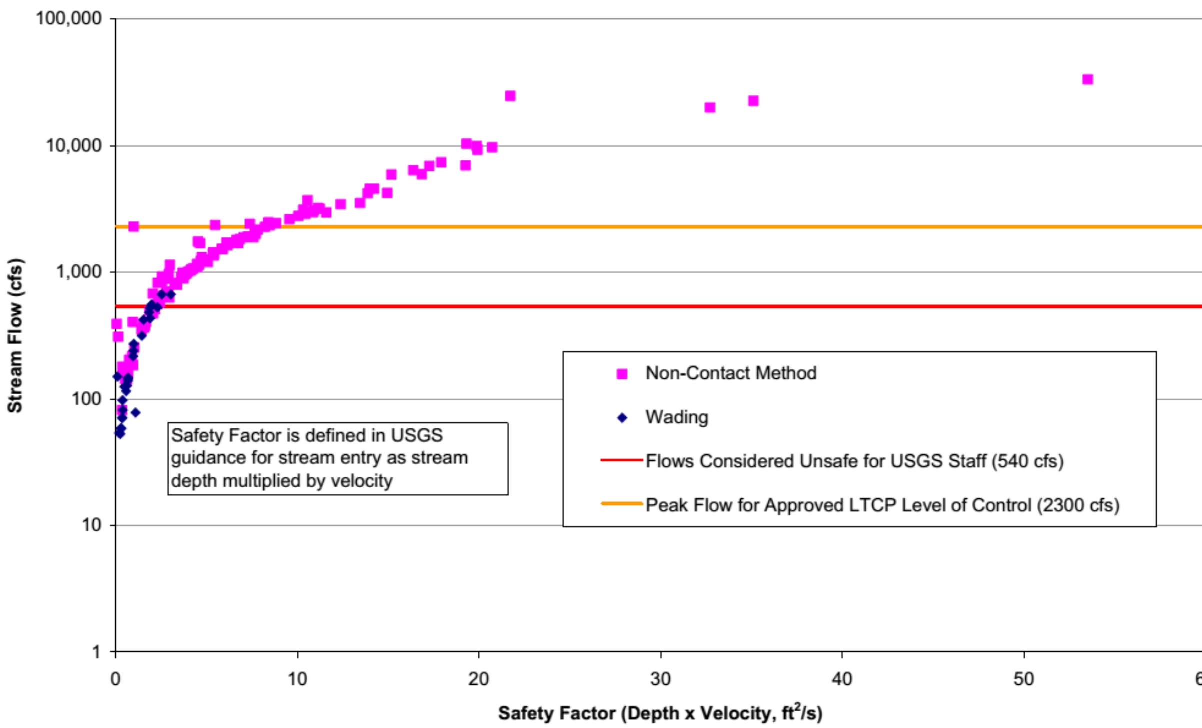


Figure 9-1
White River USGS Stream Measurement Methods at Varying Streamflows

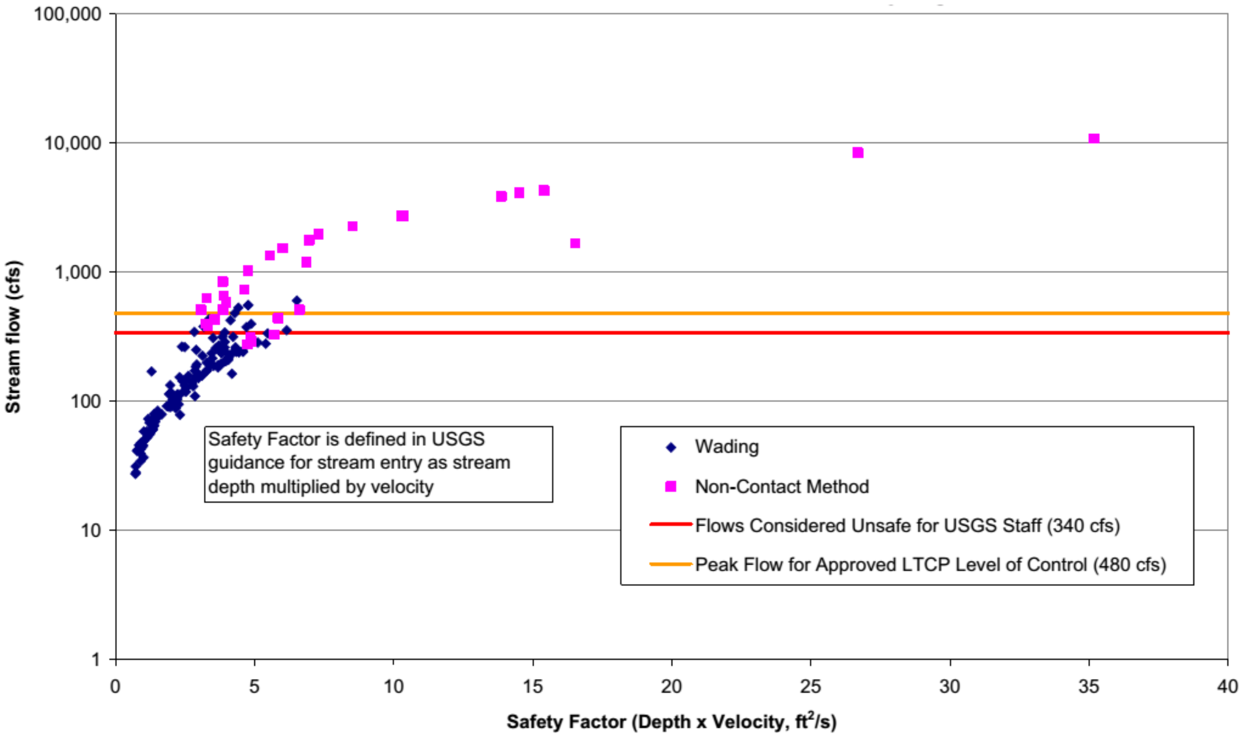


Figure 9-2
Fall Creek USGS Stream Measurement Methods at Varying Streamflows

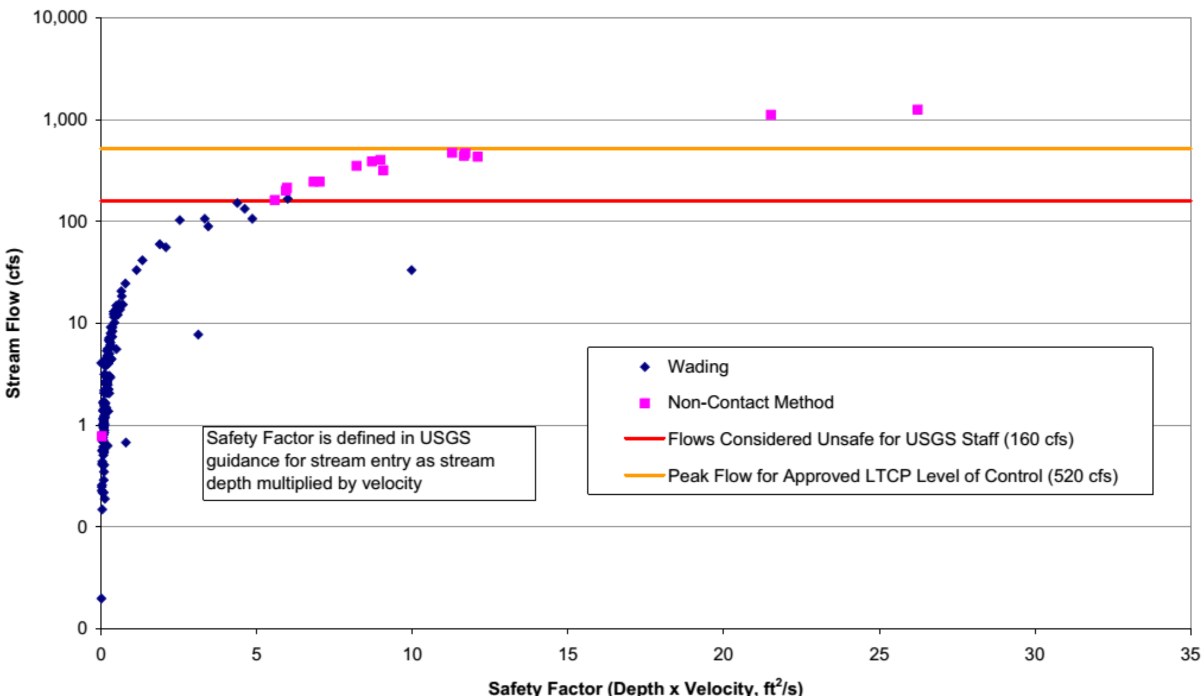


Figure 9-3
Pleasant Run USGS Stream Measurement Methods at Varying Streamflows

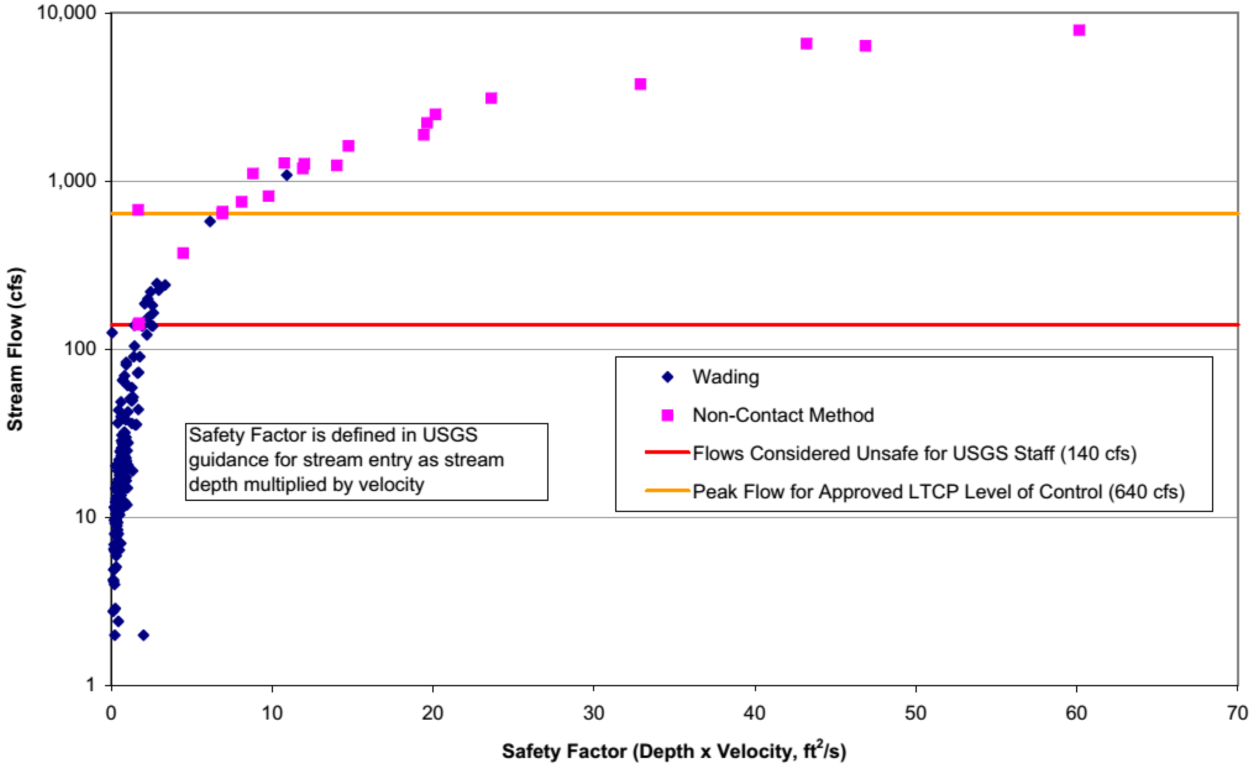


Figure 9-4
Eagle Creek USGS Stream Measurement Methods at Varying Streamflows

9.4.2.1 Increased Pollution Caused by Urbanization

Urbanized conditions quickly convey pollutants from the land surface to water courses and through the constructed storm conveyance facilities, thereby delivering substantial bacteria concentrations to these urban waters. Bacteria, such as *E. coli*, are used as indicators of waterborne pathogens in water bodies used for recreation.

According to U.S. EPA's 2005 publication, *National Management Measures to Control Nonpoint Source Pollution from Urban Areas*, urban stormwater carries typical concentrations of *E. coli* bacteria at levels of 1,450 most probable number (MPN) per 100 mL. (U.S. EPA, 2005) Work by the city to support the CSO LTCP and TMDLs for White River, Pleasant Run, and Fall Creek indicate stormwater discharges in Indianapolis typically have *E. coli* counts of 2,000 to 3,000 cfu/100 ml[19] or higher outside the CSO area. U.S. EPA notes that, "The bacteria standard is one of the most commonly violated water quality standards in terms of both the number of water bodies and stream miles impaired." The report goes on to state that three major sources of pathogens in urban waters are human waste, pet waste and anthropogenic wildlife, such as raccoons, geese, pigeons, seagulls and rats. (U.S. EPA, 2005)

Bacterial source tracking analysis has been used in some urbanized watersheds to determine the sources of bacterial contamination. In the Four Mile Run watershed in Northern Virginia such an analysis concluded that waterfowl contribute 38 percent of bacteria, humans and pets (combined) contribute 26 percent, and raccoons contributed 15 percent. Deer (9 percent) and rats (11 percent) also contributed to bacteria contamination in the watershed, an urbanized area with approximately 40 percent impervious surface. (U.S. EPA, 2002) TMDLs prepared by Indianapolis for the White River, Fall Creek and Pleasant Run/Bean Creek concluded that the following non-CSO sources contribute to bacteria contamination:

[19] MPN (most probable number) and cfu (colony forming units) represent two different laboratory methods for measuring *E. coli* in a water sample. The numbers produced are comparable to each other.

- Stormwater
- Failing septic systems
- Illicit sanitary connections to storm sewers
- Urbanization
- Domestic animals and wildlife
- Belmont and Southport AWT plant discharges
- Pollutant sources upstream and downstream of Marion County

The relative loads contributed by each of these sources in Pleasant Run, Fall Creek and White River are shown in **Table 9-2**. The information in this table was developed during the TMDL analysis for each of these streams. They also show the required reduction in *E. coli* load needed to achieve the TMDL for each stream reach studied. Within and downstream of the CSO area, total bacteria load reductions of 99 percent or greater are required in each of these streams. This level of bacteria control is infeasible, particularly with regard to controlling urban stormwater, as described further below.

9.4.2.2 Inability to Remedy Human-Caused *E. coli* Conditions

Treatment options for bacteria in urban stormwater have significant limitations that prevent or create obstacles to their widespread implementation in a fully developed urban community such as Indianapolis, particularly for the large storms that this UAA covers. One possible management method involves building constructed wetlands to capture and treat stormwater runoff prior to discharge to the stream. Such wetlands typically require water to remain for hours or days of treatment. (U.S. EPA, 2005) This becomes very difficult to achieve with the amount of stormwater runoff generated by 3-month or larger storms in Indianapolis watersheds. There is simply not enough undeveloped land to construct wetlands large enough to capture and treat a 3-month or larger storm. More importantly, such wetlands would be unable to achieve the reduction required to meet current standards.

Another possible method for reducing bacteria in stormwater runoff is employing disinfection, typically through the use of ozone or ultraviolet light. According to U.S. EPA, the city of Encinitas, California, employed ultraviolet disinfection to treat 85 percent of dry-weather flows in Cottonwood Creek, a significant source of bacterial pollution to an important seaside beach. However, the system does not operate during wet weather due to high flow and high turbidity, which render the UV disinfection ineffective. (U.S. EPA, 2005; Rasmus, 2006) Employing ozone or ultraviolet disinfection during 3month or larger storms in Indianapolis also would not be effective due to high flows and high turbidity in both the streams and stormwater outfalls. Facilities using chlorination/dechlorination would be equally problematic due to the retention times required and the lack of available space to build holding tanks. Chlorination also requires chemical storage and handling, which presents security concerns in urban neighborhoods. Furthermore, treating bacteria to meet standards still would not allow full attainment of the use, due to high stream flows that prevent safe recreation. This is demonstrated in Sections 9.4.1, 9.4.2.3, 9.4.2.4 and 9.4.3.

The intractable problem of urban stormwater runoff is reflected in experiences around the country. A review of success stories in managing non-point source pollution published on U.S. EPA's Section 319 Web site (www.epa.gov/nps) reveals no communities that have had success in reducing bacteria in urban stormwater to a point that would meet Indiana's recreational standard of 235 cfu/100 mL. Eight case studies are presented that involve reducing non-point source bacteria contamination:

- Edgewood Park Pond in Connecticut
- Cane Creek in Tennessee
- Afuelo Stream in American Samoa
- Middle Fork Holston River in Virginia
- Muddy Creek and Lower Dry River in Virginia
- Dungeness River Tributary in Washington
- Noonsack River in Washington
- North Fork Potomac River in West Virginia

Seven of those case studies (Cane Creek, Afuelo, Middle Fork Holston, Muddy Creek/Dry River, Dungeness, Noonsack and North Fork Potomac) described success in reducing bacteria from agricultural runoff or septic systems. Urban stormwater runoff was not an issue in any of those watersheds.

Table 9-2
Pollutant Load Summary and TMDL: April to October Recreation Season

Segment	Point Source - AWT Discharges (cfu)	Point Source - CSO Discharges (cfu)	Point Source - Permitted Stormwater Discharges (cfu)	Point Source - Unpermitted Sanitary Connections (cfu)	**Total Point Source Load (cfu)**	Nonpoint Source - Unpermitted Stormwater Discharges (cfu)	Nonpoint Source - Wildlife (cfu)	Nonpoint Source - Failing Septic Systems (cfu)	**Total Nonpoint Source Load (cfu)**	Upstream Out-of-County Sources (cfu)	**Total Load (cfu)**	TMDL (cfu)	**Required Load Reduction to meet TMDL (%)**
Fall Creek	0	1.50E+14	1.19E+12	1.74E+08	**1.51E+14**	8.97E+11	7.67E+10	4.66E+10	**1.02E+12**	0	**1.52E+14**	7.30E+11	**99.5%**
Pleasant Run	0	5.20E+13	3.34E+11	1.14E+08	**5.23E+13**	0	1.96E+09	9.57E+09	**1.15E+10**	0	**5.23E+13**	4.61E+10	**99.91%**
White River	2.64E+11	5.56E+14	9.40E+12	2.99E+08	**5.65E+14**	1.90E+12	7.56E+11	1.81E+11	**2.84E+12**	1.01E+12	**5.69E+14**	4.87E+12	**99.1%**

Source: Table E.1 of the Fall Creek TMDL Study (IDEM, 2003), Pleasant Run and Bean Creek TMDL Study (IDEM, 2003), and White River TMDL Study (IDEM, 2003).

Seven of those case studies (Cane Creek, Afuelo, Middle Fork Holston, Muddy Creek/Dry River, Dungeness, Noonsack and North Fork Potomac) described success in reducing bacteria from agricultural runoff or septic systems. Urban stormwater runoff was not an issue in any of those watersheds. Also, the criteria achieved in three of those studies (Cane Creek, Middle Fork Holston River, and Muddy Creek/Lower Dry River) was 1000 cfu/100 mL – significantly higher than the Indiana standard of 235 cfu/ 100 mL. A project at Edgewood Park Pond in Connecticut succeeded in resolving problems with eutrophic conditions, low dissolved oxygen, siltation, and nutrients. However, the pond remains listed on the state's 303(d) list due to bacteria impairment. The city found no success stories on the U.S. EPA Section 319 Web site related to controlling wet-weather stormwater runoff to meet bacteria standards in urban streams (U.S. EPA, 2005-2007).

A search of papers presented at Water Environment Federation's WEFTEC 2006, the premiere annual event attended by water quality professionals from around the world, also revealed no examples of a community achieving *E. coli* bacteria standards by treating urban stormwater during wet weather. The city of Columbus, Georgia, has installed a stormwater BMP in an existing drainageway to achieve flow attenuation, removal of flushed pollutants by high rate filtration and UV disinfection. However, the UV treatment facility treats only a portion of first-flush wet-weather flows. It does not fully treat peak wet weather flow conditions due to high flows. (Arnett, 2006)

Put simply, the city knows of no community that has successfully controlled urban stormwater to meet a 235 cfu/ 100 mL *E. coli* bacteria standard during large wet-weather events.

Given these limitations, the city, IDEM and U.S. EPA concluded during the LTCP analysis that the best environmental results would be achieved by capturing urban stormwater to the greatest extent possible, given the city's financial capability. This will be achieved through the existing combined sewer system and the proposed storage and conveyance facilities. The city, U.S. EPA and IDEM also concluded that central treatment at the city's existing advanced wastewater treatment plants would be superior to either sewer separation or on-site treatment along the streams. (LTCP Section 4.5) As shown in LTCP Tables 4-18 and 4-19, the approved LTCP will achieve greater benefit than sewer separation in reducing *E. coli* bacteria impacts to affected streams.

Under the city's NPDES stormwater program, activities are expected to reduce the *E. coli* to the streams from stormwater. However, controlling *E. coli* bacteria from stormwater would be especially difficult during the large storm events for which this UAA request is made. Stormwater BMP technologies for bacteria control are based on average, or typical storms, 0.25-inch or less of rainfall. These BMPs are not effective in reducing *E. coli* from stormwater during the large storm events (1.6 inch of rainfall) by the 90 to 99 percent needed to meet *E. coli* bacteria standard.

With respect to urban stormwater runoff, the city evaluated a level of control consistent with the limits of "Maximum Extent Practicable" (MEP). MEP controls and associated management actions would not be expected to have significant impact on stormwater *E. coli* concentrations to achieve the attainment of the recreational use during large storm events that would cause residual CSOs. For Indianapolis, CSO controls have been selected based on the assumption that MEP stormwater controls are in place in the combined area.

MEP is a term added to the Clean Water Act in the 1987 amendments. Amendments were added to the Act to call for the regulation of municipal stormwater under the NPDES program as point sources (Sec. 402 (p)). The EPA Administrator or the state determines the level of control that is appropriate for control of such pollutants. Currently, this level of control is understood to be six technology-based requirements that are considered BMPs:

- Public education and outreach
- Public involvement
- Illicit discharge detection and elimination
- Construction site runoff control
- Post-construction runoff control
- Pollution prevention and housekeeping

For more information on the city's stormwater management activities under each of these areas, see LTCP Section 4.3.4 and the *NPDES Stormwater Permit Annual Report*, Indianapolis Department of Public Works, December 28, 2006. Activities described in these documents include:

- stormwater design and construction standards that require the use of BMPs to preserve natural filtration and pollutant removal in city landscapes;
- review of current maintenance activities to assure that the appropriate stormwater BMPs are being utilized;
- development of standard operating procedures for inspection and cleaning of open channels and ditches, maintenance facilities and vehicle yard areas, and city-owned parking lots;
- stormwater drainage system inventory and mapping pilot study;
- automotive service facility and retail gasoline outlet inspection evaluations;
- industrial inspection program;
- public education on stormwater pollution prevention; and
- implementation of a Storm Drain Marking Plan.

These activities, though beneficial, will not achieve the reduction in stormwater bacteria required to meet standards. Control of stormwater runoff quality is based on the management of total suspended solids (TSS), with a target TSS removal rate of 80 percent. The requirements apply to all areas of the county except the city limits of Beech Grove, Lawrence, Southport and Speedway. Control of sediment is required for construction site runoff citywide. During the TMDL development in 2003, the city's current stormwater NPDES Permit program was assumed to reduce the stormwater *E. coli* bacteria load by approximately 10 percent. This reduction was considered to be an estimate of the program's effectiveness, not an objective.

9.4.2.3 Unsafe Stream Flows Exacerbated by Urbanization

Published literature documents the typical impacts of increased impervious surface from urban development. These impacts include both decreased stream baseflow and higher peak flows during wet weather. LTCP Section 2 (Baseline Conditions) describes the typical flow regimes found in Indianapolis streams, which all display high flows during wet weather, and particularly after the large storm events that will cause CSO discharges after implementation of the Indianapolis LTCP. **Table 9-1** (described earlier in Section 9.4.1) demonstrated that urbanized conditions have increased the estimated natural peak flows on both Pleasant Run and Pogues Run. Man-made dams on Eagle Creek, Fall Creek and White River have attenuated the natural peak flows, but peak stream flows remain unsafe for safe recreation. **Figure 9-5** illustrates the impacts of urbanization on stream flow, as documented in the literature.

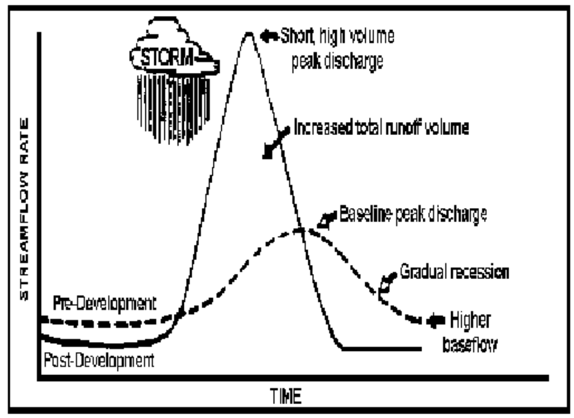


Figure 9-5
Impacts of Urbanization on Stream Flow (Schueler, 1987)

As noted in LTCP Section 2, approximately 85 percent of the 30 river-mile reach of the West Fork White River that flows through Marion County is urbanized. The remaining 15 percent of the river is located downstream of the Belmont Advanced Wastewater Treatment (AWT) plant and is bordered by gravel mine, farm field, parkland, or residential development. Natural flows of the river are affected by regulation of reservoirs and by water withdrawals for municipal drinking water supply by Indianapolis Water.

During and after wet weather events, high flow rates and flow velocities in urban streams can render the streams unsafe for recreation. During even relatively small rainfall events, the runoff volumes generated by impervious surface in the separated sewer areas result in large flow volumes and swift currents.

The city's selected CSO plan will reduce stormwater flows to the affected waterways by capturing and storing more stormwater entering the combined sewer system, then conveying that stormwater to the city's two advanced wastewater treatment plants. However, in model simulations produced by the city, results indicate that stream flows would not change significantly for the 3-month storm even after implementation of the city's selected CSO plan for Fall Creek, Pleasant Run and Eagle Creek. Though stream flows would be reduced from current values in Pogues Run and White River, the flows would still be too high to support safe recreation during large storm events following LTCP implementation. In addition, Pogues Run consists of a closed box culvert for much of its reach. The information to support this fact is outlined in **Tables 9-3** and **9-4**, which show the combined sewer versus separated sewer areas by watershed (Table 9-3) and the streamflow rates for the 3-month storm event.

The flow information of **Table 9-4** shows that CSO flow volumes make up only fractions of the total instream flows in all the watersheds with the exception of Pogues Run, where 44 percent of the flow is from CSOs. Even with CSO volumes removed from the total flow due to the high capture rates of the LTCP, instream flow volumes will still be much too high for safe recreation.

This information can also be quantified by examining the modeled maximum streamflows for a 3-month storm for the White River and each of the major tributaries. The city's analysis indicates that CSO flow reduction has little impact on the instream peak flows, due primarily to peak instream flow rates caused mainly by runoff from the separate sewer areas. This analysis is presented in **Figures 9-6** through **9-10**, along with typical summertime dry-weather stream flows.

Table 9-3
Summary of Combined and Separate Watershed Acreage

Watershed	Combined Acreage	Separate Acreage	Total Acreage	Percent Combined
Fall Creek	13,306	179,969	193,275	7□
Pleasant Run	6,718	8,447	15,165	44□
Pogues Run	6,016	2,140	8,156	74□
Eagle Creek	1,615	133,616	135,231	1□
White River	7,475	867,846	875,321	1□
White River (with CSO Tributaries)	35,130	1,192,018	1,227,148	3□

Source: IMAGIS CSO basin and watershed coverages

Table 9-4
Comparison of Modeled CSO Volume and Modeled Instream Flow Volume

Watershed	Modeled 3-Month SCS Storm CSO Volume (MG)[1]	Modeled 3-month SCS Storm Instream Flow Volume (MG)[2]	CSO Percentage of Instream Flow Volume (%)
Fall Creek	72	238	30
Pleasant Run	11	60	18
Pogues Run (Upstream of Box)	20	45	44
Eagle Creek	0.2	166	0.1
White River (including tributaries)	199	1276	16

[1] CSO volumes are from Table 3-1, Supplemental Information to the CSO Control Technology Evaluation Meeting (ICST, May 2003)
[2]Instream flow volumes are from model simulations presented in *Information to Support an Existing Use Determination* (ICST, March 2005)

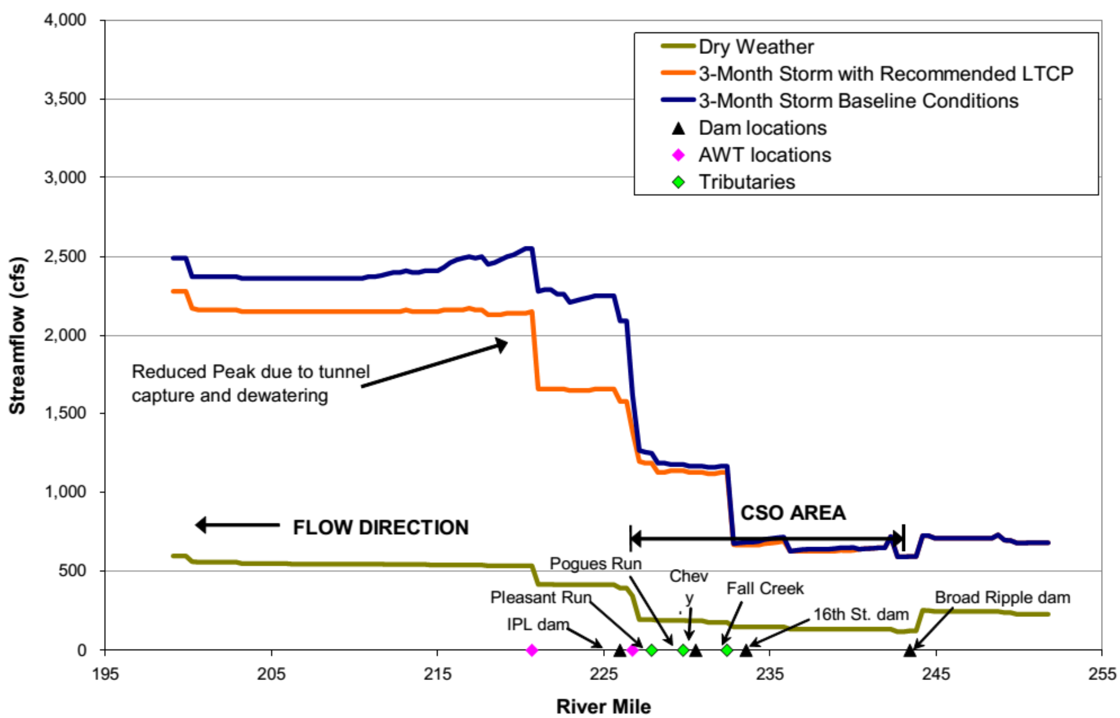


Figure 9-6
Modeled Maximum Streamflow Conditions: White River Upstream of Centerton

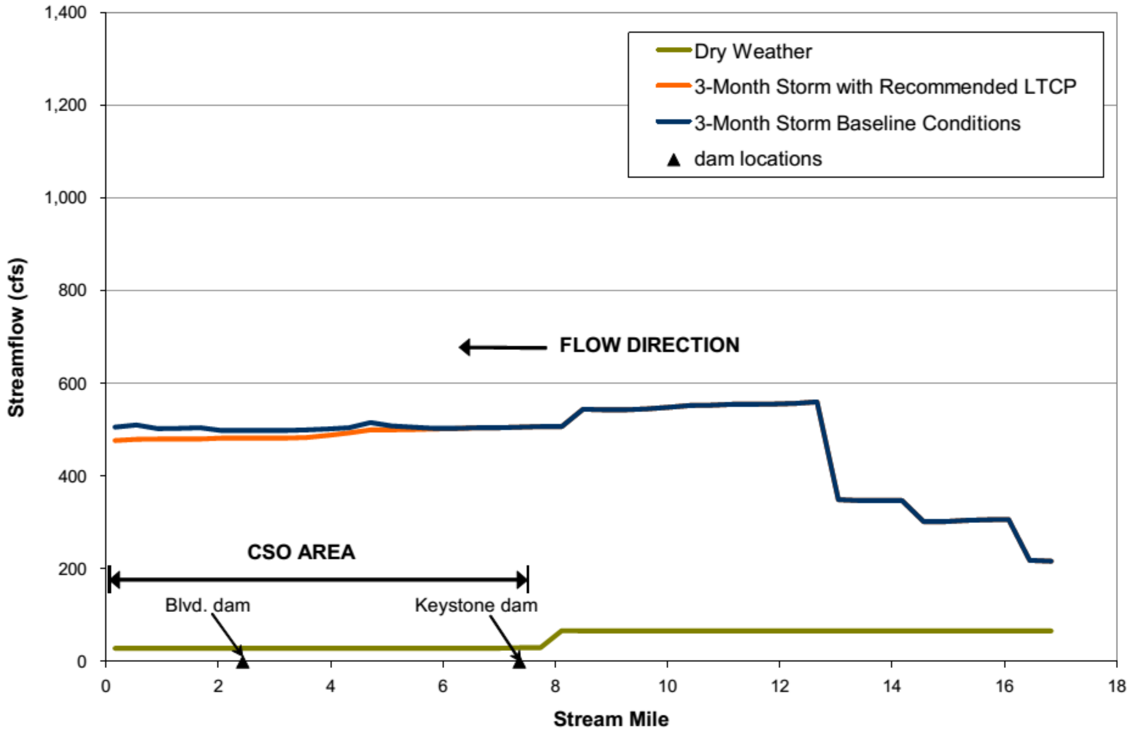


Figure 9-7
Modeled Maximum Streamflow Conditions: Fall Creek

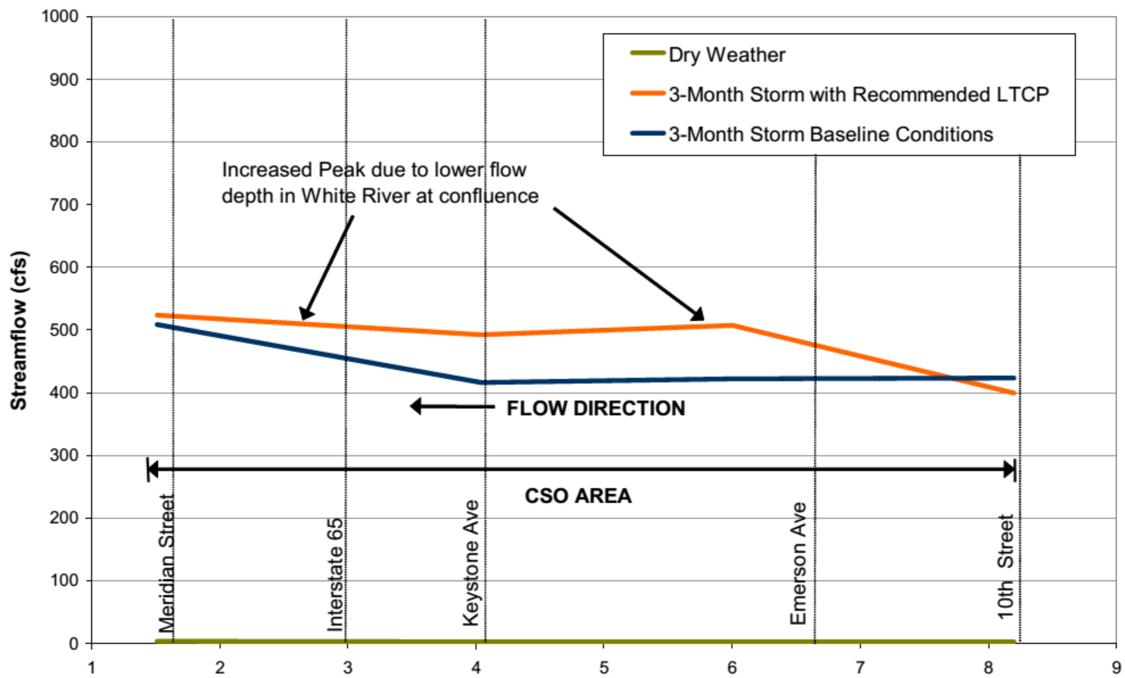


Figure 9-8
Modeled Maximum Streamflow Conditions: Pleasant Run

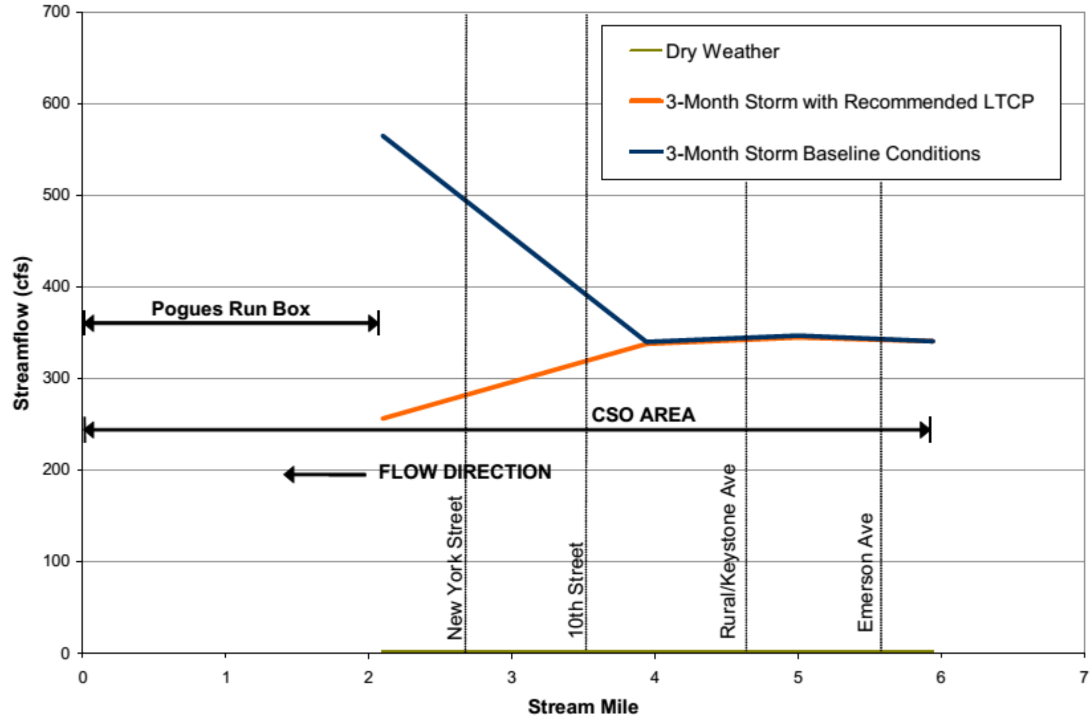


Figure 9-9
Modeled Maximum Streamflow Conditions: Pogues Run

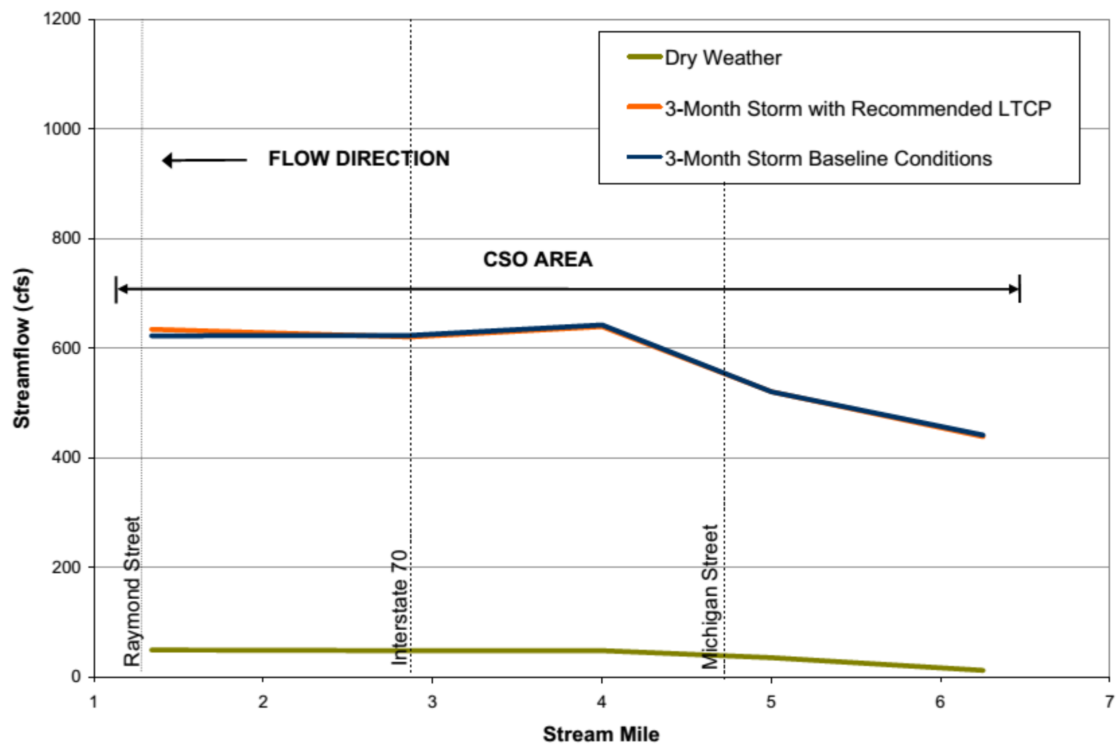


Figure 9-10
Modeled Maximum Streamflow Conditions: Eagle Creek

For the White River downstream of Marion County, even with the reduction in flow due to CSO capture the instream flows would remain high, and thus unsafe for recreational uses following the large storm events that can cause residual CSO discharges. This is illustrated in **Figure 9-11**. The same is true for Pogues Run, which is expected to see a 44 percent reduction in flow volume from the baseline condition. Even with the reduction, the flow is too large to support safe recreation during large storm events.

Table 9-5 shows the modeled peak flows instream and modeled peak stream velocities during a 3-month SCS storm, after LTCP implementation. Velocities are shown both in feet per second and miles per hour. The peak velocity represents the velocity within the stream cross section that will be likely encountered by persons attempting to recreate. This provides further support for the unsafe nature of the White River and Indianapolis waterways during large storms that will cause overflows after LTCP implementation.

The Indianapolis combined sewer system covers an area greater than 35,000 acres. Therefore, it is possible for rainfall to vary spatially across the watershed as the storm system moves through the area. In this "localized storm" circumstance, intense rainfall may occur for a short duration in a small area in the upper reaches of a tributary watershed, thus activating a localized CSO event but having little impact on instream flows in the White River. Although flows may not reach unsafe levels on the White River, the recreational use still cannot be attained due to the bacterial concentrations from non-CSO sources. Therefore, the recreational use is still prohibited and unattainable, despite the imposition of stormwater MEPs mentioned earlier.

9.4.2.4 Inability to Remedy Human-Caused High Flow Conditions

The human-caused condition factor also requires the city to consider whether those conditions can somehow be remedied without causing more environmental damage than leaving the conditions in place. Because urbanization cannot be reversed, the only feasible remedies to this human-caused condition are management practices to mitigate the effects of urbanization. The city previously analyzed the existing flow conditions within CSO receiving streams to determine whether the recreational use was an existing use. This analysis is documented in *Information to Support an Existing Use Determination*, described earlier in Section 9.3. It showed that peak stream flows do not support safe recreational activities.

The city also analyzed the reduction in peak stream flows that might be achieved from the city's planned CSO control program, as shown in Figures 9-6 through 9-11. Observed flow and instream model results provide ample support that full CSO capture during a 3-month or larger storm would not reduce streamflows sufficiently to allow recreation because CSO volume is small compared with the overall stream volume during the 3-month storm. Fall Creek, Eagle Creek, Pleasant Run, and the White River (upstream of Fall Creek and downstream of Southport) will have similar peak flow conditions. Pogues Run and the White River from Fall Creek to Southport will see reductions in flow, but not enough to attain safe recreational use.

As required by 40 CFR Sec. 131.10(g)(3), the city also considered the feasibility of using stormwater runoff reduction practices to remedy high flows caused by urbanization in order to attain the recreational standard to the maximum extent practical. Some of the available best management practices and methods for reducing peak stormwater flows include:

- Stormwater ponds
- Constructed wetlands
- Urban trees
- Green roofs
- Green parking lots
- Rain barrels
- Porous pavement
- Rain gardens

The city considered whether these stormwater controls, in conjunction with the approved LTCP controls, would remedy the human-caused high flow conditions enough to make the recreational use attainable. Theoretically, the use of these practices has the potential to reduce peak stormwater runoff in an urban environment. However, literature suggests that widespread participation and implementation would be required by private property owners to enable significant reductions in stormwater peak volume (Loucks, 2004).

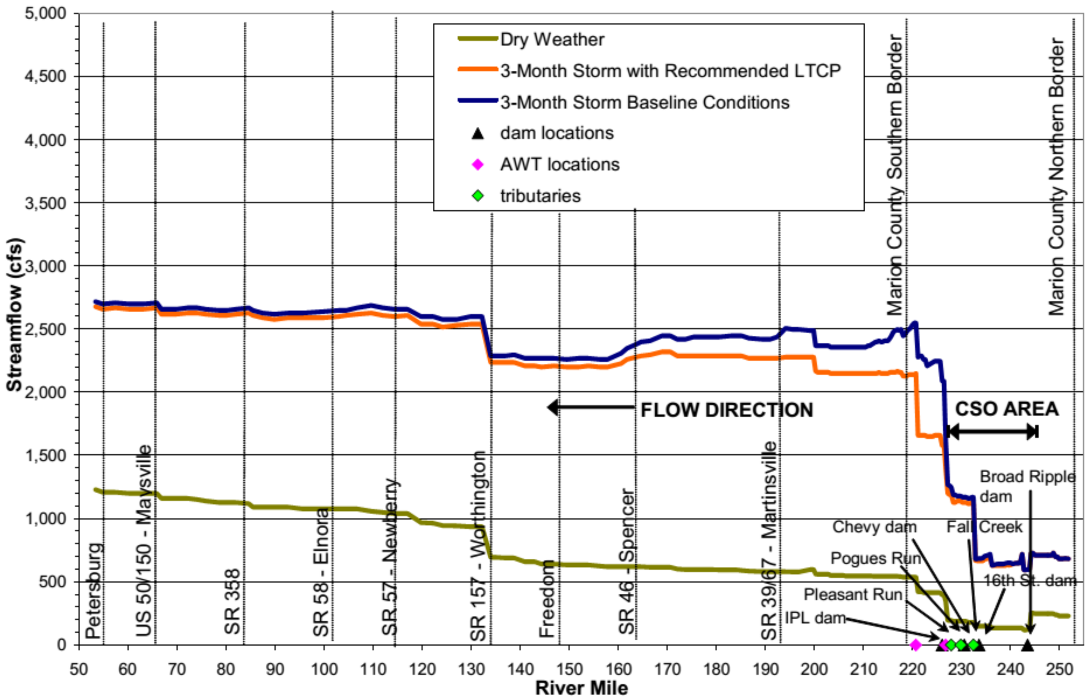


Figure 9-11
Modeled Maximum Streamflow in the White River – Indianapolis to Petersburg

Table 9-5
Modeled Instream Peak Flow and Velocity for a 3-Month SCS Storm

Watershed	Flows Considered Unsafe for Wading by USGS Staff (cfs)[1]	Peak (Modeled) Stream Flows during 3-month SCS Storm after LTCP Implementation (cfs)[2]	Peak (Modeled) Stream Velocities during 3-month SCS Storm after LTCP Implementation (fps)[3]	Peak (Modeled) Stream Velocities during 3-month SCS Storm after LTCP Implementation (miles/hour)[3]
Fall Creek	>340	480	6.4	4.4
Pleasant Run	>160	520	8.4	5.7
Pogues Run	>160	260	23.7	16.2
Eagle Creek	>140	640	6.0	4.1
White River[4]	>540	680	6.4	4.4
White River (with CSO Tributaries)	>540	2,300	10.2	7.0

[1] Flows considered unsafe for wading by USGS staff were calculated by the city and presented in *Information to Support an Existing use Determination* (ICST, 2005). The presented flows for Eagle Creek is from the Lynhurst station, and the presented flows for the White River are from the Morris Street station. The existing use document listed Pogues Run and Pleasant Run flows calculated at "16 cfs." However, that value was a typographical error and should have read "160 cfs" as shown in the table above.

[2] The urbanized instream peak flow presented in this column does not include CSO flow, which will be captured by LTCP facilities.

[3] The peak velocity represents the velocity within the stream cross section that will be likely encountered by persons attempting to recreate. The velocity is calculated as the average velocity over the cross section multiplied by 2.0 based on natural irregular channel velocity profiles presented in Open-Channel Hydraulics (V.T. Chow, 1959). Lower velocities may be found in impoundment areas.

[4] Modeled 3-month SCS Storm instream flow for the White River without tributaries is reported from upstream of the confluence with Fall Creek.

The city evaluated the potential impact of stormwater reduction practices on in-stream peak flows during a 3-month storm, as shown in **Table 9-6**. The fourth column of the table shows peak stream flows that are expected to result after LTCP implementation, with values corresponding to those shown previously in **Figures 9-6** through **9-11**. These flows exceed the USGS safety threshold calculated by the city. Column five estimates peak stream flows following LTCP implementation plus implementation of stormwater best management practices, implemented to the maximum extent practical. Even with significant participation by private property owners, these practices show little or no effect on peak stream flows, due to the size of the storm and the amount of rainfall that must be captured in a short period of time. Flows continue to exceed the USGS threshold calculated by the city. Based on this analysis, the city concluded that implementation of stormwater retention practices would not change the peak stream flows sufficiently to attain the recreational use in the 3-month and larger storms that will cause sewer overflows after LTCP implementation.

The city will continue to monitor the tangible results of stormwater retention practices in other cities while encouraging their use in Indianapolis, where possible. Some examples of the city's current activities to encourage improved stormwater flow management are described below.

New development and significant redevelopment projects in Indianapolis are required to meet post-construction stormwater runoff control requirements addressed in Chapter 561 (Drainage and Sediment Control) of the Code of the City of Indianapolis and Chapters 104.2 (Stormwater Quality), 600 (Erosion and Sediment Control) and 700 (Stormwater Quality) of the Indianapolis Stormwater Design and Construction Specifications Manual.

Under the city's drainage code, drainage systems for new development must be designed to ensure there will be no increase in peak discharge or runoff rates as a result of the development. (Revised Code, Sec. 461-336). Chapter 700 of the Indianapolis Stormwater Design and Construction Specification Manual specifies the design requirements for stormwater BMPs. Examples of BMPs in the manual include stormwater ponds, stormwater wetlands, bioretention areas, sand filters, water quality swales, biofilters and manufactured BMPs. Each of these BMPs must meet requirements for pollutant removal, in addition to stormwater runoff quantity control requirements described above. During 2005, the Indianapolis Department of Metropolitan Development approved 135 manufactured BMPs, 33 ponds, five dry swales, two wetlands, one sand filter, and six other BMPs. (Indianapolis DPW, 2006)

To encourage property owners to reduce the quantity of stormwater runoff from their properties, the city offers a stormwater utility credit of 25 percent to more than 50 percent. These quantity reduction credits are offered to nonresidential property owners that maintain stormwater control facilities to restrict stormwater released from their property. A 25 percent credit is available for property owners that restrict stormwater released from their property, but who cannot, or choose not to, provide detailed engineering information on pre-developed and post-developed runoff rates. The city has approved this credit for 303 parcels. A 35 percent credit is available for stormwater facilities that control the post-development peak rate of stormwater runoff to equal the predevelopment rates for the two, 10, and 100-year design storms. The city has approved this credit for 21 parcels. An additional quantity reduction credit is available to applicants who can demonstrate that their stormwater control facility reduces the post-development peak rate of stormwater runoff for the 100-year design storm *below* the predevelopment peak runoff rate for the 100-year design storm. The city has approved this credit for 31 parcels.

The city also co-sponsored a Green Roof Symposium in March 2007 for architects, urban planners, and building developers/managers and interested citizens. The symposium provided an opportunity to learn about the design and implementation of green roofs. A green roof consists of vegetation and soil, or a growing medium, planted over a waterproofing membrane. Green roofs can help control stormwater runoff, reduce urban heat islands, insulate a building and provide habitat for birds and other small animals. The symposium also discussed how to increase the practice of green roofs as a stormwater management tool in the city, which is working to increase the sustainability of building and development practices citywide.

Table 9-6
Analysis of Stormwater Reduction Practices and Ability to Reach Safe Wading Thresholds

Watershed	Total Acreage	Flows Considered Unsafe for Wading by USGS Staff (cfs)[1]	Peak (Modeled) Stream Flows during 3-month SCS Storm after LTCP Implementation (cfs)[2]	Peak (Modeled) Stream Flows during 3-month SCS Storm after LTCP Implementation plus MEP Stormwater Controls (cfs)[3]
Fall Creek	193,275	>340	480	480
Pleasant Run	15,165	>160	520	510
Pogues Run	8,156	>160	260	260
Eagle Creek	135,231	>140	640	630
White River[4]	875,321	>540	680	680
White River (with CSO Tributaries)	1,227,148	>540	2,300	2,260
White River at Petersburg	7,120,000	>540	2,700	2,660

[1] Flows considered unsafe for wading by USGS staff were calculated by the city and presented in *Information to Support an Existing use Determination* (ICST, 2005). The presented flows for Eagle Creek is from the Lynhurst station, and the presented flows for the White River are from the Morris Street station. The existing use document listed Pogues Run and Pleasant Run flows calculated at "16 cfs." However, that value was a typographical error and should have read "160 cfs" as shown in the table above.

[2] The urbanized instream peak flow presented in this column does not include CSO flow, which will be captured by LTCP facilities.

[3] The urbanized instream peak flow presented in this column does not include CSO flow, which will be captured by LTCP facilities, and includes the estimated impact of stormwater quantity reduction from green roofs, rain barrels, rain gardens, stormwater trees, permeable pavement, green parking lots, etc. according to the maximum extent practical (MEP) implementation of the technologies documented in Evaluating the Effectiveness of Stormwater Reduction Practices Using Continuous Simulation (Loucks, 2004).

[4] Modeled 3-month SCS Storm instream flow for the White River without tributaries is reported from upstream of the confluence with Fall Creek.

The Marion County Soil and Water Conservation District also recently encouraged improved stormwater management by co-sponsoring an April 2007 workshop on Vegetative Options for Stormwater Management. This workshop included a discussion of innovative uses of native vegetation in stormwater management.

The city will continue to encourage voluntary stormwater management practices through stormwater credits, education and other methods. The city also will review any quantifiable results that are shared by other cities' stormwater management programs and seek to adopt workable best management practices. However, the city's analysis concluded that detaining enough stormwater to attain safe flows is impractical and unachievable for the 3-month storm and larger storms. Under the required five-year UAA review process, the city will continue to evaluate the feasibility of reducing stormwater peak flows in order to attain greater recreational use on Indianapolis waterways.

In conclusion, the recreational use cannot be attained due to the effects of urbanization, specifically increased *E. coli* bacteria pollution and unsafe stream flows after large storms, and those effects cannot be corrected without causing more environmental damage. Nevertheless, the city has implemented or encouraged various practices to mitigate the effects of urbanization, and the city will continue to evaluate and promote stormwater quantity management practices by private property owners.

9.4.3 Hydrologic Modifications

The fourth factor in 40 CFR Sec. 131.10 (g) allows consideration of "dams, diversions or other types of hydrologic modifications [that] preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of the use." The urbanization of Marion County and surrounding areas acts as such a hydrologic modification, disrupting the natural flow of stormwater and creating high flow conditions that prevent attainment of the recreational use. This effect was discussed earlier in Section 9.4.1 (Natural or Intermittent High Flow Conditions) and 9.4.2 (Human-Caused Conditions), but it also applies to this factor.

According to U.S. EPA, *hydromodifications (*or hydrologic modifications) are activities that disturb natural flow patterns of surface water and groundwater and have been defined as "...activities which alter the geometry and physical characteristics of streams in such a way that flow patterns change" (USEPA, 2006).

In a publication titled "National Management Measures to Control Nonpoint Source Pollution from Hydromodification," U.S. EPA notes that urbanization is an example of hydromodification because it changes the proportion of pervious and impervious surface within a watershed. As imperviousness increases and vegetative cover is lost, the following effects are seen:

- Runoff increases
- Soil percolation decreases
- Evaporation decreases
- Transpiration decreases (USEPA, 2006)

Increased runoff volumes can result in hydraulic changes in downstream areas including bank scouring, channel modifications, and flow alterations (Anderson, 1992; Schueler, 1987).

As shown previously in **Table 9-1** and in Section 2 of the LTCP, urbanization has led to increased peak stream flows in Pleasant Run and Pogues Run, when compared to estimated natural conditions before development. The natural peak flows in Pogues Run for a 3-month SCS storm was estimated at 100 cfs. Under urbanized conditions, peak flows are modeled at 565 cfs. Even with increased stormwater capture under the city's LTCP, peak flows are expected to remain above 250 cfs on Pogues Run (**Figure 9-9**) – far above levels considered safe for recreation. Similarly, natural peak flows in Pleasant Run are estimated at 200 cfs, compared to 510 cfs under urbanized conditions. Even with increased stormwater capture through the city's LTCP, peak flows in Pleasant Run will remain above 400-500 cfs (**Figure 9-8**) and unsuitable for recreation.

9.4.3.1 Feasibility of Restoring Water Body to Original Condition

As discussed earlier in Section 9.4.2.3, a number of best management practices may be employed to reduce peak stormwater flows. However, peak flow reductions sufficient to attain the recreational use cannot be achieved, even if private property owners participate to the maximum extent practical. The city will continue to encourage these practices through stormwater credits, education and other voluntary methods, and will review the tangible results of other cities' stormwater management programs. The feasibility of reducing stormwater peak flows in order to attain greater recreational use on Pogues Run and Pleasant Run will continue to be evaluated through the required five-year UAA review process.

9.4.4 Substantial and Widespread Economic and Social Impact

Section 6 contains the city's financial capability analysis for the LTCP. One key indicator in the financial capability analysis is the cost per household of the selected LTCP controls as a percent of median household income, also known as the Residential Indicator. The Indianapolis analysis determined that the peak year Residential Indicator for the Indianapolis service area (Consolidated City) was 1.78 percent and for Center Township was 2.92 percent. These costs included projected 2005-2025 spending for LTCP controls, septic tank elimination and other sanitary capital projects. This places the service area in the medium burden category and Center Township in the high burden category.

EPA's March 1995 "Interim Economic Guidance for Water Quality Standards" provides guidance to States and EPA Regional Offices on the economic factors that may be considered, and the types of tests that can be used to determine if a designated use cannot be attained or if a variance can be granted. Page 3 of the guidance says, "The regulatory requirement that must be met is that attaining a designated use or obtaining a variance would result in substantial and widespread economic and social impacts."

Based upon the city's analysis, there is no remedy that will attain the designated use of full-body contact recreation 365 days a year. The sewer separation remedy, at a cost of $6.2 billion, would eliminate the CSO contribution to *E.coli* bacteria exceedances, but it would increase the stormwater impacts on affected waterways. Full sewer separation would cause the city's wastewater costs to greatly exceed EPA's residential high burden test of 2 percent of median household income. Notably, the selected LTCP will require significant sections of the city's population to approach and/or exceed EPA's high burden test. The city has made every effort to control these burdens through negotiation of the LTCP implementation schedule.

The Indianapolis LTCP cost estimates are limited in scope to considering the costs to correct the CSO problem only. However, the central question of the use attainability analysis is, "is the current primary contact recreation designated use for the CSO-impacted waters either an existing use or an attainable use?" To answer this question, all factors affecting the attainability of the use must be considered. In the case of the waters impacted by Indianapolis CSOs, the attainability of the recreation use is a function of the combined effects of bacteria loadings and high stream flows. These conditions are caused by both CSOs and other sources of urban stormwater. Consequently, in evaluating the applicability of 131.10(g)(6), it is appropriate to consider both CSO control costs and the projected costs of Indianapolis' other stormwater management and control programs, since the primary contact use cannot be attained through CSO controls alone. Adding stormwater costs to the cost per household increases the Residential Indicator to 2 percent for the Indianapolis service area and to 3.29 percent for Center Township, bringing both areas into the high burden category. **Table 9-7** illustrates these residential indicators for purposes of the UAA.

Table 9-7
UAA Residential Indicators

Program Costs (2005-2025)	Peak Residential Indicator	
	Service Area	Center Twp.
LTCP, Septic, Sanitary & Stormwater (UAA Indicator)	2.00%	3.29%

The city is greatly concerned about the social effects within the community of CSO controls beyond the selected LTCP. Urban core areas in the Midwest and nationwide such as Indianapolis and Marion County face economic realities associated with the demographics of the city and current economic trends for core urban areas. Median household income within Center Township and portions of the area are much lower than the state and national average. Up to a three-fold increase in sewer related costs to these current and future Indianapolis residents and employers will exacerbate the current economic difficulties linked to employment opportunities, low income and substandard housing. Unnecessary and substantial sewer related costs will provide a disincentive for current employers and future employers to locate within the area, further exacerbating existing community problems.

The economic health of the community and its citizens contributes to the city's ability to generate the revenue necessary to fund capital improvement projects or to support the debt service on bonded capital. The city is concerned that its excellent bond rating will be difficult to maintain over time as a result of excessive financial requirements of the wastewater improvement program. A lower bond rating would increase the cost to finance the city's program and could hinder the city's ability to obtain the necessary funding. The economic analysis is further documented in Section 6.

Therefore, from the social perspective for the community, the exorbitant cost ($6.2 billion) for complete sewer separation to address the water quality standard for recreational use will both divert our citizen's income from other critical needs such as housing and health care and detract from the city's ability to retain existing jobs and attract new employers that may provide opportunities for our citizens to improve the quality of life in our community.

Construction required by full sewer separation also would severely disrupt commerce and economic activity within the combined sewer area, including the vibrant downtown and the city's convention business. Total separation of the sewer system would involve major construction along more than 800 miles of urban streets and alleyways over a continual period of many years. Such activity would disrupt large and small local business, public services, emergency services, community programs, schools, and the overall quality of life. It would require demolition of homes and businesses and the subsequence relocation of those residents and businesses, and the taking of land for easements and rights-of-way.

Complete separation of combined sewers would also impact cultural resources in the City of Indianapolis. Based upon current analysis, approximately 400 historical sites and more than 7,400 acres of historical land area within the combined sewer area would be impacted by complete sewer separation (see **Figure 9-12**: Historic Sites and Historic Areas Within Combined Sewer Area). In addition, the city's Cultural Trail, now under construction with its trees and landscaping, would be disturbed and disrupted.

Therefore, eliminating the CSO causes of E. coli bacteria exceedances would result in substantial and widespread economic and social impacts but would not fully attain the recreational use.

9.5 Public Outreach

The City of Indianapolis and IDEM worked together to develop a public outreach program on the benefits of the city's long-term plan and the need for a UAA to ensure continued progress in improving water quality. The public outreach program included:

- Individual meetings with downstream community representatives and other interested parties
- Public information meetings on June 26 at McCormick's Creek State Park in Spencer and July 11 at Holliday Park in Indianapolis
- A public comment period from June 14 to July 31, 2007

During the outreach program, the City of Indianapolis met with a number of downstream community representatives and interested parties. These included elected officials, the Clean Stream Team Advisory Committee, and representatives of McCormick's Creek State Park, the Central Indiana Land Trust, Indiana Environmental Health Association-Central Indiana Chapter, Decatur Township Civic Council, and health departments and/or soil and water conservation districts from Greene, Owen, Morgan, Monroe and Johnson counties.

Public meetings on June 26 and July 11 provided information on the affected waterways, the city's LTCP and other water quality improvement programs, the stream reaches affected by the UAA and the basis for the UAA's conclusion that the designated use is not attainable during and after large storms. Meetings were publicized through press releases by both IDEM and the city and through emails to interested parties, such as the Friends of White River, the Clean Stream Team Advisory Committee and downstream health department and soil and water conservation representatives. Presentations at the meetings by IDEM and the City of Indianapolis provided background on the issues and answered questions about the city's plan and the UAA. No opposition to the UAA was heard at these meetings.

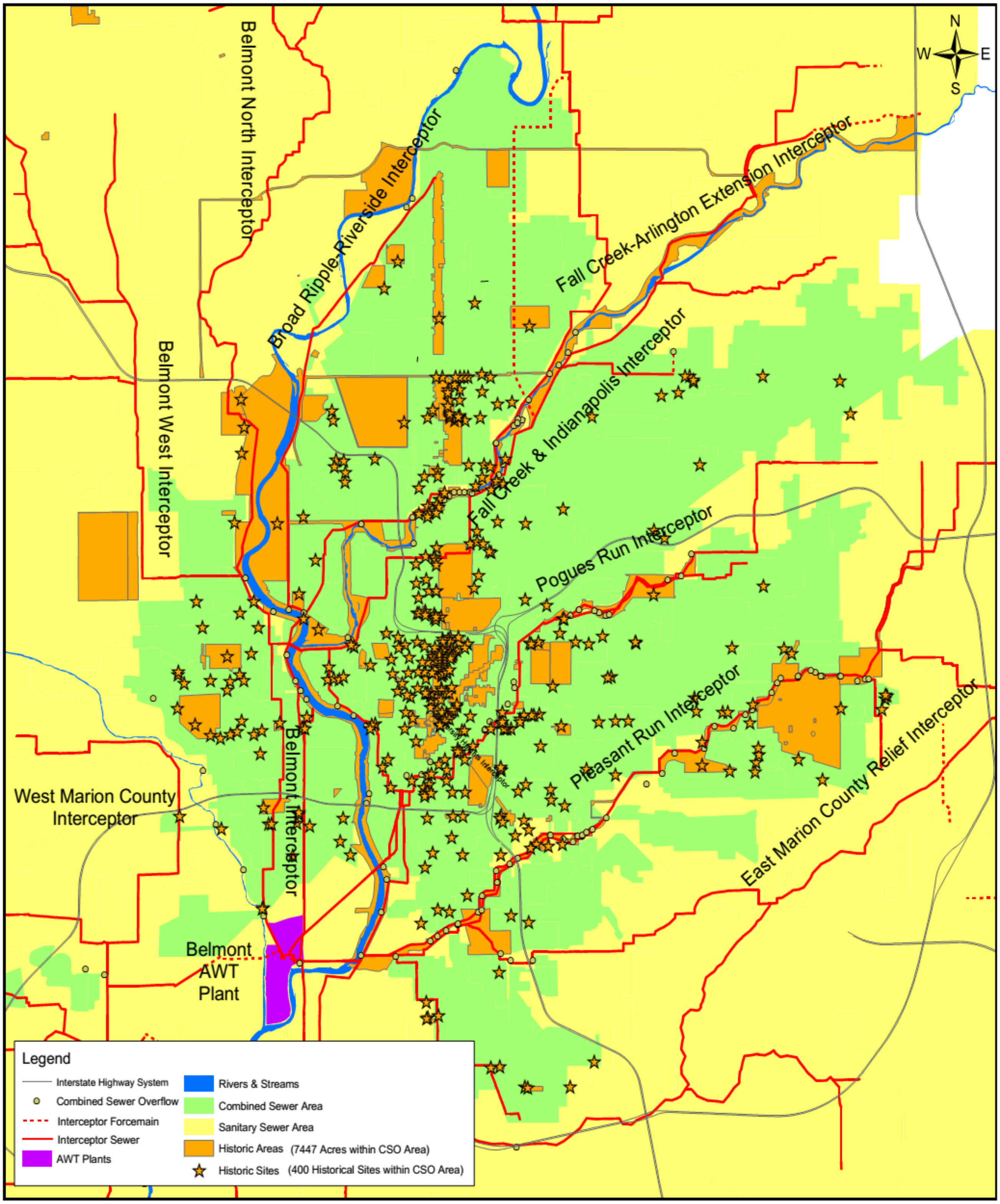


Figure 9-12
Historic Sites and Historic Areas within Combined Sewer Area

During the public comment period, two letters were received. Both letters were supportive of the LTCP and the change in use designation. One letter encouraged the city to increase stormwater retention and treatment requirements for new developments. The city will consider this recommendation the next time it revises stormwater standards for Marion County.

9.6 UAA and Wet-Weather Limited Use Subcategory for CSO-Impacted Waterways

The appropriate course for the City of Indianapolis is the selected LTCP with approval of this UAA. The selected LTCP represents the highest attainable use of the streams, based on urban conditions, wet-weather stream flows, economic capability, and other factors.

The information in this Section supports approval of the UAA based upon the following factors provided in 40 CFR Sec. 131.10(g):

- Natural, ephemeral, intermittent, or low-flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met.
- Human-caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place.
- Dams, diversions, or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in attainment of the use.
- Controls more stringent than those required by sections 301(b) and 306 of the Clean Water Act would result in substantial and widespread economic and social impact.

Based on the approval of this UAA, the city is requesting a CSO wet-weather limited use subcategory, as provided in IC 13-18-3-2.5, following CSO events that exceed the level of control in Section 7 of the city's LTCP. The CSO wet weather limited use designation should last no more than four days after a storm event that triggers a discharge and be applicable to the following waterways:

- White River, from 56th Street on the Indianapolis northside to State Road 157 near Worthington;
- Fall Creek, from Keystone Avenue to the White River;
- Little Eagle Creek from Michigan Street to the confluence with Big Eagle Creek, and Big Eagle Creek from the confluence with Little Eagle Creek to the White River;
- Pogues Run, from 21st Street to the White River;
- Pleasant Run, from Kitley Avenue to the White River;
- Bean Creek, from Interstate 65 to Pleasant Run.

The city used its instream water quality model and data analysis to identify the point downstream where Indianapolis CSOs no longer affect the White River's ability to meet the *E. coli* recreational standard of 235 cfu/100 mL. During the instream model's development, the city gathered data downstream of Indianapolis to calibrate the model to downstream river conditions. The city then conducted a model run to estimate the effects of a 1-year storm on *E. coli* concentrations after full LTCP implementation and excluding natural background and non-point sources. This simulation predicted that, after LTCP implementation, *E. coli* from Indianapolis CSOs would remain above the 235 cfu/100 mL until approximately State Road 157 near Worthington. This analysis is shown in **Figure 9-13.**

The most critical factors influencing the downstream impacts of Indianapolis CSOs are in-stream baseflow conditions, antecedent rainfall conditions, size of storm and die-off rate. The model used conservative assumptions regarding in-stream baseflow conditions, antecedent rainfall conditions and die-off. The city picked a 1-year design storm occurring following a period of dry weather because it was believed to represent the greatest downstream impact. A period of long dry weather can result in a buildup of fecal material on the land that is discharged through the stormwater system**.** The model was calibrated to short duration storm events typically occurring in August-September, capturing the worst-case scenario of low baseflow and a large CSO discharge. Higher baseflow in the stream or higher die-off rates would push the CSO impact further upstream toward Indianapolis.

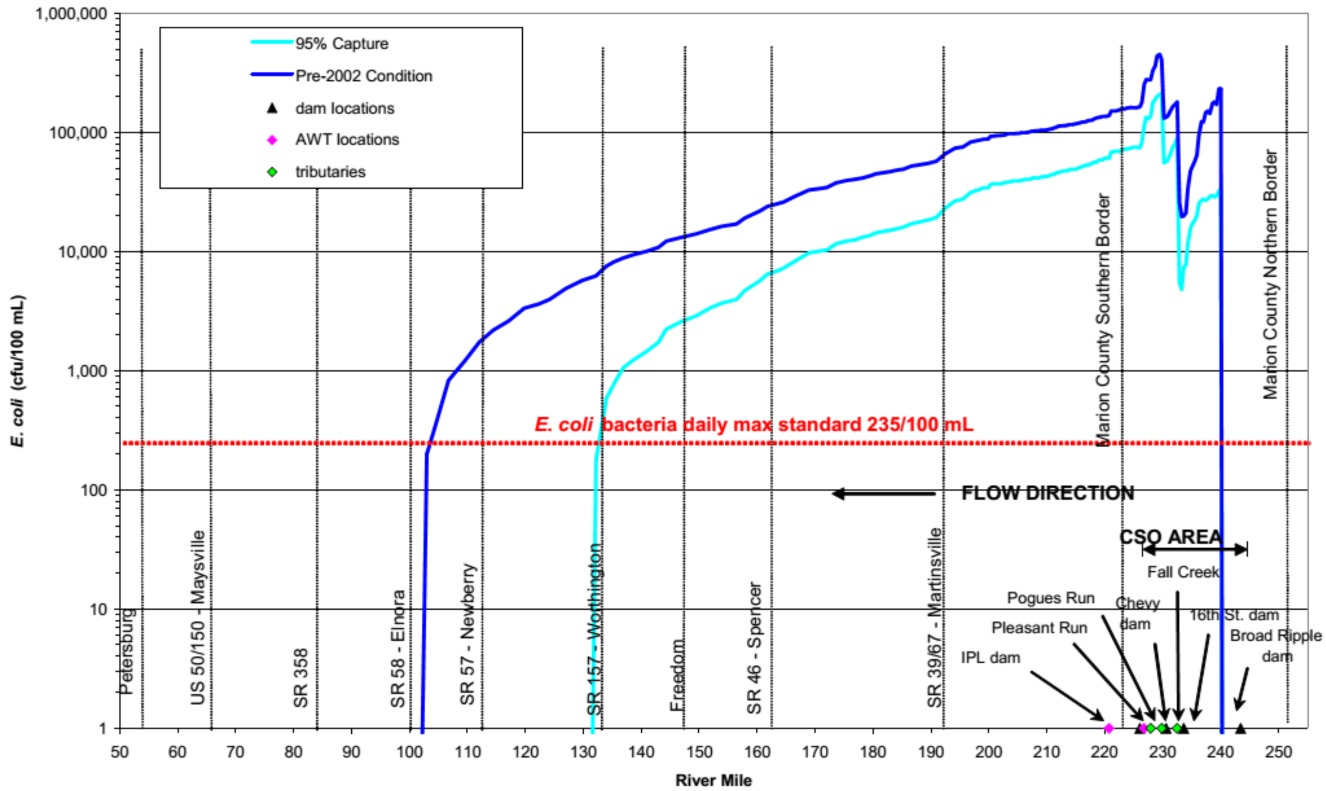


Figure 9-13
Modeled Maximum E. Coli Bacteria Concentrations Caused by CSOs in the White River (Excluding Background and Nonpoint Sources)

IDEM and the city will need to integrate the CSO LTCP with the city's NPDES permits and the state's water quality standards regulations and TMDL program through the UAA process. Upon approval of this CSO LTCP the following approval language is requested:

> "The water quality-based requirements associated with the CSO wet weather limited use subcategory for the waterways listed above are determined by implementation of this approved CSO LTCP as provided by IC 13-18-3-2.5. CSO discharges that occur consistent with this approved LTCP comply with the narrative and numeric water quality requirements of the CSO wet weather limited use subcategory. This is the level of control of CSO discharges that shall be used for any wasteload allocation (including through a total maximum daily load) that may be established for the waterways."

As noted earlier, the city requests and requires state and federal approval of the UAA in order to achieve the schedule established in LTCP **Table 7-5,** which will allow the city to proceed with CSO control-related investments.

Section 9 Modification Summary

The Section 9 of the LTCP was updated in 2017 as summarized below:

- Added an introduction section explaining that Section 9 of the LTCP is not to be updated until such time of a formal request for a UAA rulemaking

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Acronyms

ANS	Air Nitrification System
AWT	Advanced Waterwater Treatment
BC	Bean Creek
BEC	Big Eagle Creek
BMP	Best Management Practices
BOD	Biological Oxygen Demand
BRS	Bio-Roughing System
CDM	Camp Dresser & McKee
CEE	Council for Environmental Education
CFS	Cubic Feet Per Second
CFU	Coliform Forming Units
CIP	Capital Improvement Project
CRF	Code of Federal Regulation
CSO	Combined Sewer Overflows
CSOOP	CSO Operational Plan
DCAM	Department of Capital Asset Management
DNR	Department of Natural Resources
DO	Dissolved Oxygen
DPW	Department of Public Works
EHRC	Enhanced High Rate Clarification
EPA	Environmental Protection Agency
FC	Fall Creek
FCA	Financial Capability Analysis
FCWRF	Fall Creek Water Reclamation Facility
GIS	Geographical Information System
GPD	Gallon Per Day
HBI	Hilsenhoff Biotic Index
HRT	High Rate Treatment
I/I	Inflow and Infiltration
IBI	Indices of Biological Integrity
IC	Indiana Code
ICI	Invertebrate Community Index
ICST	Indianapolis Clean Stream Team
IDAC	Industrial Dischargers Advisory Committee
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
INDOT	Indiana Department of Transportation
IPL	Indianapolis Power & Light
IPS	Indianapolis Public Schools
LTCP	Long Term Control Plan
MCHD	Marion County Health Department
MCL	Maximum Contaminant Levels
MECA	Metropolitan Emergency Communications Agency
MG	Million Gallons
MGD	Million Gallons Per Day
MHI	Median Household Income
mL	Milliliters

List of Acronyms

MSAP	Mercury Sampling and Analysis Plan
NGVD	National Geodetic Vertical Datum
NH3	Ammonia
NPDES	National Pollutant Discharge Elimination System
OES	Office of Environmental Services
ONS	Oxygen Nitrification System
PAA	Peracetic Acid
PCBs	Polychlorinated Biphenyls
PE	Primary Effluent
Pl R	Pleasant Run
Po R	Pogues Run
Q	Flow
RI	Rersidential Indicator
RTC	Real-Time Controls
SBR	Sequencing Batch Reactor
SCADA	Supervisory Control and Data Acquisition
SEA	Senate Enrolled Act
SIU	Significant Industrial User
SpC	Specific Conductivity
SRCER	Stream Reach Characterization and Evaluation Report
SRF	State Revolving Fund
SSO	Sanitary Sewer Overflows
SWMM	Stormwater Management Model
SWMP	Stormwater Management Program
TDS	Total Dissolved Solids
TF/SC	Trickling Filter/Solids Contact
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UAA	Use Attainability Analysis
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UV	Ultraviolet
VSA	Vacuum Swing Adsorption
Wa	Water Appearance
WC	Williams Creek
WHHP	Well Head Protection Program
WQS	Water Quality Standards
WR	White River
WREP	White River Environmental Partnership
WWTAC	Wet-Weather Technical Advisory Committee

Glossary

A

Activated Sludge: Product that results when primary effluent is mixed with bacteria-laden sludge and then agitated and aerated to promote biological treatment, speeding the breakdown of organic matter in raw sewage undergoing secondary waste treatment.
Advanced Treatment: A level of wastewater treatment more stringent than secondary treatment; requires an 85 percent reduction in conventional pollutant concentration or a significant reduction in non-conventional pollutants. Sometimes called tertiary treatment.
Advanced Wastewater Treatment: Any treatment of sewage that goes beyond the secondary or biological water treatment stage and includes the removal of nutrients such as phosphorus and nitrogen and a high percentage of suspended solids. (See primary, secondary treatment.)
Aeration: A process that promotes biological degradation of organic matter in water. The process may be passive (as when waste is exposed to air), or active (as when a mixing or bubbling device introduces the air).
Algae: Simple rootless plants that grow in sunlit waters in proportion to the amount of available nutrients. They can affect water quality adversely by lowering the dissolved oxygen in the water. They are food for fish and small aquatic animals.
Algal Blooms: Sudden spurts of algal growth, which can affect water quality adversely and indicate potentially hazardous changes in local water chemistry.
Assimilation: The ability of a body of water to purify itself of pollutants.
Assimilative Capacity: The capacity of a natural body of water to receive wastewaters or toxic materials without deleterious effects and without damage to aquatic life or humans who consume the water.
The Authority – CWA Authority, Inc. acquired the City of Indianapolis Wastewater System on August 26, 2011 and is responsible for the planning, design, construction, operation and maintenance of said system.

B

Bacteria: (Singular: bacterium) Microscopic living organisms that can aid in pollution control by metabolizing organic matter in sewage, oil spills or other pollutants. However, bacteria in soil, water or air can also cause human, animal and plant health problems. Measured in colonies per unit per 100 milliliters of sample (cfu/100 ml).
Best Management Practice (BMP): Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from non-point sources.
Biochemical Oxygen Demand (BOD): A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. The greater the BOD, the greater the degree of pollution.
Bio Roughing: Attached biological growth used for BOD removal and nitrification. Used as the first stage of the nitrification process.
Biotic Community: A naturally occurring assemblage of plants and animals that live in the same environment and are mutually sustaining and interdependent.

C

Capture: The total volume of flow collected in the combined sewer system during precipitation events on a system-wide, annual average basis (not percent of volume being discharged).
Chlorination: The application of chlorine to drinking water, sewage, or industrial waste to disinfect or to oxidize undesirable compounds.
Collection System: Pipes used to collect and carry wastewater from individual sources to an interceptor sewer that will carry it to a treatment facility.
Combined Sewer Overflows: Discharge of a mixture of storm water and domestic waste when the flow capacity of a sewer system is exceeded during rainstorms.

Combined Sewers: A sewer system that carries both sewage and storm-water runoff. Normally, its entire flow goes to a waste treatment plant, but during a heavy storm, the volume of water may be so great as to cause overflows of untreated mixtures of storm water and sewage into receiving waters. Storm-water runoff may also carry toxic chemicals from industrial areas or streets into the sewer system.

Cost-Benefit Analysis: A quantitative evaluation of the costs which would be incurred by implementing an environmental regulation versus the overall benefits to society of the proposed action.

D

DCAM: Department of Capital Asset Management

Design Capacity: The average daily flow that a treatment plant or other facility is designed to accommodate.

Designated Uses: Those water uses identified in state water quality standards that must be achieved and maintained as required under the Clean Water Act. Uses can include cold water fisheries, public water supply, recreation, and irrigation.

Discharge: Flow of surface water in a stream or canal or the outflow of ground water from a flowing artesian well, ditch, or spring. Can also apply to discharge of liquid effluent from a facility or to chemical emissions into the air through designated venting mechanisms.

Disinfectant: A chemical or physical process that kills disease-causing organisms in water, air, or on surfaces. Chlorine is often used to disinfect sewage treatment effluent, water supplies, wells, and swimming pools.

Dissolved Oxygen (DO): The oxygen freely available in water, vital to fish and other aquatic life and for the prevention of odors. DO levels are considered a most important indicator of a water body's ability to support desirable aquatic life. Secondary and advanced waste treatment are generally designed to ensure adequate DO in waste-receiving waters.

E

Effluent Guidelines: Technical EPA documents which set effluent limitations for given industries and pollutants.

Effluent Limitation: Restrictions established by a state or EPA on quantities, rates, and concentrations in wastewater discharges.

Effluent Standard: (See effluent limitation.)

Effluent: Wastewater—treated or untreated—that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters.

F

Floatables: Large floating material sometimes characteristic of sanitary wastewater and storm runoff which includes litter and trash.

Food Chain: A sequence of organisms, each of which uses the next, lower member of the sequence as a food source.

G

Game Fish: Species like trout, salmon, or bass, caught for sport. Many of them show more sensitivity to environmental change than "rough" fish.

H

Holding Pond: A pond or reservoir, usually made of earth, built to store polluted runoff.

Hypoxia/Hypoxic Waters: Waters with dissolved oxygen concentrations of less than 2 ppm, the level generally accepted as the minimum required for most marine life to survive and reproduce.

I

Infiltration: The penetration of water from the soil into sewer or other pipes through defective joints, connections, or manhole walls.
Inflow: Entry of extraneous rain water into a sewer system from sources other than infiltration, such as basement drains, manholes, storm drains, and street washing.
Influent: Water, wastewater, or other liquid flowing into a reservoir, basin, or treatment plant.
Interceptor Sewers: Large sewer lines that, in a combined system, control the flow of sewage to the treatment plant. In a storm, they allow some of the sewage to flow directly into a receiving stream, thus keeping it from overflowing onto the streets. Also used in separate systems to collect the flows from main and trunk sewers and carry them to treatment points.

K

Knee-of-the-curve: The point where the incremental change in the cost of the control alternative per change in performance of the control alternative changes most rapidly.

L

Long Term Control Plan (LTCP): A document developed by CSO communities to describe existing waterway conditions and various CSO abatement technologies that will be used to control overflows.

M

Macro-invertebrate: Invertebrate (no spinal column) organism that is too large to pass through a No. 40 Screen (0.417mm).
Municipal Sewage: Wastes (mostly liquid) originating from a community; may be composed of domestic wastewaters and/or industrial discharges.

N

National Pollutant Discharge Elimination System (NPDES): A provision of the Clean Water Act which prohibits discharge of pollutants into waters of the United States unless a special permit is issued by EPA, a state, or, where delegated, a tribal government on an Indian reservation.
NH3: Ammonia
Non-Point Sources (NPS): Diffuse pollution sources (i.e., without a single point of origin or not introduced into a receiving stream from a specific outlet). The pollutants are generally carried off the land by storm water. Common non-point sources are agriculture, forestry, urban, mining, construction, dams, channels, land disposal, saltwater intrusion, and city streets.
Nutrient: Any substance assimilated by living things that promotes growth. The term is generally applied to nitrogen and phosphorus in wastewater, but is also applied to other essential and trace elements.

O

Operation and Maintenance (O&M): Actions taken after construction to ensure that facilities constructed will be properly operated and maintained to achieve normative efficiency levels and prescribed effluent limitations in an optimum manner.
Organic: (1) Referring to or derived from living organisms. (2) In chemistry, any compound containing carbon.
Organic Chemicals/Compounds: Naturally occurring (animal or plant-produced or synthetic) substances containing mainly carbon, hydrogen, nitrogen, and oxygen.
Organic Matter: Carbonaceous waste contained in plant or animal matter and originating from domestic or industrial sources.

P

pH: An expression of the intensity of the basic or acid condition of a liquid; may range from 0 to 14, where 0 is the most acid and 7 is neutral. Natural waters usually have a pH between 6.5 and 8.5.
Point Source: A stationary location or fixed facility from which pollutants are discharged; any single identifiable source of pollution; e.g., a pipe, ditch, ship, ore pit, factory smokestack.
Pretreatment: Processes used to reduce, eliminate, or alter the nature of wastewater pollutants from nondomestic sources before they are discharged into Publicly Owned Treatment Works (POTWs).
Primary Waste Treatment: First steps in wastewater treatment; screens and sedimentation tanks are used to remove most materials that float or will settle. Primary treatment removes about 30 percent of carbonaceous biochemical oxygen demand from domestic sewage.

R

Raw Sewage: Untreated wastewater and its contents.
Riparian Habitat: Areas adjacent to rivers and streams with a differing density, diversity, and productivity of plant and animal species relative to nearby uplands.
Run-Off: That part of precipitation, snow melt, or irrigation water that runs off the land into streams or other surface-water. It can carry pollutants from the air and land into receiving waters.

S

Sanitary Sewers: Underground pipes that carry off only domestic or industrial waste, not storm water.
Secondary Treatment: The second step in most publicly owned waste treatment systems in which bacteria consume the organic parts of the waste. It is accomplished by bringing together waste, bacteria, and oxygen in trickling filters or in the activated sludge process. This treatment removes floating and settleable solids and about 90 percent of the oxygen-demanding substances and suspended solids. Disinfection is the final stage of secondary treatment. (See: primary, tertiary treatment.)
Sedimentation: Letting solids settle out of wastewater by gravity during treatment.
Sedimentation Tanks: Wastewater tanks in which floating wastes are skimmed off and settled solids are removed for disposal.
Sediments: Soil, sand, and minerals washed from land into water, usually after rain. They pile up in reservoirs, rivers and harbors, destroying fish and wildlife habitat, and clouding the water so that sunlight cannot reach aquatic plants. Careless farming, mining, and building activities will expose sediment materials, allowing them to wash off the land after rainfall. **SF:** Square foot
Sediment Oxygen Demand (SOD): A measure of the amount of oxygen consumed in the biological process that breaks down organic matter in the sediment.
Septic System: An on-site system designed to treat and dispose of domestic sewage. A typical septic system consists of a tank that receives raw sewage and a system of tile lines or a pit that is used for the disposal of the liquid effluent (sludge) that remains after the decomposition of solids in the tank. The tank must be pumped out periodically.
Septic Tank: An underground storage tank for wastes from homes not connected to a sewer line. Waste goes directly from the home to the tank. (See: septic system.)
Settleable Solids: Material heavy enough to sink to the bottom of a wastewater treatment tank.
Settling Tank: A holding area for wastewater, where heavier particles sink to the bottom for removal and disposal.
Sewage Sludge: Sludge produced at a Publicly Owned Treatment Works (POTW), the disposal of which is regulated under the Clean Water Act.
Sewage: The waste and wastewater produced by residential and commercial sources and discharged into sewers.
Sewer: A channel or conduit that carries wastewater and storm-water runoff from the source to a treatment plant or receiving stream. "Sanitary" sewers carry household, industrial, and commercial waste. "Storm" sewers carry runoff from rain or snow. "Combined" sewers handle both.

Sewerage: The entire system of sewage collection, treatment, and disposal.
SRCER: Stream Reach Characterization and Evaluation Report
Storage: Temporary holding of waste pending treatment or disposal, as in containers, tanks, waste piles, and surface impoundments.
Storm Sewer: A system of pipes (separate from sanitary sewers) that carries water runoff from buildings and land surfaces.
Surcharge Flow: Flow in which the water level is above the crown of the pipe causing pressurized flow in pipe segments.
Surface Runoff: Precipitation, snow melt, or irrigation water in excess of what can infiltrate the soil surface and be stored in small surface depressions; a major transporter of non-point source pollutants in rivers, streams, and lakes.
Surface Water: All water naturally open to the atmosphere (rivers, lakes, reservoirs, ponds, streams, impoundments, seas, estuaries, etc.)
Suspended Loads: Specific sediment particles maintained in the water column by turbulence and carried with the flow of water.
Suspended Solids: Small particles of solid pollutants that float on the surface of, or are suspended in, sewage or other liquids. They resist removal by conventional means.

T

Tertiary Treatment: Advanced cleaning of wastewater that goes beyond the secondary or biological stage, removing nutrients such as phosphorus, nitrogen, and most BOD and suspended solids.
Total Suspended Solids (TSS): A measure of the suspended solids in wastewater, effluent, or water bodies, determined by tests for "total suspended non-filterable solids." (See: suspended solids.)
Toxic Pollutants: Materials that cause death, disease, or birth defects in organisms that ingest or absorb them.
The quantities and exposures necessary to cause these effects can vary widely.
Treated Wastewater: Wastewater that has been subjected to one or more physical, chemical, and biological processes to reduce its potential of being a health hazard.
Treatment: (1) Any method, technique, or process designed to remove solids and/or pollutants from solid waste, waste-streams, effluents, and air emissions. (2) Methods used to change the biological character or composition of any regulated medical waste so as to substantially reduce or eliminate its potential for causing disease.
Treatment Plant: A structure built to treat wastewater before discharging it into the environment.
Treatment, Storage, and Disposal Facility (TSD): Site where a hazardous substance is treated, stored, or disposed. TSD facilities are regulated by EPA and states under RCRA.

U

Urban Runoff: Storm water from city streets and adjacent domestic or commercial properties that carries pollutants of various kinds into the sewer systems and receiving waters.

W

Waste Treatment Lagoon: Impoundment made by excavation or earth fill for biological treatment of wastewater.
Waste Water Treatment Plant (WWTP): A facility containing a series of tanks, screens, filters and other processes by which pollutants are removed from water.
Wastewater: The spent or used water from a home, community, farm, or industry that contains dissolved or suspended matter.
Water Pollution: The presence in water of enough harmful or objectionable material to damage the water's quality.
Water Quality Criteria: Levels of water quality expected to render a body of water suitable for its designated use. Criteria are based on specific levels of pollutants that would make the water harmful if used for drinking, swimming, farming, fish production, or industrial processes.
Water Quality Standards: State-adopted and EPA-approved ambient standards for water bodies. The standards prescribe the use of the water body and establish the water quality criteria that must be met to protect designated uses.

Glossary

Watershed Approach: A coordinated framework for environmental management that focuses public and private efforts on the highest priority problems within hydrologically defined geographic areas taking into consideration both ground and surface water flow.

Watershed: The land area that drains into a stream; the watershed for a major river may encompass a number of smaller watersheds that ultimately combine at a common point.

Weir: (1) A wall or plate placed in an open channel to measure the flow of water. (2) A wall or obstruction used to control flow from settling tanks and clarifiers to ensure a uniform flow rate and avoid short-circuiting.

WHPP: Well Head Protection Program

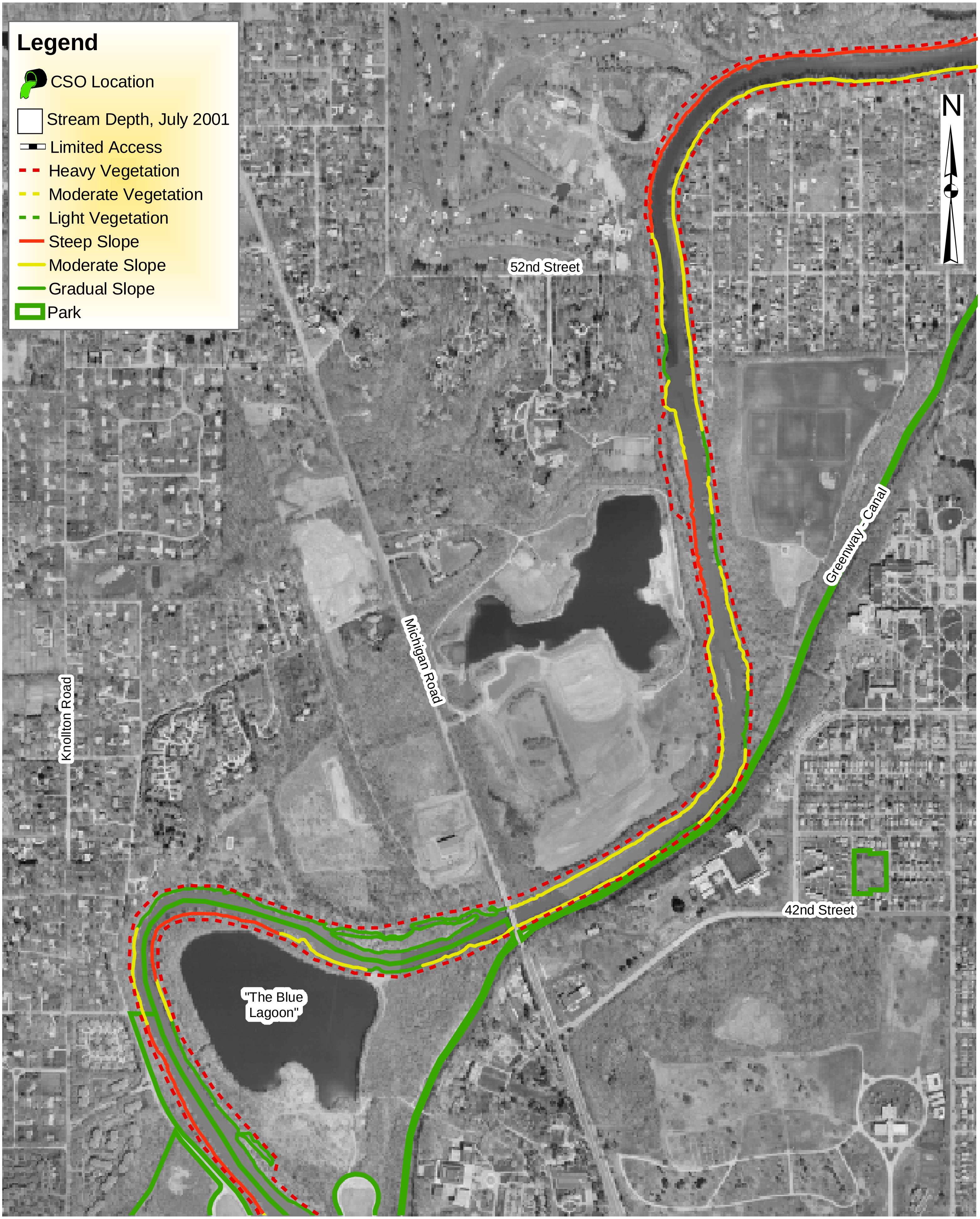
Table of Appendices

Table of Appendices

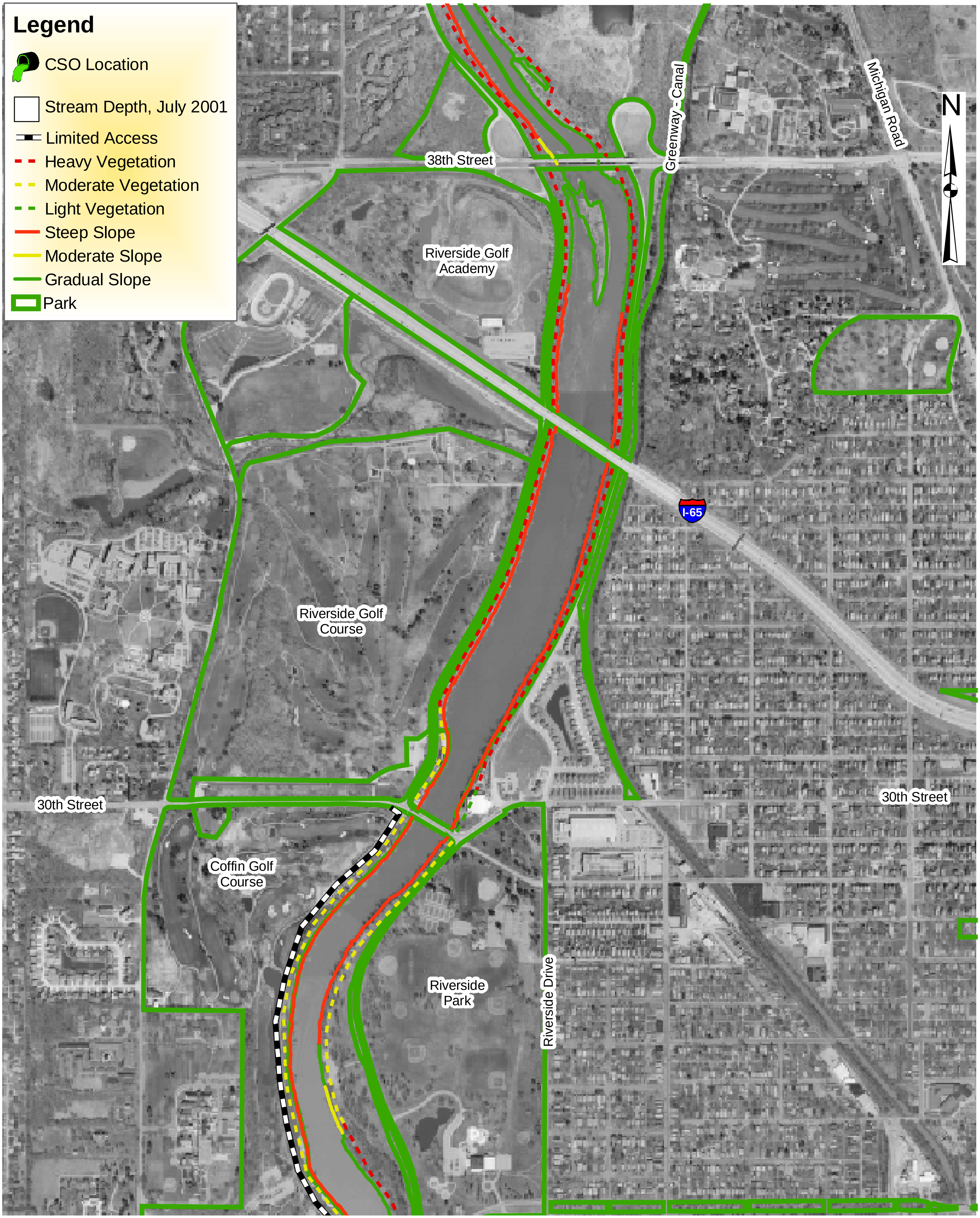
Appendix A

Physical Stream Characteristics and Reported and Observed Use Maps

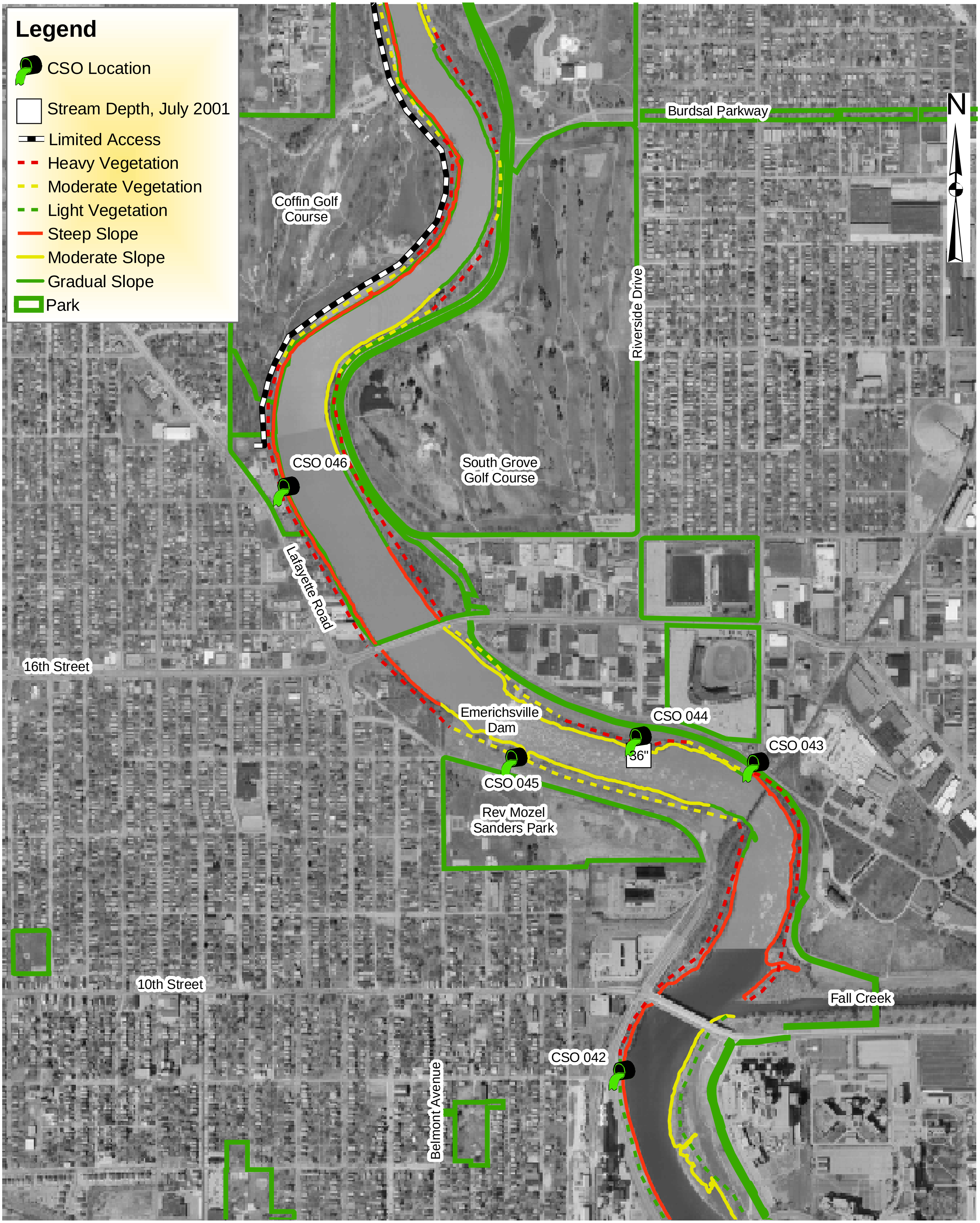
Appendix A1a
Physical Stream Characteristics
White River
Sheet 1 of 8

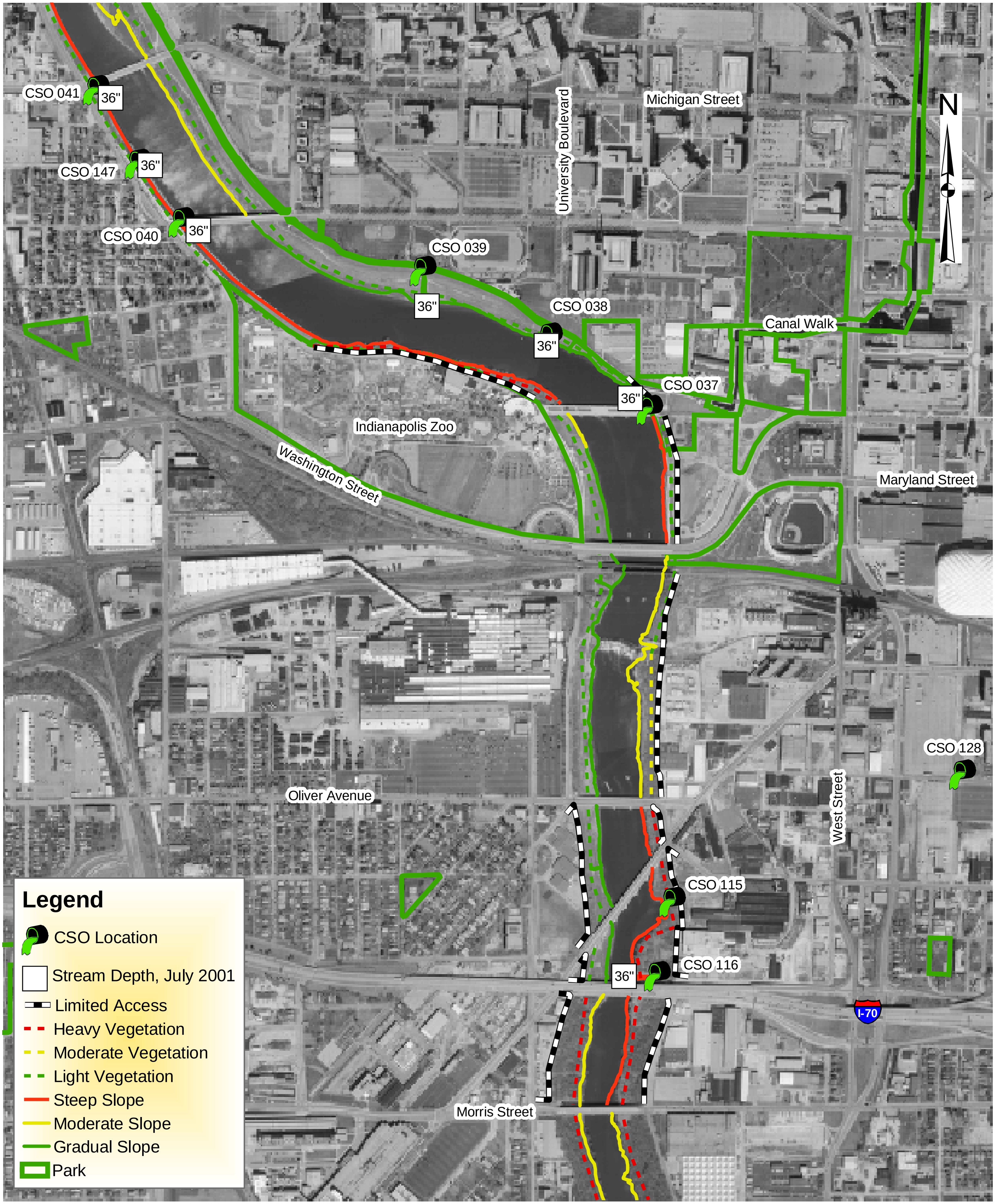


Appendix A1b
Physical Stream Characteristics
White River
Sheet 2 of 8

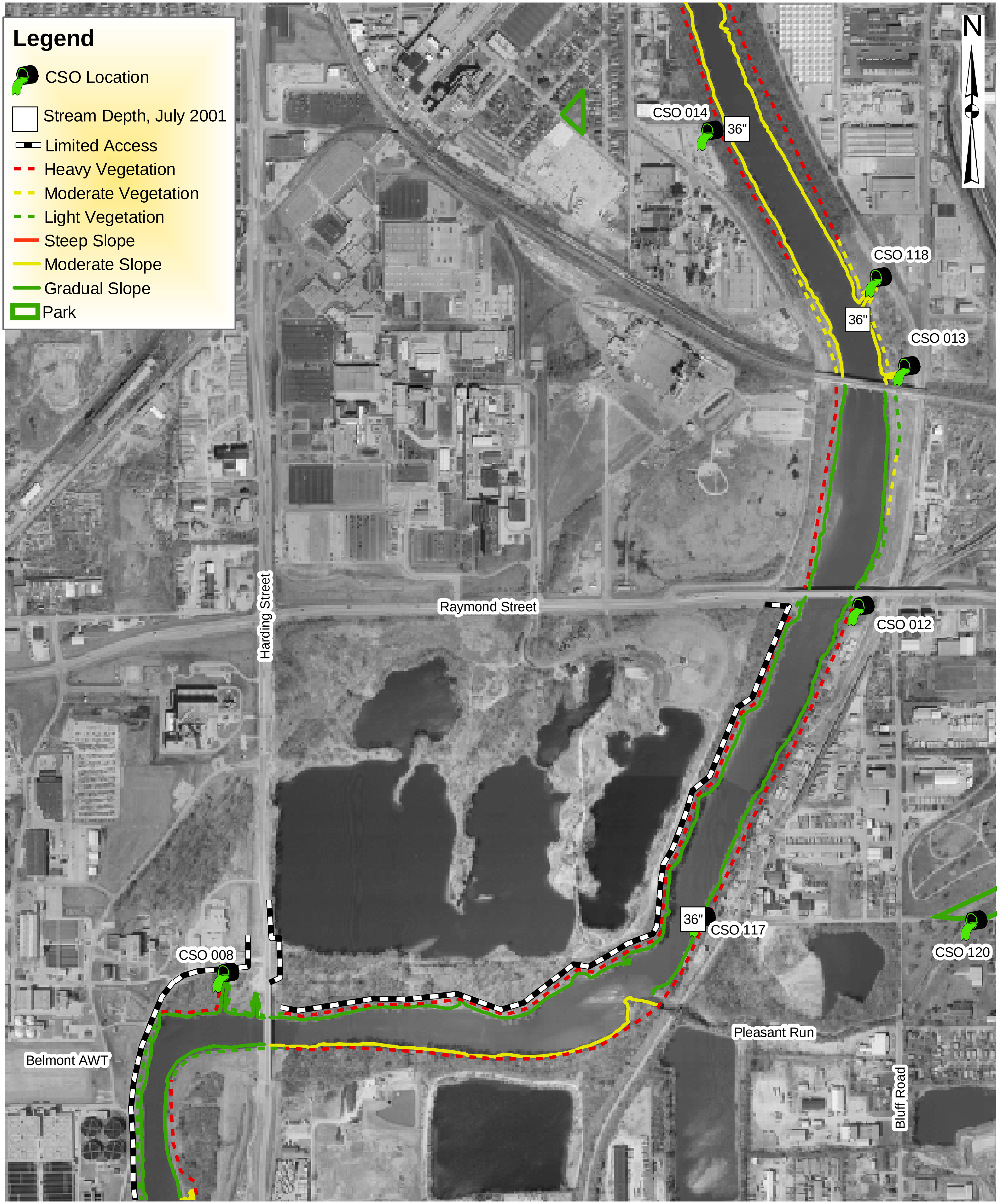


Appendix A1c
Physical Stream Characteristics
White River
Sheet 3 of 8

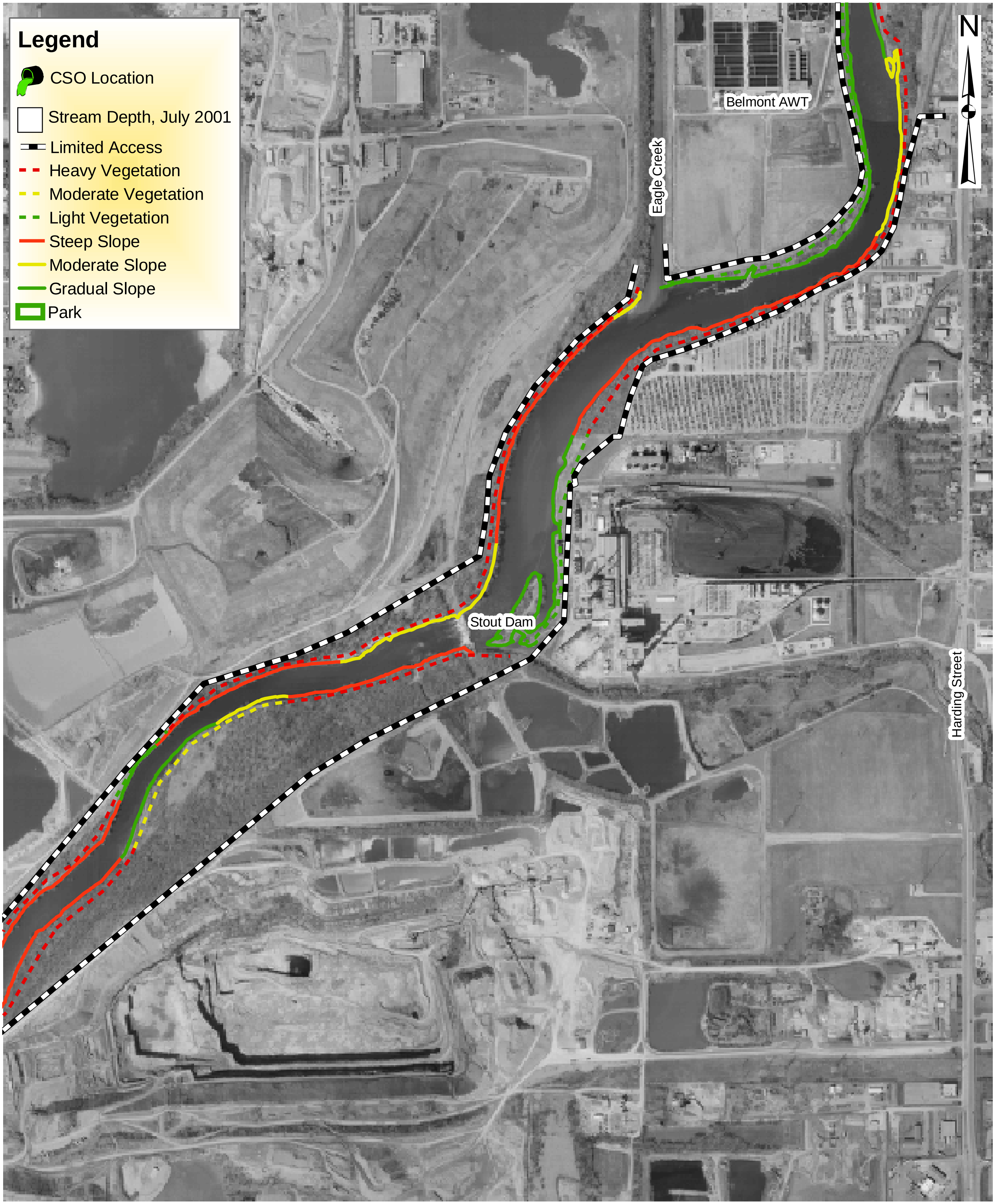

Legend
CSO Location
Stream Depth, July 2001
Limited Access
Heavy Vegetation
Moderate Vegetation
Light Vegetation
Steep Slope
Moderate Slope
Gradual Slope
Park
N
Burdsal Parkway
Coffin Golf Course
Riverside Drive
South Grove Golf Course
CSO 046
Lafayette Road
16th Street
Emerichsville Dam
CSO 044
36"
CSO 043
CSO 045
Rev Mozel Sanders Park
10th Street
Fall Creek
CSO 042
Belmont Avenue



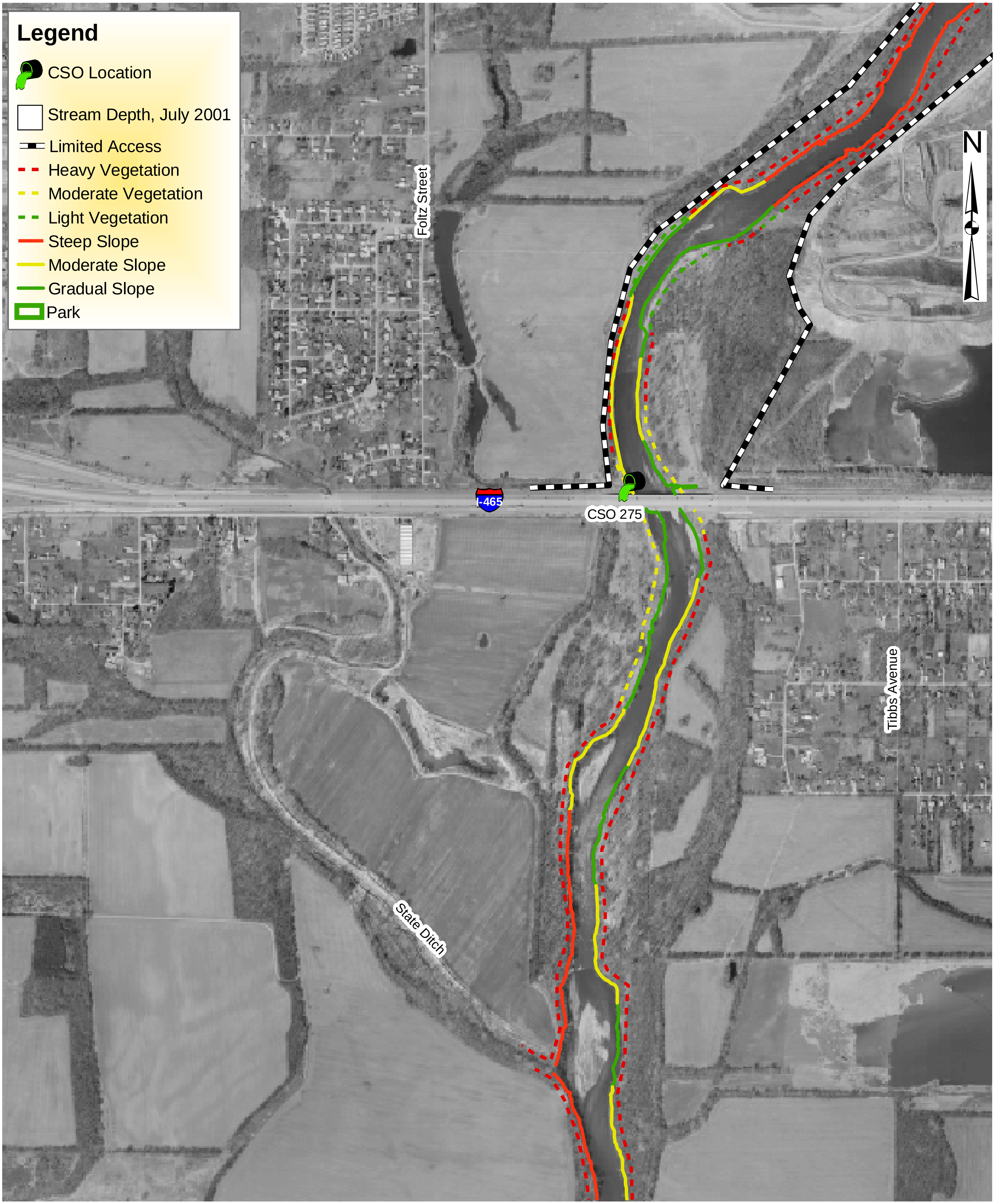
Appendix A1e
Physical Stream Characteristics
White River
Sheet 5 of 8



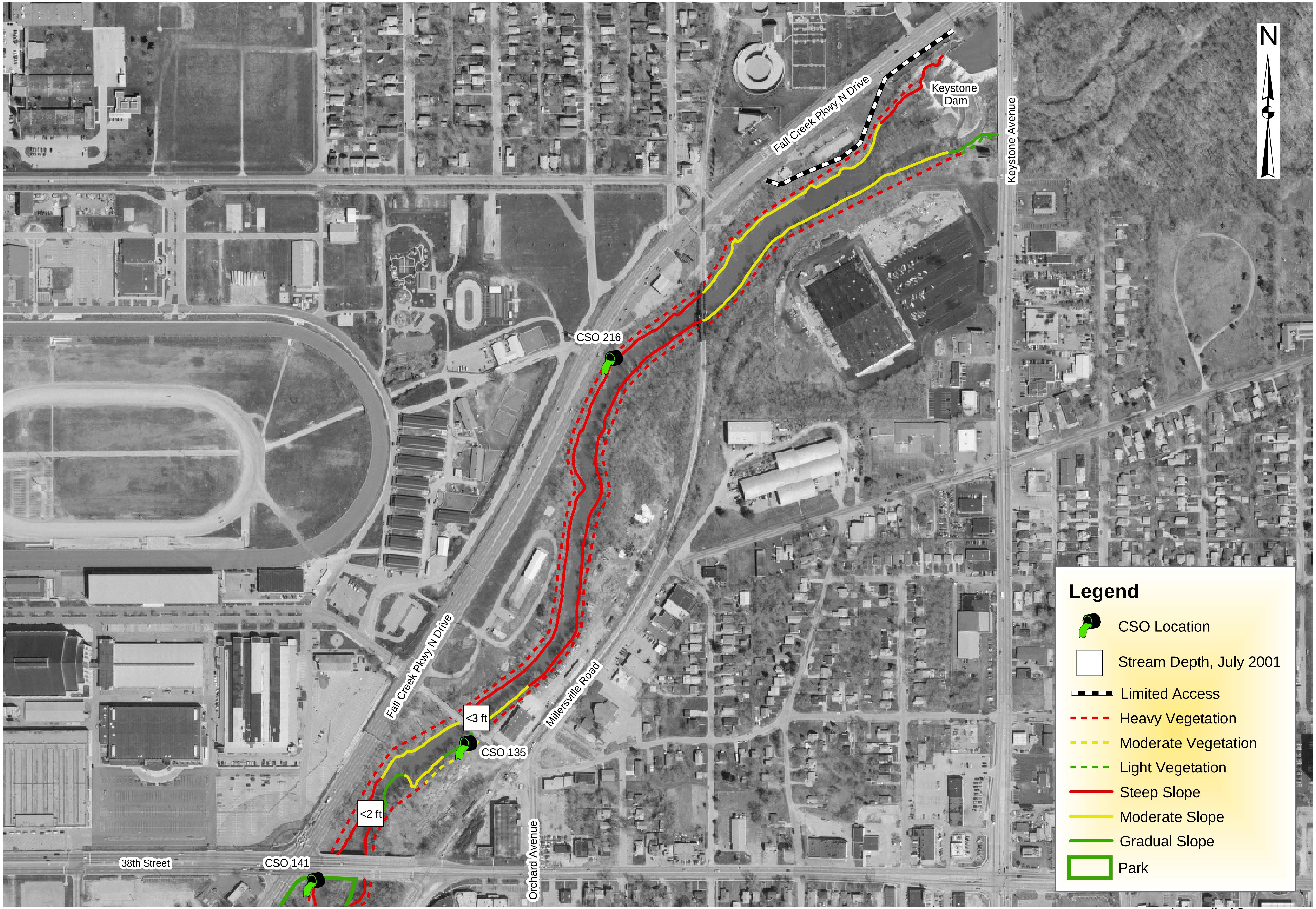
Appendix A1f
Physical Stream Characteristics
White River
Sheet 6 of 8



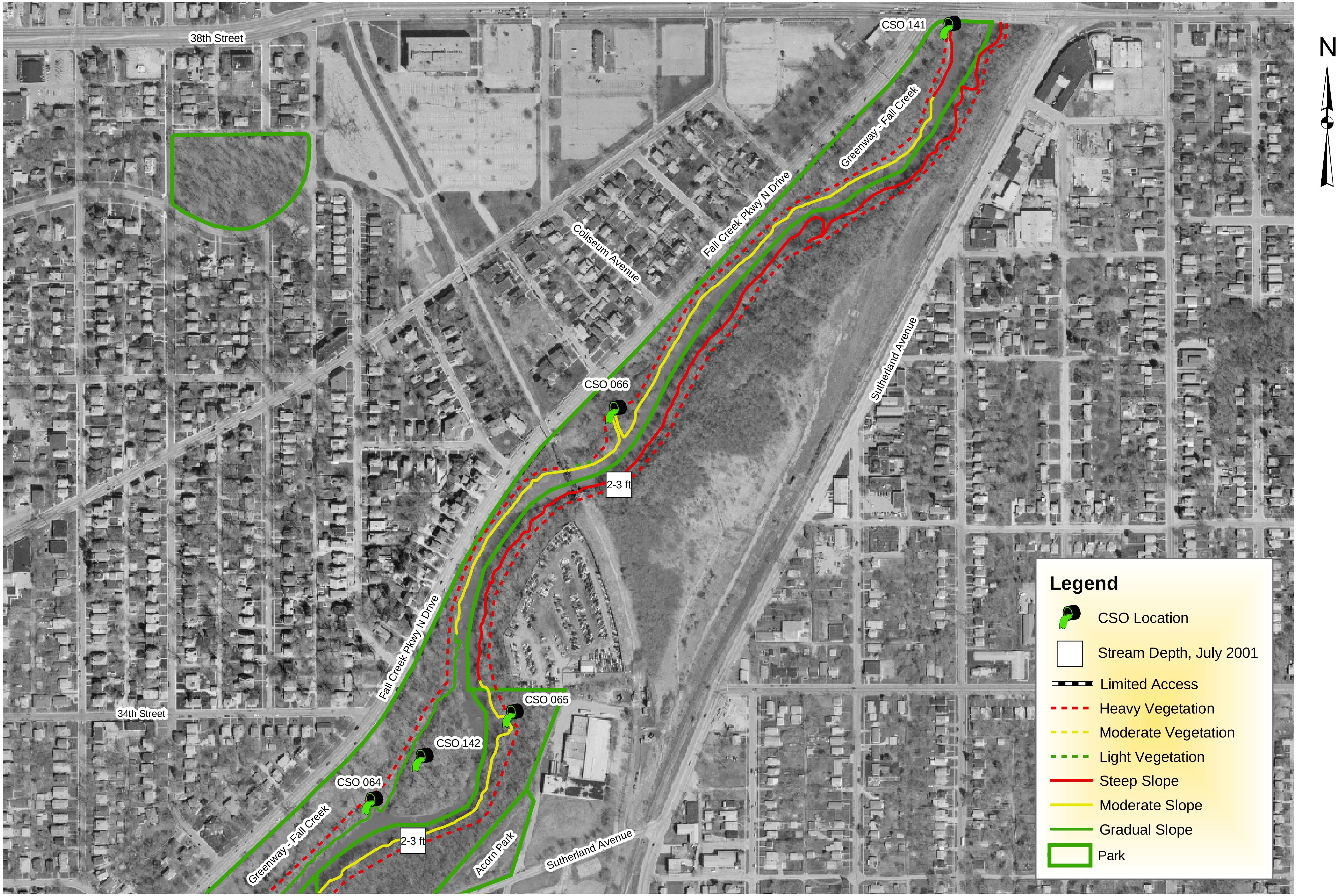
Appendix A1g
Physical Stream Characteristics
White River
Sheet 7 of 8



Appendix A1h
Physical Stream Characteristics
White River
Sheet 8 of 8

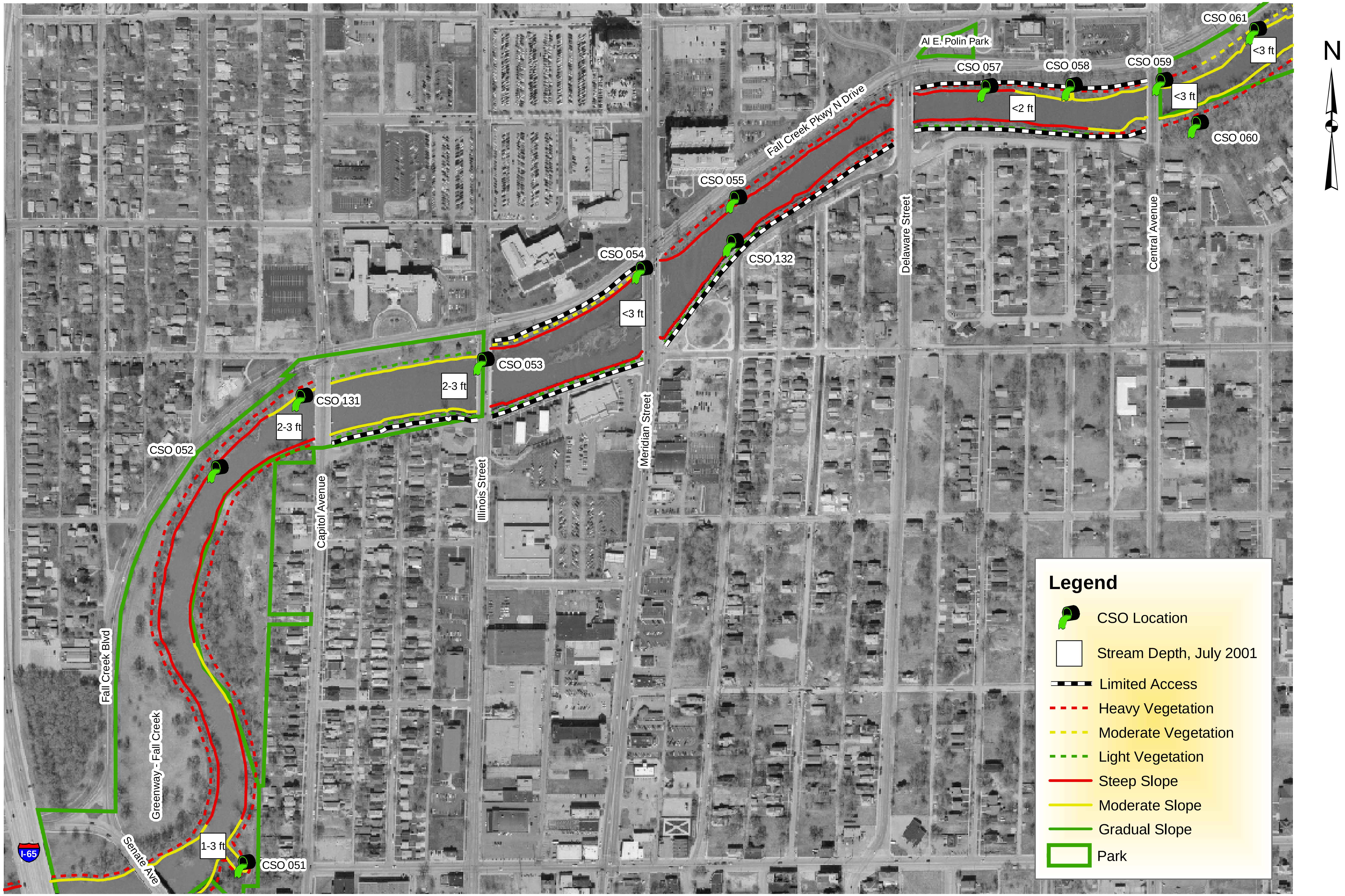


Appendix A2a
Physical Stream Characteristics
Fall Creek
Sheet 1 of 7

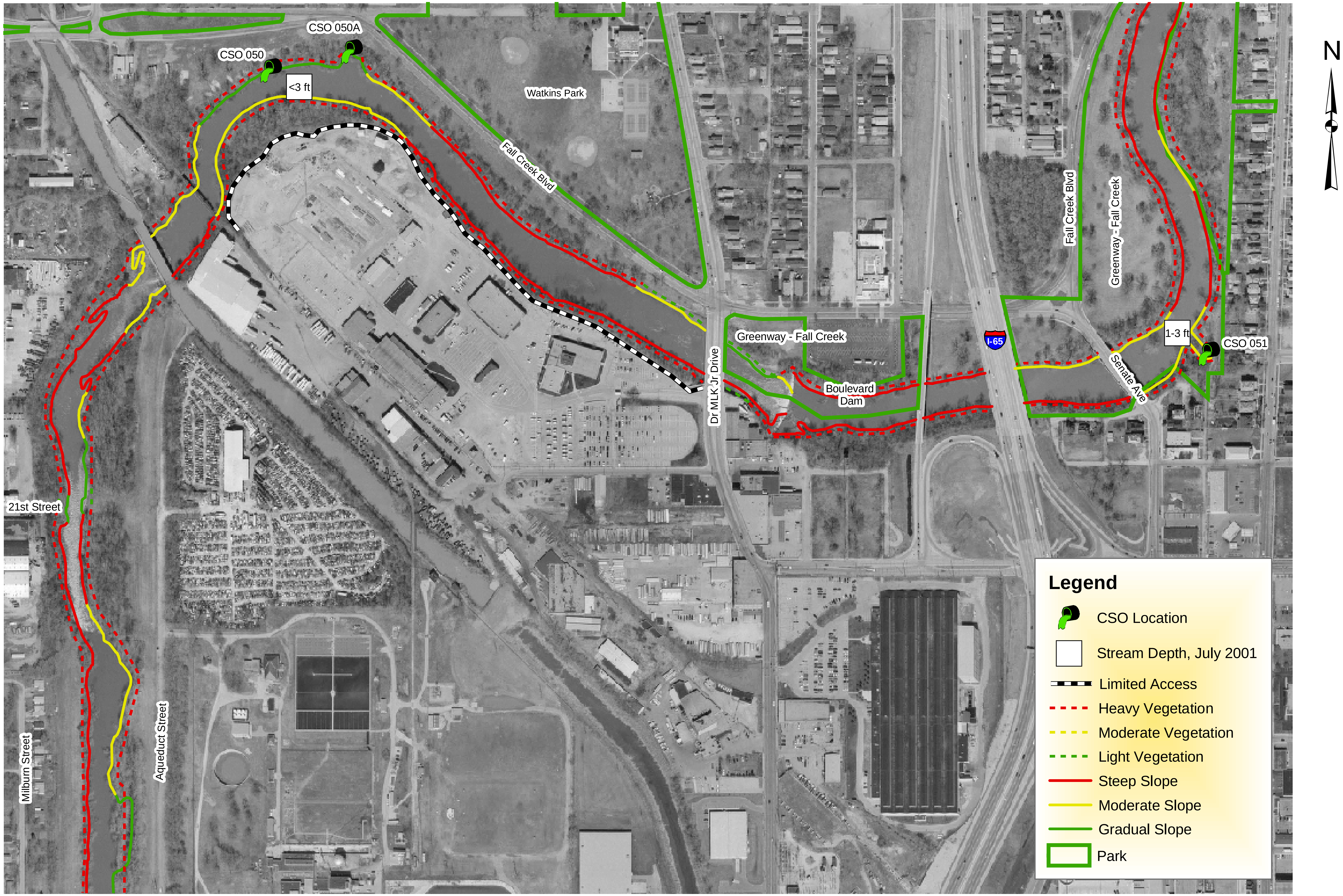


Appendix A2b
Physical Stream Characteristics
Fall Creek
Sheet 2 of 7

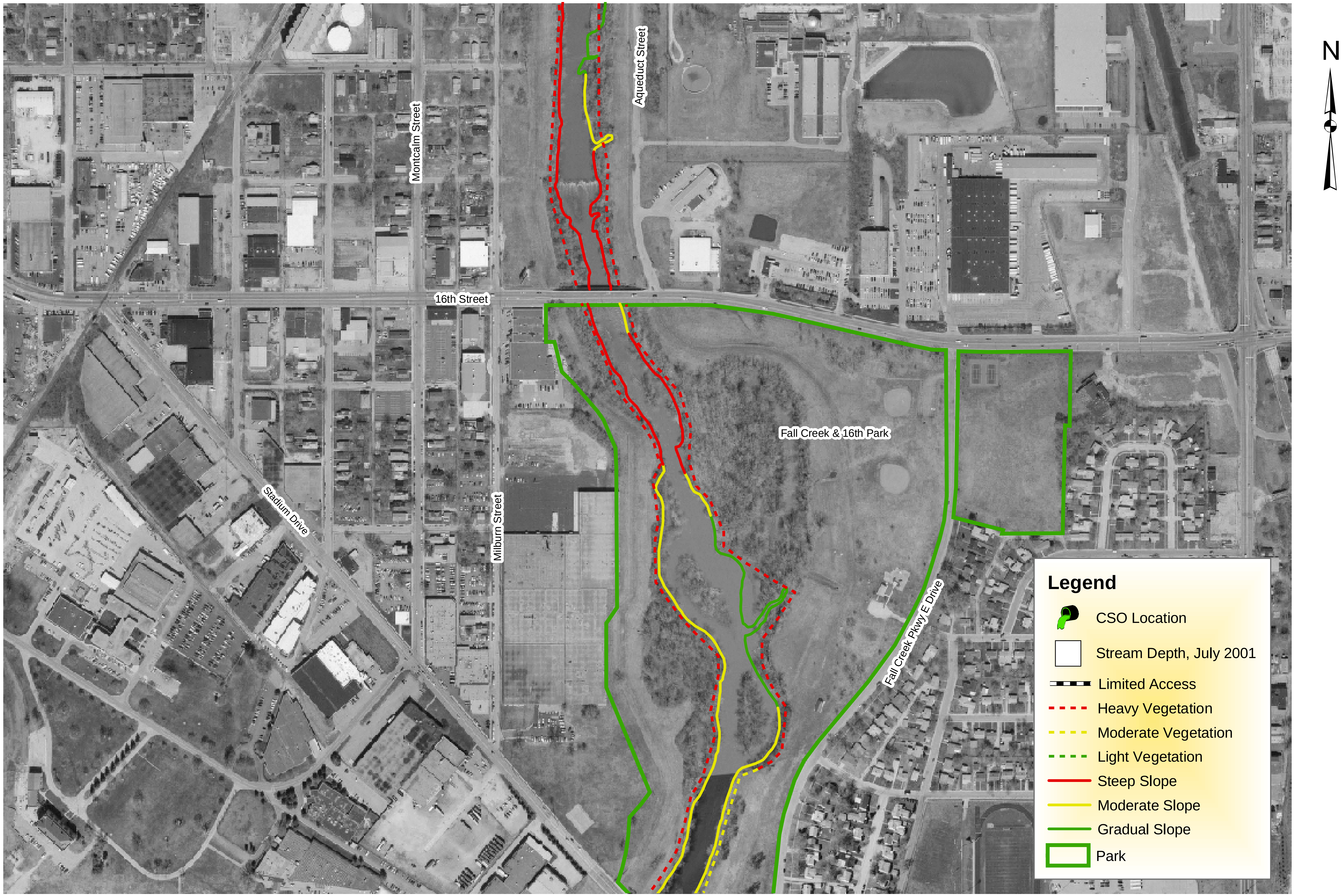
Appendix A2c
Physical Stream Characteristics
Fall Creek
Sheet 3 of 7



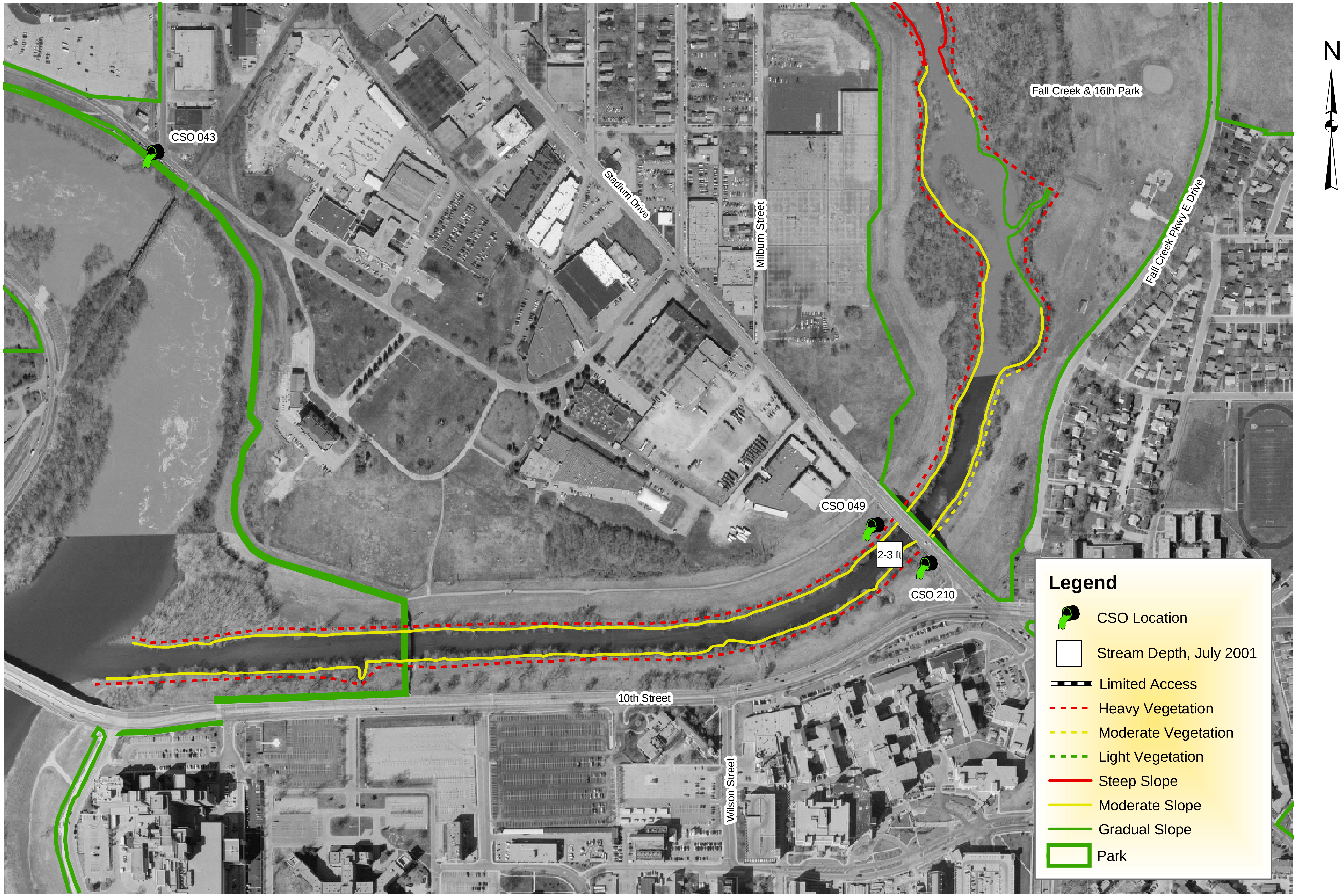
Appendix A2d
Physical Stream Characteristics
Fall Creek
Sheet 4 of 7



Appendix A2e
Physical Stream Characteristics
Fall Creek
Sheet 5 of 7



Appendix A2f
Physical Stream Characteristics
Fall Creek
Sheet 6 of 7



Appendix A2g
Physical Stream Characteristics
Fall Creek
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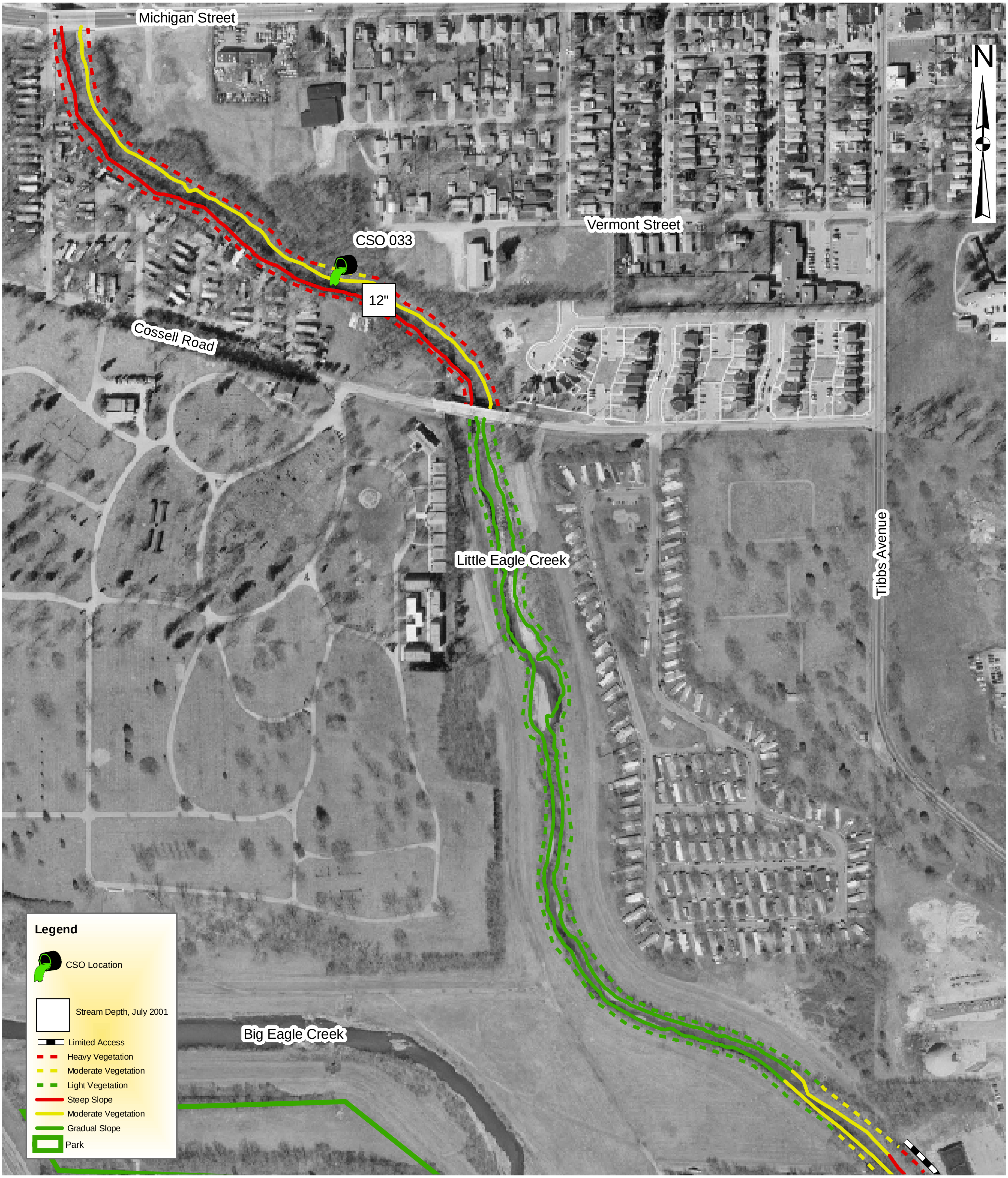

Appendix A3a
Physical Stream Characteristics
Eagle Creek
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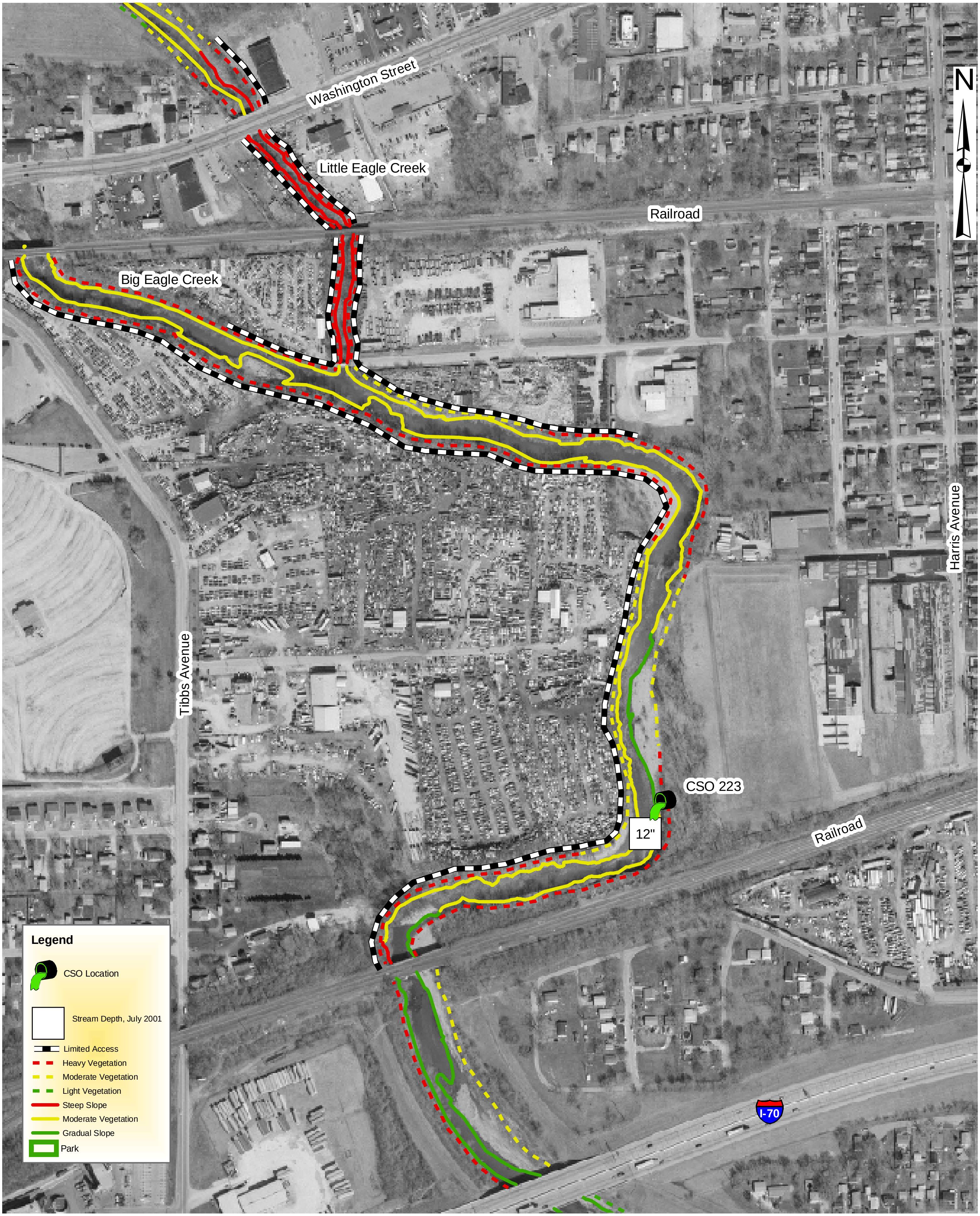

Appendix A3b
Physical Stream Characteristics
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Appendix A3c
Physical Stream Characteristics
Eagle Creek
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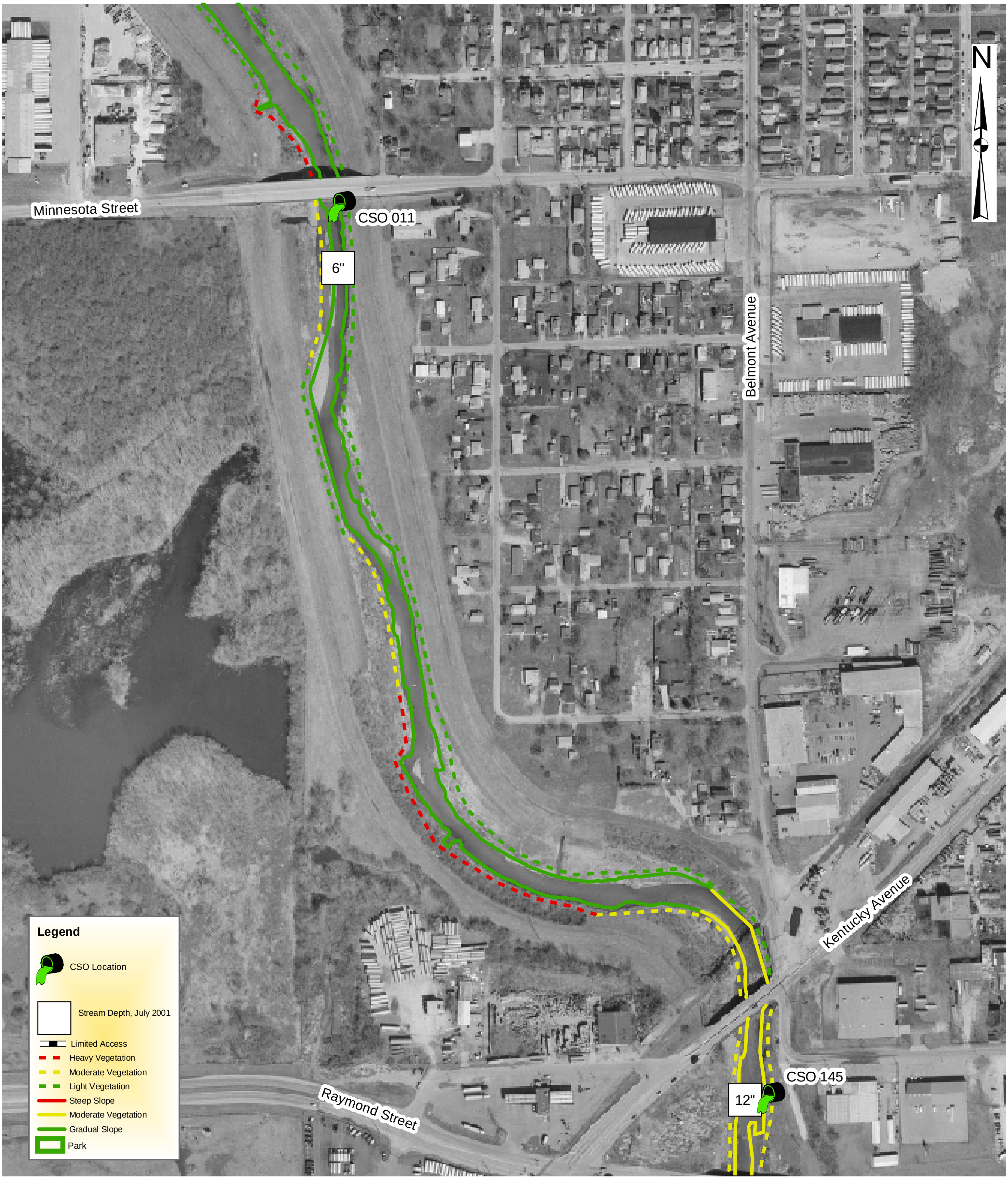

Appendix A3d
Physical Stream Characteristics
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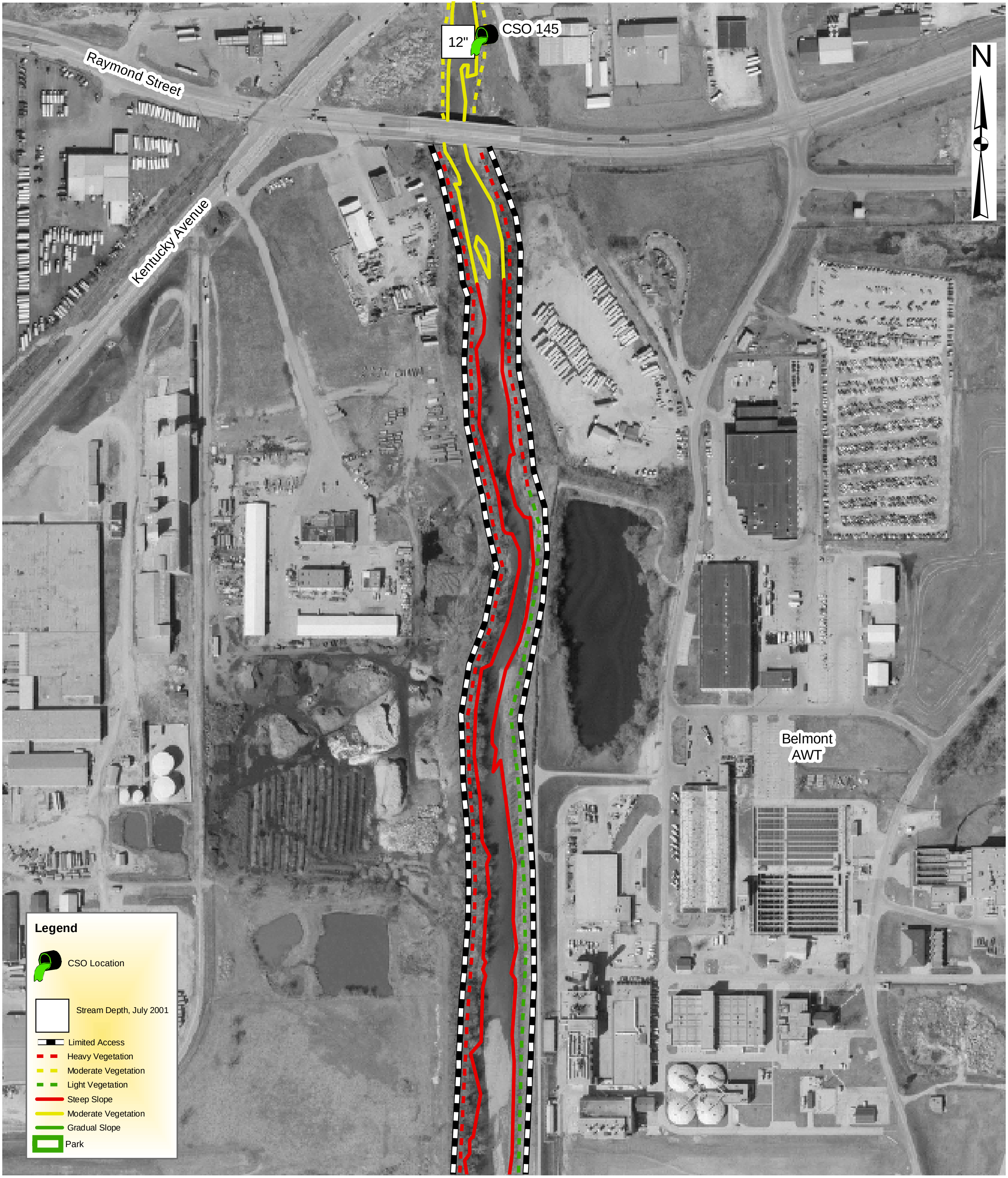
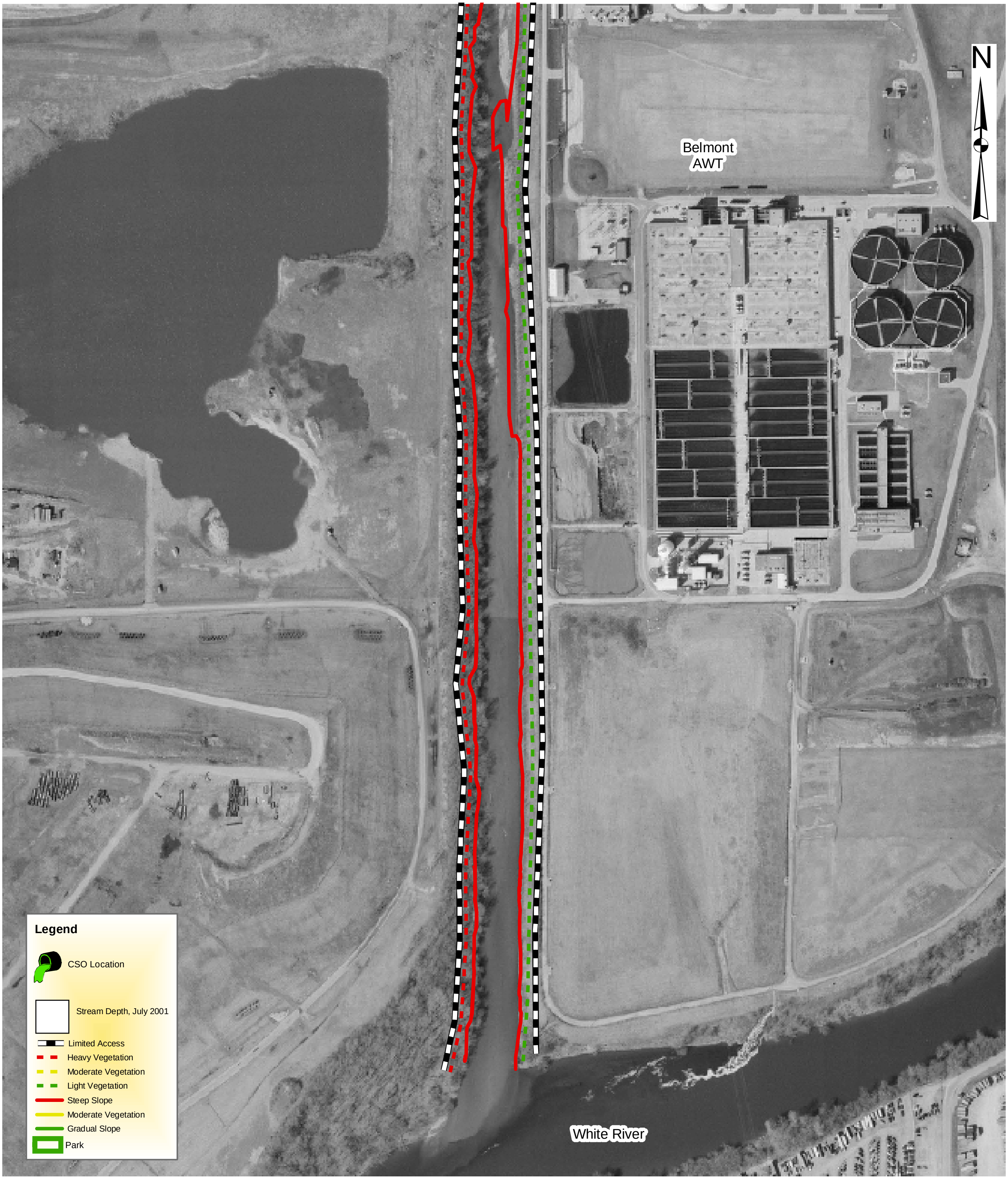


Appendix A3e
Physical Stream Characteristics
Eagle Creek
Sheet 5 of 6



Appendix A3f
Physical Stream Characteristics
Eagle Creek
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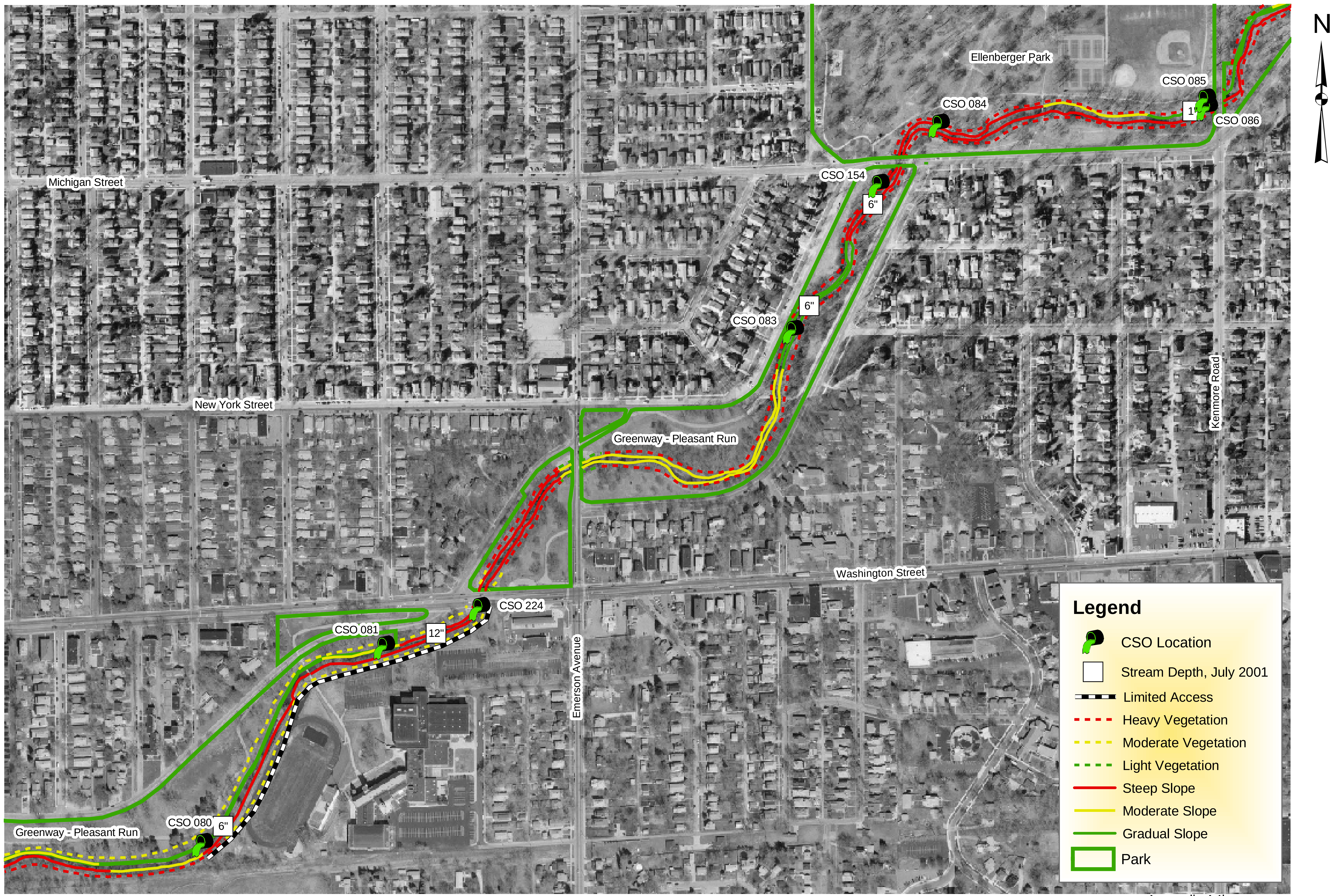
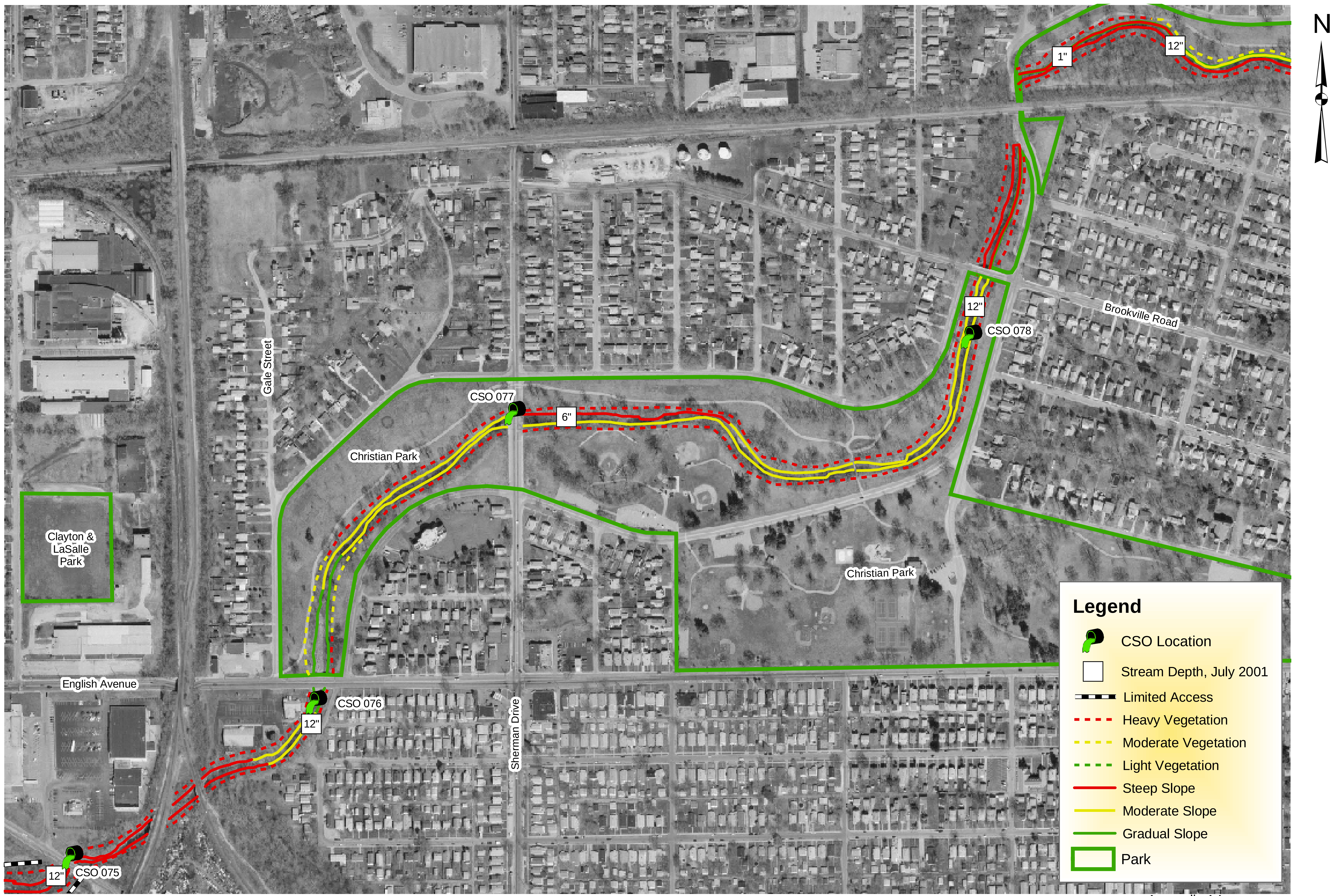
Appendix A4a
Physical Stream Characteristics
Pleasant Run
Sheet 1 of 8



Appendix A4b
Physical Stream Characteristics
Pleasant Run
Sheet 2 of 8



Appendix A4c
Physical Stream Characteristics
Pleasant Run
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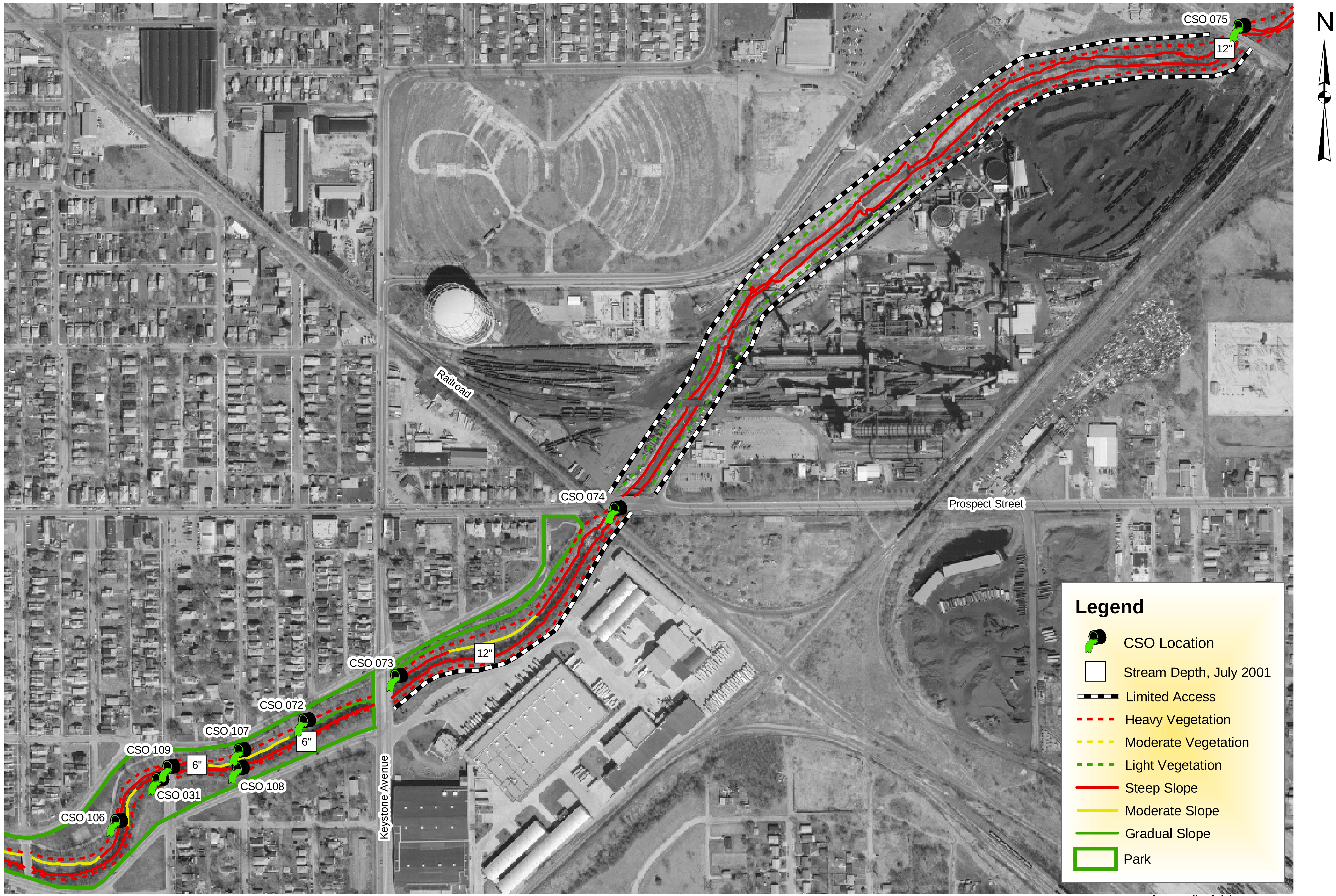

Appendix A4d
Physical Stream Characteristics
Pleasant Run
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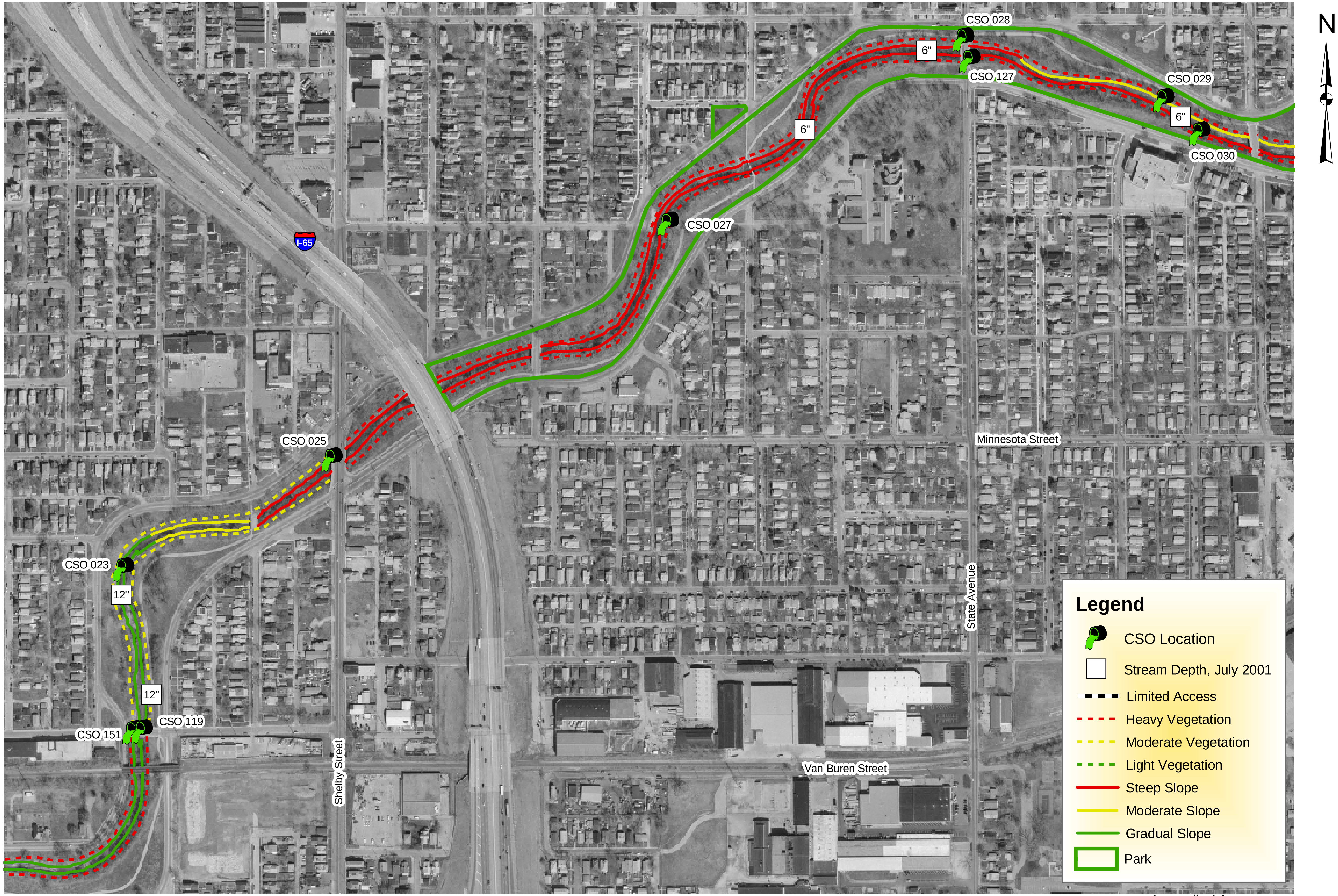

Appendix A4e
Physical Stream Characteristics
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Appendix A4f
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Appendix A4g
Physical Stream Characteristics
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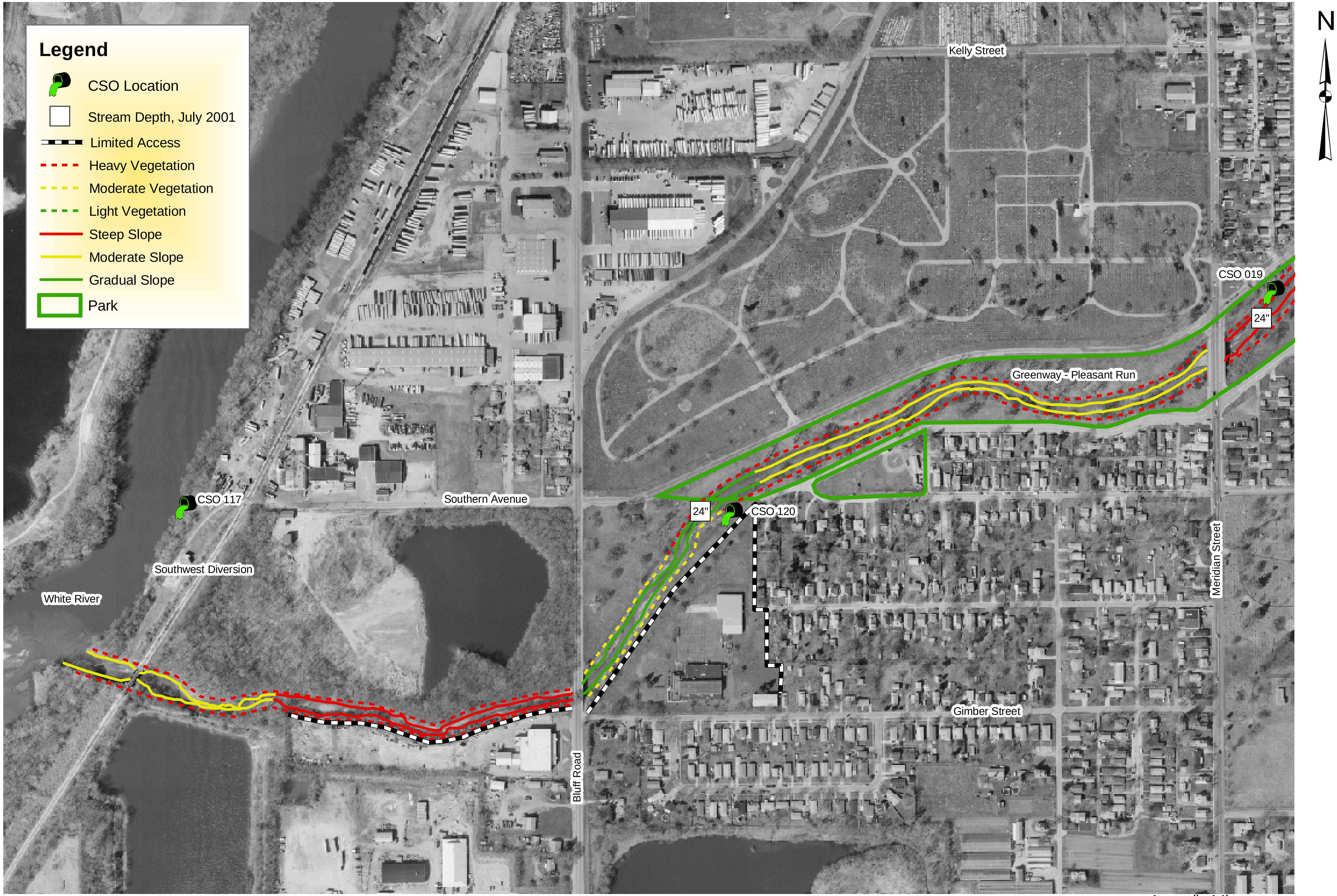

Appendix A4h
Physical Stream Characteristics
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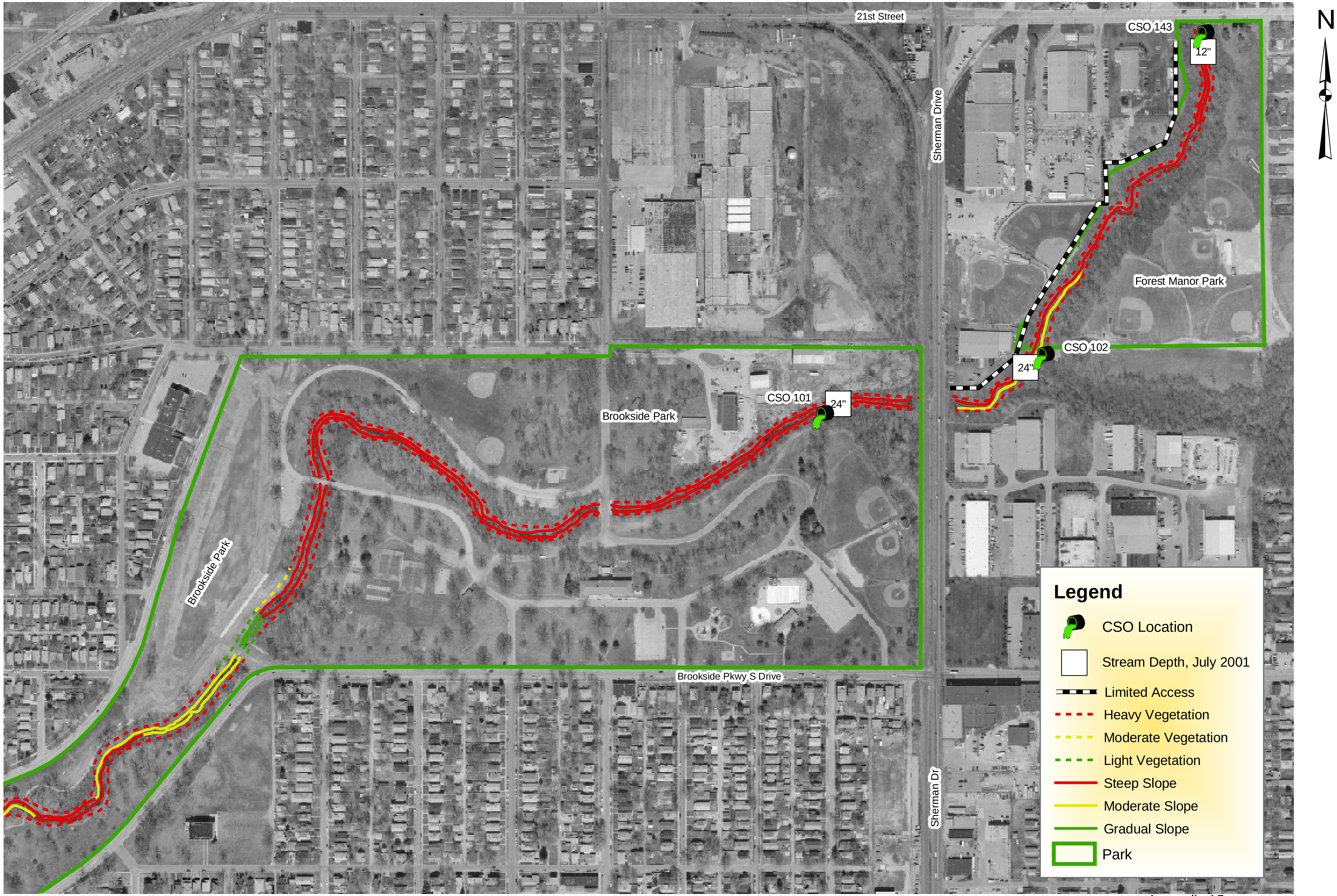

Appendix A5a
Physical Stream Characteristics
Pogues Run
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Appendix A5b
Physical Stream Characteristics
Pogues Run
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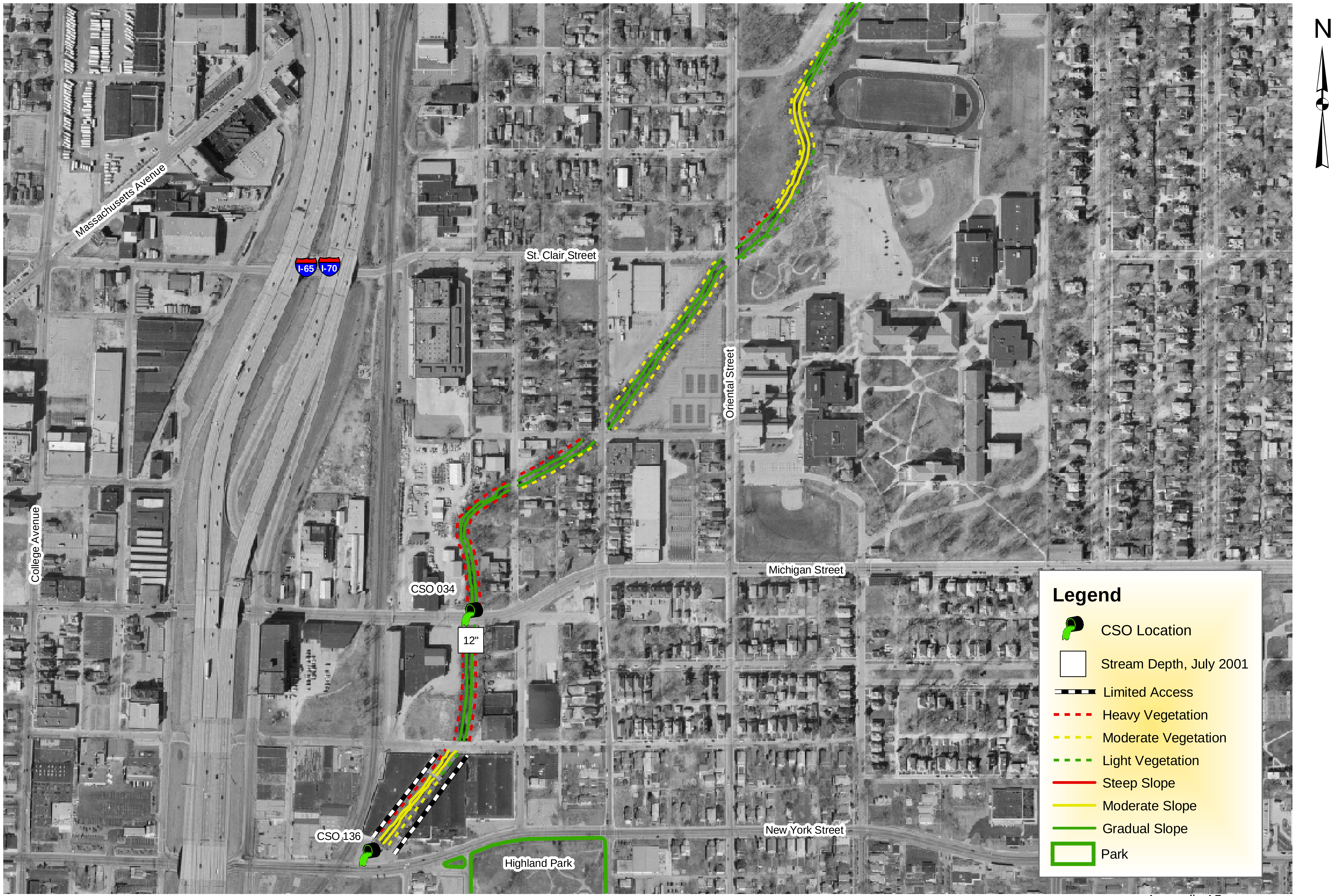

Appendix A5c
Physical Stream Characteristics
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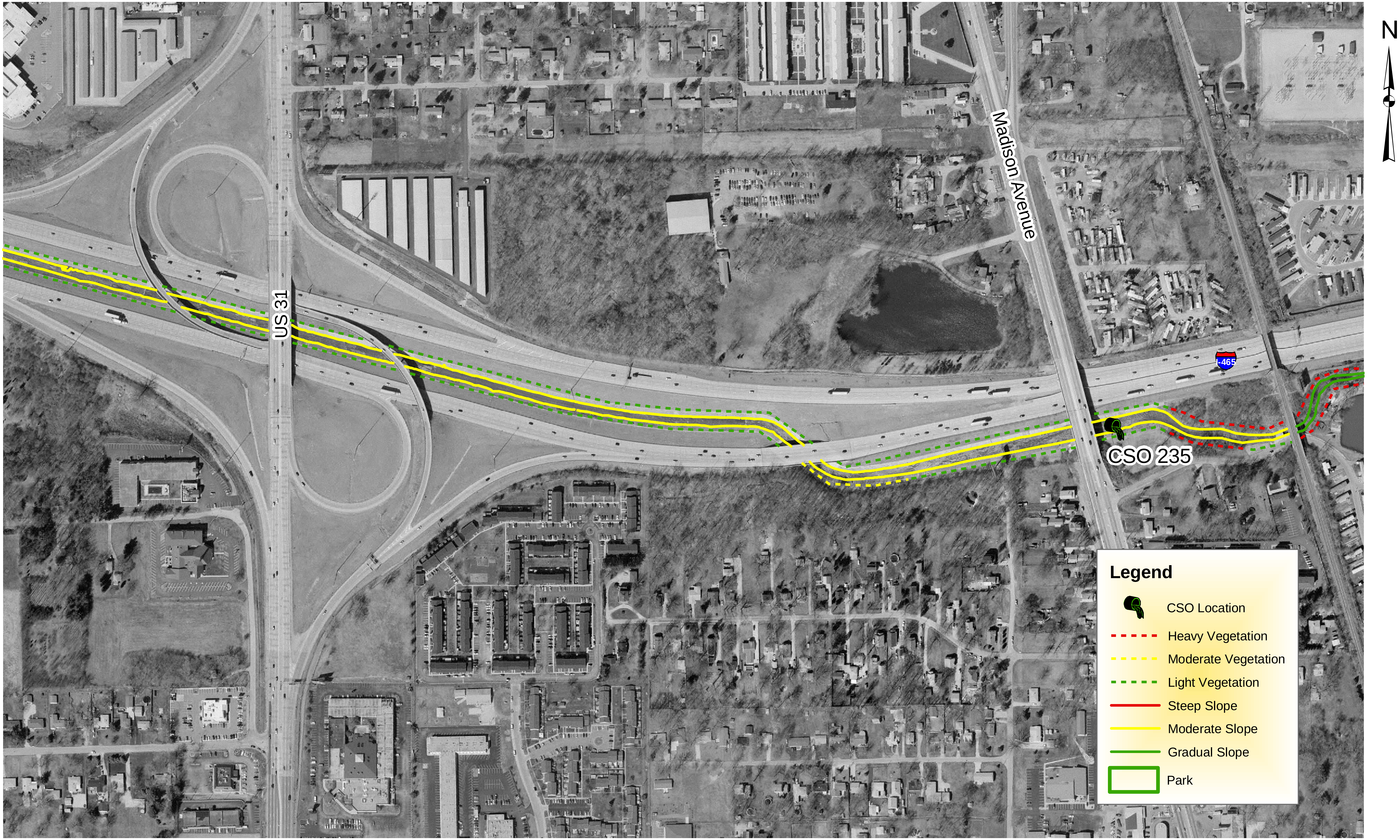

Appendix A6a
Physical Stream Characteristics
Lick Creek
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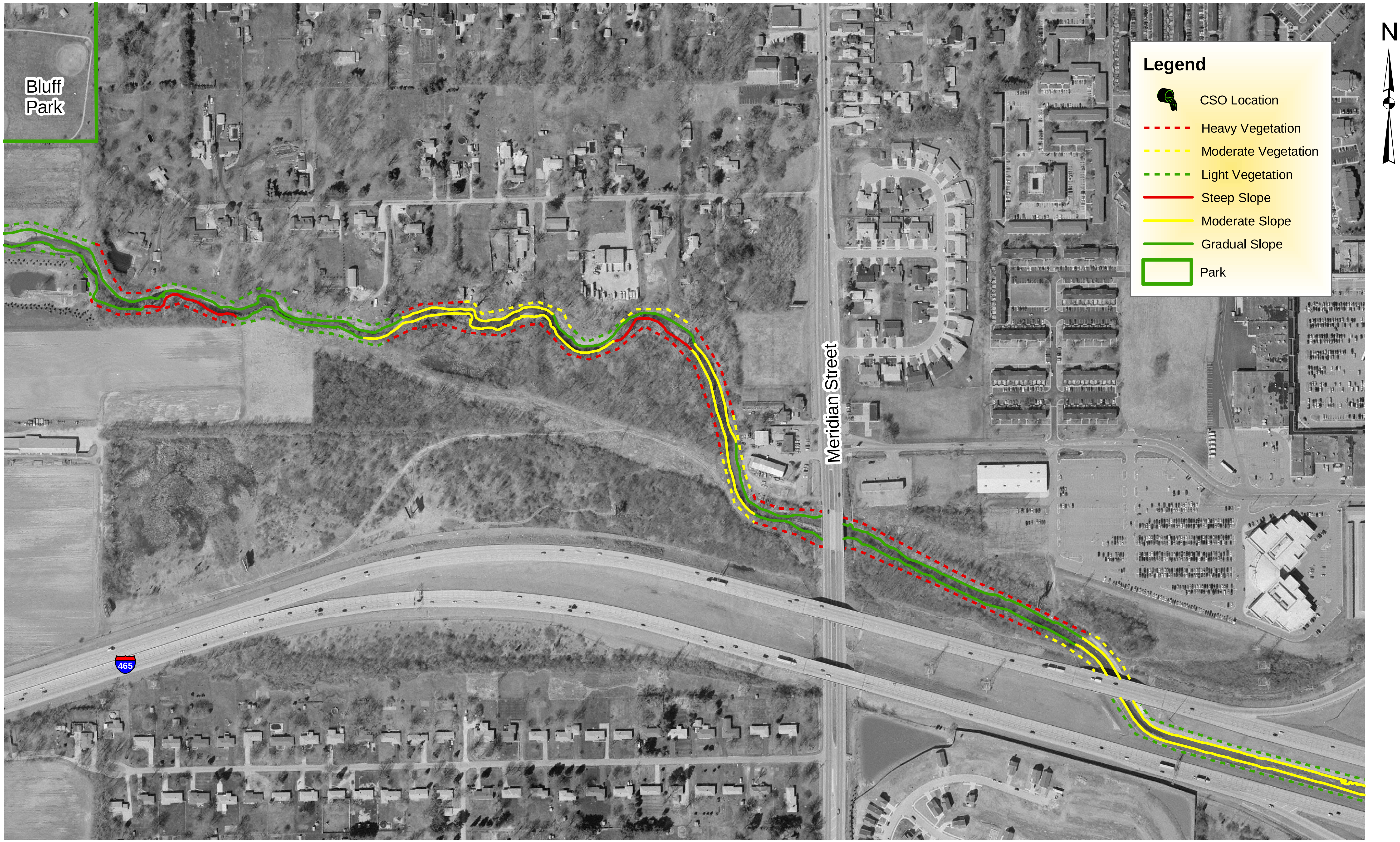

Appendix A6b
Physical Stream Characteristics
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Appendix A6c
Physical Stream Characteristics
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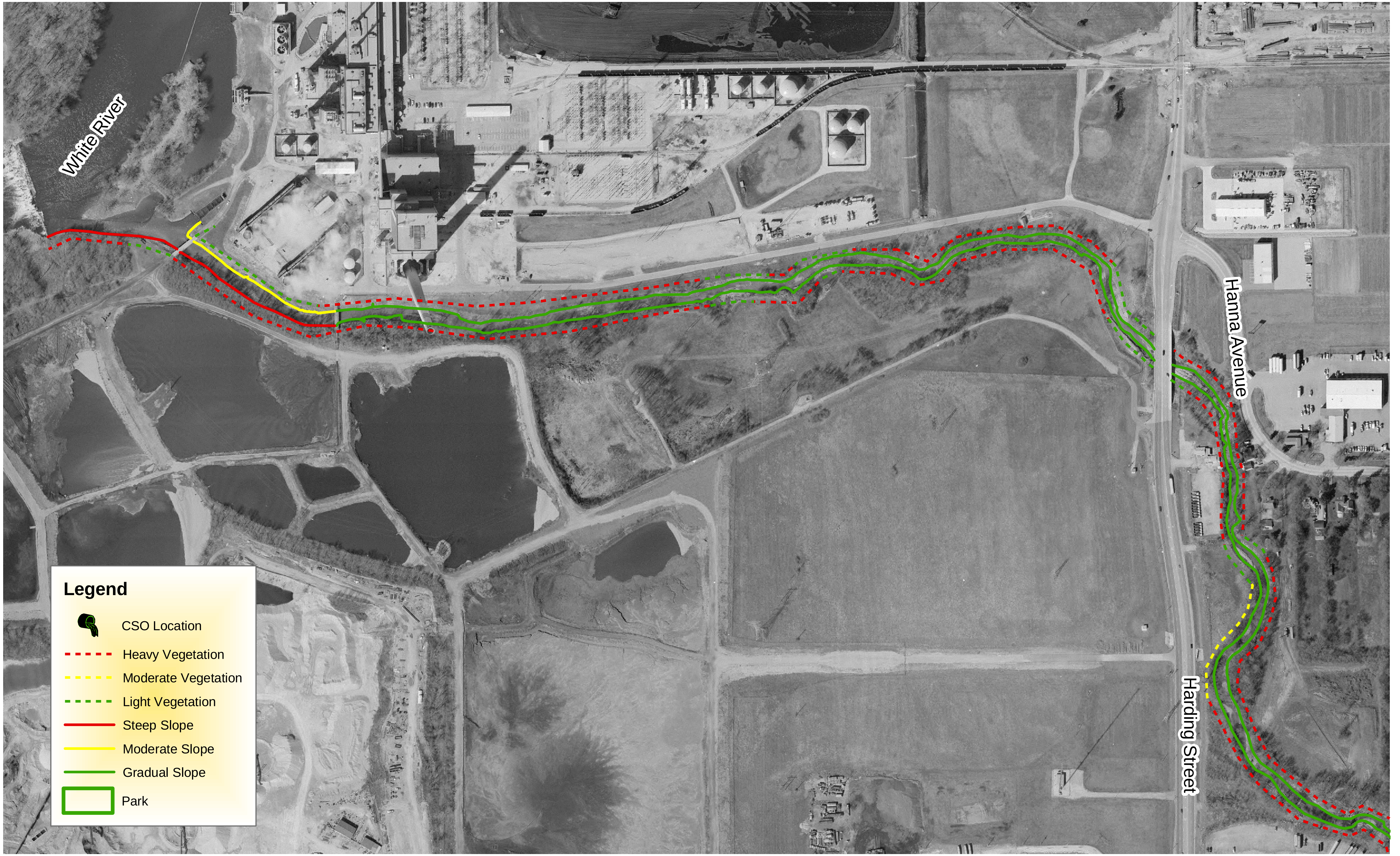

Appendix A6d
Physical Stream Characteristics
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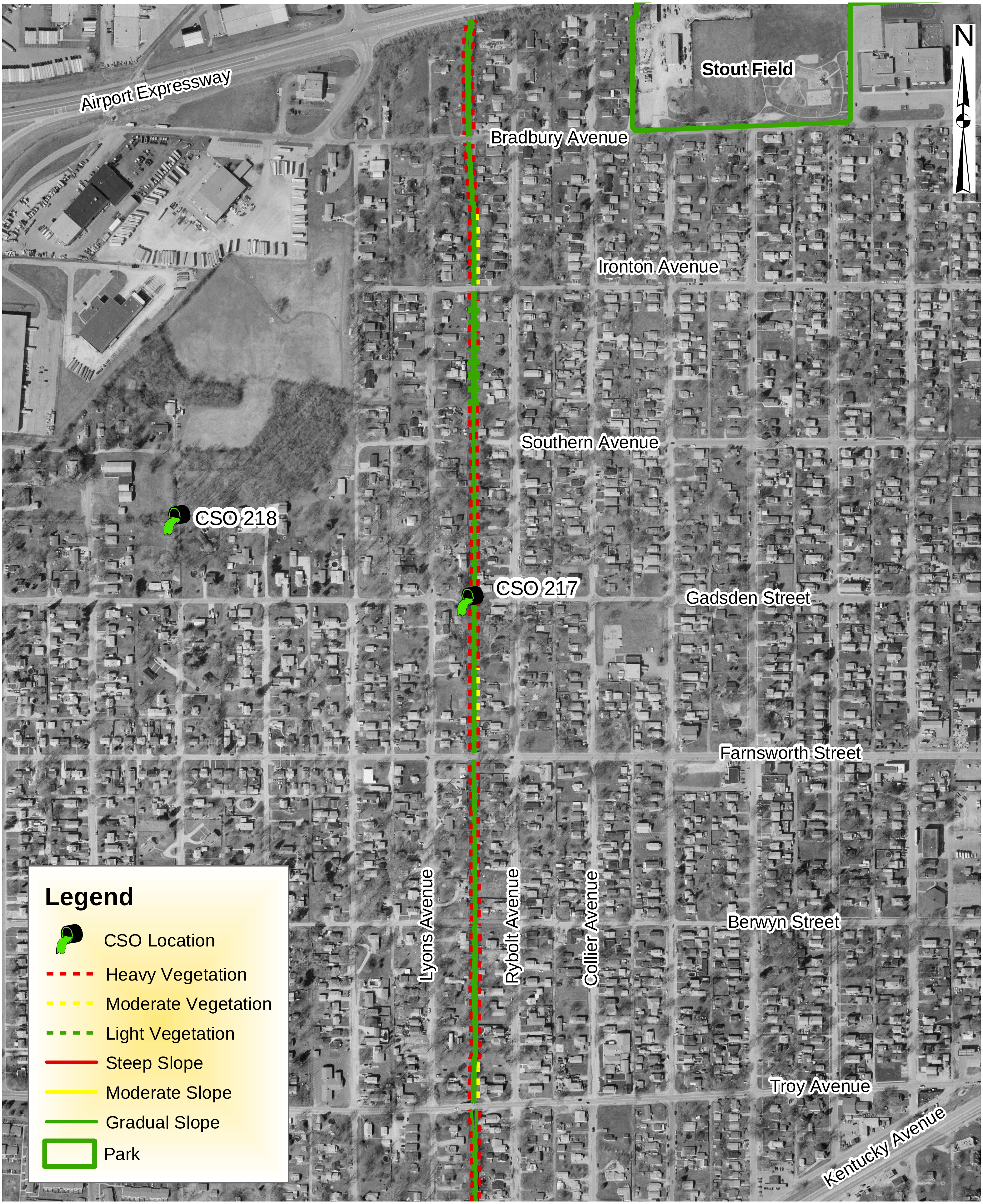

Appendix A7a
Physical Stream Characteristics
State Ditch
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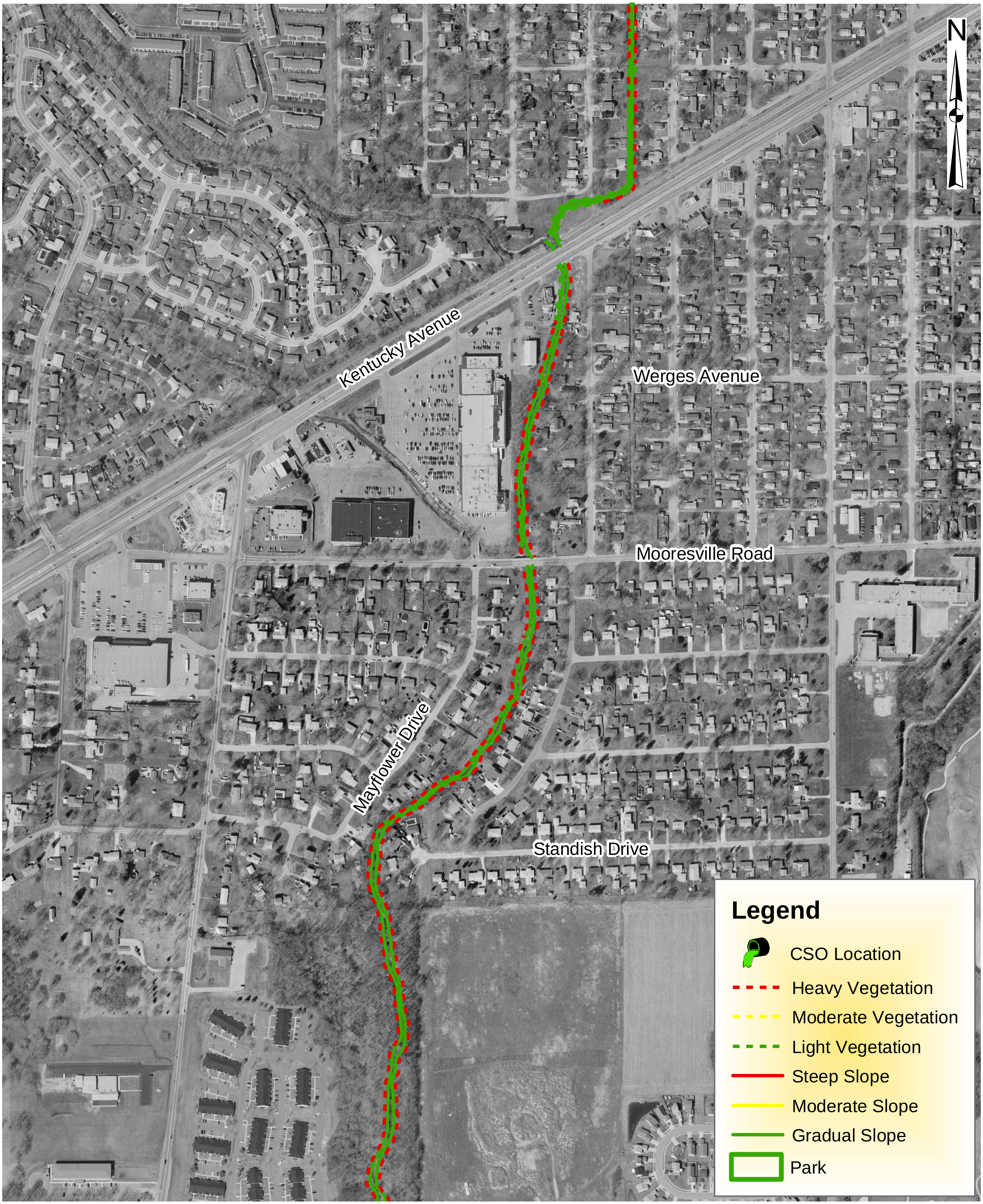

Appendix A7b
Physical Stream Characteristics
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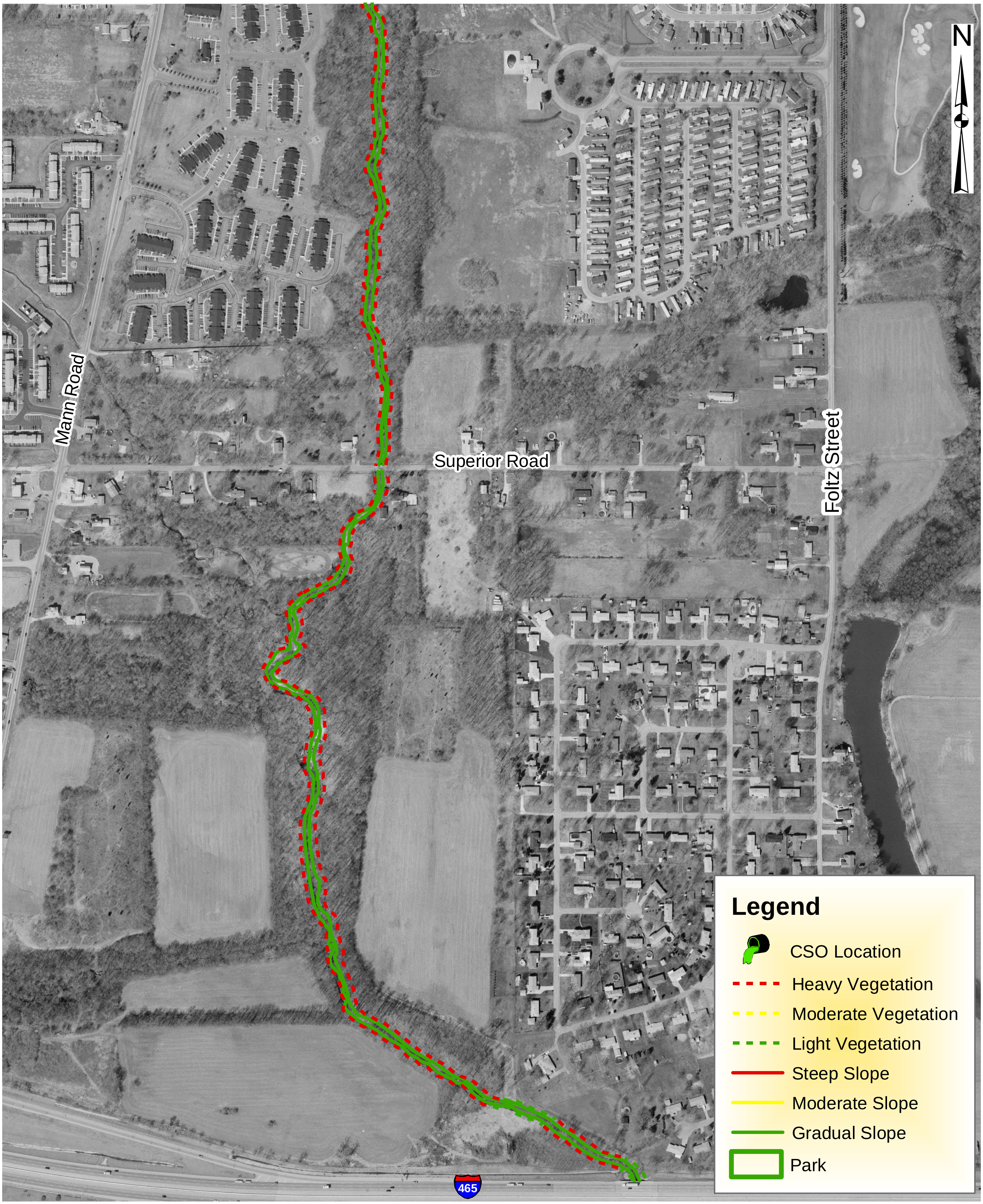

Appendix A7c
Physical Stream Characteristics
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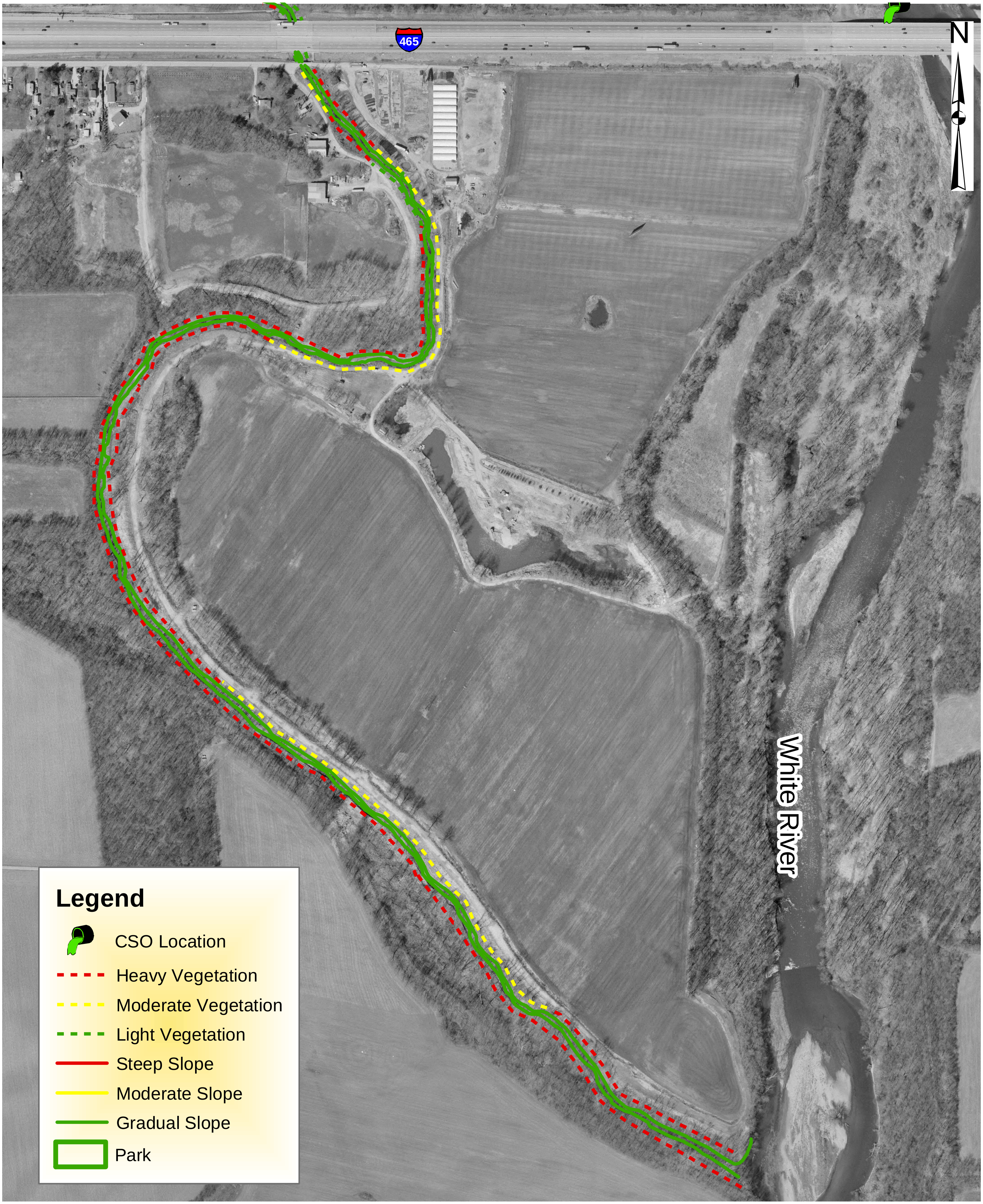

Appendix A7d
Physical Stream Characteristics
State Ditch
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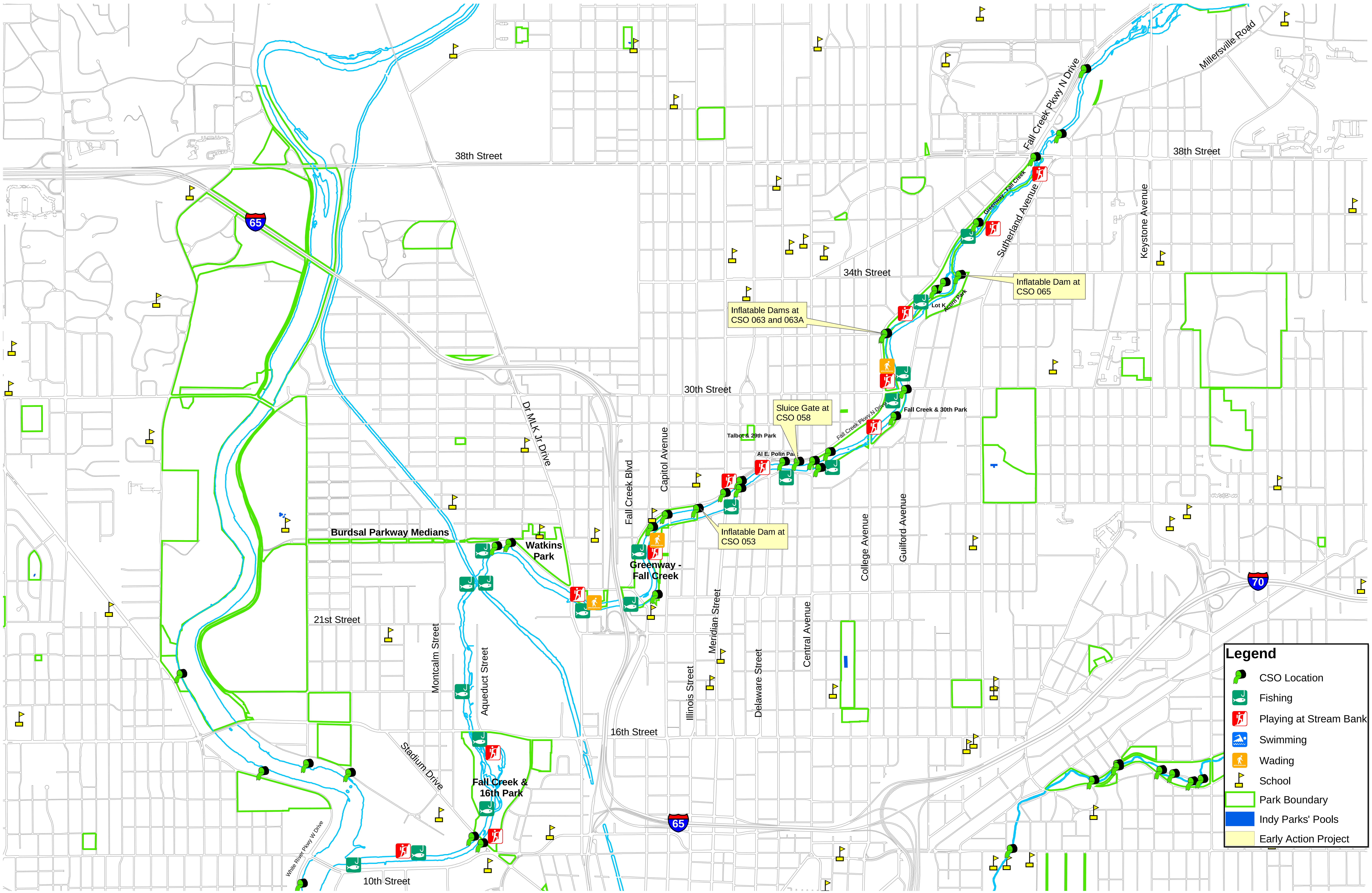
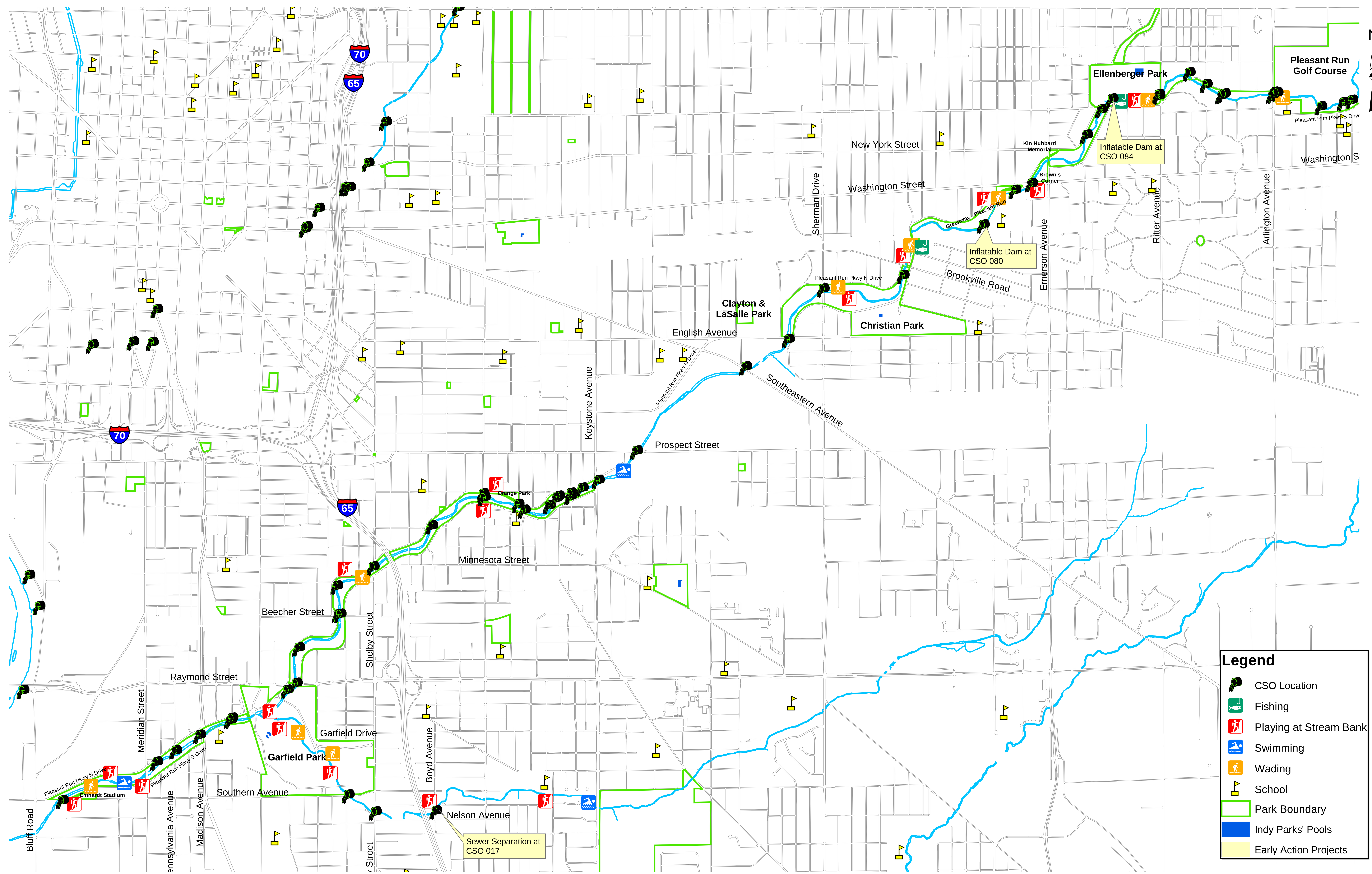


Note: Located upstream of this map, an early action project at CSO 103 will have sewer separation and rehabilitation.

Appendix A8
Fall Creek
Reported and Observed Uses



Appendix A9
Pleasant Run
Reported and Observed Uses

Note: There is also an early action project for Pogues Run on converting part of the tunnel for storage.

Appendix A10
Pogues Run
Reported and Observed Uses

Appendix A11
Eagle Creek
Reported and Observed Uses

Appendix A12a
White River
Reported and Observed Uses
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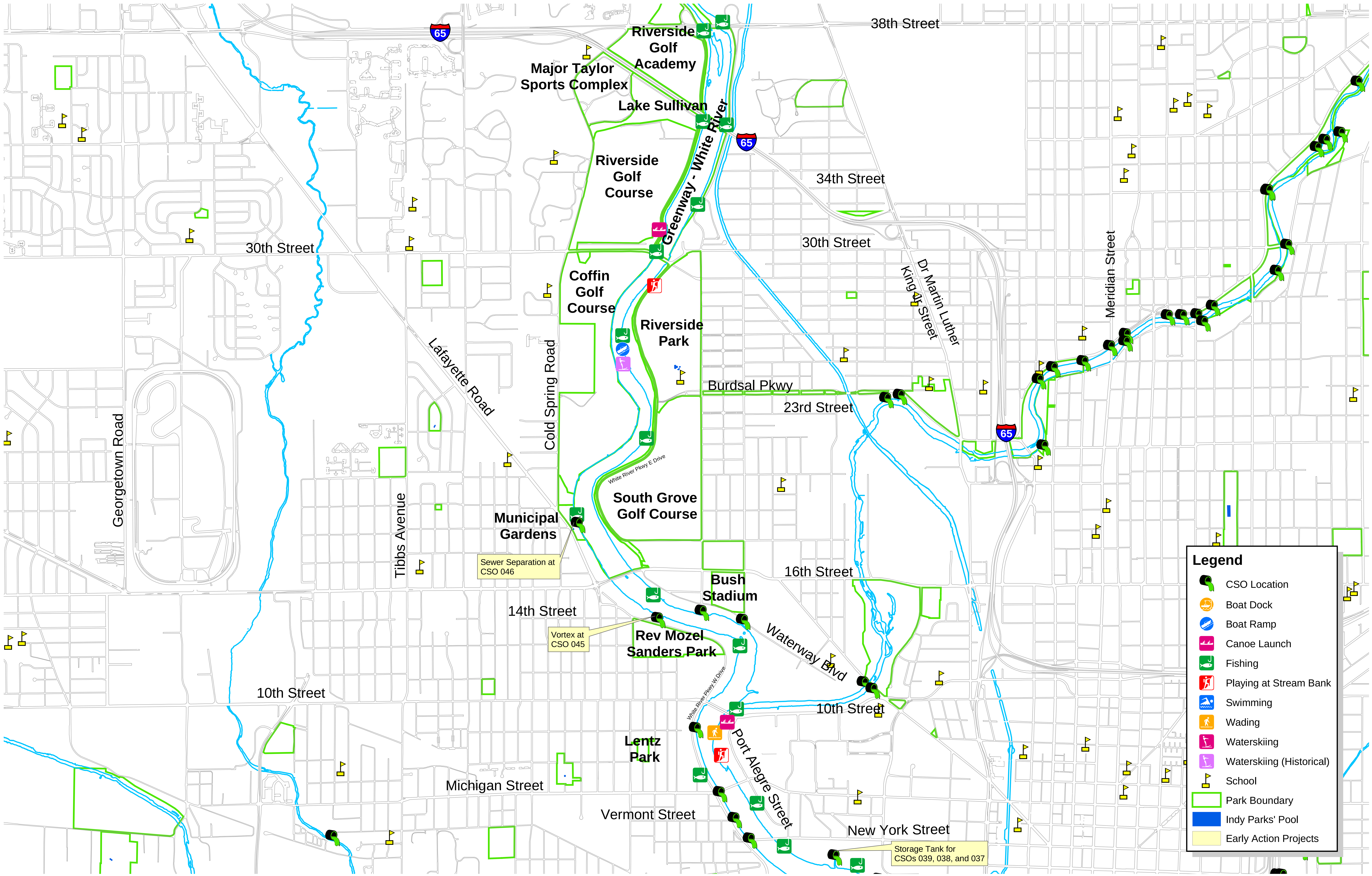

Appendix A12b
White River
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Appendix A12c
White River
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Appendix A12d
White River
Reported and Observed Uses
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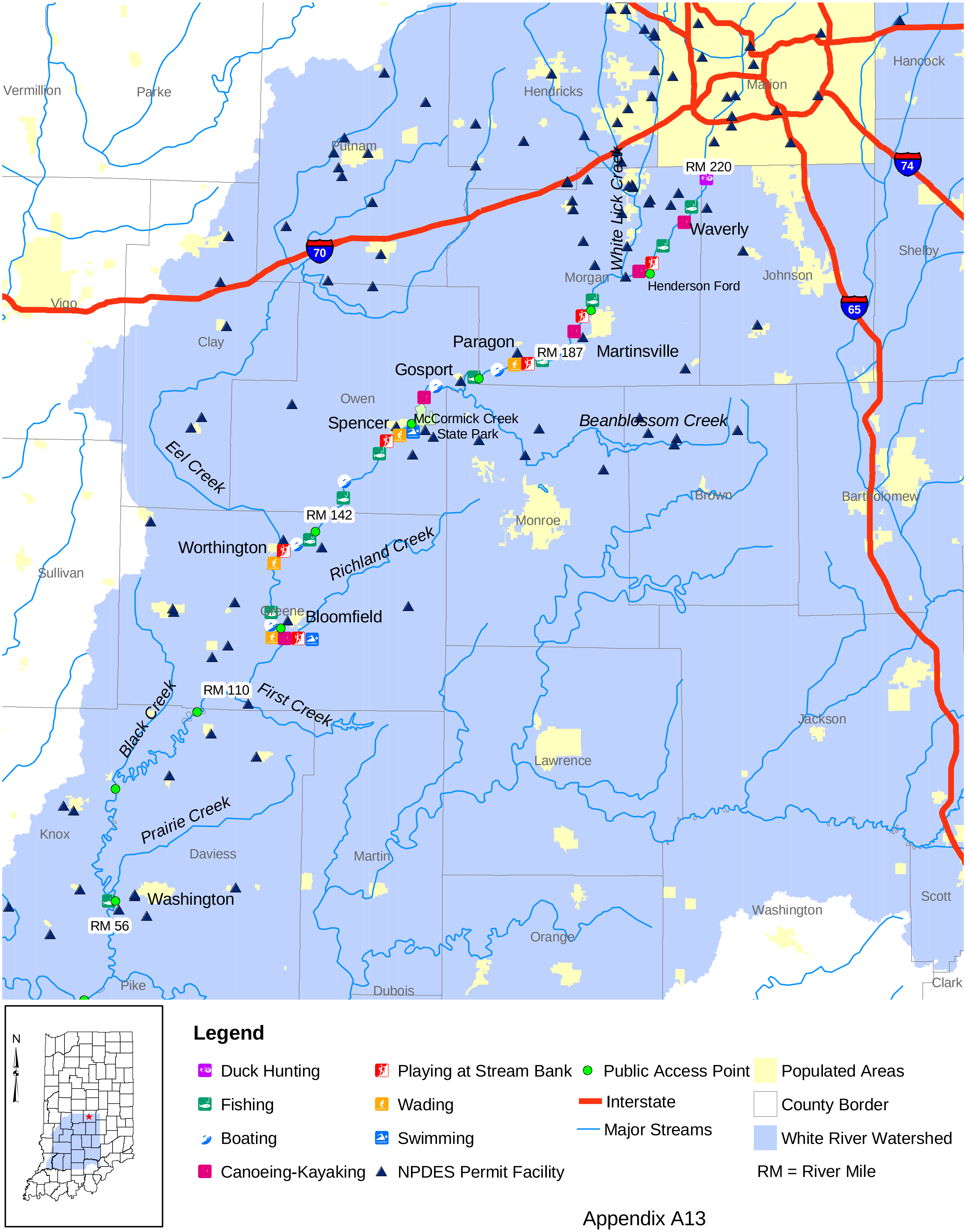

Appendix A13
White River Downstream of Marion County
Reported and Observed Uses

(IGS, 2004, http://igs.indiana.edu/arcims/statewide/download.html)
(Purdue University CAAGIS, 2004, http://danpatch.ecn.purdue.edu/~caagis/ftp/gisdata/data.html)

Indianapolis CSO LTCP Hydraulic and Water Quality Modeling Report

August 2004

CDM

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The purpose of this technical report is to document the development, calibration, acceptance, and application of the hydraulic and water quality models. The models have been used to support the development of the City of Indianapolis Combined Sewer Overflow (CSO) Long-Term Control Plan (LTCP). This report reviews the computer models and their uses to support Indianapolis CSO planning needs.

Hydraulic Modeling

The Indianapolis combined sewer system hydraulic modeling analysis incorporates two models: Storm Water Management Model (SWMM) and NetSTORM. The SWMM model was used for system hydraulic characterization; individual interceptor analysis; single event analysis; six-month continuous simulations for CSO discharge monitoring reports; and LTCP continuous modeling. The NetSTORM model was used to perform long-term continuous simulations, using the Indianapolis precipitation record of 1950-2003, to (1) generate average annual CSO statistics, (2) screen CSO control alternatives, and (3) estimate recommended CSO facility sizes. SWMM continuous simulations were used to confirm the performance of the recommended facility sizes determined based on the NetSTORM model.

The SWMM model was first developed and calibrated from 1992 to 1996, and recalibrated in 2002 using extensive flow monitoring data from the Supplemental Flow Monitoring and Sampling Program. U.S. EPA performed extensive reviews of the 2002 model recalibration effort and approved the model for CSO LTCP development in June 2002.

Water Quality Modeling

The Indianapolis receiving stream water quality modeling analysis incorporates two models: the Water Quality Analysis Simulation Program (WASP) and *E. coli* bacteria load model. The dynamic WASP model was used to determine single event dissolved oxygen (DO) and *E. coli* bacteria concentrations, and the *E. coli* bacteria load model evaluated the long-term *E. coli* bacteria performance of the White River and its tributary streams. These data are needed to ensure that the City of Indianapolis is in compliance with state and federal water quality standards.

The WASP model was calibrated in 1999 and recalibrated in 2002 to accurately predict DO and *E. coli* bacteria levels in the streams. U.S. EPA reviewed and approved the model for CSO Long-Term Control Plan development. In 2003, the city completed Total Maximum Daily Load (TMDL) reports for the Indiana Department of Environmental Management (IDEM) for the White River, Fall Creek, and Pleasant Run. The city developed and calibrated *E. coli* bacteria load models to support development of the TMDL reports. IDEM and U.S. EPA accepted and approved the TMDLs for these streams.

This report is organized into four sections. Section 1 provides an overview of the hydraulic and water quality models and their uses. Section 2 describes the development and calibration of the hydraulic modeling tools used to support the LTCP alternatives analysis. Section 3 documents the development and calibration of the water quality modeling tools used to support the LTCP alternatives analysis. Section 4 presents the model results for the various phases of the LTCP alternatives analysis.

1.0 Overview of System Models

This section introduces the system models and their uses to support Indianapolis planning needs.

The City of Indianapolis initiated its collection system modeling in 1992. The city subsequently developed a suite of modeling tools that have undergone significant refinement and expansion over the last twelve years, primarily to support combined sewer overflow (CSO) long term control planning (LTCP). A brief timeline of the modeling work follows.

- 1992-1993: Interceptor system model was developed.
- 1994-1995: Interceptor system was optimized.
- 1996-1997: Interceptor system model was calibrated and verified.
- 1998: Water quality (WQ) sampling for initial Water Quality Analysis Simulation Program (WASP) model calibration was performed.
- 2001: Draft CSO LTCP was developed; Storm Water Management Model (SWMM) and WASP models were used for facility sizing and expected WQ performance.
- 2001: Supplemental flow monitoring and sampling was performed for model recalibration.
- 2001-2002: Hydraulic model (SWMM) expansion was initiated for the Southport Advanced Wastewater Treatment Plant (SAWTP) and its tributary interceptors.
- 2002: SWMM and WASP models were recalibrated. Updated SWMM parameters were incorporated into NetSTORM. NetSTORM was validated with the recalibrated SWMM model.
- 2003: Control technologies evaluation began; NetSTORM and WASP models were used for CSO facility sizing and expected WQ performance.
- 2003: Total Maximum Daily Load (TMDL) reports for Fall Creek, Pleasant Run, and the White River were completed. The *E. coli* bacteria load model was developed to support the TMDLs.
- 2003-2004: Watershed alternative evaluations were performed for Pleasant Run and Fall Creek. The NetSTORM, WASP, and *E. coli* bacteria load models were used to support the evaluations.
- 2004: Interplant Connection Facilities Plan began. NetSTORM and SWMM were used for facility evaluation.
- 2004: SWMM model expansions for the South Marion County Regional Interceptor (SMCRI) and Belmont North Interceptors were completed.
- 2004: System Wide Plan Analysis for the Revised CSO LTCP begins.

1.1 Collection System Models

The hydraulic models were initially developed for the combined sewer interceptor system. The combined sewer interceptor system contains approximately 82 miles of sewers that serve a 35,500 acre combined sewer area. The combined sewer area is located in its entirety in Marion County, which has a 2000 census population of 860,454. It should be noted that not all of Marion County lies in the combined sewer area.

The SWMM model of the combined sewer interceptor system is a key element for understanding and predicting the hydraulic conditions that cause raw sewage overflows. The SWMM model has been applied primarily to develop the CSO Operational Plan and the Long Term Control Plan. The model is currently used to prepare discharge monitoring reports (DMR) for the combined sewer outfalls, as required by the city's National Pollutant Discharge Elimination System (NPDES) permit. The model was first developed and calibrated from 1992 to 1996, then recalibrated in June 2002 using extensive flow monitoring data from the Supplemental Flow Monitoring and Sampling Program. Since 1996, the SWMM model has been regularly updated and expanded to reflect new sewer system data and include some of the separate areas of the collection system. U.S. EPA performed extensive reviews of the 2002 model recalibration effort and approved the model for CSO LTCP development in June 2002. This approval included expectations for continued model expansion and calibration to support detailed planning during implementation of the LTCP projects. **Figure 1-1** presents the extents of the SWMM model. **Appendix A** contains correspondence from U.S. EPA approving the hydraulic and water quality models for LTCP development.

The NetSTORM model of the combined sewer interceptor system was developed for evaluation of the 1950-2003 historical precipitation record. The model was first developed and calibrated from 1992 to 1996, then validated in 2002 using the recalibrated SWMM model. The NetSTORM model was used to generate average annual CSO statistics, screen CSO control alternatives, and estimate CSO facility sizes for confirmation with the SWMM model.

Figure 1-2 presents an overall schematic showing the integration and connectivity of the collection system and receiving stream water quality modeling tools.

1.2 Receiving Stream Models

To understand and evaluate water quality improvements in the Indianapolis rivers and streams, the city initiated development of a Water Quality Analysis Simulation Program (WASP) model of the receiving streams in 1998. The WASP model was calibrated in 1999 and recalibrated in 2002 to predict levels of dissolved oxygen and *E. coli* bacteria in the streams. U.S. EPA reviewed and approved the model for CSO LTCP development.

In 2003, the city completed TMDL reports for the Indiana Department of Environmental Management (IDEM) for the White River, Fall Creek, and Pleasant Run. The city developed and calibrated *E. coli* bacteria load models to support development of these reports. IDEM and U.S. EPA accepted and approved the TMDLs for these streams.

1.3 Report Organization

This report is organized into four sections. Section 1.0 provides an overview of the system models and their uses. Section 2.0 describes the development and calibration of the hydraulic modeling tools used to support the LTCP alternative analysis. Section 3.0 documents the development and calibration of the water quality modeling tools used to support the LTCP alternative analysis. Section 4.0 presents the model results for the various phases of the LTCP alternative analysis. Full page tables and figures are located after Section 4.

1.4 Source Documents

This report has been developed from information reported in prior technical documents, which are summarized in **Table 1-1**. Information presented in this report from prior technical documents should not be considered exhaustive. The source documents may be referenced for additional information on the city’s model development.

Table 1-1
Summary Of Source Documents

Year	Author	Title	Model Reference
1997	CSO Project Team	CSO Model Calibration Technical Memorandum	SWMM □ NetSTORM
2003	CDM	Presentation Supplement for CSO Control Technology Evaluation	SWMM, NetSTORM, WASP
2003	CDM	Fall Creek TMDL Report	*E. coli* bacteria load
2003	CDM	Pleasant Run TMDL Report	*E. coli* bacteria load
2003	CDM	White River TMDL Report	*E. coli* bacteria load
2003	ICST	Stream Reach Characterization and Evaluation Report	WASP
2003	ICST	Hydraulic Model Calibration and Verification Plan	SWMM
2004	CDM	South Marion County Regional Interceptor Model Expansion Report	SWMM
2004	CDM	Belmont North Interceptor Model Expansion Report	SWMM

2.0 Combined Sewer System Hydraulic Model

This section describes the development, calibration, acceptance, and use of the combined sewer system hydraulic modeling tools. The Stormwater Management Model (SWMM) and NetSTORM models are described in detail. Section 4.0 presents the results of the NetSTORM modeling analysis supporting the Combined Sewer Overflow (CSO) Long-Term Control Plan (LTCP).

2.1 Approach

The Indianapolis combined sewer system hydraulic modeling analysis incorporates two models: SWMM and NetSTORM. The SWMM model is used for system hydraulic characterization, individual interceptor analysis, single event analysis, six-month continuous simulations for CSO discharge monitoring reports (DMR) and LTCP continuous simulations. The NetSTORM model is used for long-term continuous simulations, using the Indianapolis precipitation record of 1950-2003 to generate average annual CSO statistics, screen CSO control alternatives, and estimate CSO facility sizes. SWMM continuous simulations are used to confirm the performance of the facility sizes based on the NetSTORM model.

Recognizing that the interceptor sewers and regulators, not the combined sewers, control wet weather system conveyance capacity to the wastewater treatment plants (and therefore control the occurrences of CSOs), the City of Indianapolis developed a detailed model of interceptor sewers and regulators using the EXTRAN block of SWMM. For the purposes of this report, combined sewers are defined as the sewers in the combined sewer area upstream of the CSO regulator structures and interceptor sewer. **Figure 2-1** presents a map of the Indianapolis interceptors. The RUNOFF block of SWMM was used to generate runoff flows from drainage subcatchments and to calibrate wet weather flow to the EXTRAN model. The linked SWMM model was used to establish input data for the NetSTORM model of the combined sewer system (CSS), specifically the regulator and interceptor capacities and the rainfall-runoff coefficients. The city performed long-term continuous simulations using NetSTORM to compute average annual CSO frequencies and volumes. The selected modeling strategy enables the city to accurately determine interceptor sewer conveyance and system storage capacities, identify system optimization projects, characterize overflows and pollutant loads to receiving streams, and evaluate a large number of CSO control alternatives.

2.2 SWMM

2.2.1 Introduction

The SWMM model was developed to provide hydraulic representation of the interceptors and regulator structures in the combined sewer area for CSO operational plan development and CSO long-term control planning efforts. Although several models are available for interceptor modeling, the most widely used and accepted model for this application is the EXTRAN block of the U.S. EPA's SWMM (Roesner et al., 1988). The EXTRAN block solves the full dynamic St. Venant equations for gradually varied, unsteady flow using an explicit numerical solution technique.

Model calibration involves collecting field monitoring data (rainfall and runoff) and developing an initial model input data set. This is followed by successive applications of the model during which calibration parameters are adjusted until the model results match observed data as closely as possible. Calibration is a critical step in ensuring that the model properly simulates flow in the collection system over a range of storm events. Model calibration adjustments must be within an acceptable range for the specified hydraulic parameter. The standard for model calibration is established as +/- 20 percent of the reliable monitored flow depth, flow rate, and volume for CSO LTCP development.

Model development and calibration protocols may vary based on modeling objectives and goals established for each project and level of model detail. For example, in a typical large CSO planning project, hydraulic models are initially developed for the interceptor system and later expanded to upstream sewers to support detailed facilities planning efforts. The level of model development and calibration for facilities planning and design is significantly higher than for long-term planning efforts, in order to achieve the high degree of accuracy in model predictions necessary to support these functions. The SWMM linked model results include correlation of the simulated hydraulic grade line (HGL) and flow rate with the measured values, at various flow meter sites, during selected calibration storm events. The 1997 model calibration is summarized in the CSO Model Calibration Technical Memorandum (CSO Project Team, 1997).

2.2.2 2002 Recalibration and Verification

The model recalibration process was initiated in 2001 in order for the SWMM model to be approved by U.S. EPA for use in the LTCP. The goal of the model recalibration process was to demonstrate that the SWMM model is appropriate for simulating system flows and CSO discharges. The model recalibration used flow monitoring data from 17 CSO locations, five combined sewer interceptor locations, and permanent flow monitors upstream of the combined sewer area. This calibration included additional data collected during the supplemental flow monitoring program. **Figure 2-2** presents the locations of these flow monitors. Basin-specific radar-rainfall precipitation data was collected for three calibration rainfall events: August 31, 2001; September 7, 2001; and September 23, 2001.

The specific recalibration goals are as follows: (1) modeled depth at interceptor and CSO regulator locations should be within 20% of the reliable measured data, and (2) modeled CSO activation and event duration should be consistent with reliable outfall data. Activation and duration data are considered to be more accurate than other sources of information available from CSO outfall monitors. The Hydraulic Model Calibration and Verification Plan (ICST, 2003) documents the methodology necessary to ensure that reliable flow monitoring data is collected.

U.S. EPA performed extensive reviews of the 2002 model recalibration effort and approved the model for CSO LTCP development in June 2002. Approval of the model included expectations for continued model expansion and calibration to support detailed facilities planning and design during implementation of the LTCP projects. **Appendix A** contains correspondence from U.S. EPA approving the hydraulic and water quality models for supporting the LTCP revisions.

Appendix B contains the final 2002 model recalibration information that U.S. EPA reviewed. The summary figures of the recalibration effort are presented in **Figures 2-3** and **2-4**. Figure 2-3 presents the preliminary and final recalibration scatter plots comparing modeled and monitored HGL in the interceptor and CSO regulator locations. The majority of the data points fall within the 20% accuracy bands, which meets the calibration objective. **Figure 2-4** presents the preliminary and final recalibration scatter plots comparing modeled and monitored volume and HGL in the CSO interceptor locations. The majority of the HGL data points fall within the 20% accuracy bands, which meets the calibration objective. The data points for modeled and metered volume are considered to be accurate, within the limitations of flow metering technology to provide reliable velocity measurements in large diameter sewers. **Appendix C** contains flow monitoring scattergraphs.

2.2.3 Model Development from 1997-2004

The Indianapolis SWMM model has been refined as needed to incorporate new information gathered from field investigations and updated records. Examples of the new information include revisions to sewer profiles, subbasin delineations, regulator structure weir elevations, diversion structure operation, Advanced Wastewater Treatment (AWT) operations, and the representation of newly constructed collection system elements. This information has been incorporated into the SWMM model to support the 2001 CSO LTCP, the DMRs from 1999 through 2004, and the 2004 Interplant Connection Facilities Plan. Completion of the DMRs requires that all CSS improvements made in the six-month DMR period receive functional representation in the SWMM model. In 2001 and 2002, the SWMM model was expanded to include the headworks of the Southport AWT Plant (SAWTP) and a portion of its tributary interceptors. The objective was to expand the calibrated interceptor model to the SAWTP and include basic representation of the interceptor sewer network immediately upstream of the plant. Developing a working interceptor model that links the Belmont and Southport AWT Plants enabled the city to perform an overall planning level assessment of the flow diversion between the two plants.

In 2002 and 2003, the SWMM model was expanded to include two key separate sanitary interceptors: the South Marion County Regional Interceptor (SMCRI) and Belmont North (BN) sanitary interceptor. The expanded model will support assessment of the current and future capacity of these interceptors and support implementation of the city's CSO LTCP. The expanded SMCRI model is more detailed than the basic representation developed in the 2001-2002 Southport expansion, and is intended to be used for performing overall planning level hydraulic assessments under existing and future conditions. The development and calibration of the model expansions is documented in the South Marion County Regional Interceptor Model Expansion Report (CDM, 2004) and the Belmont North Interceptor Model Expansion Report (CDM, 2004).

2.3 NetSTORM

2.3.1 Introduction

The Storage Treatment Overflow Runoff Model (STORM) is a hydrologic model developed in the early 1970s and widely used to characterize urban stormwater runoff. STORM is a planning-level model that is applied for quantity and quality analyses of urban watersheds and for screening storage/treatment alternatives. Since its early implementation on mainframe computers, STORM has gained recognition as a practical and effective computer model for planning-level simulation of urban watersheds, especially those with combined sewer systems. STORM has since migrated to the microcomputer environment, where it remains a popular and widely used hydrologic model.

Typically, the CSS representation in STORM consists of detailing areas tributary to each modeled overflow structure. Routing of treated flows to a downstream structure for further treatment or splitting flows between two CSO drainage areas is not included in the core STORM formulation and coding. However, many prototype systems route treated flows through a network of structures, and need additional modeling capability to accurately represent the system and estimate CSO statistics. CDM developed an improved version of STORM (NetSTORM) that incorporates algorithms to simulate flow routing through networked structures. Because the Indianapolis sewer system contains numerous flow diversion structures that divert flow to different drainage basins, the NetSTORM version of STORM was applied to allow for representation of these flow diversion structures.

2.3.2 Development

NetSTORM performs continuous simulations to characterize CSOs using the Rational Method (modified to account for depression storage explicitly) to compute runoff, incorporate dry weather flow, and route combined sewer flows through conveyance, storage and treatment at each time step. The NetSTORM model was applied to the Indianapolis CSS to develop CSO frequency and volume statistics. Overflow statistics (frequencies and volumes) were developed for each structure that discharges to receiving water, or to a downstream structure.

The NetSTORM model was initially calibrated using rainfall and field monitoring data from selected calibration storm events by adjusting the calibration parameters to match combined sewer flow volume and CSO frequency with the field monitoring data. The SWMM model was used to establish critical input data for the NetSTORM model of the CSS, specifically the regulator and interceptor capacities (NetSTORM treatment rates) and the rainfall-runoff coefficients (NetSTORM C-values).

Three storm events were used for calibration of the NetSTORM model, and three separate storm events were used for verification. The original calibration efforts are summarized in the CSO Model Calibration Memorandum (CSO Project Team, 1997).

2.3.3 Validation

After the SWMM model recalibration was completed in 2002, the recalibrated SWMM model was used to provide validation for the NetSTORM model. Ten historical rain events were selected from the 1950-2003 Indianapolis rainfall database. The events were chosen to create a range of small, short storms, and large, long storms. The rain events were also screened for hyetograph shape, time to peak, and stability of modeling in SWMM. **Table 2-1** contains a summary of the rain events.

In addition to the 10 historical rain events, the 1-month, 1.7-month, 3-month, 6-month, and 24-month SCS Type II design storms were also simulated in NetSTORM and SWMM. **Figure 2-5** displays a comparison of the modeled systemwide CSO volume for the rain events.

The impact of the SWMM recalibration effort on the NetSTORM model performance is documented in the Presentation Supplement for CSO Control Technology Evaluation (CDM, 2003). The NetSTORM model accurately reflects the SWMM model, within its assumptions and limitations, and was used to evaluate of a large number of CSO control alternatives for the CSO LTCP. The results of the NetSTORM modeling analysis can be found in Section 4 of this report.

3.0 Water Quality Models

This section describes the development, calibration, acceptance, and use of the receiving stream water quality modeling tools. The Water Quality Analysis Simulation Program (WASP) and *E. coli* bacteria load models are described in detail. Section 4.0 presents the results of the water quality modeling analysis supporting the Combined Sewer Overflow (CSO) Long Term Control Plan (LTCP).

3.1 Approach

Two modeling tools were used evaluate the water quality performance of the White River and its tributary watersheds. The dynamic WASP model was used to determine single event dissolved oxygen (DO) and *E. coli* bacteria concentrations. WASP model results for single event simulations were compared against the minimum DO standard of 4.0 mg/L, the minimum 24-hour average DO standard of 5.0 mg/L, and the *E. coli* bacteria daily maximum standard of 235 cfu/100 mL.

To evaluate the long-term *E. coli* bacteria performance of the White River and its tributary watersheds, an *E. coli* bacteria load model was developed as part of the Total Maximum Daily Load (TMDL) preparation. The model simulates *E. coli* bacteria discharged from various sources including CSOs and urban and residential nonpoint sources during dry and wet weather.

While the WASP model was used to predict the *E. coli* bacteria concentration for a single event, the *E. coli* bacteria load model predicts daily *E. coli* bacteria concentrations for the historical period of 1991-2001. The ten-year simulation period is necessary in order to evaluate water quality performance against (1) the *E. coli* bacteria monthly geometric mean standard of 125 cfu/100 mL, (2) the reference criteria of no more than 10% of samples above 235 cfu/100 mL, (3) the reference criteria of no samples over 10,000 cfu/100 mL, and (4) two additional bacteria levels of 2000 cfu/100 mL and 5000 cfu/100 mL. The reference criteria are documented in the Indiana Department of Environmental Management's (IDEM) 303(d) Listing Methodology (IDEM, 2002).

3.2 WASP

This section describes the development, calibration, acceptance, and use of the WASP model. Additional information on the WASP model is documented in the Stream Reach Characterization and Evaluation Report (ICST, 2003).

3.2.1 Introduction

Figure 1-1 presents the White River receiving water modeling strategy used in this study. As shown in the figure, the modeling strategy begins with the evaluation of hydrology and hydraulics using the U.S. EPA Storm Water Management Model (SWMM). The total study area was divided into the combined sewer areas and separate sanitary sewer areas. Combined sewer overflow rates calculated in the SWMM model were used to represent the combined sewer flow contribution to the stream system, while the RUNOFF block of the SWMM model was used to calculate the rates of stormwater runoff entering the stream system from separate sanitary sewer areas. The rate of runoff at any given location is dependent upon precipitation, land area, impervious cover, land slope and other physical parameters.

The stream hydraulics were modeled using the EXTRAN block of the SWMM model. Dry weather conditions were modeled to establish the base conditions of flow rate, velocity and depth before the onset of a storm event. Wet weather events were modeled to evaluate the routing of baseflow, stormwater runoff and CSO flows through the stream system.

Once the hydrology and hydraulics models were established, the water quality evaluation was initiated. Many of the important parameters required for instream water quality modeling were developed using the results of the hydrology and hydraulics models. These physical parameters are important in determining the rate of key instream water quality processes, which are discussed further in Section 3.2.3.

3.2.2 Development

The SWMM hydraulic model, which is described in Section 2.2.1, calculates combined sewer overflow rates at various locations in the sewer system. The overflow rates are then mapped to the appropriate receiving water quality model stream segment. For separate sanitary sewer areas, the total area of 2,421 square miles was subdivided into model subbasins, based on delineations using United States Geological Survey (USGS) quadrangle maps. As with combined sewer flows, separate sanitary sewer flows were mapped to the appropriate stream network segment.

In 1998, an EXTRAN model of the stream network was developed using available stream cross-section data, supplemented by data collected in the field. The model consisted of the White River and Fall Creek stream segments. The WASP water quality model of the stream network is directly comparable to the EXTRAN hydraulic receiving water model. The three key input categories for water quality modeling in WASP include physical stream parameters, water quality constituent loads, and instream rate constants. The key modeled constituents for modeling DO included DO and biochemical oxygen demand (BOD).

Water quality constituent loads were calculated by multiplying stream inflows by concentrations of the constituents. For dry weather flow conditions, baseflow loads of DO and BOD were calculated assuming a 5 day BOD concentration of 5 mg/L and a DO concentration of 75% of saturation. For wet weather CSO discharges, concentrations of BOD were based on measured values (2001 Monitoring Data, CDM 2001). Comparisons between modeled and measured instream BOD values led to the development of variable BOD concentrations from CSOs during wet weather events. Higher BOD concentrations were assumed for the first half hour of the storm to reflect a “first-flush” effect that has been observed in CSO sampling. For wet weather runoff in the separate sanitary sewer area, event mean concentration (EMC) data for BOD was assigned to various land uses based on literature values from previous studies. EMC data was estimated for each subbasin as a function of the land use distribution in each subbasin. DO values were assumed to be 75% of saturation.

Key instream rate constants for the DO analysis included the BOD decay rate, the reaeration rate and the sediment oxygen demand (SOD) rate. The BOD decay rate is the rate at which carbonaceous BOD is oxidized, consuming stream DO in the process. A variable systemwide decay rate that is a function of the instream BOD concentration was developed, calibrated, and verified. This decay rate is particularly critical during wet weather events, where high instream BOD concentrations are primarily due to CSOs. BOD from CSOs is more easily oxidized than the lower levels of BOD that are found in baseflow or stormwater runoff. However, special (high) reaeration rates were assigned to locations downstream of dams, to account for the reaeration that occurs when water travels over the dam spillway. SOD is an assumed sink of oxygen caused by decomposition of organic matter in stream sediments. The highest SOD values were assigned just upstream of dams, where organic matter would be expected to settle as the streamflow is slowed down by backwater effects.

Another key physical model parameter is water temperature. For processes such as BOD decay, reaeration and SOD, the rates are typically assumed to increase as water temperature increases. In addition, the DO saturation concentration is lower at higher temperatures. For the dry weather and wet weather calibration and verification events, the water temperature values were set as input values in WASP.

Like the DO modeling, the three key input categories for *E. coli* bacteria modeling in WASP are physical stream parameters, water quality constituent loads, and instream rate constants. *E. coli* bacteria were modeled in WASP using the same framework as the BOD/DO model. Advection of *E. coli* bacteria between model segments was the key physical transport process.

Water quality constituent loads were calculated by multiplying stream inflows by constituent concentrations. For dry weather flow conditions, baseflow loads of *E. coli* bacteria were initially calculated assuming a concentration of 150/100 mL, which was representative of the dry weather geometric mean at a number of sampling stations in the study area. For wet weather CSO discharges, a typical concentration of 900,000 cfu/100 mL was initially assigned based on monitoring data. Comparisons between modeled and measured instream *E. coli* bacteria concentrations led to the development of variable *E. coli* bacteria concentrations from CSOs during the wet weather events. The higher concentration of 900,000 cfu/100 mL was assumed for the first half hour of the storm to reflect a first-flush effect. In the separate sanitary sewer areas, a typical stormwater concentration of 3,000 cfu/100 mL was assigned based on literature values.

The key instream rate constant for the *E. coli* bacteria analysis was the first-order die-off. A rate of 1.0 per day was initially assigned and confirmed during the calibration process. This value corresponds to roughly 90% die-off of bacteria over a 48 hour period.

3.2.3 Calibration and Verification

Water quality monitoring was conducted in the White River and Fall Creek between September and November 1998 in support of the CSO LTCP development. The monitoring program consisted of wet-weather grab sample collection at 12 sites on the White River, Fall Creek, Pleasant Run, Pogues Run, and Eagle Creek; as well as continuous DO metering at six locations. The first sampled storm event occurred on October 6, 1998 and the second event occurred on October 18, 1998.

Observations from a review of the collected data include the following:

- Fall Creek often experiences a significant drop in DO (minimum concentrations as low as 1 mg/L were observed) at the confluence with the White River during storm events. DO drops also occur in the White River at the Raymond Street and IPL Pool sampling stations.
- The water quality response of the White River and Fall Creek systems appears to be dependent on storm event characteristics such as volume, peak intensity, time of occurrence of peak intensity, and antecedent conditions.
- Significant increases in BOD concentrations occurred in the White River at locations within and downstream of the CSO area during and after rainfall events. The peak BOD concentration observed in the White River was 18 mg/L. Peak BOD concentrations observed at the discharge points of tributaries with CSOs (Fall Creek, Pogues Run, Pleasant Run, Eagle Creek) ranged from 15 to 70 mg/L.

The data clearly indicates that BOD in CSO discharges is a major contributor to the DO drops that can occur in the White River and Fall Creek system during storm events. In addition, DO concentrations are often low between storm events at some locations, such as Fall Creek at Boulevard Place.

The water quality model of the White River and Fall Creek was initially calibrated using two measured events. The first event was a dry weather period followed by a 2.26-inch storm event on October 6, 1998. The second event was a dry weather period followed by a 0.81-inch storm event on October 18. Both storms were sufficiently large to produce combined sewer overflows as well as substantial runoff from separate sanitary sewer areas. The 1998 monitoring and sampling data are presented in Appendix D of the Stream Reach Characterization and Evaluation Report (ICST, 2003).

Additional instream and CSO data was collected during 2001. The data included:

- CSO discharge monitoring for BOD, *E. coli* bacteria and dissolved oxygen
- Continuous instream dissolved oxygen and temperature at five locations
- Time-of-travel measurements for Fall Creek and White River
- Dam reaeration measurements
- Instream phytoplankton measurements

This data was used to further verify the accuracy of the instream model as described in this section. During 2002, the instream model was expanded to include Pogues Run, Pleasant Run and Eagle Creek, and the White River model was extended to Petersburg. At that time, the model was verified for the monitoring data collected in 2001. The model validation used data from storm events that occurred on August 31 and September 7, 2001.

The following sections summarize the calibration and verification of the water quality model. Section 3.2.3.1 provides an overview of the calibration and verification process. Section 3.2.3.2 describes the calibration and verification of the dry weather periods preceding the two selected storm events, and section 3.2.3.3 describes the calibration and verification of the two selected storm events.

3.2.3.1 Calibration and Verification Overview

The overall objective of model calibration and verification is to define values of key model parameters for an acceptable match between the measured data and the model results. The calibrated parameter values should be within the range of typical values presented in literature, unless a reason is established for local values that are atypical from the accepted range.

3.2.3.2 Dry Weather Calibration and Verification

Prior to the evaluation of a storm event, the antecedent dry weather period is simulated. For each pre-event period, the analysis began with a dry weather flow balance. An acceptable flow balance allows for the evaluation of the water quality parameters. The model results provided a reasonable representation of the measured water quality constituent concentrations, as well as providing initial conditions for the storm event modeling. This section documents the dry weather calibration and verification of the hydrology and hydraulics of the receiving stream model, and the dry weather calibration and verification of the water quality models for BOD, DO, and *E. coli* bacteria.

Hydrology and Hydraulics

In order to establish the dry weather pre-event conditions for the two calibration events, the physical stream parameters required for the dry weather water quality modeling were developed by running the EXTRAN block of the receiving stream SWMM model under steady flow conditions until steady state conditions were achieved. **Figure 3-2** shows the dry weather pre-event flow conditions for the White River. For the two 2001 events, the streamflows range from 300 cfs just upstream of the Broad Ripple Dam, to 700 cfs at the downstream end of the system (USGS gage at Centerton). The flow balance includes a 115 cfs withdrawal by IWC, which is the reason that the minimum streamflow is located just upstream of the Broad Ripple Dam.

Dry weather pre-event flow conditions for Fall Creek, Pleasant Run, Eagle Creek and Pogues Run are presented in **Figures 3-3** through **Figure 3-6**. The Fall Creek flow balance includes a 38 cfs withdrawal by IWC, which is the reason that the minimum pre-event streamflow is located in the combined sewer area. The pre-event streamflow in Pleasant Run and Pogues Run is very low – virtually zero - compared to the other streams.

BOD and Dissolved Oxygen

For the BOD and DO simulation, the key processes in achieving a representative model of the stream system were reaeration and SOD. **Figures 3-7** and **3-8** compare the measured and modeled instream DO concentrations on the White River for the pre-event conditions. In both cases, the measured values at all stations were above the instream DO standards of 5 mg/L daily average and 4 mg/L minimum standard. The modeled DO values in all cases are within 1 mg/L of the measured values. Modeled DO values were lowest just upstream of the 16th Street and Chevy dams. These two dams have relatively low flow, which causes low reaeration and relatively high SOD values.

Measured and modeled instream DO concentrations for Fall Creek are presented in **Figures 3-9** and **3-10**. In both cases, the average of the measured values was above the instream DO standards of 5 mg/L daily average and 4 mg/L minimum standard. Modeled DO values were lowest just upstream of the Boulevard dam, due to relatively low reaeration and relatively high SOD values at the dam.

Figures 3-11 through **Figure 3-16** compare the measured and modeled instream DO concentrations for Pleasant Run, Eagle Creek and Pogues Run. For all cases, the average of the measured values was above the instream standards of 5 mg/L daily average and 4 mg/L minimum standard.

E. coli Bacteria

For the *E. coli* bacteria simulation, historical data was used to validate the model. Key parameters were adjusted such that the modeled instream bacteria concentrations were consistent with the geometric mean of designated dry weather bacteria samples taken in 2000 and 2001 within the study area.

The most critical components of the *E. coli* bacteria modeling were the *E. coli* bacteria loads and the first-order die-off rate. In the absence of detailed instream data, a first-order die-off rate of 1.0 per day was initially assigned and confirmed during the calibration process. Baseflow *E. coli* bacteria concentrations were initially assigned based on historical instream data.

Historical and modeled dry weather *E. coli* bacteria data are compared in **Figures 3-17** through **Figure 3-26**. For the White River, Fall Creek, Pleasant Run, Eagle Creek, and Pogues Run, the modeled *E. coli* bacteria concentrations are similar to the geometric means of the historical dry weather data. In some cases, particularly the White River upstream of Marion County and downstream of the IPL dam, the measured and modeled dry weather *E. coli* bacteria concentrations exceed the daily maximum *E. coli* bacteria standard of 235 cfu/100 mL.

3.2.3.3 Wet Weather Calibration and Verification

Following the model calibration and verification for the two dry pre-event periods, the model was further calibrated and verified for the two 2001 storm events. The following sections document the wet weather calibration and verification of the hydrology and hydraulics of the receiving stream model and the water quality models for BOD, DO, and *E. coli* bacteria.

Hydrology and Hydraulics

Two key parameters for calibrating and verifying the hydrology and hydraulics model are flow volume and peak flow at gauged locations in the study area. Flow volume calibration and verification allows the model to represent an appropriate amount of combined sewer overflow and runoff discharged to the river. Because over 98% of the study area consists of non-CSO (i.e. sanitary, septic, unsewered) areas, direct surface runoff to the stream system is the major component of wet weather flow volume.

The calibration of flow volume focused on subbasin hydrology parameters in the RUNOFF block of the SWMM model for separate sanitary sewer areas. The most critical RUNOFF parameter is the directly connected impervious area (DCIA). Initial DCIA values were established for various land use types, and initial subbasin DCIA values were assigned based on these values and the subbasin land use distribution. **Figure 3-27** presents calculated and measured flow volumes for the two 2001 wet weather events. As shown in the figure, the calculated flow volumes are within 10% of the measured volumes at most locations for both events. The 10% tolerance value was set as a calibration/verification goal for the study.

Calibration of peak flow also focused primarily on subbasin hydrology parameters in the RUNOFF block of the SWMM model for separate sanitary sewer areas. **Figure 3-28** presents calculated and measured peak flows for the two wet weather events. As shown in the figure, the calculated flow volumes are in most cases within 10% of the measured volumes. Because CSO control measures will be expected to control relatively small events, the results shown in Figure 3-28 are considered acceptable for wet weather hydrology and hydraulics calibration and verification.

Measured and modeled flows at White River and Fall Creek locations are presented in **Figures 3-29** through **Figure 3-38**. The five locations represent the USGS stations on the White River and Fall Creek within the study area. All of the plots reflect model results that are comparable to measured data with respect to flow volume, peak flow, and timing of the peak, further emphasizing the validity of the model's hydrology and hydraulics representation of the study area response to typical rainfall conditions.

BOD and Dissolved Oxygen

Because BOD and DO simulation factors such as reaeration and SOD were addressed in the dry weather calibration, the key factors in achieving a representative wet weather model simulation of DO in the stream system were BOD loads and the BOD decay rate. BOD loads to the model were calculated as the product of stream inflows and BOD concentrations. For separate sanitary sewer areas, subbasin runoff BOD concentrations ranged between 4.5 mg/L for forests and open areas to 57 mg/L for medium density residential areas. For combined sewer areas, combined sewer overflow BOD concentrations were assigned based on the 2001 CSO discharge monitoring. The assigned concentrations reflected a first-flush effect, with BOD concentrations of 100 mg/L or more during the first 20 minutes of the CSO discharge; 60 mg/L from 20 to 60 minutes; and 50 mg/L or less after the first hour. The DO concentration for discharges from CSO and stormwater was set at 75% of the temperature-specific DO saturation concentration.

The calibrated BOD decay rate represents a range of instream decay rates, depending upon the instream BOD concentration. The applied BOD decay rate increases as the BOD concentration increases.

Table 3-1 presents a range of instream BOD decay rates as established in model calibration and verification. The table shows the BOD decay rates for corresponding values of 5 day carbonaceous BOD ($CBOD_5$) and ultimate carbonaceous BOD (CBODU). Under dry weather conditions, instream $CBOD_5$ values were approximately 5 mg/L, and the assumed BOD decay rate is 0.10/day. This corresponds to a CBODU concentration of 12.5 mg/L, and an ultimate/5-day ratio of 2.5. Measured peak $CBOD_5$ values from grab samples during the two storm events varied from 20 to 70 mg/L, which would correspond to BOD decay rates from 0.16 to 0.22/day.

Figure 3-39 compares the measured and modeled minimum instream DO on the White River and its tributaries for the wet weather events. As shown in Figure 3-39, most of the modeled minimum DO values fall within 15% of the measured minimum DO.

Figures 3-40 through **3-51** compare measured and modeled DO values for the calibration and verification events at specific locations on the White River, Fall Creek, Pleasant Run, and Eagle Creek. The data presented is the DO measured and modeled along the stream system over a 5 day period beginning on the day of the rainfall event.

Figures 3-52 and **3-53** present the measured and modeled minimum DO values for the calibration and verification events on the White River. As shown in the figures, the measured and modeled DO values are typically within 1 mg/L of each other, and the modeled drops in DO from dry weather to wet weather conditions are consistent with the measured DO drops (typically 1 to 3 mg/L). For both events, the model calculates the minimum DO concentration just upstream of the Chevy dam. The minimum modeled DO for both events drops below the minimum instream DO standard (4 mg/L), but no actual measurements were made at that location to verify the modeled DO drop.

The relationship between the measured and modeled minimum DO concentrations for Fall Creek is presented in **Figures 3-54** and **3-55**. As shown in the figures, the measured and modeled DO values are typically within 1 mg/L of each other, and the modeled drops in DO from dry weather to wet weather conditions are consistent with the measured DO drops. For both events, the model calculates the minimum DO concentration just upstream of the Boulevard dam. The minimum modeled DO for both storm events drops below the minimum instream DO standard (4 mg/L), and these drops were verified by measurements made just upstream of the dam site.

The relationship between the measured and modeled minimum DO concentrations for Pleasant Run, Eagle Creek and Pogues Run are presented in **Figures 3-56** through **3-61**. As shown in the figures, the measured and modeled DO values are typically within 1 mg/L of each other, with the exception of Eagle Creek on the September 7, 2001 storm event. For both events, a significant drop in DO from dry weather to wet weather conditions was not observed in Pleasant Run, Eagle Creek or Pogues Run. This is due to the relatively short wet weather travel time in the tributary streams.

Based on the results, the receiving water quality model provides a realistic representation of DO conditions in the White River and its tributaries during dry weather and wet weather conditions. The model indicates that DO drops up to 4 mg/L can be expected during storm events, resulting in DO concentrations less than the minimum instream DO standard. Additional calibration plots are provided in **Appendix D** of this report.

E. coli Bacteria

Similar to the dry weather conditions, the key factor in achieving a representative wet weather model simulation of *E. coli* bacteria in the White River and its tributaries was an appropriate representation of the *E. coli* bacteria loads. These loads to the model were calculated as the product of stream inflows and *E. coli* bacteria concentrations. For separate sanitary sewer areas, subbasin runoff bacteria concentrations were initially set at 3,000 cfu/100 mL *E. coli* bacteria, based on literature values. For combined sewer areas, *E. coli* bacteria concentrations of 900,000 cfu/100 mL were initially set based on CSO monitoring data. Comparisons between modeled and measured instream *E. coli* bacteria concentrations led to the development of variable *E. coli* bacteria concentrations from CSOs during the wet weather events. The higher concentration of 900,000 cfu/100 mL was assumed for the first half hour of the storm to reflect a first-flush effect.

Because no instream *E. coli* bacteria data was collected during the wet weather events, the *E. coli* bacteria loads were calibrated to historical wet weather bacteria sampling data. The selected stormwater and CSO discharge concentrations were consistent with the historical maximum grab sample *E. coli* bacteria concentrations collected at 17 historical monitoring stations, and with instream *E. coli* bacteria data collected by the Marion County Health Department and the Department of Public Works in 2000 and 2001. Headwater *E. coli* bacteria concentrations on the White River and Fall Creek were based on historical sampling data. For the White River upstream of Marion County, out-of-county stormwater *E. coli* bacteria was initially set at 1,000 cfu/100 mL and was confirmed during the calibration process. For the headwaters of Fall Creek, the historical data indicated a stormwater concentration of 2,000 cfu/100 mL.

Figures 3-62 and **3-63** compare the historical and simulated bacteria values based on the model results for the August 31, 2001 and the September 7, 2001 storm events. At the monitoring stations, *E. coli* bacteria values are presented for the geometric mean and the 95% level of all grab sample measurements. The model was validated assuming that the modeled *E. coli* bacteria concentration should be consistent with the maximum measured grab sample values. The figure illustrates that the model results follow the same patterns of *E. coli* bacteria concentrations that have been measured historically in the study area. On the White River, both the model and historical data show increases in bacteria levels just below the confluence with Fall Creek. **Figures 3-64** and **3-65** present the same comparison for Fall Creek. Validation plots are presented for Pleasant Run, Eagle Creek and Pogues Run in **Figures 3-66** through **3-71**, respectively. The *E. coli* bacteria concentrations at all locations downstream of CSO discharges consistently exceed the daily maximum *E. coli* bacteria standard of 235 cfu/100 mL.

Based on the results, the receiving water quality model provides a realistic representation of *E. coli* bacteria concentrations in the White River and its tributaries during dry weather and wet weather conditions. The model indicates that *E. coli* bacteria concentrations above 235 cfu/100 mL can be expected during storm events, resulting in exceedances of the *E. coli* bacteria daily maximum standard. Additional calibration plots are provided in **Appendix D** of this report.

3.3 *E. coli* Bacteria Load Model

This section describes the development, validation and baseline findings of the *E. coli* bacteria load model used to evaluate the performance of all major Indianapolis watersheds against (1) the monthly geometric mean standard of 125 cfu/100 mL, (2) the reference criteria of no more than 10% of samples greater than 235 cfu/100 mL, (3) the reference criteria of no samples greater than 10,000 cfu/100 mL, and (4) additional *E. coli* bacteria levels of 2000 cfu/100 mL and 5000 cfu/100 mL. The reference criteria are documented in IDEM's 303(d) Listing Methodology (IDEM, 2002).

3.3.1 Introduction

E. coli bacteria load models for the following watersheds were developed and validated to the existing instream *E. coli* bacteria data. These models simulate the daily instream *E. coli* bacteria counts for each stream segment based on the characterized *E. coli* bacteria loads from the sources described in Section 3.3.2. **Figures 3-72** through **3-76** present the stream segments for each model developed. These segments are listed below:

- White River North – 96th Street to I-65
- White River CSO Area – I-65 to I-465
- White River South – I-465 to Waverly
- Fall Creek Upstream of the CSO Area – Geist to Keystone
- Fall Creek CSO Area – Keystone to White River
- Pleasant Run Upstream of the CSO Area – 30th Street to 9th Street
- Pleasant Run CSO Area – 9th Street to White River
- Pogues Run CSO Area – I-70 to New York
- Eagle Creek CSO Area – Michigan to White River

The White River, Fall Creek and Pleasant Run *E. coli* bacteria load models were developed to support the development of TMDLs for each watershed in 2003. For the Systemwide Plan analysis, the White River CSO Area, Fall Creek CSO Area, and Pleasant Run CSO Area models were used to predict the *E. coli* bacteria concentrations in CSO areas. The Pogues Run CSO Area and Eagle Creek CSO Area *E. coli* bacteria load models were developed to support the CSO LTCP Systemwide Plan analysis in 2004.

3.3.2 Development

The long-term *E. coli* bacteria load models were developed to simulate the impact of both dry and wet weather sources to the White River and its tributaries. The model simulates wet weather *E. coli* bacteria sources including CSOs and urban and residential nonpoint sources. Additional work was performed to define the sources of dry weather *E. coli* bacteria and the components of urban and residential nonpoint source wet weather contaminants. *E. coli* bacteria for the watersheds was characterized from the following sources:

- Septic systems
- Unpermitted connections to storm drains
- Advanced Wastewater Treatment (AWT) plants
- Wildlife/natural
- Stormwater runoff
- Combined sewer overflows
- Upstream sources

The source assessment evaluated the type, magnitude, timing, and location of pollutant loading to the impaired water bodies for *E. coli* bacteria. The relative rankings of the pollutant contribution for each parameter were established based on available source data. Additional source information can be found in the White River TMDL Report (IDEM, 2003), Fall Creek TMDL Report (IDEM, 2003) and the Pleasant Run TMDL Report (IDEM, 2003).

Each dry weather source is represented by a constant *E. coli* bacteria load. Dry weather sources are failing septics, wildlife and natural background, unpermitted storm drain connections and upstream out-of-county sources.

E. coli bacteria loads for stormwater runoff and CSO discharges are based on the city's separate sanitary sewer area water quality model for stormwater (SWMM/RUNOFF), and the collection system hydraulic model (NetSTORM) for CSO discharges during wet weather. The results of the city's models are the input to the *E. coli* bacteria load model, so that the *E. coli* bacteria load model includes the loads for both dry and wet weather sources. **Table 3-2** summarizes the daily *E. coli* bacteria loadings from failed septics, unpermitted storm drain connections, wildlife, stormwater, and CSO for each watershed.

A ten year period of time (October 1991 through September 2001) was simulated with the models to predict the *E. coli* bacteria loads to the stream system on a daily basis. Data on stream flow was used to predict the resultant instream *E. coli* bacteria concentration for each day for the ten year period.
Daily flow data for the major stream segments was obtained from the USGS for the period of October 1, 1991 through September 30, 2001. This flow data was used in the daily *E. coli* bacteria model to evaluate the resulting *E. coli* bacteria concentration from the daily loads.

3.3.3 Calibration

Model calibration consisted of comparisons of the geometric mean, percent of samples greater than 235 cfu/100 mL, and the number of samples over 10,000 cfu/100 mL per year of sampling. *E. coli* bacteria sampling data was collected between 2000 and 2002 for all watersheds. These comparisons were performed for both dry weather and wet weather data. The calibration of the model for *E. coli* bacteria included quality checks of the USGS daily flow data, adjustment for *E. coli* bacteria contributions from wildlife and stormwater for all reaches, and Pleasant Run failed septic systems.

Table 3-3 contains a summary of the observed and modeled geometric mean, percent of samples greater than 235 cfu/100 mL, and the number of samples over 10,000 cfu/100 mL per year for all watersheds modeled from October 1991 through September 2001. The model calibration is considered to be within the limitations of the *E. coli* bacteria sampling data and is appropriate for water quality planning purposes. **Table 3-4** presents a sample page from the daily *E. coli* bacteria model for the White River CSO Area. **Figure 3-77** presents the predicted instream *E. coli* bacteria counts for April 1, 1997 to October 31, 1997 for the White River CSO Area segment. The results of the *E. coli* bacteria load models for water quality planning purposes can be found in Section 4.

4.0 Model Results

This section presents the hydraulic and water quality modeling results for the 2004 Revised CSO LTCP.

4.1 NetSTORM

This section describes the results of the NetSTORM modeling analysis.

4.1.1 Existing Conditions

Table 4-1 presents the systemwide NetSTORM results for existing conditions during the 1950-2003 precipitation record. The systemwide percent capture ranges from 62 to 68 percent. **Tables 4-2** through **4-6** present the NetSTORM results by CSO for the Fall Creek, Pleasant Run, Pogues Run, Central Sub-Network, and System Relief reaches of the Indianapolis system. Eagle Creek is part of the Central Sub-Network. The NetSTORM model is considered to be more suitable for generating systemwide or reach-wide CSO statistics, as opposed to individual CSO statistics.

4.1.2 Baseline Findings

To support CSO alternative analysis and facility sizing for the Indianapolis CSO LTCP, the Indianapolis NetSTORM model was updated to include early action projects (EAP) and supplemental projects. These projects represent the baseline condition for the modeling analysis. The Draft Memorandum Early Action Projects for Modeling (ICST, February 12, 2004), and Draft Memorandum Control Technology Rationale (ICST, February 17, 2004) detail proposed EAP and supplemental projects to be included as the baseline condition for the system.

For purposes of NetSTORM modeling, projects can be divided into the following categories: inflatable dams, sewer separation, sewer rehabilitation, storage facilities, and conveyance facilities. Conceptual approaches for each category are described below.

Inflatable Dams

There are nine inflatable dam and sluice gate projects. Operational data has been recovered for four of the inflatable dams from design memorandums. Each dam is assumed to store CSO flows up to the volume documented in the in-system storage analysis in the CSO Operational Plan (CSOOP) unless revised storage information from the design memoranda is available. In the case that a CSO was not analyzed in the 1995 CSOOP and no additional data is available, the average storage volume for the CSO outfall pipe size was assumed. Available storage volumes have been refined for four dams from additional data found in the 2004 reports produced by Triad Engineering Corporation (TEC) and MS Consultants (MSC).

Wet weather flow that arrives at the regulator will be stored up to the available storage volume. After available storage has been exhausted, excess wet weather flow will result in an overflow into the proposed CSO facilities to meet the desired level of control.

The NetSTORM representation assumes that stored CSO can be dewatered to existing interceptors in one day. Due to the relatively low dewatering rates, the representation also assumes that stored flows can be dewatered to the existing interceptors if there is available conveyance capacity.

Sewer Separation

Sewer separation is modeled in NetSTORM by reducing the CSO basin’s C-value to 5.0. This approach assumes that 5% of the rainfall that falls over the separated CSO basin still enters the collection system after separation is completed. This is a conservative assumption.

Sewer Rehabilitation

Sewer rehabilitation is modeled in NetSTORM by assuming that all wet weather flow that previously resulted in overflow will be eliminated through reducing wet weather flow to the existing sewer system. Of all the EAPs, only CSO 103 is slated for sewer rehabilitation. According to the 2002 CSO 103 System Investigation by GRW, Inc., CSO elimination will consist of cured in-place pipe rehabilitation, and reduction of inflow through replacement of manhole covers. Since the replacement of manhole covers is not expected to remove all inflow and infiltration (I/I), it will be assumed that 50% of wet weather flow will be removed from the collection system, with the remaining 50% conveyed to the downstream Fall Creek system.

Storage Facilities

Storage facilities are modeled in NetSTORM such that stored CSO can be dewatered in 0.5 to 2 days depending on facility and downstream interceptor system capacity. The representation assumes that stored flows can be dewatered after the storm event. Due to the relatively low dewatering rates, the representation may be modified such that stored CSO flow is held until a certain number of hours after the storm event has passed. This modification would be made if the premature release of stored flow is contributing to overflows in the downstream system.

Conveyance Facilities

Conveyance facilities may be identified as relief sewers, CSO consolidation sewers, or cut-off sewers, depending on the project name. Conveyance facilities are modeled in NetSTORM by conservatively assuming that the theoretical capacity of the pipe is the ultimate capacity. The model does not consider additional flows that may be conveyed through the interceptor under surcharged conditions. Conveyance facilities in NetSTORM are modeled with incidental storage available in the tributary sewer system.

Specific Facility NetSTORM Representation

All EAP information incorporated into the NetSTORM model is summarized in **Table 4-7.**

Table 4-7
NetSTORM Representation of Early Action Projects

Watershed	CSO #	EAP Type	Conveyance Capacity (MGD)	Storage Volume (MG)	Information Source
Fall Creek	53	Inflatable Dam	N/A	0.070	1995 CSOOP
Fall Creek	58	Sluice Gate	N/A	0.075	1995 CSOOP
Fall Creek	63	Inflatable Dam	N/A	1.222	1995 CSOOP
Fall Creek	63A	Inflatable Dam	N/A	1.250	1995 CSOOP
Fall Creek	65	Inflatable Dam	NA	2.170	1995 CSOOP
Fall Creek	103	I/I Removal & Rehab	N/A	N/A	2002 GRW (Facilities Plan)
Pleasant Run	80	Inflatable Dam	N/A	0.03	2004 TEC
Pleasant Run	84	Inflatable Dam	N/A	0.35	2004 TEC
Pogues Run	101	Inflatable Dam	N/A	0.4	2004 MSC
Pogues Run	36, 95, 96, 97, 98, 99, 100,	Spades Park Storage Tank	N/A	4.0	2001 LTCP
Pogues Run	34, 35, 136	Consolidation Sewer	98 (U/S) 457 (D/S)	N/A	2003 Design Memo by Clark Dietz
Pogues Run	A138, 137, 133, 152, 129, 125, 138, 128, 153, 115	Barrel Conversion for Storage and Conveyance	715	10	2001 LTCP (storage volume) 2004 VS Engineering (conveyance capacity)
Eagle Creek	33, 223, 32, 11, 145	Relief Interceptor	105	0.5	2001 LTCP (12 OF/yr)
Lick Creek	235	Sewer Separation	N/A	N/A	2004 ICST
State Ditch	217, 218	Sewer Separation	N/A	N/A	2001 LTCP
Lick Creek	235	Sewer Separation	N/A	N/A	2004 ICST
State Ditch	217, 218	Sewer Separation	N/A	N/A	2001 LTCP
Upper WR	155, 156, 205	Riviera Storage Tank	N/A	EAP + 1.0	2004 ICST
Lower WR	37, 38, 39	Storage Tank	N/A	3.0	2001 LTCP
Lower WR	45	Vortex	20	N/A	1997 Project Description
Lower WR	117	Interplant Connection	344	6.0	2004 Interplant Connection Facilities Plan

Table 4-7 (Continued)
NetSTORM Representation of Early Action Projects

Watershed	CSO #	EAP Type	Conveyance Capacity (MGD)	Storage Volume (MG)	Information Source
Lower WR	118	Inflatable Dam	N/A	0.12	2004 TEC
Lower WR	275	Sewer Separation	N/A	N/A	2004 ICST
Belmont AWT	008	AWT Upgrades	300	34	2004 ICST
Southport AWT		AWT Upgrades	300	25	2004 ICST

Table 4-8 summarizes supplemental projects that are also part of the baseline condition. The Riviera and Spades Park Storage Tanks and the Eagle Creek Relief Interceptor will be sized for each level of CSO control as supplemental projects.

Table 4-8
NetSTORM Representation of Supplemental Projects

Watershed	CSO #	Project Type	Conveyance Capacity (MGD)	Storage Volume (MG)	Information Source
Bean Creek	17	Separation	N/A	N/A	2004 ICST
Pogues Run	36, 95, 96, 97, 98, 99, 100,	Spades Park Storage Tank	Varies per Level of Control	Varies per Level of Control	2001 LTCP
Pogues Run	143	Sewer Separation	N/A	N/A	2004 ICST
Eagle Creek	N/A	Belmont North / West Cutoff	164	0.5	2004 CDM
Eagle Creek	33, 223, 32, 11, 145	Relief Interceptor	Varies per Level of Control	Varies per Level of Control	2001 LTCP (12 OF/yr)
Upper WR	155, 156, 205	Riviera Storage Tank	Varies per Level of Control	Varies per Level of Control	2004 ICST Settling/Disinfection with a minimum residence time of 30 minutes is applied to attain higher levels of control.
Lower WR	46	Separation	N/A	N/A	2004 ICST

The EAP and supplemental projects representing the baseline condition are expected to increase the systemwide percent capture to 77%.

Appendix E contains all hydraulic and water quality modeling results for the baseline condition. The results include the reduction in average annual CSO volume, BOD loads, and *E. coli* bacteria loads.

4.1.3 Watershed Evaluation

The NetSTORM model was applied to evaluate alternatives for the Pleasant Run and Fall Creek Watershed Alternative Evaluations. For each watershed, numerous alternatives comprised of storage, conveyance, treatment, and separation technologies were evaluated. The Pleasant Run Watershed Evaluation was submitted to U.S. EPA and IDEM on September 8, 2003. The Fall Creek Watershed Evaluation was submitted on November 7, 2003. Specific model results include facility sizing and the reduction in average annual CSO volume, BOD loads, and *E. coli* bacteria loads.

4.1.4 Systemwide Plan Analysis

The NetSTORM model was applied to evaluate Systemwide Plans 1 and 2, which are described in the Control Technology Rationale Memorandum (ICST, February 17, 2004). Both plans consist of storage and conveyance facilities in all watersheds. In Systemwide Plan 1, all facilities convey captured CSO to the AWT Plants, whereas in Systemwide Plan 2, the Fall Creek and Pogues Run facilities convey captured CSO to remote treatment facilities that discharge to the White River. In addition to these two plans, systemwide sewer separation was also considered but not explicitly modeled in NetSTORM. **Figures 4-1** and **4-2** present schematics for the two plans.

Tables 4-9 and **4-10** present the facility sizes for Systemwide Plans 1 and 2, respectively. The facility sizes for Systemwide Plan 1, at the 4 overflow/yr level of control, were confirmed with SWMM continuous simulations. Please refer to the table endnotes for additional information regarding the facility sizes. **Appendix E** contains all hydraulic and water quality modeling results used to support Systemwide Plans 1 and 2.

4.2 WASP

This section describes the results of the Water Quality Analysis Simulation Program (WASP) modeling analysis.

4.2.1 Existing Conditions

WASP simulations were performed for all major stream segments to provide the existing dissolved oxygen (DO) and *E. coli* bacteria conditions. During storm events, all stream segments are expected to exceed the *E. coli* bacteria daily maximum standard of 235 cfu/100 mL, while Fall Creek and the White River are expected to exceed the minimum dissolved oxygen standard of 4.0 mg/L.

4.2.2 Baseline Findings

The baseline conditions, or the implementation of early action and supplemental projects, was not simulated in WASP as the baseline condition on its own is not expected to attain compliance with the minimum DO standard of 4.0 mg/L on Fall Creek or the White River, or the *E. coli* bacteria daily maximum standard of 235 cfu/100 mL on all streams. This was confirmed by simulating the effects of a 12 overflows/year level of control in WASP.

4.2.3 Watershed Evaluation

The WASP model was applied to evaluate alternatives for the Pleasant Run and Fall Creek Watershed Alternative Evaluations. For each watershed, numerous alternatives comprised of storage, conveyance, treatment, and separation technologies were evaluated. The Pleasant Run Watershed Evaluation was submitted to U.S. EPA and IDEM on September 8, 2003. The Fall Creek Watershed Evaluation was submitted on November 7, 2003. Specific model results include the single event DO and *E. coli* bacteria performance for various evaluation storms.

4.2.4 Systemwide Plan Analysis

The WASP model was applied to evaluate Systemwide Plans 1 and 2. **Appendix E** contains all the hydraulic and water quality modeling results used to support Systemwide Plans 1 and 2. The modeling analysis for Systemwide Plans 1 and 2 also incorporated the expected water quality benefits of stream improvements that are not directly related to CSO controls. These additional measures are classified as "watershed improvements." The objective of the analysis is to evaluate the cost-effective water quality benefit of the watershed improvements, compared with achieving the same benefit by selecting a higher level of CSO control.

Watershed improvements for the White River and all tributary streams were analyzed in the 2001 LTCP and the 2003 Watershed Alternative Evaluations to evaluate compliance with the instantaneous minimum DO standard of 4.0 mg/L. It should be noted that the DO evaluations were only performed on Fall Creek.

Table 4-11 summarizes the watershed improvement projects that were identified in prior versions of the LTCP or alternative analyses. These projects were carried forward to support the Systemwide Plan Analyses. For the single event DO modeling, the removal of the Boulevard Dam and temporary aeration were analyzed to attain compliance with the minimum DO standard of 4.0 mg/L on Fall Creek at the levels of control of 12 overflows/year and 6 overflows/year. Although the combination of the Stout Dam modification, Chevy Dam permanent aeration and temporary aeration are believed to attain compliance with the minimum DO standard of 4.0 mg/L on the White River at the 12 overflows/year level of control, no specific water quality modeling analysis was performed.

Additional projects that may be classified as "watershed improvements", and do not have an assumed water quality impact on the White River and its tributaries, include: the Basin Master Plan, the Watershed Team, additional street sweeping, public education, pretreatment improvements, the raised dam at Geist, and the Pogues Run Channel Improvements.

4.3 *E. coli* Bacteria Load Model

This section describes the results of the *E. coli* bacteria load modeling analysis.

4.3.1 Existing Conditions

The *E. coli* bacterial load model was applied for all major stream segments to provide the existing *E. coli* bacteria conditions. **Appendix E** contains all hydraulic and water quality modeling results used to support Systemwide Plans 1 and 2. Table 3-3 contains specific *E. coli* bacteria parameters under existing conditions.

4.3.2 Baseline Findings

The EAP and supplemental projects are expected to provide a small improvement in *E. coli* bacteria concentrations in the White River and its tributaries. Appendix E contains all hydraulic and water quality modeling results, including the baseline condition results. The results include the *E. coli* bacteria performance against the monthly geometric mean standard of 125 cfu/100 mL; the reference criteria of no more than 10% of samples above 235 cfu/100 mL; the reference criteria of no samples over 10,000 cfu/100 mL; and additional bacteria levels of 2000 cfu/100 mL and 5000 cfu/100 mL.

4.3.3 Watershed Evaluation

The *E. coli* bacteria load model was applied to evaluate alternatives for the Pleasant Run and Fall Creek Watershed Alternative Evaluations. For each watershed, numerous alternatives comprised of storage, conveyance, treatment, and separation technologies were evaluated. The Pleasant Run Watershed Evaluation was submitted to U.S. EPA and IDEM on September 8, 2003. The Fall Creek Watershed Evaluation was submitted on November 7, 2003.The results include the *E. coli* bacteria performance against the monthly geometric mean standard of 125 cfu/100 mL; the reference criteria of no more than 10% of samples above 235 cfu/100 mL; the reference criteria of no samples over 10,000 cfu/100 mL; and additional bacteria levels of 2000 cfu/100 mL and 5000 cfu/100 mL.

4.3.4 Systemwide Plan Analysis

The *E. coli* bacteria load model was applied for all CSO stream segments to evaluate Systemwide Plans 1 and 2. For example, the White River CSO Area *E. coli* bacteria load model was applied to simulate the *E. coli* bacteria performance for the White River. Appendix E contains all hydraulic and water quality modeling results used to support Systemwide Plans 1 and 2. The modeling analysis for Systemwide Plans 1 and 2 also incorporated the expected water quality benefits of stream improvements that are not directly related to CSO controls. These additional measures are classified as “watershed improvements.” The objective of the analysis is to evaluate the cost-effective water quality benefit of the watershed improvements, compared with achieving the same benefit by selecting a higher level of CSO control.

Watershed improvements for the White River and all tributary streams were analyzed in the 2001 LTCP and the 2003 Watershed Alternative Evaluations to evaluate compliance with the *E. coli* bacteria daily maximum standard of 235 cfu/100 mL, and the additional *E. coli* bacteria levels of 2000, 5000, and 10,000 cfu/100 mL.

Table 4-11 summarizes the watershed improvement projects that were identified in prior versions of the LTCP or alternative analyses. These projects were carried forward to support the Systemwide Plan Analysis. For the *E. coli* bacteria load modeling, the following watershed improvements were incorporated: Failing septic system removal, unpermitted connection removal, and stormwater best management practices (BMP) and capital improvement projects (CIP). The analysis also assumed that the White River will be brought into compliance with *E. coli* bacteria standards upstream of Marion County. Specific model assumptions are defined below:

- Failing septic system removal assumed that the *E. coli* bacteria load allocated to septic systems in all Septic Tank Elimination Program priority areas has been removed. The septic system removal is a combination of the existing Septic Tank Elimination Program, and the Accelerated Septic Removal discussed in the 2001 LTCP.
- Unpermitted connection removal assumes that the *E. coli* bacteria load allocated to unpermitted connections from the sanitary system to the stormwater collection system is removed.
- Stormwater BMPs and CIPs are assumed to reduce the *E. coli* bacteria load allocated to stormwater by 10%. The Stormwater Master Plan is included in this load reduction.
- *E. coli* bacteria compliance upstream of Marion County assumes that the White River is in compliance with the *E. coli* bacteria monthly geometric mean standard of 125 cfu/100 mL.

Additional projects that may be classified as “watershed improvements”, and do not have an assumed water quality impact on the White River and its tributaries, include the Basin Master Plan, the Watershed Team, additional street sweeping, public education, and the pretreatment improvements.

As documented in Appendix E, the *E. coli* bacteria impacts of the watershed improvements are more significant than CSO control for some of the *E. coli* bacteria parameters, especially the predicted number of days per year above the daily maximum standard of 235 cfu/100 mL.

CDM, 2003, Presentation Supplement for Combined Sewer Overflow Control Technology Evaluation.

CDM, 2003, 2001 Monitoring Data

CDM, 2003, Fall Creek Total Maximum Daily Load Report.

CDM, 2003, Pleasant Run and Bean Creek Total Maximum Daily Load Report.

CDM, 2003, White River Total Maximum Daily Load Report.

CDM, 2004, South Marion County Regional Interceptor Model Expansion Report.

CDM, 2004, Belmont North Interceptor Model Expansion Report.

Combined Sewer Overflow Project Team, 1997, Combined Sewer Overflow Model Calibration Technical Memorandum. Indianapolis Clean Stream Team, 2003, Stream Reach Characterization and Evaluation Report.

GRW Engineers, 2002, CSO 103 System Investigation.

Indiana Department of Environmental Management, 2002, Indiana's 303(d) Listing Methodology for Impaired Waterbodies and Total Maximum Daily Load.

Indianapolis Clean Stream Team, 2004, Draft Early Action Projects for Modeling Memorandum.

Indianapolis Clean Stream Team, 2004, Draft Control Technology Rationale Memorandum.

Roesner, L.A., Aldrich, J.A. and R.E. Dickinson, 1988, Storm Water Management Model, Version 4, User's Manual: EXTRAN Addendum. EPA/600/3-88/001b (NTIS PB88-236658/AS), U.S. Environmental Protection Agency, Athens, GA, 30605.

List of Acronyms

AWT	Advanced Wastewater Treatment
BMP	Best Management Practices
BN	Belmont North
BOD	Biochemical Oxygen Demand
$CBOD_5$	5-Day Carbonaceous BOD
CBODU	Ultimate Carbonaceous BOD
CIP	Capital Improvement Projects
CSS	Combined Sewer System
CSO	Combined Sewer Overflow
DCIA	Directly Connected Impervious Area
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
EAP	Early Action Projects
HGL	Hydraulic Grade Line
IDEM	Indiana Department of Environmental Management
I/I	Infiltration and inflow
LTCP	Long-Term Control Plan
MSC	MS Consultants
NetSTORM	Networked Storage Treatment Overflow and Runoff Model
TMDL	Total Maximum Daily Load
SAWTP	Southport Advanced Wastewater Treatment Plant
SMCRI	South Marion County Regional Interceptor
SWMM	Storm Water Management Model
STORM	Storage Treatment Overflow and Runoff Model
TEC	Triad Engineering Corporation
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WASP	Water Quality Analysis Simulation Program
WQ	Water Quality

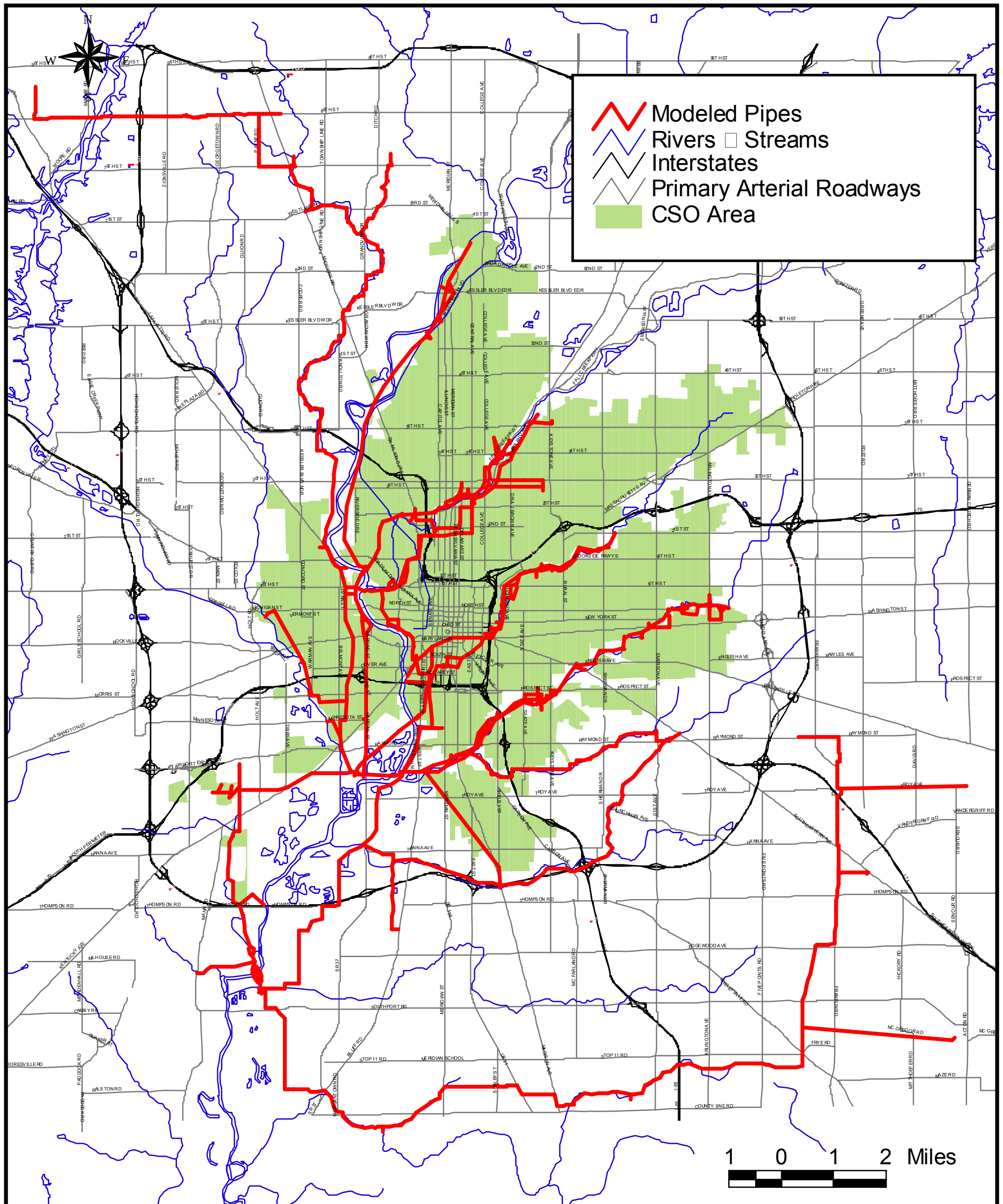


Figure 1-1: Extents of SWMM Model

Date: 2004

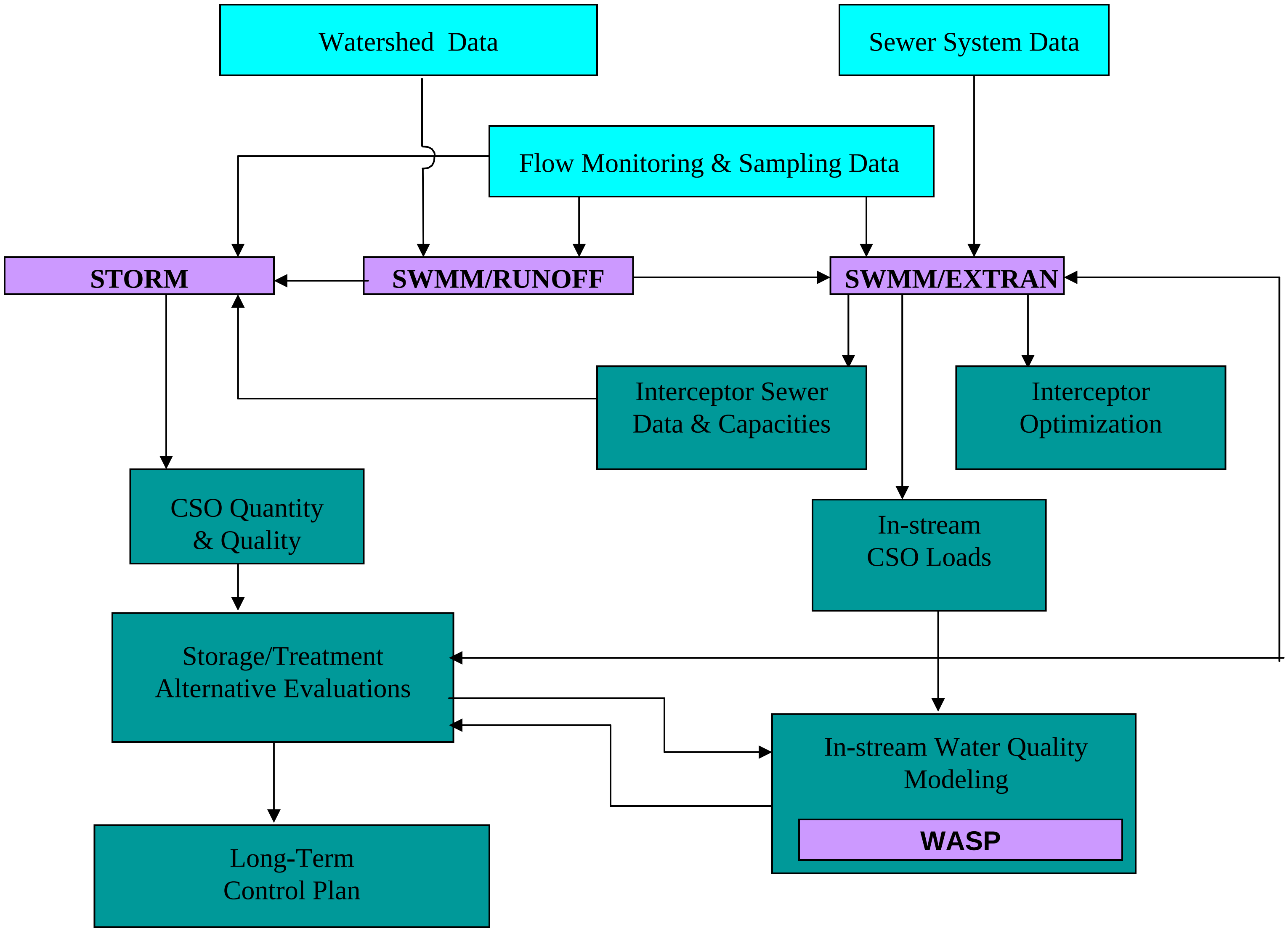


Figure 1-2
CSO Modeling Strategy

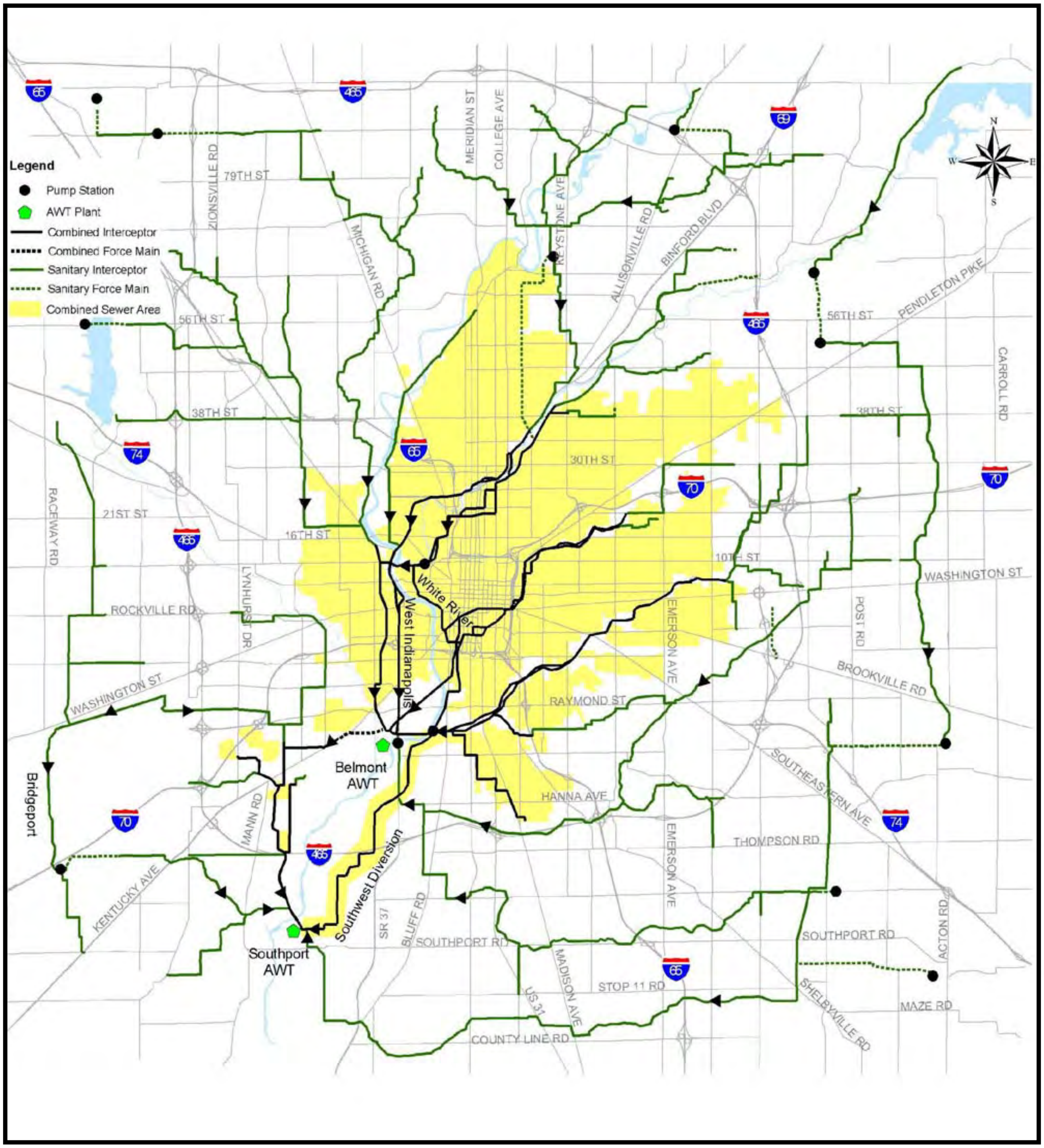


Figure 2-1
Indianapolis Interceptor Map

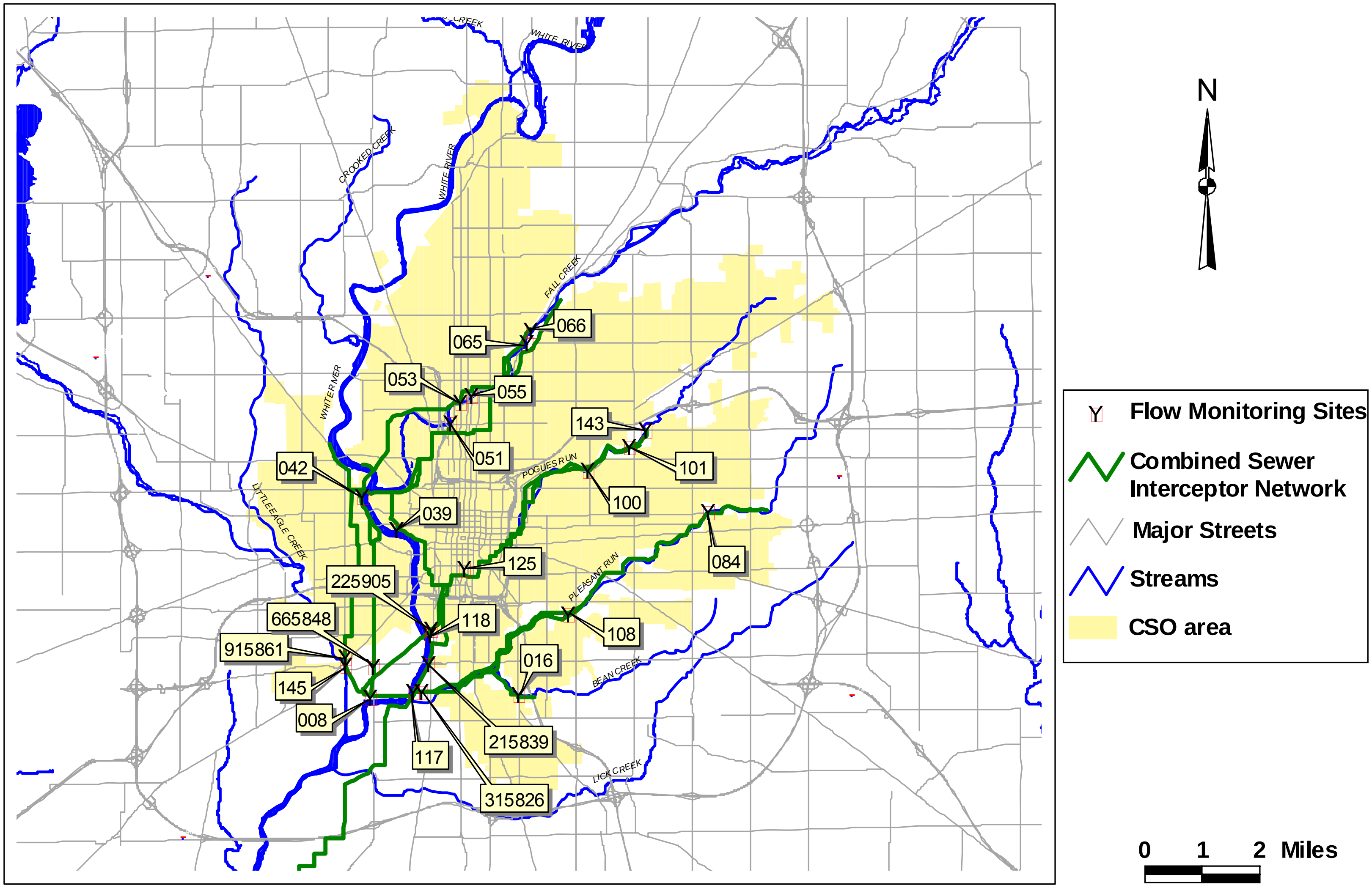
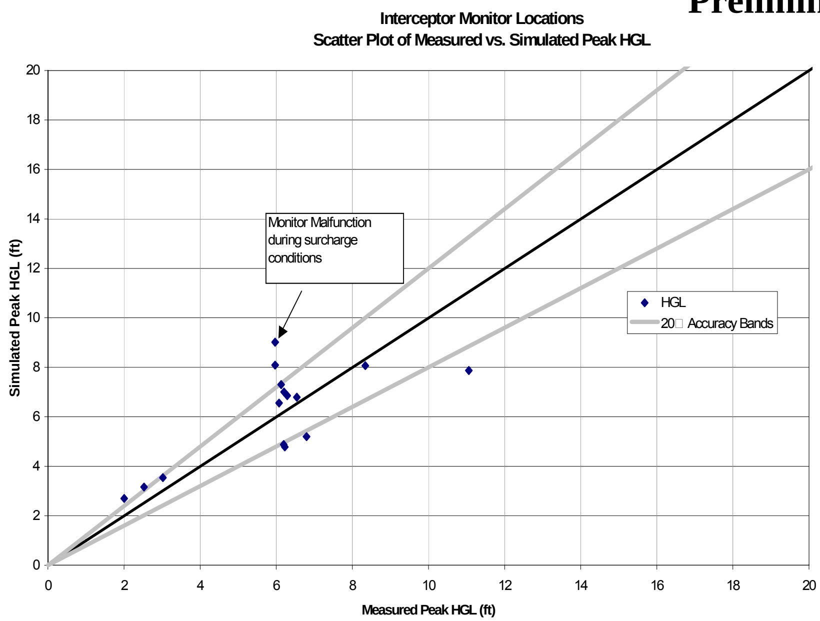
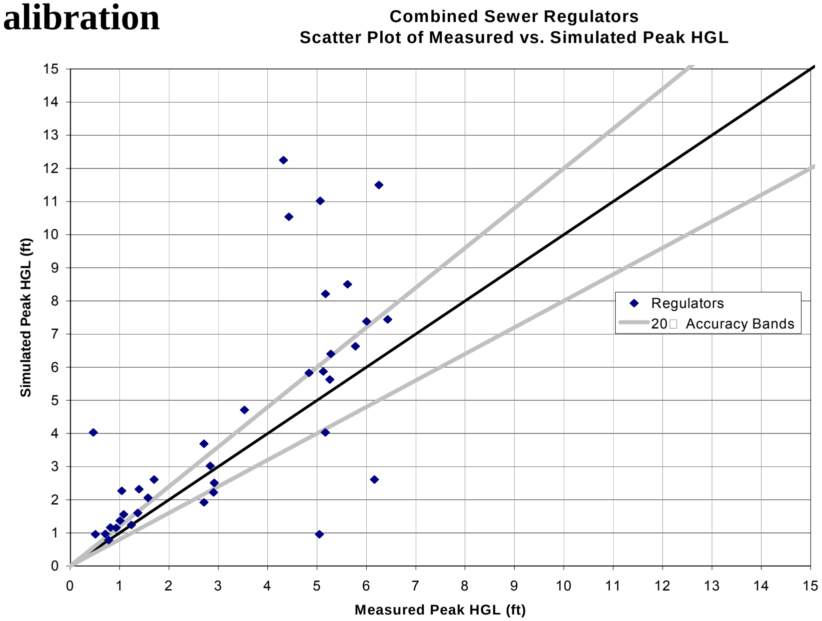


Figure 2-2
Flow Monitoring Locations - SWMM Model Recalibration

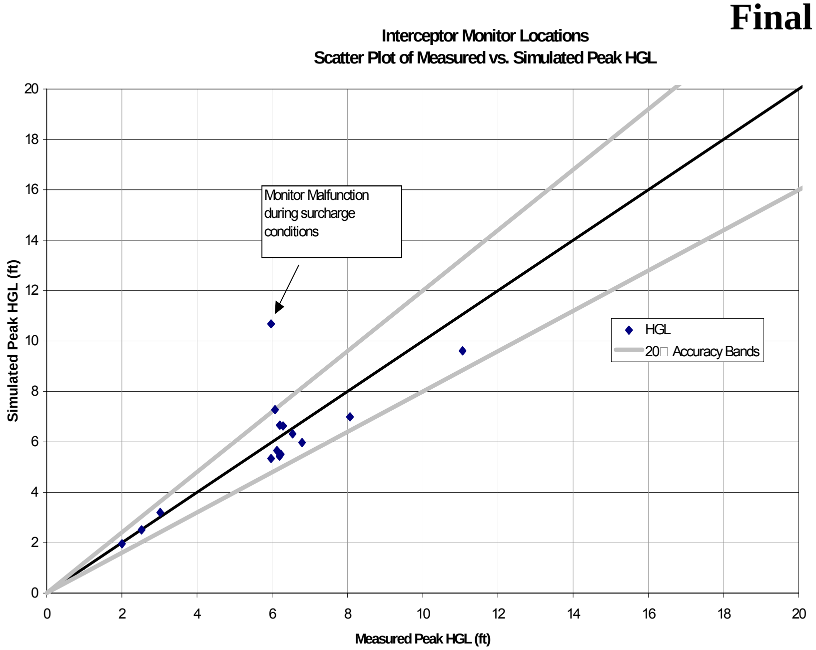
City of Indianapolis

Preliminary Re-Calibration





Final Re-Calibration



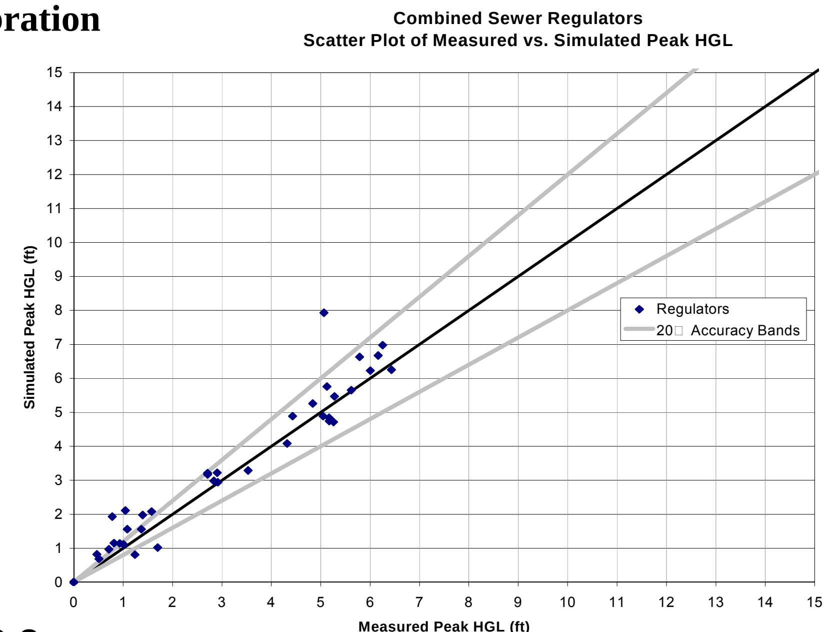
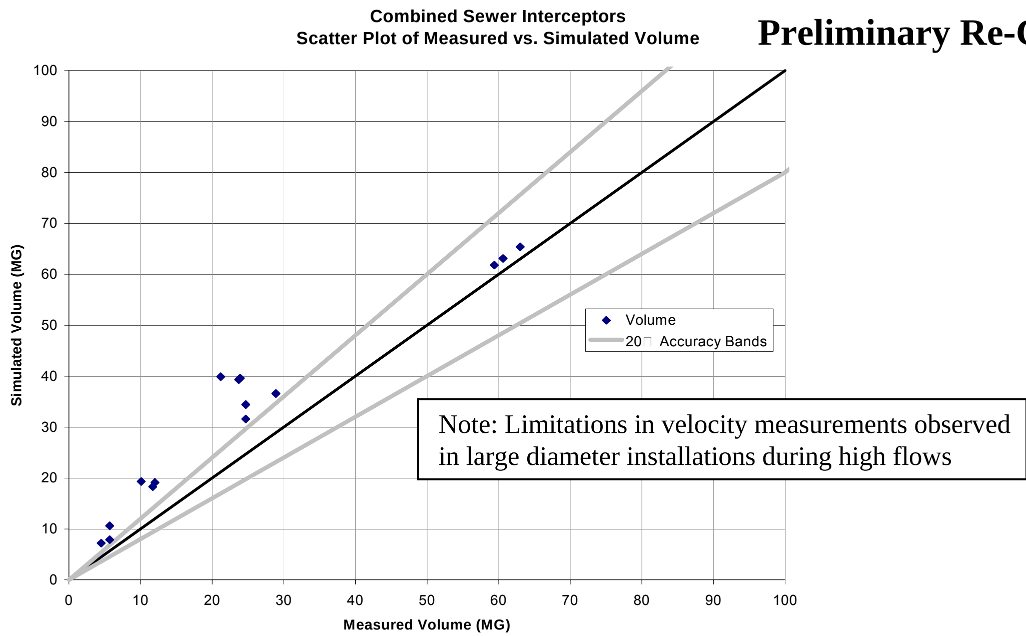
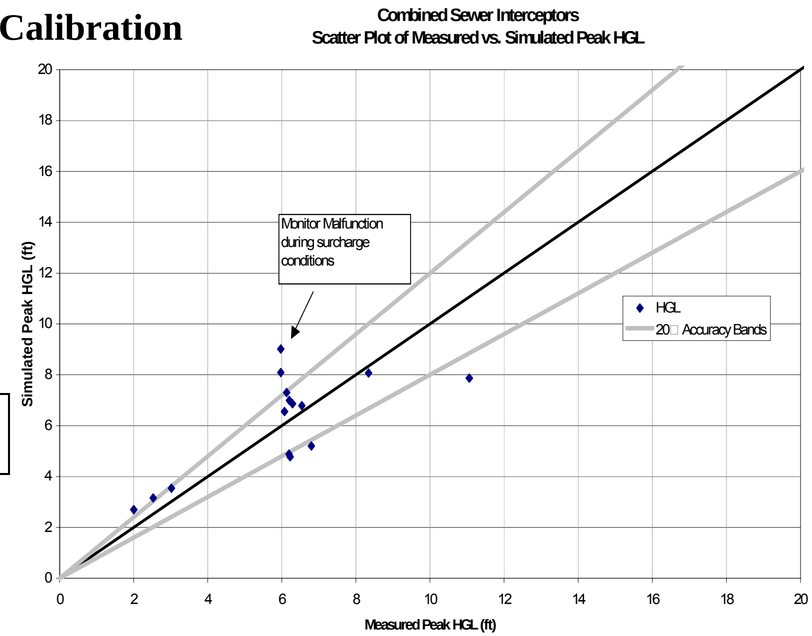


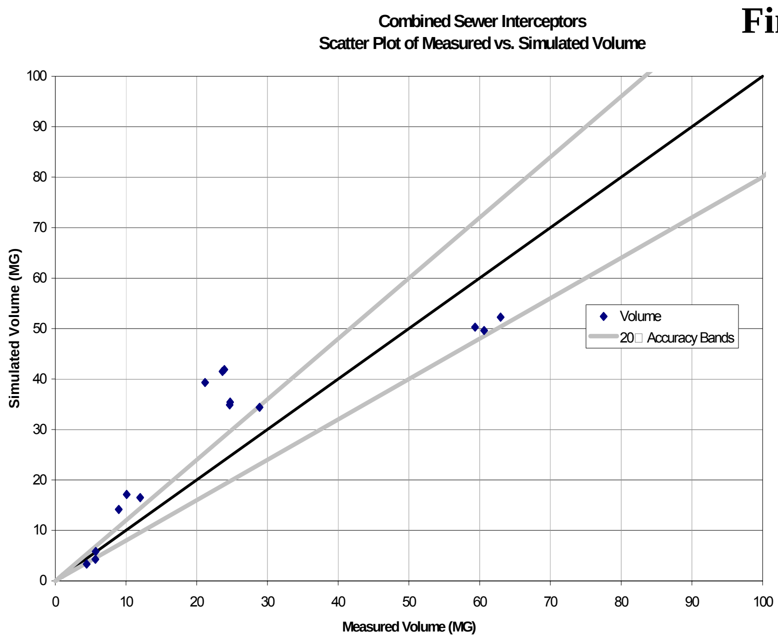
Figure 2-3
Recalibration Scatter Plots: Interceptor Monitor and CSO Regulator HGL

Preliminary Re-Calibration





Final Re-Calibration



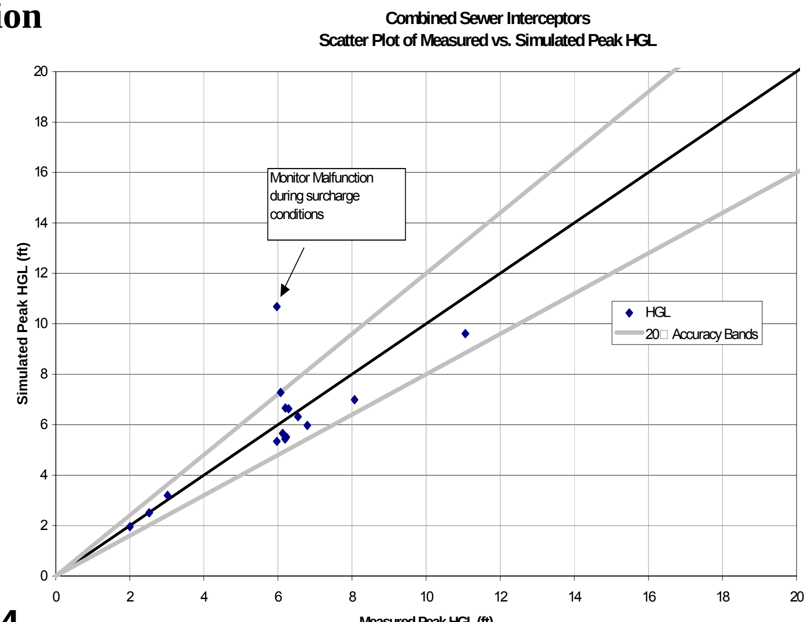


Figure 2-4

Recalibration Scatter Plots: Combined Sewer Interceptor Volumes and HGL

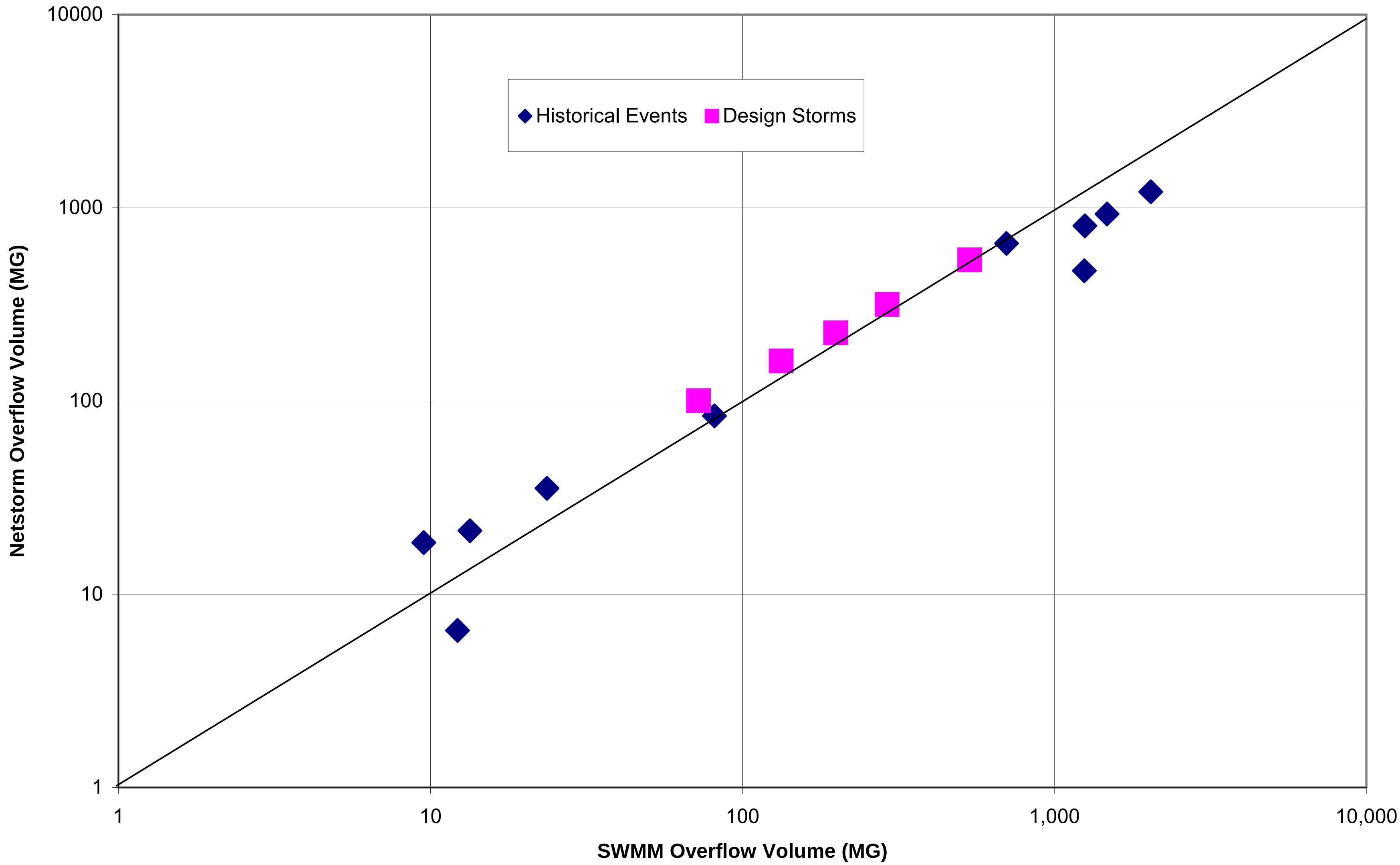


Figure 2-5
Comparison of NetSTORM and SWMM Performance

TABLE 2-1
SUMMARY OF HISTORICAL RAIN EVENTS FOR NETSTORM & EXTRAN COMPARISON

Event #	Rainfall Depth (in)	Peak Hour Intensity (in/hr)	Duration (hours)	Start Date / Time
1	0.25	0.21	2	6/26/1956 19:00
2	0.27	0.22	2	9/17/1987 2:00
3	0.30	0.19	4	3/3/1993 18:00
4	0.35	0.19	3	1/7/1978 13:00
5	0.70	0.26	6	7/18/1970 22:00
6	2.20	0.43	11	5/22/1968 22:00
7	2.95	0.64	17	7/28/1979 1:00
8	3.61	0.96	14	6/22/1960 22:00
9	4.00	0.69	15	7/20/1969 1:00
10	5.09	1.24	16	7/1/1987 2:00

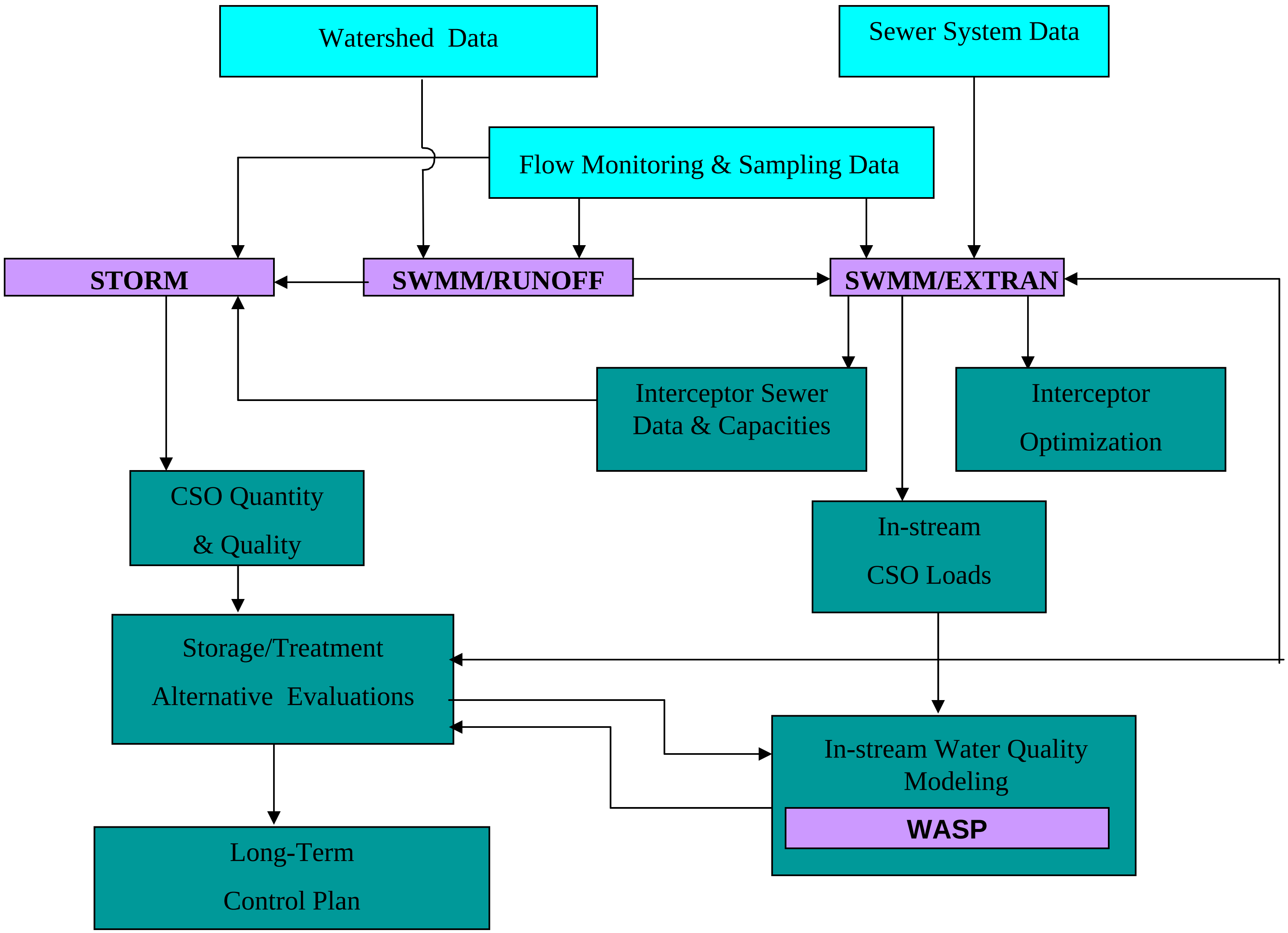


Figure 3-1
CSO Modeling Strategy

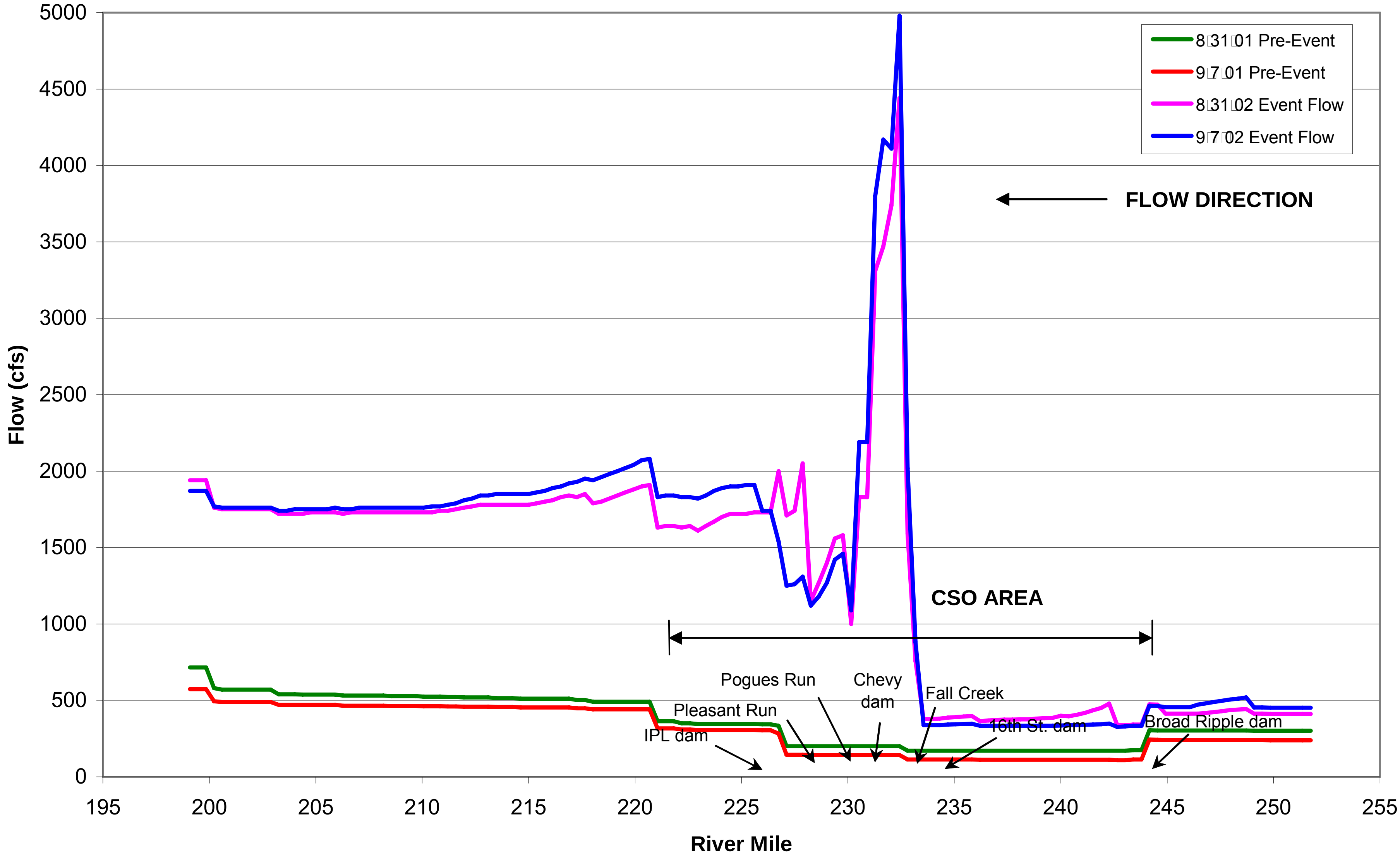


Figure 3-2
Pre-Event and Peak Event Modeled Flow in the White River

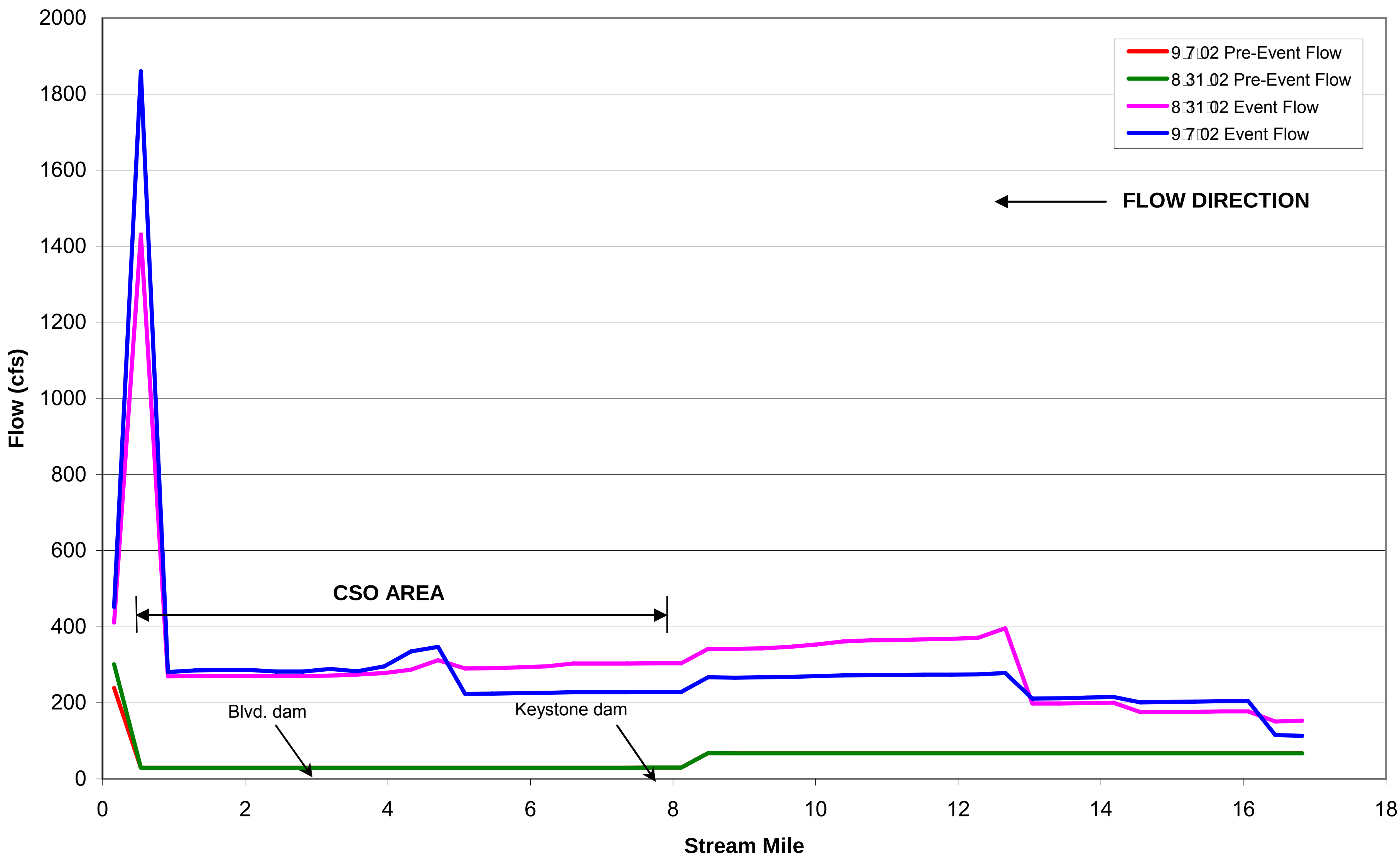


Figure 3-3
CSO Maximum Modeled Flow in Fall Creek

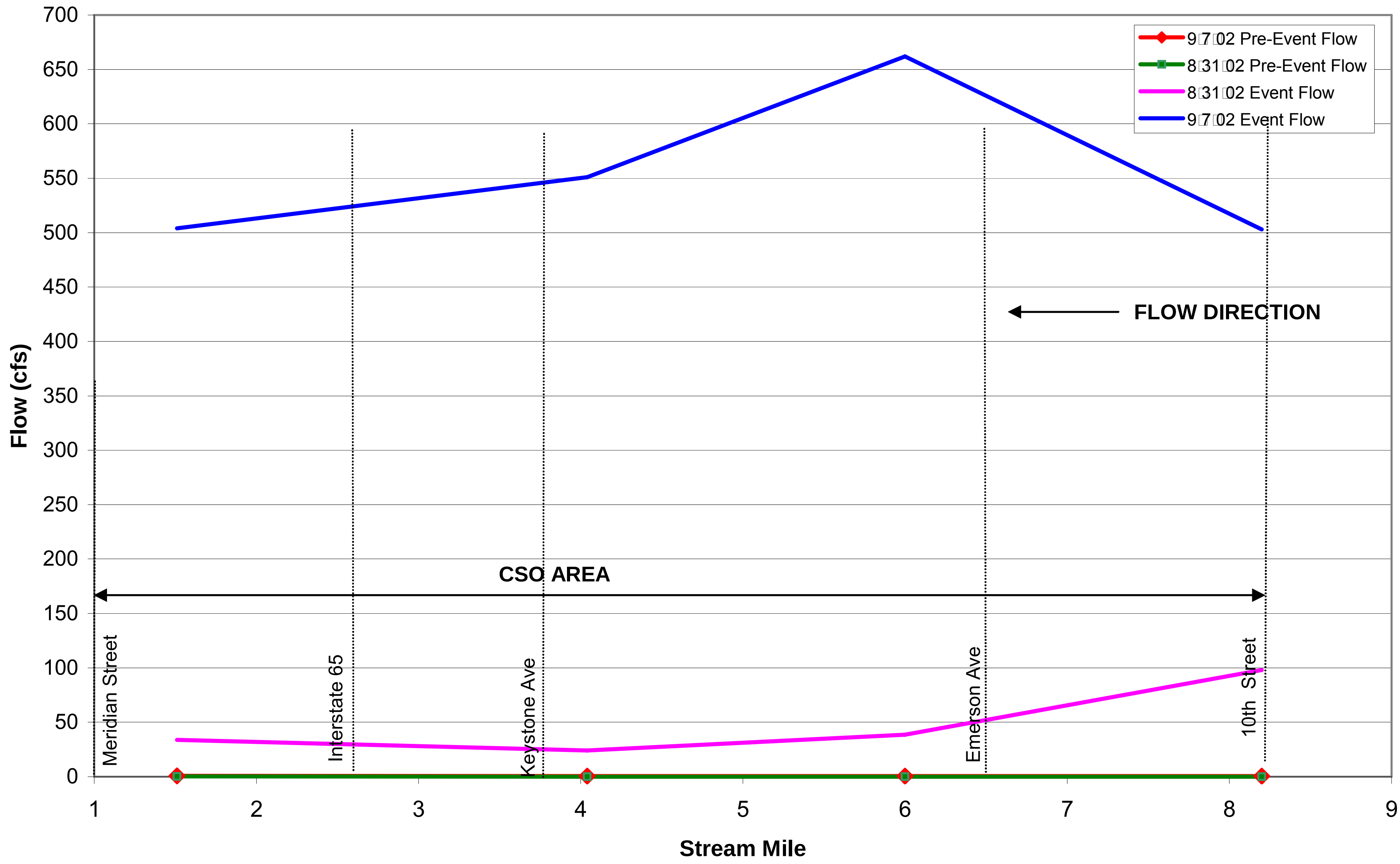


Figure 3-4
CSO Maximum Modeled Flow in Pleasant Run

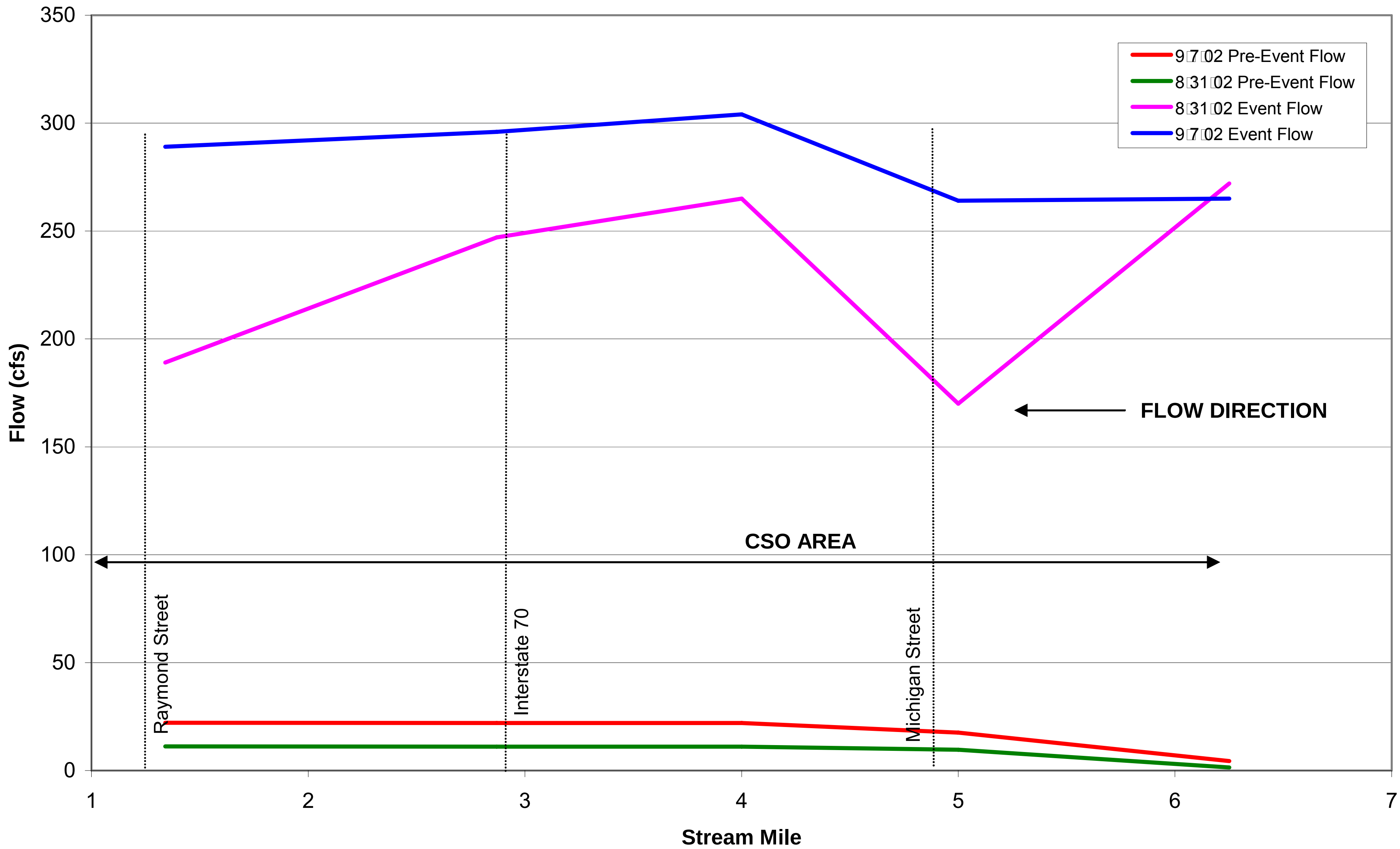


Figure 3-5
CSO Maximum Modeled Flow in Eagle Creek

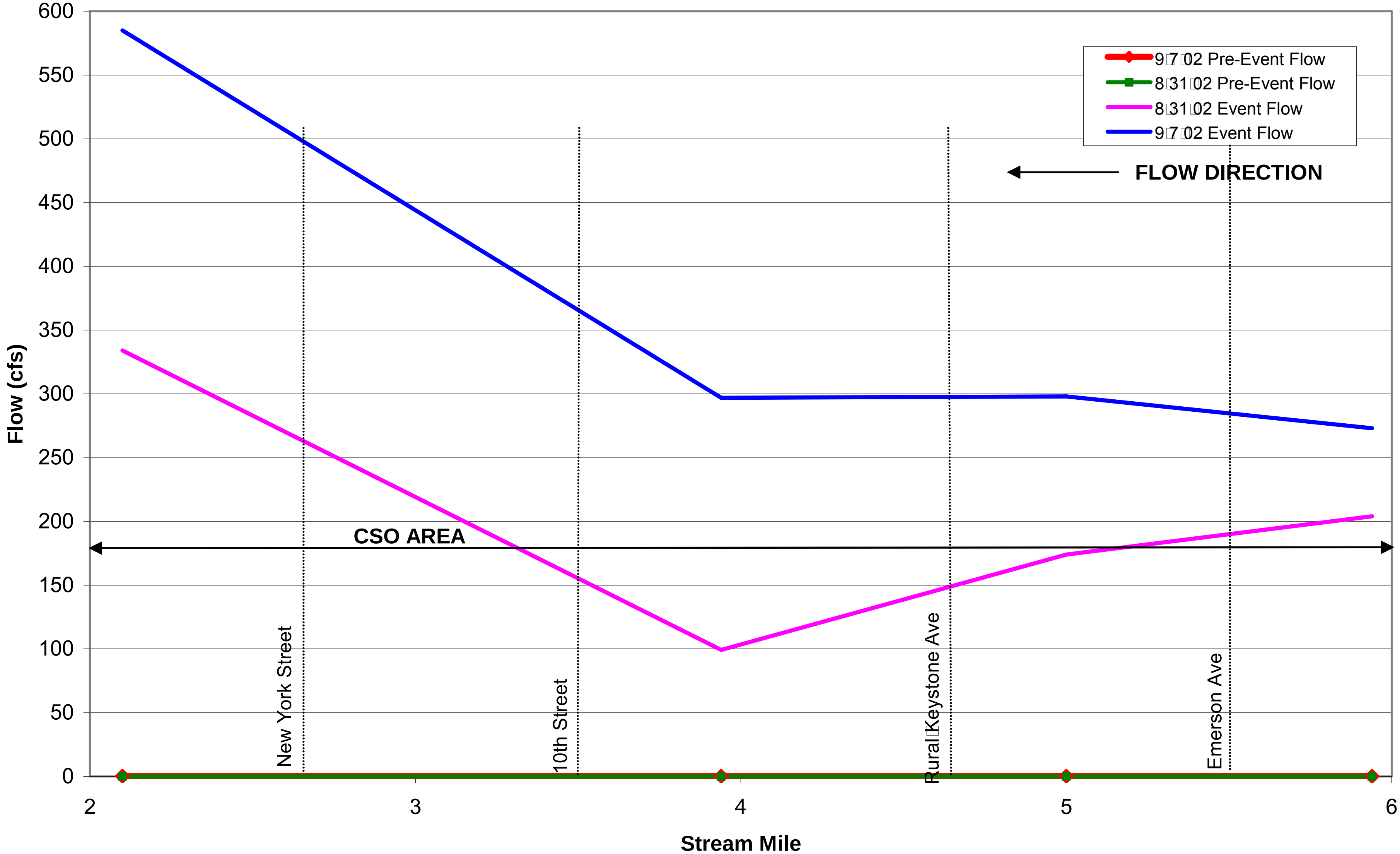


Figure 3-6
CSO Maximum Modeled Flow in Pogues Run

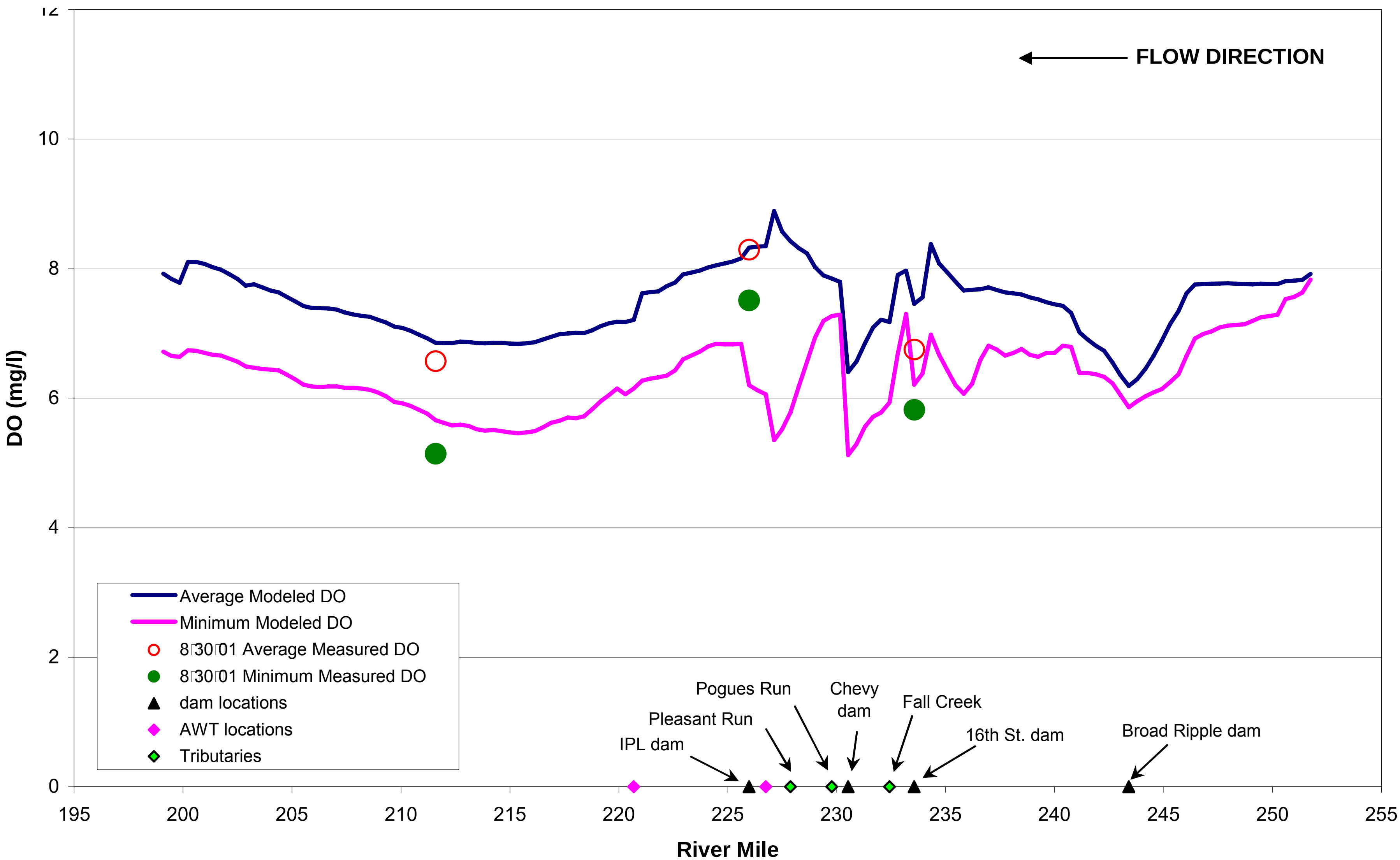


Figure 3-7
Typical Dry Weather Pre-Event DO Conditions for the White River
August 31, 2001 Storm Event

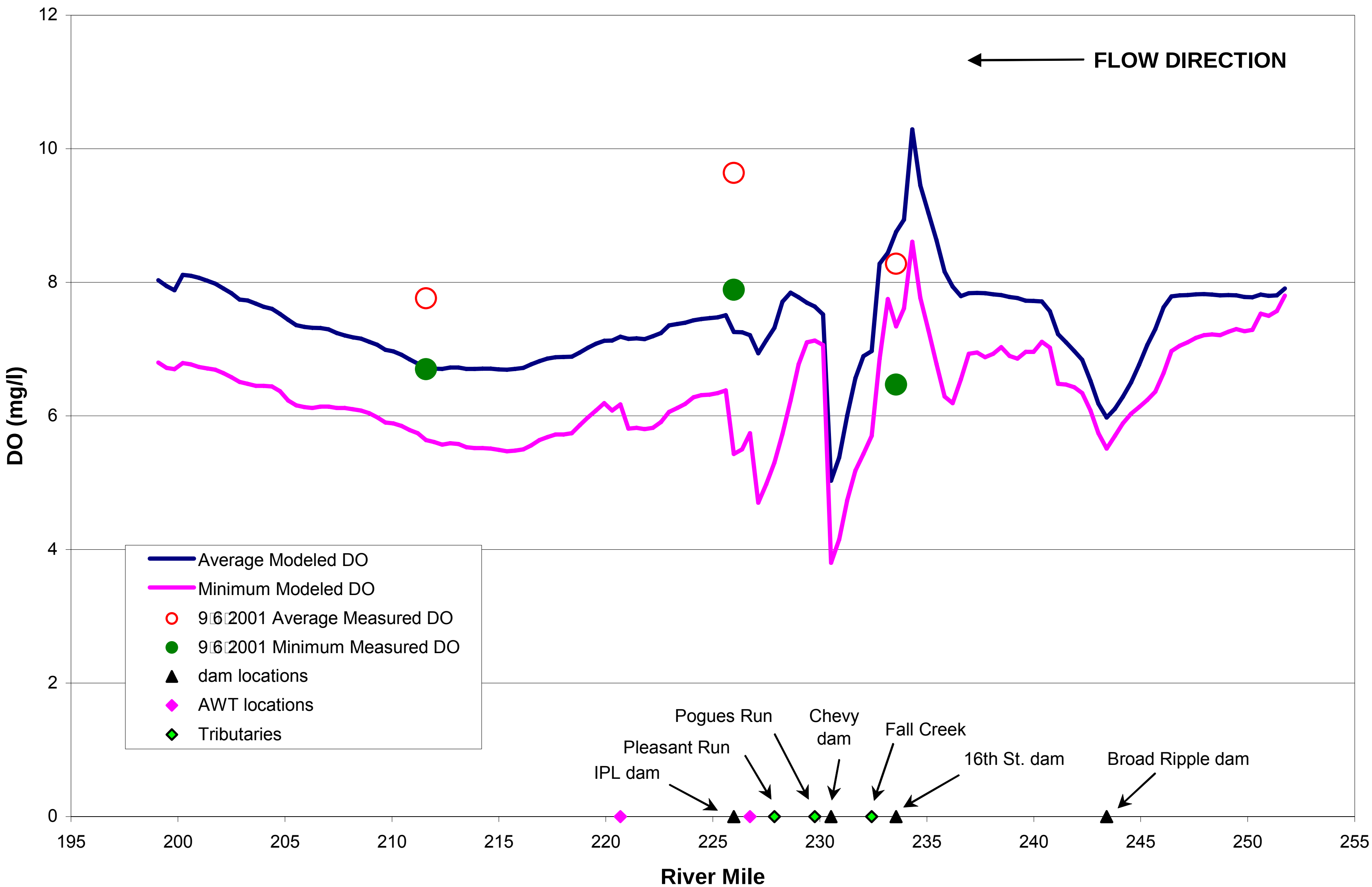


Figure 3-8
Typical Dry Weather Pre-Event DO Conditions for the White River
September 7, 2001 Storm Event

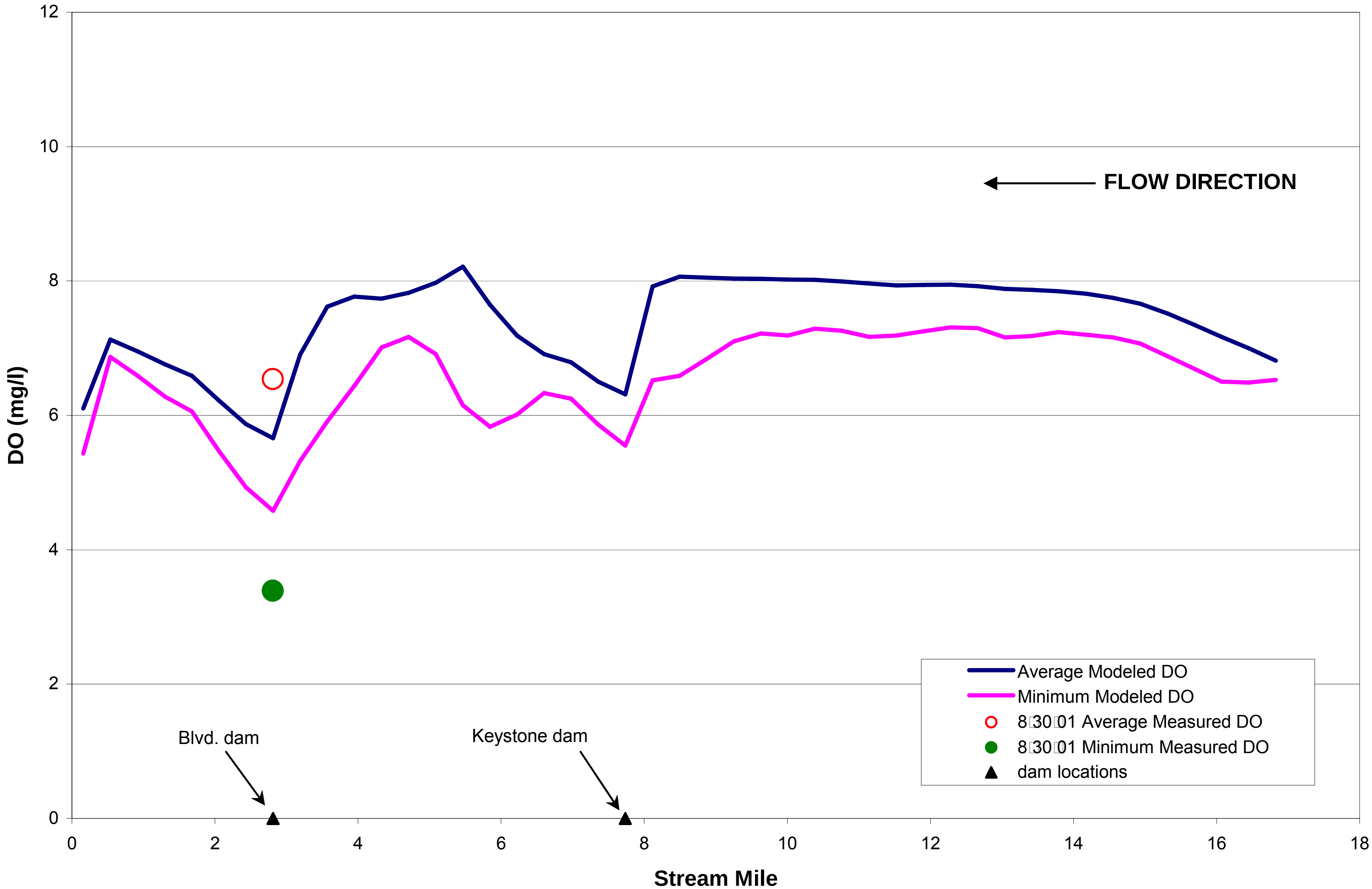


Figure 3-9
Typical Dry Weather Pre-Event DO Conditions for Fall Creek
August 31, 2001 Storm Event

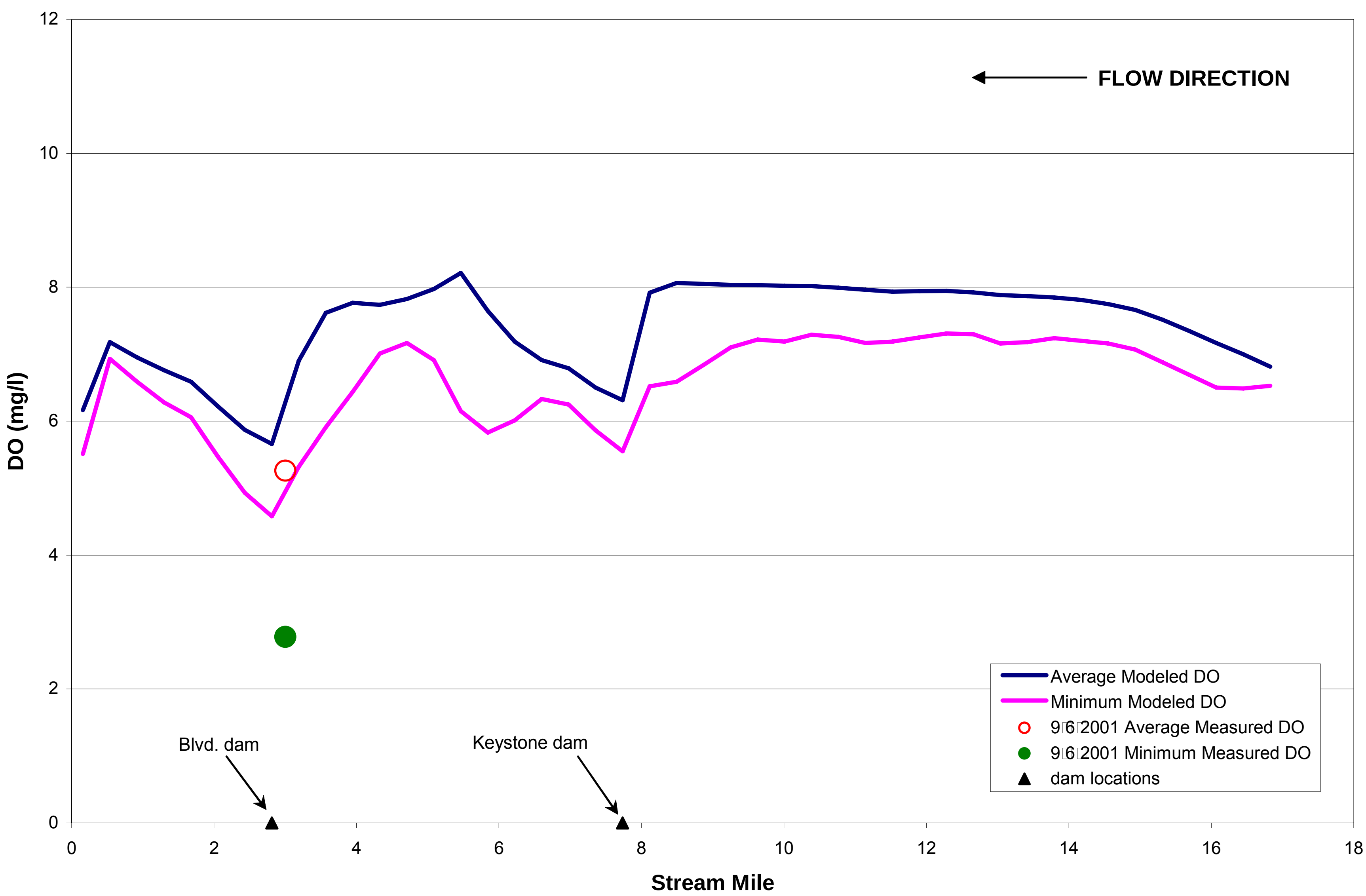


Figure 3-10
Typical Dry Weather Pre-Event DO Conditions for Fall Creek
September 7, 2001 Storm Event

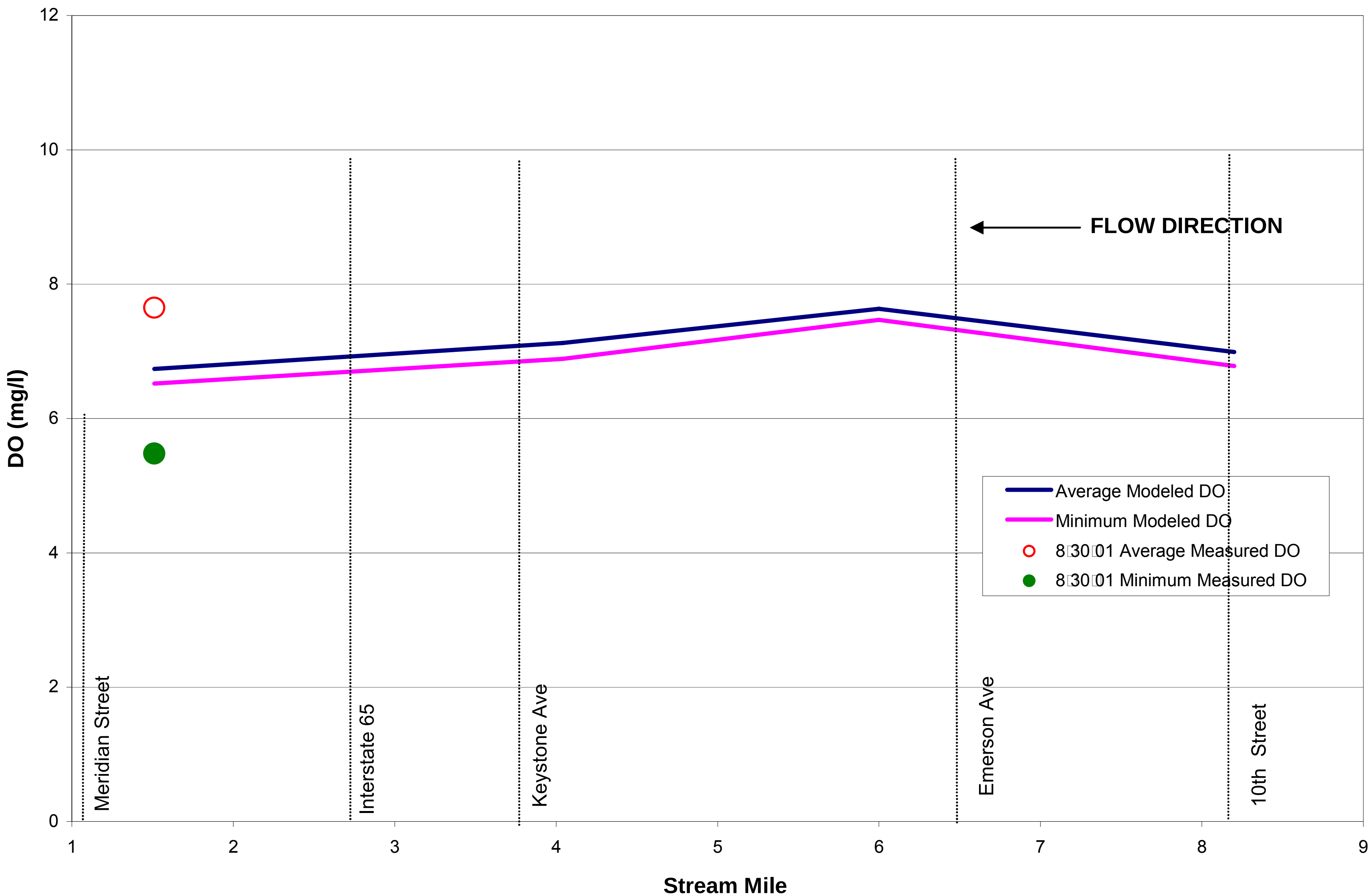


Figure 3-11
Typical Dry Weather Pre-Event DO Conditions for Pleasant Run
August 31, 2001 Storm Event

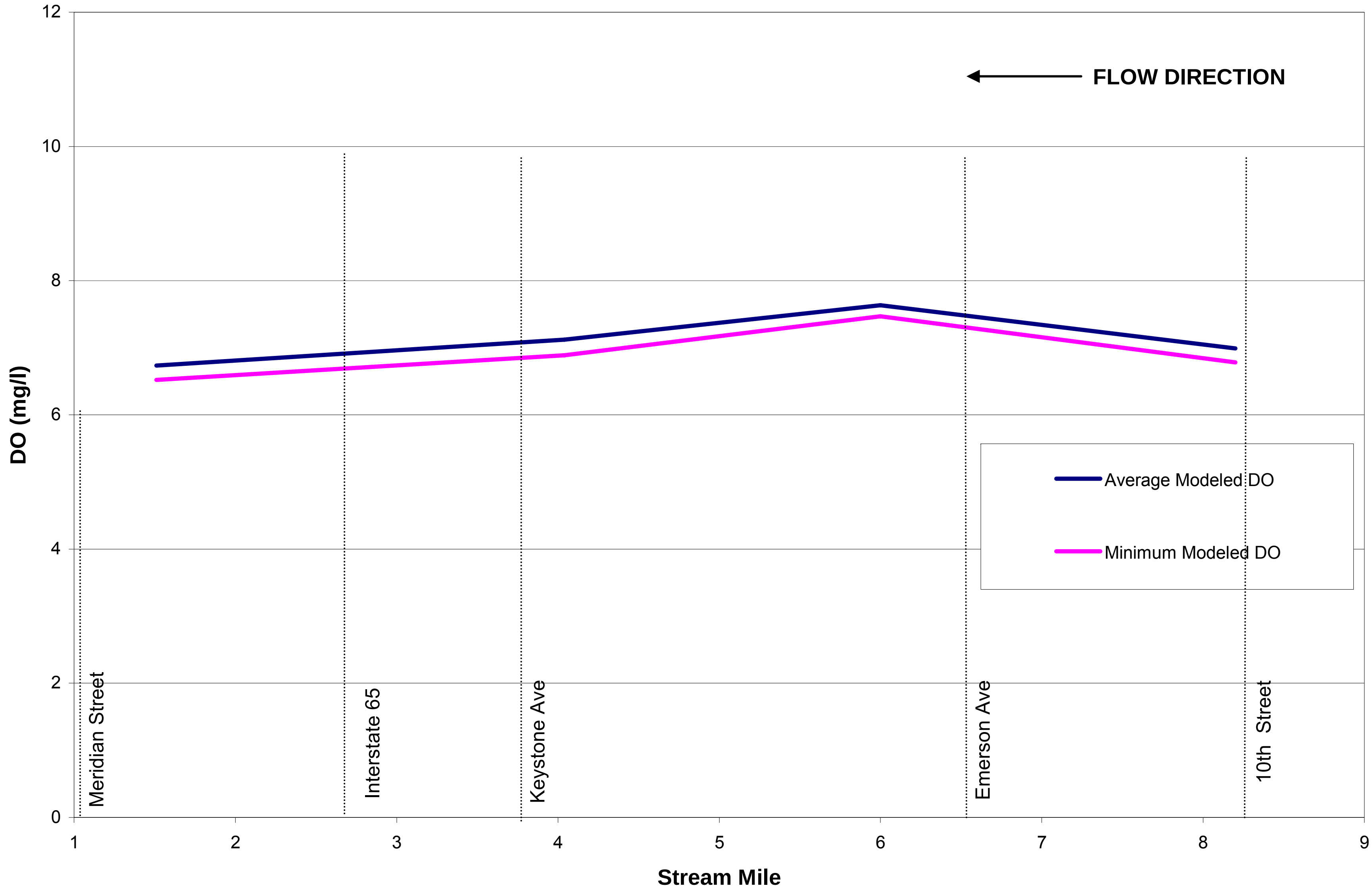


Figure 3-12
Typical Dry Weather Pre-Event DO Conditions for Pleasant Run
September 7, 2001 Storm Event

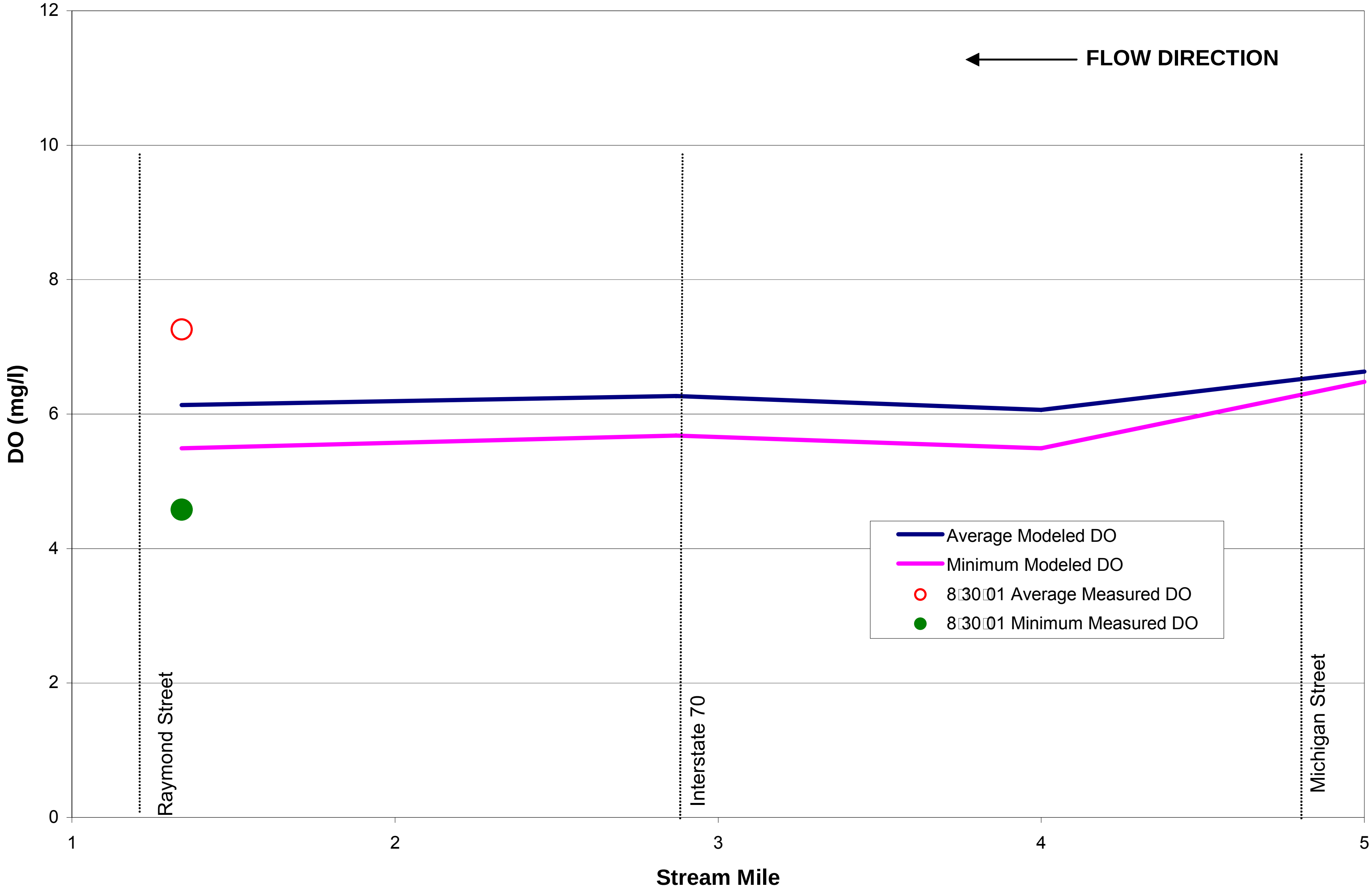


Figure 3-13

Typical Dry Weather Pre-Event DO Conditions for Eagle Creek

August 31, 2001 Storm Event

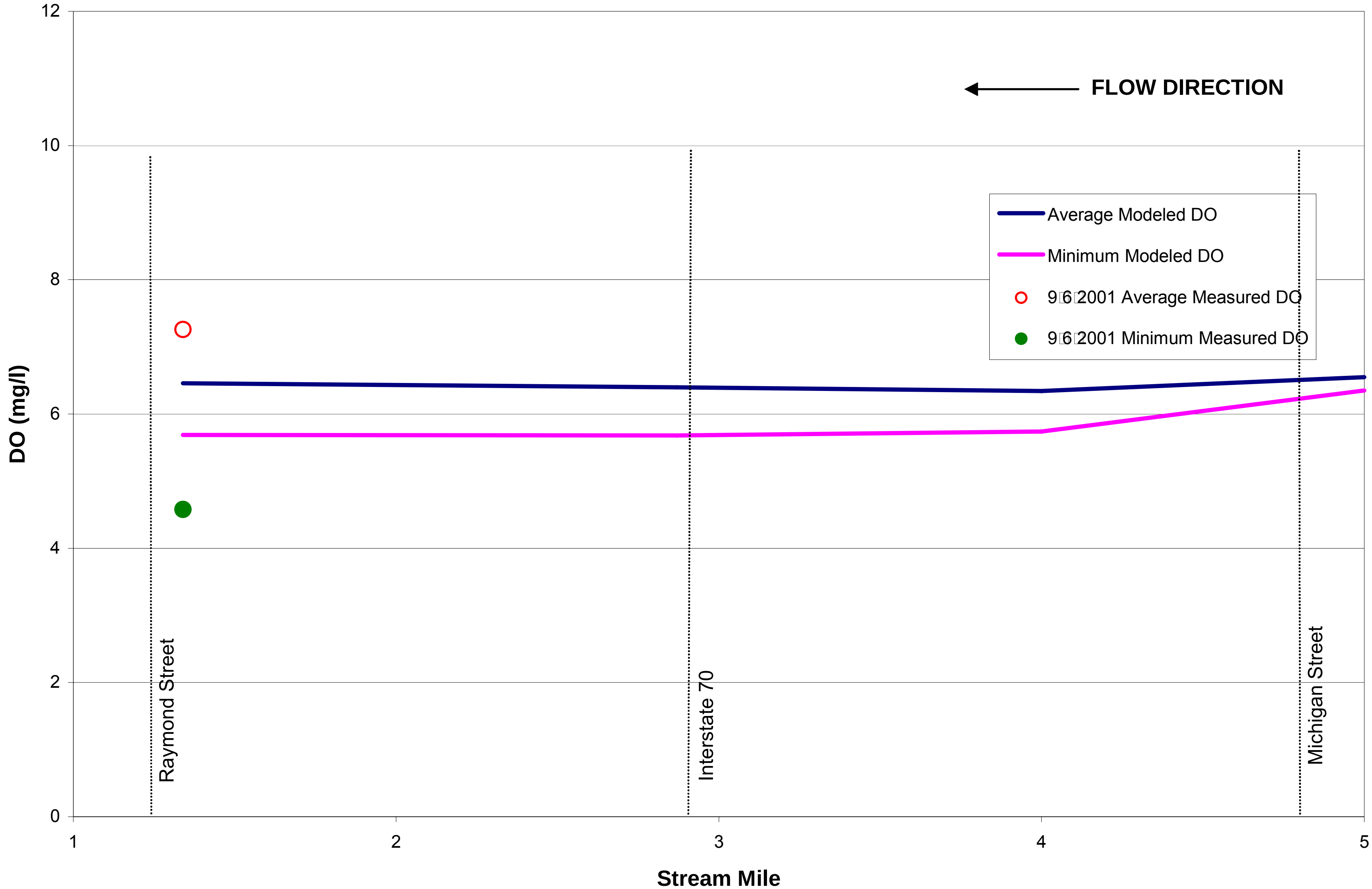


Figure 3-14

Typical Dry Weather Pre-Event DO Conditions for Eagle Creek

September 7, 2001 Storm Event

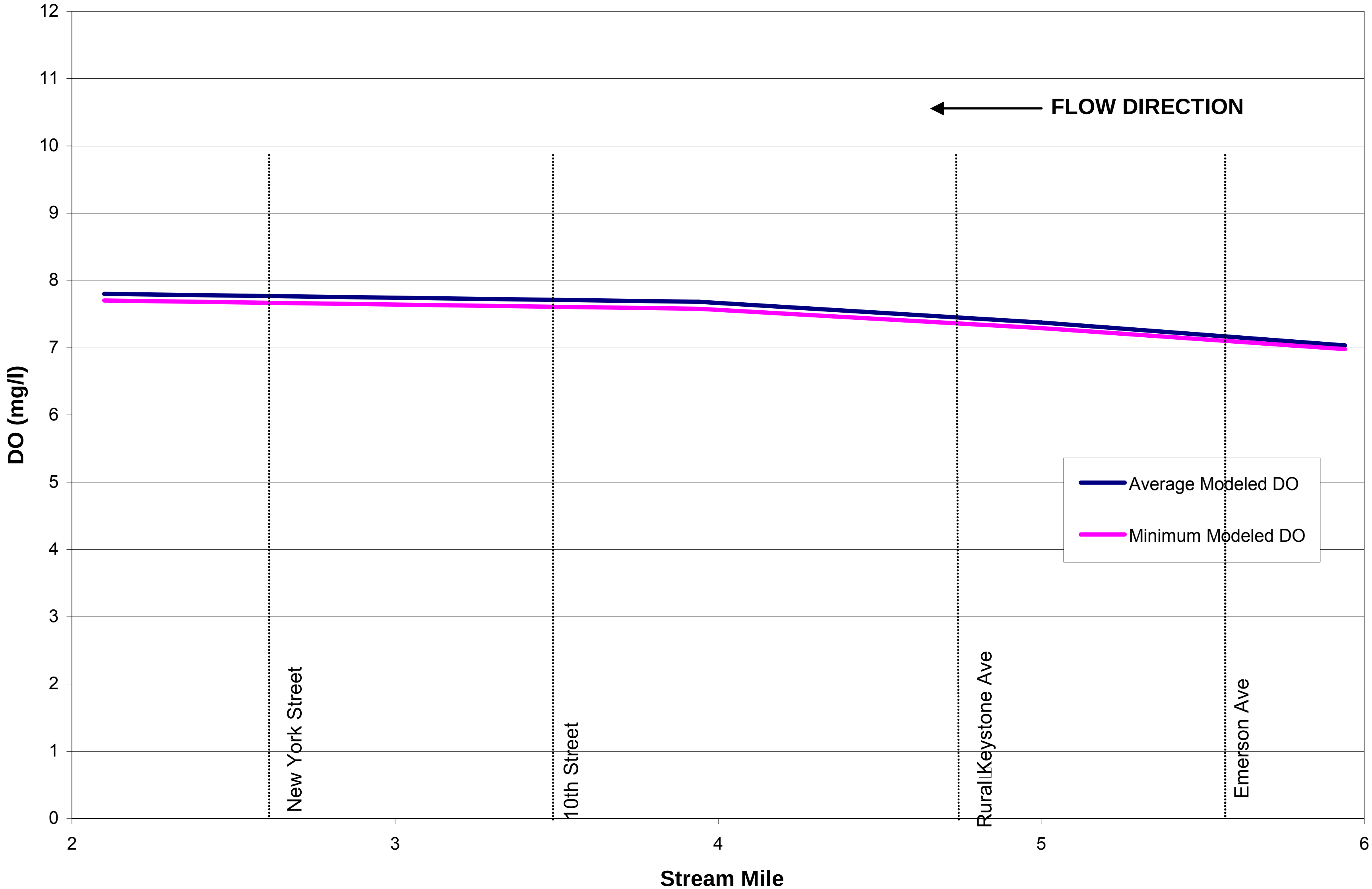


Figure 3-15
Typical Dry Weather Pre-Event DO Conditions for Pogues Run
August 31, 2001 Storm Event

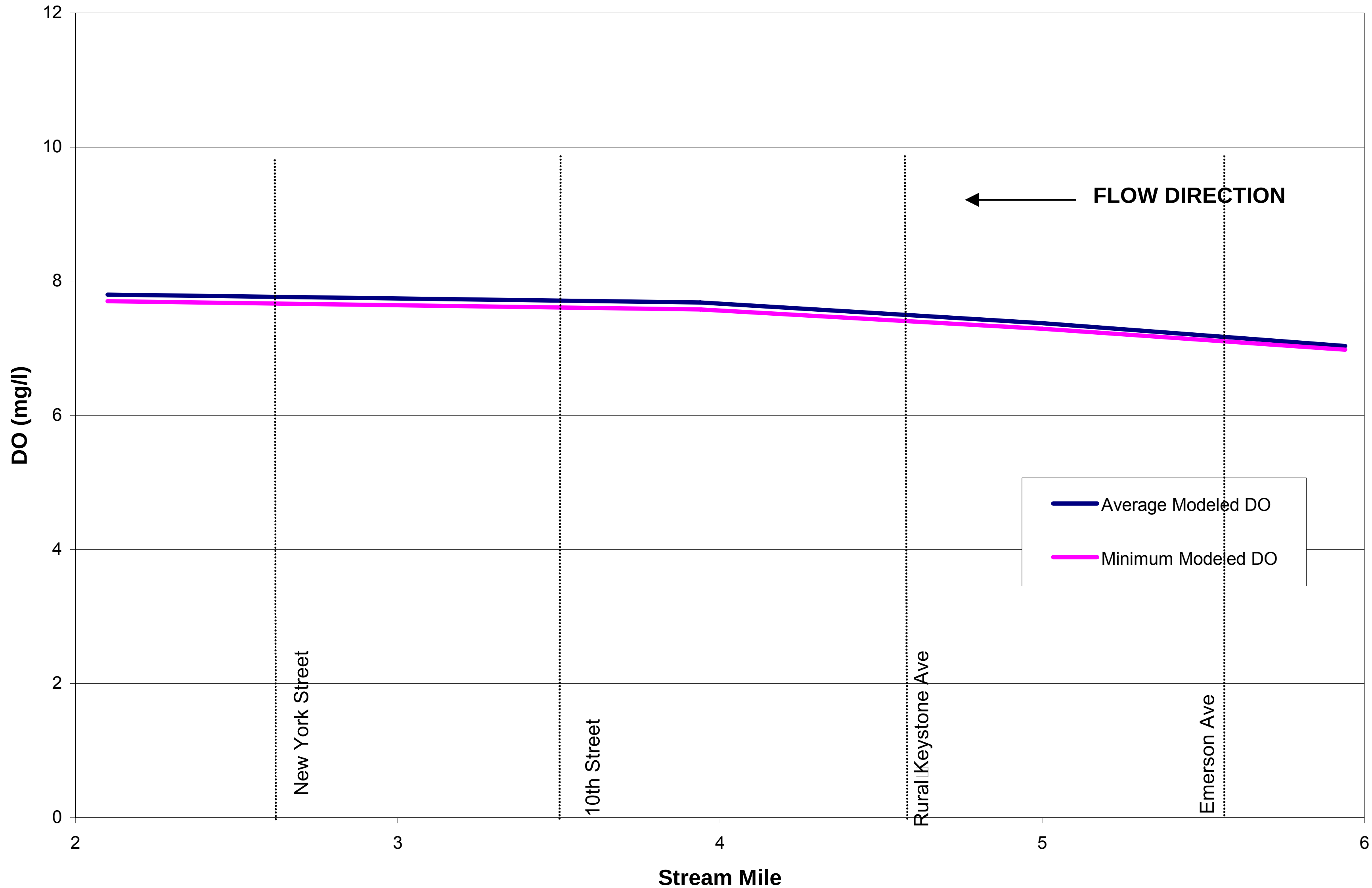


Figure 3-16
Typical Dry Weather Pre-Event DO Conditions for Pogues Run
September 7, 2001 Storm Event

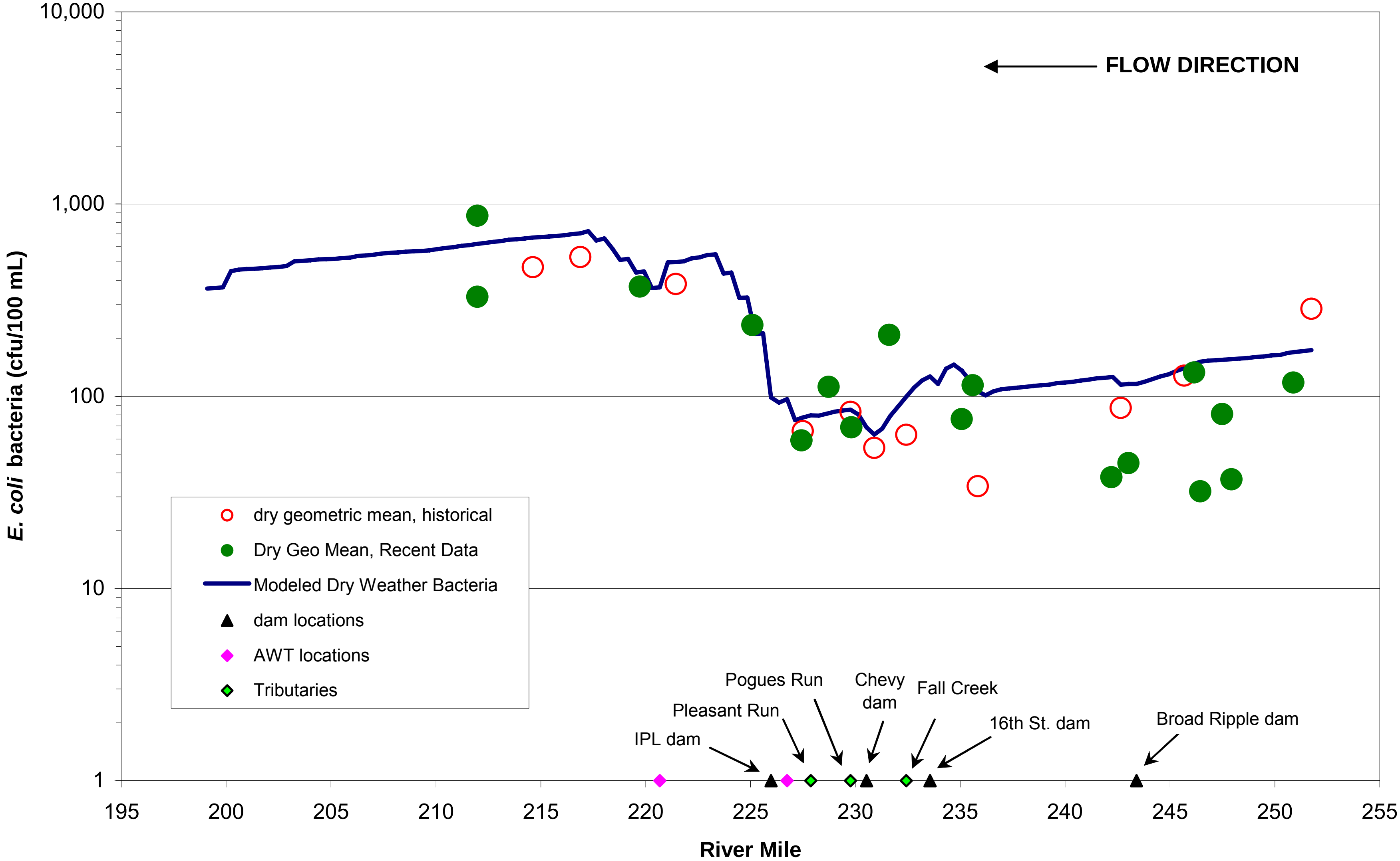


Figure 3-17

Typical Dry Weather Pre-Event *E. coli* Bacteria Conditions for the White River

August 31, 2001 Storm Event

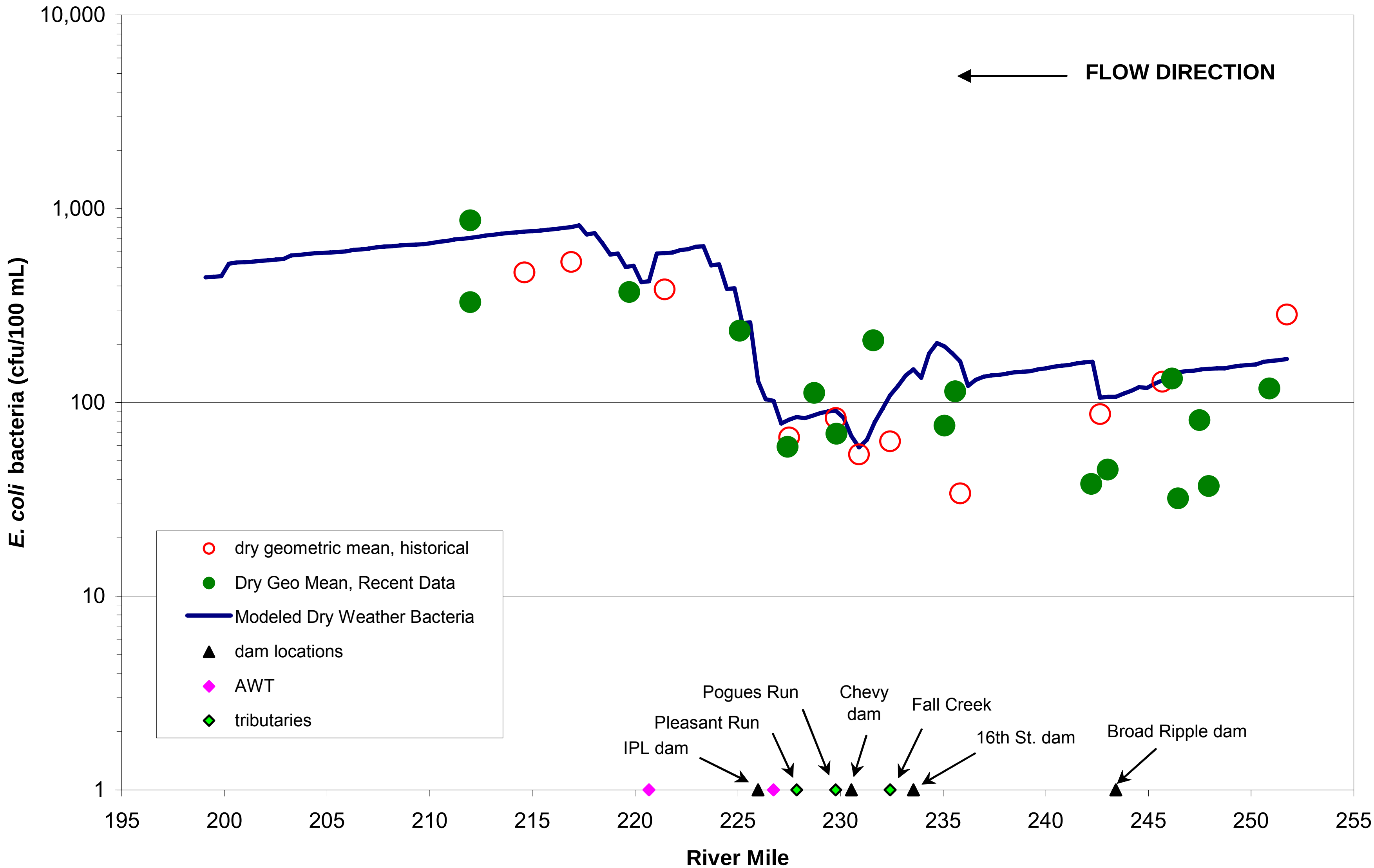


Figure 3-18

Typical Dry Weather Pre-Event *E. coli* Bacteria Conditions for the White River

September 7, 2001 Storm Event

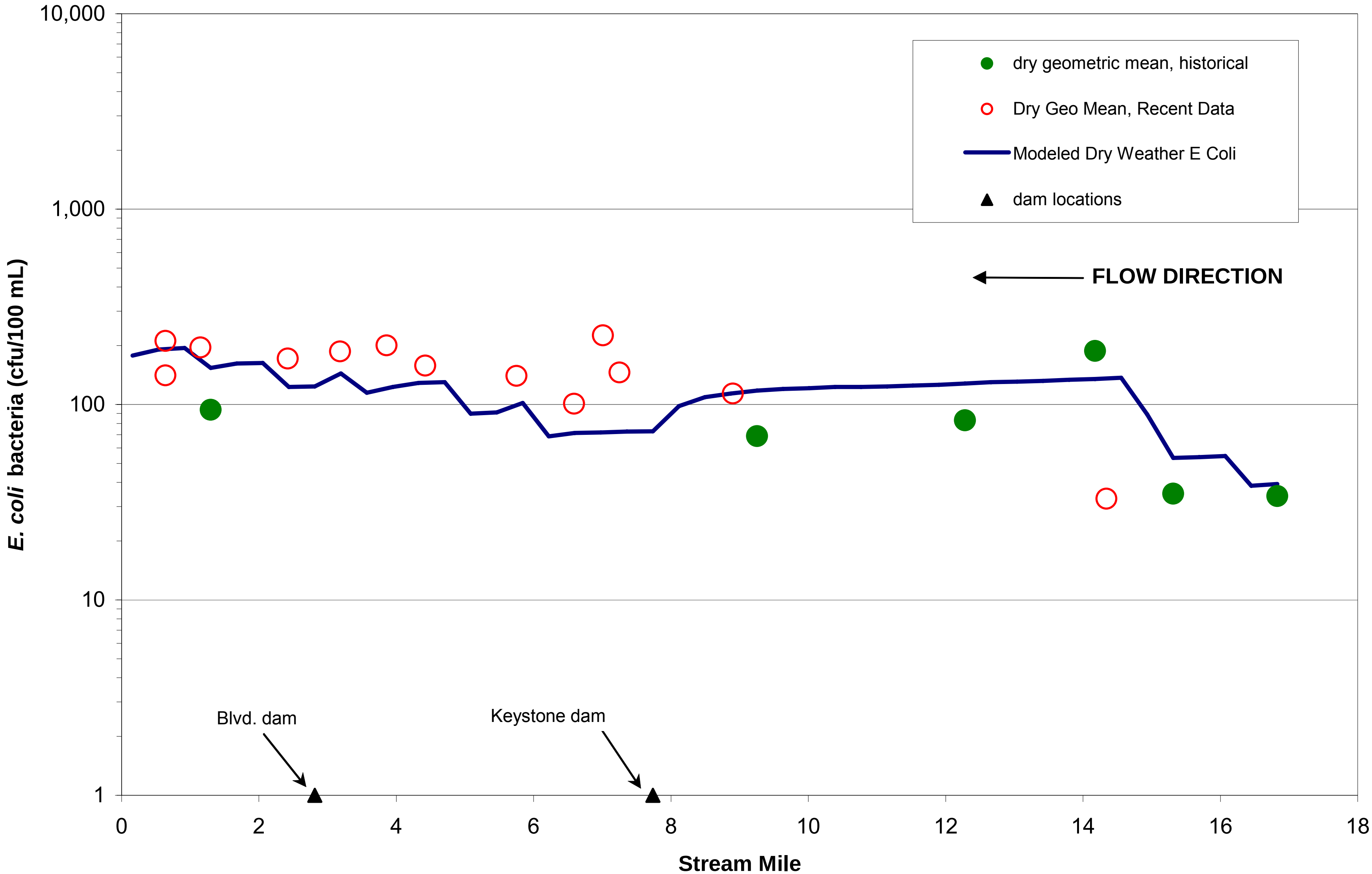


Figure 3-19
Typical Dry Weather Pre-Event *E. coli* Bacteria Conditions for Fall Creek
August 31, 2001 Storm Event

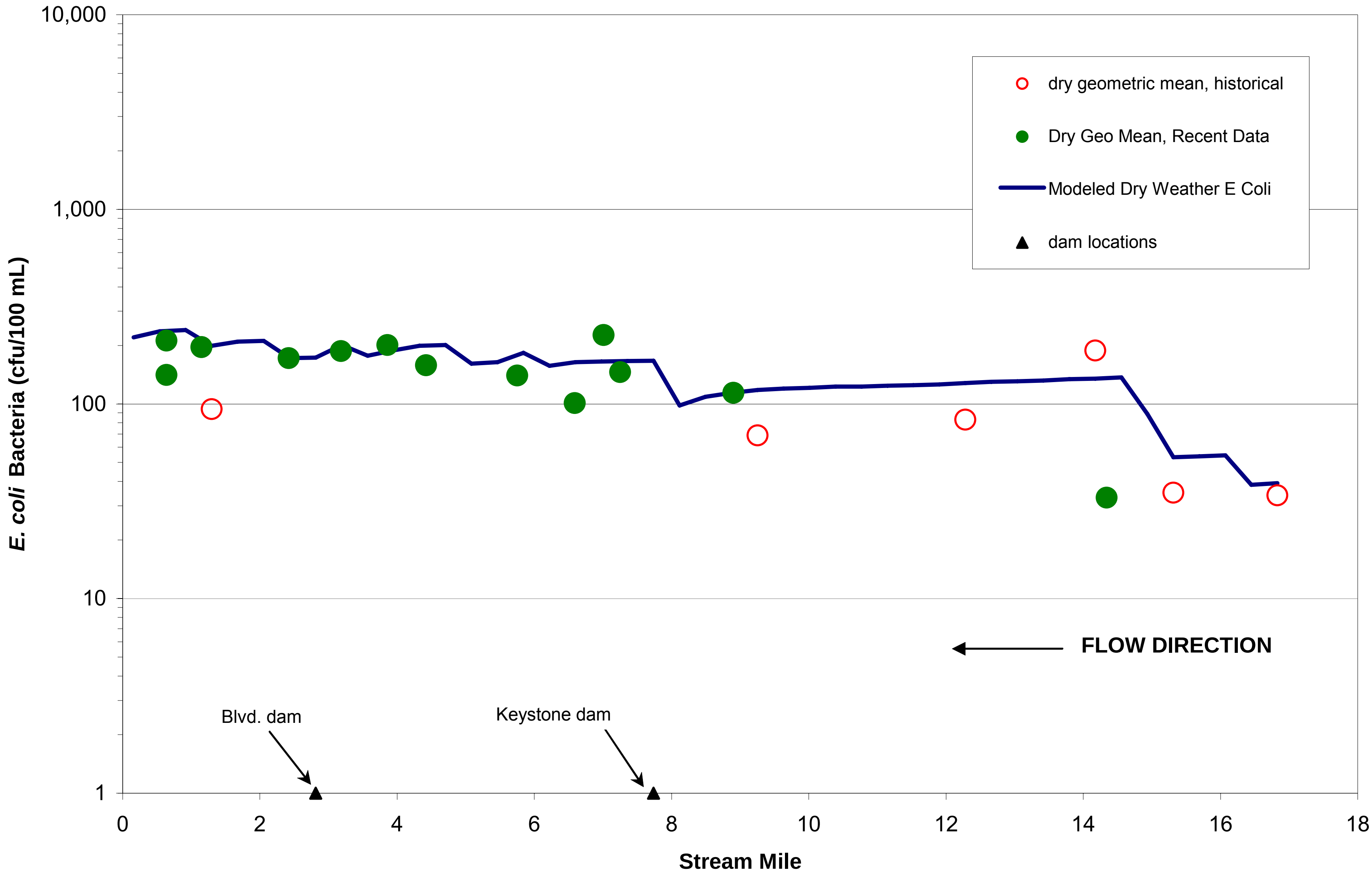


Figure 3-20
Typical Dry Weather Pre-Event *E. coli* Bacteria Conditions for Fall Creek
September 7, 2001 Storm Event

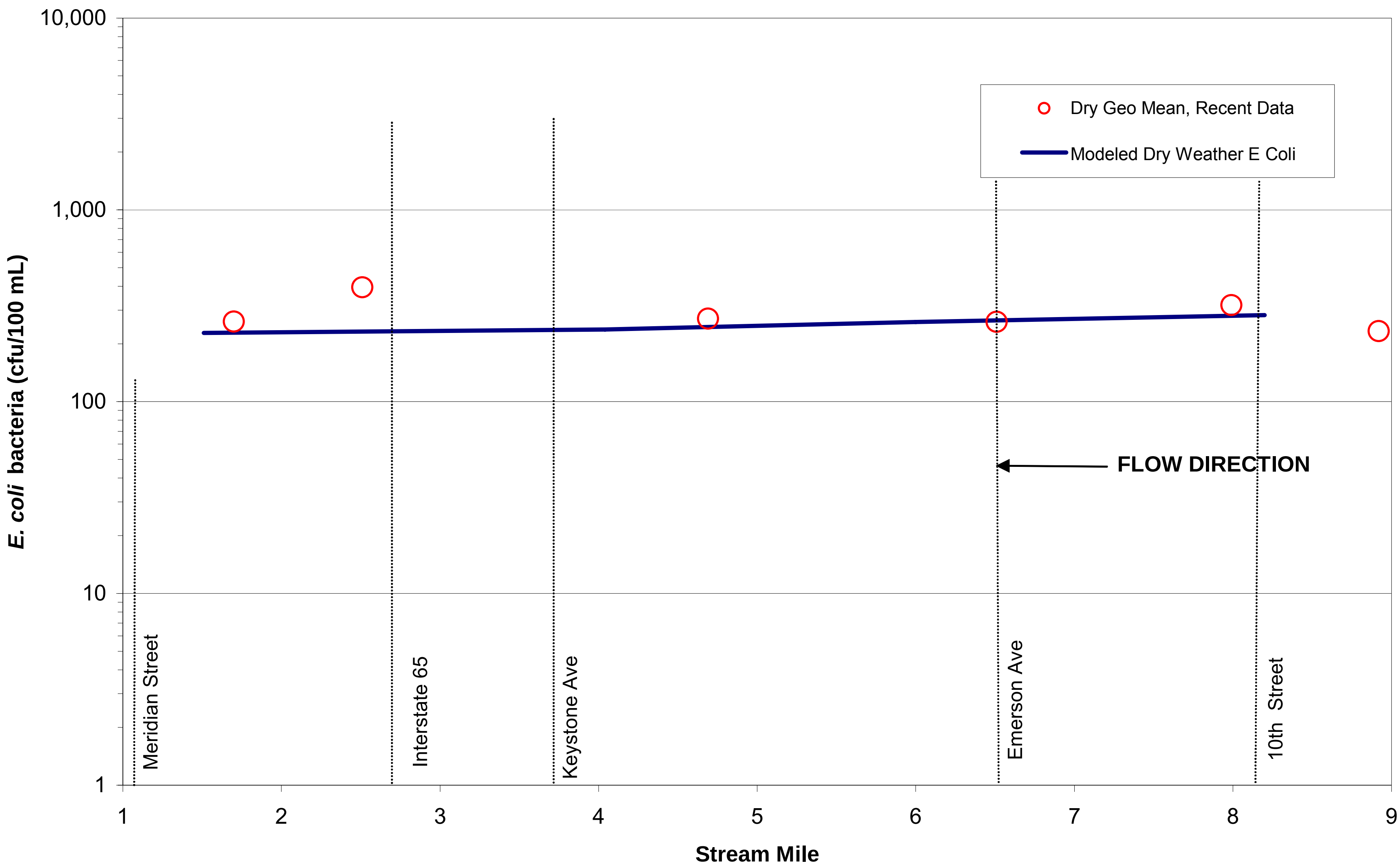


Figure 3-21
Typical Dry Weather Pre-Event *E. coli* Bacteria Conditions for Pleasant Run
August 31, 2001 Storm Event

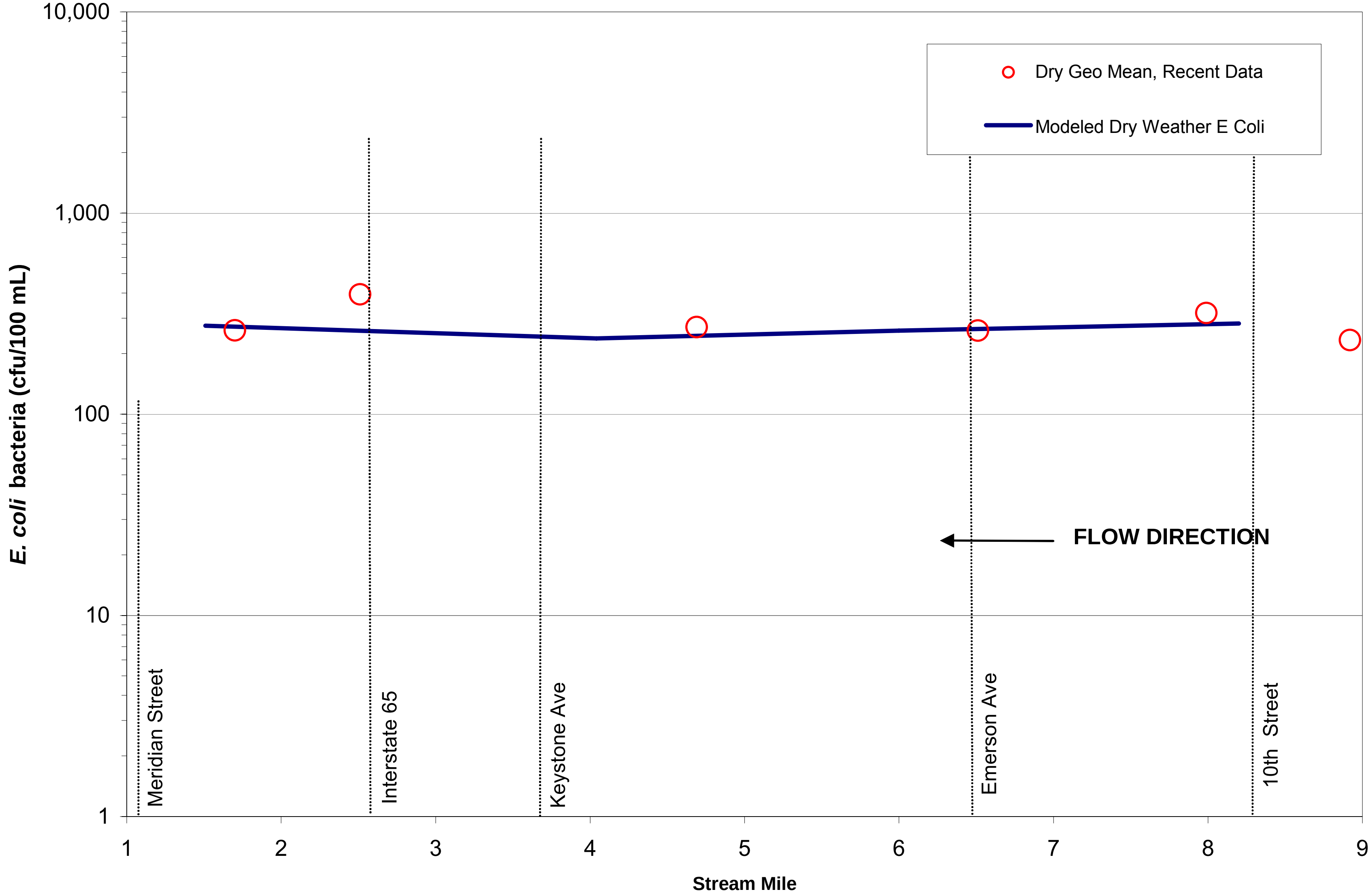


Figure 3-22

Typical Dry Weather Pre-Event *E. coli* Bacteria Conditions for Pleasant Run

September 7, 2001 Storm Event

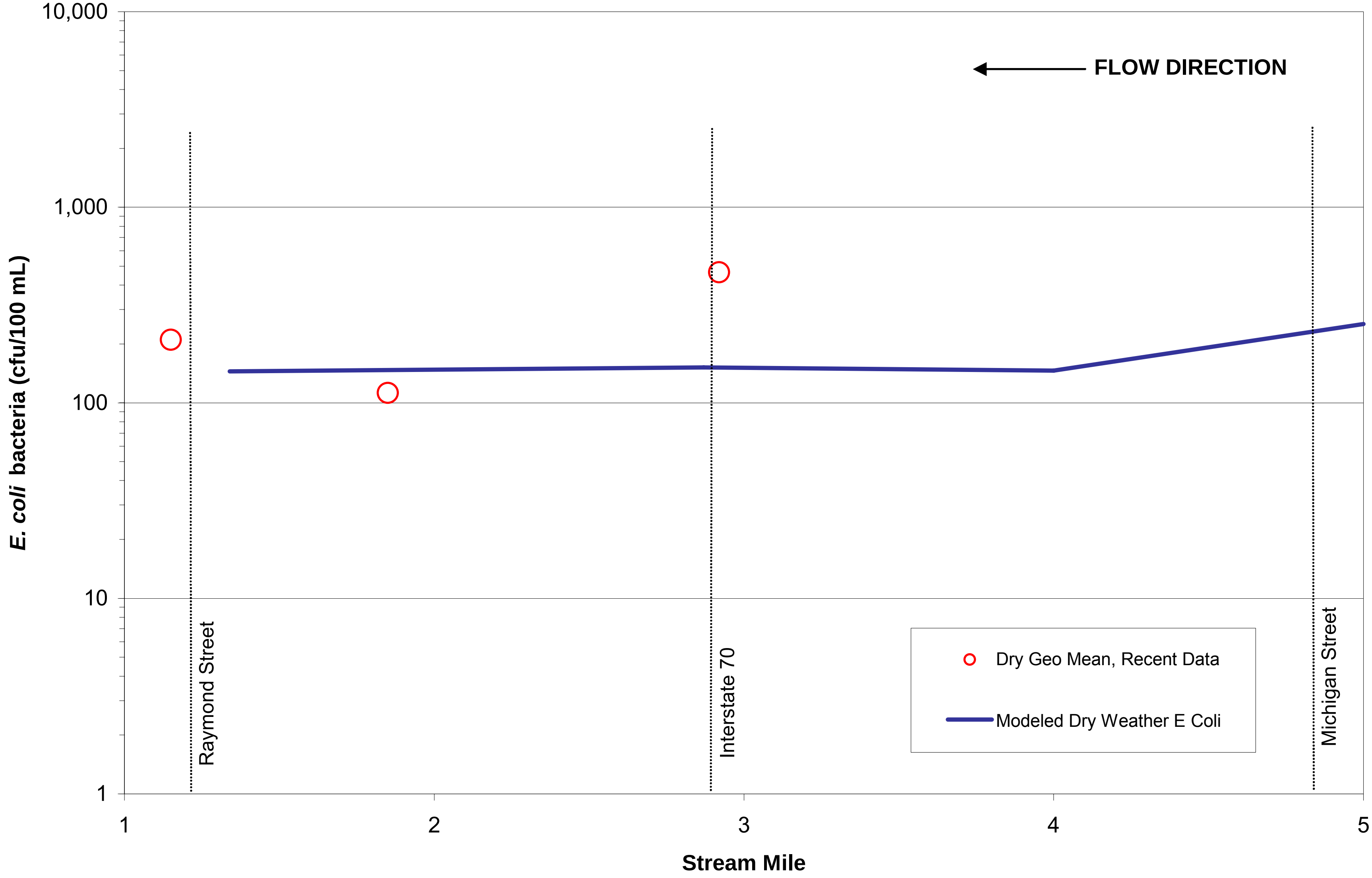


Figure 3-23

Typical Dry Weather Pre-Event *E. coli* Bacteria Conditions for Eagle Creek

August 31, 2001 Storm Event

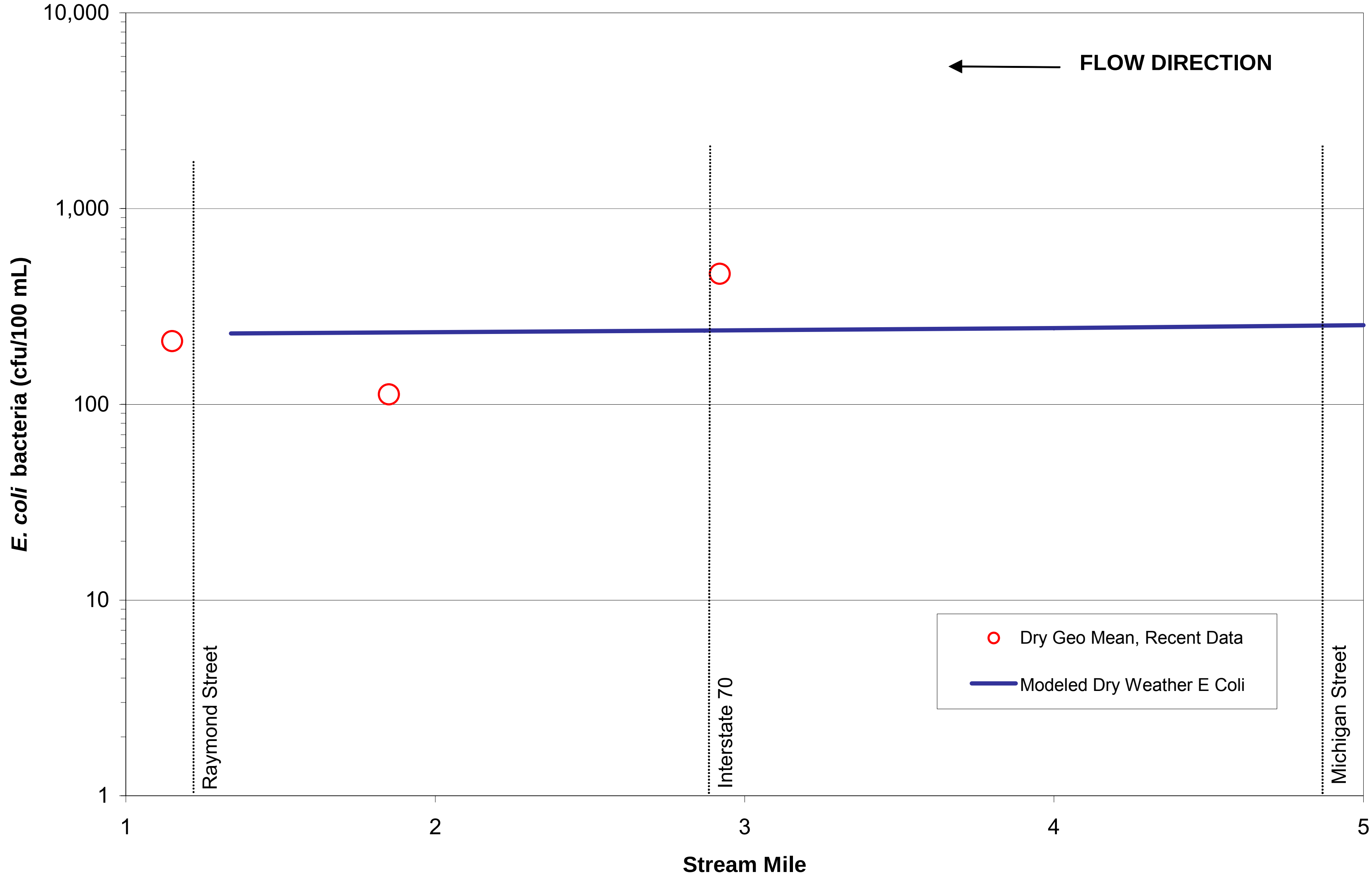


Figure 3-24
Typical Dry Weather Pre-Event *E. coli* Bacteria Conditions for Eagle Creek
September 7, 2001 Storm Event

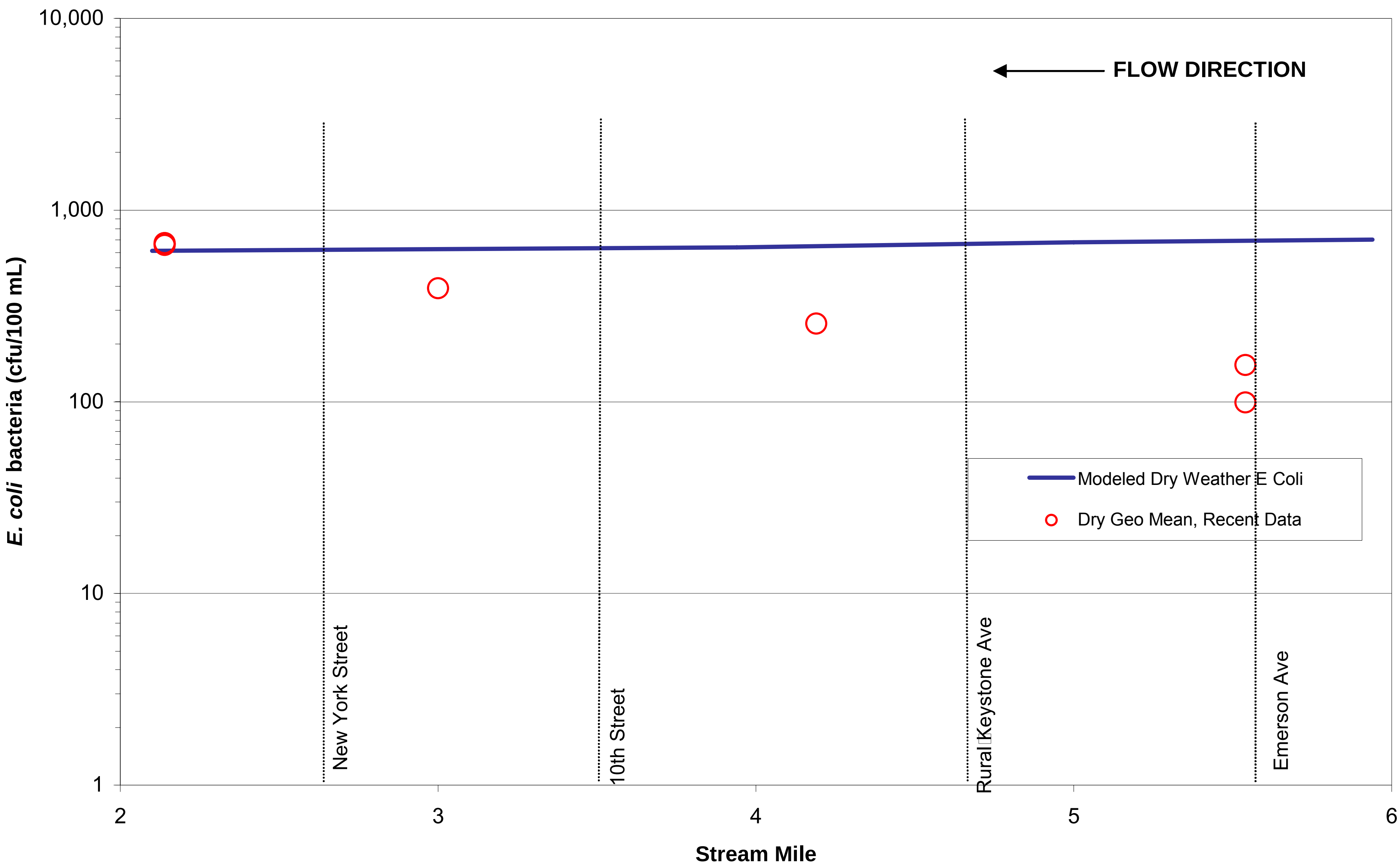


Figure 3-25
Typical Dry Weather Pre-Event *E. coli* Bacteria Conditions for Pogues Run
August 31, 2001 Storm Event

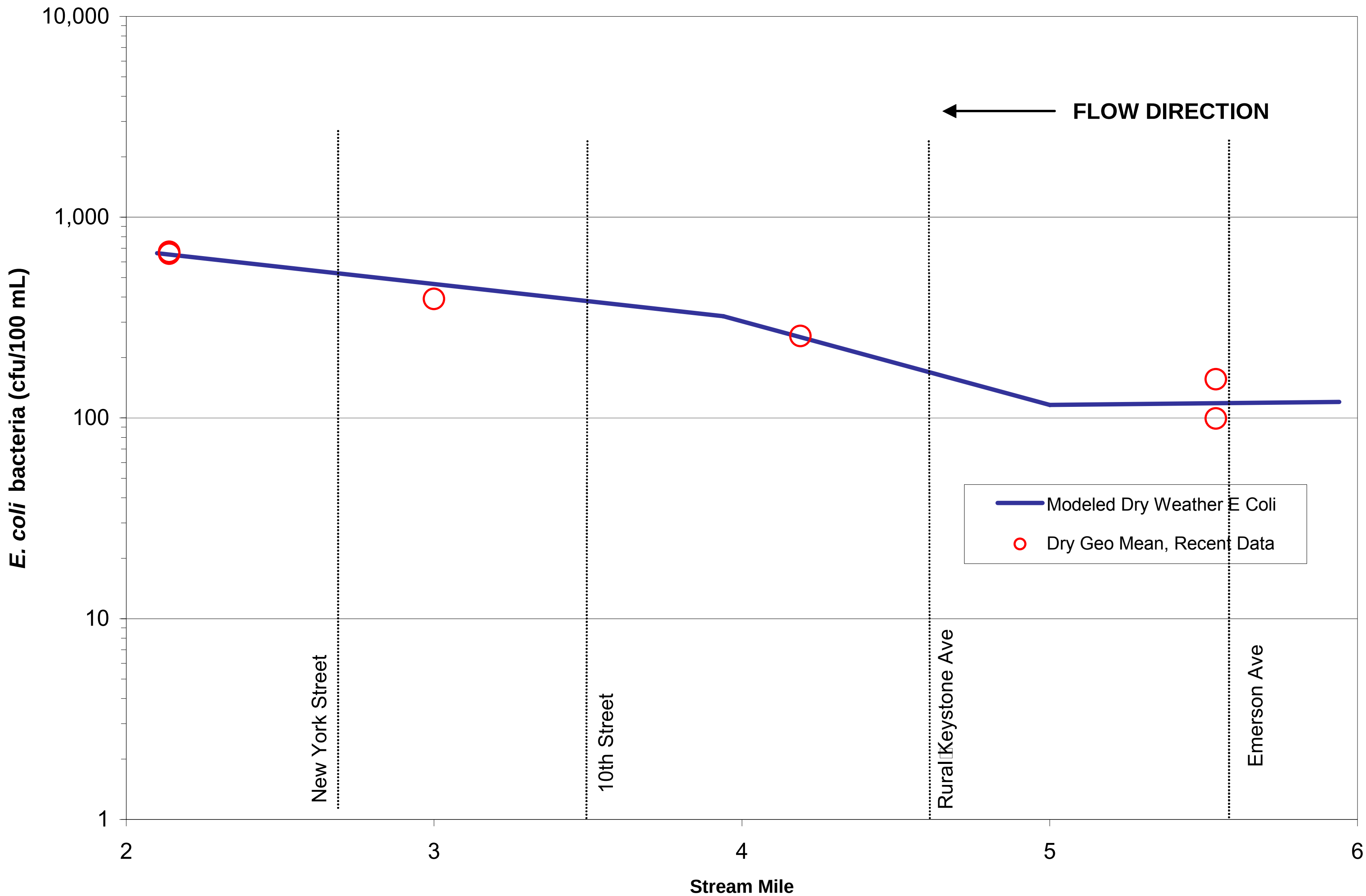


Figure 3-26
Typical Dry Weather Pre-Event *E. coli* Bacteria Conditions for Pogues Run
September 7, 2001 Storm Event

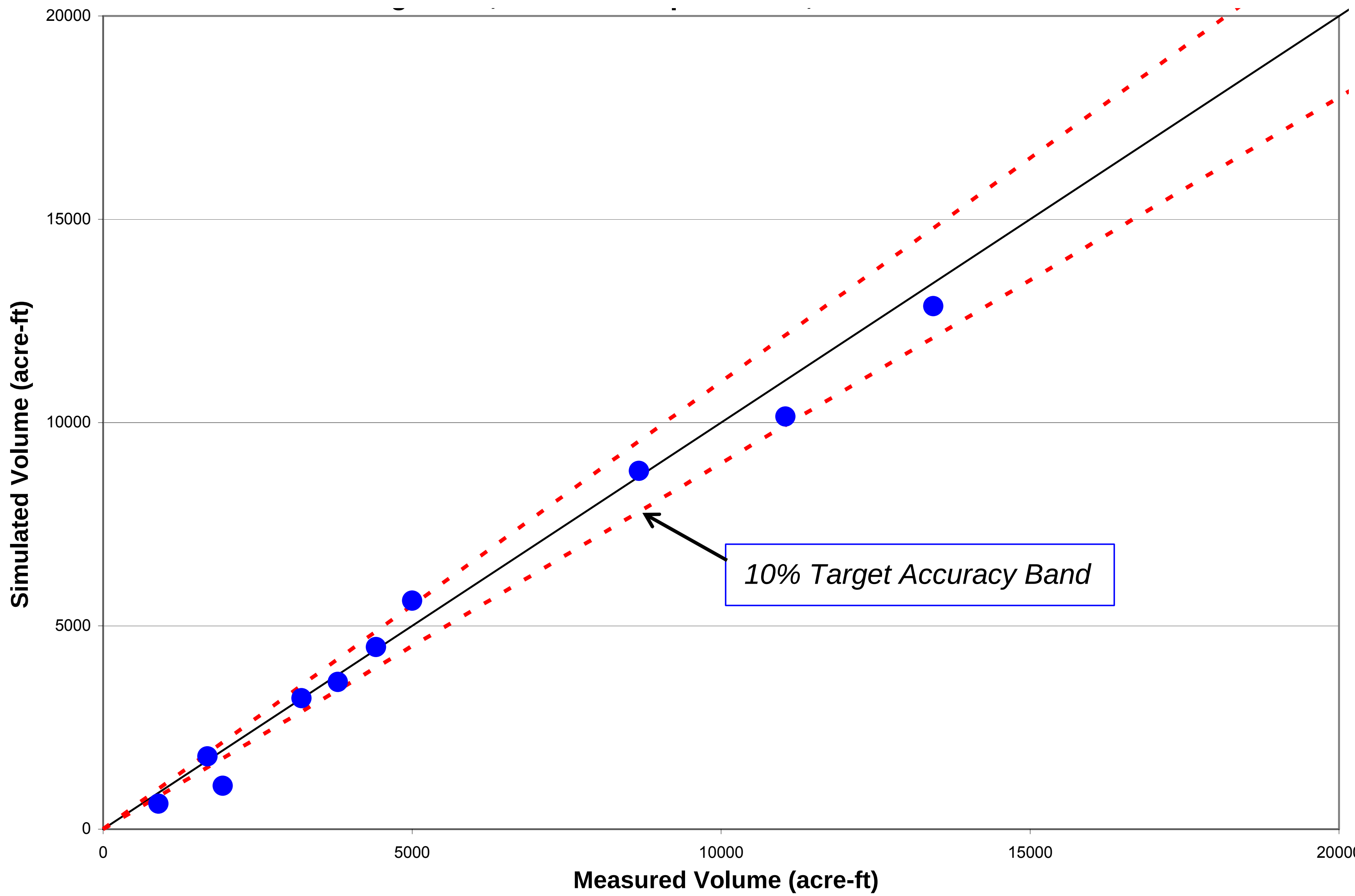


Figure 3-27
Comparison of Calculated and Measured Flow Volume for 2001 Storm Events
August 31 and September 7, 2001 Storm Events

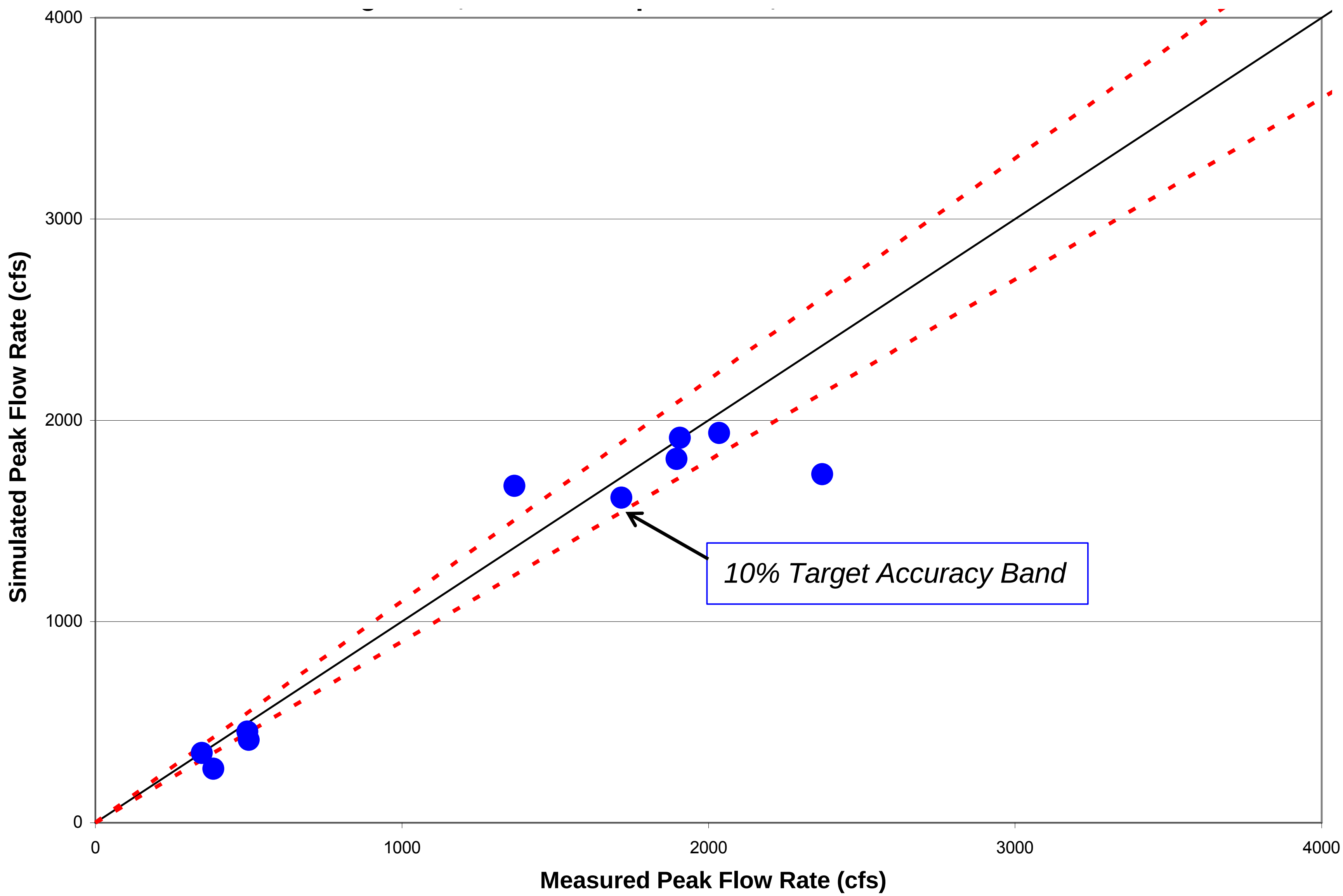


Figure 3-28
Comparison of Calculated and Measured Peak Flow Rates for 2001 Storm Events
August 31 and September 7, 2001 Storm Events

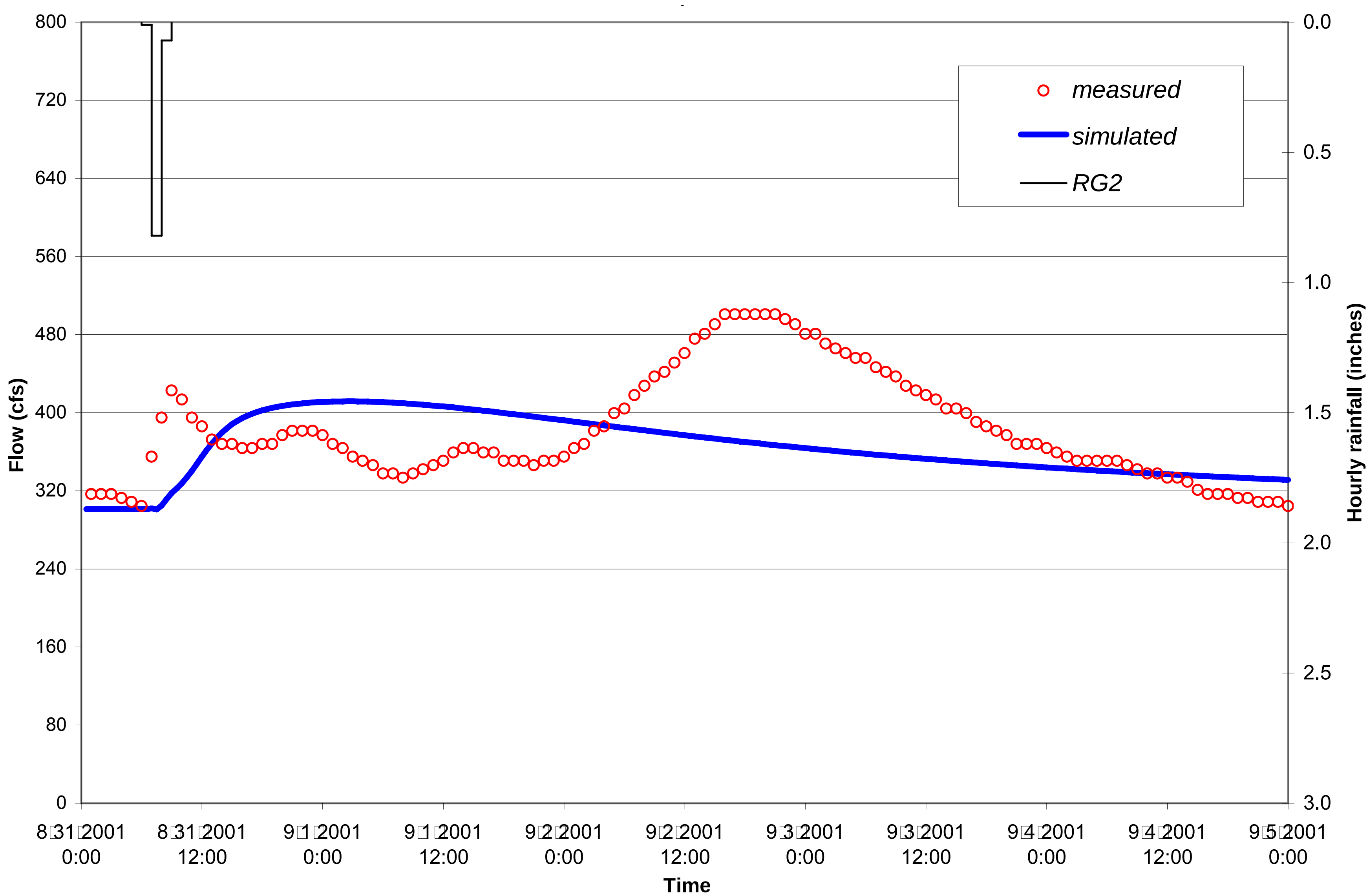


Figure 3-29
Comparison of Calculated and Measured Flows for August 31, 2001 Storm Event
White River, Nora Station

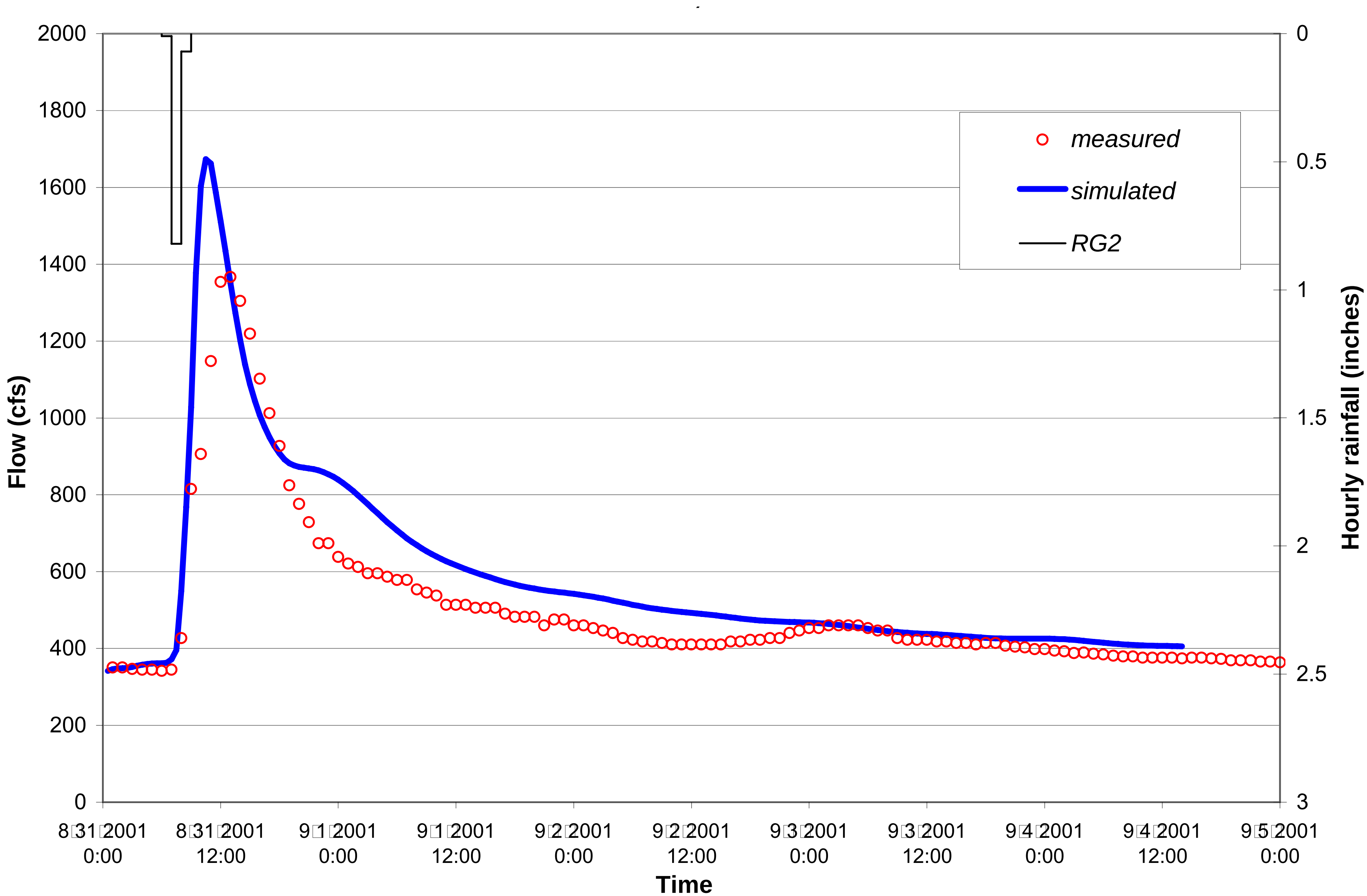


Figure 3-30
Comparison of Calculated and Measured Flows for August 31, 2001 Storm Event
White River, IPL Station

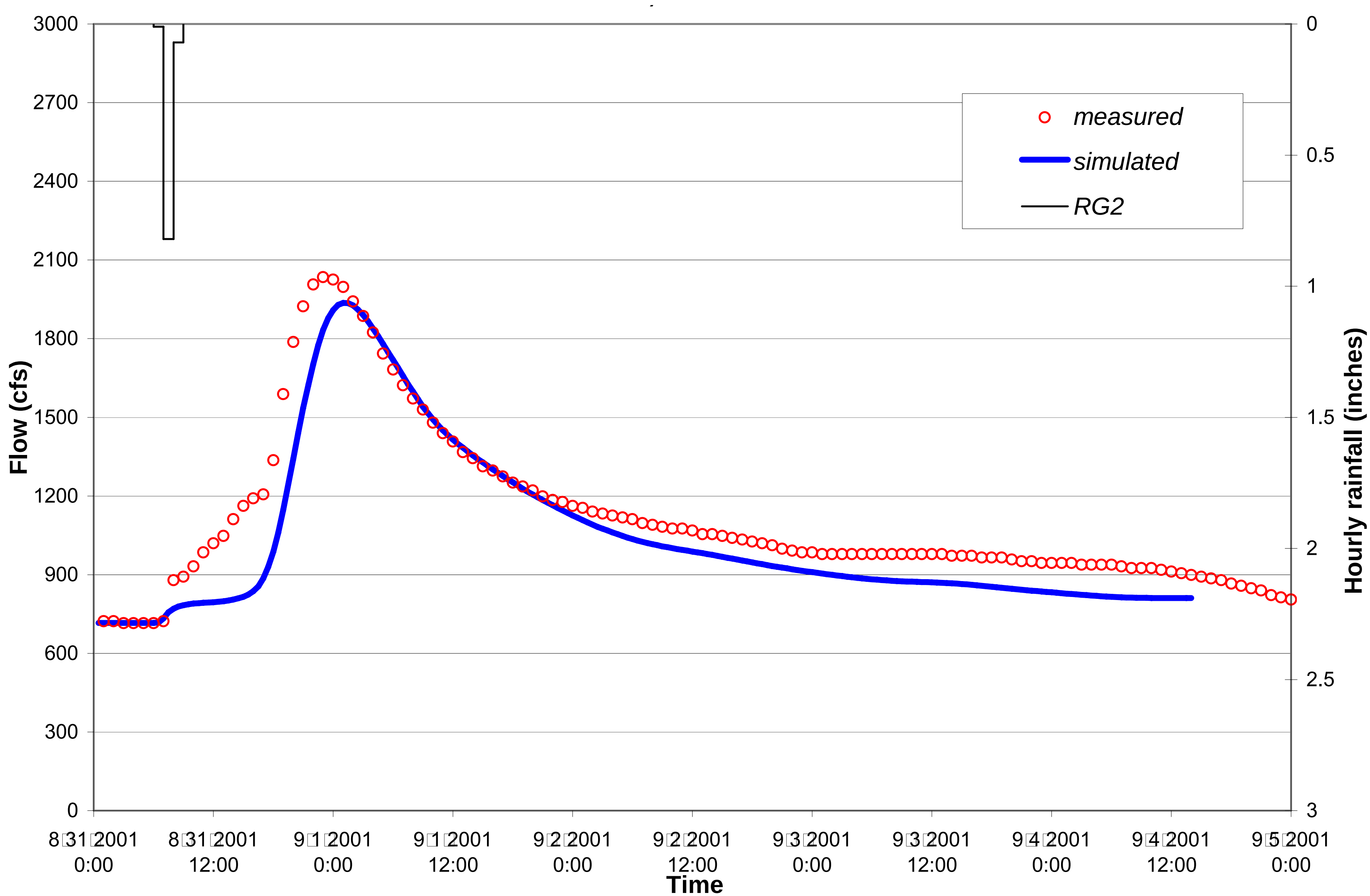


Figure 3-31
Comparison of Calculated and Measured Flows for August 31, 2001 Storm Event
White River, Centerton Station

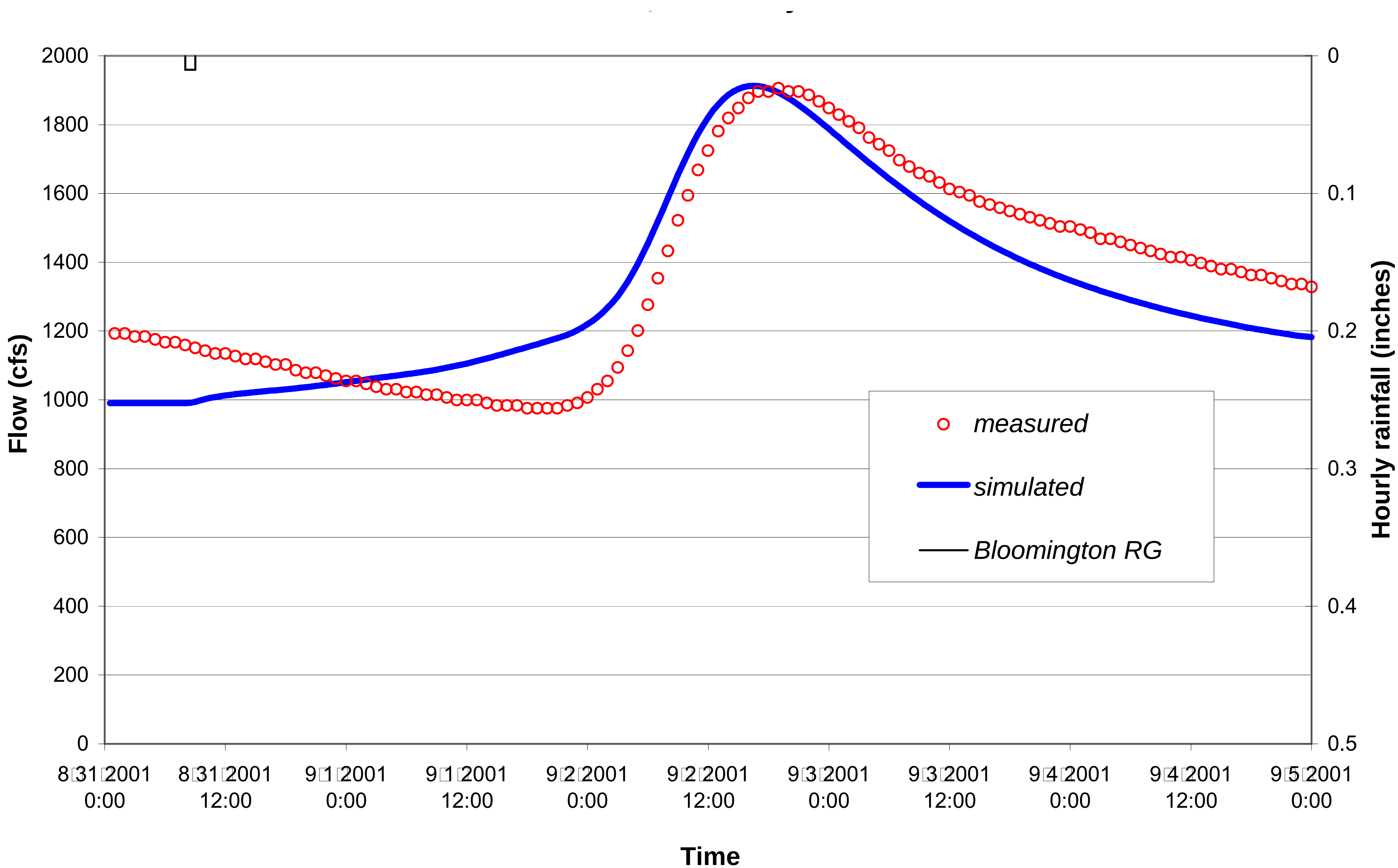


Figure 3-32
Comparison of Calculated and Measured Flows for August 31, 2001 Storm Event
White River, Newberry Station

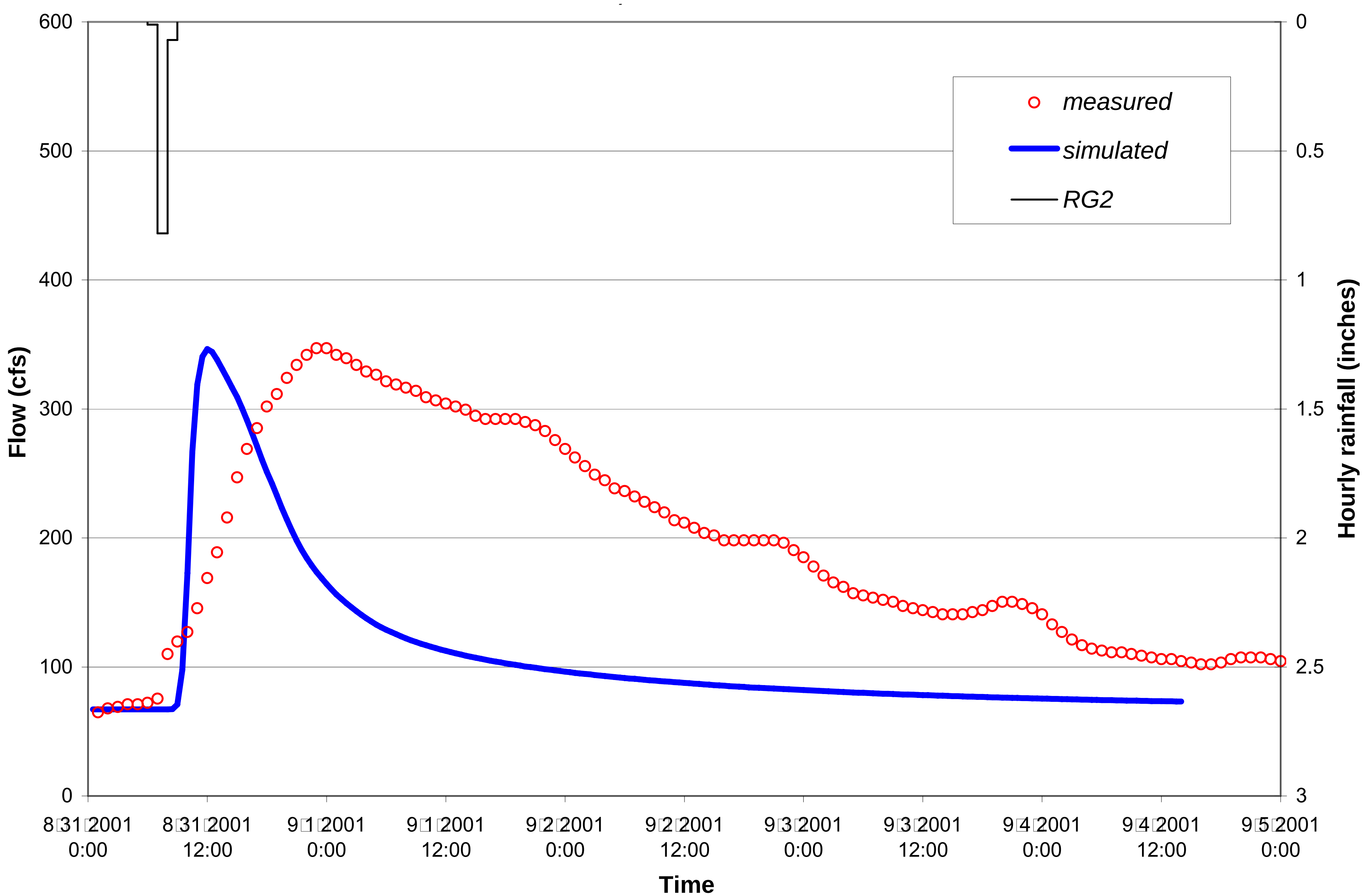


Figure 3-33
Comparison of Calculated and Measured Flows for August 31, 2001 Storm Event
Fall Creek, Millersville Station

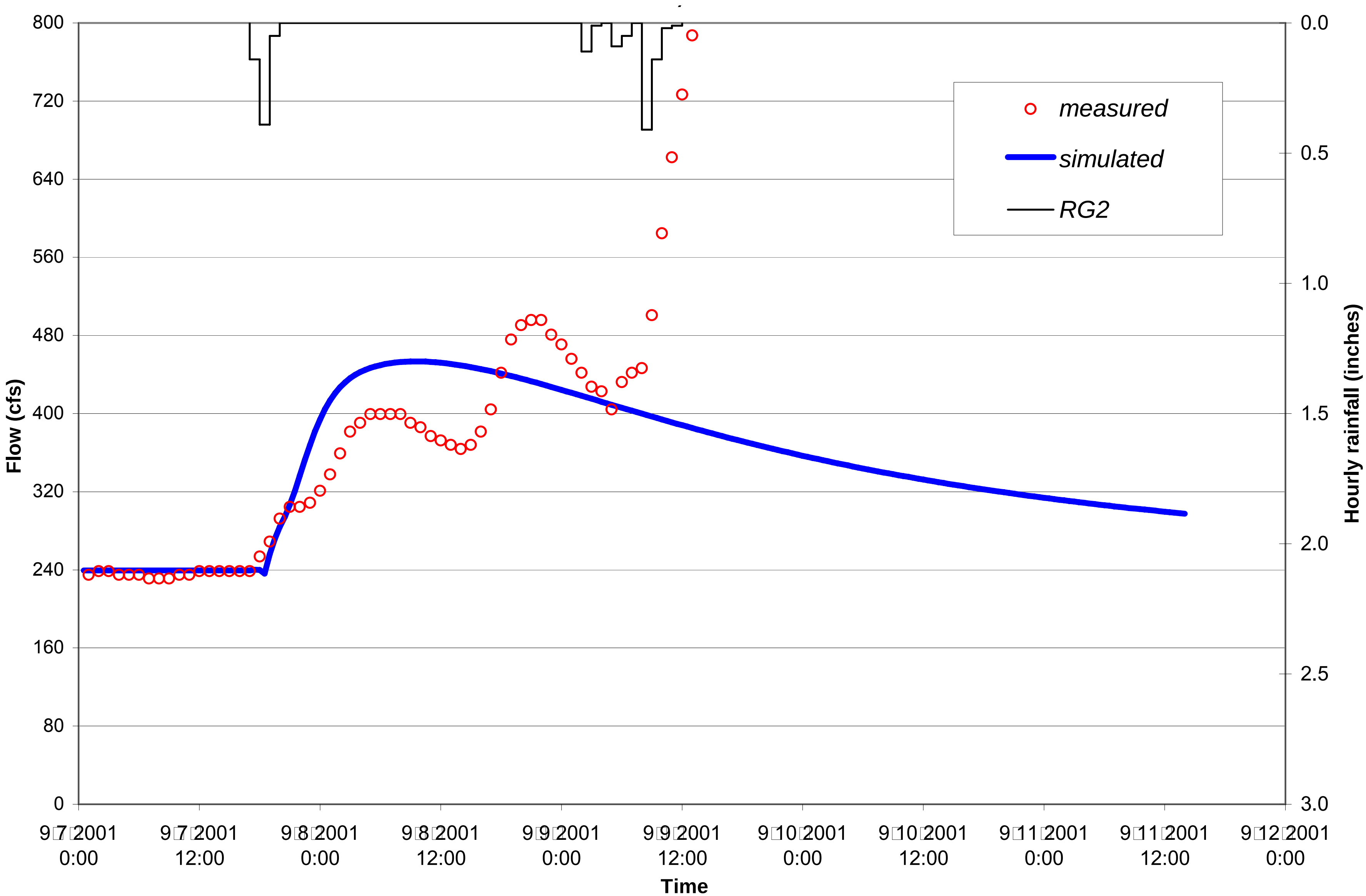


Figure 3-34
Comparison of Calculated and Measured Flows for September 7, 2001 Storm Event
White River, Nora Station

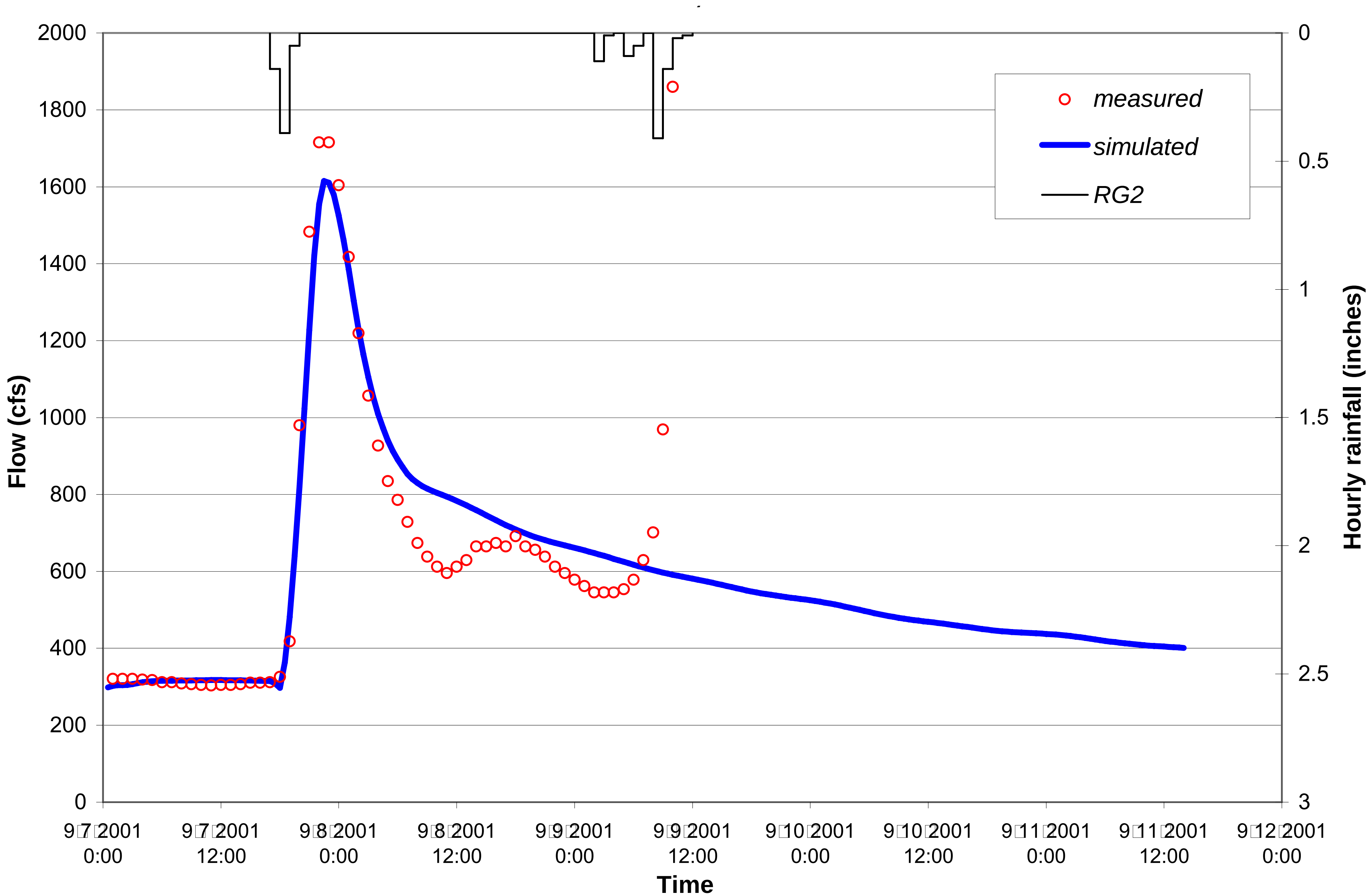


Figure 3-35
Comparison of Calculated and Measured Flows for September 7, 2001 Storm Event
White River, IPL Station

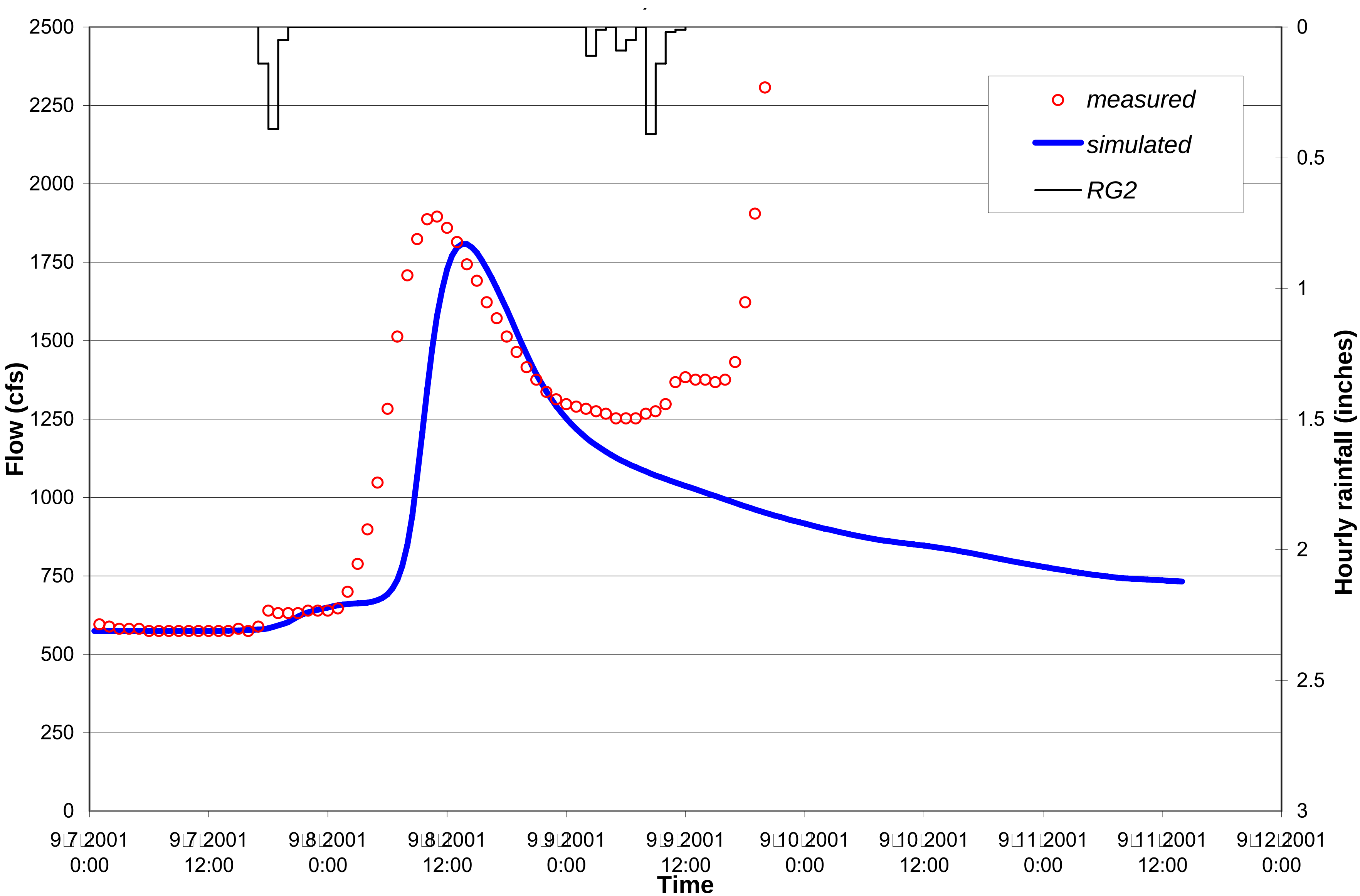


Figure 3-36
Comparison of Calculated and Measured Flows for September 7, 2001 Storm Event
White River, Centerton Station

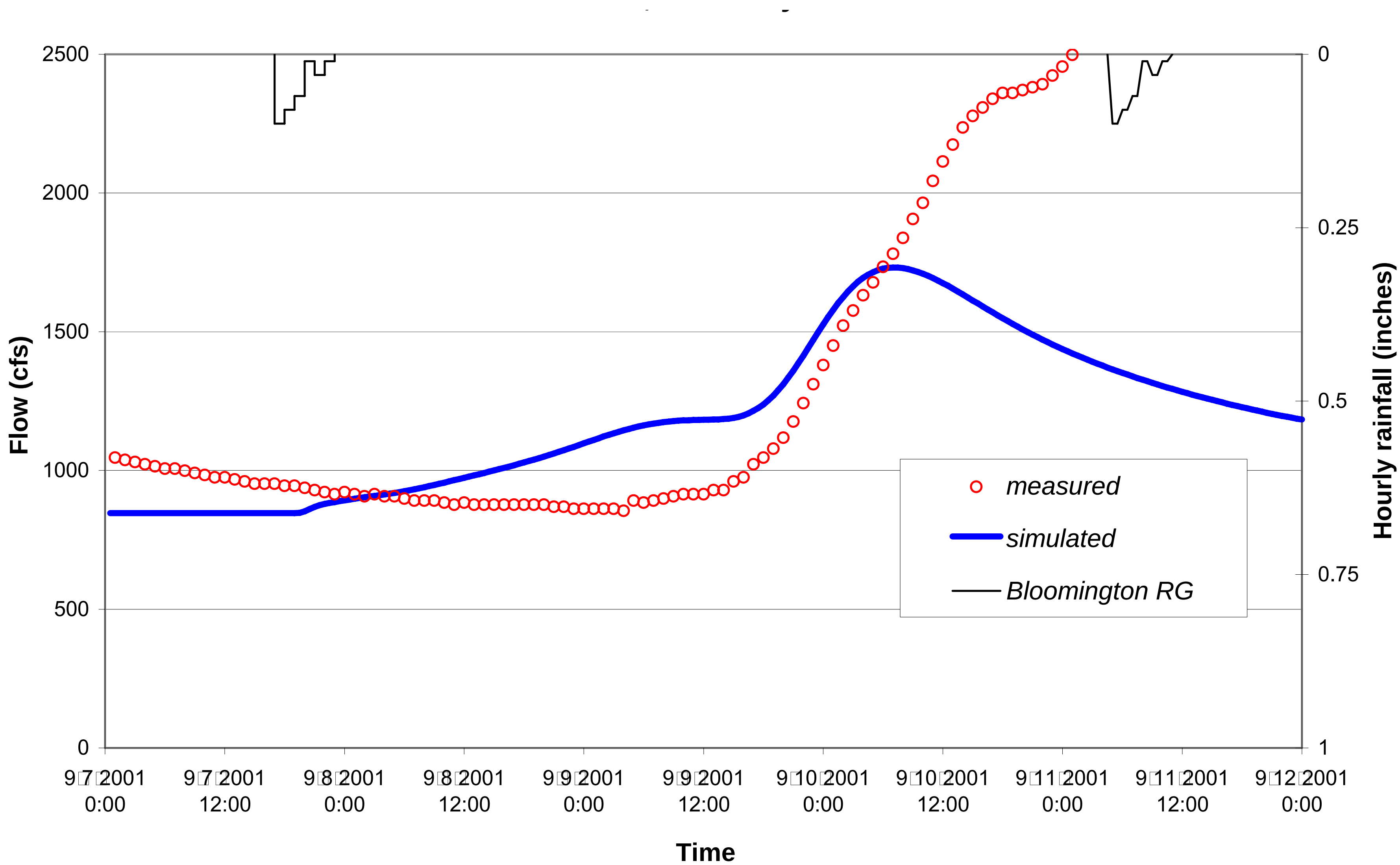


Figure 3-37
Comparison of Calculated and Measured Flows for September 7, 2001 Storm Event
White River, Newberry Station

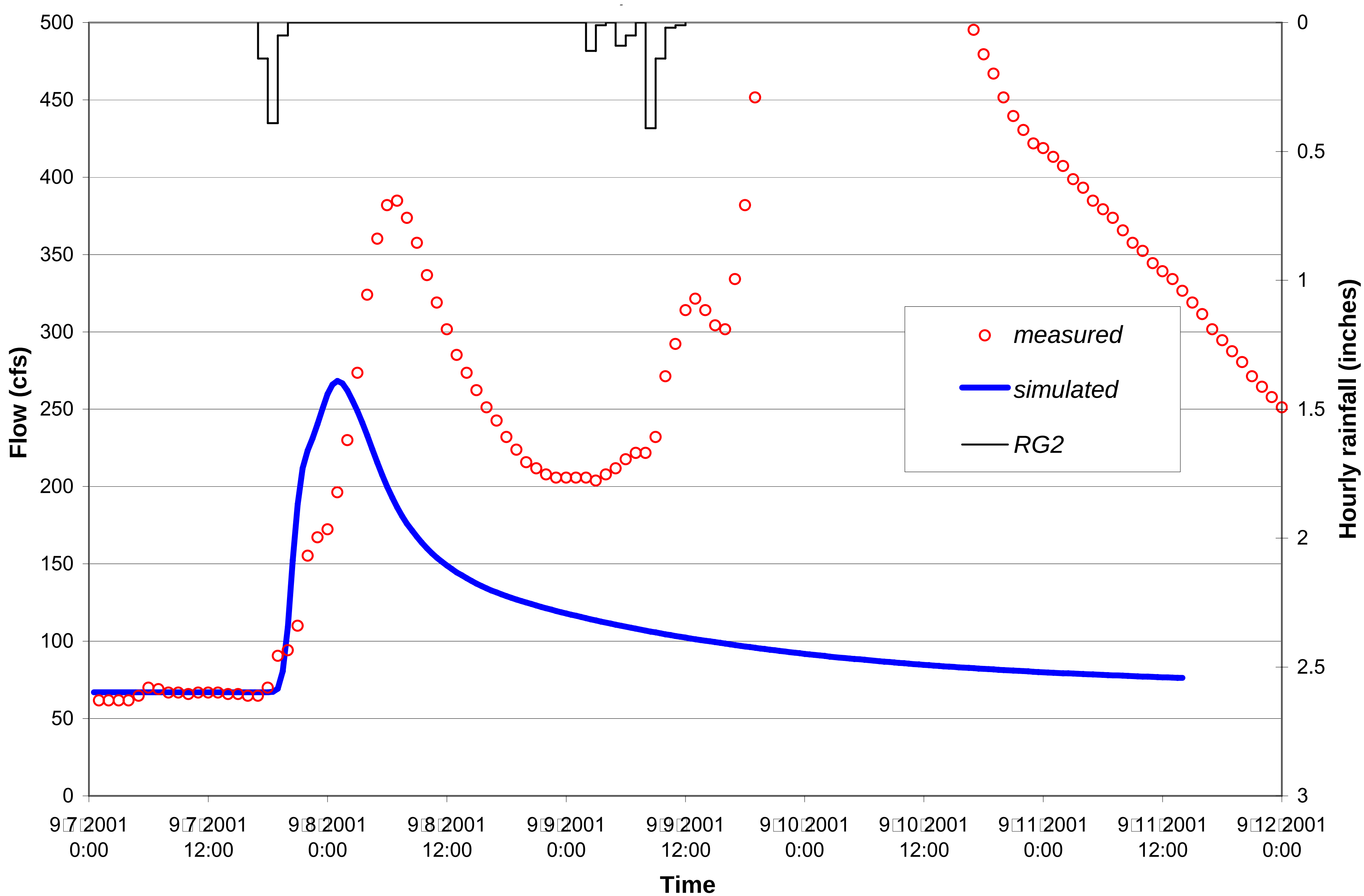


Figure 3-38
Comparison of Calculated and Measured Flows for September 7, 2001 Storm Event
Fall Creek, Millersville Station

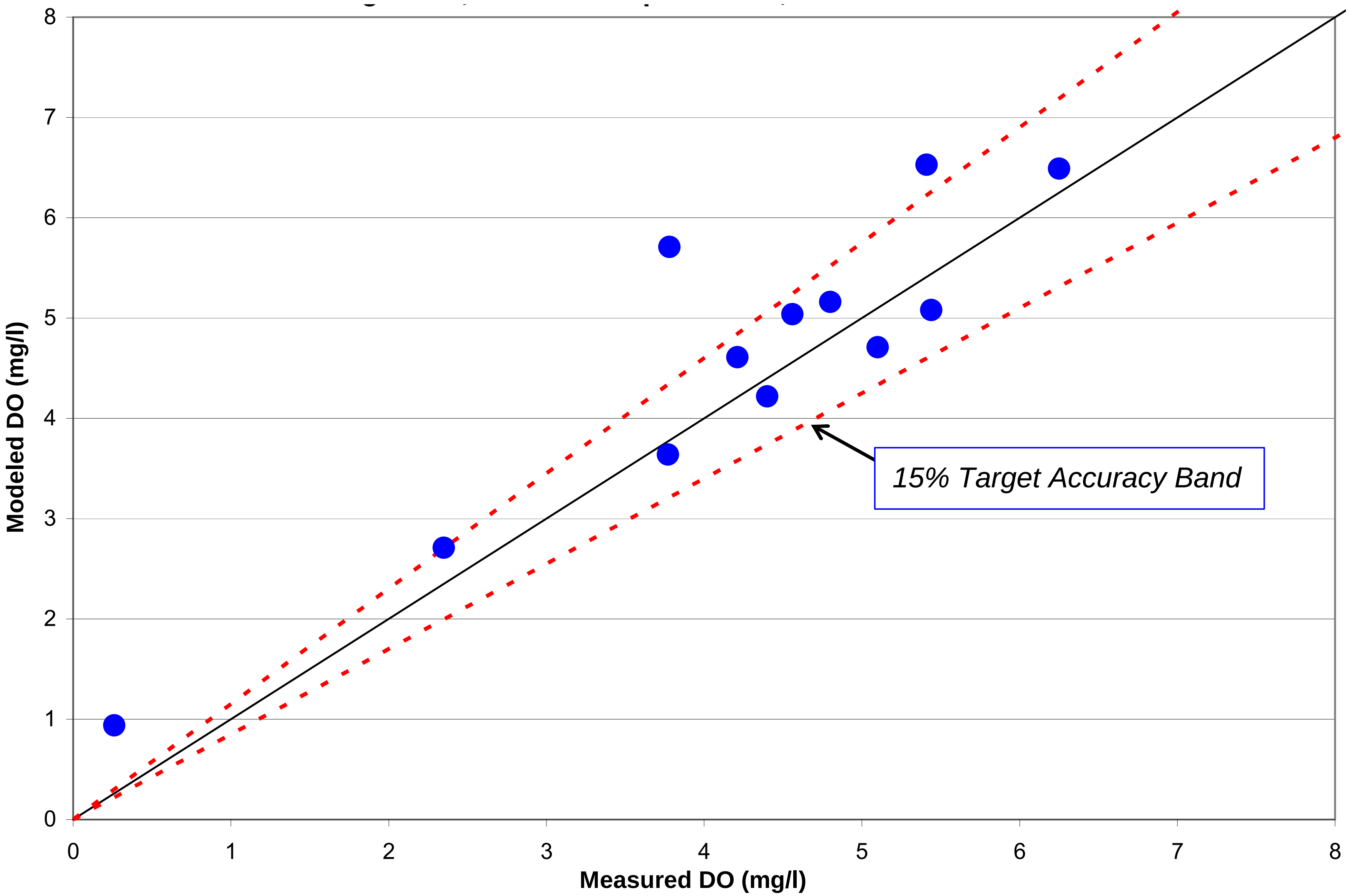


Figure 3-39
Relationship Between Measured and Modeled Minimum DO Concentrations
August 31, 2001 and September 7, 2001 Storm Events

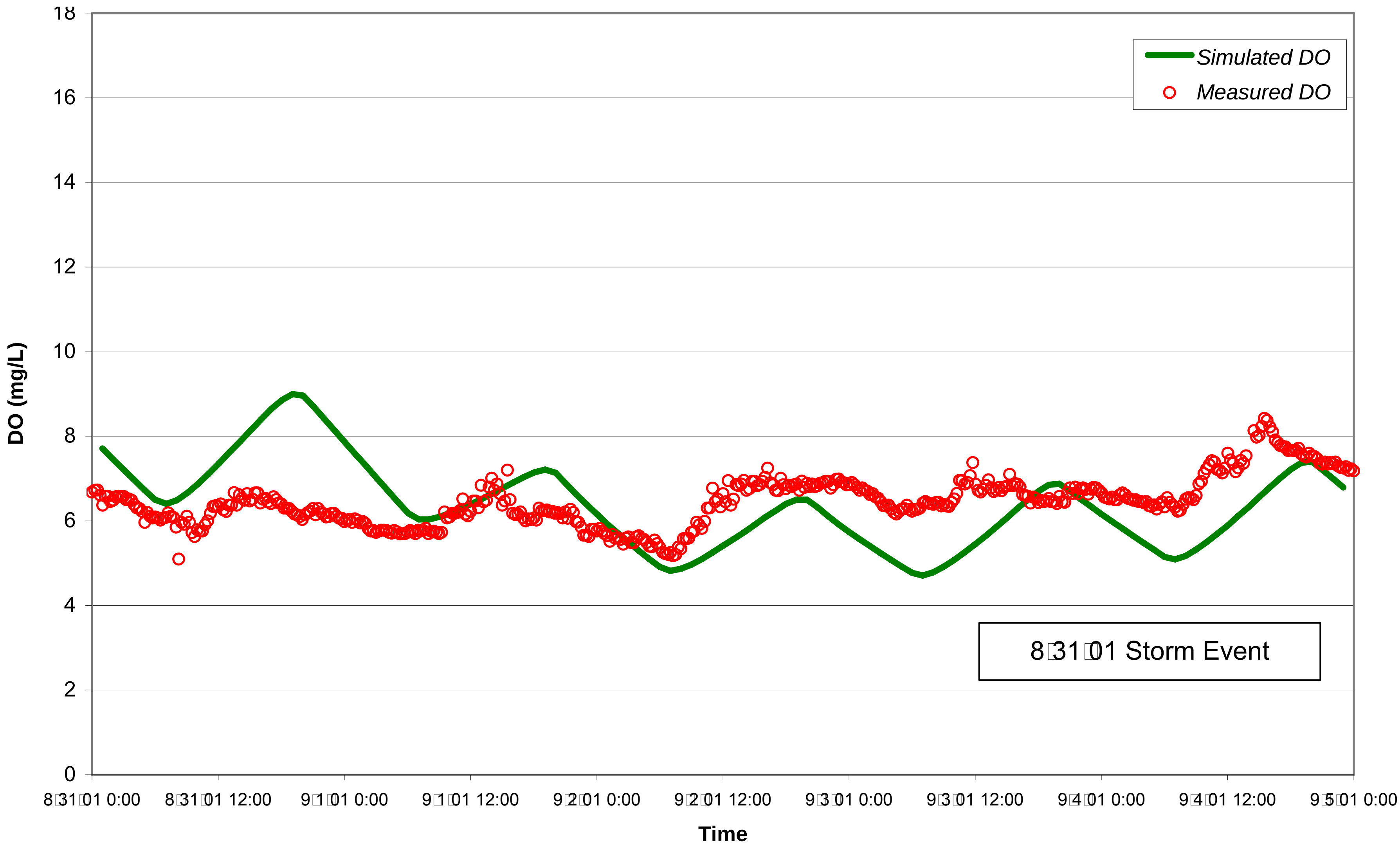


Figure 3-40
Relationship Between Measured and Modeled Minimum DO at White River – 16th Street Station
August 31, 2001 Storm Event

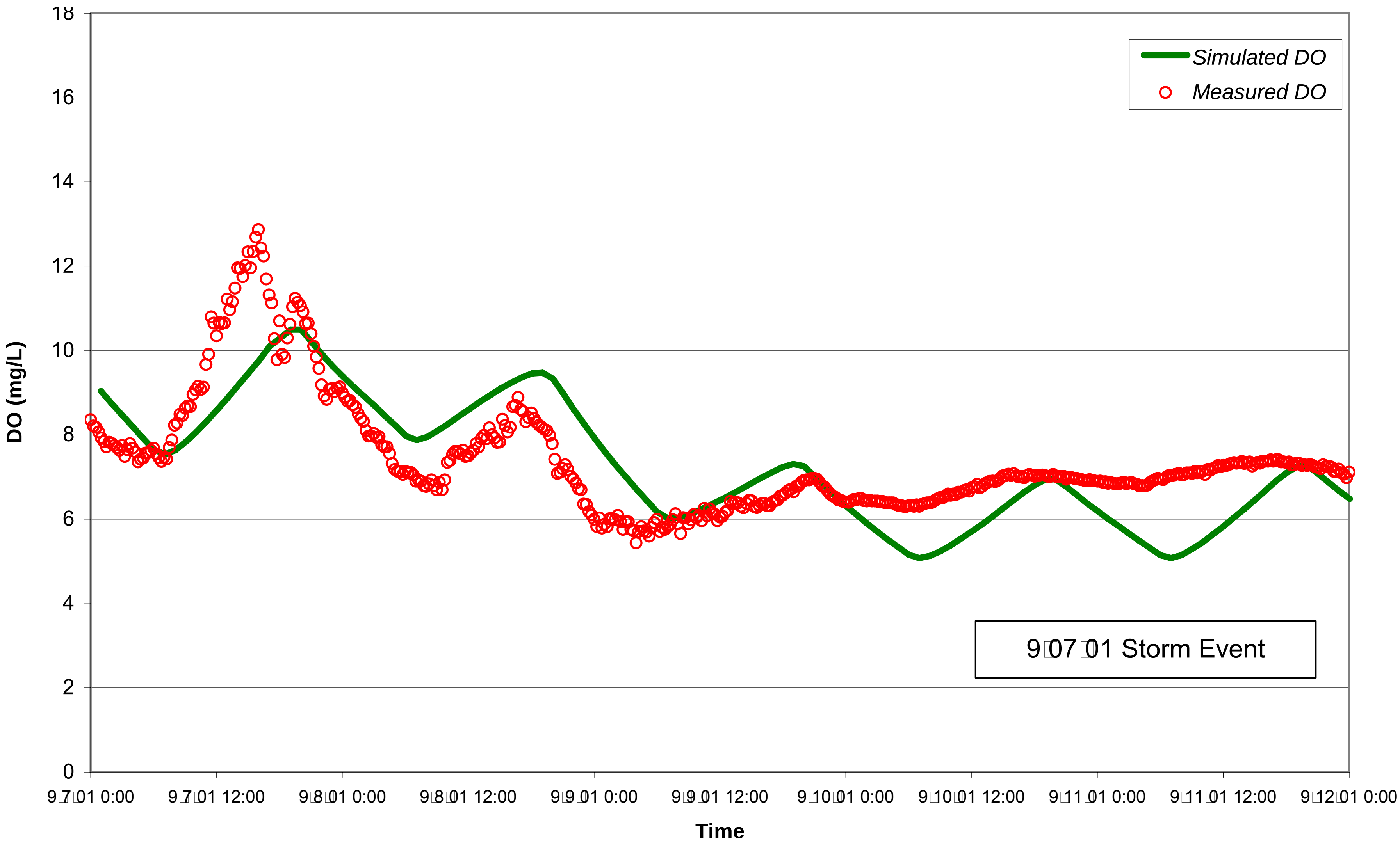


Figure 3-41
Relationship Between Measured and Modeled Minimum DO at White River – 16th Street Station
September 7, 2001 Storm Event

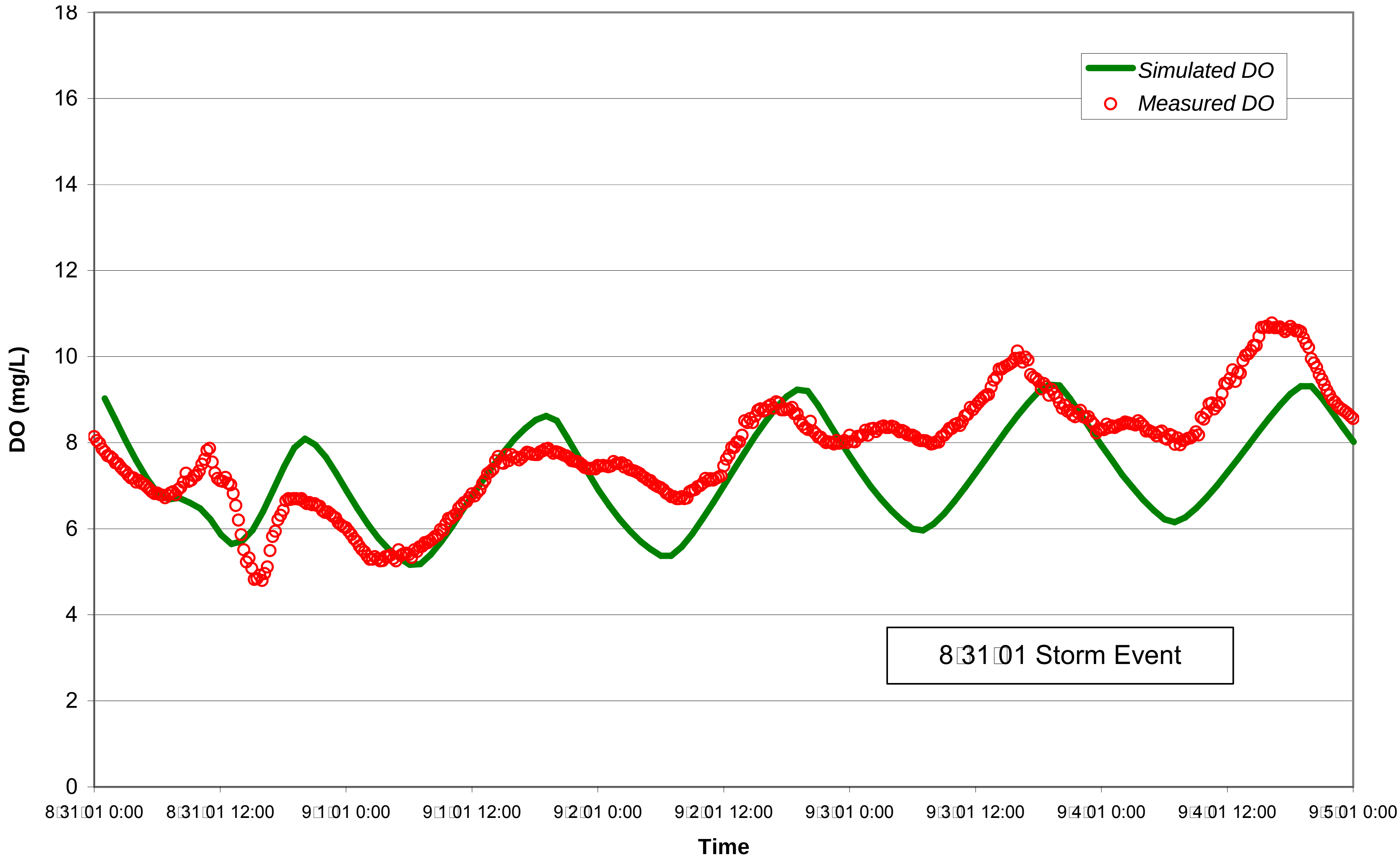


Figure 3-42
Relationship Between Measured and Modeled Minimum DO at White River – IPL Station
August 31, 2001 Storm Event

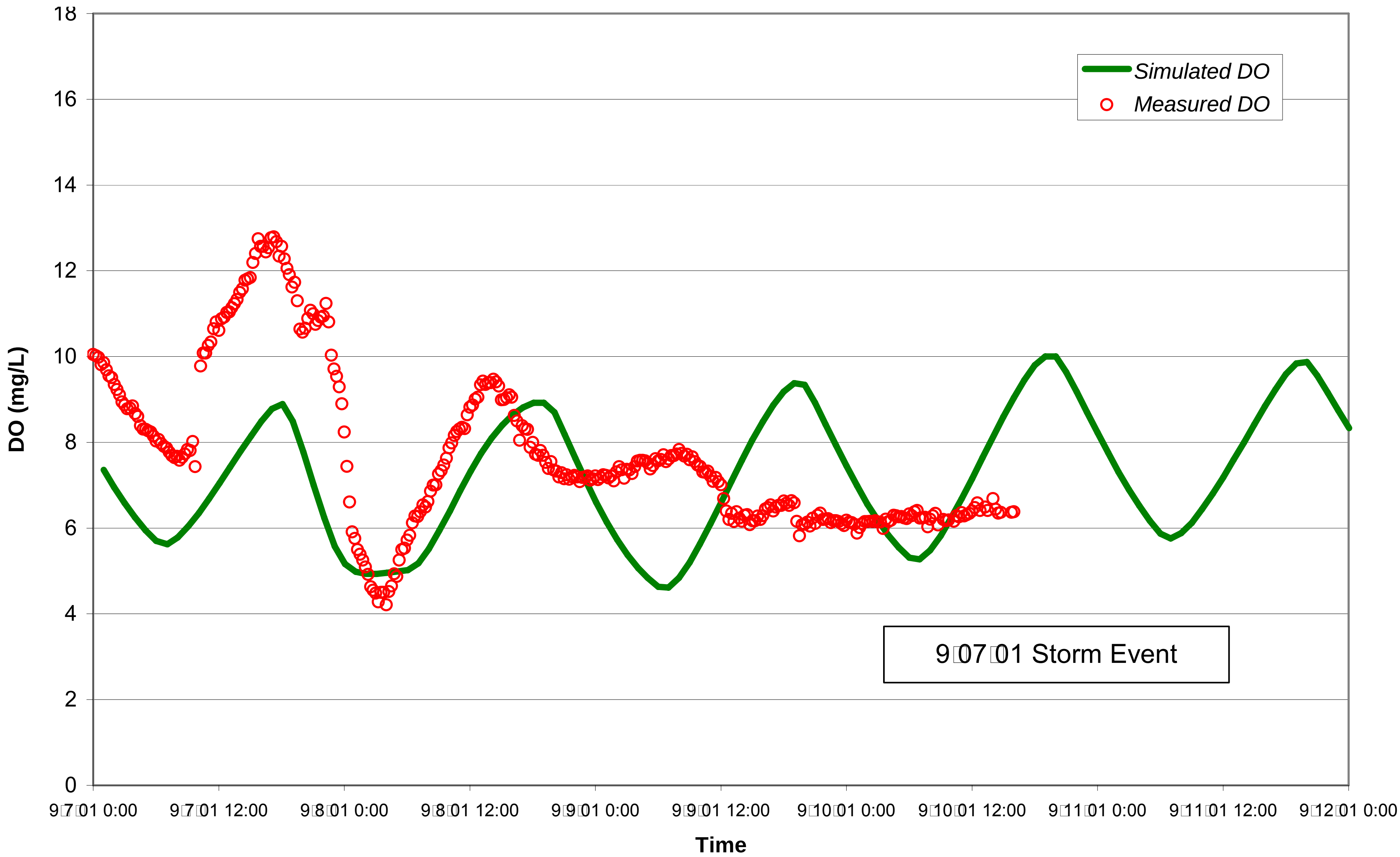


Figure 3-43
Relationship Between Measured and Modeled Minimum DO at White River – IPL Station
September 7, 2001 Storm Event

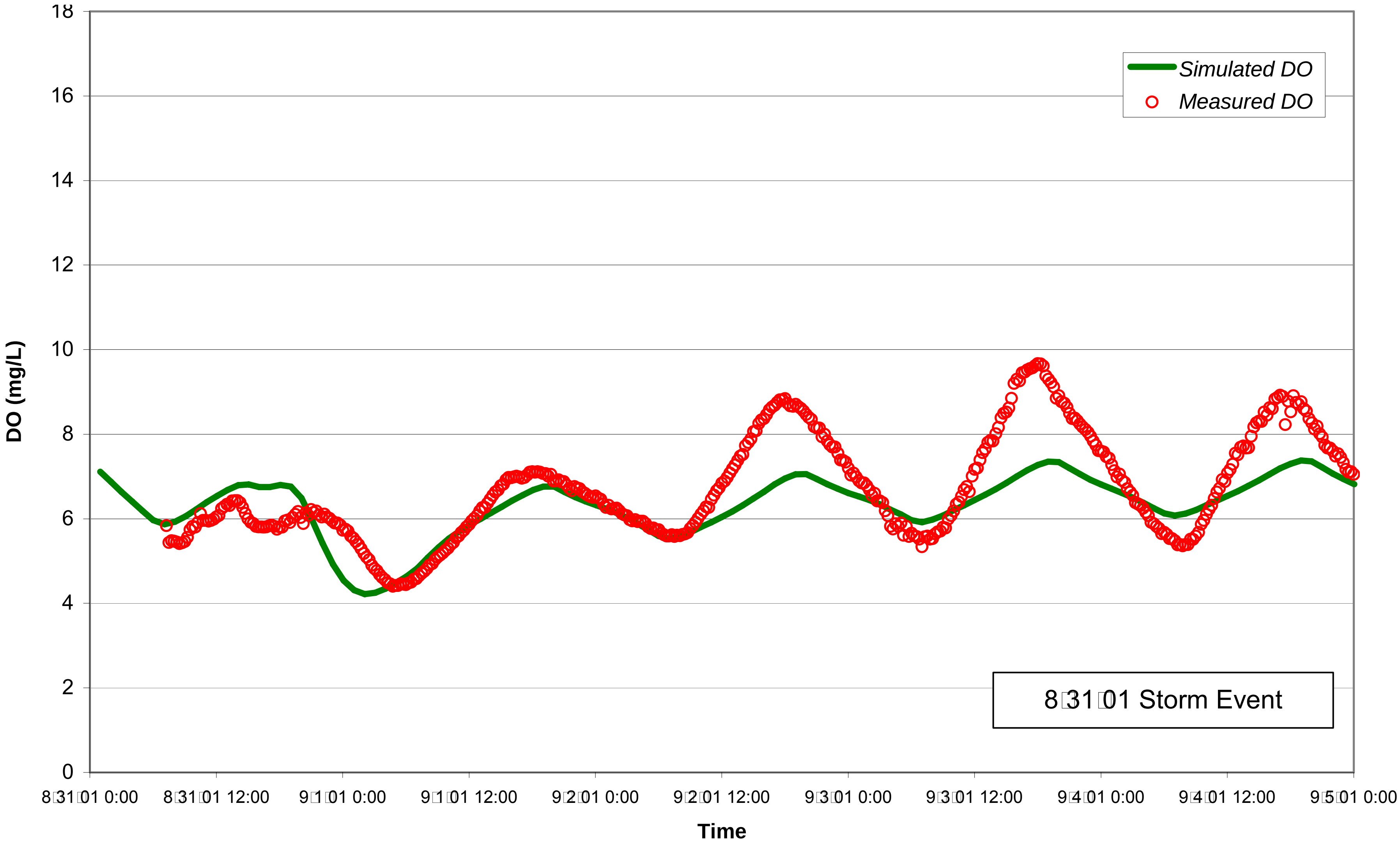


Figure 3-44
Relationship Between Measured and Modeled Minimum DO at White River – Waverly Street
August 31, 2001 Storm Event

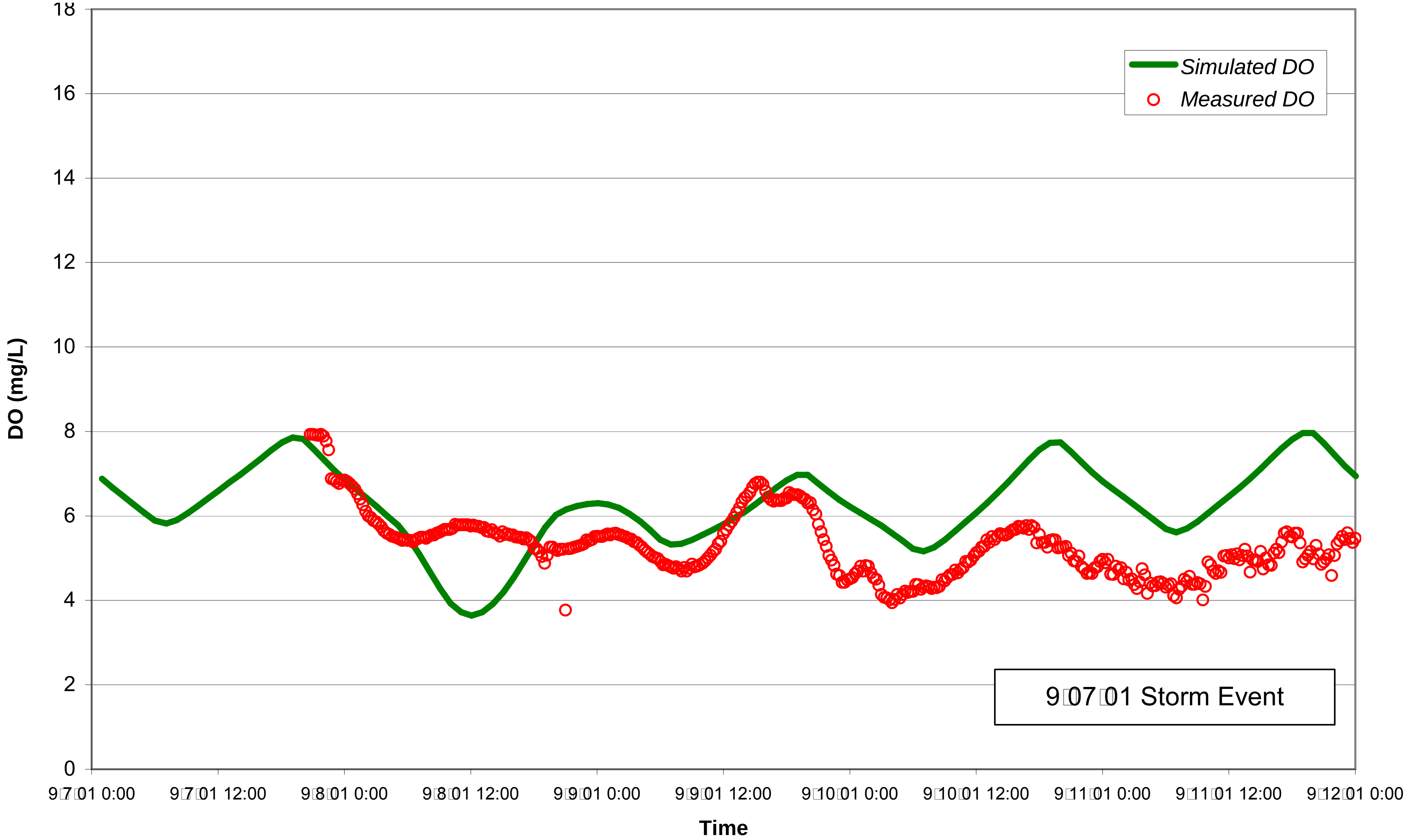


Figure 3-45
Relationship Between Measured and Modeled Minimum DO at White River – Waverly Street
September 7, 2001 Storm Event

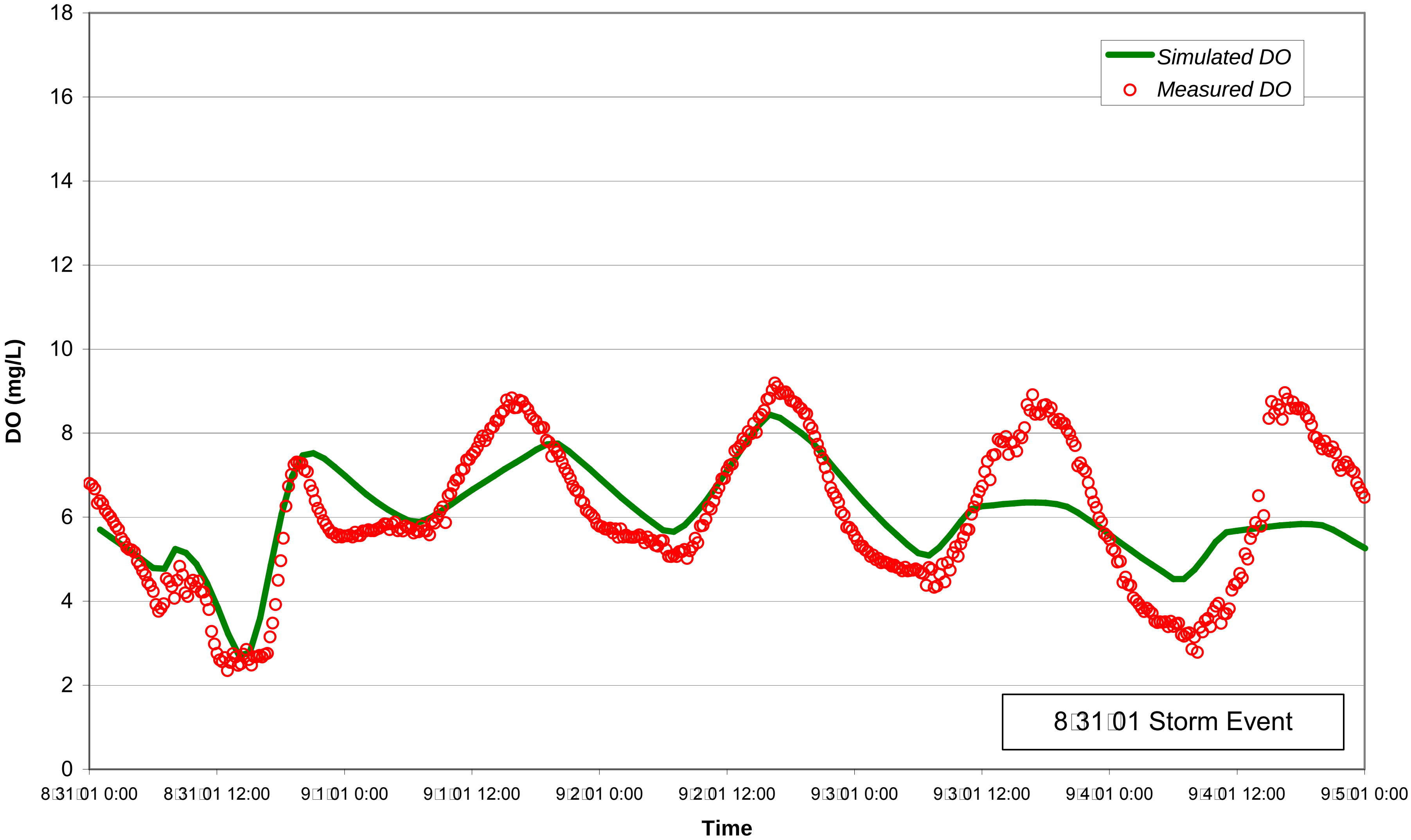


Figure 3-46
Relationship Between Measured and Modeled Minimum DO at Fall Creek – Blvd. Station
August 31, 2001 Storm Event

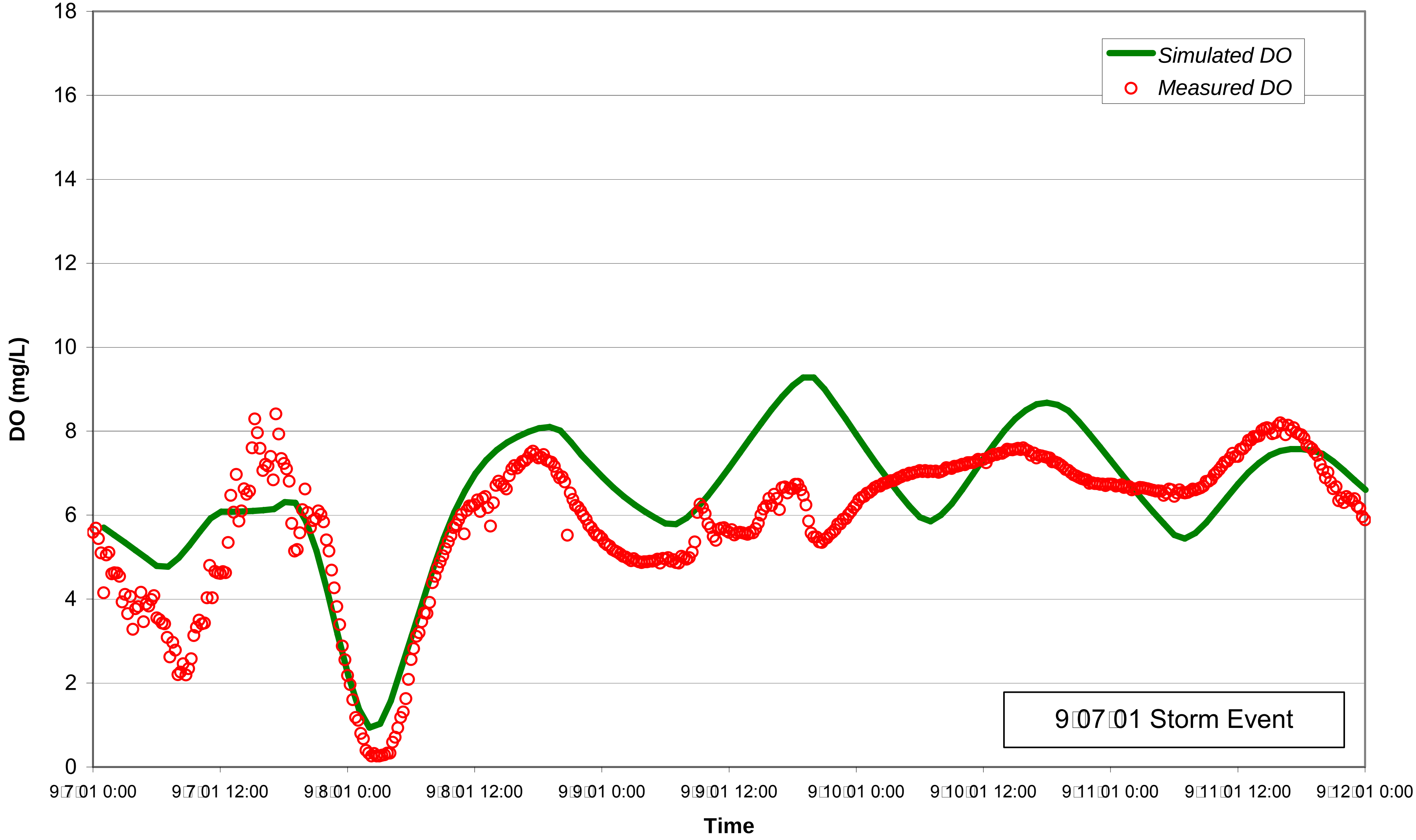


Figure 3-47
Relationship Between Measured and Modeled Minimum DO at Fall Creek – Blvd. Station
September 7, 2001 Storm Event

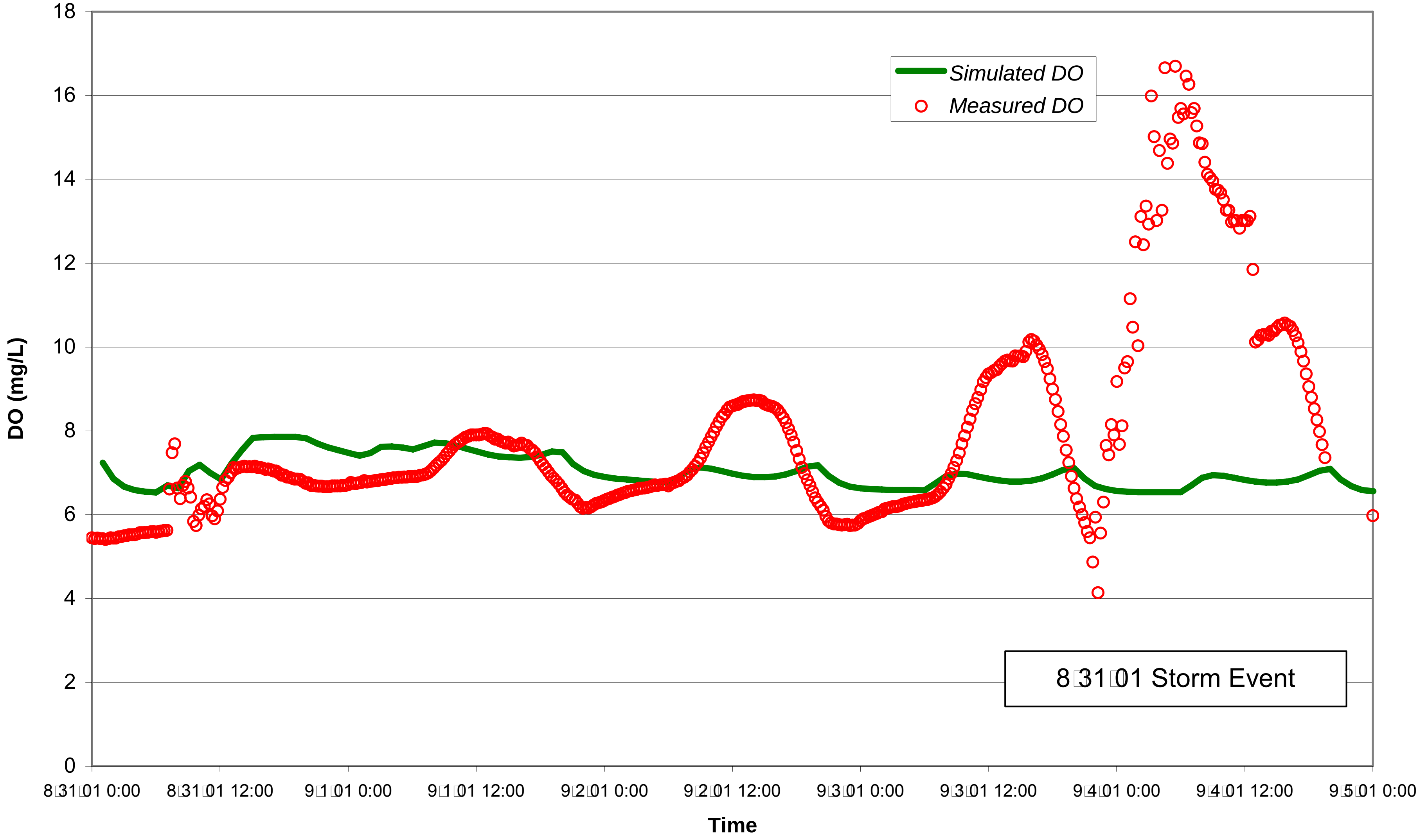


Figure 3-48
Relationship Between Measured and Modeled Minimum DO at Pleasant Run
Meridian Street Station - August 31, 2001 Storm Event

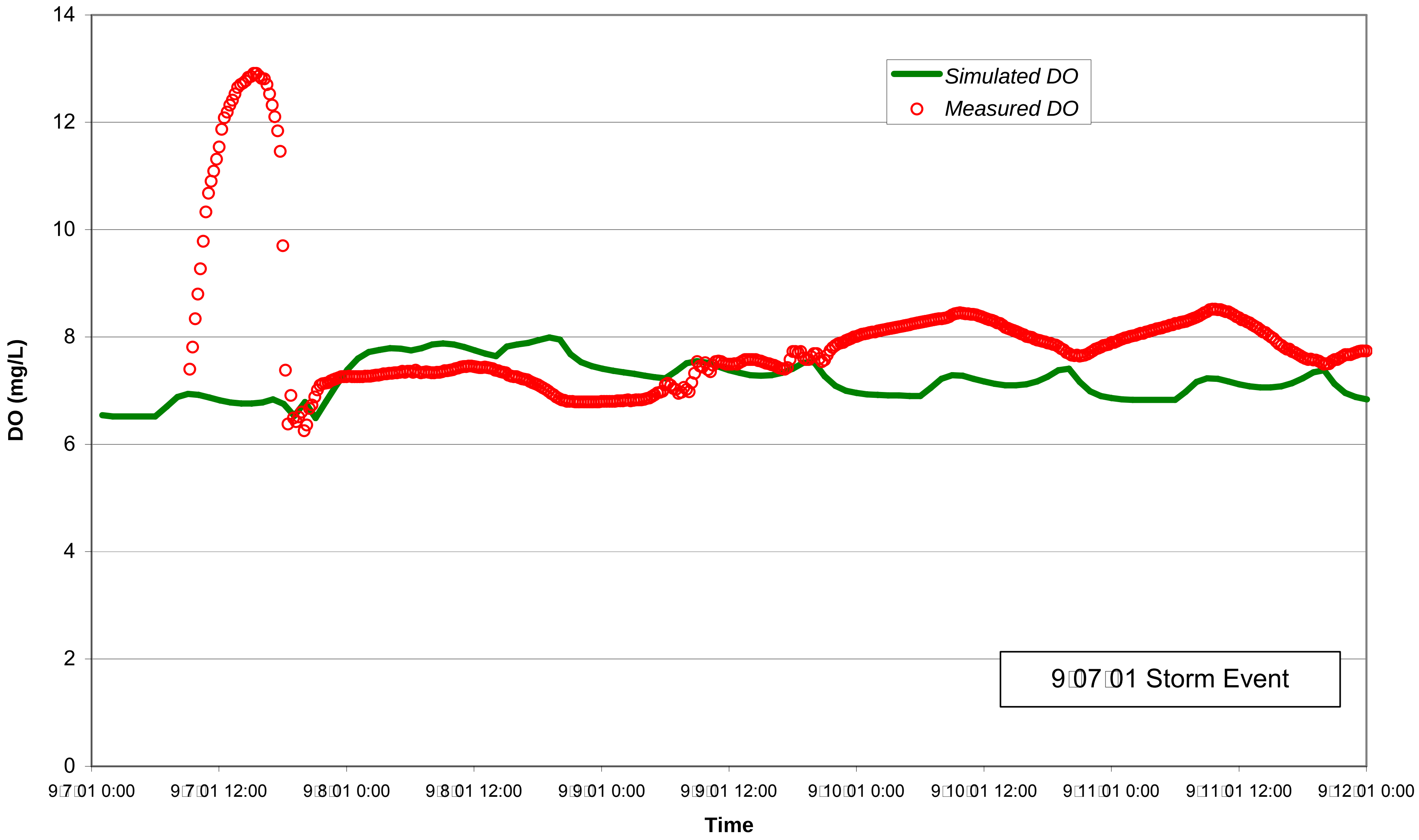


Figure 3-49
Relationship Between Measured and Modeled Minimum DO at Pleasant Run Meridian Street Station - September 7, 2001 Storm Event

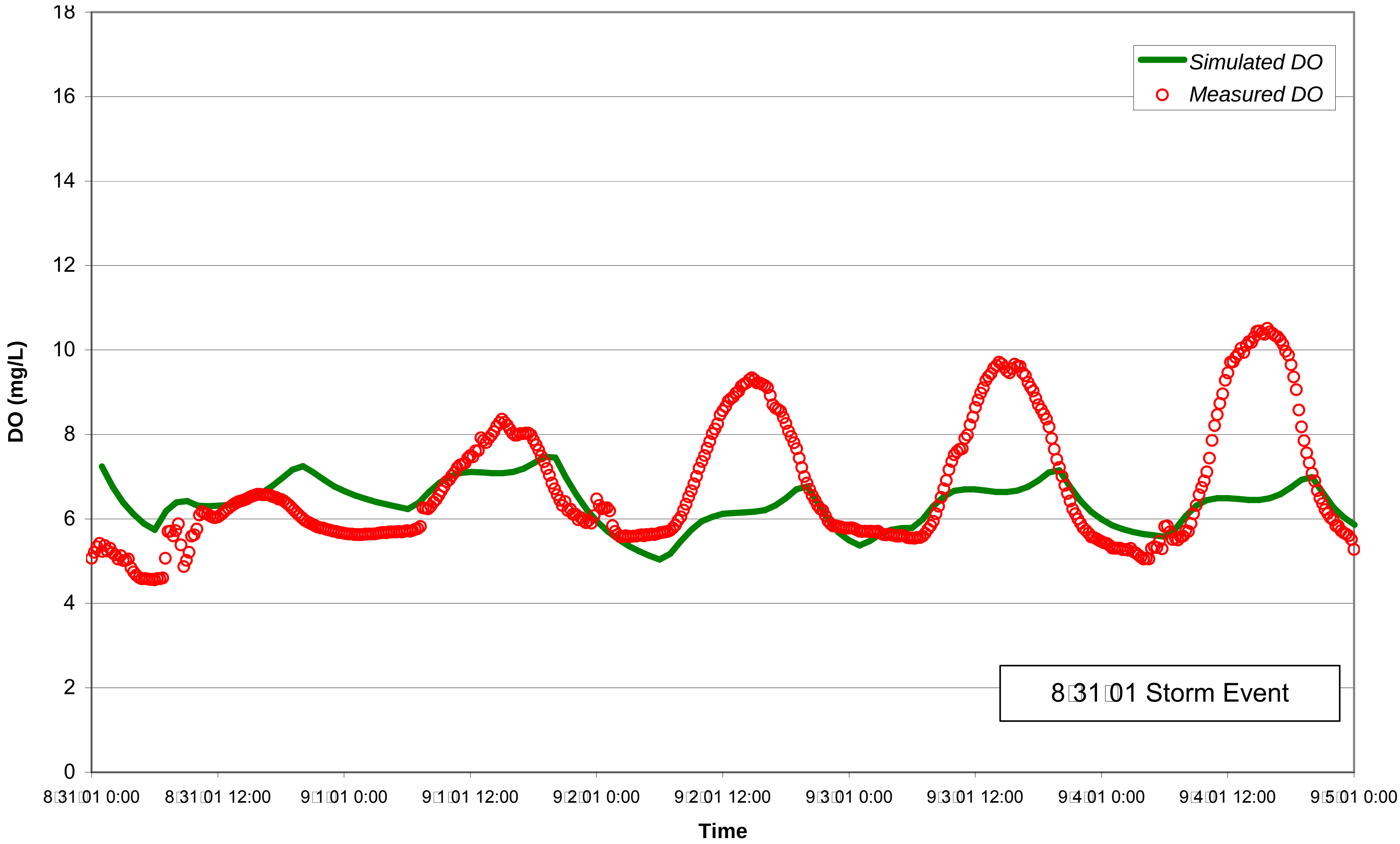


Figure 3-50
Relationship Between Measured and Modeled Minimum DO at Eagle Creek
Kentucky Avenue Station - August 31, 2001 Storm Event

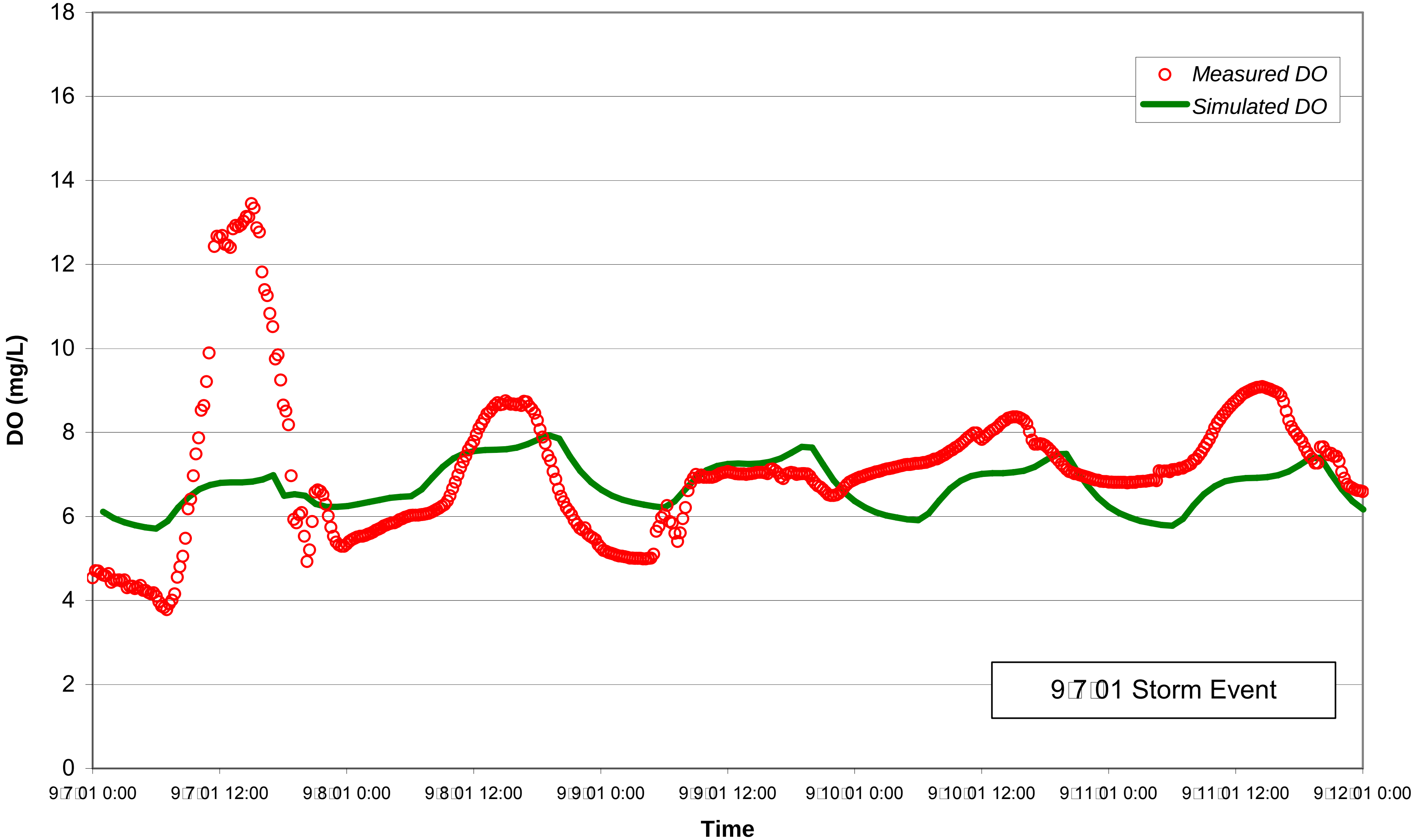


Figure 3-51
Relationship Between Measured and Modeled Minimum DO at Eagle Creek
Kentucky Avenue Station - September 7, 2001 Storm Event

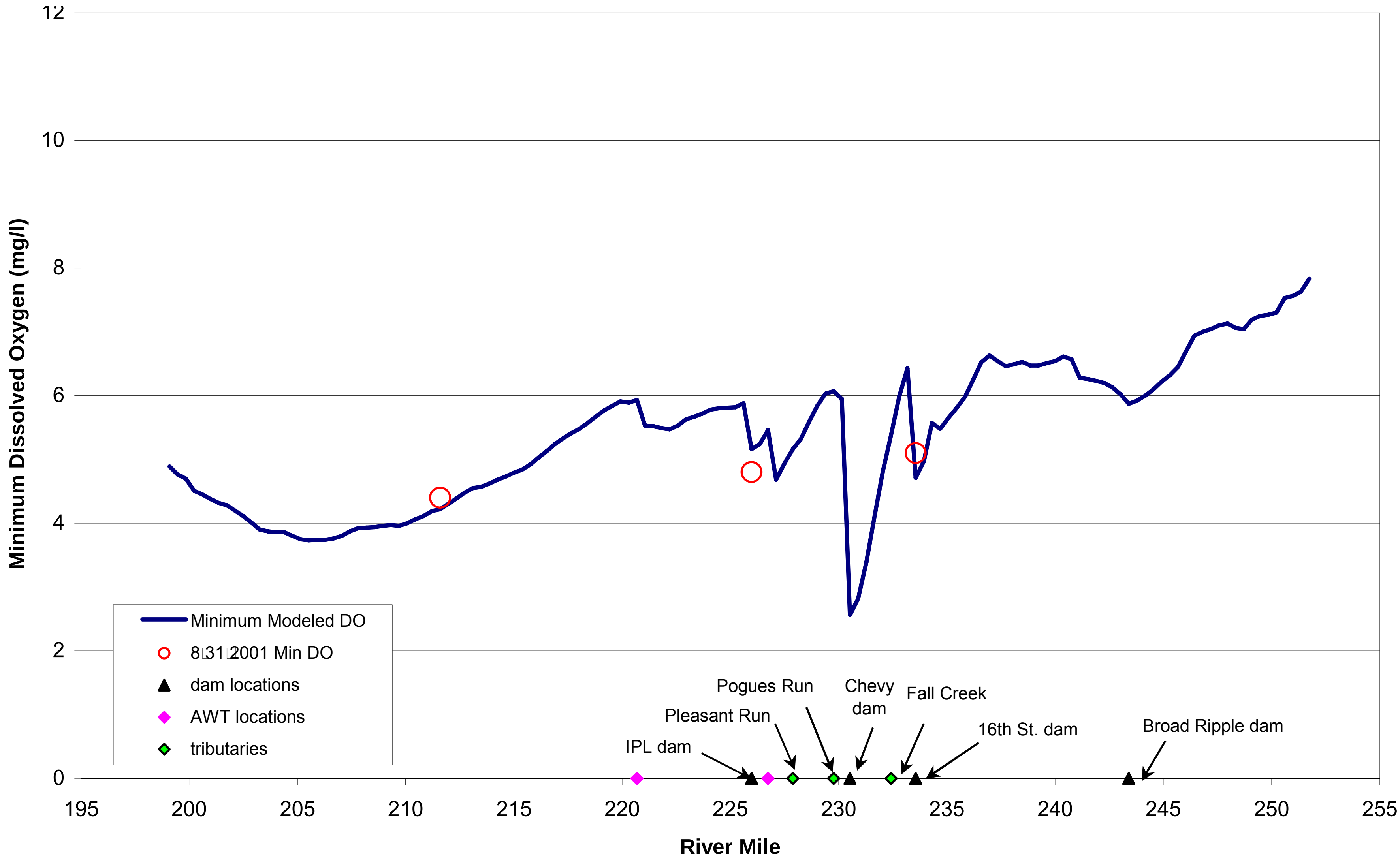


Figure 3-52
Relationship Between Measured and Modeled Minimum DO Concentrations – White River
August 31, 2001 Storm Event

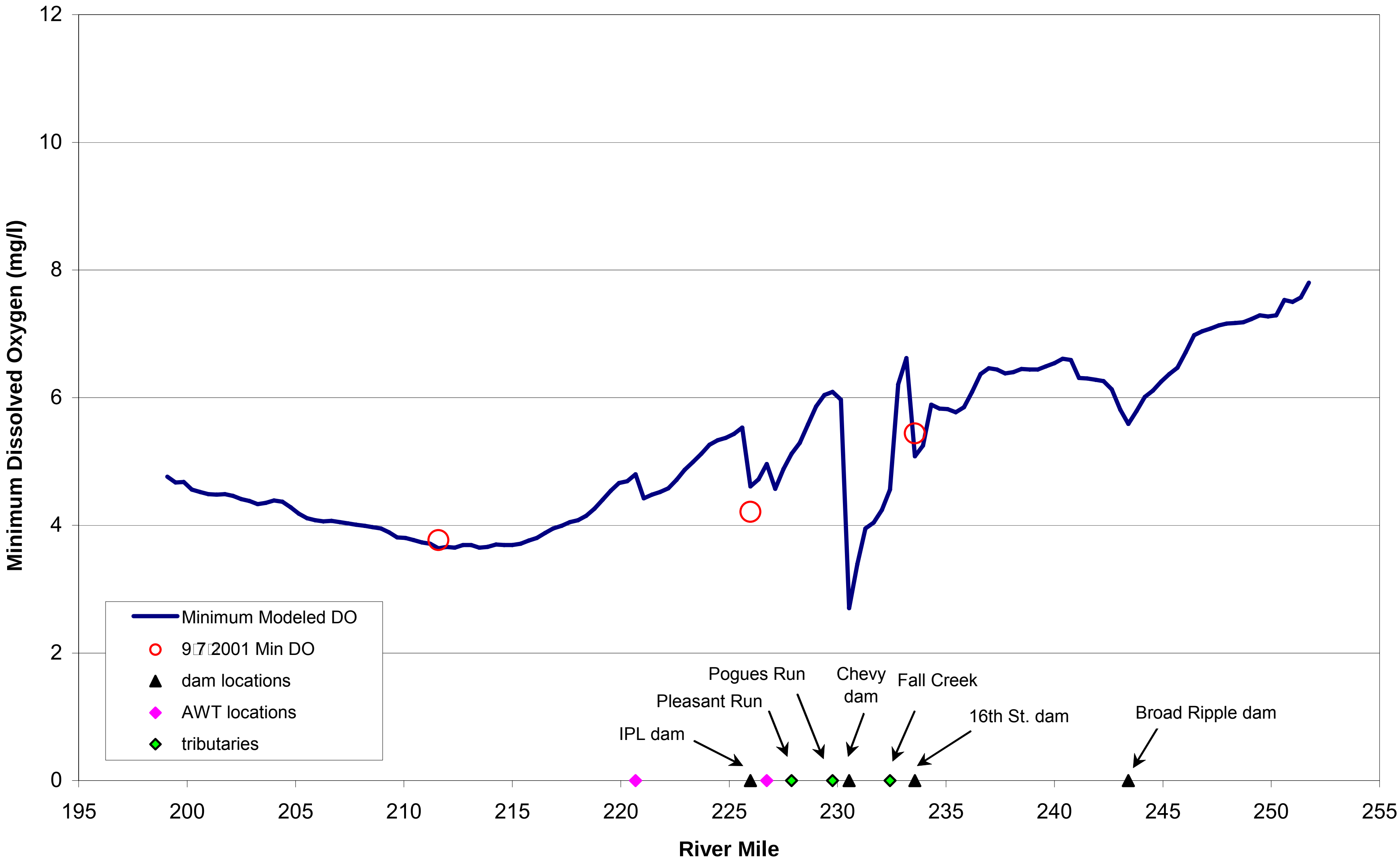


Figure 3-53
Relationship Between Measured and Modeled Minimum DO Concentrations – White River September 7, 2001 Storm Event

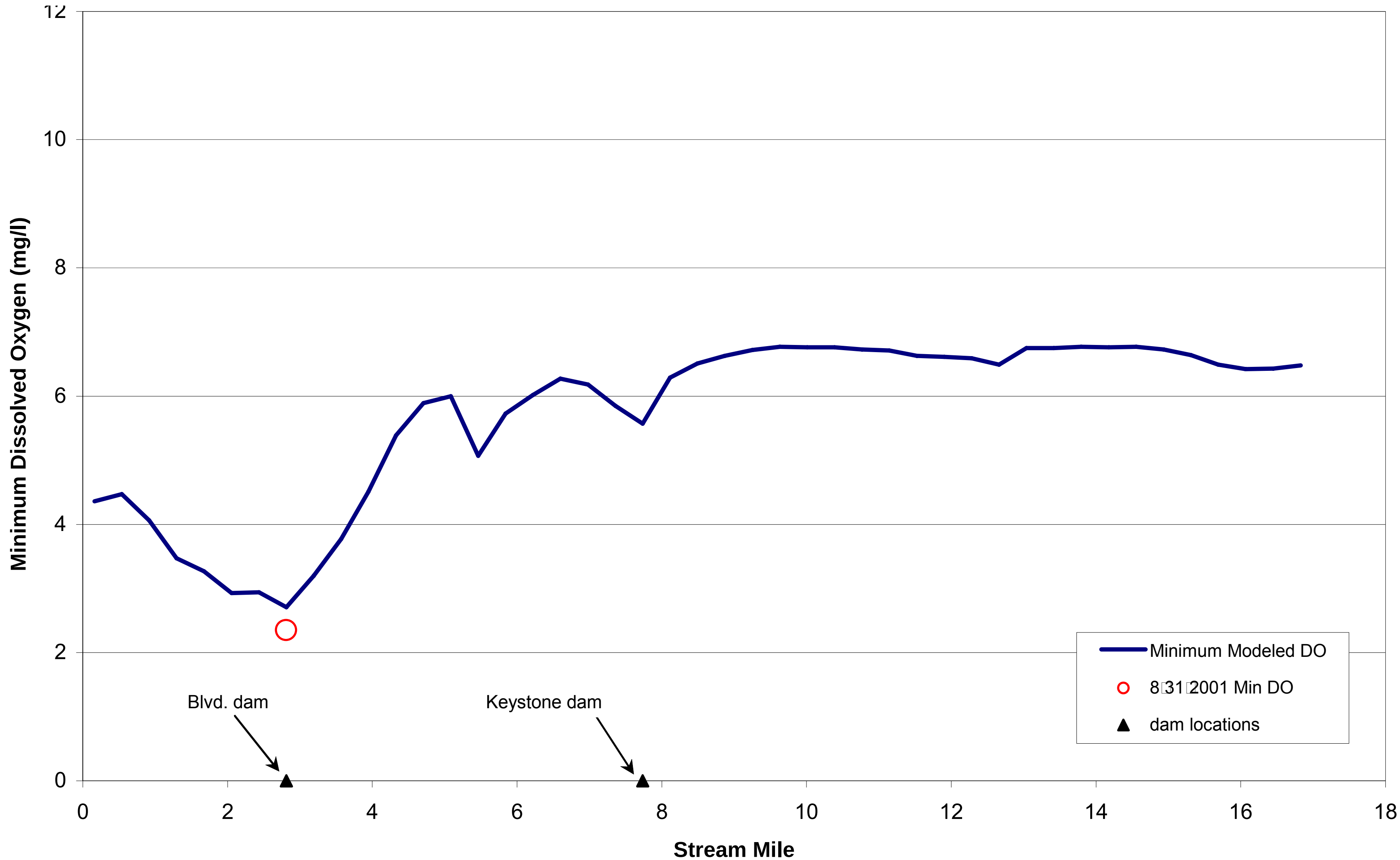


Figure 3-54
Relationship Between Measured and Modeled Minimum DO Concentrations – Fall Creek
August 31, 2001 Storm Event

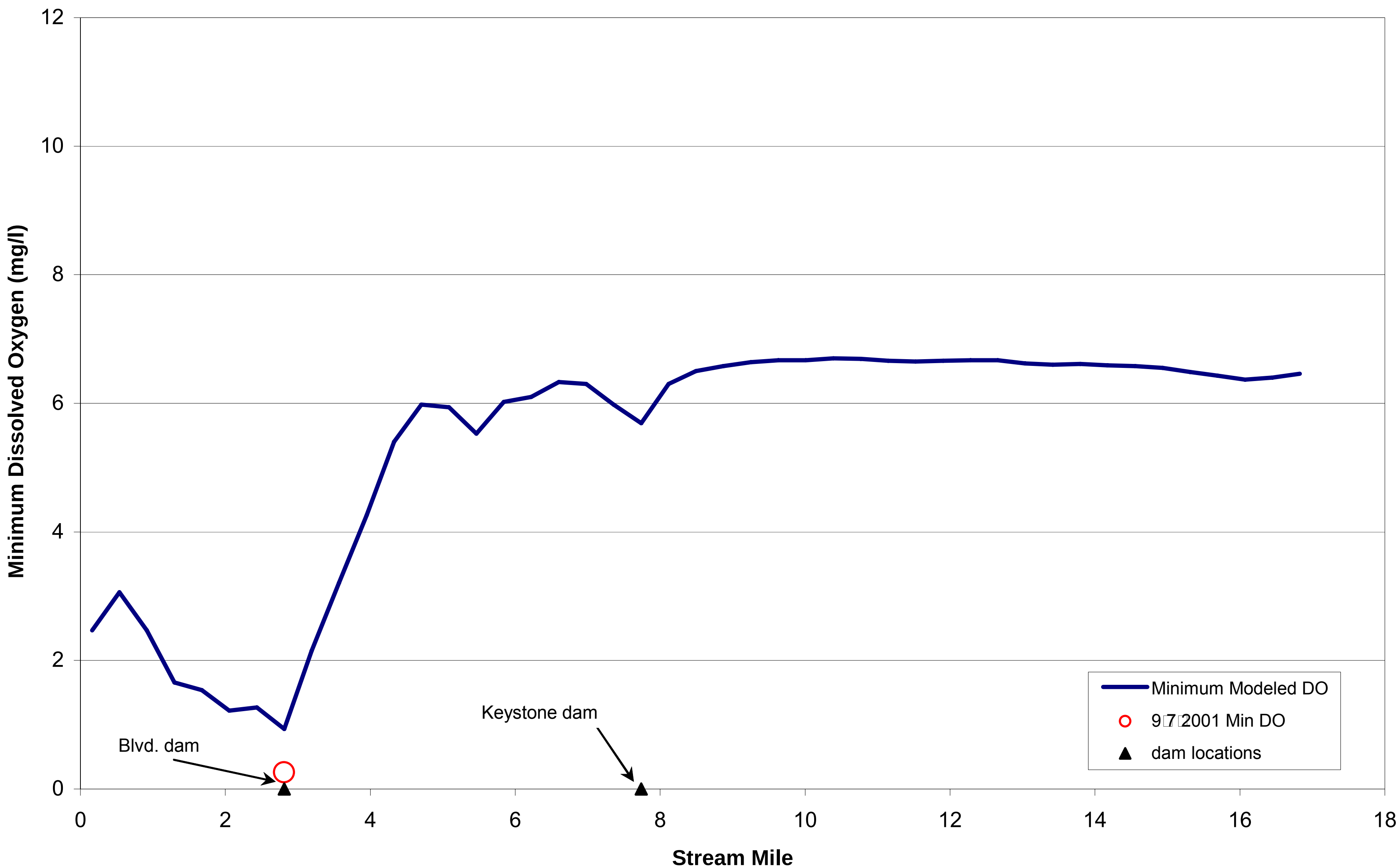


Figure 3-55
Relationship Between Measured and Modeled Minimum DO Concentrations – Fall Creek
September 7, 2001 Storm Event

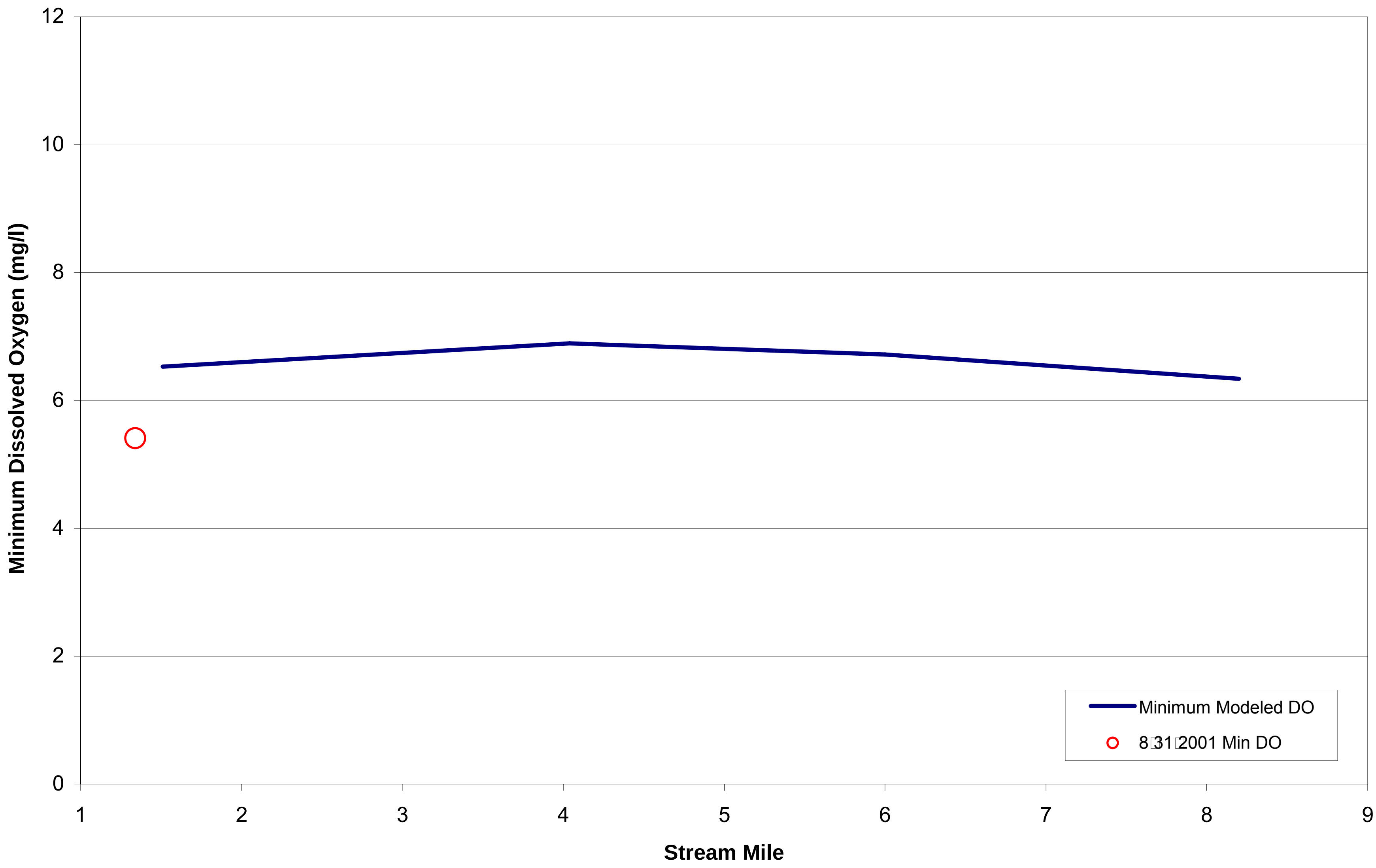


Figure 3-56
Relationship Between Measured and Modeled Minimum DO Concentrations – Pleasant Run
August 31, 2001 Storm Event

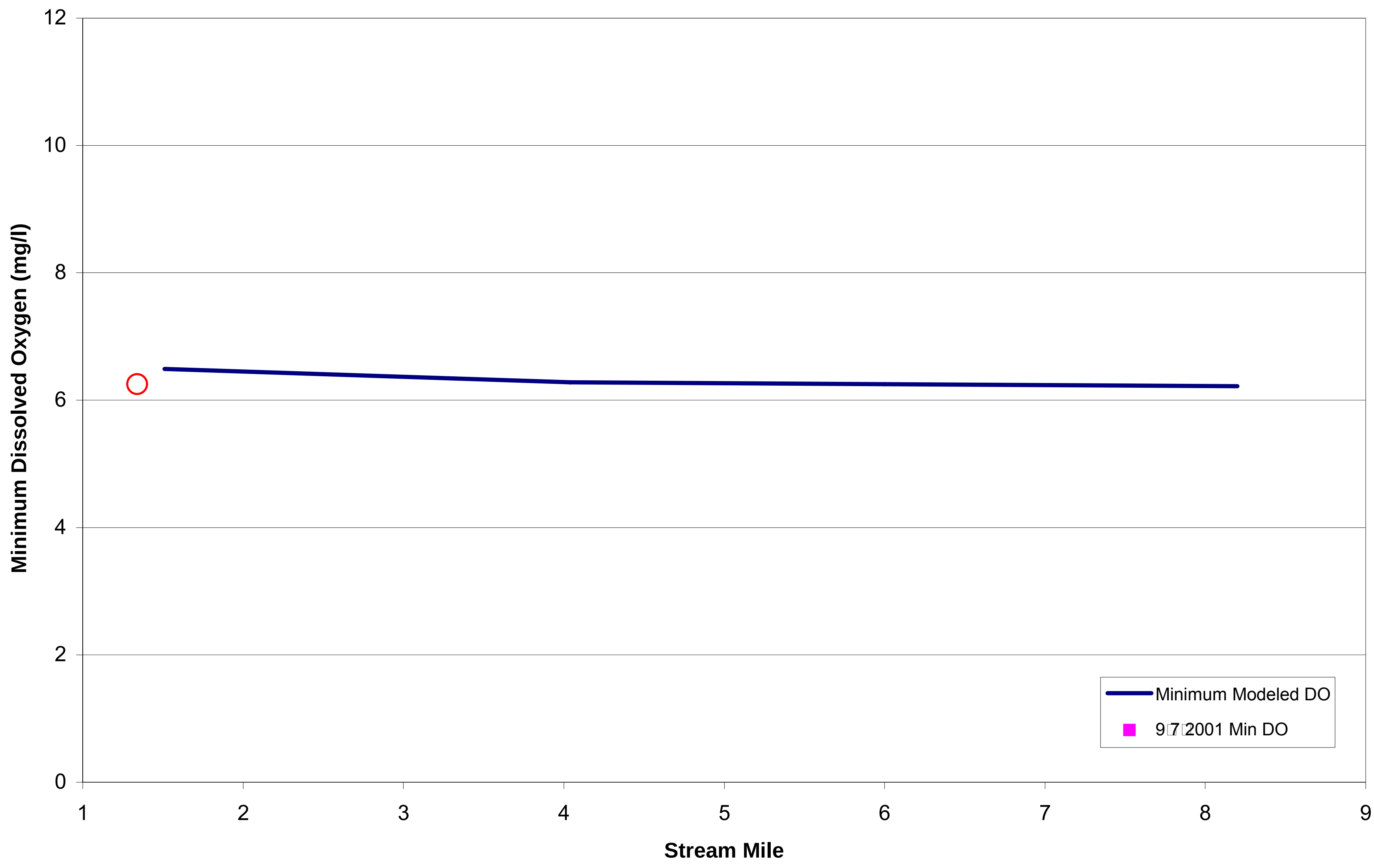


Figure 3-57
Relationship Between Measured and Modeled Minimum DO Concentrations – Pleasant Run
September 7, 2001 Storm Event

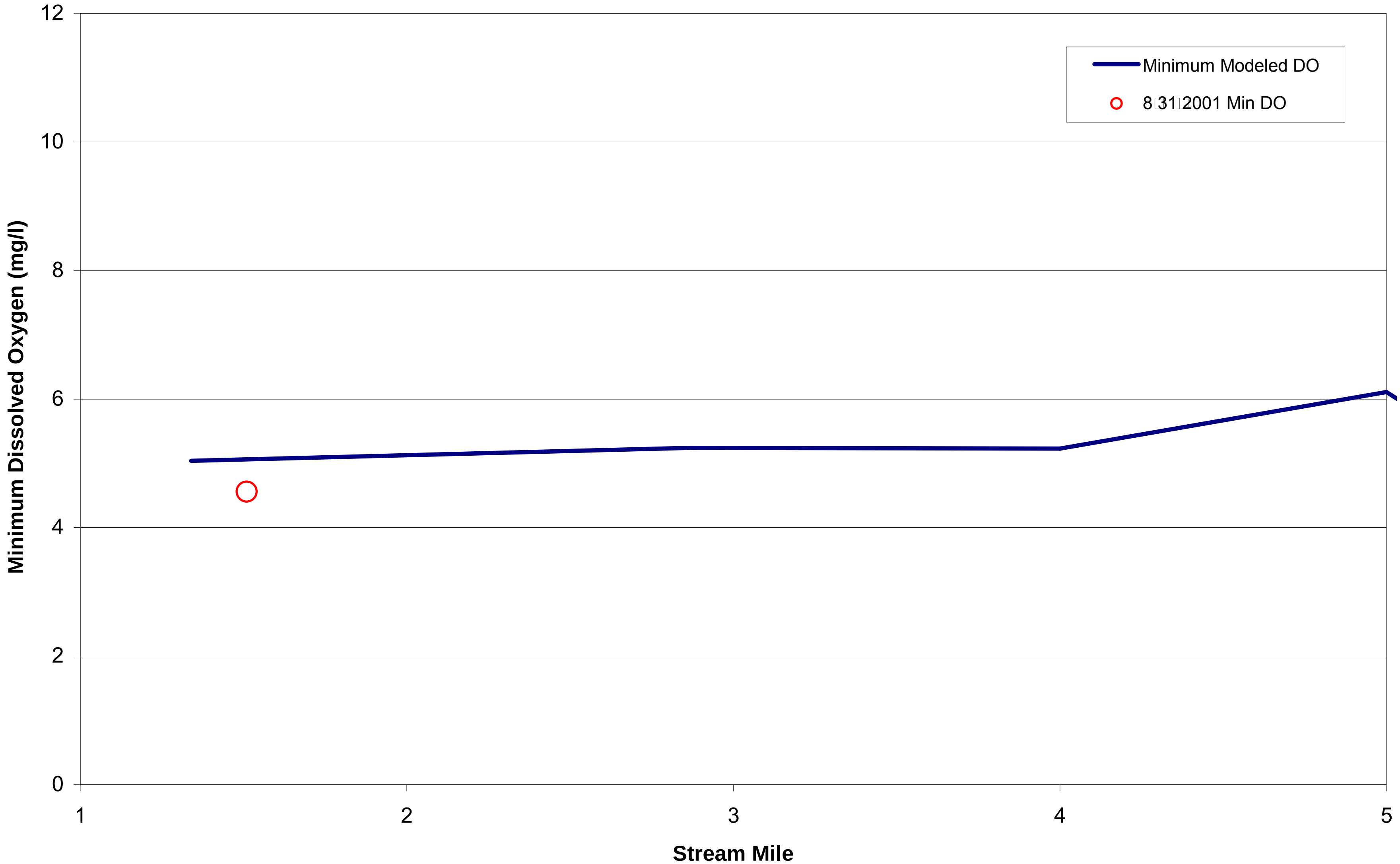


Figure 3-58
Relationship Between Measured and Modeled Minimum DO Concentrations – Eagle Creek
August 31, 2001 Storm Event

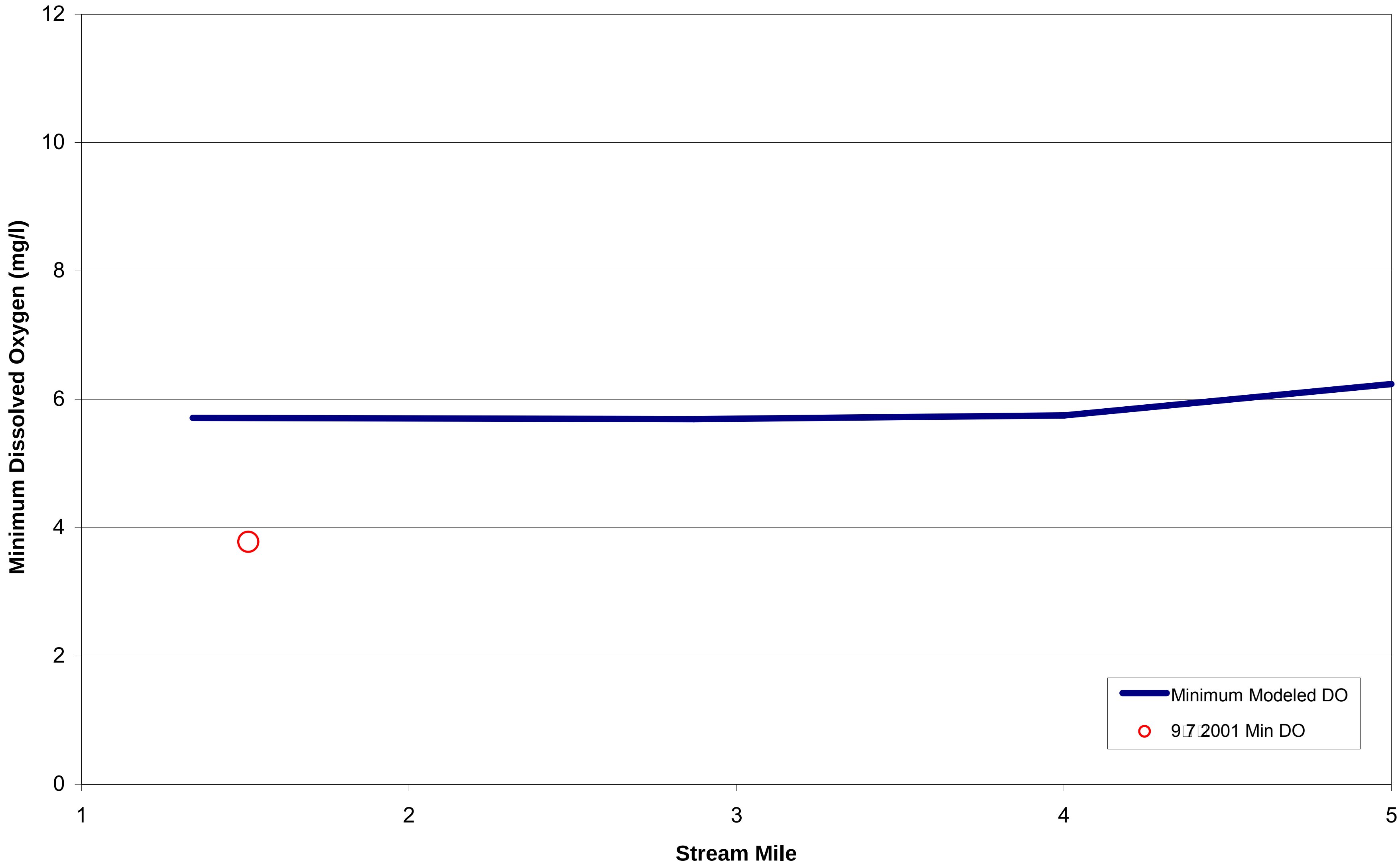


Figure 3-59
Relationship Between Measured and Modeled Minimum DO Concentrations – Eagle Creek
September 7, 2001 Storm Event

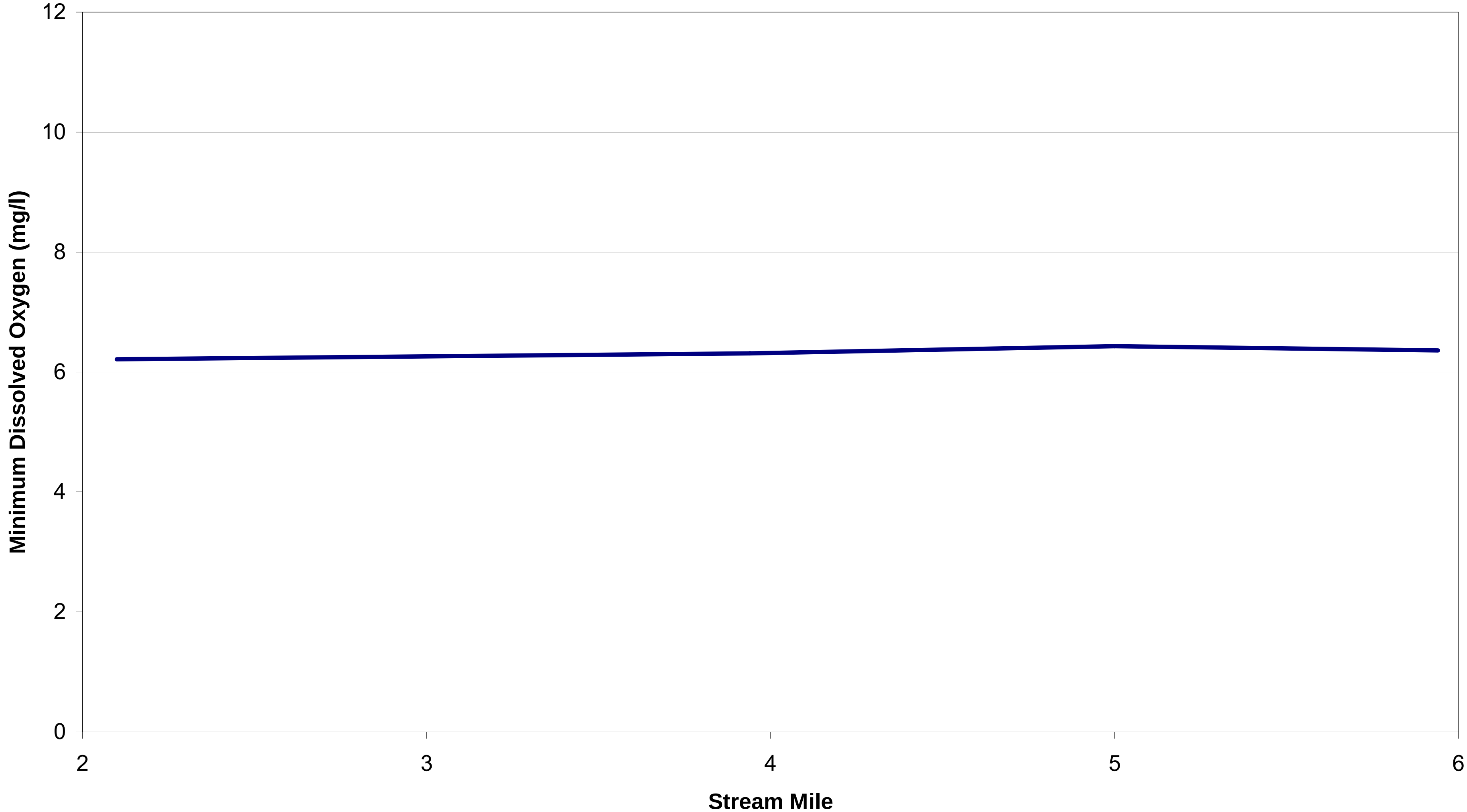


Figure 3-60
Relationship Between Measured and Modeled Minimum DO Concentrations – Pogues Run
August 31, 2001 Storm Event

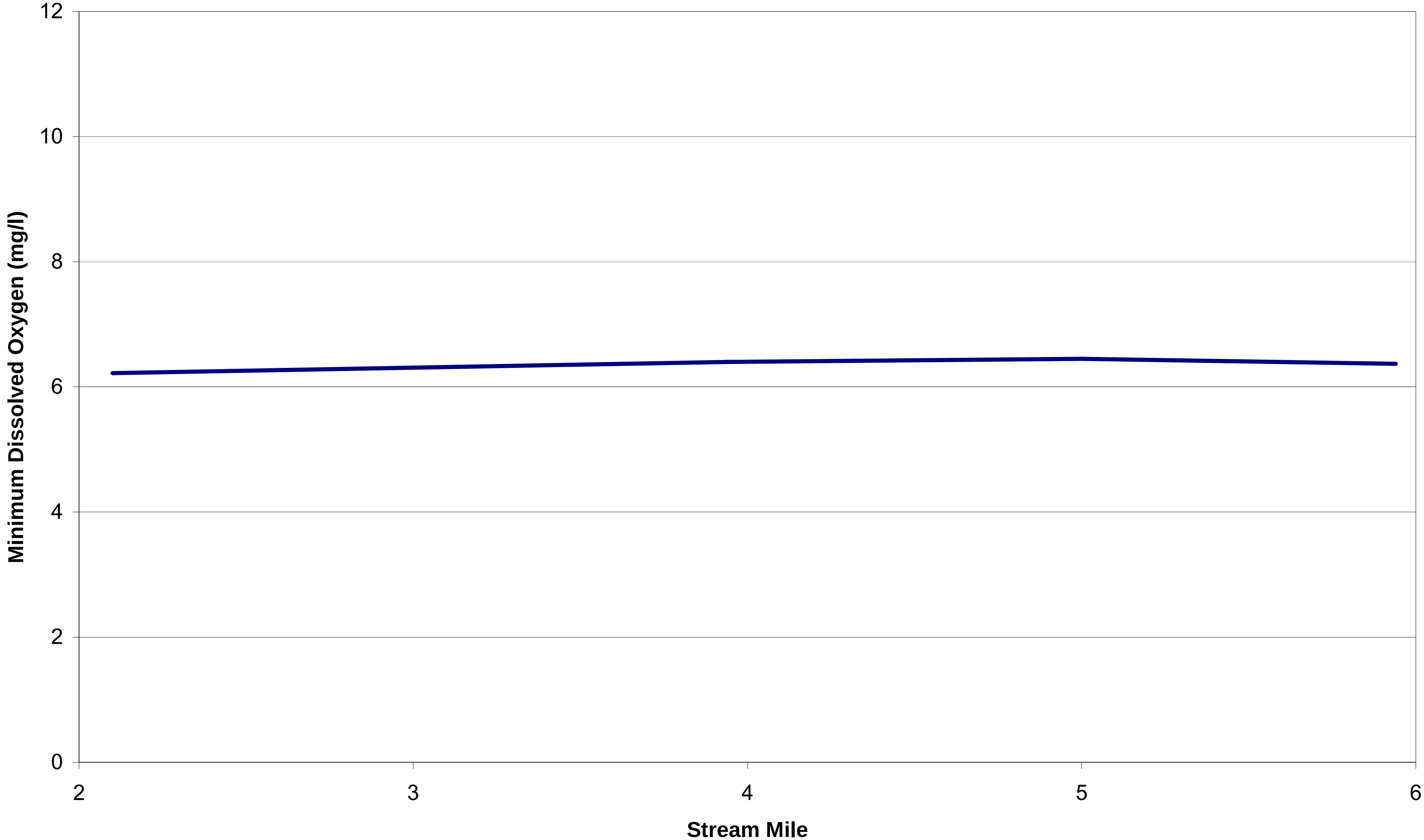


Figure 3-61
Relationship Between Measured and Modeled Minimum DO Concentrations – Pogues Run
September 7, 2001 Storm Event

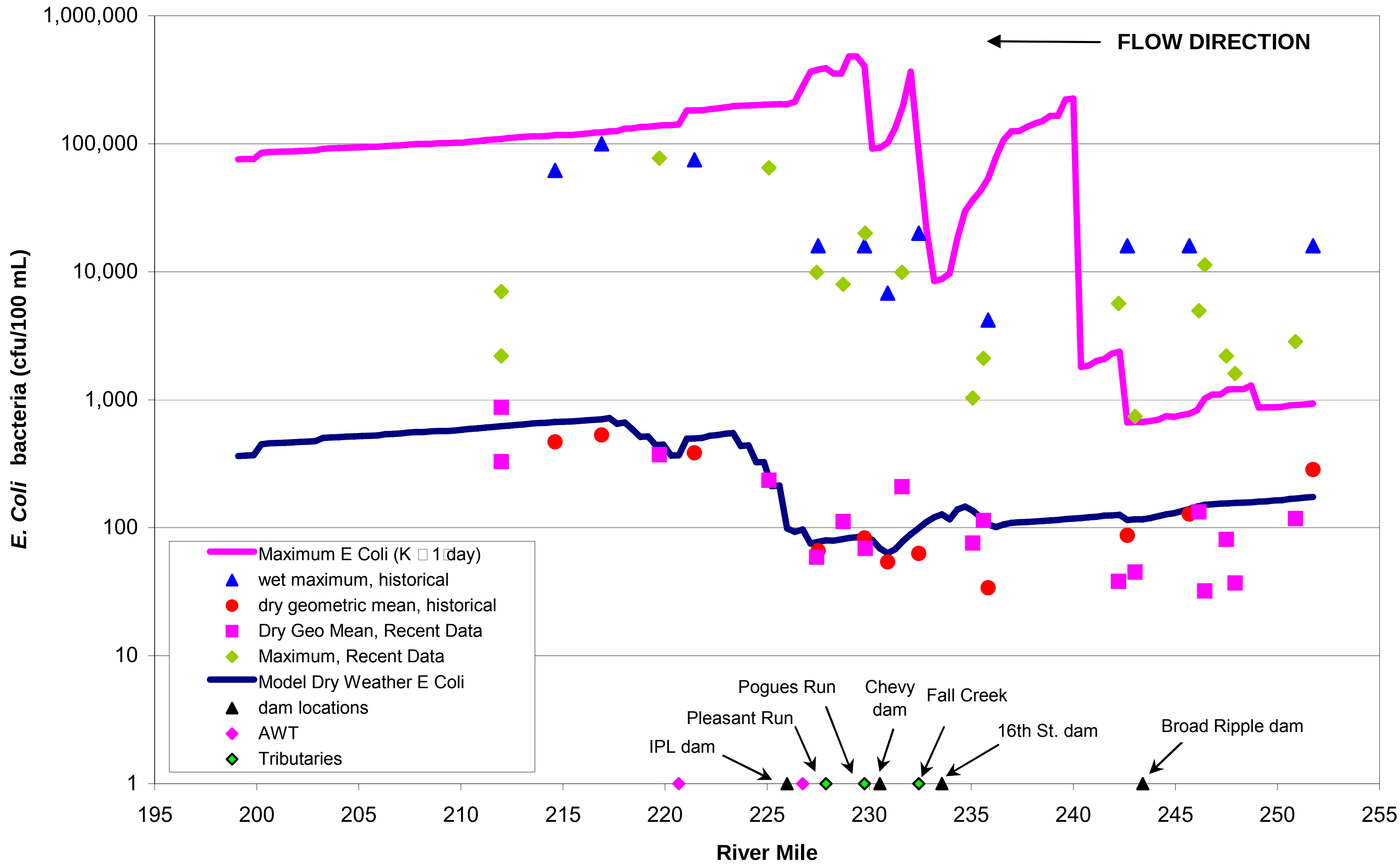


Figure 3-62
Relationship Between Wet Weather and Dry Weather *E. coli* Bacteria Concentrations
White River - August 31, 2001 Storm Event

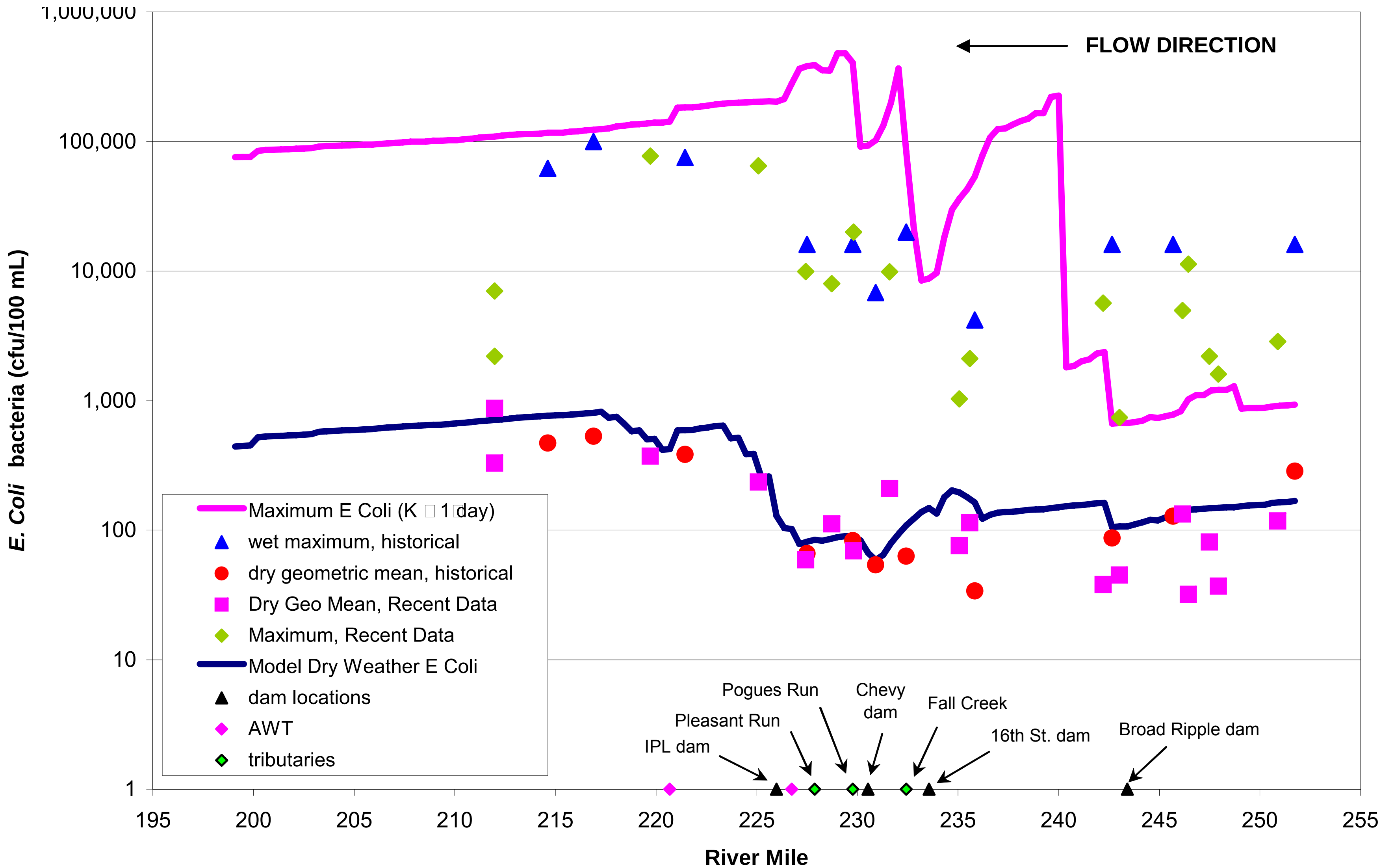


Figure 3-63
Relationship Between Wet Weather and Dry Weather *E. coli* Bacteria Concentrations
White River - September 7, 2001 Storm Event

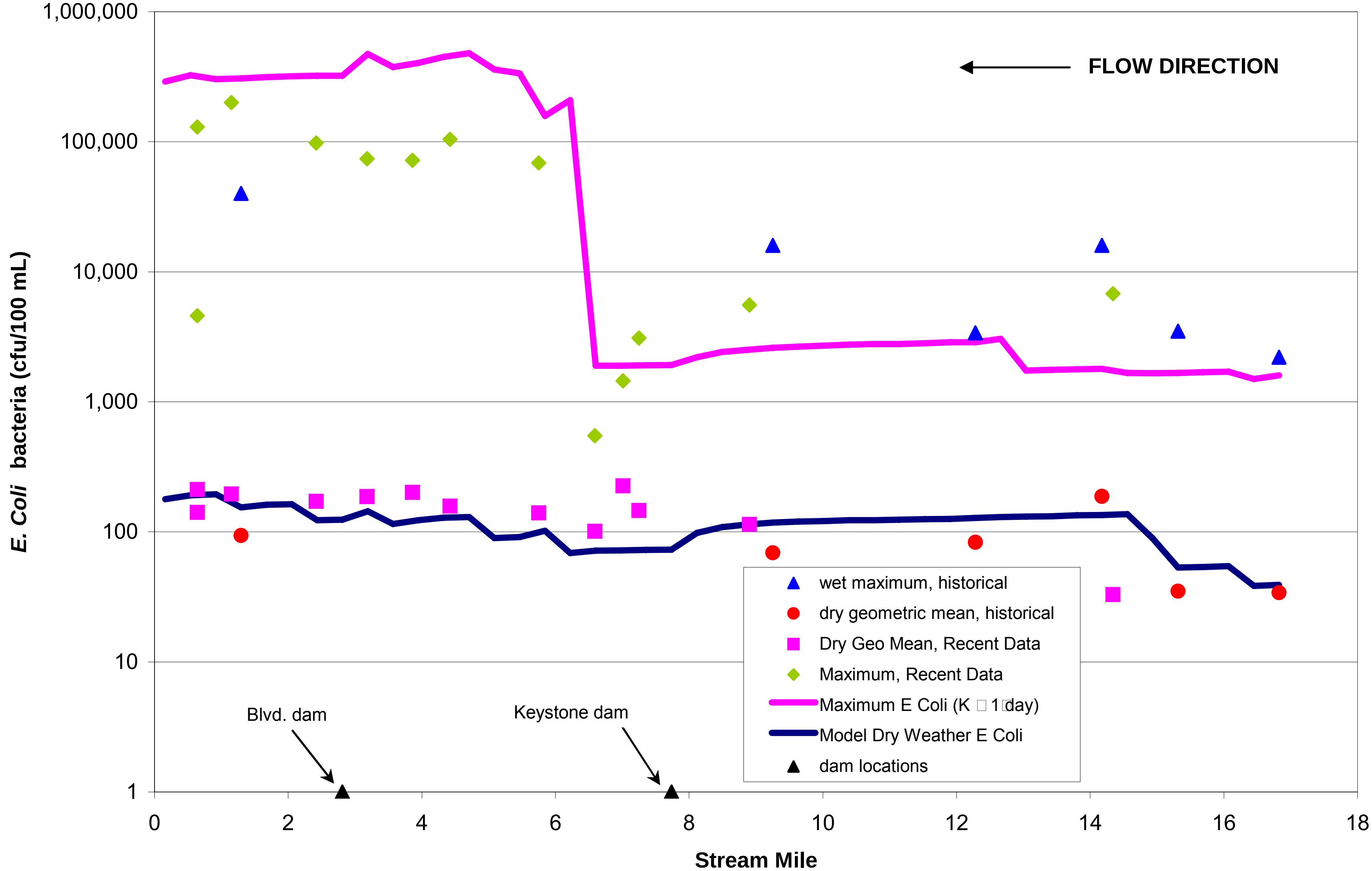


Figure 3-64
Relationship Between Wet Weather and Dry Weather *E. coli* Bacteria Concentrations
Fall Creek - August 31, 2001 Storm Event

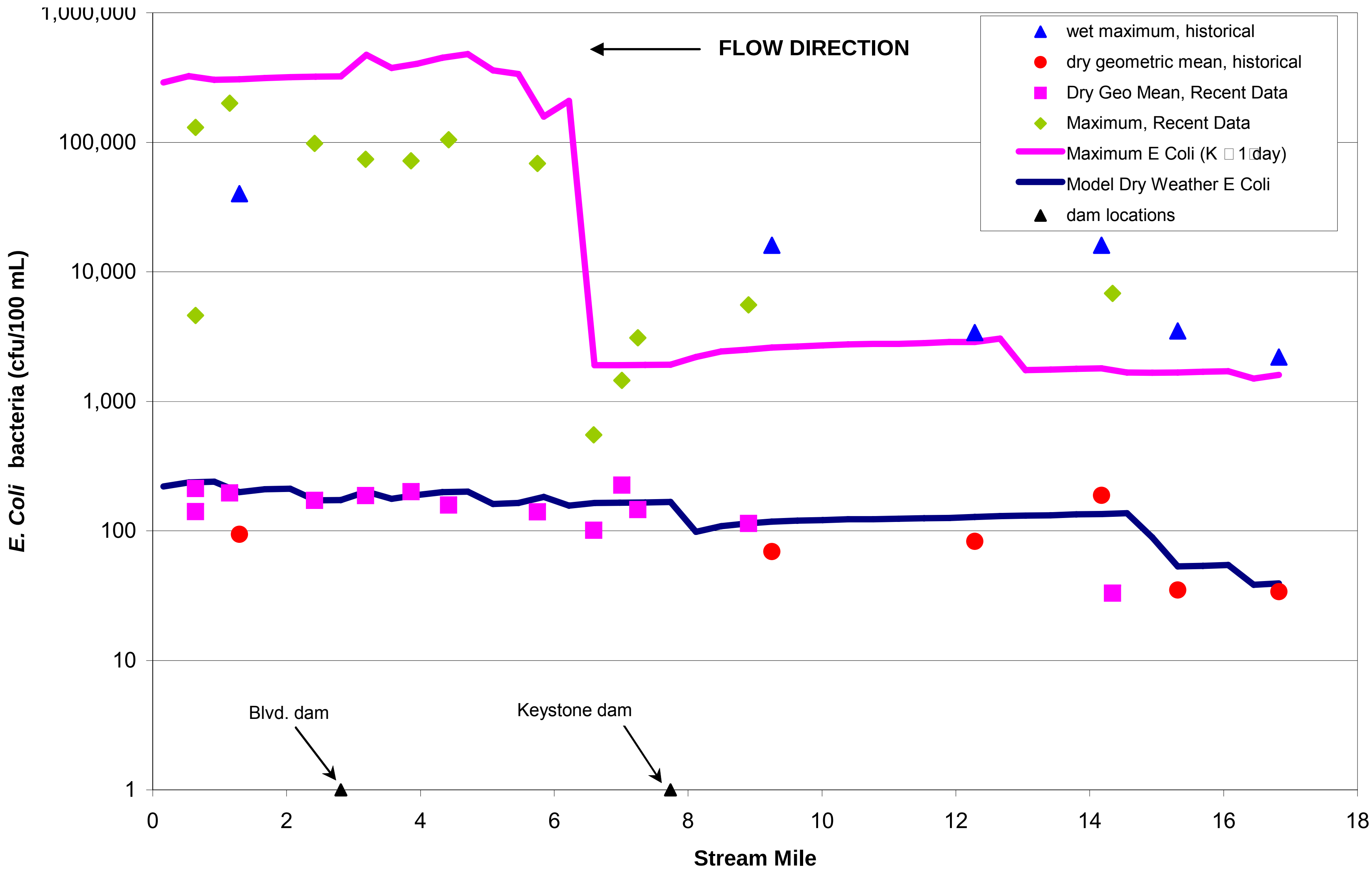


Figure 3-65

Relationship Between Wet Weather and Dry Weather *E. coli* Bacteria Concentrations

Fall Creek - September 7, 2001 Storm Event

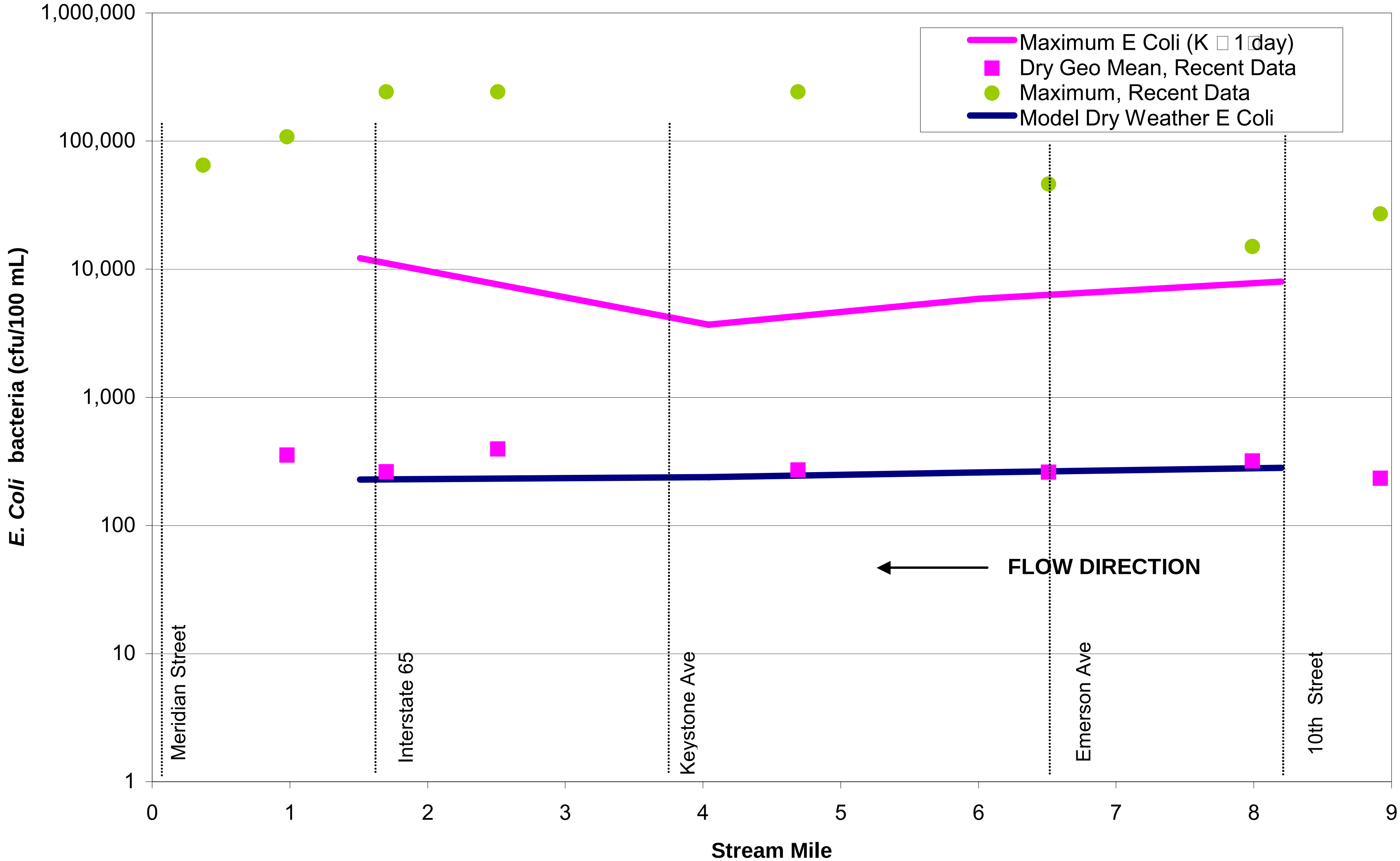


Figure 3-66
Relationship Between Wet Weather and Dry Weather *E. coli* Bacteria Concentrations
Pleasant Run - August 31, 2001 Storm Event

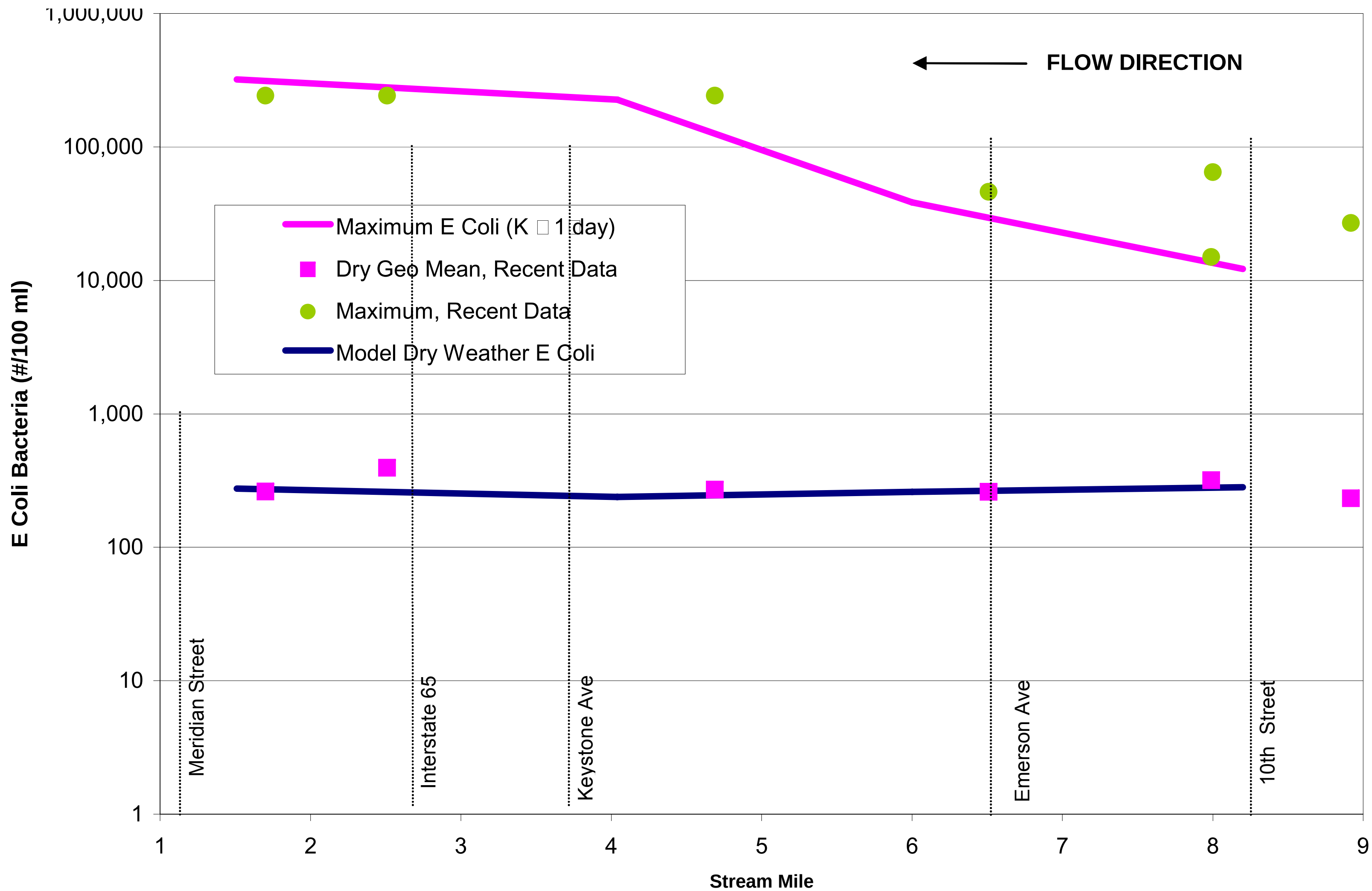


Figure 3-67
Relationship Between Wet Weather and Dry Weather *E. coli* Bacteria Concentrations
Pleasant Run - September 7, 2001 Storm Event

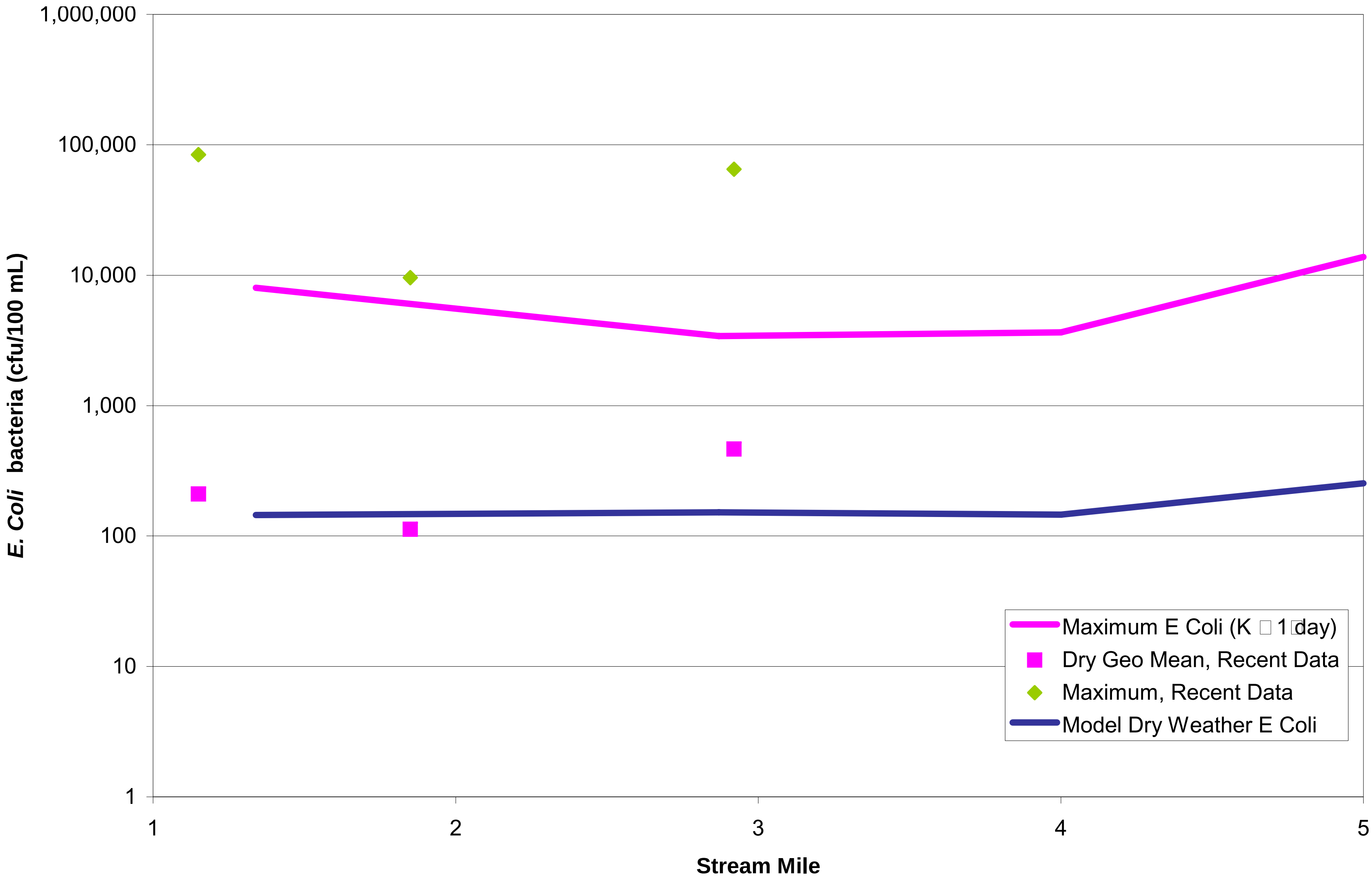


Figure 3-68
Relationship Between Wet Weather and Dry Weather *E. coli* Bacteria Concentrations
Eagle Creek - August 31, 2001 Storm Event

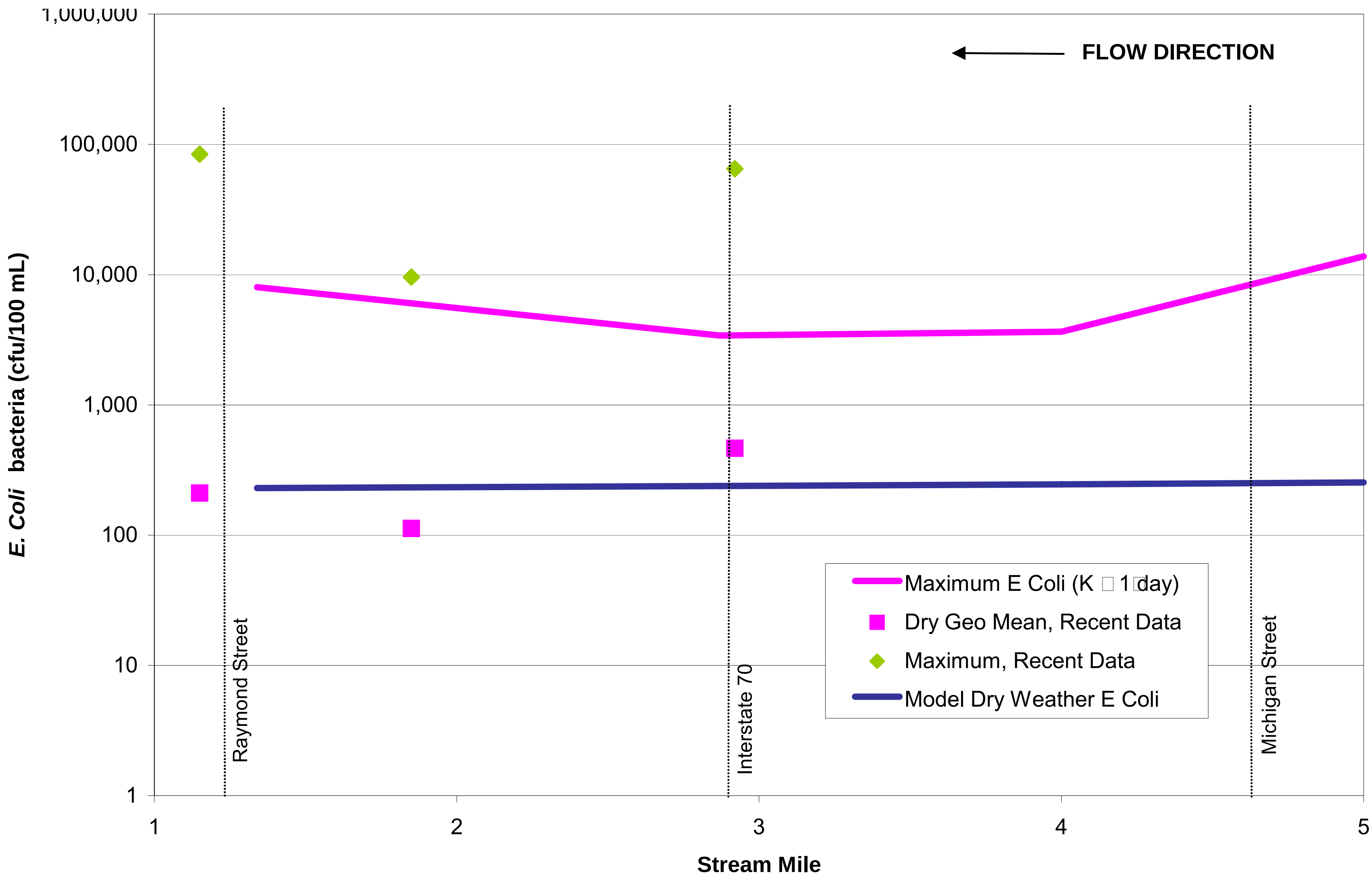


Figure 3-69
Relationship Between Wet Weather and Dry Weather *E. coli* Bacteria Concentrations
Eagle Creek - September 7, 2001 Storm Event

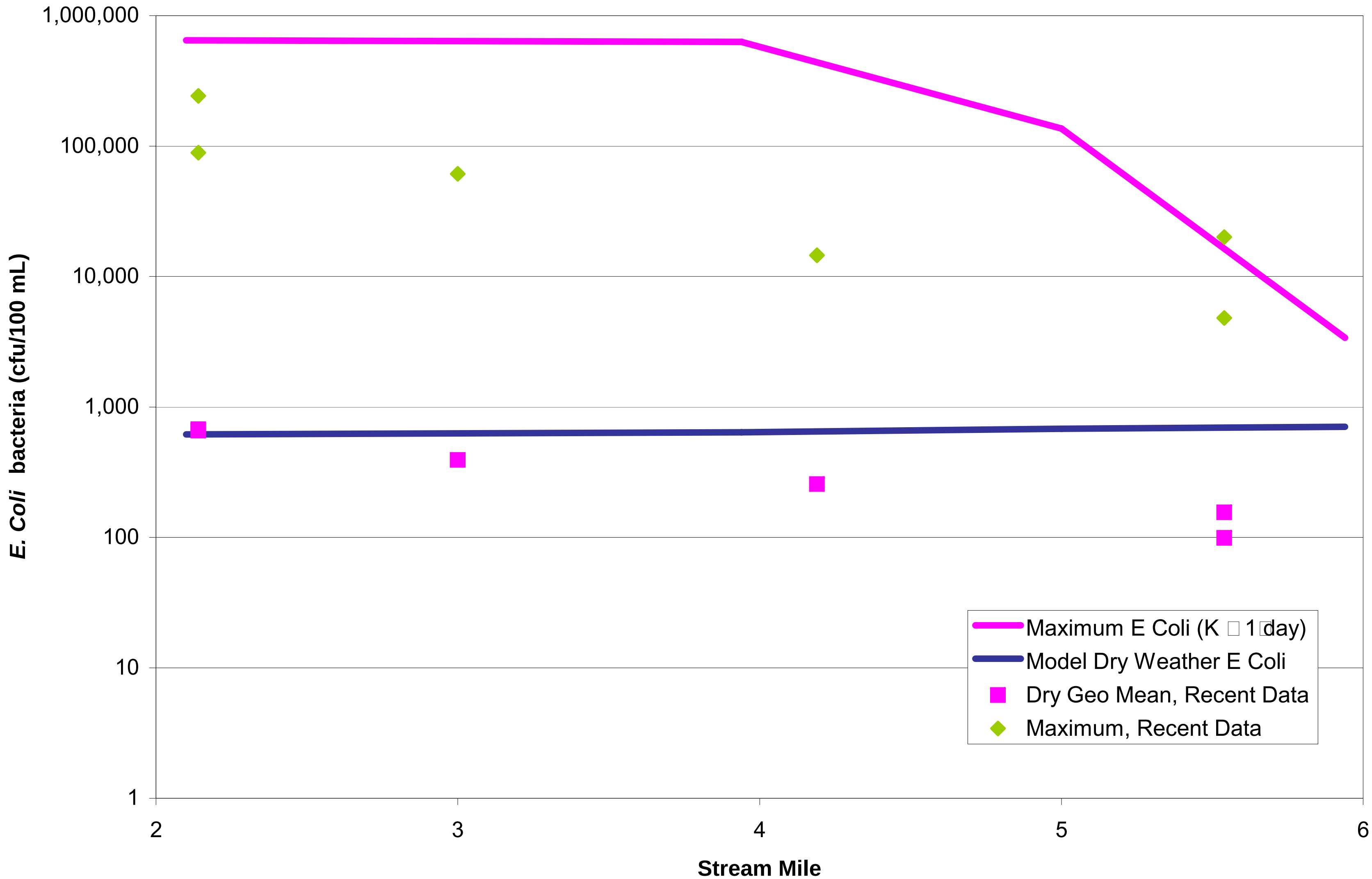


Figure 3-70
Relationship Between Wet Weather and Dry Weather *E. coli* Bacteria Concentrations
Pogues Run - August 31, 2001 Storm Event

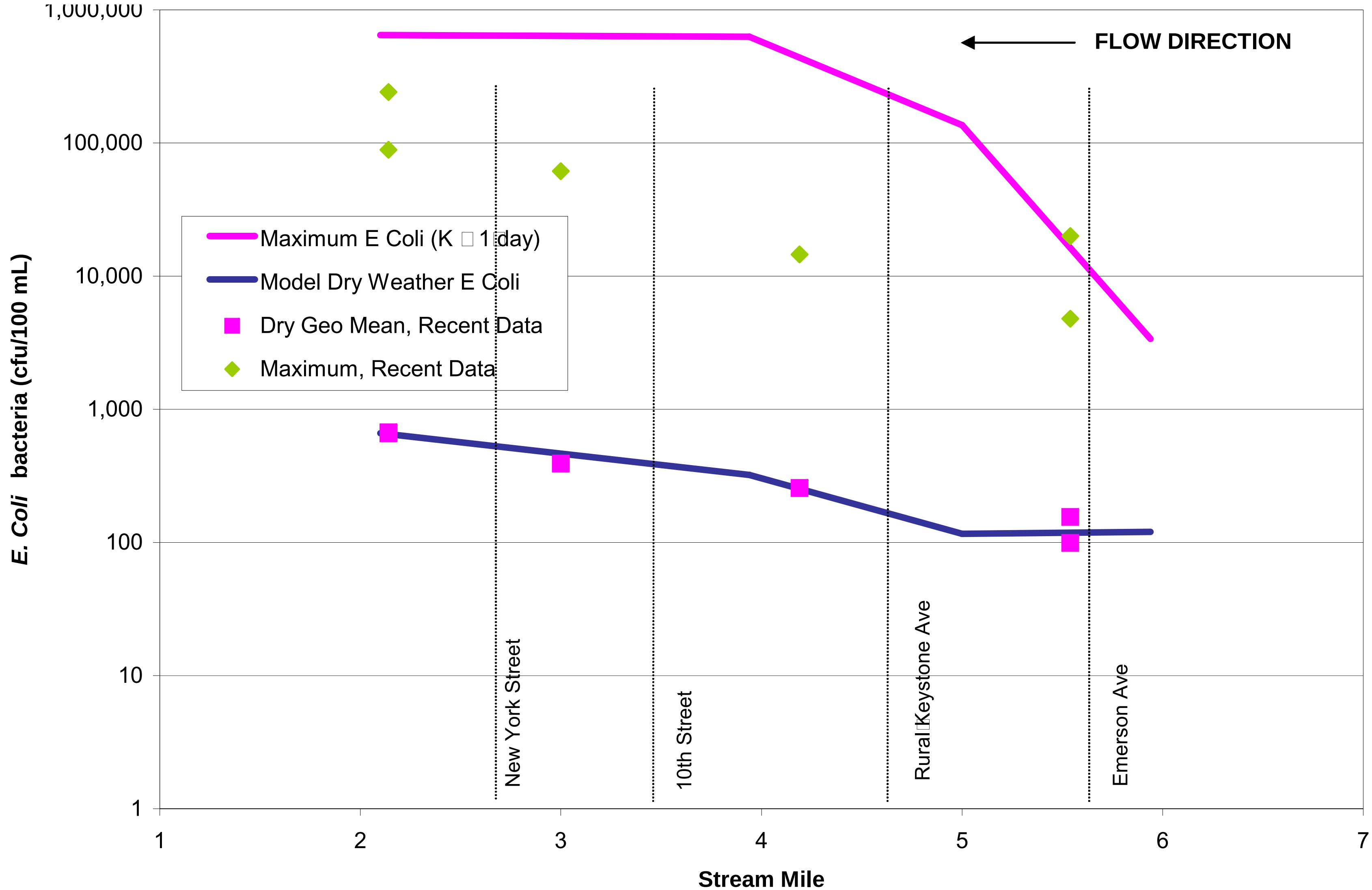


Figure 3-71
Relationship Between Wet Weather and Dry Weather *E. coli* Bacteria Concentrations
Pogues Run - September 7, 2001 Storm Event

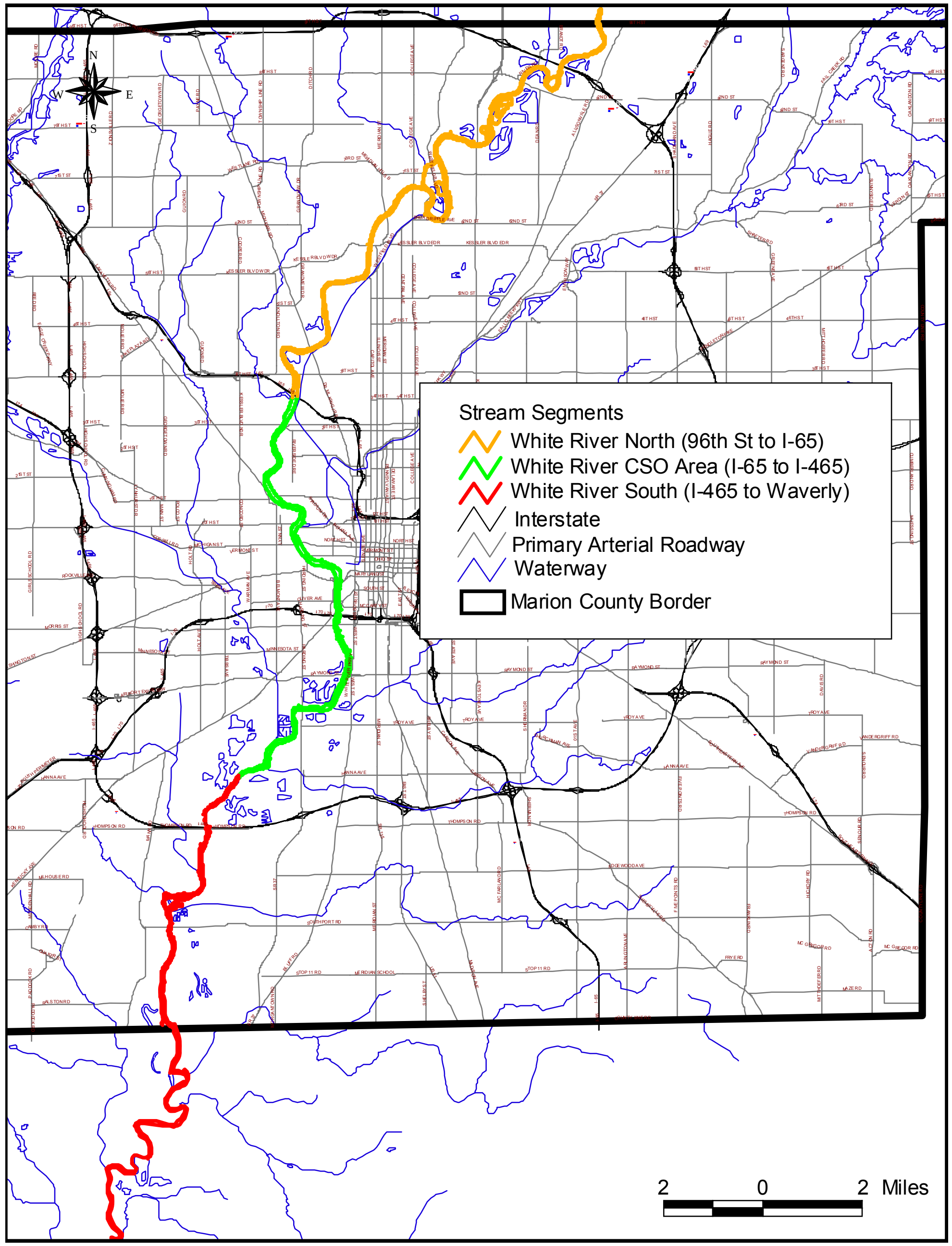


Figure 3-72
White River Stream Segments

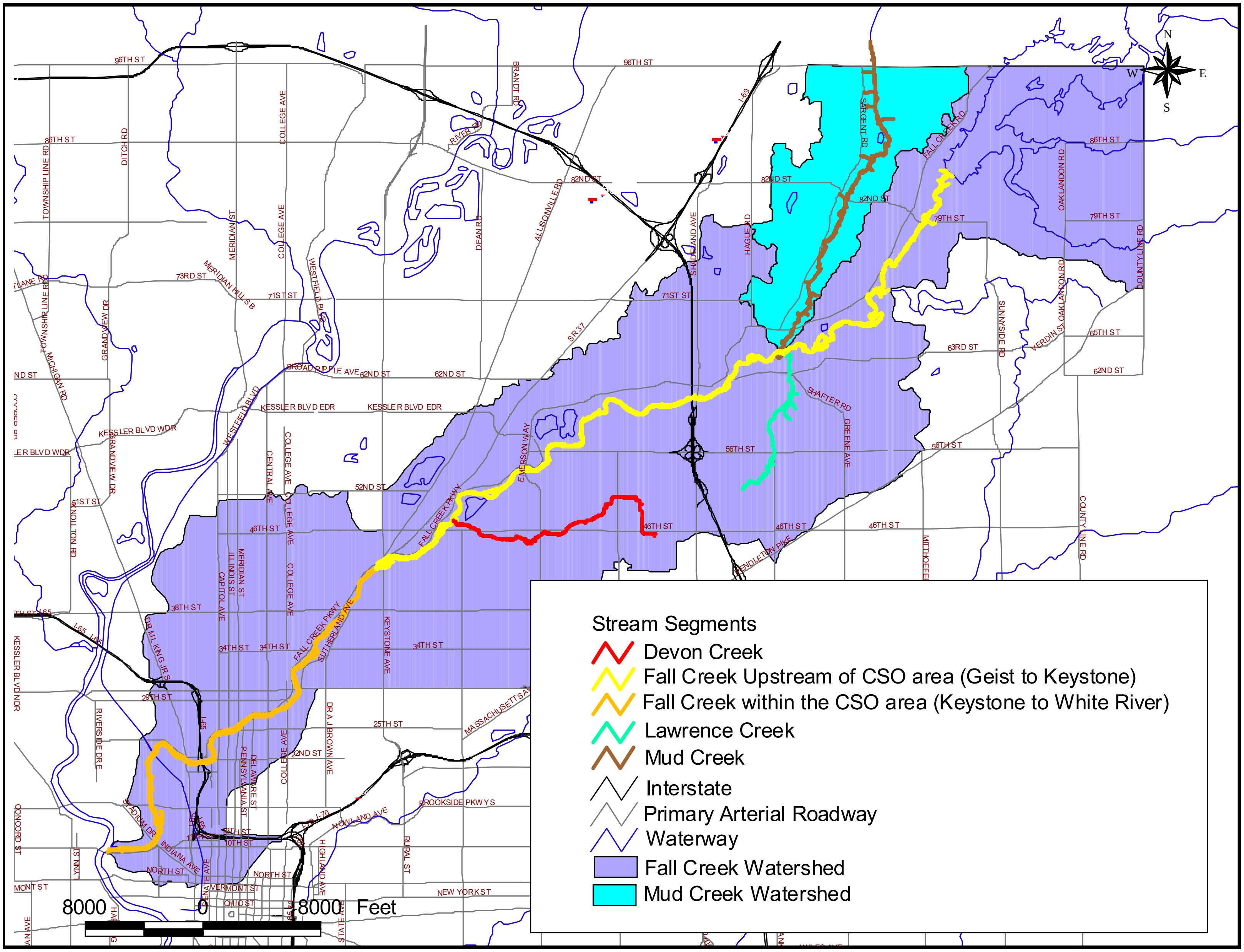


Figure 3-73: Fall Creek Stream Segments

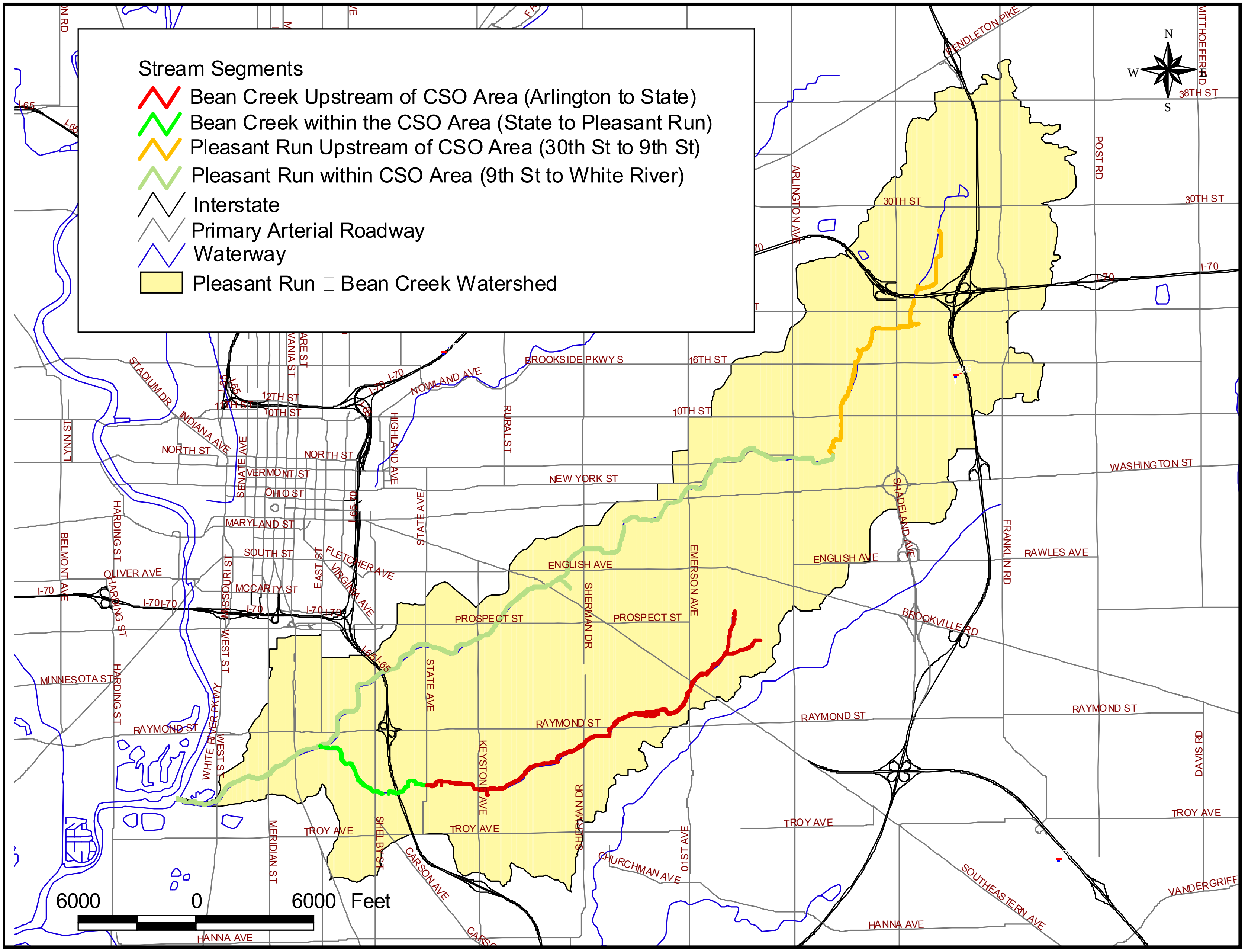


Figure 3-74: Pleasant Run Stream Segments

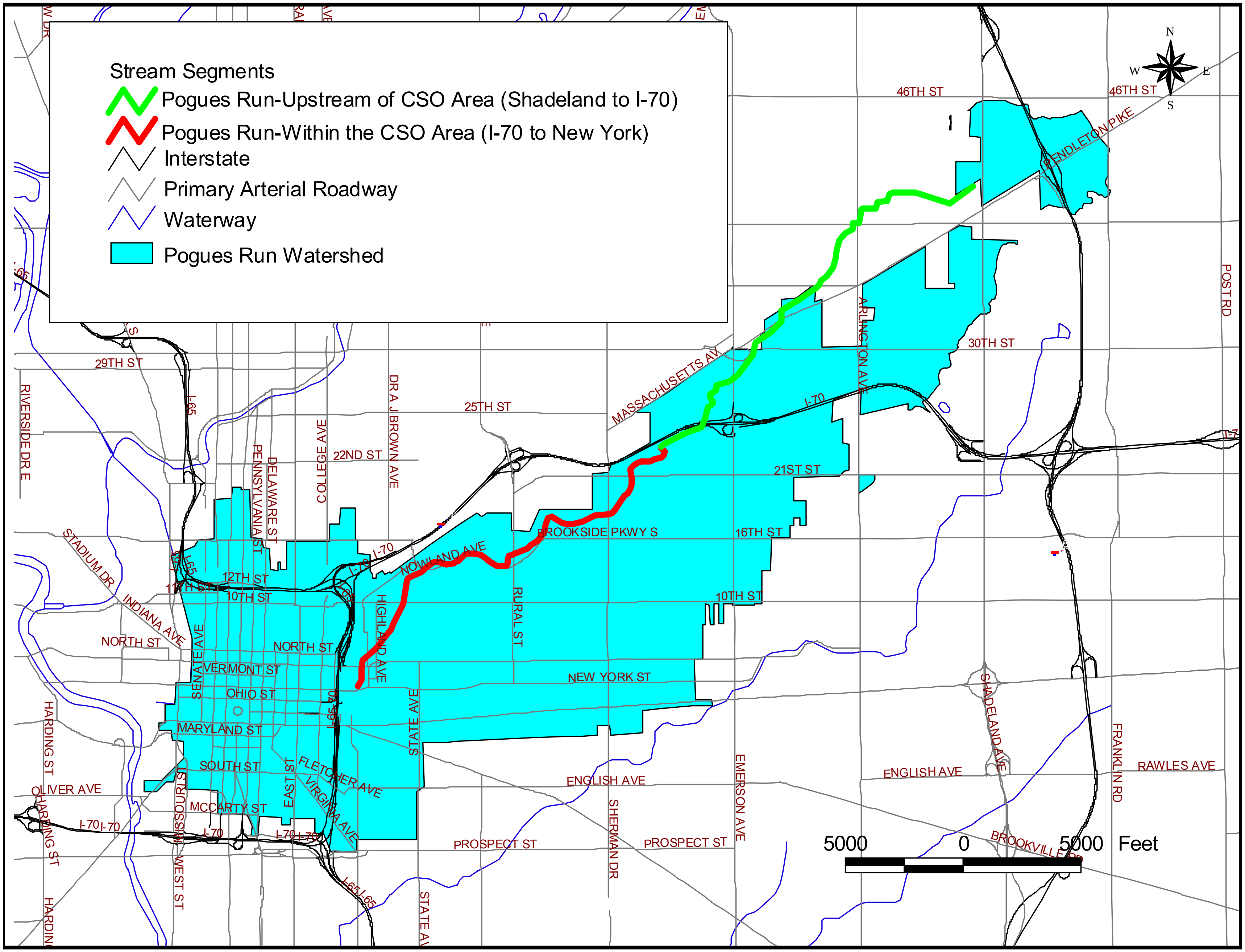


Figure 3-75: Pogues Run Stream Segments

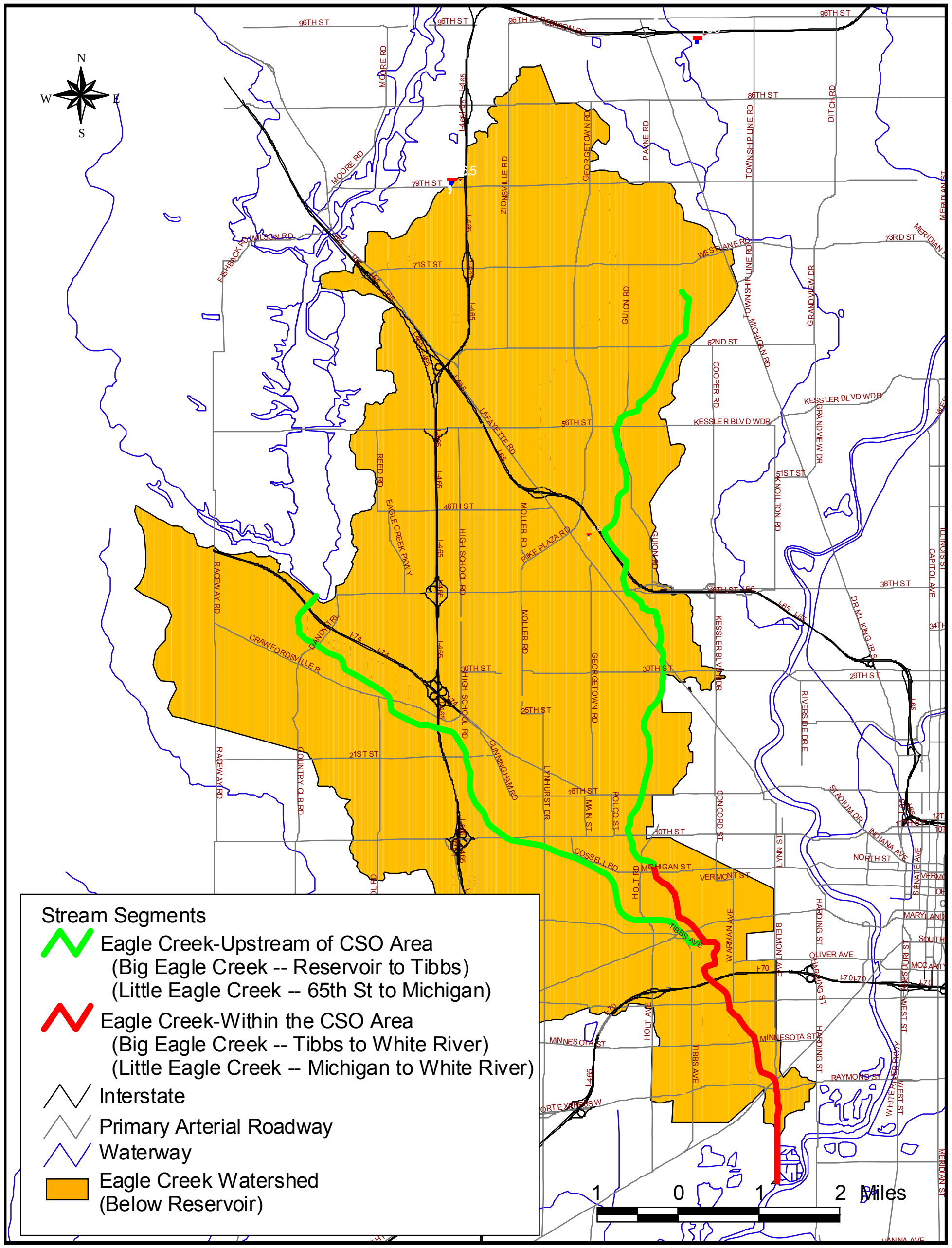


Figure 3-76: Eagle Creek Stream Segments

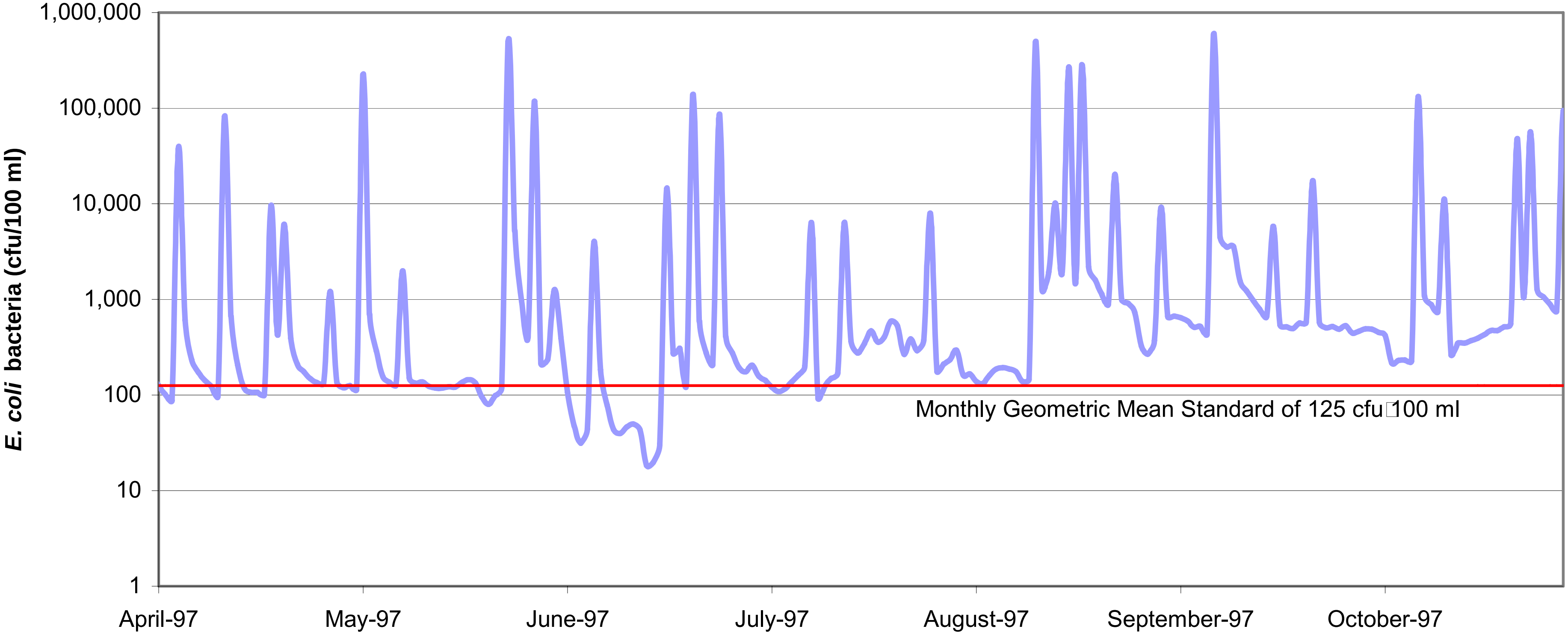


Figure 3-77
White River CSO Area Daily *E. coli* Bacteria Counts
April 1, 1997 through October 31, 1997

Table 3-1: Relationship Between 5-Day CBOD, Ultimate CBOD, and BOD Decay Rate

Ultimate Carbonaceous BOD (mg/L)	BOD Decay Rate (1/day)	5-Day Carbonaceous BOD (mg/L)	Ultimate 5-Day Ratio
1.0	0.012	0.1	16.7
5.0	0.052	1.1	4.4
10.0	0.087	3.5	2.8
12.6	0.100	5.0	2.5
15.0	0.111	6.4	2.3
20.0	0.130	9.6	2.1
25.0	0.144	12.9	1.9
30.0	0.156	16.2	1.8
35.0	0.165	19.7	1.8
40.0	0.173	23.3	1.7
45.0	0.180	26.7	1.7
50.0	0.186	30.2	1.7
55.0	0.191	33.8	1.6
65.0	0.199	40.9	1.6
75.0	0.205	48.1	1.6
85.0	0.210	55.3	1.5
95.0	0.215	62.5	1.5
105.0	0.218	69.8	1.5

TABLE 3-2 TOTAL AVERAGE *E. COLI* BACTERIA DAILY LOAD - ALL WATERSHEDS							
Watershed	Estimated Daily Failing Septic Load (cfu)	Estimated Daily Unpermitted Connection Load (cfu)	Estimated Daily Instream Wildlife Load (cfu)	Average Daily AWT Load (cfu)	Average Daily Stormwater Load (cfu)	Average Daily CSO Load (cfu)	Total Average Daily Load (cfu)
White River North	9.72E□10	1.21E□08	4.21E□11		5.24E□12		5.76E□12
White River CSO Area	1.66E□10	1.51E□07	3.44E□09	1.26E□11	7.09E□11	1.43E□14	1.44E□14
White River South	4.73E□10	1.51E□07	6.41E□11	1.60E□11	1.24E□12		2.08E□12
Fall Creek Upstream of the CSO Area	4.66E□10	1.21E□08	1.86E□10		1.42E□12		1.48E□12
Fall Creek CSO Area	0.00E□00	5.30E□07	5.81E□10		3.40E□11	1.10E□14	1.11E□14
Pleasant Run Upstream of the CSO Area	5.39E□09	5.30E□07	9.79E□08		2.56E□11		2.62E□11
Pleasant Run CSO Area	4.18E□09	6.06E□07	9.79E□08		4.35E□10	4.13E□13	4.14E□13
Pogues Run CSO Area	3.82E□09	6.06E□07	6.05E□09		8.64E□10	1.28E□14	1.28E□14
Eagle Creek CSO Area	2.18E□10	1.51E□07	5.05E□10	1.65E□10	1.11E□12	5.62E□12	6.82E□12

TABLE 3-3
COMPARISON OF OBSERVED AND MODELED *E. COLI* BACTERIA COUNTS ALL MODELED WATERSHEDS

	Geometric Mean of *E. coli* bacteria (cfu□100 mL)			□ of Days *E. coli* bacteria □235 cfu□100 ml			□of Days per year *E. coli* bacteria □10,000 cfu□100 ml		
Stream Reach	All	Dry□□	Wet□□□	All	Dry□□	Wet□□□	All	Dry□□	Wet□□□
White River-North Measured□	166	74	236	33□	19□	39□	1	0	1
White River-North Modeled	181	73	210	40□	0□	43□	0	0	0
White River-CSO Measured□	238	99	561	46□	25□	67□	3	0	3
White River-CSO Modeled	459	113	551	54□	19□	56□	37	0	37
White River-South Measured□	410	165	1159	64□	44□	86□	1	0	1
White River-South Modeled	455	166	539	56□	33□	58□	35	0	35
Fall Creek-Upstream Measured□	117	72	185	27□	11□	42□	0	0	0
Fall Creek-Upstream Modeled	139	72	169	37□	12□	41□	0	0	0
Fall Creek-CSO Measured□	295	146	552	50□	33□	65□	20	0	20
Fall Creek-CSO Modeled	372	138	487	51□	34□	54□	38	0	38
Pleasant Run-Upstream Measured□	342	267	454	59□	56□	63□	3	0	3
Pleasant Run-Upstream Modeled	368	257	443	63□	62□	64□	0	0	0
Pleasant Run-CSO Measured□	413	269	676	60□	54□	66□	19	2	17
Pleasant Run-CSO Modeled	448	259	597	60□	62□	58□	24	0	24
Pogues Run CSO Measured□	481	251	934	73□	51□	79□	8	2	7
Pogues Run CSO Modeled	478	214	919	47□	44□	48□	60	0	60
Eagle Creek CSO Measured□	419	165	1719	59□	45□	80□	2	0	2
Eagle Creek CSO Modeled	286	179	329	55□	40□	57□	11	0	11

□Measured *E. coli* bacteria counts were determined from an analysis of sampling data collected from 2000-2002.

□□The dry weather geometric mean, □ of days over 235 cfu□100 ml, and number of days per year over 10,000 cfu□100 ml are calculated for dry weather days only.

□□□The wet weather geometric mean, □ of days over 235 cfu□100 ml, and number of days per year over 10,000 cfu□100 ml are calculated for wet weather days only.

TABLE 3-4 SAMPLE OF WHITE RIVER CSO AREA DAILY *E. COLI* BACTERIA COUNTS												
Date	Average Daily Flow (cfs)	CSO Flow (cfs)	Total Flow (cfs)	Hamilton Co. Load (cfu/day)	Septic Load (cfu/day)	Unpermitted Load (cfu/day)	AWT Load (cfu/day)	Wildlife Load (cfu/day)	Stormwater Runoff Load (cfu/day)	CSO Load (cfu/day)	Total Load (cfu/day)	Resulting Concentration (cfu/100 ml)
10/1/1991	83	0	83	3.36E+11	1.34E+11	2.84E+08	1.26E+11	1.15E+11	0.00E+00	0.00E+00	7.11E+11	350
10/2/1991	67	0	67	3.36E+11	1.34E+11	2.84E+08	1.26E+11	1.15E+11	0.00E+00	0.00E+00	7.11E+11	434
10/3/1991	143	8	151	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	5.07E+12	1.98E+14	2.04E+14	55,505
10/4/1991	116	0	116	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	1.25E+12	0.00E+00	2.66E+12	939
10/5/1991	319	101	420	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	2.71E+13	2.59E+15	2.62E+15	254,814
10/6/1991	221	0	221	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	8.41E+12	0.00E+00	9.83E+12	1,818
10/7/1991	178	0	178	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	4.94E+12	0.00E+00	6.36E+12	1,460
10/8/1991	150	0	150	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	3.18E+12	0.00E+00	4.59E+12	1,251
10/9/1991	129	0	129	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	2.14E+12	0.00E+00	3.55E+12	1,126
10/10/1991	173	3	176	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	4.34E+12	6.59E+13	7.17E+13	16,689
10/11/1991	156	0	156	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	2.08E+12	0.00E+00	3.50E+12	918
10/12/1991	117	0	117	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	1.38E+12	0.00E+00	2.80E+12	979
10/13/1991	106	0	106	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	9.72E+11	0.00E+00	2.39E+12	921
10/14/1991	120	1	121	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	2.11E+12	3.62E+13	3.97E+13	13,367
10/15/1991	125	0	125	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	1.21E+12	0.00E+00	2.63E+12	859
10/16/1991	110	0	110	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	7.67E+11	0.00E+00	2.18E+12	812
10/17/1991	110	0	110	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	5.33E+11	0.00E+00	1.95E+12	725
10/18/1991	116	0	116	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	3.82E+11	0.00E+00	1.80E+12	634
10/19/1991	113	0	113	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	6.68E+11	0.00E+00	2.08E+12	754
10/20/1991	117	0	117	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	3.33E+11	0.00E+00	1.75E+12	611
10/21/1991	127	0	127	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	2.20E+11	0.00E+00	1.64E+12	527
10/22/1991	128	0	128	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	1.52E+11	0.00E+00	1.57E+12	501
10/23/1991	127	0	127	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	1.08E+11	0.00E+00	1.52E+12	491
10/24/1991	136	1035	1171	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	1.16E+11	2.67E+16	2.67E+16	930,498
10/25/1991	265	0	265	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	3.79E+13	0.00E+00	3.94E+13	6,071
10/26/1991	2540	0	2540	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	2.04E+14	0.00E+00	2.06E+14	3,308
10/27/1991	1710	0	1710	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	9.62E+13	0.00E+00	9.76E+13	2,334
10/28/1991	994	0	994	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	3.22E+13	0.00E+00	3.36E+13	1,383
10/29/1991	654	0	654	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	1.50E+13	0.00E+00	1.64E+13	1,027
10/30/1991	393	7	400	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	8.17E+12	1.82E+14	1.92E+14	19,614
10/31/1991	294	0	294	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	4.91E+12	0.00E+00	6.33E+12	880
11/1/1991	332	0	332	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	6.58E+12	0.00E+00	8.00E+12	985
11/2/1991	306	0	306	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	4.13E+12	0.00E+00	5.54E+12	740
11/3/1991	251	0	251	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	2.57E+12	0.00E+00	3.99E+12	649
11/4/1991	228	0	228	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	1.86E+12	0.00E+00	3.28E+12	588
11/5/1991	223	0	223	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	1.29E+12	0.00E+00	2.71E+12	496
11/6/1991	211	0	211	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	9.17E+11	0.00E+00	2.33E+12	452
11/7/1991	197	0	197	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	1.13E+12	7.77E+12	1.03E+13	2,138
11/8/1991	208	0	208	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	6.99E+11	0.00E+00	2.12E+12	416
11/9/1991	204	0	204	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	4.86E+11	0.00E+00	1.90E+12	381
11/10/1991	199	0	199	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	3.53E+11	0.00E+00	1.77E+12	364
11/11/1991	197	0	197	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	2.61E+11	0.00E+00	1.68E+12	348
11/12/1991	203	1	204	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	9.62E+11	2.22E+13	2.46E+13	4,933
11/13/1991	196	0	196	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	4.72E+11	0.00E+00	1.89E+12	394
11/14/1991	190	1	191	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	2.78E+11	1.39E+13	1.56E+13	3,345
11/15/1991	200	0	200	1.04E+12	1.34E+11	2.84E+08	1.26E+11	1.15E+11	5.70E+11	0.00E+00	1.99E+12	406

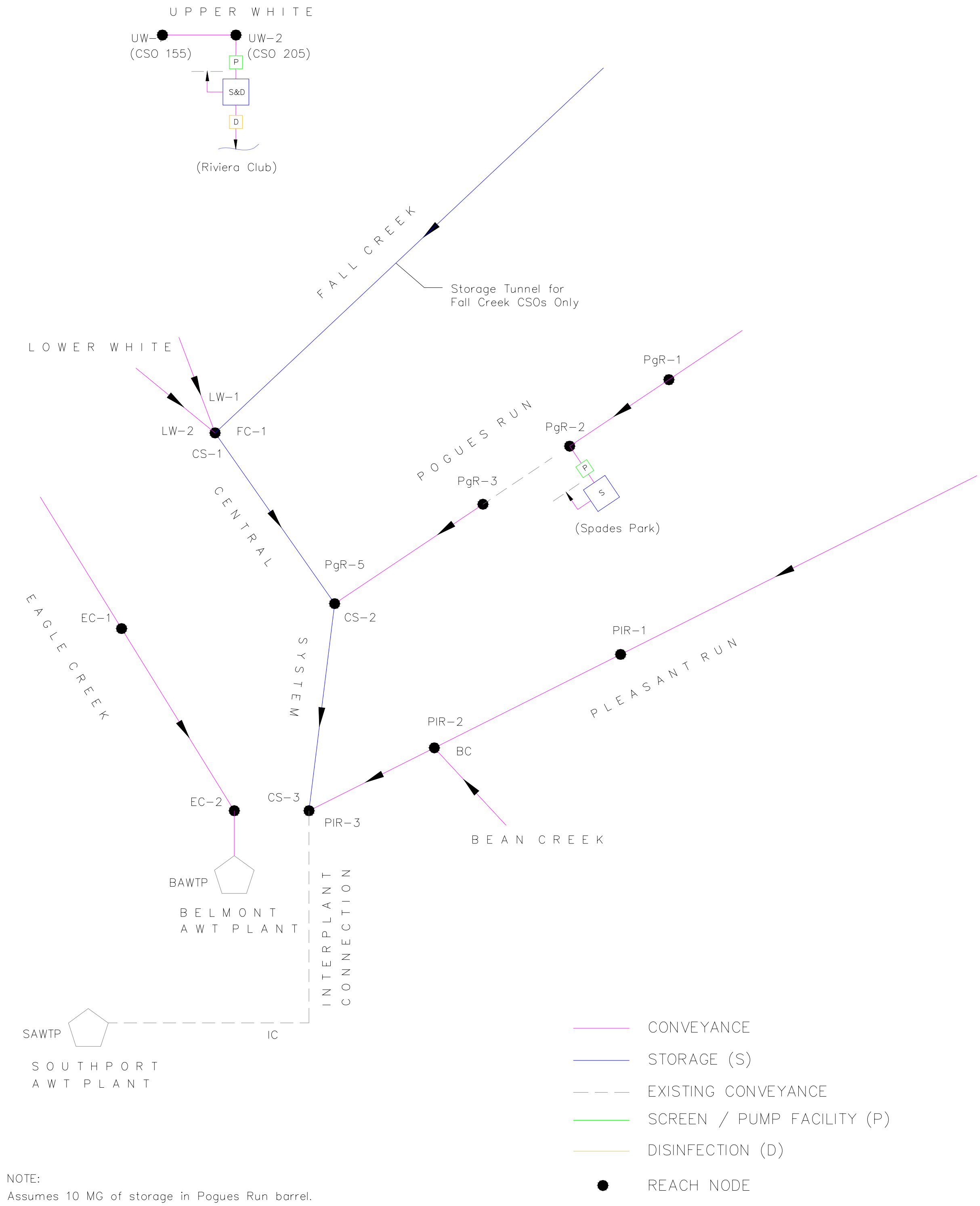


Figure 4-1
System Wide Plan 1 Schematic

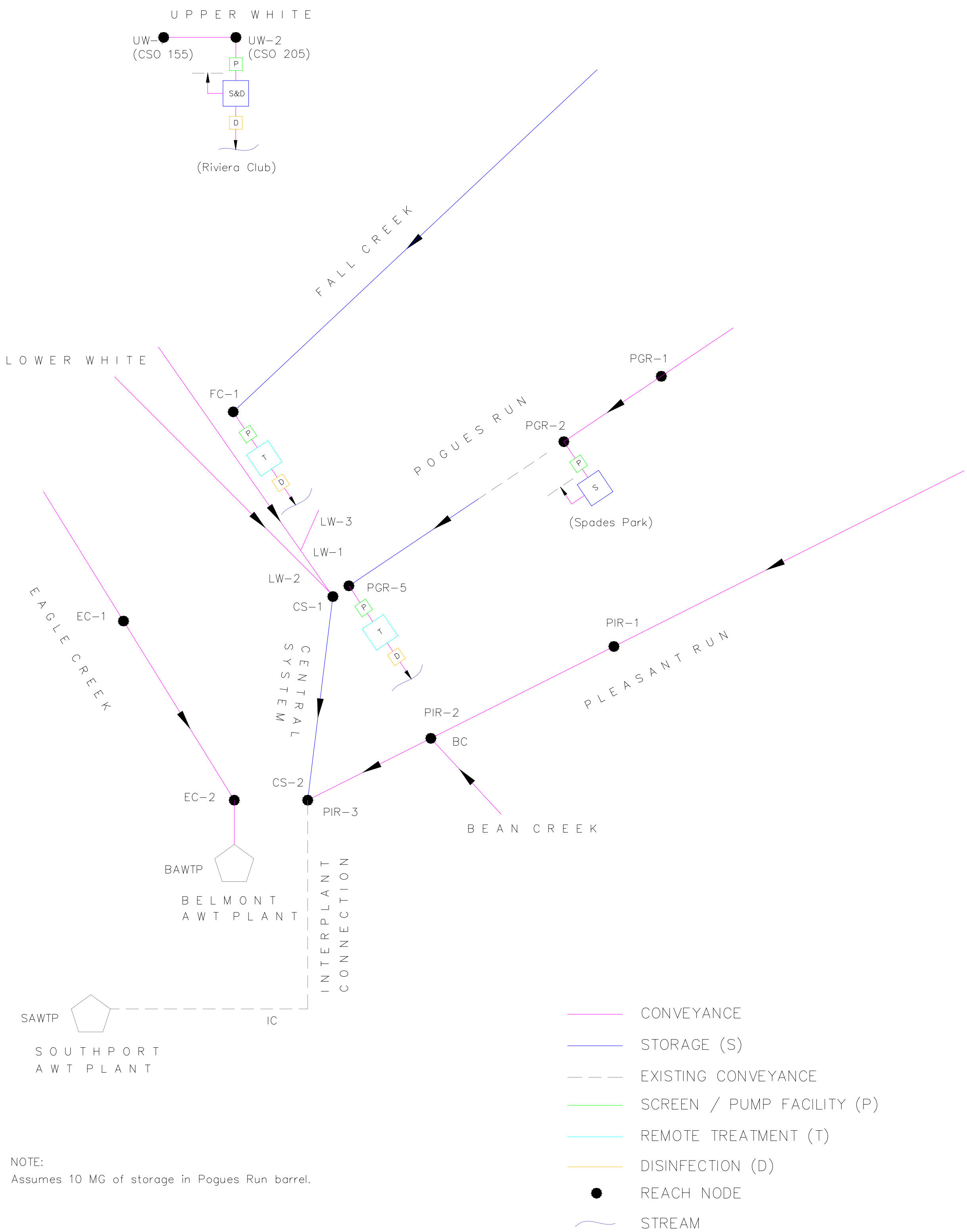


Figure 4-2
System Wide Plan 2 Schematic

Table 4-1
Existing Conditions Model Estimates of Annual Combined Sewer Overflow

Indianapolis Interceptor Systems	Number of Outfalls	Number of Regulators	Overflow Range per sub-system per year		Frequency Average per sub- system per year	Range of Annual Overflow Volume (MG/year)	Range of Combined Sewage Retained per year(%)
Upper Pleasant Run	23	23	<1	33	11	116 - 157	85 - 88
Lower Pleasant Run	9	9	<1	30	13	83 - 113	83 - 86
Relief- Pleasant Run	15	15	3	56	17	98 - 133	80 - 84
Bean Creek - Pleasant Run	4	4	<1	22	10	11 - 15	86 - 89
Pleasant Run System	51	51	<1	56	13	309 - 418	83 - 87
Upper Pogues Run	10	10	2	42	16	73 - 99	77 - 82
Upper Relief- Pogues Run	7	7	1	55	26	330 - 447	64 - 70
Lower Relief - Pogues Run	3	4	4	10	6	28 - 38	88 - 90
Combined Sewer - Pogues Run	3	3	8	83	31	509 - 689	55 - 62
Pogues Run System	23	24	1	83	19	941 - 1273	64 - 70
Upper North- Fall Creek	6	14	14	55	39	288 - 389	56 - 62
Lower North- Fall Creek	11	12	1	88	26	414 - 560	48 - 55
Upper South- Fall Creek	4	4	9	44	29	336 - 454	72 - 77
Lower South - Fall Creek	5	5	3	56	31	389 - 527	56 - 62
Fall Creek System	26	35	1	88	31	1427 - 1930	59 - 66
Belmont - Central Sub Network	7	7	<1	42	19	134 - 181	87 - 90
West Indianapolis - Central Sub Network	3	3	13	27	18	20 - 27	73 - 78
White River - Central Sub Network	5	6	16	42	31	170 - 230	91 - 93
Alder - McCarty - Central Sub Network	4	4	21	35	28	29 - 40	77 - 81
Upper - Central Sub Network	7	19	<1	48	21	174 - 235	85 - 88
Southport - Central Sub Network	4	4	3	55	27	48 - 65	83 - 87
Central Sub Network System	30	43	<1	55	24	575 - 778	87 - 90
System Relief	4	4	<1	70	37	1439 - 1946	N/A
Pleasant Run, Pogues Run,Fall Creek, System Subnetwork Total	134	157	<1	88	25	4690 - 6346	62 - 68

Note: (1) Belmont-Central Sub Network includes Eagle Creek CSOs.

(2) The Southport-Central Sub Network consists of CSOs 217, 218, 235, and 275. This subnetwork was not presented in the 2003 Control Technology Evaluation.

(3) System Relief overflow volumes have increased from the volumes presented in the 2003 Control Technology Evaluation due to refinements in the Belmont AWT Plant model representation. These refinements were incorporated during the development of the 2004 Draft Interplant Connection Facilities Plan.

(4) Upper - Central Sub Network overflow volumes have increased from the volumes presented in the 2003 Control Technology evaluation due to refinements in the representation of CSO 43. These refinements were incorporated as part of the 2004 System Wide Plan Analysis.

(5) Relief - Pleasant Run overflow volumes have increased from the volumes presented in the 2003 Control Technology evaluation due to refinements in the dry weather flow allocation to Pleasant Run. These refinements were incorporated as part of the 2004 System Wide Plan Analysis.

Table 4-2

Existing Conditions NetSTORM results for Fall Creek

Upper North - FC1						
Drainage Area ID	**Regulator Structure ID**	**Outfall ID**	**Overflows per year**		**Annual Overflow Volume Range (MG/year)**	
141	141	141	14 - 14		37	49
142	142A	142	29 - 31		36	49
063A	2001	063A	52 - 55		14	19
063	2004	063	52 - 55		151	204
216	216	216	44 - 46		45	61
064	64	064	36 - 37		5	7
FC1 Range of Values			**14**	**55**	**288**	**389**

Lower North - FC2						
Drainage Area ID	**Regulator Structure ID**	**Outfall ID**	**Overflows per year**		**Annual Overflow Volume Range (MG/year)**	
132A	132	132A	23 - 23		4	6
061	2009	061	84 - 88		254	344
050	2039	050	42 - 44		103	140
059A	2094	059A	8 - 8		1	2
052	2143	052	43 - 45		41	55
131	2145	131	21 - 22		4	5
054A	2149	054A	4 - 4		1	2
053	2151	053	5 - 6		2	3
057A	2162	057A	1 - 1		0	0
055	55	055	21 - 22		1	1
058A	58	058A	28 - 29		2	3
FC2 Range of Values			**1**	**88**	**414**	**560**

Upper South - FC3						
Drainage Area ID	**Regulator Structure ID**	**Outfall ID**	**Overflows per year**		**Annual Overflow Volume Range (MG/year)**	
103	10301	103	9 - 10		5	6
062	2196	062	22 - 23		119	161
065	2223	065	33 - 34		110	148
135	2239	135	38 - 39		77	104
066	2249	066	42 - 44		26	35
FC3 Range of Values			**9**	**44**	**336**	**454**

Lower South - FC4						
Drainage Area ID	**Regulator Structure ID**	**Outfall ID**	**Overflows per year**		**Annual Overflow Volume Range (MG/year)**	
051	2007	051	40 - 41		251	339
210	2024	210	54 - 56		66	89
213	21301	213	3 - 3		0.3	0.5
049	2048	049	18 - 19		2	2
050A	2141	050A	38 - 40		56	76
060	2184	060	33 - 34		15	20
FC4 Range of Values			**3**	**56**	**389**	**527**

Table 4-3
Existing Conditions NetSTORM results for Pleasant Run

Upper - PLR1						
Drainage Area ID	Regulator Structure ID	Outfall ID	Overflows per year		Annual Overflow Volume Range (MG/year)	
090	151	090	0 - 0		0.1	0.1
127	12701	127	4 - 4		0.2	0.2
088	152	088	1 - 1		0.1	0.1
091	153	091	8 - 8		0.3	0.5
081	154	081	0 - 0		0.1	0.1
229	159	229	3 - 3		1	1
228	160	228	0 - 0		0.1	0.1
083	161	083	0 - 0		0.1	0.1
226	162	226	0 - 0		0.1	0.1
092	5250	092	0 - 0		0.2	0.2
074	5252	074	0 - 0		0.1	0.1
075	5254	075	23 - 24		5	7
076	5256	076	29 - 30		28	37
077	5258	077	1 - 1		0.1	0.1
078	5260	078	31 - 32		11	15
079	5262	079	0 - 0		0.0	0.0
080	5264	080	29 - 30		15	20
224	5266	224	2 - 2		0.2	0.2
154	5268	154	27 - 28		9	12
084	5270	084	28 - 29		32	43
085	5272	085	23 - 23		4	5
087	5274	087	32 - 33		8	11
089	5276	089	25 - 26		2	3
086	86	086	0 - 0		0.1	0.1
PLR1 Range of Values			**<1**	**33**	**116**	**157**

Lower - PLR2						
Drainage Area ID	Regulator Structure ID	Outfall ID	Overflows per year		Annual Overflow Volume Range (MG/year)	
031	148	031	4 - 4		1	2
030	172	030	0 - 0		0	0
227	22701	227	29 - 30		1	1
120	5037	120	24 - 25		31	42
130	5039	130	1 - 1		0	0
022	5164	022	12 - 12		11	15
149	5166	149	8 - 9		20	27
119	5168	119	11 - 12		14	19
027	5170	027	4 - 4		1	2
108	5174	108	26 - 27		4	5
PLR2 Range of Values			**<1**	**30**	**84**	**113**

Table 4-3
Existing Conditions NetSTORM results for Pleasant Run (continued)

Relief - PLR3				
Drainage Area ID	Regulator Structure ID	Outfall ID	Overflows per year	Annual Overflow Volume Range (MG/year)
148	145	148	22 - 23	1 2
020	146	020	13 - 13	1 1
151	147	151	42 - 44	6 9
072	150	072	4 - 4	0 0
106	157	106	6 - 6	1 1
109	164	109	3 - 3	0 0
073	5018	073	27 - 28	9 13
150	5021	150	56 - 56	23 31
019	5063	019	3 - 3	1 1
021	5065	021	28 - 29	35 48
028	5122	028	10 - 10	2 3
023	5124	023	7 - 7	2 3
025	5176	025	10 - 10	3 4
029	5196	029	6 - 6	1 1
107	5198	107	11 - 11	13 18
PLR3 Range of Values			**3 56**	**98 133**

Bean Creek - PLR4				
Drainage Area ID	Regulator Structure ID	Outfall ID	Overflows per year	Annual Overflow Volume Range (MG/year)
016	16	016	21 - 22	6 9
018	163	018	0 - 0	0 0
017	5162	017	8 - 9	0 1
015	5194	015	10 - 11	4 6
PLR4 Range of Values			**<1 22**	**11 15**

Note: (1) Relief - Pleasant Run overflow volumes have increased from the volumes presented in the 2003 Control Technology evaluation due to refinements in the dry weather flow allocation to Pleasant Run. These refinements were incorporated as part of the 2004 System Wide Plan Analysis.

Table 4-4

Existing Conditions NetSTORM results for Pogues Run

Upper - PGR1							
Drainage Area ID	Regulator Structure ID	Outfall ID	Overflows per year			Annual Overflow Volume Range (MG/year)	
138A	1001	138A	28	-	29	41	55
102	1120	102	6	-	7	3	3
O95	1148	O95	2	-	2	1	2
O98	1150	O98	2	-	2	0	0
100	1152	100	40	-	42	24	32
137	1155	137	5	-	5	0	0
136	1157	136	12	-	13	1	1
O96	1182	O96	24	-	25	1	2
O36	36	O36	16	-	17	1	1
O97	97	O97	17	-	18	2	2
PGR1 Range of Values			**2**		**42**	**73**	**99**

Upper Relief - PGR2							
Drainage Area ID	Regulator Structure ID	Outfall ID	Overflows per year			Annual Overflow Volume Range (MG/year)	
143	1030	143	1	-	1	0	0
133	1122	133	13	-	13	4	6
152	1124	152	48	-	50	77	104
O34	1127	O34	19	-	20	56	76
101	1146	101	10	-	11	14	19
O99	1160	O99	53	-	55	155	210
O35	35	35	31	-	33	24	32
PGR2 Range of Values			**1**		**55**	**330**	**447**

Lower Relief - PGR3							
Drainage Area ID	Regulator Structure ID	Outfall ID	Overflows per year			Annual Overflow Volume Range (MG/year)	
129	1042	129	4	-	4	2	2
125	1044	125	9	-	10	26	35
138	1049	138	4	-	4	0	1
PGR3 Range of Values			**4**		**10**	**28**	**38**

Combined Sewer - PGR4							
Drainage Area ID	Regulator Structure ID	Outfall ID	Overflows per year			Annual Overflow Volume Range (MG/year)	
128	1028	128	33	-	34	130	176
128	1177	128	0	-	0	1	1
153	153	153	8	-	8	0	0
115	4357	115	79	-	83	378	512
PGR4 Range of Values			**8**		**83**	**509**	**689**

Table 4-5
Existing Conditions NetSTORM results for the Central Sub-Network

Belmont - CSN1						
Drainage Area ID	**Regulator Structure ID**	**Outfall ID**	**Overflows per year**		**Annual Overflow Volume Range (MG/year)**	
032	223	032	26 - 27		39	53
033	33	033	34 - 36		12	16
032	4213	032	0 - 0		0	0
011	4254	011	17 - 18		6	8
042	4268	042	40 - 42		57	77
046	4307	046	6 - 6		0.3	0.3
045	45	045	24 - 25		19	26
CSN1 Range of Values			**<1**	**42**	**134**	**181**

West Indianapolis - CSN2						
Drainage Area ID	**Regulator Structure ID**	**Outfall ID**	**Overflows per year**		**Annual Overflow Volume Range (MG/year)**	
040	4056	040	13 - 14		2	3
041	4160	041	26 - 27		18	24
147	4231	147	13 - 13		0.2	0.2
CSN2 Range of Values			**13**	**27**	**20**	**27**

White River - CSN3						
Drainage Area ID	**Regulator Structure ID**	**Outfall ID**	**Overflows per year**		**Annual Overflow Volume Range (MG/year)**	
039	4001	039	39 - 41		111	151
037	4012	037	16 - 17		13	17
116	4288	116	40 - 42		39	53
038	4359	038	31 - 32		7	9
CSN3 Range of Values			**16**	**42**	**170**	**230**

Table 4-5

Existing Conditions NetSTORM results for the Central Sub-Network (continued)

Alder-McCarty - CSN4				
Regulator Structure ID	Outfall ID	Overflows per year	Annual Overflow Volume Range (MG/year)	
4221	012	34 - 35	8	11
4223	013	21 - 22	21	29
Range of Values		21 35	29	40

Upper - CSN5				
Regulator Structure ID	Outfall ID	Overflows per year	Annual Overflow Volume Range (MG/year)	
155A	155	7 - 8	14	20
155B	155	27 - 28	34	45
156	156	3 - 3	0.3	0.3
205	205	42 - 44	16	22
4318	043	46 - 48	108	146
4355	044	0 - 0	0.1	0.1
Range of Values		<1 48	174	235

Southport System CSOs - CSNB				
Regulator Structure ID	Outfall ID	Overflows per year	Annual Overflow Volume Range (MG/year)	
21701	217	5 - 6	1	1
21801	218	53 - 55	34	46
23501	235	47 - 49	11	15
27501	275	3 - 3	2	3
Range of Values		3 55	48	65

nt-Central Sub Network includes Eagle Creek CSOs.

outhport-Central Sub Network consists of CSOs 217, 218, 235, and 275. This subnetwork
t presented in the 2003 Control Technology Evaluation.

- Central Sub Network overflow volumes have increased from the volumes presented
2003 Control Technology evaluation due to refinements in the representation of CSO 43.
refinements were incorporated as part of the 2004 System Wide Plan Analysis.

Table 4-6
Existing Conditions NetSTORM results for System Relief

System Relief						
Drainage Area ID	**Regulator Structure ID**	**Outfall ID**	**Overflows per year**		**Annual Overflow Volume Range (MG/year)**	
008	008A	008	67 - 70		838	1,133
117	5003	117	25 - 26		141	190
118	4250	118	51 - 54		461	623
145	4015	145	0 - 0		0	0
System Relief Range of Values			**<1**	**70**	**1,439**	**1,947**

Note: (1) System Relief overflow volumes have increased from the volumes presented in the 2003 Control Technology Evaluation due to refinements in the Belmont AWT Plant model representation. These refinements were incorporated during the development of the 2004 Draft Interplant Connection Facilities Plan.

Table 4-9
System Wide Plan 1 Facility Sizes

LTCP SYSTEM-WIDE ANALYSIS: Storage/Conveyance in All Watersheds
System Data - Flowrate/Volume To Size and Cost Facilities
Control 008 via Headworks (limited to 160 MG) expansion & Routing 008 to Storage Tunnel

FALL CREEK

	Untreated Overflows Per Year				
Volume (MG)	**12**	**6**	**4**	**2**	**0.5**
V_{FC-1}	40	62	76	110	162

POGUES RUN

	Untreated Overflows Per Year				
Flowrate (MGD)	**12**	**6**	**4**	**2**	**0.5**
Q_{PgR-1}	0	2	14	40	100
Q_{PgR-2}	50	100	125	210	400

Flowrate is **not** cumulative.

	Untreated Overflows Per Year				
Volume (MG)	**12**	**6**	**4**	**2**	**0.5**
V_{PgR-1}	0	0.5	1	2.5	6
V_{PgR-2}	4	7	8.5	12	20
$V_{PgR-TOTAL}$	4	7.5	9.5	14.5	26

	Untreated Overflows Per Year				
Flowrate (MGD)	**12**	**6**	**4**	**2**	**0.5**
Q_{PgR-3}	0	0	0	0	0
Q_{PgR-5}	125	300	500	800	1400

PLEASANT RUN

	Untreated Overflows Per Year				
Flowrate (MGD)	**12**	**6**	**4**	**2**	**0.5**
Q_{PlR-1}	35	90	120	189	331
Q_{PlR-2}	60	185	260	385	736
Q_{PlR-3}	105	260	355	500	919

BEAN CREEK

	Untreated Overflows Per Year				
Flowrate (MGD)	**12**	**6**	**4**	**2**	**0.5**
Q_{BW}	3	10	15	25	55

EAGLE CREEK

	Untreated Overflows Per Year				
Flowrate (MGD)	**12**	**6**	**4**	**2**	**0.5**
Q_{EC-1}	45	80	100	140	220
Q_{EC-2}	45	80	100	140	220

UPPER WHITE

	Untreated Overflows Per Year				
Flowrate (MGD)	**12**	**6**	**4**	**2**	**0.5**
Q_{UW-1}	17	35	65	120	200

	Untreated Overflows Per Year				
Volume (MG)	**12**	**6**	**4**	**2**	**0.5**
V_{UW-2}	1	1	1.1	2	3.5

	Untreated Overflows Per Year				
Screening & Disinfection (MGD)	**12**	**6**	**4**	**2**	**0.5**
Q_{UW-2}	2	25	53	96	168

LOWER WHITE

	Untreated Overflows Per Year				
Flowrate (MGD)	**12**	**6**	**4**	**2**	**0.5**
Q_{LW-1}	40	65	90	135	241
Q_{LW-2}	35	55	80	115	200

Flowrate is **not** cumulative.

CENTRAL SYSTEM

	Untreated Overflows Per Year				
Volume (MG)	**12**	**6**	**4**	**2**	**0.5**
V_{CS-2}	0.5	1	1.5	10	32
V_{CS-3}	20	66	112	190	310
$V_{CS-TOTAL}$	20.5	67	113.5	200	342

	Untreated Overflows Per Year				
Flowrate (MGD)	**12**	**6**	**4**	**2**	**0.5**
Q_{CS-1}	80	130	170	120	97
Q_{CS-2}	185	180	175	165	185

TUNNEL STATISTICS -- FALL CREEK AND CENTRAL SYSTEM

	Untreated Overflows Per Year				
	12	**6**	**4**	**2**	**0.5**
TOTAL VOLUME (MG)	61	129	190	310	504
Dewatering Time (Days)	0.3	0.7	1.1	1.9	2.7

NOTES:
Flowrate **is** cumulative except where noted.
Storage volume is **not** cumulative.

Table 4-9
System Wide Plan 1 Facility Sizes (continued)

LTCP SYSTEM-WIDE ANALYSIS: Storage/Conveyance in All Watersheds
AWT Plants and Interplant Connection Data
Control 008 via Headworks (limited to 160 MG) expansion & Routing 008

B E L M O N T A W T P L A N T

Headworks Expansion (MGD)	Untreated Overflows Per Year				
	12	6	4	2	0.5
Q_{BHEAD}	160	160	160	160	160

AWT & 2ndary Treatment (MGD)	Untreated Overflows Per Year				
	12	6	4	2	0.5
Q_{BAWTP}	300	300	300	300	300

Storage Volume (I	Untreated Overflows Per Year				
	12	6	4	2	0.5
V_{BAWTP}	34	34	34	34	34

008 Consolidation Sewers to Central Tunnel (MGD)	Untreated Overflows Per Year				
	12	6	4	2	0.5
$Q_{90"SWD}$	0	54	97	102	102
Q_{008}	0	0	0	130	300

008 Overflow Frequency	Untreated Overflows Per Year				
	12	6	4	2	0.5
Events per Year	12	6	4	2	0.5

S O U T H P O R T A W T P L A N T

Headworks Flowrate (MGD)	Untreated Overflows Per Year				
	12	6	4	2	0.5
Q_{SAWTP}	350	350	350	350	350

AWT Flowrate (MGD)	Untreated Overflows Per Year				
	12	6	4	2	0.5
Q_{SAWTP}	300	300	300	300	300

Storage Volume (MG)	Untreated Overflows Per Year				
	12	6	4	2	0.5
V_{SAWTP}	25	25	25	25	25

HRT or Settling/Disinfection (MGD)	Untreated Overflows Per Year				
	12	6	4	2	0.5
Q_{SHRT}	0	0	0	0	75

I N T E R P L A N T C O N N E C T I O N

Flowrate (MGD)	Untreated Overflows Per Year				
	12	6	4	2	0.5
Q_{IC}	185	180	175	165	185

Table 4-9
System Wide Plan 1 Facility Sizes (continued)

Fall Creek

Note: (1) All model simulations assume 20-year dry weather flow projections as documented in the Draft Interplant Connection Facilities Plan (ICST, 2004).

(2) All model simulations include representation of EAP's at CSOs 53, 58, 63, 63A, 65, and 103.

Pleasant Run

Note: (1) All model simulations assume 20-year dry weather flow projections as documented in the Draft Interplant Connection Facilities Plan (ICST, 2004).

(2) All model simulations include representation of EAP's at CSOs 17, 80, and 84.

(3) Reach 3 Interceptor capacity includes Bean Creek CSOs 15 and 16

Pogues Run

Note: (1) All model simulations assume 20-year dry weather flow projections as documented in the Draft Interplant Connection Facilities Plan (ICST, 2004).

(2) All model simulations include representation of the following EAP's: CSO 143 Separation, CSO 101 Inflatable Dam, Upper Storage Tank □ Consolidation Sewer, CSO 34□35 Consolidation Sewer, and 10 MG of storage in the North Barrel of the PGR Box.

(3) Average Annual OF volume has increased from prior analyses due to the 20-year ADWF, and the assumptions made regarding the CSO 34□99 Diversion structure.

(4) Storage Volumes in Reach 1 are in addition to 0.4 MG in the CSO 101 Inflatable Dam. No additional volume is needed at 12 OF□yr.

(5) Reach 5 assumes that flow is stored first in the PGR and conveyed second. The new conveyance rates for Reach 5 represent an increase from prior model submittals due to this change in operational strategy. Conveyance capacity includes Reach 4 CSOs.

(6) Storage Volumes and Consolidation Sewer Capacities in Reach 2 assume that 50□ of the wet-weather flow in CSO 34's basin is diverted to CSO 99.

(7) Reach 3 is the CSO 34□35 Consolidation Sewer -- 457 MGD Capacity. No additional conveyance or storage is required.

(8) Storage Volumes presented in Reach 2 represent the total storage volume, not the additive volume to the EAP facility size.

Eagle Creek

Note: (1) All model simulations assume 20-year dry weather flow projections as documented in the Draft Interplant Connection Facilities Plan (ICST, 2004).

(2) All model simulations include representation of the Belmont North □ West Cut-Off Sewer. The Cut-Off Sewer is assumed to convey 50□ of its flow to the Eagle Creek Relief Interceptor.

(3) Reach 1 and Reach 2 conveyance capacities are identical, as the majority of the wet-weather flow in Eagle Creek is allocated to Reach 1.

(4) All model simulations assume a 164 MGD Belmont North □ West Cut-Off Sewer. The assumptions and capacity of the Cut-Off Sewer will be refined during the Belmont North Capacity Management study by ACE.

White River

Note: (1) All model simulations assume 20-year dry weather flow projections as documented in the Draft Interplant Connection Facilities Plan (ICST, 2004).

(2) Tunnel Dewatering is set to maximize available AWT capacity at the Southport AWT Plant.

(3) Storage Tunnel is dewatered to the Southport AWT Plant via the Interplant Connection Sewer.

(4) Southport's capacity is a function of both treatment and equalization storage volume. Flow from the interplant connection is routed to the 25 MG of equalization storage at all levels of control to ensure maximization of available storage. At higher levels of control, the volume that is captured by the tunnel and dewatered to the SAWTP increases. Therefore, the peak flow rate from the interplant connection is reduced at higher levels of control to ensure that the captured volume from a single CSO event does not exceed the 25 MG of available equalization storage at the SAWTP. The dewatering rate increases at 0.5 OF□yr due to the addition of 75 MGD HRT at the SAWTP.

(5) Storage Tunnel is dewatered in more than two days at 0.5 OF□yr to offset the additional flow the SAWTP receives from the Central System Tunnel. Additional equalization storage at the SAWTP with 75 MGD HRT is required to dewater the tunnel in 2 days.

(6) All model simulations include representation of the following EAP's: CSO 46 Separation, CSO 39 Storage Tank, Riviera Storage Tank, CSO 275 Elimination, and the CSO 118 Inflatable Dam.

(7) Nominal Storage volumes in CS-1 for 12 OF□yr through 4 OF□yr imply that the reach serves as conveyance.

(8) Screening □ Disinfection at UW-2 is required in addition to storage for each level of control. Per the direction of ICST, additional storage beyond the existing 1.0 MG is allocated for 4 OF□yr through 0.5 OF□yr. Storage is sized to maintain a residence time of 30 minutes.

(9) All model simulations assume 20-year projected rainfall dependant inflow □ infiltration (RDII) flows in the South Marion County Interceptor, which is tributary to the Southport AWT Plant. The representation was determined per the Draft South Marion County Model Expansion Report (CDM, 2004).

(10) BAWTP Headworks expansion is in addition to the existing 300 MGD Headworks capacity.

(11) 008 is connected to the Central Tunnel at two places. The first connection ($Q_{90"SWD}$) is from the Southwest Diversion Structure. The second connection (Q_{008}) is from the outfall structure at the BAWTP.

Table 4-10
System Wide Plan 2 Facility Sizes

LTCP SYSTEM-WIDE ANALYSIS: Remote Treatment in Fall Creek/Pogues
System Data - Flowrate/Volume To Size and Cost Facilities
Limit Belmont Headworks Expansion to 160 MGD, Control 008 with Centı

F A L L C R E E K

	Untreated Overflows Per Year				
Volume (MG)	**12**	**6**	**4**	**2**	**0.5**
V_{FC-1}	40	62	76	110	162

Remote Treatment Facility (MGD)	**Untreated Overflows Per Year**				
	12	**6**	**4**	**2**	**0.5**
Q_{FC-1}	20	31	38	55	81

P O G U E S R U N

	Untreated Overflows Per Year				
Flowrate (MGD)	**12**	**6**	**4**	**2**	**0.5**
Q_{PgR-1}	0	2	14	40	100
Q_{PgR-2}	50	100	125	210	400

□Flowrate is **not** cumulative.

	Untreated Overflows Per Year				
Volume (MG)	**12**	**6**	**4**	**2**	**0.5**
V_{PgR-1}	0	0.5	1	2.5	6
V_{PgR-2}	4	7	8.5	12	20
$V_{PgR-1□2}$	4	7.5	9.5	14.5	26

	Untreated Overflows Per Year				
Volume (MG)	**12**	**6**	**4**	**2**	**0.5**
V_{PgR-5}	20	33	43	66	100

Remote Treatment Facility (MGD)	**Untreated Overflows Per Year**				
	12	**6**	**4**	**2**	**0.5**
Q_{PGR-1}	10	17	22	33	50

P L E A S A N T R U N

	Untreated Overflows Per Year				
Flowrate (MGD)	**12**	**6**	**4**	**2**	**0.5**
Q_{PlR-1}	35	90	120	189	331
Q_{PlR-2}	60	185	260	385	736
Q_{PlR-3}	105	260	355	500	919

B E A N C R E E K

	Untreated Overflows Per Year				
Flowrate (MGD)	**12**	**6**	**4**	**2**	**0.5**
Q_{BW}	3	10	15	25	55

E A G L E C R E E K

	Untreated Overflows Per Year				
Flowrate (MGD)	**12**	**6**	**4**	**2**	**0.5**
Q_{EC-1}	45	80	100	140	220
Q_{EC-2}	45	80	100	140	220

U P P E R W H I T E

	Untreated Overflows Per Year				
Flowrate (MGD)	**12**	**6**	**4**	**2**	**0.5**
Q_{UW-1}	17	35	65	120	200

	Untreated Overflows Per Year				
Volume (MG)	**12**	**6**	**4**	**2**	**0.5**
V_{UW-2}	1	1	1.1	2	3.5

Screening & Disinfection (MGD)	**Untreated Overflows Per Year**				
	12	**6**	**4**	**2**	**0.5**
Q_{UW-2}	2	25	53	96	168

L O W E R W H I T E

	Untreated Overflows Per Year				
Flowrate (MGD)	**12**	**6**	**4**	**2**	**0.5**
Q_{LW-1}	40	65	90	135	241
Q_{LW-2}	35	55	80	115	200
Q_{LW-3}	0	22	32	65	110

□Flowrate is **not** cumulative.

C E N T R A L S Y S T E M

	Untreated Overflows Per Year				
Volume (MG)	**12**	**6**	**4**	**2**	**0.5**
V_{CS-2}	8	32.5	52	94.5	182
Dewatering Time (Days)	0.0	0.2	0.3	0.5	1.1

	Untreated Overflows Per Year				
Flowrate (MGD)	**12**	**6**	**4**	**2**	**0.5**
Q_{CS-1}	73	110	150	175	170
Q_{CS-2}	210	185	180	175	170

NOTES:
Flowrate **is** cumulative except where noted.
Storage volume is **not** cumulative.

Table 4-10
System Wide Plan 2 Facility Sizes (continued)

LTCP SYSTEM-WIDE ANALYSIS: Remote Treatment in Fall Creek/Pogues
AWT Plants and Interplant Connection Data
Limit Belmont Headworks Expansion to 160 MGD, Control 008 with Centı

BELMONT AWT PLANT

Headworks Expansion (MGD)	Untreated Overflows Per Year				
	12	6	4	2	0.5
Q_{BHEAD}	160	160	160	160	160

AWT & 2ndary Treatment (MGD)	Untreated Overflows Per Year				
	12	6	4	2	0.5
Q_{BAWTP}	300	300	300	300	300

Storage Volume (I	Untreated Overflows Per Year				
	12	6	4	2	0.5
V_{BAWTP}	34	34	34	34	34

008 Consolidation Sewers to Central Tunnel (MGD)	Untreated Overflows Per Year				
	12	6	4	2	0.5
$Q_{90"SWD}$	0	54	97	102	102
Q_{008}	0	0	0	130	300

008 Overflow Frequency	Untreated Overflows Per Year				
	12	6	4	2	0.5
Events per Year	12	6	4	2	0.5

SOUTHPORT AWT PLANT

Headworks Flowrate (MGD)	Untreated Overflows Per Year				
	12	6	4	2	0.5
Q_{SAWTP}	350	350	350	350	350

AWT Flowrate (MGD)	Untreated Overflows Per Year				
	12	6	4	2	0.5
Q_{SAWTP}	300	300	300	300	300

Storage Volume (MG)	Untreated Overflows Per Year				
	12	6	4	2	0.5
V_{SAWTP}	25	25	25	25	25

HRT or Settling/Disinfection (MGD)	Untreated Overflows Per Year				
	12	6	4	2	0.5
Q_{SHRT}	0	0	0	0	0

INTERPLANT CONNECTION

Flowrate (MGD)	Untreated Overflows Per Year				
	12	6	4	2	0.5
Q_{IC}	210	185	180	175	170

Table 4-10
System Wide Plan 2 Facility Sizes (continued)

Fall Creek

Note: (1) All model simulations assume 20-year dry weather flow projections as documented in the Draft Interplant Connection Facilities Plan (ICST, 2004).

(2) All model simulations include representation of EAP's at CSOs 53, 58, 63, 63A, 65, and 103.

Pleasant Run

Note: (1) All model simulations assume 20-year dry weather flow projections as documented in the Draft Interplant Connection Facilities Plan (ICST, 2004).

(2) All model simulations include representation of EAP's at CSOs 17, 80, and 84.

(3) Reach 3 Interceptor capacity includes Bean Creek CSOs 15 and 16

Pogues Run

Note: (1) All model simulations assume 20-year dry weather flow projections as documented in the Draft Interplant Connection Facilities Plan (ICST, 2004).

(2) All model simulations include representation of the following EAP's: CSO 143 Separation, CSO 101 Inflatable Dam, Upper Storage Tank □ Consolidation Sewer, CSO 34□35 Consolidation Sewer, and 10 MG of storage in the North Barrel of the PGR Box.

(3) Average Annual OF volume has increased from prior analyses due to the 20-year ADWF, and the assumptions made regarding the CSO 34□99 Diversion structure.

(4) Storage Volumes in Reach 1 are in addition to 0.4 MG in the CSO 101 Inflatable Dam. No additional volume is needed at 12 OF□yr.

(5) Up to 10 MG of the storage volume in Reaches 4 and 5 could be provided by the North Barrel of the PGR Box.

(6) Storage Volumes and Consolidation Sewer Capacities in Reach 2 assume that 50□ of the wet-weather flow in CSO 34's basin is diverted to CSO 99.

(7) Reach 3 is the CSO 34□35 Consolidation Sewer -- 457 MGD Capacity. No additional conveyance or storage is required.

(8) Storage Volumes presented in Reach 2 represent the total storage volume, not the additive volume to the EAP facility size.

Eagle Creek

Note: (1) All model simulations assume 20-year dry weather flow projections as documented in the Draft Interplant Connection Facilities Plan (ICST, 2004).

(2) All model simulations include representation of the Belmont North □ West Cut-Off Sewer. The Cut-Off Sewer is assumed to convey 50□ of its flow to the Eagle Creek Relief Interceptor.

(3) Reach 1 and Reach 2 conveyance capacities are identical, as the majority of the wet-weather flow in Eagle Creek is allocated to Reach 1.

(4) All model simulations assume a 164 MGD Belmont North □ West Cut-Off Sewer. The assumptions and capacity of the Cut-Off Sewer will be refined during the Belmont North Capacity Management study by ACE.

White River

Note: (1) All model simulations assume 20-year dry weather flow projections as documented in the Draft Interplant Connection Facilities Plan (ICST, 2004).

(2) Tunnel Dewatering is set to maximize available AWT capacity at the Southport AWT Plant.

(3) Storage Tunnel is dewatered to the Southport AWT Plant via the Interplant Connection Sewer.

(4) Southport's capacity is a function of both treatment and equalization storage volume. Flow from the interplant connection is routed to the 25 MG of equalization storage at all levels of control to ensure maximization of available storage. At higher levels of control, the volume that is captured by the tunnel and dewatered to the SAWTP increases. Therefore, the peak flow rate from the interplant connection is reduced at higher levels of control to ensure that the captured volume from a single CSO event does not exceed the 25 MG of available equalization storage at the SAWTP.

(5) All model simulations include representation of the following EAP's: CSO 46 Separation, CSO 39 Storage Tank, Riviera Storage Tank, CSO 275 Elimination, and the CSO 118 Inflatable Dam.

(6) Screening □ Disinfection at UW-2 is required in addition to storage for each level of control. Per the direction of ICST, additional storage beyond the existing 1.0 MG is allocated for 4 OF□yr through 0.5 OF□yr. Storage is sized to maintain a residence time of 30 minutes.

(7) All model simulations assume 20-year projected rainfall dependant inflow □ infiltration (RDII) flows in the South Marion County Interceptor, which is tributary to the Southport AWT Plant. The representation was determined per the Draft South Marion County Model Expansion Report (CDM, 2004).

(8) BAWTP Headworks expansion is in addition to the existing 300 MGD Headworks capacity.

(9) 008 is connected to the Central Tunnel at two places. The first connection ($Q_{90"SWD}$) is from the Southwest Diversion Structure. The second connection (Q_{008}) is from the outfall structure at the BAWTP.

Table 4-11
Summary of Watershed Improvement Projects for Systemwide Plans 1 and 2

Project Name	Quantity/Size	DO Benefit	*E. coli* bacteria Benefit
Accelerated Septic Removal	N/A	N/A	Dry-weather load reduction
Stormwater BMP/CIP's	N/A	N/A	Wet-weather load reduction
Streambank Restoration / Sediment Removal	N/A	Improved stream hydraulics	N/A
Unpermitted connection removal	N/A	N/A	Dry-weather load reduction
Fall Creek Flow Augmentation	2.5 MGD	Not sufficient for compliance	Dry-weather compliance (10% over 235)
Fall Creek Dam Removal	N/A	Compliance at 6 OF/yr -- Plan 1 for Fall Creek	N/A
Fall Creek Temporary Aeration	N/A	Compliance at 12 OF/yr -- Plan 1, with Dam Removal for Fall Creek	N/A
Pleasant Run Flow Augmentation	0.1 MGD	N/A	Dry-weather compliance (10% over 235)
Pogues Run Flow Augmentation	0.5 to 2.0 MGD	N/A	Dry-weather compliance (10% over 235)
Eagle Creek Flow Augmentation	2.25 MGD	N/A	Dry-weather compliance (10% over 235)
White River Stout Dam Modification	N/A	N/A	N/A
White River Chevy Dam Permanent Aeration	N/A	N/A	N/A
White River Temporary Aeration	N/A	N/A	N/A

Note: (1) All flow augmentation quanities were determined in the 2003 Watershed Alternative Evaluation, for *E. coli* bacteria dry-weather compliance. The compliance is for the individual watershed.

(2) Fall Creek Dam Removal and Temporary Aeration were evaluated in the 2003 Watershed Alternative Evaluation. The compliance is for Fall Creek only.

Appendix B

Cost Estimating Procedures for Raw Sewage Overflow Control Program

City of Indianapolis
Department of Public Works
Raw Sewage Overflow Control Program

Cost Estimating Procedures for Raw Sewage Overflow Control Program

April 23, 2004

Cost Estimating Procedures for Raw Sewage Overflow Control Program

City of Indianapolis

Department of Public Works

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1.0 Introduction

This document presents procedures for developing project cost estimates for various long-term raw sewage overflow control alternatives. These procedures will be applied to develop conceptual planning cost estimates that will provide a basis for comparing different technologies and characterize the potential economic impact in relation to other control alternatives.

The cost estimating procedures in this document are a guideline and reference for screening raw sewage overflow control alternatives, in preparation of the long-tern control plan (LTCP) for the city's Raw Sewage Overflow Control Program. The level of detail in this document is consistent with the objective: to support concept-level cost estimates for screening alternative control approaches. It does not present procedures for detailed cost analysis (such as would be used for facilities planning-type cost estimates), as this would impede, rather than support, conceptual planning. The approach includes a thorough evaluation of facility requirements and cost estimates with sufficient detail to support sound decisions on the direction of the long-term planning.

This document presents the unit costs for the construction and operation and maintenance (O&M) of various raw sewage overflow control technologies and procedures. These costs can be used to develop total capital costs and total present worth costs.

This document consists of this introduction and the following five sections:

- Section 2, General Project Costs and Cost Assumptions -- Presents the list of references used, along with general assumptions for developing capital and O&M costs. This section presents the basis for developing present worth and equivalent annual costs; it also presents the economic service life for major raw sewage overflow control components. In addition, it describes how multiple-function facilities and ancillary facilities are handled in developing cost estimates.
- Section 3, Minimum Technology Control Facilities -- Provides the cost estimating procedures for in-system storage facilities such as inflatable dams, automated sluice gates, and end-of-pipe treatment devices including netting devices and overflow screens.
- Section 4, Conveyance Facilities -- Presents cost curves for new sewer construction and pump station facilities. In addition, this section provides cost estimating procedures for total sewer separation projects.
- Section 5, Treatment Facilities -- Provides cost estimating procedures for various treatment alternatives such as mechanical screens, chlorination and dechlorination, ultraviolet disinfection, and enhanced high rate clarification.
- Section 6, Storage Facilities -- Presents procedures for estimating the costs of storage facilities, including earthen, prestressed concrete and concrete storage facilities, as well as deep tunnel storage.

2.0 General Project Costs And Assumptions

This section presents the references used to develop project costs and the methodology for developing the cost equations and unit costs.

2.1 References

The cost data were developed based on information from the following references.

- Combined Sewer Overflow Control, U.S. Environmental Protection Agency (U.S. EPA); July 1994
- Costs for Select CSO Control Technologies, U.S. EPA; October 1992
- CSO Guidance for Long-term Control Plan, U.S. EPA; September 1995
- Approaches to CSO Program Development, AMSA; November, 1994
- CSO Control Manual, U.S. EPA; September 1993
- CSO Needs Survey, U.S. EPA; 1992
- Control and Treatment of CSOs, edited by Peter E. Moffa, Published by Van Nostrand Reinhold; 1990
- Means Construction Cost Data; 2003
- Innovative and Alternative Technology Assessment Manual; 1980

2.2 Methodology

The U.S. EPA references were the most current and comprehensive sources of costs for raw sewage overflow control technologies and were therefore the primary source for obtaining construction costs. The other references yielded cost data that were not available in the U.S. EPA references; they also enabled comparison with the U.S. EPA data.

The following methodology was used for developing the cost equations and unit costs. The intent was to maintain the integrity of the original U.S. EPA cost equations when available, yet adjust the equations to local conditions.

- The U.S. EPA cost equations provide the cost basis for the majority of control technologies. When U.S. EPA data were not available or too general, equations were developed from actual cost data and regional experience. The equations were adjusted for current local conditions with the *Engineering News Record* Construction Cost Index (ENRCCI). Because the *Engineering News Record* cost index criterion does not include Indianapolis, the index for Cincinnati, Ohio (the nearest comparable city) was used. The cost equations and unit costs are based on an ENRCCI of 6635 (April 2003). The equations provide the base construction cost.
- Site adjustment factors to account for unique characteristics not covered by the equations were used as appropriate. For example, dewatering, rock excavation, and land acquisition are covered in this way. The factors are multiplied by the cost equations to provide the adjusted base construction cost.
- Total Construction cost includes the results from the adjusted base construction cost plus the site adjustments and a contingency factor of 25 percent.
- Land cost includes cost of land required for right-of-way or easements for the construction, operation and maintenance of the proposed control technologies.
- Engineering, administration and inspection costs consist of 25 percent of total construction costs plus land costs.

- Project (Capital) cost is the sum of total construction costs; land costs; and engineering, administration and inspection costs.

Facility costs are highly variable per given process due to site specificity such as location, depth, support facilities and ease of construction. Based on the level of project development and the variability inherent in the cost sources, these equations represent an accuracy of ± 30 to 50 percent. These cost equations and unit costs are expected to be appropriate for comparing prospective alternatives. As the project evolves, construction cost estimates will continually be refined to better represent actual conditions.

2.3 Total Construction Costs

The total program costs cover all costs as currently envisioned for project construction. These costs include base construction costs; site adjustment factors such as appurtenances, utility conflicts, dewatering, traffic routing, pavement restoration, excess materials disposal, and construction contingency. Total construction costs can be represented by the following formula:

*Total Construction Costs ($) = (BCC * (ENRCCI/6635) * 1.SAF) * C*

Where:

BCC = Base construction cost per U.S. EPA equation
ENRCCI = *Engineering News Record* construction cost indices at the time of estimate
SAF = Site adjustment factors (see Table 1)
C = Contingency for undeveloped design (minimum 1.25)

2.3.1 Site Adjustment Factors

Costs related to site adjustment factors (SAF) are estimated based on the total percentages for specific site conditions as shown on Table 1 times the base construction cost.

Table 1
Site Adjustment Factors

Project Feature	Guidance
Manholes and appurtenances	• 2% large diameter to 10% for less than 18 inch, • 0 % for tunnels
Utility conflicts	• 5% urban • 2% suburban • 0% rural
Dewatering	• 1% – 3% (additional required for areas parallel to major water bodies) • 0 % for tunnels
Traffic routing	0% - 1% based on location 0.5 % for tunnels
Pavement restoration	• 15% urban • 5-10% suburban • 0-1% rural • 0% for tunnels, use GIS impervious as guidance
Excess materials disposal	• 1% - 5% for sewer projects

Project Feature	Guidance
	• 0% for tunneling - use soils quality and impervious as guidance
Additional adjustment required at engineer's adjustment	Rock excavation, hazardous materials (requires written explanation of content and purpose; see text for potential examples)

2.3.2 Other Construction Cost Considerations

Other issues, which may affect project costs, include facility siting costs, treatment plant capacity issues, and non-economic issues. These site-specific issues should be evaluated in terms of their perceived impact on the cost effectiveness of each alternative. The methodology should include evaluation of deep versus shallow sewers where applicable.

2.3.3 Multiple-Function and Ancillary Facilities

Raw sewage overflow control alternatives often include multiple functions for a control facility, and these functions must be reflected in the cost. For example, if a storage basin is also considered for treatment, then the estimated costs need to consider the additional cost of treatment components. Other examples include the following:

- The storage costs do not include pumping. Add the costs from storage alone to the costs required for pumping facilities.
- The storage costs do not include disinfection. Add disinfection costs as needed.
- Pumping costs do not include force main. Add pipeline costs as required.
- Enhanced treatment includes only high rate separation. Include screening and disinfection as required.
- Chlorine disinfection does not include chlorine contact chamber. Include cast in place storage where needed for contact basin.

2.4 Land Costs

Land required for right-of-way or easements; for the construction, operation and maintenance of the proposed control technologies; is estimated on a project-specific basis. Land costs are estimated based on the unit cost per acre, using prevailing market rate. Where land required for the facility is not specifically identified; the land costs are estimated based on a percentage of base construction cost, for a specific type facility, as shown on Table 2.

Table 2
Land Costs

Project Feature	Guidance
Land Costs (for Right-of-way or easements)	• If estimated acreage is available, use $__ per acre • 5% average • 0.5% to 1% for tunnels • 3% to 5% for open cut large diameter sewers • 0% to 1% for treatment plant construction • 2% to 3% for surface storage

2.5 Engineering, Administration and Inspection Costs (Non-Construction Costs)

Engineering, administration and inspection (EAI) includes engineering fees for facilities planning, design, inspection, construction management costs, administration costs for project management, funding reporting requirements, public relations efforts, contract management and associated legal support costs. This has been historically estimated at an average of 25 percent of the project construction cost and is variable based on the magnitude, duration, complexity and uniqueness of the project.

*EAI Costs ($) = (Total Construction Costs ($) + Land Costs ($)) * EAI Factor (0.25)*

Where:

EAI = Engineering, administration, inspection factor (minimum 0.25)

2.6 Project (Capital) Costs

The project (capital) costs cover all costs for a project as currently envisioned. Project costs can be represented by the following formula:

Project (Capital) Costs ($) = Total Construction Costs ($) + Land Costs ($) + EAI Costs ($)

2.7 O&M Costs

O&M costs, in general, include energy consumption, labor requirements, residual disposal, and equipment maintenance. O&M costs for raw sewage overflow control facilities are presented whenever reliable data are available from the listed references. These costs are highly site-specific and very difficult to predict due to the intermittent nature of raw sewage overflows.

O&M costs are a function of overflow frequency and facility activation, design capacity, and the components included in the facility. Therefore, evaluation of raw sewage overflow control alternatives should include a detailed analysis of O&M costs based on the technology being evaluated and on site-specific conditions. Due to the site specific nature of the O&M requirements, the costs presented in this document are expected to provide an estimate of the cost to operate and maintain the raw sewage overflow control facilities.

2.8 Service Life

Table 3 presents the service life for major raw sewage overflow control components. These figures are based on the U.S. EPA cost-effectiveness guidelines.

Table 3
Service Life

Component Type	Service Life
Land	Permanent
Wastewater conveyance structure (including collection systems, outfall pipes, interceptors, force mains, drop shafts, tunnels)	50 years
Other structures (Including plant buildings, concrete process tankage, basins, lift station structures, and site work)	40 years
Process equipment (including major process equipment such as clarifier mechanisms, vacuum filters, etc.; steel process tanks and chemical storage facilities; electrical generating facilities on standby service only)	20 years
Auxiliary equipment (including instruments and control facilities; sewage pumps and electrical motors; mechanical equipment such as compressors, aeration systems, centrifuges, chlorinators; electrical generating facilities on regular service)	10 years

2.9 Replacement Costs

The future replacement costs for all facility components having service life of less than 20 years (e.g. auxiliary equipment having service life of 10 years) are estimated based on total capital costs required at the end of each component's service life.

2.10 Salvage Values

The salvage values (residual values) are determined for all facility components having service life of greater than 20 years (e.g. tunnels having service life of 50 years). The salvage values are estimated from the service life of each component, using straight line depreciation.

2.11 Present Worth and Equivalent Uniform Annual Costs

"Present Worth" may be thought of as the sum which, if invested now at a given rate, would provide exactly the funds required to make all future payments. "Equivalent Uniform Annual Cost" is the expression of a nonuniform series of expenditures as a uniform annual amount. Either of these methods may be used in the economic evaluation of alternatives.

To permit economic analysis and evaluation of alternative wastewater management systems, all cost estimates must be presented in a common dollar base. For the city's LTCP, all costs will be updated and expressed in terms of 2004 dollars and the cost-effectiveness analysis will be performed on a present worth basis. Each project alternative shall be evaluated using a 20-year planning period, recognizing the service life of facility components and including replacement costs within 20-year planning period and salvage value of components with service life beyond the 20-year horizon. To calculate present worth, the annual interest rate used shall be equivalent to either the current rate or present mandated rate used by the U.S. EPA for federal projects. The present worth analysis should include all front end capital costs, annual O&M costs, service life (replacement) costs, and salvage value (if applicable). Inflation is not considered during the 20-year planning period, unless specifically stated.

Present worth of annual O&M costs will be equal to annual O&M costs times the uniform series present worth factor at the prescribed interest rate for 20 years.

Present worth of the future replacement costs which occur at year 10 will be equal to future replacement costs times the single payment present worth factor at the prescribed interest rate for 10 years.

Present worth of salvage values at the end of 20 years will be equal to salvage values times single payment present worth factor at the prescribed interest rate for 20 years.

To find equivalent uniform annual cost, multiply the estimated present worth costs times the capital recovery factor at the prescribed interest rate for 20 years.

3.0 Minimum Technology Control Facilities

Two types of minimum technology structural control facilities are considered for the Raw Sewage Overflow Control Program: in-line storage facilities and end-of-pipe treatment devices. This section briefly describes these facilities and provides estimated construction costs.

3.1 In-System Storage Facilities

In-system storage facilities are used to maximize the in-system storage potential in the existing collection system during storm events to temporarily store wet-weather flow. Two types of facilities are considered for the Raw Sewage Overflow Control Program: inflatable dams and automated sluice gates. These are most often used for in-system storage purposes. Table 4 presents the base construction costs for inflatable dams and automated sluice gates.

Table 4
In-System Storage Facilities Base Construction Costs

Diameter (inches)	Base Construction Cost ($)
Inflatable Dams	
48	554,000
54	585,000
60	618,000
72	689,000
84	971,000
96	1,103,000
Automated Sluice Gates	
32 x 48 up to 60 x 40	232,000

Inflatable dam costs cover a size range for pipe diameter between 48 and 96 inches. Accessibility to the installation is moderate, requiring demolition. The inflatable dam would be installed within existing piping with no additional structure required. An inflatable dam project would most likely not require additional land acquisition, as the dam is within existing piping and the control panel can be placed in the existing right of way owned by the city. As well, traffic disruption and dewatering is assumed to be nominal unless a unique access must be constructed to install the dam, or bypass pumping becomes required due to location. The cost includes local controls with a panel located at ground access and primary power immediately available. Annual O&M costs for these devices are included within the collection system maintenance costs.

Sluice gate costs range for pipe sizes between 32 inches by 48 inches and 60 inches by 40 inches; costs for other sizes should be determined on a site-specific basis. A sluice gate installation is assumed to include a constructed vault around the existing piping, a new motor operated sluice gate, and local control panel for local and remote activation. Sluice gates using special materials are equipped with unique controls that require separate cost consideration. Annual O&M costs for these devices are included within the collection system maintenance costs.

3.2 End-of-Pipe Treatment Devices

End-of-pipe treatment devices are used to provide floatable control. Two types of technologies are considered for the Raw Sewage Overflow Control Program: netting devices and weir mounted overflow screens. Table 5 presents the base construction costs for the end-of-pipe treatment devices.

Table 5
End-of-Pipe Treatment Devices Base Construction Costs

Technology	Base Construction Cost ($/MGD)
Netting devices	500 – 3,000
Overflow screens	500 – 3,000

The typical aperture opening for these facilities is 0.5 inch. Costs may vary depending on flow rates, site constraints, new construction, and screen type and size. This cost includes installation of the netting device on the pipe outfalls, accessible from the stream bank and not requiring any special equipment for installation.

In-line screen installation costs consider utilizing the existing right of way for constructing a vault and screen box around the existing outfall pipe. The concrete vault is assumed to be precast (except for the floor), and costs include excavation and backfill. Pavement restoration depends upon location and is applied using the site adjustment factor.

The annual O&M costs for 10 overflow events per year can be estimated using the following equation:

$$\text{O\&M Cost (\$thousands)} = (\text{current ENRCCI}/6635) * (0.00012\, Q^2 + 0.071\, Q + 5.34)$$

Where:
Q = *Facility capacity in million gallons per day (MGD)*

For 30 overflow events per year, the equation is as follows:

$$\text{O\&M Cost (\$thousands)} = (\text{current ENRCCI}/6635) * (0.00048\, Q^2 + 0.098\, Q + 12.64)$$

4.0 Conveyance Facilities

This section presents cost estimating procedures for the following conveyance alternatives:

- Regulator modification
- Static regulators
- Interceptor connections
- Sewer construction

- Pumping facilities
- Total sewer separation
- Partial sewer separation

4.1 Regulator Modification

Regulator modifications include a newly constructed vault or manhole, complete with weir or similar regulating device. The cost of these typical features vary greatly with pipe size, depth and location. Table 6 presents the base construction costs for regulator modifications. Sizes up to 96 inches are identified; the estimator may adjust or expand costs where needed.

Table 6

Regulator Modification Base Construction Costs

Diameter (inches)	Base Construction Cost ($)
Up to 36 inches	30,000
42 to 96 inches	60,000

The estimator must carefully evaluate and adjust these guideline costs to reflect actual conditions and extent of structure anticipated. These costs assume the new vault or manhole is constructed around the existing pipe and no additional piping is included. If additional piping is required, the estimator should add costs based on sewer construction costs. Annual O&M costs for these devices are included within the collection system maintenance costs.

4.2 Static Regulator

Static regulators include a newly constructed vault or manhole, complete with weir or similar regulating device. The cost of these typical features vary greatly with pipe size, depth, and location. Table 7 presents the base construction cost for static regulators. Sizes up to 96 inches are identified; the estimator may adjust or expand costs where needed.

Table 7

Static Regulator Base Construction Costs

Diameter (inches)	Base Construction Cost ($)
Up to 36 inches	250,000
42 to 96 inches	500,000

The estimator must carefully evaluate and adjust these guideline costs to reflect actual conditions and extent of structure anticipated. These costs assume the new vault or manhole is constructed around the existing pipe and no additional piping is included. If sluice gates are used within the new regulator, the costs should be based on those for automated sluice gates, not on regulators. The costs include excavation, sheeting and bracing, disposal, fill, and compaction. Annual O&M costs for these devices are included within the collection system maintenance costs.

4.3 Interceptor Connection

The interceptor connection cost includes the connection to the existing piping, the connection to the interceptor and the new interconnecting piping, not to exceed 500 feet. As part of the assembly, the manhole, at the existing system tie-in, is included in the estimated costs. Excavation and backfill is included. Dewatering and pavement restoration are site-specific and applied using the site adjustment factors. The cost of these typical features vary greatly with pipe size, depth, and location.

Table 8 presents the base construction costs for interceptor connections. Costs are graduated in three sizes. The estimator must carefully evaluate and adjust these guideline costs to reflect actual conditions and extent of structure anticipated. Annual O&M costs for these devices are included within the collection system maintenance costs.

Table 8

Interceptor Connection Base Construction Costs

Diameter (inches)	Base Construction Cost ($)
Up to 36 inches	60,000
42 to 60 inches	120,000
72 to 108 inches	200,000

4.4 Sewer Construction

Tables 9 and 10 present base construction costs for reinforced concrete pipe (RCP) sewer construction and pre-cast concrete box culvert construction, respectively. The pipe is assumed to be RCP Class IV with gaskets and PVC liner for corrosion protection; the box culvert is assumed to be reinforced to C-850. Pipe diameters range from 12 to 120 inches, and the box culvert sizes include an equivalent pipe cross section from 132 to 312 inches.

Table 9

Sewer Construction Costs

Diameter (inches)	Cost ($/linear foot)	Cost($/inch dia./ linear foot)
12	$47	$4
15	$53	$4
18	$61	$3
24	$77	$3
30	$117	$4
36	$151	$4
42	$192	$5
48	$250	$5
60	$272	$5
72	$349	$5
84	$487	$6
96	$975	$10
102	$1,117	$11
108	$1,229	$11
120	$1,467	$12

Table 10

Box Culvert Construction Costs

Equivalent Pipeline Diameter (inches)	Cost ($/lin. foot)	Cost ($/inch eq dia./lin. foot)
132	$2,004	$15
144	$2,120	$15
168	$2,346	$14
192	$2,957	$16
216	$3,443	$16
240	$4,436	$19
264	$5,142	$20
288	$6,741	$24
312	$7,394	$24

The cost includes excavation, sheeting and bracing, bedding, backfill, disposal, compaction, and pipe with an average depth of 16 feet not including rock excavation. Manholes and appurtenances are added by means of the site adjustment factors. Pavement restoration, traffic routing and extensive dewatering are also covered by these adjustment factors. The estimator is responsible for applying these factors to represent anticipated conditions.

For sewers greater than 0.5 miles in length, the following discount is applied:

5 percent for greater than 0.5 miles

10 percent for greater than 2 miles

15 percent for greater than 5 miles

For sewers less than 200 feet in length, an additional 10 percent is added to the pipe cost.

The annual O&M cost can be projected by the following equation:

*Cost ($) = ($76.80) * (2 hours) * (# of events per year) + (0.0025 * Capital Cost)*

4.5 Pumping Facilities

Table 11 presents the base construction costs for pumping facilities. These costs are based on the following equation:

$$Cost\ (\$M) = (Current\ ENRCCI/6635) * 0.40 * Q^{0.704}$$

Where:

Q = Facility capacity in million gallons per day (MGD)

Table 11

Pumping Facilities Construction Costs

Pumping Capacity (MGD)	Base Construction Cost ($)	Unit Construction Cost ($/gpd)	Annual O&M Cost ($)

Pumping Capacity (MGD)	Base Construction Cost ($)	Unit Construction Cost ($/gpd)	Annual O&M Cost ($)
1	400,000	$0.40	15,000
2	651,000	$0.33	24,000
5	1,240,000	$0.25	44,000
10	2,020,000	$0.20	70,000
15	2,687,000	$0.18	92,000
20	3,291,000	$0.16	111,000
25	3,850,000	$0.15	129,000
30	4,378,000	$0.15	146,000
40	5,360,000	$0.13	177,000
50	6,272,000	$0.13	205,000
60	7,131,000	$0.12	232,000
70	7,948,000	$0.11	257,000
80	8,732,000	$0.11	281,000
90	9,487,000	$0.11	304,000
100	10,217,000	$0.10	326,000
120	11,616,000	$0.10	368,000
140	12,948,000	$0.09	408,000
160	14,224,000	$0.09	447,000
180	15,453,000	$0.09	483,000
200	16,643,000	$0.08	518,000

The cost estimates for wastewater pumping assume the following:

- Fully enclosed, submersible type structure, concrete construction
- Excavation and backfill included
- One redundant pump
- Aboveground control panel and SCADA for reporting failures
- Immediately available primary power
- Pumping equipment capable of meeting the peak flow with largest unit out of service.
- No force main; use pipeline costs as needed.
- No sewer work to route flow to the pump station; use sewer construction if required.

These assumptions and base construction costs apply only to traditional, low head sanitary sewer collection system pump stations. High head and high flow pump stations, such as tunnel dewatering, must be independently estimated.

Annual O&M costs estimated for pumping facilities can be projected by the following equation:

$$Cost\ (\$Thousands) = (Current\ ENRCCI/6635) * 14.95 * Q^{0.669}$$

Where:

Q = facility capacity in MGD

4.6 Total Sewer Separation

Table 12 presents the base construction cost for total sewer separation for differing land types. The cost includes excavation, sheeting and bracing, backfill, disposal, compaction, and sewer construction. Manholes, utility conflicts, dewatering, traffic routing, pavement restoration and excess materials disposal are applied by means of the site adjustment factor.

Table 12

Total Sewer Separation Construction Costs

Land Type	Base Construction Cost ($/acre)
Rural	75,000
Suburban	92,000
Urban	100,000

Annual O&M costs for sewer separation can be projected by the following equation:

*Cost ($) = (0.0025 * Capital Cost)*

5.0 Treatment Facilities

Construction cost relationships are used for treatment and storage facilities. Costs for these facilities reflect the basic structure and ancillary equipment such as grates, valves and conduits. These costs do not include pumping. Each treatment process is individually identified for singular use, as in the case of enhanced high rate treatment.

5.1 Mechanical Screens

Table 13 presents the base construction costs for mechanical screens. These costs are based on the equation below.

$$\text{Cost (\$M)} = (\text{current ENRCCI}/6635) * 0.099\, Q^{0.843}$$

Where:

Q = facility capacity in MGD

The annual O&M costs for 10 overflow events per year can be estimated using the following equation:

$$\text{Cost (\$thousands)} = (\text{current ENRCCI}/6635) * (0.00012\, Q^2 + 0.071\, Q + 5.34)$$

The annual O&M costs for 30 overflow events per year can be estimated using the following equation:

$$\text{Cost (\$thousands)} = (\text{current ENRCCI}/6635) * (0.00048\, Q2 + 0.098\, Q + 12.64)$$

Table 13

Mechanical Screens Construction Costs

Screen Capacity (MGD)	Construction Cost ($)	Unit Construction Cost ($/gpd)	Annual O&M Cost ($)	
			10 Overflow events/year	30 Overflow events/year
0.8	62,000	$0.08	6,000	13,000
1	75,000	$0.08	6,000	13,000

Screen Capacity (MGD)	Construction Cost ($)	Unit Construction Cost ($/gpd)	Annual O&M Cost ($)	
			10 Overflow events/year	30 Overflow events/year
2	134,000	$0.07	6,000	13,000
5	290,000	$0.06	6,000	14,000
10	519,000	$0.05	7,000	14,000
15	730,000	$0.05	7,000	15,000
20	930,000	$0.05	7,000	15,000
30	1, 310,000	$0.04	8,000	17,000
40	1,670,000	$0.04	9,000	18,000
50	2,015,000	$0.04	10,000	19,000
60	2,350,000	$0.04	11,000	21,000
70	2,675,000	$0.04	11,000	22,000
80	3,000,000	$0.04	12,000	24,000
90	3,300,000	$0.04	13,000	26,000
100	3,600,000	$0.04	14,000	28,000
120	4,200,000	$0.04	16,000	32,000
140	4,800,000	$0.03	18,000	36,000
160	5,370,000	$0.03	20,000	41,000
180	5,950,000	$0.03	23,000	46,000
200	6,480,000	$0.03	25,000	52,000

The cost equation applies to facility sizes in the range of 0.8 and 200 MGD. Beyond 200 MGD, the applications are modular and multiples of smaller sizes. With multiples of a selected size, there is little economy of scale; therefore, the costs can be represented by multiplying the cost for a single unit. The cost shown includes a motorized screen equipment, power supply, controls, and structure to support screens. No building enclosure is envisioned, and no odor control facilities are included. Structure construction costs include excavation, backfill and concrete.

The costs proposed in this segment do not include the housing or containment of these screens. If these screens are intended (in a particular option) to be installed as primary screens for influent wastewater, a permanent enclosure and odor control should be added to the anticipated costs. These can be added by an independent estimate. Site adjustment factors add costs for issues such as dewatering, spoil disposal and appurtenances.

5.2 Chlorination Disinfection and Dechlorination

This section discusses gas chlorine and liquid chlorine disinfection.

- **Gas Chlorination and Dechlorination**. Table 14 presents the base construction costs for gas chlorination and sulphur dioxide dechlorination, which is based on the cost equation below.

$$Cost\ (\$M) = (current\ ENRCCI/6635) * (0.0443\ Q^{0.655} + 0.0655\ Q^{0.417})$$

Where:

Q = Facility capacity in MGD

The annual O&M costs can be estimated using the following equation.

*Cost ($Thousands) = (current ENRCCI/6635) * 12.531 Q0.614*

Table 14
Gas Chlorination/Disinfection and Dechlorination Construction Costs

Facility Capacity (MGD)	Construction Cost ($)	Unit Construction Cost ($/gpd)	Annual O&M Cost ($)
1	110,000	$0.11	13,000
2	158,000	$0.08	20,000
5	256,000	$0.05	34,000
10	372,000	$0.04	52,000
15	464,000	$0.03	67,000
20	544,000	$0.03	79,000
30	682,000	$0.02	102,000
40	802,000	$0.02	121,000
50	910,000	$0.02	139,000
60	1,009,000	$0.02	155,000
70	1,102,000	$0.02	171,000
80	1,189,000	$0.01	185,000
90	1,272,000	$0.01	199,000
100	1,352,000	$0.01	212,000
120	1,502,000	$0.013	237,000
140	1,642,000	$0.012	261,000
160	1,775,000	$0.011	283,000
180	1,901,000	$0.011	304,000
200	2,021,000	$0.010	325,000
500	3,470,000	$0.007	570,000
1000	5,255,000	$0.005	871,000
2000	7,995,000	$0.004	1,333,000

The cost includes the chemical storage tanks, chlorine evaporators and chlorinators, chemical feed pumps, reaction tank and mixer and instrumentation. The cost does not include a chemical building or chlorine scrubber. For facilities larger than 2,000 MGD, a multiple unit approach should be used.

- **Liquid Chlorination and Dechlorination**. Table 15 presents the base construction costs for liquid chlorination using sodium hypochlorite and sodium bisulfite dechlorination. These costs are based on the cost equation below.

$$\text{Cost (\$M)} = (\text{current ENRCCI}/6635) * 0.178\ Q^{0.464}$$

Where:

Q = Facility capacity in MGD

The annual O&M costs can be estimated using the following equation.

$$\text{Cost (\$M)} = (\text{current ENRCCI}/6635) * 12.531\ Q^{0.614}$$

Table 15
Liquid Chlorination and Dechlorination Construction Costs

Facility Capacity (MGD)	Construction Cost ($)	Unit Construction Cost ($/gpd)	Annual O&M Cost ($)
1	178,000	$0.18	13,000
2	246,000	$0.12	20,000
5	376,000	$0.08	34,000
10	518,000	$0.05	52,000
15	625,000	$0.04	67,000
20	715,000	$0.04	79,000
30	862,000	$0.03	102,000
40	986,000	$0.02	121,000
50	1,093,000	$0.02	139,000
60	1,189,000	$0.02	155,000
70	1,278,000	$0.02	171,000
80	1,359,000	$0.02	185,000
90	1,436,000	$0.02	199,000
100	1,507,000	$0.02	212,000
120	1,640,000	$0.014	237,000
140	1,762,000	$0.013	261,000
160	1,875,000	$0.012	283,000
180	1,980,000	$0.011	304,000
200	2,079,000	$0.010	325,000
500	3,180,000	$0.006	570,000
1000	4,387,000	$0.004	871,000
2000	6,051,000	$0.003	1,333,000

The cost equation above applies to facility sizes in the range of 1 and 2,000 MGD. The base costs do not include a building or enclosure to house the system. It is assumed that the equipment will be housed in a multi-use facility with other like equipment. If a structure is desired, the estimator shall include costs reflecting the addition.

Gas chlorination may be used when facilities are located at the advanced wastewater treatment plants. For remote locations, sodium hypochlorite is the preferred disinfectant.

5.3 Ultraviolet Disinfection

Table 16 presents the base construction costs for UV disinfection facilities. These costs are based on the cost equation below.

*Cost ($) = (current ENRCCI/6635) * (418,701 + 55817 * Q)*

Where:

Q = Facility capacity in MGD

The annual O&M costs can be estimated using the following equation.

*Cost ($) = (current ENRCCI/6635) * 5475 * Q*

Where:

Q = Facility capacity in MGD

Table 16
Ultraviolet Disinfection Construction Costs

Facility Capacity (MGD)	Construction Cost ($)	Unit Construction Cost ($/gpd)	Annual O&M Cost ($)
1	475,000	$0.48	6,000
2	531,000	$0.27	11,000
5	698,000	$0.14	28,000
10	977,000	$0.10	55,000
15	1,256,000	$0.08	83,000
20	1,536,000	$0.08	110,000
30	2,094,000	$0.07	165,000
40	2,652,000	$0.07	220,000
50	3,210,000	$0.06	274,000
60	3,768,000	$0.06	329,000
70	4,326,000	$0.06	384,000
80	4,885,000	$0.06	439,000
90	5,443,000	$0.06	493,000
100	6,001,000	$0.06	548,000
120	7,117,000	$0.06	658,000
140	8,234,000	$0.06	767,000
160	9,350,000	$0.06	877,000
180	10,466,000	$0.06	986,000
200	11,583,000	$0.06	1,096,000

The UV disinfection facility consists of two parts: the outdoor channel with submerged tubes and ready access for maintenance, and an enclosure that houses the electronics and power panels, complete with HVAC. Transmittance is assumed at 45 percent to achieve a 3 log fecal coliform reduction. Assumptions include readily available 480-volt power and process instrumentation. Beyond 200 MGD, multiple units of smaller sizes should be used.

5.4 Enhanced High Rate Clarification

Table 17 presents the base construction costs for enhanced high rate clarification facilities. These costs are based on the cost equation below.

*Cost ($M) = (current ENRCCI/6635) * (646,079 + 130114 * Q)*

Where:

Q = Facility capacity in MGD

The annual O&M costs can be estimated using the following equation.

*Cost ($Thousands) = (current ENRCCI/6635) * 18.238 * Q0.592*

Where:

Q = Facility capacity in MGD

The costs reflect known equipment and installation costs for ballasted flocculation equipment packages. For comparison, an assumed loading rate of 60 GPM/SF may be used. Loading rate is at peak hourly flow, applied to the area of clarification only. It was assumed that the vendor equipment would be delivered, assembled and installed on a concrete pad above grade. Primary power was assumed to be immediately available and piping modifications were nominal. Pumping or pump station costs were not included and would be applied by using pump station costs. Force main and outfall lines were excluded and would be added using unit costs provided elsewhere. Site specific costs, such as traffic reroute, or paving repair is applied by adjustment factor.

Table 17
Enhanced High Rate Clarification Construction Costs

Facility Capacity (MGD)	Construction Cost ($)	Unit Construction Cost ($/gpd)	Annual O&M Cost ($)
1	777,000	$0.78	19,000
2	907,000	$0.45	28,000
5	1,297,000	$0.26	48,000
10	1,948,000	$0.19	72,000
15	2,598,000	$0.17	91,000
20	3,249,000	$0.16	108,000
30	4,550,000	$0.15	137,000
40	5,851,000	$0.15	162,000
50	7,152,000	$0.14	185,000
60	8,453,000	$0.14	206,000
70	9,755,000	$0.14	226,000
80	11,056,000	$0.14	245,000
90	12,357,000	$0.14	262,000
100	13,658,000	$0.14	279,000
120	16,260,000	$0.14	311,000
140	18,863,000	$0.13	341,000
160	21,465,000	$0.13	368,000
180	24,067,000	$0.13	395,000
200	26,669,000	$0.13	420,000
220	29,272,000	$0.13	445,000
240	31,874,000	$0.13	468,000
260	34,476,000	$0.13	491,000
280	37,078,000	$0.13	513,000
300	39,681,000	$0.13	534,000
320	42,283,000	$0.13	555,000
340	44,885,000	$0.13	575,000
360	47,488,000	$0.13	595,000
380	50,090,000	$0.13	615,000
400	52,692,000	$0.13	634,000
420	55,294,000	$0.13	652,000

Facility Capacity (MGD)	Construction Cost ($)	Unit Construction Cost ($/gpd)	Annual O&M Cost ($)
440	57,897,000	$0.13	670,000
460	60,499,000	$0.13	688,000
480	63,101,000	$0.13	706,000
500	65,704,000	$0.13	723,000

6.0 Storage Facilities

Two types of storage facilities are considered for the Raw Sewage Overflow Control Program: subsurface storage and deep tunnels. This section briefly describes these facilities and provides estimated base construction costs.

6.1 Subsurface Storage

Table 18 presents the base construction costs for subsurface storage. These costs are based on the cost equation below.

*Cost ($M) = (current ENRCCI/6635) * 5.026 V0.826*

Where:

V = Facility volume in million gallons (MG)

Annual O&M costs can be estimated using the following equation:

*Cost ($) = ($76.80) * (2 hours) * (# of events per year) + (0.0025 * Capital Cost)*

These costs apply for facility sizes in the range of 0.15 and 30 MG. Beyond 30 MG, multiple storage cells would be expected, and these costs represent those of an individual cell.

The earthen basin is assumed to be installed below grade and open to the atmosphere. The costs for the earthen basin include excavation, synthetic liner and associated piping. Neither mechanized cleaning systems nor pump stations are included. An equation adjustment factor of 0.15 will be applied to better reflect local construction costs.

Table 18
Earthen Basin Subsurface Storage Construction Costs

Storage Volume (MG)	Construction Cost ($)	Unit Construction Cost ($/gallon)
0.15	158,000	$1.05
0.3	279,000	$0.93
0.5	425,000	$0.85
0.8	627,000	$0.78
1	754,000	$0.75
3	1,868,000	$0.62
5	2,849,000	$0.57
8	4,200,000	$0.53
10	5,050,000	$0.51
15	7,060,000	$0.47
20	8,954,000	$0.45
25	10,766,000	$0.43
30	12,516,000	$0.42

For prestressed concrete tank storage, costs include an at-grade tank with roof. No pumping, valving or cleaning equipment is included. An equation adjustment factor of 0.34 will be applied to better reflect local construction costs.

Table 19
Prestressed Concrete Tank Subsurface Storage Construction Costs

Storage Volume (MG)	Construction Cost ($)	Unit Construction Cost ($/gallon)
0.15	357,000	$2.38
0.3	632,000	$2.11
0.5	964,000	$1.93
0.8	1,422,000	$1.78
1	1,709,000	$1.71
3	4,235,000	$1.41
5	6,458,000	$1.29
8	9,521,000	$1.19
10	11,448,000	$1.14
15	16,002,000	$1.07
20	20,295,000	$1.01
25	24,402,000	$0.98
30	28,369,000	$0.95

Cast-in-place tanks were assumed to be installed below grade with a covered top, including excavation, backfill and disposal of excess. Baffling was not required but represents a nominal increase (when applied for a chlorine contact chamber). Excavation dewatering is not included; property requirements are applied as an additional cost after construction. If pump station costs or disinfection facilities are desired at one of these sites, the costs for these technologies in other equations may be added. An equation adjustment factor of 0.50 will be applied to better reflect local construction costs.

Table 20
Cast-in-Place Tank Subsurface Storage Construction Costs

Storage Volume (MG)	Construction Cost ($)	Unit Construction Cost ($/gallon)
0.15	525,000	$3.50
0.3	930,000	$3.10
0.5	1,418,000	$2.84
0.8	2,091,000	$2.61
1	2,514,000	$2.51
3	6,228,000	$2.08
5	9,497,000	$1.90
8	14,002,000	$1.75
10	16,836,000	$1.68
15	23,533,000	$1.57
20	29,846,000	$1.49
25	35,886,000	$1.44
30	41,719,000	$1.39

6.2 Deep Tunnels

Table 21 presents the base construction costs for deep tunnels. These costs are based on the cost equation below.

*Cost ($ per LF) = (current ENRCCI/6635) * (1450 + 145 D)*

Where:

D = Inside tunnel diameter

Annual O&M costs for deep tunnels can be projected by the following equation:

*Cost ($) = ($76.80) * (2 hours) * (# of events per year) + (0.0025 * Capital Cost)*

Table 21
Deep Tunnel Construction Costs

Inside Diameter (feet)	Cost per Linear Foot ($)
5	2,175
10	2,900
15	3,625
20	4,350
25	5,075
30	5,800
35	6,525

The costs include mobilization, tunnel shafts, dewatering, material disposal and tunnel lining. Costs represent a complete tunnel in place, without any ancillary features such as deep pump stations or odor control facilities. These shall be added by the estimator, if needed. Costs not included in the base, but that may apply based upon site-specific considerations, include excess dewatering, utility relocation, boulder zone and pavement restoration.

Tunnel costs assume tunneling in good rock, limited groundwater, no grouting, no ground gasses and an open faced tunnel boring machine. While the rock conditions in Indianapolis have not yet been sufficiently defined, initial assessments indicate geology at the intended tunneling depth to be sedimentary dolomite, limestone and shale formations.

Appendix C

Detailed Systemwide Plan Cost Estimates

System Summary

PRELIMINARY COST ESTIMATES FOR SYSTEM-WIDE PLAN ONE			12								
Cost Item	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
TRIBUTARIES											
Fall Creek	92,285,926	7,309,864	24,898,947	124,494,737	2,183,009	31,669,437	158,347,183	450,232	-	56,992,552	145,369,230
Pogues Run	37,469,335	10,428,059	11,745,055	59,642,449	1,678,439	15,330,222	76,651,111	399,841	5,020,598	22,992,941	76,780,402
Pleasant Run	22,219,464	8,470,993	7,672,614	38,363,071	1,718,978	10,020,512	50,102,562	122,678	-	14,650,533	46,846,872
Eagle Creek	7,467,687	3,172,541	2,660,057	13,300,285	856,992	3,539,319	17,696,596	62,416	-	5,243,237	16,745,915
TRIBUTARIES Subtotal	**159,442,412**	**29,381,457**	**46,976,673**	**235,800,542**	**6,437,419**	**60,559,490**	**302,797,452**	**1,035,167**	**5,020,598**	**99,879,263**	**285,742,419**
CENTRAL System											
Upper White	4,965,459	1,606,046	1,642,876	8,214,381	27,662	2,060,511	10,302,553	164,702	2,567,272	301,894	13,565,175
Lower White	125,417,093	21,848,637	36,816,432	184,082,162	3,358,654	46,860,204	234,301,020	3,219,098	26,551,633	51,412,416	270,190,268
CENTRAL System Subtotal	**130,382,552**	**23,454,683**	**38,459,309**	**192,296,543**	**3,386,316**	**48,920,715**	**244,603,574**	**3,383,799**	**29,118,905**	**51,714,311**	**283,755,443**
AWT SYSTEM											
Interplant Connection	88,390,432	-	22,097,608	110,488,040	1,511,960	28,000,000	140,000,000	361,520	-	54,546,219	126,775,108
Southport AWT	141,195,000	-	35,298,750	176,493,750	-	44,123,438	220,617,188	1,512,500	61,772,813	-	273,045,898
Belmont AWT	98,383,897	-	24,595,974	122,979,871	-	30,744,968	153,724,838	1,895,000	43,042,955	-	200,002,871
AWT SYSTEM Subtotal	**327,969,329**	**-**	**81,992,332**	**409,961,661**	**1,511,960**	**102,868,405**	**514,342,026**	**3,769,020**	**104,815,767**	**54,546,219**	**599,823,878**
Early Action Plans											
Early Action Plans Subtotal	**-**	**-**	**-**	**-**	**-**	**-**	**189,300,000**	**1,300,000**	**24,900,000**	**27,200,000**	**208,800,000**
Total without WaterShed Improvements	**617,794,292**	**52,836,139**	**167,428,314**	**838,058,746**	**11,335,695**	**212,348,610**	**1,251,043,051**	**9,487,987**	**163,855,270**	**233,339,793**	**1,378,121,739**
WaterShed Improvements	**-**	**-**	**-**	**63,400,000**	**-**	**-**	**63,320,000**	**130,000**	**-**	**-**	**64,720,000**
Total with WaterShed Improvements	**617,794,292**	**52,836,139**	**167,428,314**	**901,458,746**	**11,335,695**	**212,348,610**	**1,314,363,051**	**9,617,987**	**163,855,270**	**233,339,793**	**1,442,841,739**

PRELIMINARY COST ESTIMATES FOR SYSTEM-WIDE PLAN ONE			6								
Cost Item	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
TRIBUTARIES											
Fall Creek	104,250,771	8,224,859	28,118,907	140,594,537	2,186,768	35,695,326	178,476,632	500,556	-	64,175,219	163,788,720
Pogues Run	48,228,858	13,845,019	15,224,265	77,298,142	1,885,303	19,795,861	98,979,307	563,580	8,379,038	25,726,289	102,030,854
Pleasant Run	43,868,716	17,979,632	15,462,087	77,310,434	1,828,278	19,784,678	98,923,390	244,730	-	27,749,384	92,900,132
Eagle Creek	10,051,194	4,309,284	3,590,120	17,950,598	856,992	4,701,898	23,509,488	76,948	-	6,793,341	22,232,324
TRIBUTARIES Subtotal	**206,399,539**	**44,358,794**	**62,395,379**	**313,153,712**	**6,757,342**	**79,977,764**	**399,888,818**	**1,385,814**	**8,379,038**	**124,444,232**	**380,952,029**
CENTRAL System											
Upper White	8,959,509	2,895,353	2,963,715	14,818,577	53,028	3,717,901	18,589,506	371,761	4,819,883	383,315	25,498,155
Lower White	157,499,822	23,662,745	45,290,642	226,453,208	3,340,654	57,448,466	287,242,328	3,305,165	25,925,106	71,294,991	317,427,337
CENTRAL System Subtotal	**166,459,331**	**26,558,098**	**48,254,357**	**241,271,785**	**3,393,682**	**61,166,367**	**305,831,834**	**3,676,926**	**30,744,990**	**71,678,306**	**342,925,491**
AWT SYSTEM											
Interplant Connection	88,390,432	-	22,097,608	110,488,040	1,511,960	28,000,000	140,000,000	361,520	-	54,546,219	126,775,108
Southport AWT	141,195,000	-	35,298,750	176,493,750	-	44,123,438	220,617,188	1,832,500	61,772,813	-	276,753,810
Belmont AWT	105,407,797	-	26,351,949	131,759,746	-	32,939,936	164,699,682	1,705,000	46,115,911	-	210,512,431
AWT SYSTEM Subtotal	**334,993,229**	**-**	**83,748,307**	**418,741,536**	**1,511,960**	**105,063,374**	**525,316,869**	**3,899,020**	**107,888,723**	**54,546,219**	**614,041,350**
Early Action Plans											
Early Action Plans Subtotal	-	-	-	-	-	-	189,300,000	1,300,000	24,900,000	27,200,000	208,800,000
Total without WaterShed Improvements	**707,852,098**	**70,916,892**	**194,398,043**	**973,167,033**	**11,662,984**	**246,207,504**	**1,420,337,521**	**10,261,761**	**171,912,751**	**277,868,757**	**1,546,718,871**
WaterShed Improvements	**-**	**-**	**-**	**63,400,000**	**-**	**-**	**63,320,000**	**130,000**	**-**	**-**	**64,720,000**
Total with WaterShed Improvements	**707,852,098**	**70,916,892**	**194,398,043**	**1,036,567,033**	**11,662,984**	**246,207,504**	**1,483,657,521**	**10,391,761**	**171,912,751**	**277,868,757**	**1,611,438,871**

System Summary

PRELIMINARY COST ESTIMATES FOR SYSTEM-WIDE PLAN ONE — 4

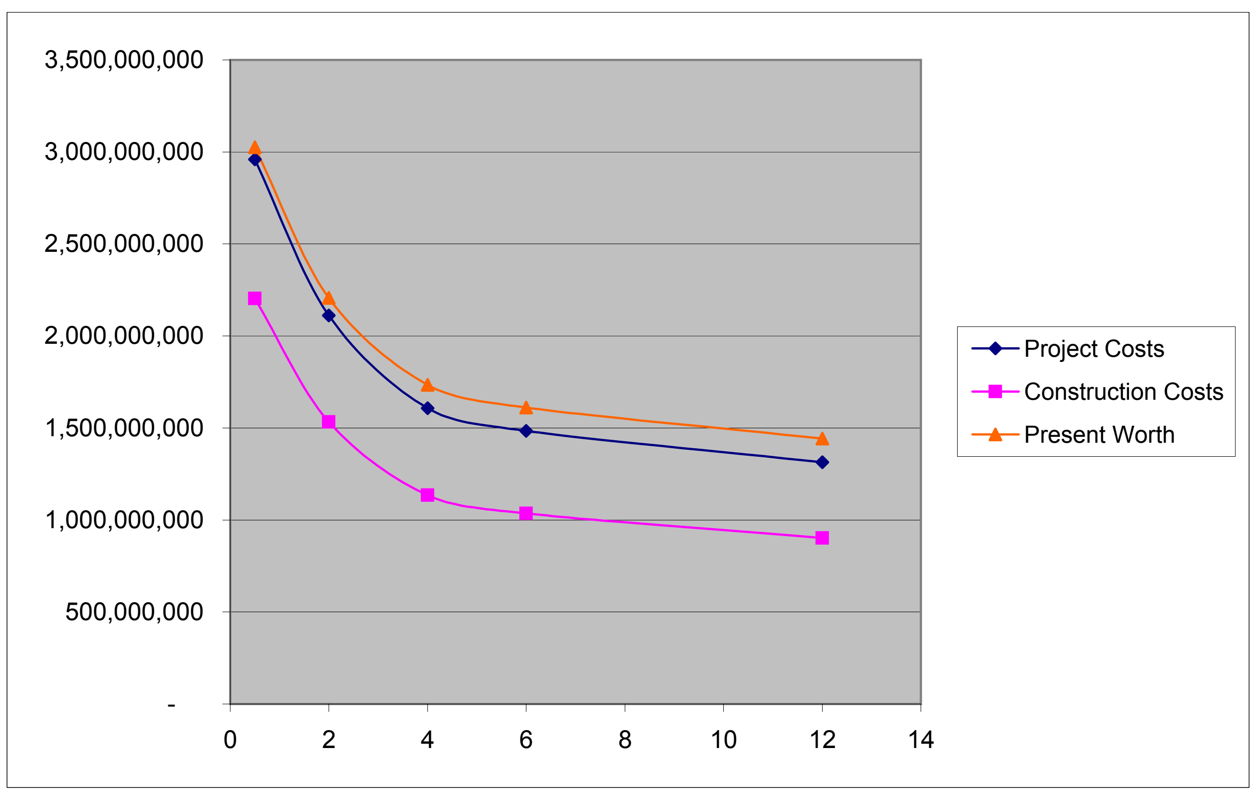
Cost Item	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
TRIBUTARIES											
Fall Creek	114,924,203	9,659,016	31,145,805	155,729,025	2,224,570	39,488,399	197,441,993	547,969	-	70,617,079	181,246,904
Pogues Run	55,412,208	15,496,354	16,905,223	87,813,785	1,944,682	22,439,617	112,198,084	640,750	9,884,778	28,327,202	116,164,248
Pleasant Run	57,651,332	24,043,983	20,423,829	102,119,144	2,011,261	26,032,601	130,163,007	322,829	-	36,201,937	122,346,218
Eagle Creek	13,652,448	5,893,836	4,886,571	24,432,854	999,824	6,358,170	31,790,848	97,651	-	9,096,925	30,018,158
TRIBUTARIES Subtotal	**241,640,192**	**55,093,189**	**73,361,428**	**370,094,808**	**7,180,337**	**94,318,786**	**471,593,931**	**1,609,200**	**9,884,778**	**144,243,144**	**449,775,527**
CENTRAL System											
Upper White	13,804,462	4,448,229	4,563,173	22,815,864	78,738	5,723,650	28,618,252	577,277	7,451,388	555,219	39,340,242
Lower White	178,053,559	24,925,387	50,744,736	253,723,682	3,322,654	64,261,584	321,307,920	3,343,617	25,296,706	84,262,116	347,443,657
CENTRAL System Subtotal	**191,858,020**	**29,373,616**	**55,307,909**	**276,539,546**	**3,401,393**	**69,985,235**	**349,926,173**	**3,920,894**	**32,748,094**	**84,817,335**	**386,783,899**
AWT SYSTEM											
Interplant Connection	88,390,432	-	22,097,608	110,488,040	1,511,960	28,000,000	140,000,000	361,520	-	54,546,219	126,775,108
Southport AWT	141,195,000	-	35,298,750	176,493,750	-	44,123,438	220,617,188	2,170,000	61,772,813	-	280,664,499
Belmont AWT	110,126,547	-	27,531,637	137,658,183	-	34,414,546	172,072,729	1,450,000	48,180,364	-	216,097,198
AWT SYSTEM Subtotal	**339,711,979**	**-**	**84,927,995**	**424,639,973**	**1,511,960**	**106,537,983**	**532,689,916**	**3,981,520**	**109,953,177**	**54,546,219**	**623,536,806**
Early Action Plans											
Early Action Plans Subtotal	-	-	-	-	-	-	189,300,000	1,300,000	24,900,000	27,200,000	208,800,000
Total without WaterShed Improvements	**773,210,190**	**84,466,805**	**213,597,331**	**1,071,274,327**	**12,093,690**	**270,842,004**	**1,543,510,021**	**10,811,614**	**177,486,049**	**310,806,698**	**1,668,896,232**
WaterShed Improvements	**-**	**-**	**-**	**63,400,000**	**-**	**-**	**63,320,000**	**130,000**	**-**	**-**	**64,720,000**
Total with WaterShed Improvements	**773,210,190**	**84,466,805**	**213,597,331**	**1,134,674,327**	**12,093,690**	**270,842,004**	**1,606,830,021**	**10,941,614**	**177,486,049**	**310,806,698**	**1,733,616,232**

PRELIMINARY COST ESTIMATES FOR SYSTEM-WIDE PLAN ONE — 2

Cost Item	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
TRIBUTARIES											
Fall Creek	131,620,973	11,568,673	35,797,412	178,987,058	2,228,587	45,303,911	226,519,556	620,663	-	80,639,158	207,967,234
Pogues Run	75,107,835	21,957,659	23,029,704	120,095,198	2,645,261	30,685,115	153,425,574	910,444	14,204,758	35,875,911	160,547,698
Pleasant Run	83,791,795	35,545,787	29,834,396	149,171,978	2,094,485	37,816,616	189,083,078	470,129	-	51,969,438	177,939,307
Eagle Creek	26,387,314	11,497,177	9,471,123	47,355,613	999,824	12,088,859	60,444,297	169,285	-	16,737,845	57,062,275
TRIBUTARIES Subtotal	**316,907,917**	**80,569,296**	**98,132,634**	**495,609,847**	**7,968,157**	**125,894,501**	**629,472,505**	**2,170,521**	**14,204,758**	**185,222,352**	**603,516,514**
CENTRAL System											
Upper White	22,338,502	7,203,469	7,385,493	36,927,463	144,767	9,268,058	46,340,288	847,326	11,382,345	1,505,130	62,109,210
Lower White	373,548,072	35,851,867	102,349,985	511,749,924	7,838,717	129,897,160	649,485,800	4,069,288	24,034,009	207,386,779	644,008,990
CENTRAL System Subtotal	**395,886,573**	**43,055,336**	**109,735,477**	**548,677,387**	**7,983,483**	**139,165,218**	**695,826,088**	**4,916,613**	**35,416,355**	**208,891,909**	**706,118,201**
AWT SYSTEM											
Interplant Connection	88,390,432	-	22,097,608	110,488,040	1,511,960	28,000,000	140,000,000	361,520	-	54,546,219	126,775,108
Southport AWT	141,195,000	-	35,298,750	176,493,750	-	44,123,438	220,617,188	2,282,500	61,772,813	-	281,968,062
Belmont AWT	110,126,547	-	27,531,637	137,658,183	-	34,414,546	172,072,729	1,422,500	48,180,364	-	215,778,549
AWT SYSTEM Subtotal	**339,711,979**	**-**	**84,927,995**	**424,639,973**	**1,511,960**	**106,537,983**	**532,689,916**	**4,066,520**	**109,953,177**	**54,546,219**	**624,521,720**
Early Action Plans											
Early Action Plans Subtotal	-	-	-	-	-	-	189,300,000	1,300,000	24,900,000	27,200,000	208,800,000
Total without WaterShed Improvements	**1,052,506,469**	**123,624,633**	**292,796,106**	**1,468,927,207**	**17,463,601**	**371,597,702**	**2,047,288,510**	**12,453,655**	**184,474,289**	**475,860,481**	**2,142,956,435**
WaterShed Improvements	**-**	**-**	**-**	**63,400,000**	**-**	**-**	**63,320,000**	**130,000**	**-**	**-**	**64,720,000**
Total with WaterShed Improvements	**1,052,506,469**	**123,624,633**	**292,796,106**	**1,532,327,207**	**17,463,601**	**371,597,702**	**2,110,608,510**	**12,583,655**	**184,474,289**	**475,860,481**	**2,207,676,435**

System Summary

PRELIMINARY COST ESTIMATES FOR SYSTEM-WIDE PLAN ONE			0.5								
Cost Item	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
TRIBUTARIES											
Fall Creek	258,136,041	20,286,400	69,605,610	348,028,051	4,994,921	88,255,743	441,278,715	1,157,561	-	159,314,533	403,830,401
Pogues Run	126,562,877	41,307,617	39,989,963	207,860,457	3,131,723	52,748,045	263,740,226	2,286,416	17,922,861	62,361,163	280,451,435
Pleasant Run	124,975,958	53,666,818	44,660,694	223,303,470	2,448,005	56,437,869	282,189,345	702,895	-	77,033,457	265,740,983
Eagle Creek	33,015,707	14,413,670	11,857,344	59,286,722	999,824	15,071,636	75,358,182	206,570	-	20,714,881	71,138,516
TRIBUTARIES Subtotal	**542,690,583**	**129,674,505**	**166,113,612**	**838,478,700**	**11,574,474**	**212,513,294**	**1,062,566,468**	**4,353,442**	**17,922,861**	**319,424,033**	**1,021,161,336**
CENTRAL System											
Upper White	33,532,188	10,856,791	11,097,245	55,486,223	231,341	13,929,391	69,646,954	1,200,566	16,332,482	2,962,166	91,840,734
Lower White	586,173,097	53,163,854	159,834,238	799,171,188	11,663,792	202,708,745	1,013,543,725	5,167,205	26,551,633	336,171,156	981,096,767
CENTRAL System Subtotal	**619,705,284**	**64,020,644**	**170,931,482**	**854,657,411**	**11,895,133**	**216,638,136**	**1,083,190,679**	**6,367,771**	**42,884,115**	**339,133,322**	**1,072,937,501**
AWT SYSTEM											
Interplant Connection	88,390,432	-	22,097,608	110,488,040	1,511,960	28,000,000	140,000,000	361,520	-	54,546,219	126,775,108
Southport AWT	159,642,000	-	39,910,500	199,552,500	-	49,888,125	249,440,625	2,349,000	69,843,375	-	316,046,783
Belmont AWT	110,126,547	-	27,531,637	137,658,183	-	34,414,546	172,072,729	1,422,500	48,180,364	-	215,778,549
AWT SYSTEM Subtotal	**358,158,979**	**-**	**89,539,745**	**447,698,723**	**1,511,960**	**112,302,671**	**561,513,354**	**4,133,020**	**118,023,739**	**54,546,219**	**658,600,441**
Early Action Plans											
Early Action Plans Subtotal				-			189,300,000	1,300,000	24,900,000	27,200,000	208,800,000
Total without WaterShed Improvements	**1,520,554,845**	**193,695,150**	**426,584,839**	**2,140,834,834**	**24,981,567**	**541,454,100**	**2,896,570,501**	**16,154,233**	**203,730,715**	**740,303,575**	**2,961,499,278**
WaterShed Improvements	**-**	**-**	**-**	**63,400,000**	**-**	**-**	**63,320,000**	**130,000**	**-**	**-**	**64,720,000**
Total with WaterShed Improvements	**1,520,554,845**	**193,695,150**	**426,584,839**	**2,204,234,834**	**24,981,567**	**541,454,100**	**2,959,890,501**	**16,284,233**	**203,730,715**	**740,303,575**	**3,026,219,278**



	Construction Cost ($)	Project Cost ($)	Present Worth ($)
12	901,458,746	1,314,363,051	1,442,841,739
6	1,036,567,033	1,483,657,521	1,611,438,871
4	1,134,674,327	1,606,830,021	1,733,616,232
2	1,532,327,207	2,110,608,510	2,207,676,435
0.5	2,204,234,834	2,959,890,501	3,026,219,278

Fall Creek

Number of Events	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
Level of Control Cost Summary											
	$ 92,285,926	$ 7,309,864	$ 24,898,947	$ 124,494,737	$ 2,183,009	$ 31,669,437	$ 158,347,183	$ 450,232	$ -	$ 56,992,552	$ 145,369,230
0.5	$ 258,136,041	$ 20,286,400	$ 69,605,610	$ 348,028,051	$ 4,994,921	$ 88,255,743	$ 441,278,715	$ 1,157,561	$ -	$ 159,314,533	$ 403,830,401
2	$ 131,620,973	$ 11,568,673	$ 35,797,412	$ 178,987,058	$ 2,228,587	$ 45,303,911	$ 226,519,556	$ 620,663	$ -	$ 80,639,158	$ 207,967,234
4	$ 114,924,203	$ 9,659,016	$ 31,145,805	$ 155,729,025	$ 2,224,570	$ 39,488,399	$ 197,441,993	$ 547,969	$ -	$ 70,617,079	$ 181,246,904
6	$ 104,250,771	$ 8,224,859	$ 28,118,907	$ 140,594,537	$ 2,186,768	$ 35,695,326	$ 178,476,632	$ 500,556	$ -	$ 64,175,219	$ 163,788,720
12	$ 92,285,926	$ 7,309,864	$ 24,898,947	$ 124,494,737	$ 2,183,009	$ 31,669,437	$ 158,347,183	$ 450,232	$ -	$ 56,992,552	$ 145,369,230

Pogues Run

Number of Events	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
Level of Control Cost Summary											
	$ 37,469,335	$ 10,428,059	$ 11,745,055	$ 59,642,449	$ 1,678,439	$ 15,330,222	$ 76,651,111	$ 399,841	$ 5,020,598	$ 22,992,941	$ 76,780,402
0.5	$ 126,562,877	$ 41,307,617	$ 39,989,963	$ 207,860,457	$ 3,131,723	$ 52,748,045	$ 263,740,226	$ 2,286,416	$ 17,922,861	$ 62,361,163	$ 280,451,435
2	$ 75,107,835	$ 21,957,659	$ 23,029,704	$ 120,095,198	$ 2,645,261	$ 30,685,115	$ 153,425,574	$ 910,444	$ 14,204,758	$ 35,875,911	$ 160,547,698
4	$ 55,412,208	$ 15,496,354	$ 16,905,223	$ 87,813,785	$ 1,944,682	$ 22,439,617	$ 112,198,084	$ 640,750	$ 9,884,778	$ 28,327,202	$ 116,164,248
6	$ 48,228,858	$ 13,845,019	$ 15,224,265	$ 77,298,142	$ 1,885,303	$ 19,795,861	$ 98,979,307	$ 563,580	$ 8,379,038	$ 25,726,289	$ 102,030,854
12	$ 37,469,335	$ 10,428,059	$ 11,745,055	$ 59,642,449	$ 1,678,439	$ 15,330,222	$ 76,651,111	$ 399,841	$ 5,020,598	$ 22,992,941	$ 76,780,402

Pleasant Run

Number of Events	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
Level of Control Cost Summary											
	$ 22,219,464	$ 8,470,993	$ 7,672,614	$ 38,363,071	$ 1,718,978	$ 10,020,512	$ 50,102,562	$ 122,678	$ -	$ 14,650,533	$ 46,846,872
0.5	$ 124,975,958	$ 53,666,818	$ 44,660,694	$ 223,303,470	$ 2,448,005	$ 56,437,869	$ 282,189,345	$ 702,895	$ -	$ 77,033,457	$ 265,740,983
2	$ 83,791,795	$ 35,545,787	$ 29,834,396	$ 149,171,978	$ 2,094,485	$ 37,816,616	$ 189,083,078	$ 470,129	$ -	$ 51,969,438	$ 177,939,307
4	$ 57,651,332	$ 24,043,983	$ 20,423,829	$ 102,119,144	$ 2,011,261	$ 26,032,601	$ 130,163,007	$ 322,829	$ -	$ 36,201,937	$ 122,346,218
6	$ 43,868,716	$ 17,979,632	$ 15,462,087	$ 77,310,434	$ 1,828,278	$ 19,784,678	$ 98,923,390	$ 244,730	$ -	$ 27,749,384	$ 92,900,132
12	$ 22,219,464	$ 8,470,993	$ 7,672,614	$ 38,363,071	$ 1,718,978	$ 10,020,512	$ 50,102,562	$ 122,678	$ -	$ 14,650,533	$ 46,846,872

Eagle Creek

Number of Events	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
Level of Control Cost Summary											
	$ 7,467,687	$ 3,172,541	$ 2,660,057	$ 13,300,285	$ 856,992	$ 3,539,319	$ 17,696,596	$ 62,416	$ -	$ 5,243,237	$ 16,745,915
0.5	$ 33,015,707	$ 14,413,670	$ 11,857,344	$ 59,286,722	$ 999,824	$ 15,071,636	$ 75,358,182	$ 206,570	$ -	$ 20,714,881	$ 71,138,516
2	$ 26,387,314	$ 11,497,177	$ 9,471,123	$ 47,355,613	$ 999,824	$ 12,088,859	$ 60,444,297	$ 169,285	$ -	$ 16,737,845	$ 57,062,275
4	$ 13,652,448	$ 5,893,836	$ 4,886,571	$ 24,432,854	$ 999,824	$ 6,358,170	$ 31,790,848	$ 97,651	$ -	$ 9,096,925	$ 30,018,158
6	$ 10,051,194	$ 4,309,284	$ 3,590,120	$ 17,950,598	$ 856,992	$ 4,701,898	$ 23,509,488	$ 76,948	$ -	$ 6,793,341	$ 22,232,324
12	$ 7,467,687	$ 3,172,541	$ 2,660,057	$ 13,300,285	$ 856,992	$ 3,539,319	$ 17,696,596	$ 62,416	$ -	$ 5,243,237	$ 16,745,915

Upper White

Number of Events	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
Level of Control Final Cost Summary											
	$ 4,965,459	$ 1,606,046	$ 1,642,876	$ 8,214,381	$ 27,662	$ 2,060,511	$ 10,302,553	$ 164,702	$ 2,567,272	$ 301,894	$ 13,565,175
0.5	$ 33,532,188	$ 10,856,791	$ 11,097,245	$ 55,486,223	$ 231,341	$ 13,929,391	$ 69,646,954	$ 1,200,566	$ 16,332,482	$ 2,962,166	$ 91,840,734
2	$ 22,338,502	$ 7,203,469	$ 7,385,493	$ 36,927,463	$ 144,767	$ 9,268,058	$ 46,340,288	$ 847,326	$ 11,382,345	$ 1,505,130	$ 62,109,210
4	$ 13,804,462	$ 4,448,229	$ 4,563,173	$ 22,815,864	$ 78,738	$ 5,723,650	$ 28,618,252	$ 577,277	$ 7,451,388	$ 555,219	$ 39,340,242
6	$ 8,959,509	$ 2,895,353	$ 2,963,715	$ 14,818,577	$ 53,028	$ 3,717,901	$ 18,589,506	$ 371,761	$ 4,819,883	$ 383,315	$ 25,498,155
12	$ 4,965,459	$ 1,606,046	$ 1,642,876	$ 8,214,381	$ 27,662	$ 2,060,511	$ 10,302,553	$ 164,702	$ 2,567,272	$ 301,894	$ 13,565,175

Central System

Number of Events	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
Level of Control Cost Summary											
	$ 125,417,093	$ 21,848,637	$ 36,816,432	$ 184,082,162	$ 3,358,654	$ 46,860,204	$ 234,301,020	$ 3,219,098	$ 26,551,633	$ 51,412,416	$ 270,190,268
0.5	$ 586,173,097	$ 53,163,854	$ 159,834,238	$ 799,171,188	$ 11,663,792	$ 202,708,745	$ 1,013,543,725	$ 5,167,205	$ 26,551,633	$ 336,171,156	$ 981,096,767
2	$ 373,548,072	$ 35,851,867	$ 102,349,985	$ 511,749,924	$ 7,838,717	$ 129,897,160	$ 649,485,800	$ 4,069,288	$ 24,034,009	$ 207,386,779	$ 644,008,990
4	$ 178,053,559	$ 24,925,387	$ 50,744,736	$ 253,723,682	$ 3,322,654	$ 64,261,584	$ 321,307,920	$ 3,343,617	$ 25,296,706	$ 84,262,116	$ 347,443,657
6	$ 157,499,822	$ 23,662,745	$ 45,290,642	$ 226,453,208	$ 3,340,654	$ 57,448,466	$ 287,242,328	$ 3,305,165	$ 25,925,106	$ 71,294,991	$ 317,427,337
12	$ 125,417,093	$ 21,848,637	$ 36,816,432	$ 184,082,162	$ 3,358,654	$ 46,860,204	$ 234,301,020	$ 3,219,098	$ 26,551,633	$ 51,412,416	$ 270,190,268

Interplant

Number of Events	Base Construction Cost	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration	Project (Capital) Cost	Annual Operation & Maintenance	Replacement Cost ($)	Residual Value @ 20 years	Present Worth ($)
Level of Control Cost Summary											
	$ 88,390,432	$ -	$ 22,097,608	$ 110,488,040	$ 1,511,960	$ 28,000,000	$ 140,000,000	$ 361,520	$ -	$ 54,546,219	$ 126,775,108
0.5	$ 88,390,432	$ -	$ 22,097,608	$ 110,488,040	$ 1,511,960	$ 28,000,000	$ 140,000,000	$ 361,520	$ -	$ 54,546,219	$ 126,775,108
2	$ 88,390,432	$ -	$ 22,097,608	$ 110,488,040	$ 1,511,960	$ 28,000,000	$ 140,000,000	$ 361,520	$ -	$ 54,546,219	$ 126,775,108
4	$ 88,390,432	$ -	$ 22,097,608	$ 110,488,040	$ 1,511,960	$ 28,000,000	$ 140,000,000	$ 361,520	$ -	$ 54,546,219	$ 126,775,108
6	$ 88,390,432	$ -	$ 22,097,608	$ 110,488,040	$ 1,511,960	$ 28,000,000	$ 140,000,000	$ 361,520	$ -	$ 54,546,219	$ 126,775,108
12	$ 88,390,432	$ -	$ 22,097,608	$ 110,488,040	$ 1,511,960	$ 28,000,000	$ 140,000,000	$ 361,520	$ -	$ 54,546,219	$ 126,775,108

Southport

Number of Events	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
Level of Control Cost Summary											
	$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 1,512,500	$ 61,772,813	$ -	$ 273,045,898
0.5	$ 159,642,000	$ -	$ 39,910,500	$ 199,552,500	$ -	$ 49,888,125	$ 249,440,625	$ 2,349,000	$ 69,843,375	$ -	$ 316,046,783
2	$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 2,282,500	$ 61,772,813	$ -	$ 281,968,062
4	$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 2,170,000	$ 61,772,813	$ -	$ 280,664,499
6	$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 1,832,500	$ 61,772,813	$ -	$ 276,753,810
12	$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 1,512,500	$ 61,772,813	$ -	$ 273,045,898

Belmont

Number of Events	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
Level of Control Cost Summary											
	$ 98,383,897	$ -	$ 24,595,974	$ 122,979,871	$ -	$ 30,744,968	$ 153,724,838	$ 1,895,000	$ 43,042,955	$ -	$ 200,002,871
0.5	$ 110,126,547	$ -	$ 27,531,637	$ 137,658,183	$ -	$ 34,414,546	$ 172,072,729	$ 1,422,500	$ 48,180,364	$ -	$ 215,778,549
2	$ 110,126,547	$ -	$ 27,531,637	$ 137,658,183	$ -	$ 34,414,546	$ 172,072,729	$ 1,422,500	$ 48,180,364	$ -	$ 215,778,549
4	$ 110,126,547	$ -	$ 27,531,637	$ 137,658,183	$ -	$ 34,414,546	$ 172,072,729	$ 1,450,000	$ 48,180,364	$ -	$ 216,097,198
6	$ 105,407,797	$ -	$ 26,351,949	$ 131,759,746	$ -	$ 32,939,936	$ 164,699,682	$ 1,705,000	$ 46,115,911	$ -	$ 210,512,431
12	$ 98,383,897	$ -	$ 24,595,974	$ 122,979,871	$ -	$ 30,744,968	$ 153,724,838	$ 1,895,000	$ 43,042,955	$ -	$ 200,002,871

F A L L C R E E K W A T E R S H E D ***Plan One***

CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**12**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	FC-1																			
1	Regulator Modification	21						$ 62,912	$ 1,321,148	$ 422,768	$ 435,979	$ 2,179,895	$ -	$ 544,974	$ 2,724,869	$ -	$ -	$ 660,574	$ 2,513,980	40
2	Interceptor Connection	21						125,824	2,642,297	845,535	871,958	4,359,790	$ -	1,089,947	5,449,737	$ -	$ -	$ 1,321,148	$ 5,027,960	40
3	Deep Tunnel		VFC-1	40.0	20 ft	18,577		4,561	84,731,243	4,660,218	22,347,865	111,739,326	$ 1,919,013.13	28,414,585	142,072,924	$ 366,702	$ -	$ 52,757,759	$ 129,479,048	50
4	Regulator	1						524,265	524,265	167,765	173,008	865,038	$ -	216,259	1,081,297	$ 14,223	$ -	$ 262,133	$ 1,162,419	40
	CSO 216																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 216	14.7		30	1,650		$ 123	$ 202,419	$ 89,064	$ 72,871	$ 364,354	$ 47,346.31	$ 102,925	$ 514,625	$ 12,807	$ -	$ 168,798	$ 609,129	50
	CSO 135																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 135	43.3		48	700		$ 262	$ 183,493	$ 80,737	$ 66,057	$ 330,287	$ 24,104	$ 88,598	$ 442,988	$ 12,627	$ -	$ 134,199	$ 546,463	50
	CSO 141																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 141	43.3		48	2,000		$ 262	$ 524,265	$ 230,677	$ 188,735	$ 943,677	$ 68,867	$ 253,136	$ 1,265,681	$ 14,684	$ -	$ 383,427	$ 1,313,421	50
	CSO 066																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 066	52.4		60	655		$ 285	$ 186,806	$ 82,195	$ 67,250	$ 336,251	$ 22,554	$ 89,701	$ 448,507	$ 12,641	$ -	$ 134,638	$ 552,001	50
	CSO 050 & 050A																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	CSO 050 & 050A	56.0		60	2,937		$ 285	$ 837,576	$ 368,534	$ 301,527	$ 1,507,637	$ 101,125	$ 402,191	$ 2,010,953	$ 16,547	$ -	$ 603,671	$ 2,009,969	50
					ALTERNATIVE TOTAL				$ 92,285,926	$ 7,309,864	$ 24,898,947	$ 124,494,737	$ 2,183,009	$ 31,669,437	$ 158,347,183	$ 450,232	$ -	$ 56,992,552	$ 145,369,230	

POUGES RUN W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**12**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
Upper Pogues																				
	PgR-1																			
1	Regulator Modification	3						$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	40
2	Interceptor Connection	3						$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	40
3	Interceptor (Sewer Construction)	QPgR-1	0.0		0	5,783		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	50
	PgR-2																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QPgR-2	50.0		60	3,216		$ 44	$ 917,176	$ 62,698	$ 15,674	$ 995,548	$ 110,735	$ 276,571	$ 1,382,854	$ 14,977	$ -	$ 661,041	$ 1,345,360	50
4	Mechanical Screens		50.0					$ 0.04	$ 2,106,247	$ 673,999	$ 695,061	$ 3,475,307	$ -	$ 868,827	$ 4,344,134	$ 18,740	$ 1,216,357	$ -	$ 5,248,548	10
5	Pumping Facilities		50.0					$ 0.13	$ 6,587,429	$ 2,107,977	$ 2,173,852	$ 10,869,258	$ -	$ 2,717,314	$ 13,586,572	$ 204,763	$ 3,804,240	$ -	$ 18,108,693	10
6	Subsurface Storage		VPgR-2	4.0				$ 1.41	$ 5,630,981	$ 1,801,914	$ 1,858,224	$ 9,291,118	$ 81,845	$ 2,343,241	$ 11,716,204	$ 40,811	$ -	$ 2,897,335	$ 11,264,109	40
	CSO 017																			
1	Total separation							$ 133,000	$ 19,019,000	$ 4,754,750	$ 5,943,438	$ 29,717,188	$ 1,485,859	$ 7,800,762	$ 39,003,808	$97,510	$ -	$ 17,830,313	$ 34,441,343	50
Lower Pogues																				
	PgR-4																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-4	35.0		0	8,167		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,520	$ -	$ -	$ 133,485	50
	PgR-5																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-5	90.0		0	7,650		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,520	$ -	$ -	$ 133,485	50
					ALTERNATIVE TOTAL				$ 37,469,335	$ 10,428,059	$ 11,745,055	$ 59,642,449	$ 1,678,439	$ 15,330,222	$ 76,651,111	$ 399,841	$ 5,020,598	$ 22,992,941	$ 76,780,402	

PLEASANT RUN W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**12**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	+ Project (Capital) Cost ($)	+ Annual Operation & Maintenance Cost ($)	+ Replacement Cost ($)	- Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	PgR-1																			
1	Regulator Modification	23						$ 62,912	$ 1,446,972	$ 463,031	$ 477,501	$ 2,387,504	$ -	$ 596,876	$ 2,984,380	$ -	$ -	$ 723,486	$ 2,753,407	40
2	Interceptor Connection	23						$ 125,824	$ 2,893,944	$ 926,062	$ 955,002	$ 4,775,008	$ -	$ 1,193,752	$ 5,968,760	$ -	$ -	$ 1,446,972	$ 5,506,813	40
3	Interceptor (Sewer Construction)	QPIR-1	35.0		42	23,510		$ 201	$ 4,732,963	$ 2,082,504	$ 1,703,867	$ 8,519,333	$ 809,532	$ 2,332,216	$ 11,661,082	$ 40,673	$ -	$ 3,649,310	$ 10,967,322	50
	PgR-2																			
1	Regulator Modification	18						$ 62,912	$ 1,132,413	$ 362,372	$ 373,696	$ 1,868,481	$ -	$ 467,120	$ 2,335,602	$ -	$ -	$ 566,206	$ 2,154,840	40
2	Interceptor Connection	18						$ 125,824	$ 2,264,826	$ 724,744	$ 747,393	$ 3,736,963	$ -	$ 934,241	$ 4,671,203	$ -	$ -	$ 1,132,413	$ 4,309,680	40
3	Interceptor (Sewer Construction)	QPIR-2	60.0		60	10,671		$ 285	$ 3,043,258	$ 1,339,034	$ 1,095,573	$ 5,477,865	$ 367,428	$ 1,461,323	$ 7,306,616	$ 29,787	$ -	$ 2,193,383	$ 6,951,521	50
	CSO 017																			
1	Total separation							$ 133,000	$ 1,729,000	$ 570,570	$ 574,893	$ 2,874,463	$ 143,723	$ 754,546	$ 3,772,732	$9,432	$ -	$ 1,724,677	$ 3,331,419	50
	PgR-3																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QBW	105.0		72	8,375		$ 366	$ 3,064,577	$ 1,348,414	$ 1,103,248	$ 5,516,239	$ 288,368	$ 1,451,152	$ 7,255,759	$ 29,659	$ -	$ 2,127,115	$ 6,920,347	50
	BW																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QPIR-3	3.0		15	3,831		$ 56	$ 212,891	$ 110,703	$ 80,899	$ 404,493	$ 109,927	$ 128,605	$ 643,025	$ 13,128	$ -	$ 237,661	$ 719,264	50
					ALTERNATIVE TOTAL				$ 22,219,464	$ 8,470,993	$ 7,672,614	$ 38,363,071	$ 1,718,978	$ 10,020,512	$ 50,102,562	$ 122,678	$ -	$ 14,650,533	$ 46,846,872	

EAGLE CREEK W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**12**
Planning Period:	20
Discount Rate:	5.875%

															+	+	+	-		
Item No.	**Item Description**	**No. of Regulators**	**Flowrate (MGD)**	**Volume (MG)**	**Pipe Diameter (inches)**	**Pipe Length (feet)**	**Land (acres)**	**Unit Cost ($)**	**Base Construction Cost ($)**	**Site Adjustment ($)**	**Construction Contingency (25%)**	**Construction Cost ($)**	**Land Costs ($)**	**Engineering, Legal & Administration (25%)**	**Project (Capital) Cost ($)**	**Annual Operation & Maintenance Cost ($)**	**Replacement Cost ($)**	**Residual Value @ 20 years ($)**	**Present Worth ($)**	**Asset Life (years)**
	EC-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QEC-1	45.0		48	13,091		$ 262	$ 3,431,447	$ 1,509,837	$ 1,235,321	$ 6,176,605	$ 450,754	$ 1,656,840	$ 8,284,199	$ 32,230	$ -	$ 2,509,622	$ 7,856,463	50
	EC-2																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QEC-2	45.0		48	11,798		$ 262	$ 3,092,562	$ 1,360,727	$ 1,113,322	$ 5,566,612	$ 406,238	$ 1,493,213	$ 7,466,063	$ 30,185	$ -	$ 2,261,776	$ 7,093,752	50
					ALTERNATIVE TOTAL				$ 7,467,687	$ 3,172,541	$ 2,660,057	$ 13,300,285	$ 856,992	$ 3,539,319	$ 17,696,596	$ 62,416	$ -	$ 5,243,237	$ 16,745,915	

UPPER WHITE W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%

Untreated Overflows / Year:	12	Planning Period:	20	Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	UW-2																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	251,647	80,527	83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QUW-1	17.0		36	900		$ 158	$ 142,495	$ 62,698	$ 51,298	$ 256,492	$ 25,825	$ 70,579	$ 352,896	$ 12,402	$ -	$ 111,322	$ 461,064	50
4	Mechanical Screens		17.0					$ 0.05	$ 848,293	$ 271,454	$ 279,937	$ 1,399,684	$ -	$ 349,921	$ 1,749,605	$ 14,445	$ 489,889	$ -	$ 2,193,777	10
5	Pumping Facilities		17.0	Delta V	Requied V			$ 0.18	$ 3,082,316	$ 986,341	$ 1,017,164	$ 5,085,821	$ -	$ 1,271,455	$ 6,357,276	$ 99,497	$ 1,780,037	$ -	$ 8,515,935	10
6	Subsurface Storage		VUW-2	0.0	1.0			#DIV/0!	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	40
7	Chlorination	QUW-1	2.0					$ 0.13	$ 257,442	$ 82,381	$ 84,956	$ 424,779	$ 918	$ 106,424	$ 532,121	$ 19,179	$ 148,673	$ 918	$ 838,059	10
8	Dechlorination		2.0					$ 0.13	$ 257,442	$ 82,381	$ 84,956	$ 424,779	$ 918	$ 106,424	$ 532,121	$ 19,179	$ 148,673	$ 918	$ 838,059	10
					ALTERNATIVE TOTAL				$ 4,965,459	$ 1,606,046	$ 1,642,876	$ 8,214,381	$ 27,662	$ 2,060,511	$ 10,302,553	$ 164,702	$ 2,567,272	$ 301,894	$ 13,565,175	

CENTRAL SYSTEM W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**12**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	LW-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QLW-1	40.0		48	4,266		$ 262	$ 1,118,153	$ 491,987	$ 402,535	$ 2,012,675	$ 146,880	$ 539,889	$ 2,699,445	$ 18,269	$ -	$ 817,772	$ 2,650,053	50
	LW-2																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QLW-2	35.0		42	9,264		$ 201	$ 1,864,968	$ 820,586	$ 671,389	$ 3,356,943	$ 318,987	$ 918,982	$ 4,594,912	$ 23,007	$ -	$ 1,437,968	$ 4,402,431	50
	CS-2																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Deep Tunnel		VCS-2	0.5	14 ft	10,091		3,649	36,819,451	2,025,070	9,711,130	$ 48,555,651	$ 1,042,369	$ 12,399,505	$ 61,997,526	$ 166,514	$ -	$ 23,134,040	$ 56,541,406	50
	OO8																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Deep Tunnel		0.0	0.0	0 ft	5,500		-	-	-	-	$ -	$ -	$ -	$ -	$ 11,520	$ -	$ -	$ 133,485	50
	CSO 046																			
1	Total separation							$ 133,000	$ 2,793,000	$ 921,690	$ 928,673	$ 4,643,363	$ 232,168	$ 1,218,883	$ 6,094,413	$15,236	$ -	$ 2,618,437	$ 5,435,019	50
	CS-3																			
1	Regulator Modification	6						$ 62,912	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
2	Interceptor Connection	6						$ 125,824	$ 754,942	$ 241,581	$ 249,131	$ 1,245,654	$ -	$ 311,414	$ 1,557,068	$ -	$ -	$ 377,471	$ 1,436,560	40
3	Deep Tunnel		VCS-3	20.0	14 ft	9,218		3,649	33,636,163	1,849,989	8,871,538	$ 44,357,690	$ 952,250	$ 11,327,485	$ 56,637,424	$ 153,114	$ -	$ 21,133,947	$ 51,664,563	50
4	Mechanical Screens		185.0					$ 0.03	$ 6,346,047	$ 2,030,735	$ 2,094,196	$ 10,470,978	$ -	$ 2,617,744	$ 13,088,722	$ 47,198	$ 3,664,842	$ -	$ 15,706,335	10
5	Deep Pumping Facilities		185.0					$ 0.21	$ 39,630,807	$ 12,681,858	$ 13,078,166	$ 65,390,832	$ 666,000	$ 16,514,208	$ 82,571,039	$ 2,784,240	$ 22,886,791	$ 666,000	$ 127,551,596	10
					ALTERNATIVE TOTAL				$ 125,417,093	$ 21,848,637	$ 36,816,432	$ 184,082,162	$ 3,358,654	$ 46,860,204	$ 234,301,020	$ 3,219,098	$ 26,551,633	$ 51,412,416	$ 270,190,268	

AWT and Interplant ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

Untreated Overflows / Year: 12	Planning Period: 20	Discount Rate: 5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	Interplant																			
1	Interceptor (Sewer Construction)	QSAWTP	185.0		144	32,932		**$ 2,684**	**$ 88,390,432**		**$ 22,097,608**	**$ 110,488,040**	**$ 1,511,960**	**$ 28,000,000**	**$ 140,000,000**	**$ 361,520**	**$ -**	**$ 54,546,219**	**$ 126,775,108**	**50**
	SOUTHPORT AWT																			
1	Raw Wastewater (Captured CSO) Pump Station for EHRC (75-MGD firm capacity)								$ 8,376,300		$ 2,094,075	$ 10,470,375	$ -	$ 2,617,594	$ 13,087,969		$ 3,664,631	$ -	$ 15,158,568	10
2	New 354-MGD Headworks Facility w/ Screening								$ 29,079,200		$ 7,269,800	$ 36,349,000	$ -	$ 9,087,250	$ 45,436,250		$ 12,722,150	$ -	$ 52,624,551	10
3	New 354-MGD Grit Removal Facility with blending and flow split								$ 8,754,000		$ 2,188,500	$ 10,942,500	$ -	$ 2,735,625	$ 13,678,125		$ 3,829,875	$ -	$ 15,842,091	10
4	New 125-MGD/275-MGD Primary Clarifiers								$ 33,184,000		$ 8,296,000	$ 41,480,000	$ -	$ 10,370,000	$ 51,850,000		$ 14,518,000	$ -	$ 60,052,997	10
5	New 15-MG EHRC Basin w/ grit removal and primary settling		0.0						$ -		$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	10
6	New 75-MGD EHRC Facility		0.0						$ -		$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	10
7	EHRC Annual O&M		0.0									$ -			$ -	$ -	$ -		$ -	10
8	New ANS Aeration Equipment								$ 5,100,000		$ 1,275,000	$ 6,375,000	$ -	$ 1,593,750	$ 7,968,750		$ 2,231,250	$ -	$ 9,229,457	10
9	New ANS Return Activated Sludge (RAS) Pumping								$ 3,778,000		$ 944,500	$ 4,722,500	$ -	$ 1,180,625	$ 5,903,125		$ 1,652,875	$ -	$ 6,837,037	10
10	New ANS Final Clarifiers (8 units each @ 155' diameter)								$ 35,041,400		$ 8,760,350	$ 43,801,750	$ -	$ 10,950,438	$ 54,752,188		$ 15,330,613	$ -	$ 63,414,329	10
11	New Effluent Pump Station on ANS (154-MGD firm capacity)								$ 3,865,600		$ 966,400	$ 4,832,000	$ -	$ 1,208,000	$ 6,040,000		$ 1,691,200	$ -	$ 6,995,566	10
12	New 15 MG – Sec. Effluent Equalization Basin w/Aerators								$ 3,608,000		$ 902,000	$ 4,510,000	$ -	$ 1,127,500	$ 5,637,500		$ 1,578,500	$ -	$ 6,529,388	10
13	Add Supplemental Disinfection Process (chlorination /dechlor.)								$ 4,656,000		$ 1,164,000	$ 5,820,000	$ -	$ 1,455,000	$ 7,275,000		$ 2,037,000	$ -	$ 8,425,951	10
14	Yard Piping and Valves								$ 5,752,500		$ 1,438,125	$ 7,190,625	$ -	$ 1,797,656	$ 8,988,281		$ 2,516,719	$ -	$ 10,410,284	10
15	Wet Weather Secondary Annual O&M		6,050.0									$ -	$ -	$ -	$ -	$ 1,512,500	$ -	$ -	$ 17,525,680	10
									$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 1,512,500	$ 61,772,813	$ -	$ 273,045,898	
	Belmont AWT																			
1	New Headworks Facility with Screens		160.0						$15,661,800		$ 3,915,450	$ 19,577,250	$ -	$ 4,894,313	$ 24,471,563		$ 6,852,038	$ -	$ 28,343,118	10
2	New Grit Facility w/ Flow Split		160						$3,063,515		$ 765,879	$ 3,829,394	$ -	$ 957,348	$ 4,786,742		$ 1,340,288	$ -	$ 5,544,035	10
3	New Intermediate Clarifiers								$36,168,000		$ 9,042,000	$ 45,210,000	$ -	$ 11,302,500	$ 56,512,500		$ 15,823,500	$ -	$ 65,453,134	10
4	New Return Sludge Pumping								$9,247,500		$ 2,311,875	$ 11,559,375	$ -	$ 2,889,844	$ 14,449,219		$ 4,045,781	$ -	$ 16,735,176	10
5	Effluent Disinfection - Chlorination/Dechlorination								$8,310,000		$ 2,077,500	$ 10,387,500	$ -	$ 2,596,875	$ 12,984,375		$ 3,635,625	$ -	$ 15,038,585	10
6	Belmont Anaerobic Digestor Facility BE-78-001								**$18,688,000**		**$ 4,672,000**	**$ 23,360,000**	**$ -**	**$ 5,840,000**	**$ 29,200,000**		**$ 8,176,000**	**$ -**	**$ 33,819,624**	**10**
7	Yard Piping and Valves								$7,245,082		$ 1,811,270	$ 9,056,352	$ -	$ 2,264,088	$ 11,320,440		$ 3,169,723	$ -	$ 13,111,405	10
8	Annual O&M		7,580.00									$ -	$ -	$ -	$ -	$ 1,895,000	$ -	$ -	$ 21,957,794	10
					ALTERNATIVE TOTAL				$ 98,383,897	$ -	$ 24,595,974	$ 122,979,871	$ -	$ 30,744,968	$ 153,724,838	$ 1,895,000	$ 43,042,955	$ -	$ 200,002,871	

F A L L C R E E K W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**6**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	FC-1																			
1	Regulator Modification	21						$ 62,912	$ 1,321,148	$ 422,768	$ 435,979	$ 2,179,895	$ -	$ 544,974	$ 2,724,869	$ -	$ -	$ 660,574	$ 2,513,980	40
2	Interceptor Connection	21						125,824	2,642,297	845,535	871,958	4,359,790	$ -	1,089,947	5,449,737	$ -	$ -	$ 1,321,148	$ 5,027,960	40
3	Deep Tunnel		VFC-1	62.0	24 ft	18,577		5,169	96,028,742	5,281,581	25,327,581	126,637,903	$ 1,919,013.13	32,139,229	160,696,146	$ 413,260	$ -	$ 59,536,258	$ 146,477,709	50
4	Regulator	1						524,265	524,265	167,765	173,008	865,038	$ -	216,259	1,081,297	$ 14,223	$ -	$ 262,133	$ 1,162,419	40
	CSO 216																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 216	24.7		36	1,650		$ 158	$ 261,241	$ 114,946	$ 94,047	$ 470,234	$ 47,346.31	$ 129,395	$ 646,976	$ 13,137	$ -	$ 204,091	$ 734,046	50
	CSO 135																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 135	75.8		60	700		$ 285	$ 199,640	$ 87,842	$ 71,870	$ 359,352	$ 24,104	$ 95,864	$ 479,320	$ 12,718	$ -	$ 143,888	$ 580,754	50
	CSO 141																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 141	107.2		72	2,000		$ 366	$ 731,874	$ 322,025	$ 263,475	$ 1,317,374	$ 68,867	$ 346,560	$ 1,732,801	$ 15,852	$ -	$ 507,992	$ 1,754,305	50
	CSO 066																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 066	122.8		84	655		$ 511	$ 334,466	$ 147,165	$ 120,408	$ 602,038	$ 26,313	$ 157,088	$ 785,439	$ 13,484	$ -	$ 226,992	$ 869,209	50
	CSO 050 & 050A																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	CSO 050 & 050A	97.0		72	2,937		$ 366	$ 1,074,684	$ 472,861	$ 386,886	$ 1,934,432	$ 101,125	$ 508,889	$ 2,544,446	$ 17,881	$ -	$ 745,935	$ 2,513,498	50
					ALTERNATIVE TOTAL				$ 104,250,771	$ 8,224,859	$ 28,118,907	$ 140,594,537	$ 2,186,768	$ 35,695,326	$ 178,476,632	$ 500,556	$ -	$ 64,175,219	$ 163,788,720	

POUGES RUN W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**6**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
Upper Pogues																				
	PgR-1																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QPgR-1	0.0		12	5,783		$ 49	$ 284,992	$ 148,196	$ 108,297	$ 541,484	$ 165,942	$ 176,856	$ 884,282	$ 13,731	$ -	$ 336,937	$ 935,816	50
	PgR-2																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QPgR-2	100.0		72	3,216		$ 73	$ 1,176,817	$ 103,805	$ 25,951	$ 1,306,573	$ 110,735	$ 354,327	$ 1,771,635	$ 15,949	$ -	$ 816,826	$ 1,695,669	50
4	Mechanical Screens		100.0					$ 0.04	$ 3,778,136	$ 1,209,003	$ 1,246,785	$ 6,233,924	$ -	$ 1,558,481	$ 7,792,405	$ 27,240	$ 2,181,873	$ -	$ 9,340,848	10
5	Pumping Facilities		100.0					$ 0.11	$ 10,731,022	$ 3,433,927	$ 3,541,237	$ 17,706,186	$ -	$ 4,426,546	$ 22,132,732	$ 325,568	$ 6,197,165	$ -	$ 29,406,695	10
6	Subsurface Storage		VPgR-2	7.5				$ 1.26	$ 9,464,182	$ 3,028,538	$ 3,123,180	$ 15,615,900	$ 122,768	$ 3,934,667	$ 19,673,335	$ 60,703	$ -	$ 4,854,859	$ 18,826,802	40
	CSO 017																			
1	Total separation							$ 133,000	$ 19,019,000	$ 4,754,750	$ 5,943,438	$ 29,717,188	$ 1,485,859	$ 7,800,762	$ 39,003,808	$97,510	$ -	$ 17,830,313	$ 34,441,343	50
Lower Pogues																				
	PgR-4																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-4	105.0		0	8,167		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,520	$ -	$ -	$ 133,485	50
	PgR-5																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-5	240.0		0	7,650		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,520	$ -	$ -	$ 133,485	50
					ALTERNATIVE TOTAL				$ 48,228,858	$ 13,886,126	$ 15,234,542	$ 77,349,525	$ 1,885,303	$ 19,808,707	$ 99,043,536	$ 563,741	$ 8,379,038	$ 25,726,289	$ 102,096,943	

PLEASANT RUN W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	6
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	+ Project (Capital) Cost ($)	+ Annual Operation & Maintenance Cost ($)	+ Replacement Cost ($)	- Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	PgR-1																			
1	Regulator Modification	23						$ 62,912	$ 1,446,972	$ 463,031	$ 477,501	$ 2,387,504	$ -	$ 596,876	$ 2,984,380	$ -	$ -	$ 723,486	$ 2,753,407	40
2	Interceptor Connection	23						$ 125,824	$ 2,893,944	$ 926,062	$ 955,002	$ 4,775,008	$ -	$ 1,193,752	$ 5,968,760	$ -	$ -	$ 1,446,972	$ 5,506,813	40
3	Interceptor (Sewer Construction)	QPIR-1	90.0		72	23,510		$ 366	$ 8,603,146	$ 3,785,384	$ 3,097,133	$ 15,485,663	$ 809,532	$ 4,073,799	$ 20,368,994	$ 62,442	$ -	$ 5,971,420	$ 19,186,150	50
	PgR-2																			
1	Regulator Modification	18						$ 62,912	$ 1,132,413	$ 362,372	$ 373,696	$ 1,868,481	$ -	$ 467,120	$ 2,335,602	$ -	$ -	$ 566,206	$ 2,154,840	40
2	Interceptor Connection	18						$ 125,824	$ 2,264,826	$ 724,744	$ 747,393	$ 3,736,963	$ -	$ 934,241	$ 4,671,203	$ -	$ -	$ 1,132,413	$ 4,309,680	40
3	Interceptor (Sewer Construction)	QPIR-2	185.0		96	10,671		$ 1,022	$ 10,908,739	$ 4,799,845	$ 3,927,146	$ 19,635,729	$ 428,666	$ 5,016,099	$ 25,080,494	$ 74,221	$ -	$ 6,973,909	$ 23,714,089	50
	CSO 017																			
1	Total separation							$ 133,000	$ 1,729,000	$ 570,570	$ 574,893	$ 2,874,463	$ 143,723	$ 754,546	$ 3,772,732	$9,432	$ -	$ 1,724,677	$ 3,331,419	50
	PgR-3																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QBW	260.0		120	8,375		$ 1,538	$ 12,881,762	$ 5,667,975	$ 4,637,434	$ 23,187,171	$ 336,430	$ 5,880,900	$ 29,404,501	$ 85,031	$ -	$ 8,065,487	$ 27,814,867	50
	BW																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QPIR-3	10.0		24	3,831		$ 81	$ 309,295	$ 136,090	$ 111,346	$ 556,731	$ 109,927	$ 166,664	$ 833,322	$ 13,603	$ -	$ 295,504	$ 896,607	50
					ALTERNATIVE TOTAL				$ 43,868,716	$ 17,979,632	$ 15,462,087	$ 77,310,434	$ 1,828,278	$ 19,784,678	$ 98,923,390	$ 244,730	$ -	$ 27,749,384	$ 92,900,132	

EAGLE CREEK W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**6**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	+ Project (Capital) Cost ($)	+ Annual Operation & Maintenance Cost ($)	+ Replacement Cost ($)	- Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	EC-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QEC-1	80.0		72	13,091		$ 366	$ 4,790,300	$ 2,107,732	$ 1,724,508	$ 8,622,541	$ 450,754	$ 2,268,324	$ 11,341,618	$ 39,874	$ -	$ 3,324,934	$ 10,742,161	50
	EC-2																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QEC-2	80.0		72	11,798		$ 366	$ 4,317,217	$ 1,899,575	$ 1,554,198	$ 7,770,990	$ 406,238	$ 2,044,307	$ 10,221,535	$ 37,074	$ -	$ 2,996,568	$ 9,694,463	50
					ALTERNATIVE TOTAL				$ 10,051,194	$ 4,309,284	$ 3,590,120	$ 17,950,598	$ 856,992	$ 4,701,898	$ 23,509,488	$ 76,948	$ -	$ 6,793,341	$ 22,232,324	

UPPER WHITE W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**6**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	UW-2																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	251,647	80,527	83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QUW-1	35.0		48	900		$ 262	$ 235,919	$ 103,805	$ 84,931	$ 424,655	$ 30,990	$ 113,911	$ 569,556	$ 12,944	$ -	$ 172,542	$ 664,456	50
4	Mechanical Screens		35.0					$ 0.04	$ 1,559,290	$ 498,973	$ 514,566	$ 2,572,829	$ -	$ 643,207	$ 3,216,036	$ 16,658	$ 900,490	$ -	$ 3,917,853	10
5	Pumping Facilities		35.0	Delta V	Requied V			$ 0.15	$ 5,124,659	$ 1,639,891	$ 1,691,137	$ 8,455,687	$ -	$ 2,113,922	$ 10,569,609	$ 161,296	$ 2,959,491	$ -	$ 14,110,757	10
6	Subsurface Storage		VUW-2	0.0	1.0			#DIV/0!	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	40
7	Chlorination	QUW-1	25.0					$ 0.03	$ 831,085	$ 265,947	$ 274,258	$ 1,371,290	$ 11,019	$ 345,577	$ 1,727,885	$ 90,432	$ 479,951	$ 11,019	$ 3,043,404	10
8	Dechlorination		25.0					$ 0.03	$ 831,085	$ 265,947	$ 274,258	$ 1,371,290	$ 11,019	$ 345,577	$ 1,727,885	$ 90,432	$ 479,951	$ 11,019	$ 3,043,404	10
					ALTERNATIVE TOTAL				$ 8,959,509	$ 2,895,353	$ 2,963,715	$ 14,818,577	$ 53,028	$ 3,717,901	$ 18,589,506	$ 371,761	$ 4,819,883	$ 383,315	$ 25,498,155	

CENTRAL SYSTEM W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	6
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	LW-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QLW-1	65.0		60	4,266		$ 285	$ 1,216,550	$ 535,282	$ 437,958	$ 2,189,791	$ 146,880	$ 584,168	$ 2,920,839	$ 18,822	$ -	$ 876,811	$ 2,859,013	50
	LW-2																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QLW-2	55.0		60	9,264		$ 285	$ 2,642,039	$ 1,162,497	$ 951,134	$ 4,755,669	$ 318,987	$ 1,268,664	$ 6,343,320	$ 27,378	$ -	$ 1,904,210	$ 6,052,639	50
	CS-2																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Deep Tunnel		VCS-2	1.0	25 ft	10,091		5,321	53,695,033	2,953,227	14,162,065	$ 70,810,325	$ 1,042,369	$ 17,963,174	$ 89,815,868	$ 236,060	$ -	$ 33,259,389	$ 81,933,069	50
	OO8																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Deep Tunnel		0.0	0.0	0 ft	5,500		-	-	-	-	$ -	$ -	$ -	$ -	$ 11,520	$ -	$ -	$ 133,485	50
	CSO 046																			
1	Total separation							$ 133,000	$ 2,793,000	$ 921,690	$ 928,673	$ 4,643,363	$ 232,168	$ 1,218,883	$ 6,094,413	$15,236	$ -	$ 2,618,437	$ 5,435,019	50
	CS-3																			
1	Regulator Modification	6						$ 62,912	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
2	Interceptor Connection	6						$ 125,824	$ 754,942	$ 241,581	$ 249,131	$ 1,245,654	$ -	$ 311,414	$ 1,557,068	$ -	$ -	$ 377,471	$ 1,436,560	40
3	Deep Tunnel		VCS-3	66.0	25 ft	9,218		5,321	49,052,737	2,697,901	12,937,660	$ 64,688,298	$ 952,250	$ 16,410,137	$ 82,050,684	$ 216,647	$ -	$ 30,383,892	$ 74,860,947	50
4	Mechanical Screens		180.0					$ 0.03	$ 6,201,150	$ 1,984,368	$ 2,046,380	$ 10,231,898	$ -	$ 2,557,974	$ 12,789,872	$ 45,832	$ 3,581,164	$ -	$ 15,344,377	10
5	Deep Pumping Facilities		180.0					$ 0.21	$ 38,690,809	$ 12,381,059	$ 12,767,967	$ 63,839,835	$ 648,000	$ 16,121,959	$ 80,609,794	$ 2,733,670	$ 22,343,942	$ 648,000	$ 124,703,408	10
					ALTERNATIVE TOTAL				$ 157,499,822	$ 23,662,745	$ 45,290,642	$ 226,453,208	$ 3,340,654	$ 57,448,466	$ 287,242,328	$ 3,305,165	$ 25,925,106	$ 71,294,991	$ 317,427,337	

AWT and Interplant ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

Untreated Overflows / Year: **6**	Planning Period: 20	Discount Rate: 5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	Interplant																			
1	Interceptor (Sewer Construction)	QSAWTP	180.0		144	32,932		**$ 2,684**	**$ 88,390,432**		**$ 22,097,608**	**$ 110,488,040**	**$ 1,511,960**	**$ 28,000,000**	**$ 140,000,000**	**$ 361,520**	**$ -**	**$ 54,546,219**	**$ 126,775,108**	**50**
	SOUTHPORT AWT																			
1	Raw Wastewater (Captured CSO) Pump Station for EHRC (75-MGD firm capacity)								$ 8,376,300		$ 2,094,075	$ 10,470,375	$ -	$ 2,617,594	$ 13,087,969		$ 3,664,631	$ -	$ 15,158,568	10
2	New 354-MGD Headworks Facility w/ Screening								$ 29,079,200		$ 7,269,800	$ 36,349,000	$ -	$ 9,087,250	$ 45,436,250		$ 12,722,150	$ -	$ 52,624,551	10
3	New 354-MGD Grit Removal Facility with blending and flow split								$ 8,754,000		$ 2,188,500	$ 10,942,500	$ -	$ 2,735,625	$ 13,678,125		$ 3,829,875	$ -	$ 15,842,091	10
4	New 125-MGD/275-MGD Primary Clarifiers								$ 33,184,000		$ 8,296,000	$ 41,480,000	$ -	$ 10,370,000	$ 51,850,000		$ 14,518,000	$ -	$ 60,052,997	10
5	New 15-MG EHRC Basin w/ grit removal and primary settling		0.0						$ -		$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	10
6	New 75-MGD EHRC Facility		0.0						$ -		$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	10
7	EHRC Annual O&M		0.0									$ -			$ -	$ -	$ -		$ -	10
8	New ANS Aeration Equipment								$ 5,100,000		$ 1,275,000	$ 6,375,000	$ -	$ 1,593,750	$ 7,968,750		$ 2,231,250	$ -	$ 9,229,457	10
9	New ANS Return Activated Sludge (RAS) Pumping								$ 3,778,000		$ 944,500	$ 4,722,500	$ -	$ 1,180,625	$ 5,903,125		$ 1,652,875	$ -	$ 6,837,037	10
10	New ANS Final Clarifiers (8 units each @ 155' diameter)								$ 35,041,400		$ 8,760,350	$ 43,801,750	$ -	$ 10,950,438	$ 54,752,188		$ 15,330,613	$ -	$ 63,414,329	10
11	New Effluent Pump Station on ANS (154-MGD firm capacity)								$ 3,865,600		$ 966,400	$ 4,832,000	$ -	$ 1,208,000	$ 6,040,000		$ 1,691,200	$ -	$ 6,995,566	10
12	New 15 MG – Sec. Effluent Equalization Basin w/Aerators								$ 3,608,000		$ 902,000	$ 4,510,000	$ -	$ 1,127,500	$ 5,637,500		$ 1,578,500	$ -	$ 6,529,388	10
13	Add Supplemental Disinfection Process (chlorination /dechlor.)								$ 4,656,000		$ 1,164,000	$ 5,820,000	$ -	$ 1,455,000	$ 7,275,000		$ 2,037,000	$ -	$ 8,425,951	10
14	Yard Piping and Valves								$ 5,752,500		$ 1,438,125	$ 7,190,625	$ -	$ 1,797,656	$ 8,988,281		$ 2,516,719	$ -	$ 10,410,284	10
15	Wet Weather Secondary Annual O&M		7,330.0									$ -	$ -	$ -	$ -	$ 1,832,500	$ -	$ -	$ 21,233,592	10
									$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 1,832,500	$ 61,772,813	$ -	$ 276,753,810	
	Belmont AWT																			
1	New Headworks Facility with Screens		250.0						$21,038,400		$ 5,259,600	$ 26,298,000	$ -	$ 6,574,500	$ 32,872,500		$ 9,204,300	$ -	$ 38,073,137	10
2	New Grit Facility w/ Flow Split		250						$4,710,815		$ 1,177,704	$ 5,888,519	$ -	$ 1,472,130	$ 7,360,648		$ 2,060,982	$ -	$ 8,525,149	10
3	New Intermediate Clarifiers								$36,168,000		$ 9,042,000	$ 45,210,000	$ -	$ 11,302,500	$ 56,512,500		$ 15,823,500	$ -	$ 65,453,134	10
4	New Return Sludge Pumping								$9,247,500		$ 2,311,875	$ 11,559,375	$ -	$ 2,889,844	$ 14,449,219		$ 4,045,781	$ -	$ 16,735,176	10
5	Effluent Disinfection - Chlorination/Dechlorination								$8,310,000		$ 2,077,500	$ 10,387,500	$ -	$ 2,596,875	$ 12,984,375		$ 3,635,625	$ -	$ 15,038,585	10
6	Belmont Anaerobic Digestor Facility BE-78-001								**$18,688,000**		**$ 4,672,000**	**$ 23,360,000**	**$ -**	**$ 5,840,000**	**$ 29,200,000**		**$ 8,176,000**	**$ -**	**$ 33,819,624**	**10**
7	Yard Piping and Valves								$7,245,082		$ 1,811,270	$ 9,056,352	$ -	$ 2,264,088	$ 11,320,440		$ 3,169,723	$ -	$ 13,111,405	10
8	Annual O&M		6,820.00									$ -	$ -	$ -	$ -	$ 1,705,000	$ -	$ -	$ 19,756,221	10
					ALTERNATIVE TOTAL				$ 105,407,797	$ -	$ 26,351,949	$ 131,759,746	$ -	$ 32,939,936	$ 164,699,682	$ 1,705,000	$ 46,115,911	$ -	$ 210,512,431	

F A L L C R E E K W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

Untreated Overflows / Year: 4	Planning Period: 20	ENRCCI factor: 105%	Discount Rate: 5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	FC-1																			
1	Regulator Modification	21						$ 62,912	$ 1,321,148	$ 422,768	$ 435,979	$ 2,179,895	$ -	$ 544,974	$ 2,724,869	$ -	$ -	$ 660,574	$ 2,513,980	40
2	Interceptor Connection	21						125,824	2,642,297	845,535	871,958	4,359,790	$ -	1,089,947	5,449,737	$ -	$ -	$ 1,321,148	$ 5,027,960	40
3	Deep Tunnel		VFC-1	76.0	27 ft	18,577		5,625	104,501,866	5,747,603	27,562,367	137,811,836	$ 1,919,013.13	34,932,712	174,663,561	$ 448,179	$ -	$ 64,620,133	$ 159,226,704	50
4	Regulator	1						524,265	524,265	167,765	173,008	865,038	$ -	216,259	1,081,297	$ 14,223	$ -	$ 262,133	$ 1,162,419	40
	CSO 216																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 216	31.3		42	1,650		$ 201	$ 332,174	$ 146,157	$ 119,583	$ 597,914	$ 56,815.57	$ 163,682	$ 818,412	$ 13,566	$ -	$ 256,120	$ 893,838	50
	CSO 135																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 135	97.1		72	700		$ 366	$ 256,156	$ 112,709	$ 92,216	$ 461,081	$ 24,104	$ 121,296	$ 606,480	$ 13,036	$ -	$ 177,797	$ 700,772	50
	CSO 141																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 141	151.6		96	2,000		$ 1,022	$ 2,044,635	$ 899,639	$ 736,068	$ 3,680,342	$ 80,345	$ 940,172	$ 4,700,859	$ 23,272	$ -	$ 1,307,126	$ 4,553,218	50
	CSO 066																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 066	171.5		96	655		$ 1,022	$ 669,618	$ 294,632	$ 241,062	$ 1,205,312	$ 26,313	$ 307,906	$ 1,539,531	$ 15,369	$ -	$ 428,084	$ 1,580,948	50
	CSO 050 & 050A																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	CSO 050 & 050A	125.0		84	2,937		$ 511	$ 1,499,631	$ 659,838	$ 539,867	$ 2,699,336	$ 117,979	$ 704,329	$ 3,521,643	$ 20,324	$ -	$ 1,017,758	$ 3,432,224	50
					ALTERNATIVE TOTAL				$ 114,924,203	$ 9,659,016	$ 31,145,805	$ 155,729,025	$ 2,224,570	$ 39,488,399	$ 197,441,993	$ 547,969	$ -	$ 70,617,079	$ 181,246,904	

POUGES RUN W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor: 105%

Untreated Overflows / Year: **4**

Planning Period: 20

Discount Rate: 5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
Upper Pogues																				
	PgR-1																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QPgR-1	0.0		30	5,783		$ 123	$ 709,447	$ 312,157	$ 255,401	$ 1,277,005	$ 165,942	$ 360,737	$ 1,803,683	$ 16,029	$ -	$ 591,610	$ 1,800,546	50
	PgR-2																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QPgR-2	125.0		96	3,216		$ 80	$ 3,287,670	$ 112,939	$ 28,235	$ 3,428,844	$ 129,191	$ 889,509	$ 4,447,544	$ 22,639	$ -	$ 2,101,793	$ 4,038,867	50
4	Mechanical Screens		125.0					$ 0.04	$ 4,560,082	$ 1,459,226	$ 1,504,827	$ 7,524,136	$ -	$ 1,881,034	$ 9,405,170	$ 32,390	$ 2,633,447	$ -	$ 11,268,437	10
5	Pumping Facilities		125.0					$ 0.10	$ 12,556,417	$ 4,018,053	$ 4,143,617	$ 20,718,087	$ -	$ 5,179,522	$ 25,897,609	$ 377,985	$ 7,251,331	$ -	$ 34,374,566	10
6	Subsurface Storage		VPgR-2	9.5				$ 1.21	$ 11,504,882	$ 3,681,562	$ 3,796,611	$ 18,983,056	$ 163,690	$ 4,786,686	$ 23,933,432	$ 71,354	$ -	$ 5,916,131	$ 22,871,495	40
	CSO 017																			
1	Total separation							$ 133,000	$ 19,019,000	$ 4,754,750	$ 5,943,438	$ 29,717,188	$ 1,485,859	$ 7,800,762	$ 39,003,808	$97,510	$ -	$ 17,830,313	$ 34,441,343	50
Lower Pogues																				
	PgR-4																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-4	150.0		0	8,167		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,520	$ -	$ -	$ 133,485	50
	PgR-5																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-5	400.0		0	7,650		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,520	$ -	$ -	$ 133,485	50
					ALTERNATIVE TOTAL				$ 55,412,208	$ 15,546,595	$ 16,917,783	$ 87,876,587	$ 1,944,682	$ 22,455,317	$ 112,276,586	$ 640,946	$ 9,884,778	$ 28,327,202	$ 116,245,024	

PLEASANT RUN W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor: 105%

Untreated Overflows / Year: **4**

Planning Period: 20

Discount Rate: 5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	+ Project (Capital) Cost ($)	+ Annual Operation & Maintenance Cost ($)	+ Replacement Cost ($)	- Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
PgR-1																				
1	Regulator Modification	23						$ 62,912	$ 1,446,972	$ 463,031	$ 477,501	$ 2,387,504	$ -	$ 596,876	$ 2,984,380	$ -	$ -	$ 723,486	$ 2,753,407	40
2	Interceptor Connection	23						$ 125,824	$ 2,893,944	$ 926,062	$ 955,002	$ 4,775,008	$ -	$ 1,193,752	$ 5,968,760	$ -	$ -	$ 1,446,972	$ 5,506,813	40
3	Interceptor (Sewer Construction)	QPIR-1	120.0		84	23,510		$ 511	$ 12,004,963	$ 5,282,184	$ 4,321,787	$ 21,608,933	$ 944,454	$ 5,638,347	$ 28,191,734	$ 81,999	$ -	$ 8,147,432	$ 26,540,808	50
PgR-2																				
1	Regulator Modification	18						$ 62,912	$ 1,132,413	$ 362,372	$ 373,696	$ 1,868,481	$ -	$ 467,120	$ 2,335,602	$ -	$ -	$ 566,206	$ 2,154,840	40
2	Interceptor Connection	18						$ 125,824	$ 2,264,826	$ 724,744	$ 747,393	$ 3,736,963	$ -	$ 934,241	$ 4,671,203	$ -	$ -	$ 1,132,413	$ 4,309,680	40
3	Interceptor (Sewer Construction)	QPIR-2	260.0		120	10,671		$ 1,538	$ 16,413,456	$ 7,221,921	$ 5,908,844	$ 29,544,220	$ 428,666	$ 7,493,222	$ 37,466,108	$ 105,185	$ -	$ 10,276,740	$ 35,404,060	50
CSO 017																				
1	Total separation							$ 133,000	$ 1,729,000	$ 570,570	$ 574,893	$ 2,874,463	$ 143,723	$ 754,546	$ 3,772,732	$9,432	$ -	$ 1,724,677	$ 3,331,419	50
PgR-3																				
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QBW	355.0		132	8,375		$ 2,101	$ 17,597,171	$ 7,742,755	$ 6,334,982	$ 31,674,909	$ 384,491	$ 8,014,850	$ 40,074,250	$ 111,706	$ -	$ 10,942,794	$ 37,875,116	50
BW																				
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QPIR-3	15.0		30	3,831		$ 123	$ 469,967	$ 206,786	$ 169,188	$ 845,941	$ 109,927	$ 238,967	$ 1,194,835	$ 14,507	$ -	$ 391,907	$ 1,237,815	50
					ALTERNATIVE TOTAL				$ 57,651,332	$ 24,043,983	$ 20,423,829	$ 102,119,144	$ 2,011,261	$ 26,032,601	$ 130,163,007	$ 322,829	$ -	$ 36,201,937	$ 122,346,218	

EAGLE CREEK W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor: 105%

Untreated Overflows / Year: **4**

Planning Period: 20

Discount Rate: 5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	+ Project (Capital) Cost ($)	+ Annual Operation & Maintenance Cost ($)	+ Replacement Cost ($)	- Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	EC-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QEC-1	100.0		84	13,091		$ 511	$ 6,684,459	$ 2,941,162	$ 2,406,405	$ 12,032,026	$ 525,880	$ 3,139,477	$ 15,697,383	$ 50,763	$ -	$ 4,536,555	$ 14,837,293	50
	EC-2																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QEC-2	100.0		84	11,798		$ 511	$ 6,024,311	$ 2,650,697	$ 2,168,752	$ 10,843,760	$ 473,945	$ 2,829,426	$ 14,147,131	$ 46,888	$ -	$ 4,088,531	$ 13,385,165	50
					ALTERNATIVE TOTAL				$ 13,652,448	$ 5,893,836	$ 4,886,571	$ 24,432,854	$ 999,824	$ 6,358,170	$ 31,790,848	$ 97,651	$ -	$ 9,096,925	$ 30,018,158	

UPPER WHITE W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	4
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	UW-2																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	251,647	80,527	83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QUW-1	65.0		60	900		$ 285	$ 256,680	$ 112,939	$ 92,405	$ 462,024	$ 30,990	$ 123,254	$ 616,269	$ 13,061	$ -	$ 184,998	$ 708,545	50
4	Mechanical Screens		65.0					$ 0.04	$ 2,627,626	$ 840,840	$ 867,116	$ 4,335,582	$ -	$ 1,083,896	$ 5,419,478	$ 21,038	$ 1,517,454	$ -	$ 6,520,646	10
5	Pumping Facilities		65.0	Delta V	Requied V			$ 0.12	$ 7,923,774	$ 2,535,608	$ 2,614,845	$ 13,074,227	$ -	$ 3,268,557	$ 16,342,784	$ 244,051	$ 4,575,979	$ -	$ 21,756,187	10
6	Subsurface Storage		VUW-2	0.1	1.1			$ 2.67	$ 267,475	$ 85,592	$ 88,267	$ 441,333	$ -	$ 110,333	$ 551,666	$ 12,899	$ -	$ 133,737	$ 658,436	40
7	Chlorination	QUW-1	52.8					$ 0.02	$ 1,175,718	$ 376,230	$ 387,987	$ 1,939,935	$ 23,874	$ 490,952	$ 2,454,761	$ 143,114	$ 678,977	$ 23,874	$ 4,489,074	10
8	Dechlorination		52.8					$ 0.02	$ 1,175,718	$ 376,230	$ 387,987	$ 1,939,935	$ 23,874	$ 490,952	$ 2,454,761	$ 143,114	$ 678,977	$ 23,874	$ 4,489,074	10
					ALTERNATIVE TOTAL				$ 13,804,462	$ 4,448,229	$ 4,563,173	$ 22,815,864	$ 78,738	$ 5,723,650	$ 28,618,252	$ 577,277	$ 7,451,388	$ 555,219	$ 39,340,242	

CENTRAL SYSTEM W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	4
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	LW-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QLW-1	90.0		72	4,266		$ 366	$ 1,560,942	$ 686,814	$ 561,939	$ 2,809,695	$ 146,880	$ 739,144	$ 3,695,719	$ 20,759	$ -	$ 1,083,445	$ 3,590,371	50
	LW-2																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QLW-2	80.0		72	9,264		$ 366	$ 3,389,969	$ 1,491,586	$ 1,220,389	$ 6,101,943	$ 318,987	$ 1,605,233	$ 8,026,163	$ 31,585	$ -	$ 2,352,968	$ 7,640,964	50
	CS-2																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Deep Tunnel		VCS-2	1.5	32 ft	10,091		6,386	64,434,040	3,543,872	16,994,478	$ 84,972,390	$ 1,042,369	$ 21,503,690	$ 107,518,449	$ 280,316	$ -	$ 39,702,793	$ 98,091,400	50
	OO8																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Deep Tunnel		0.0	0.0	0 ft	5,500		-	-	-	-	$ -	$ -	$ -	$ -	$ 11,520	$ -	$ -	$ 133,485	50
	CSO 046																			
1	Total separation							$ 133,000	$ 2,793,000	$ 921,690	$ 928,673	$ 4,643,363	$ 232,168	$ 1,218,883	$ 6,094,413	$15,236	$ -	$ 2,618,437	$ 5,435,019	50
	CS-3																			
1	Regulator Modification	6						$ 62,912	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
2	Interceptor Connection	6						$ 125,824	$ 754,942	$ 241,581	$ 249,131	$ 1,245,654	$ -	$ 311,414	$ 1,557,068	$ -	$ -	$ 377,471	$ 1,436,560	40
3	Deep Tunnel		VCS-3	112.0	32 ft	9,218		6,386	58,863,285	3,237,481	15,525,191	$ 77,625,957	$ 952,250	$ 19,644,552	$ 98,222,758	$ 257,077	$ -	$ 36,270,221	$ 89,622,282	50
4	Mechanical Screens		175.0					$ 0.03	$ 6,055,620	$ 1,937,798	$ 1,998,355	$ 9,991,773	$ -	$ 2,497,943	$ 12,489,716	$ 44,490	$ 3,497,121	$ -	$ 14,981,184	10
5	Deep Pumping Facilities		175.0					$ 0.22	$ 37,748,201	$ 12,079,424	$ 12,456,906	$ 62,284,531	$ 630,000	$ 15,728,633	$ 78,643,164	$ 2,682,633	$ 21,799,586	$ 630,000	$ 121,843,572	10
					ALTERNATIVE TOTAL				$ 178,053,559	$ 24,925,387	$ 50,744,736	$ 253,723,682	$ 3,322,654	$ 64,261,584	$ 321,307,920	$ 3,343,617	$ 25,296,706	$ 84,262,116	$ 347,443,657	

AWT and Interplant *Plan One*
CONTROL TECHNOLOGY 1: Storage and Conveyance

Untreated Overflows / Year: 4	Planning Period: 20	Discount Rate: 5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	Interplant																			
1	Interceptor (Sewer Construction)	QSAWTP	175.0		144	32,932		**$ 2,684**	**$ 88,390,432**		**$ 22,097,608**	**$ 110,488,040**	**$ 1,511,960**	**$ 28,000,000**	**$ 140,000,000**	**$ 361,520**	**$ -**	**$ 54,546,219**	**$ 126,775,108**	**50**
	SOUTHPORT AWT																			
1	Raw Wastewater (Captured CSO) Pump Station for EHRC (75-MGD firm capacity)								$ 8,376,300		$ 2,094,075	$ 10,470,375	$ -	$ 2,617,594	$ 13,087,969		$ 3,664,631	$ -	$ 15,158,568	10
2	New 354-MGD Headworks Facility w/ Screening								$ 29,079,200		$ 7,269,800	$ 36,349,000	$ -	$ 9,087,250	$ 45,436,250		$ 12,722,150	$ -	$ 52,624,551	10
3	New 354-MGD Grit Removal Facility with blending and flow split								$ 8,754,000		$ 2,188,500	$ 10,942,500	$ -	$ 2,735,625	$ 13,678,125		$ 3,829,875	$ -	$ 15,842,091	10
4	New 125-MGD/275-MGD Primary Clarifiers								$ 33,184,000		$ 8,296,000	$ 41,480,000	$ -	$ 10,370,000	$ 51,850,000		$ 14,518,000	$ -	$ 60,052,997	10
5	New 15-MG EHRC Basin w/ grit removal and primary settling		0.0						$ -		$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	10
6	New 75-MGD EHRC Facility		0.0						$ -		$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	10
7	EHRC Annual O&M		0.0									$ -			$ -	$ -	$ -		$ -	10
8	New ANS Aeration Equipment								$ 5,100,000		$ 1,275,000	$ 6,375,000	$ -	$ 1,593,750	$ 7,968,750		$ 2,231,250	$ -	$ 9,229,457	10
9	New ANS Return Activated Sludge (RAS) Pumping								$ 3,778,000		$ 944,500	$ 4,722,500	$ -	$ 1,180,625	$ 5,903,125		$ 1,652,875	$ -	$ 6,837,037	10
10	New ANS Final Clarifiers (8 units each @ 155' diameter)								$ 35,041,400		$ 8,760,350	$ 43,801,750	$ -	$ 10,950,438	$ 54,752,188		$ 15,330,613	$ -	$ 63,414,329	10
11	New Effluent Pump Station on ANS (154-MGD firm capacity)								$ 3,865,600		$ 966,400	$ 4,832,000	$ -	$ 1,208,000	$ 6,040,000		$ 1,691,200	$ -	$ 6,995,566	10
12	New 15 MG – Sec. Effluent Equalization Basin w/Aerators								$ 3,608,000		$ 902,000	$ 4,510,000	$ -	$ 1,127,500	$ 5,637,500		$ 1,578,500	$ -	$ 6,529,388	10
13	Add Supplemental Disinfection Process (chlorination /dechlor.)								$ 4,656,000		$ 1,164,000	$ 5,820,000	$ -	$ 1,455,000	$ 7,275,000		$ 2,037,000	$ -	$ 8,425,951	10
14	Yard Piping and Valves								$ 5,752,500		$ 1,438,125	$ 7,190,625	$ -	$ 1,797,656	$ 8,988,281		$ 2,516,719	$ -	$ 10,410,284	10
15	Wet Weather Secondary Annual O&M		8,680.0									$ -	$ -	$ -	$ -	$ 2,170,000	$ -	$ -	$ 25,144,281	10
									$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 2,170,000	$ 61,772,813	$ -	$ 280,664,499	
	Belmont AWT																			
1	New Headworks Facility with Screens		300.0						$24,786,950		$ 6,196,738	$ 30,983,688	$ -	$ 7,745,922	$ 38,729,609		$ 10,844,291	$ -	$ 44,856,878	10
2	New Grit Facility w/ Flow Split		300						$5,681,015		$ 1,420,254	$ 7,101,269	$ -	$ 1,775,317	$ 8,876,586		$ 2,485,444	$ -	$ 10,280,918	10
3	New Intermediate Clarifiers								$36,168,000		$ 9,042,000	$ 45,210,000	$ -	$ 11,302,500	$ 56,512,500		$ 15,823,500	$ -	$ 65,453,134	10
4	New Return Sludge Pumping								$9,247,500		$ 2,311,875	$ 11,559,375	$ -	$ 2,889,844	$ 14,449,219		$ 4,045,781	$ -	$ 16,735,176	10
5	Effluent Disinfection - Chlorination/Dechlorination								$8,310,000		$ 2,077,500	$ 10,387,500	$ -	$ 2,596,875	$ 12,984,375		$ 3,635,625	$ -	$ 15,038,585	10
6	Belmont Anaerobic Digestor Facility BE-78-001								**$18,688,000**		**$ 4,672,000**	**$ 23,360,000**	**$ -**	**$ 5,840,000**	**$ 29,200,000**		**$ 8,176,000**	**$ -**	**$ 33,819,624**	**10**
7	Yard Piping and Valves								$7,245,082		$ 1,811,270	$ 9,056,352	$ -	$ 2,264,088	$ 11,320,440		$ 3,169,723	$ -	$ 13,111,405	10
8	Annual O&M		5,800.00									$ -	$ -	$ -	$ -	$ 1,450,000	$ -	$ -	$ 16,801,478	10
					ALTERNATIVE TOTAL				$ 110,126,547	$ -	$ 27,531,637	$ 137,658,183	$ -	$ 34,414,546	$ 172,072,729	$ 1,450,000	$ 48,180,364	$ -	$ 216,097,198	

F A L L   C R E E K   W A T E R S H E D ***Plan One***

CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**2**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	FC-1																			
1	Regulator Modification	21						$ 62,912	$ 1,321,148	$ 422,768	$ 435,979	$ 2,179,895	$ -	$ 544,974	$ 2,724,869	$ -	$ -	$ 660,574	$ 2,513,980	40
2	Interceptor Connection	21						125,824	2,642,297	845,535	871,958	4,359,790	$ -	1,089,947	5,449,737	$ -	$ -	$ 1,321,148	$ 5,027,960	40
3	Deep Tunnel		VFC-1	110.0	32 ft	18,577		6,386	118,623,740	6,524,306	31,287,011	156,435,057	$ 1,919,013.13	39,588,518	197,942,588	$ 506,376	$ -	$ 73,093,257	$ 180,475,030	50
4	Regulator	1						524,265	524,265	167,765	173,008	865,038	$ -	216,259	1,081,297	$ 14,223	$ -	$ 262,133	$ 1,162,419	40
	CSO 216																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 216	44.7		48	1,650		$ 262	$ 432,519	$ 190,308	$ 155,707	$ 778,534	$ 56,815.57	$ 208,837	$ 1,044,187	$ 14,130	$ -	$ 316,327	$ 1,106,932	50
	CSO 135																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 135	140.0		84	700		$ 511	$ 357,444	$ 157,275	$ 128,680	$ 643,399	$ 28,121	$ 167,880	$ 839,400	$ 13,619	$ -	$ 242,587	$ 919,755	50
	CSO 141																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 141	235.0		108	2,000		$ 1,289	$ 2,577,288	$ 1,134,007	$ 927,824	$ 4,639,118	$ 80,345	$ 1,179,866	$ 5,899,330	$ 26,268	$ -	$ 1,626,718	$ 5,684,376	50
	CSO 066																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 066	263.6		120	655		$ 1,538	$ 1,007,517	$ 443,308	$ 362,706	$ 1,813,531	$ 26,313	$ 459,961	$ 2,299,805	$ 17,270	$ -	$ 630,823	$ 2,298,520	50
	CSO 050 & 050A																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	CSO 050 & 050A	179.0		96	2,937		$ 1,022	$ 3,002,341	$ 1,321,030	$ 1,080,843	$ 5,404,214	$ 117,979	$ 1,380,548	$ 6,902,742	$ 28,777	$ -	$ 1,919,384	$ 6,623,421	50
					ALTERNATIVE TOTAL				$ 131,620,973	$ 11,568,673	$ 35,797,412	$ 178,987,058	$ 2,228,587	$ 45,303,911	$ 226,519,556	$ 620,663	$ -	$ 80,639,158	$ 207,967,234	

POUGES RUN W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor: 105%

Untreated Overflows / Year: **2**

Planning Period: 20

Discount Rate: 5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
Upper Pogues																				
	PgR-1																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QPgR-1	0.0		48	5,783		$ 262	$ 1,515,913	$ 667,002	$ 545,729	$ 2,728,643	$ 199,130	$ 731,943	$ 3,659,717	$ 20,669	$ -	$ 1,108,678	$ 3,545,271	50
	PgR-2																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QPgR-2	210.0		120	3,216		$ 143	$ 4,946,679	$ 202,211	$ 50,553	$ 5,199,443	$ 129,191	$ 1,332,159	$ 6,660,793	$ 28,172	$ -	$ 3,097,199	$ 5,998,446	50
4	Mechanical Screens		210.0					$ 0.03	$ 7,115,987	$ 2,277,116	$ 2,348,276	$ 11,741,378	$ -	$ 2,935,344	$ 14,676,722	$ 54,012	$ 4,109,482	$ -	$ 17,624,522	10
5	Pumping Facilities		210.0					$ 0.08	$ 17,480,996	$ 5,593,919	$ 5,768,729	$ 28,843,644	$ -	$ 7,210,911	$ 36,054,555	$ 561,559	$ 10,095,275	$ -	$ 48,265,522	10
6	Subsurface Storage		VPgR-2	14.5				$ 1.13	$ 16,314,450	$ 5,220,624	$ 5,383,769	$ 26,918,843	$ 286,458	$ 6,801,325	$ 34,006,626	$ 96,537	$ -	$ 8,443,683	$ 32,429,567	40
	CSO 017																			
1	Total separation							$ 133,000	$ 19,019,000	$ 4,754,750	$ 5,943,438	$ 29,717,188	$ 1,485,859	$ 7,800,762	$ 39,003,808	$97,510	$ -	$ 17,830,313	$ 34,441,343	50
Lower Pogues																				
	PgR-4																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-4	260.0		48	8,167		$ 262	$ 2,140,863	$ 941,980	$ 770,711	$ 3,853,554	$ 281,223	$ 1,033,694	$ 5,168,472	$ 24,441	$ -	$ 1,565,741	$ 4,951,814	50
	PgR-5																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-5	650.0		72	7,650		$ 366	$ 2,799,236	$ 1,231,664	$ 1,007,725	$ 5,038,625	$ 263,400	$ 1,325,506	$ 6,627,532	$ 28,089	$ -	$ 1,942,942	$ 6,332,719	50
					ALTERNATIVE TOTAL				$ 75,107,835	$ 22,097,173	$ 23,064,582	$ 120,269,590	$ 2,645,261	$ 30,728,713	$ 153,643,564	$ 910,989	$ 14,204,758	$ 35,875,911	$ 160,772,002	

PLEASANT RUN W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	2
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	+ Project (Capital) Cost ($)	+ Annual Operation & Maintenance Cost ($)	+ Replacement Cost ($)	- Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	PgR-1																			
1	Regulator Modification	23						$ 62,912	$ 1,446,972	$ 463,031	$ 477,501	$ 2,387,504	$ -	$ 596,876	$ 2,984,380	$ -	$ -	$ 723,486	$ 2,753,407	40
2	Interceptor Connection	23						$ 125,824	$ 2,893,944	$ 926,062	$ 955,002	$ 4,775,008	$ -	$ 1,193,752	$ 5,968,760	$ -	$ -	$ 1,446,972	$ 5,506,813	40
3	Interceptor (Sewer Construction)	QPIR-1	189.0		102	23,510		$ 1,171	$ 27,534,997	$ 12,115,399	$ 9,912,599	$ 49,562,994	$ 944,454	$ 12,626,862	$ 63,134,311	$ 169,356	$ -	$ 17,465,453	$ 59,520,821	50
	PgR-2																			
1	Regulator Modification	18						$ 62,912	$ 1,132,413	$ 362,372	$ 373,696	$ 1,868,481	$ -	$ 467,120	$ 2,335,602	$ -	$ -	$ 566,206	$ 2,154,840	40
2	Interceptor Connection	18						$ 125,824	$ 2,264,826	$ 724,744	$ 747,393	$ 3,736,963	$ -	$ 934,241	$ 4,671,203	$ -	$ -	$ 1,132,413	$ 4,309,680	40
3	Interceptor (Sewer Construction)	QPIR-2	385.0		144	10,671		$ 2,223	$ 23,719,514	$ 10,436,586	$ 8,539,025	$ 42,695,124	$ 489,904	$ 10,796,257	$ 53,981,285	$ 146,473	$ -	$ 14,721,612	$ 50,978,622	50
	CSO 017																			
1	Total separation							$ 133,000	$ 1,729,000	$ 570,570	$ 574,893	$ 2,874,463	$ 143,723	$ 754,546	$ 3,772,732	$9,432	$ -	$ 1,724,677	$ 3,331,419	50
	PgR-3																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QBW	500.0		168	8,375		$ 2,460	$ 20,600,282	$ 9,064,124	$ 7,416,101	$ 37,080,507	$ 384,491	$ 9,366,249	$ 46,831,247	$ 128,598	$ -	$ 12,744,660	$ 44,252,604	50
	BW																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QPIR-3	25.0		42	3,831		$ 201	$ 771,229	$ 339,341	$ 277,642	$ 1,388,211	$ 131,912	$ 380,031	$ 1,900,154	$ 16,270	$ -	$ 594,649	$ 1,898,841	50
					ALTERNATIVE TOTAL				$ 83,791,795	$ 35,545,787	$ 29,834,396	$ 149,171,978	$ 2,094,485	$ 37,816,616	$ 189,083,078	$ 470,129	$ -	$ 51,969,438	$ 177,939,307	

EAGLE CREEK W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor: 105%

Untreated Overflows / Year: **2** | Planning Period: 20 | Discount Rate: 5.875%

															+	+	+	-		
Item No.	**Item Description**	**No. of Regulators**	**Flowrate (MGD)**	**Volume (MG)**	**Pipe Diameter (inches)**	**Pipe Length (feet)**	**Land (acres)**	**Unit Cost ($)**	**Base Construction Cost ($)**	**Site Adjustment ($)**	**Construction Contingency (25%)**	**Construction Cost ($)**	**Land Costs ($)**	**Engineering, Legal & Administration (25%)**	**Project (Capital) Cost ($)**	**Annual Operation & Maintenance Cost ($)**	**Replacement Cost ($)**	**Residual Value @ 20 years ($)**	**Present Worth ($)**	**Asset Life (years)**
	EC-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QEC-1	140.0		96	13,091		$ 1,022	$ 13,382,644	$ 5,888,363	$ 4,817,752	$ 24,088,759	$ 525,880	$ 6,153,660	$ 30,768,299	$ 88,441	$ -	$ 8,555,466	$ 29,061,745	50
	EC-2																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QEC-2	140.0		96	11,798		$ 1,022	$ 12,060,992	$ 5,306,837	$ 4,341,957	$ 21,709,786	$ 473,945	$ 5,545,933	$ 27,729,663	$ 80,844	$ -	$ 7,710,540	$ 26,204,830	50
					ALTERNATIVE TOTAL				$ 26,387,314	$ 11,497,177	$ 9,471,123	$ 47,355,613	$ 999,824	$ 12,088,859	$ 60,444,297	$ 169,285	$ -	$ 16,737,845	$ 57,062,275	

UPPER WHITE W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	2
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	UW-2																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	251,647	80,527	83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QUW-1	120.0		84	900		$ 511	$ 459,571	$ 202,211	$ 165,446	$ 827,228	$ 36,155	$ 215,846	$ 1,079,229	$ 14,218	$ -	$ 311,898	$ 1,144,403	50
4	Mechanical Screens		120.0					$ 0.04	$ 4,405,826	$ 1,409,864	$ 1,453,923	$ 7,269,613	$ -	$ 1,817,403	$ 9,087,016	$ 31,312	$ 2,544,364	$ -	$ 10,887,458	10
5	Pumping Facilities		120.0	Delta V	Requied V			$ 0.10	$ 12,200,698	$ 3,904,223	$ 4,026,230	$ 20,131,151	$ -	$ 5,032,788	$ 25,163,939	$ 367,801	$ 7,045,903	$ -	$ 33,406,831	10
6	Subsurface Storage		VUW-2	1.0	2.0			$ 1.79	$ 1,791,771	$ 573,367	$ 591,284	$ 2,956,422	$ 20,461	$ 744,221	$ 3,721,104	$ 20,823	$ -	$ 916,347	$ 3,669,838	40
7	Chlorination	QUW-1	96.0					$ 0.02	$ 1,551,583	$ 496,506	$ 512,022	$ 2,560,111	$ 44,075	$ 651,047	$ 3,255,233	$ 206,586	$ 896,039	$ 44,075	$ 6,141,200	10
8	Dechlorination		96.0					$ 0.02	$ 1,551,583	$ 496,506	$ 512,022	$ 2,560,111	$ 44,075	$ 651,047	$ 3,255,233	$ 206,586	$ 896,039	$ 44,075	$ 6,141,200	10
					ALTERNATIVE TOTAL				$ 22,338,502	$ 7,203,469	$ 7,385,493	$ 36,927,463	$ 144,767	$ 9,268,058	$ 46,340,288	$ 847,326	$ 11,382,345	$ 1,505,130	$ 62,109,210	

CENTRAL SYSTEM W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	2
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	LW-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QLW-1	135.0		84	4,266		$ 511	$ 2,178,162	$ 958,391	$ 784,138	$ 3,920,691	$ 171,360	$ 1,023,013	$ 5,115,065	$ 24,308	$ -	$ 1,478,258	$ 4,924,789	50
	LW-2																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QLW-2	115.0		84	9,264		$ 511	$ 4,730,415	$ 2,081,382	$ 1,702,949	$ 8,514,746	$ 372,151	$ 2,221,724	$ 11,108,622	$ 39,292	$ -	$ 3,210,400	$ 10,538,980	50
	CS-2																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Deep Tunnel		VCS-2	10.0	43 ft	10,091		15,743	158,851,386	8,736,826	41,897,053	$ 209,485,265	$ 3,083,746	$ 53,142,253	$ 265,711,263	$ 675,798	$ -	$ 98,394,577	$ 242,129,375	50
	OO8																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Deep Tunnel		130.0	0.0	8 ft	5,500		2,737	15,051,656	827,841	3,969,874	$ 19,849,371	$ 568,156	$ 5,104,382	$ 25,521,908	$ 75,325	$ -	$ 9,599,149	$ 23,330,181	50
	CSO 046																			
1	Total separation							$ 133,000	$ 2,793,000	$ 921,690	$ 928,673	$ 4,643,363	$ 232,168	$ 1,218,883	$ 6,094,413	$15,236	$ -	$ 2,618,437	$ 5,435,019	50
	CS-3																			
1	Regulator Modification	6						$ 62,912	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
2	Interceptor Connection	6						$ 125,824	$ 754,942	$ 241,581	$ 249,131	$ 1,245,654	$ -	$ 311,414	$ 1,557,068	$ -	$ -	$ 377,471	$ 1,436,560	40
3	Deep Tunnel		VCS-3	190.0	43 ft	9,218		15,743	145,117,619	7,981,469	38,274,772	$ 191,373,860	$ 2,817,135	$ 48,547,749	$ 242,738,744	$ 618,367	$ -	$ 89,887,707	$ 221,207,209	50
4	Mechanical Screens		165.0					$ 0.03	$ 5,762,574	$ 1,844,024	$ 1,901,649	$ 9,508,247	$ -	$ 2,377,062	$ 11,885,308	$ 41,878	$ 3,327,886	$ -	$ 14,250,889	10
5	Deep Pumping Facilities		165.0					$ 0.22	$ 35,854,758	$ 11,473,523	$ 11,832,070	$ 59,160,351	$ 594,000	$ 14,938,588	$ 74,692,939	$ 2,579,085	$ 20,706,123	$ 594,000	$ 116,087,169	10
					ALTERNATIVE TOTAL				$ 373,548,072	$ 35,851,867	$ 102,349,985	$ 511,749,924	$ 7,838,717	$ 129,897,160	$ 649,485,800	$ 4,069,288	$ 24,034,009	$ 207,386,779	$ 644,008,990	

AWT and Interplant *Plan One*
CONTROL TECHNOLOGY 1: Storage and Conveyance

Untreated Overflows / Year:	2	Planning Period:	20	Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	Interplant																			
1	Interceptor (Sewer Construction)	QSAWTP	165.0		144	32,932		**$ 2,684**	**$ 88,390,432**		**$ 22,097,608**	**$ 110,488,040**	**$ 1,511,960**	**$ 28,000,000**	**$ 140,000,000**	**$ 361,520**	**$ -**	**$ 54,546,219**	**$ 126,775,108**	**50**
	SOUTHPORT AWT																			
1	Raw Wastewater (Captured CSO) Pump Station for EHRC (75-MGD firm capacity)								$ 8,376,300		$ 2,094,075	$ 10,470,375	$ -	$ 2,617,594	$ 13,087,969		$ 3,664,631	$ -	$ 15,158,568	10
2	New 354-MGD Headworks Facility w/ Screening								$ 29,079,200		$ 7,269,800	$ 36,349,000	$ -	$ 9,087,250	$ 45,436,250		$ 12,722,150	$ -	$ 52,624,551	10
3	New 354-MGD Grit Removal Facility with blending and flow split								$ 8,754,000		$ 2,188,500	$ 10,942,500	$ -	$ 2,735,625	$ 13,678,125		$ 3,829,875	$ -	$ 15,842,091	10
4	New 125-MGD/275-MGD Primary Clarifiers								$ 33,184,000		$ 8,296,000	$ 41,480,000	$ -	$ 10,370,000	$ 51,850,000		$ 14,518,000	$ -	$ 60,052,997	10
5	New 15-MG EHRC Basin w/ grit removal and primary settling		0.0						$ -		$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	10
6	New 75-MGD EHRC Facility		0.0						$ -		$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	10
7	EHRC Annual O&M		0.0									$ -			$ -	$ -	$ -		$ -	10
8	New ANS Aeration Equipment								$ 5,100,000		$ 1,275,000	$ 6,375,000	$ -	$ 1,593,750	$ 7,968,750		$ 2,231,250	$ -	$ 9,229,457	10
9	New ANS Return Activated Sludge (RAS) Pumping								$ 3,778,000		$ 944,500	$ 4,722,500	$ -	$ 1,180,625	$ 5,903,125		$ 1,652,875	$ -	$ 6,837,037	10
10	New ANS Final Clarifiers (8 units each @ 155' diameter)								$ 35,041,400		$ 8,760,350	$ 43,801,750	$ -	$ 10,950,438	$ 54,752,188		$ 15,330,613	$ -	$ 63,414,329	10
11	New Effluent Pump Station on ANS (154-MGD firm capacity)								$ 3,865,600		$ 966,400	$ 4,832,000	$ -	$ 1,208,000	$ 6,040,000		$ 1,691,200	$ -	$ 6,995,566	10
12	New 15 MG – Sec. Effluent Equalization Basin w/Aerators								$ 3,608,000		$ 902,000	$ 4,510,000	$ -	$ 1,127,500	$ 5,637,500		$ 1,578,500	$ -	$ 6,529,388	10
13	Add Supplemental Disinfection Process (chlorination /dechlor.)								$ 4,656,000		$ 1,164,000	$ 5,820,000	$ -	$ 1,455,000	$ 7,275,000		$ 2,037,000	$ -	$ 8,425,951	10
14	Yard Piping and Valves								$ 5,752,500		$ 1,438,125	$ 7,190,625	$ -	$ 1,797,656	$ 8,988,281		$ 2,516,719	$ -	$ 10,410,284	10
15	Wet Weather Secondary Annual O&M		9,130.0									$ -	$ -	$ -	$ -	$ 2,282,500	$ -	$ -	$ 26,447,844	10
									$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 2,282,500	$ 61,772,813	$ -	$ 281,968,062	
	Belmont AWT																			
1	New Headworks Facility with Screens		300.0						$24,786,950		$ 6,196,738	$ 30,983,688	$ -	$ 7,745,922	$ 38,729,609		$ 10,844,291	$ -	$ 44,856,878	10
2	New Grit Facility w/ Flow Split		300						$5,681,015		$ 1,420,254	$ 7,101,269	$ -	$ 1,775,317	$ 8,876,586		$ 2,485,444	$ -	$ 10,280,918	10
3	New Intermediate Clarifiers								$36,168,000		$ 9,042,000	$ 45,210,000	$ -	$ 11,302,500	$ 56,512,500		$ 15,823,500	$ -	$ 65,453,134	10
4	New Return Sludge Pumping								$9,247,500		$ 2,311,875	$ 11,559,375	$ -	$ 2,889,844	$ 14,449,219		$ 4,045,781	$ -	$ 16,735,176	10
5	Effluent Disinfection - Chlorination/Dechlorination								$8,310,000		$ 2,077,500	$ 10,387,500	$ -	$ 2,596,875	$ 12,984,375		$ 3,635,625	$ -	$ 15,038,585	10
6	Belmont Anaerobic Digestor Facility BE-78-001								**$18,688,000**		**$ 4,672,000**	**$ 23,360,000**	**$ -**	**$ 5,840,000**	**$ 29,200,000**		**$ 8,176,000**	**$ -**	**$ 33,819,624**	**10**
7	Yard Piping and Valves								$7,245,082		$ 1,811,270	$ 9,056,352	$ -	$ 2,264,088	$ 11,320,440		$ 3,169,723	$ -	$ 13,111,405	10
8	Annual O&M		5,690.00									$ -	$ -	$ -	$ -	$ 1,422,500	$ -	$ -	$ 16,482,829	10
					ALTERNATIVE TOTAL				$ 110,126,547	$ -	$ 27,531,637	$ 137,658,183	$ -	$ 34,414,546	$ 172,072,729	$ 1,422,500	$ 48,180,364	$ -	$ 215,778,549	

F A L L C R E E K W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	0.5
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	FC-1																			
1	Regulator Modification	21						$ 62,912	$ 1,321,148	$ 422,768	$ 435,979	$ 2,179,895	$ -	$ 544,974	$ 2,724,869	$ -	$ -	$ 660,574	$ 2,513,980	40
2	Interceptor Connection	21						125,824	2,642,297	845,535	871,958	4,359,790	$ -	1,089,947	5,449,737	$ -	$ -	$ 1,321,148	$ 5,027,960	40
3	Deep Tunnel		VFC-1	162.0	39 ft	18,577		12,950	240,568,945	13,231,292	63,450,059	317,250,296	$ 4,670,110.35	80,480,101	402,400,507	$ 1,017,521	$ -	$ 149,011,477	$ 366,618,774	50
4	Regulator	1						524,265	524,265	167,765	173,008	865,038	$ -	216,259	1,081,297	$ 14,223	$ -	$ 262,133	$ 1,162,419	40
	CSO 216																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 216	75.3		60	1,650		$ 285	$ 470,580	$ 207,055	$ 169,409	$ 847,045	$ 56,815.57	$ 225,965	$ 1,129,826	$ 14,345	$ -	$ 339,164	$ 1,187,761	50
	CSO 135																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 135	237.7		108	700		$ 1,289	$ 902,051	$ 396,902	$ 324,738	$ 1,623,691	$ 28,121	$ 412,953	$ 2,064,765	$ 16,682	$ -	$ 569,351	$ 2,076,297	50
	CSO 141																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 141	432.4		144	2,000		$ 2,223	$ 4,445,769	$ 1,956,139	$ 1,600,477	$ 8,002,385	$ 91,823	$ 2,023,552	$ 10,117,760	$ 36,814	$ -	$ 2,759,285	$ 9,663,434	50
	CSO 066																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 066	480.4		156	655		$ 2,460	$ 1,611,203	$ 708,930	$ 580,033	$ 2,900,166	$ 30,072	$ 732,560	$ 3,662,798	$ 20,677	$ -	$ 996,794	$ 3,584,160	50
	CSO 050 & 050A																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	CSO 050 & 050A	304.0		120	2,937		$ 1,538	$ 4,517,369	$ 1,987,642	$ 1,626,253	$ 8,131,264	$ 117,979	$ 2,062,311	$ 10,311,554	$ 37,299	$ -	$ 2,828,400	$ 9,840,776	50
					ALTERNATIVE TOTAL				$ 258,136,041	$ 20,286,400	$ 69,605,610	$ 348,028,051	$ 4,994,921	$ 88,255,743	$ 441,278,715	$ 1,157,561	$ -	$ 159,314,533	$ 403,830,401	

POUGES RUN W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**0.5**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
Upper Pogues																				
	PgR-1																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QPgR-1	0.0		72	5,783		$ 366	$ 2,116,215	$ 931,134	$ 761,837	$ 3,809,186	$ 199,130	$ 1,002,079	$ 5,010,395	$ 24,046	$ -	$ 1,468,859	$ 4,820,088	50
	PgR-2																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QPgR-2	400.0		168	3,216		$ 328	$ 7,910,640	$ 463,799	$ 115,950	$ 8,490,388	$ 147,647	$ 2,159,509	$ 10,797,544	$ 38,514	$ -	$ 4,894,031	$ 9,681,391	50
4	Mechanical Screens		400.0					$ 0.03	$ 13,554,260	$ 4,337,363	$ 4,472,906	$ 22,364,529	$ -	$ 5,591,132	$ 27,955,662	$ 102,880	$ 7,827,585	$ -	$ 33,570,517	10
5	Pumping Facilities		400.0					$ 0.04	$ 17,480,996	$ 5,593,919	$ 5,768,729	$ 28,843,644	$ -	$ 7,210,911	$ 36,054,555	$ 1,646,074	$ 10,095,275	$ -	$ 60,832,044	10
6	Subsurface Storage		VPgR-2	26.0				$ 1.02	$ 26,427,158	$ 8,456,691	$ 8,720,962	$ 43,604,811	$ 531,993	$ 11,034,201	$ 55,171,004	$ 149,448	$ -	$ 13,745,572	$ 52,514,406	40
	CSO 017																			
1	Total separation							$ 133,000	$ 19,019,000	$ 4,754,750	$ 5,943,438	$ 29,717,188	$ 1,485,859	$ 7,800,762	$ 39,003,808	$97,510	$ -	$ 17,830,313	$ 34,441,343	50
Lower Pogues																				
	PgR-4																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-4	475.0		120	8,167		$ 1,538	$ 12,562,586	$ 5,527,538	$ 4,522,531	$ 22,612,656	$ 328,094	$ 5,735,187	$ 28,675,937	$ 83,210	$ -	$ 7,865,646	$ 27,128,997	50
	PgR-5																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-5	1200.0		192	7,650		$ 3,101	$ 23,717,311	$ 10,435,617	$ 8,538,232	$ 42,691,160	$ 439,001	$ 10,782,540	$ 53,912,701	$ 146,302	$ -	$ 14,669,387	$ 50,924,724	50
					ALTERNATIVE TOTAL				$ 126,562,877	$ 41,708,718	$ 40,090,239	$ 208,361,833	$ 3,131,723	$ 52,873,389	$ 264,366,945	$ 2,287,983	$ 17,922,861	$ 62,361,163	$ 281,096,310	

PLEASANT RUN W A T E R S H E D *Plan One*
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**0.5**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
															+	+	+	-		
	PgR-1																			
1	Regulator Modification	23						$ 62,912	$ 1,446,972	$ 463,031	$ 477,501	$ 2,387,504	$ -	$ 596,876	$ 2,984,380	$ -	$ -	$ 723,486	$ 2,753,407	40
2	Interceptor Connection	23						$ 125,824	$ 2,893,944	$ 926,062	$ 955,002	$ 4,775,008	$ -	$ 1,193,752	$ 5,968,760	$ -	$ -	$ 1,446,972	$ 5,506,813	40
3	Interceptor (Sewer Construction)	QPIR-1	330.7		132	23,510		$ 2,101	$ 49,400,299	$ 21,736,131	$ 17,784,108	$ 88,920,538	$ 1,079,377	$ 22,499,979	$ 112,499,893	$ 292,770	$ -	$ 30,719,556	$ 106,085,050	50
	PgR-2																			
1	Regulator Modification	18						$ 62,912	$ 1,132,413	$ 362,372	$ 373,696	$ 1,868,481	$ -	$ 467,120	$ 2,335,602	$ -	$ -	$ 566,206	$ 2,154,840	40
2	Interceptor Connection	18						$ 125,824	$ 2,264,826	$ 724,744	$ 747,393	$ 3,736,963	$ -	$ 934,241	$ 4,671,203	$ -	$ -	$ 1,132,413	$ 4,309,680	40
3	Interceptor (Sewer Construction)	QPIR-2	736.2		192	10,671		$ 3,101	$ 33,084,246	$ 14,557,068	$ 11,910,329	$ 59,551,643	$ 612,380	$ 15,041,006	$ 75,205,028	$ 199,533	$ -	$ 20,462,928	$ 70,984,258	50
	CSO 017																			
1	Total separation							$ 133,000	$ 1,729,000	$ 570,570	$ 574,893	$ 2,874,463	$ 143,723	$ 754,546	$ 3,772,732	$9,432	$ -	$ 1,724,677	$ 3,331,419	50
	PgR-3																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QBW	918.8		216	8,375		$ 3,610	$ 30,233,065	$ 13,302,548	$ 10,883,903	$ 54,419,516	$ 480,614	$ 13,725,033	$ 68,625,163	$ 183,083	$ -	$ 18,620,453	$ 64,801,998	50
	BW																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QPIR-3	55.0		60	3,831		$ 285	$ 1,092,574	$ 480,732	$ 393,327	$ 1,966,633	$ 131,912	$ 524,636	$ 2,623,181	$ 18,078	$ -	$ 787,456	$ 2,581,259	50
					ALTERNATIVE TOTAL				$ 124,975,958	$ 53,666,818	$ 44,660,694	$ 223,303,470	$ 2,448,005	$ 56,437,869	$ 282,189,345	$ 702,895	$ -	$ 77,033,457	$ 265,740,983	

EAGLE CREEK W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**0.5**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
															+	+	+	-		
	EC-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QEC-1	220.0		108	13,091		$ 1,289	$ 16,868,994	$ 7,422,358	$ 6,072,838	$ 30,364,190	$ 525,880	$ 7,722,517	$ 38,612,587	$ 108,051	$ -	$ 10,647,276	$ 36,465,456	50
	EC-2																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QEC-2	220.0		108	11,798		$ 1,289	$ 15,203,035	$ 6,689,336	$ 5,473,093	$ 27,365,464	$ 473,945	$ 6,959,852	$ 34,799,260	$ 98,518	$ -	$ 9,595,766	$ 32,877,360	50
					ALTERNATIVE TOTAL				$ 33,015,707	$ 14,413,670	$ 11,857,344	$ 59,286,722	$ 999,824	$ 15,071,636	$ 75,358,182	$ 206,570	$ -	$ 20,714,881	$ 71,138,516	

UPPER WHITE W A T E R S H E D *Plan One*
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**0.5**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	UW-2																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	251,647	80,527	83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QUW-1	200.0		102	900		$ 1,171	$ 1,054,088	$ 463,799	$ 379,472	$ 1,897,358	$ 36,155	$ 483,378	$ 2,416,892	$ 17,562	$ -	$ 668,608	$ 2,406,936	50
4	Mechanical Screens		200.0					$ 0.03	$ 6,777,130	$ 2,168,682	$ 2,236,453	$ 11,182,265	$ -	$ 2,795,566	$ 13,977,831	$ 51,440	$ 3,913,793	$ -	$ 16,785,259	10
5	Pumping Facilities		200.0	Delta V	Requied V			$ 0.09	$ 17,480,996	$ 5,593,919	$ 5,768,729	$ 28,843,644	$ -	$ 7,210,911	$ 36,054,555	$ 517,643	$ 10,095,275	$ -	$ 47,756,659	10
6	Subsurface Storage		VUW-2	2.5	3.5			$ 1.53	$ 3,819,275	$ 1,222,168	$ 1,260,361	$ 6,301,804	$ 40,923	$ 1,585,682	$ 7,928,408	$ 31,341	$ -	$ 1,950,560	$ 7,668,846	40
7	Chlorination	QUW-1	168.0					$ 0.01	$ 2,011,614	$ 643,716	$ 663,833	$ 3,319,163	$ 77,131	$ 849,074	$ 4,245,368	$ 291,290	$ 1,161,707	$ 77,131	$ 8,252,377	10
8	Dechlorination		168.0					$ 0.01	$ 2,011,614	$ 643,716	$ 663,833	$ 3,319,163	$ 77,131	$ 849,074	$ 4,245,368	$ 291,290	$ 1,161,707	$ 77,131	$ 8,252,377	10
					ALTERNATIVE TOTAL				$ 33,532,188	$ 10,856,791	$ 11,097,245	$ 55,486,223	$ 231,341	$ 13,929,391	$ 69,646,954	$ 1,200,566	$ 16,332,482	$ 2,962,166	$ 91,840,734	

CENTRAL SYSTEM W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**0.5**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	LW-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QLW-1	241.0		120	4,266		$ 1,538	$ 6,561,321	$ 2,886,981	$ 2,362,076	$ 11,810,379	$ 171,360	$ 2,995,435	$ 14,977,174	$ 48,963	$ -	$ 4,108,153	$ 14,232,989	50
	LW-2																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QLW-2	200.0		108	9,264		$ 1,289	$ 11,937,740	$ 5,252,606	$ 4,297,587	$ 21,487,933	$ 372,151	$ 5,465,021	$ 27,325,105	$ 79,833	$ -	$ 7,534,795	$ 25,844,658	50
	CS-2																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Deep Tunnel		VCS-2	32.0	55 ft	10,091		25,755	259,883,960	14,293,618	68,544,394	$ 342,721,972	$ 5,045,068	$ 86,941,760	$ 434,708,800	$ 1,098,292	$ -	$ 160,975,444	$ 396,043,473	50
	OO8																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Deep Tunnel		300.0	0.0	12 ft	5,500		3,345	18,396,468	1,011,806	4,852,068	$ 24,260,342	$ 568,156	$ 6,207,124	$ 31,035,622	$ 89,109	$ -	$ 11,606,037	$ 28,362,917	50
	CSO 046																			
1	Total separation							$ 133,000	$ 2,793,000	$ 921,690	$ 928,673	$ 4,643,363	$ 232,168	$ 1,218,883	$ 6,094,413	$15,236	$ -	$ 2,618,437	$ 5,435,019	50
	CS-3																			
1	Regulator Modification	6						$ 62,912	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
2	Interceptor Connection	6						$ 125,824	$ 754,942	$ 241,581	$ 249,131	$ 1,245,654	$ -	$ 311,414	$ 1,557,068	$ -	$ -	$ 377,471	$ 1,436,560	40
3	Deep Tunnel		VCS-3	310.0	55 ft	9,218		25,755	237,415,249	13,057,839	62,618,272	$ 313,091,360	$ 4,608,888	$ 79,425,062	$ 397,125,311	$ 1,004,333	$ -	$ 147,058,038	$ 361,814,401	50
4	Mechanical Screens		185.0					$ 0.03	$ 6,346,047	$ 2,030,735	$ 2,094,196	$ 10,470,978	$ -	$ 2,617,744	$ 13,088,722	$ 47,198	$ 3,664,842	$ -	$ 15,706,335	10
5	Deep Pumping Facilities		185.0					$ 0.21	$ 39,630,807	$ 12,681,858	$ 13,078,166	$ 65,390,832	$ 666,000	$ 16,514,208	$ 82,571,039	$ 2,784,240	$ 22,886,791	$ 666,000	$ 127,551,596	10
					ALTERNATIVE TOTAL				$ 586,173,097	$ 53,163,854	$ 159,834,238	$ 799,171,188	$ 11,663,792	$ 202,708,745	$ 1,013,543,725	$ 5,167,205	$ 26,551,633	$ 336,171,156	$ 981,096,767	

AWT and Interplant ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

Untreated Overflows / Year:	**0.5**

Planning Period:	20

Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	Interplant																			
1	Interceptor (Sewer Construction)	QSAWTP	185.0		144	32,932		**$ 2,684**	**$ 88,390,432**		**$ 22,097,608**	**$ 110,488,040**	**$ 1,511,960**	**$ 28,000,000**	**$ 140,000,000**	**$ 361,520**	**$ -**	**$ 54,546,219**	**$ 126,775,108**	**50**
	SOUTHPORT AWT																			
1	Raw Wastewater (Captured CSO) Pump Station for EHRC (75-MGD firm capacity)								$ 8,376,300		$ 2,094,075	$ 10,470,375	$ -	$ 2,617,594	$ 13,087,969		$ 3,664,631	$ -	$ 15,158,568	10
2	New 354-MGD Headworks Facility w/ Screening								$ 29,079,200		$ 7,269,800	$ 36,349,000	$ -	$ 9,087,250	$ 45,436,250		$ 12,722,150	$ -	$ 52,624,551	10
3	New 354-MGD Grit Removal Facility with blending and flow split								$ 8,754,000		$ 2,188,500	$ 10,942,500	$ -	$ 2,735,625	$ 13,678,125		$ 3,829,875	$ -	$ 15,842,091	10
4	New 125-MGD/275-MGD Primary Clarifiers								$ 33,184,000		$ 8,296,000	$ 41,480,000	$ -	$ 10,370,000	$ 51,850,000		$ 14,518,000	$ -	$ 60,052,997	10
5	New 15-MG EHRC Basin w/ grit removal and primary settling		75.0						$ 4,319,000		$ 1,079,750	$ 5,398,750	$ -	$ 1,349,688	$ 6,748,438		$ 1,889,563	$ -	$ 7,816,083	10
6	New 75-MGD EHRC Facility		75.0						$ 14,128,000		$ 3,532,000	$ 17,660,000	$ -	$ 4,415,000	$ 22,075,000		$ 6,181,000	$ -	$ 25,567,404	10
7	EHRC Annual O&M		26.0									$ -			$ -	$ 6,500	$ -		$ -	10
8	New ANS Aeration Equipment								$ 5,100,000		$ 1,275,000	$ 6,375,000	$ -	$ 1,593,750	$ 7,968,750		$ 2,231,250	$ -	$ 9,229,457	10
9	New ANS Return Activated Sludge (RAS) Pumping								$ 3,778,000		$ 944,500	$ 4,722,500	$ -	$ 1,180,625	$ 5,903,125		$ 1,652,875	$ -	$ 6,837,037	10
10	New ANS Final Clarifiers (8 units each @ 155' diameter)								$ 35,041,400		$ 8,760,350	$ 43,801,750	$ -	$ 10,950,438	$ 54,752,188		$ 15,330,613	$ -	$ 63,414,329	10
11	New Effluent Pump Station on ANS (154-MGD firm capacity)								$ 3,865,600		$ 966,400	$ 4,832,000	$ -	$ 1,208,000	$ 6,040,000		$ 1,691,200	$ -	$ 6,995,566	10
12	New 15 MG – Sec. Effluent Equalization Basin w/Aerators								$ 3,608,000		$ 902,000	$ 4,510,000	$ -	$ 1,127,500	$ 5,637,500		$ 1,578,500	$ -	$ 6,529,388	10
13	Add Supplemental Disinfection Process (chlorination /dechlor.)								$ 4,656,000		$ 1,164,000	$ 5,820,000	$ -	$ 1,455,000	$ 7,275,000		$ 2,037,000	$ -	$ 8,425,951	10
14	Yard Piping and Valves								$ 5,752,500		$ 1,438,125	$ 7,190,625	$ -	$ 1,797,656	$ 8,988,281		$ 2,516,719	$ -	$ 10,410,284	10
15	Wet Weather Secondary Annual O&M		9,370.0									$ -	$ -	$ -	$ -	$ 2,342,500	$ -	$ -	$ 27,143,077	10
									$ 159,642,000	$ -	$ 39,910,500	$ 199,552,500	$ -	$ 49,888,125	$ 249,440,625	$ 2,349,000	$ 69,843,375	$ -	$ 316,046,783	
	Belmont AWT																			
1	New Headworks Facility with Screens		300.0						$24,786,950		$ 6,196,738	$ 30,983,688	$ -	$ 7,745,922	$ 38,729,609		$ 10,844,291	$ -	$ 44,856,878	10
2	New Grit Facility w/ Flow Split		300						$5,681,015		$ 1,420,254	$ 7,101,269	$ -	$ 1,775,317	$ 8,876,586		$ 2,485,444	$ -	$ 10,280,918	10
3	New Intermediate Clarifiers								$36,168,000		$ 9,042,000	$ 45,210,000	$ -	$ 11,302,500	$ 56,512,500		$ 15,823,500	$ -	$ 65,453,134	10
4	New Return Sludge Pumping								$9,247,500		$ 2,311,875	$ 11,559,375	$ -	$ 2,889,844	$ 14,449,219		$ 4,045,781	$ -	$ 16,735,176	10
5	Effluent Disinfection - Chlorination/Dechlorination								$8,310,000		$ 2,077,500	$ 10,387,500	$ -	$ 2,596,875	$ 12,984,375		$ 3,635,625	$ -	$ 15,038,585	10
6	Belmont Anaerobic Digestor Facility BE-78-001								**$18,688,000**		**$ 4,672,000**	**$ 23,360,000**	**$ -**	**$ 5,840,000**	**$ 29,200,000**		**$ 8,176,000**	**$ -**	**$ 33,819,624**	**10**
7	Yard Piping and Valves								$7,245,082		$ 1,811,270	$ 9,056,352	$ -	$ 2,264,088	$ 11,320,440		$ 3,169,723	$ -	$ 13,111,405	10
8	Annual O&M		5,690.00									$ -	$ -	$ -	$ -	$ 1,422,500	$ -	$ -	$ 16,482,829	10
					ALTERNATIVE TOTAL				$ 110,126,547	$ -	$ 27,531,637	$ 137,658,183	$ -	$ 34,414,546	$ 172,072,729	$ 1,422,500	$ 48,180,364	$ -	$ 215,778,549	

System Summary

PRELIMINARY COST ESTIMATES FOR SYSTEM-WIDE PLAN TWO			12								
Cost Item	**Base Construction Cost ($)**	**Site Adjustment ($)**	**Construction Contingency (25%)**	**Construction Cost ($)**	**Land Costs ($)**	**Engineering, Legal & Administration (25%)**	**Project (Capital) Cost ($)**	**Annual Operation & Maintenance Cost ($)**	**Replacement Cost ($)**	**Residual Value @ 20 years ($)**	**Present Worth ($)**
TRIBUTARIES											
Fall Creek	108,522,716	12,248,064	30,192,695	150,963,476	2,542,865	38,376,585	191,882,927	1,405,128	6,981,070	59,523,785	193,105,932
Pogues Run	92,657,521	15,845,986	26,896,583	135,400,090	3,068,718	34,617,202	173,086,010	1,195,763	9,178,068	52,997,504	175,207,927
Pleasant Run	22,219,464	8,470,993	7,672,614	38,363,071	1,718,978	10,020,512	50,102,562	122,678	-	14,650,533	46,846,872
Eagle Creek	7,467,687	3,172,541	2,660,057	13,300,285	856,992	3,539,319	17,696,596	62,416	-	5,243,237	16,745,915
TRIBUTARIES Subtotal	**230,867,389**	**39,737,583**	**67,421,949**	**338,026,921**	**8,187,555**	**86,553,619**	**432,768,095**	**2,785,985**	**16,159,138**	**132,415,059**	**431,906,647**
CENTRAL System											
Upper White	4,965,459	1,606,046	1,642,876	8,214,381	27,662	2,060,511	10,302,553	164,702	2,567,272	301,894	13,565,175
Lower White	93,420,700	21,906,813	28,831,878	144,159,391	2,516,472	36,668,966	183,344,829	3,471,298	29,336,862	28,478,655	231,051,705
CENTRAL System Subtotal	**98,386,158**	**23,512,859**	**30,474,754**	**152,373,772**	**2,544,134**	**38,729,476**	**193,647,382**	**3,635,999**	**31,904,134**	**28,780,549**	**244,616,880**
AWT SYSTEM											
Interplant Connection	88,390,432	-	22,097,608	110,488,040	1,511,960	28,000,000	140,000,000	361,520	-	54,546,219	126,775,108
Southport AWT	141,195,000	-	35,298,750	176,493,750	-	44,123,438	220,617,188	1,125,000	61,772,813	-	268,555,848
Belmont AWT	98,383,897	-	24,595,974	122,979,871	-	30,744,968	153,724,838	1,895,000	43,042,955	-	200,002,871
AWT SYSTEM Subtotal	**327,969,329**	**-**	**81,992,332**	**409,961,661**	**1,511,960**	**102,868,405**	**514,342,026**	**3,381,520**	**104,815,767**	**54,546,219**	**595,333,827**
Baseline Projects											
Baseline Projects Subtotal	**-**	**-**	**-**	**189,300,000**	**-**	**-**	**189,300,000**	**1,300,000**	**24,900,000**	**27,200,000**	**208,800,000**
Total without WaterShed Improvements	**657,222,875**	**63,250,442**	**179,889,036**	**1,089,662,353**	**12,243,649**	**228,151,501**	**1,330,057,503**	**11,103,505**	**177,779,039**	**242,941,827**	**1,480,657,354**
WaterShed Improvements	**-**	**-**	**-**	**63,320,000**	**-**	**-**	**63,320,000**	**130,000**	**-**	**-**	**64,720,000**
Total with WaterShed Improvements	**657,222,875**	**63,250,442**	**179,889,036**	**1,152,982,353**	**12,243,649**	**228,151,501**	**1,393,377,503**	**11,233,505**	**177,779,039**	**242,941,827**	**1,545,377,354**

PRELIMINARY COST ESTIMATES FOR SYSTEM-WIDE PLAN TWO			6								
Cost Item	**Base Construction Cost ($)**	**Site Adjustment ($)**	**Construction Contingency (25%)**	**Construction Cost ($)**	**Land Costs ($)**	**Engineering, Legal & Administration (25%)**	**Project (Capital) Cost ($)**	**Annual Operation & Maintenance Cost ($)**	**Replacement Cost ($)**	**Residual Value @ 20 years ($)**	**Present Worth ($)**
TRIBUTARIES											
Fall Creek	126,991,520	15,209,983	35,550,376	177,751,878	2,792,419	45,136,074	225,680,372	1,764,249	9,862,120	67,722,768	230,074,920
Pogues Run	115,815,447	21,044,311	33,920,735	170,780,493	3,425,526	43,551,505	217,757,524	1,621,718	14,402,372	61,289,484	225,119,707
Pleasant Run	43,868,716	17,979,632	15,462,087	77,310,434	1,828,278	19,784,678	98,923,390	244,730	-	27,749,384	92,900,132
Eagle Creek	10,051,194	4,309,284	3,590,120	17,950,598	856,992	4,701,898	23,509,488	76,948	-	6,793,341	22,232,324
TRIBUTARIES Subtotal	**296,726,877**	**58,543,210**	**88,523,317**	**443,793,404**	**8,903,216**	**113,174,155**	**565,870,774**	**3,707,645**	**24,264,492**	**163,554,977**	**570,327,083**
CENTRAL System											
Upper White	8,959,509	2,895,353	2,963,715	14,818,577	53,028	3,717,901	18,589,506	371,761	4,819,883	383,315	25,498,155
Lower White	107,419,545	22,170,233	32,397,444	161,987,222	2,719,733	41,176,739	205,883,694	3,148,054	26,551,633	39,974,966	244,601,158
CENTRAL System Subtotal	**116,379,054**	**25,065,586**	**35,361,160**	**176,805,799**	**2,772,761**	**44,894,640**	**224,473,200**	**3,519,815**	**31,371,517**	**40,358,281**	**270,099,312**
AWT SYSTEM											
Interplant Connection	88,390,432	-	22,097,608	110,488,040	1,511,960	28,000,000	140,000,000	361,520	-	54,546,219	126,775,108
Southport AWT	141,195,000	-	35,298,750	176,493,750	-	44,123,438	220,617,188	1,367,500	61,772,813	-	271,365,750
Belmont AWT	105,407,797	-	26,351,949	131,759,746	-	32,939,936	164,699,682	1,705,000	46,115,911	-	210,512,431
AWT SYSTEM Subtotal	**334,993,229**	**-**	**83,748,307**	**418,741,536**	**1,511,960**	**105,063,374**	**525,316,869**	**3,434,020**	**107,888,723**	**54,546,219**	**608,653,290**
Baseline Projects											
Baseline Projects Subtotal	**-**	**-**	**-**	**189,300,000**	**-**	**-**	**189,300,000**	**1,300,000**	**24,900,000**	**27,200,000**	**208,800,000**
Total without WaterShed Improvements	**748,099,159**	**83,608,796**	**207,632,784**	**1,228,640,739**	**13,187,936**	**263,132,169**	**1,504,960,844**	**11,961,481**	**188,424,732**	**285,659,477**	**1,657,879,685**
WaterShed Improvements	**-**	**-**	**-**	**63,320,000**	**-**	**-**	**63,320,000**	**130,000**	**-**	**-**	**64,720,000**
Total with WaterShed Improvements	**748,099,159**	**83,608,796**	**207,632,784**	**1,291,960,739**	**13,187,936**	**263,132,169**	**1,568,280,844**	**12,091,481**	**188,424,732**	**285,659,477**	**1,722,599,685**

System Summary

PRELIMINARY COST ESTIMATES FOR SYSTEM-WIDE PLAN TWO — 4

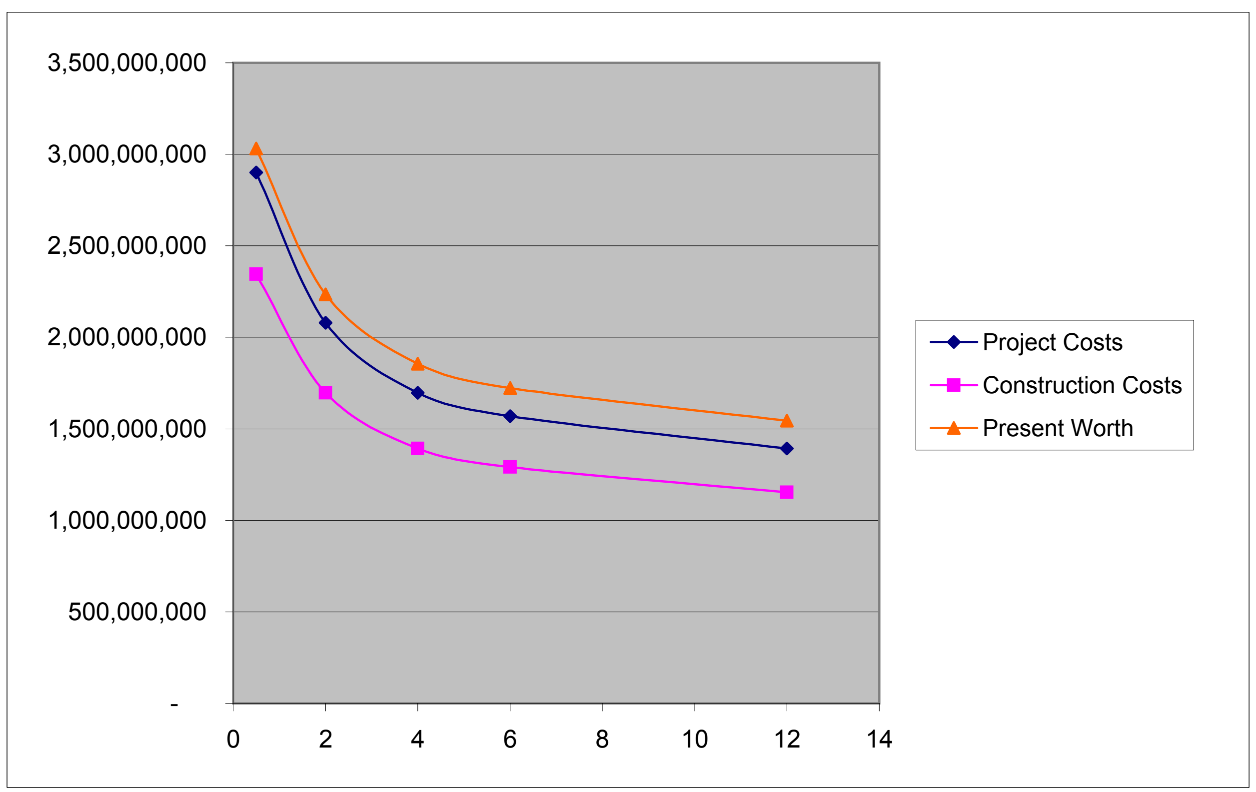
Cost Item	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
TRIBUTARIES											
Fall Creek	141,651,137	17,893,962	39,886,275	199,431,373	3,254,926	50,671,575	253,357,874	1,989,183	11,625,525	75,065,390	259,011,014
Pogues Run	130,967,295	23,933,891	37,903,379	192,804,564	3,619,217	49,105,945	245,529,727	1,873,954	17,269,041	67,325,637	255,507,314
Pleasant Run	57,651,332	24,043,983	20,423,829	102,119,144	2,011,261	26,032,601	130,163,007	322,829	-	36,201,937	122,346,218
Eagle Creek	13,652,448	5,893,836	4,886,571	24,432,854	999,824	6,358,170	31,790,848	97,651	-	9,096,925	30,018,158
TRIBUTARIES Subtotal	**343,922,211**	**71,765,671**	**103,100,053**	**518,787,936**	**9,885,229**	**132,168,291**	**660,841,456**	**4,283,618**	**28,894,565**	**187,689,889**	**666,882,704**
CENTRAL System											
Upper White	13,804,462	4,448,229	4,563,173	22,815,864	78,738	5,723,650	28,618,252	577,277	7,451,388	555,219	39,340,242
Lower White	116,533,591	23,073,190	34,901,695	174,508,477	2,760,385	44,317,215	221,586,077	3,141,025	25,925,106	46,134,983	257,901,494
CENTRAL System Subtotal	**130,338,053**	**27,521,419**	**39,464,868**	**197,324,340**	**2,839,123**	**50,040,866**	**250,204,329**	**3,718,302**	**33,376,494**	**46,690,202**	**297,241,736**
AWT SYSTEM											
Interplant Connection	88,390,432	-	22,097,608	110,488,040	1,511,960	28,000,000	140,000,000	361,520	-	54,546,219	126,775,108
Southport AWT	141,195,000	-	35,298,750	176,493,750	-	44,123,438	220,617,188	1,657,500	61,772,813	-	274,726,046
Belmont AWT	110,126,547	-	27,531,637	137,658,183	-	34,414,546	172,072,729	1,450,000	48,180,364	-	216,097,198
AWT SYSTEM Subtotal	**339,711,979**	**-**	**84,927,995**	**424,639,973**	**1,511,960**	**106,537,983**	**532,689,916**	**3,469,020**	**109,953,177**	**54,546,219**	**617,598,352**
Baseline Projects											
Baseline Projects Subtotal	**-**	**-**	**-**	**189,300,000**	**-**	**-**	**189,300,000**	**1,300,000**	**24,900,000**	**27,200,000**	**208,800,000**
Total without WaterShed Improvements	**813,972,243**	**99,287,091**	**227,492,916**	**1,330,052,249**	**14,236,312**	**288,747,140**	**1,633,035,702**	**12,770,940**	**197,124,236**	**316,126,310**	**1,790,522,792**
WaterShed Improvements	**-**	**-**	**-**	**63,320,000**	**-**	**-**	**63,320,000**	**130,000**	**-**	**-**	**64,720,000**
Total with WaterShed Improvements	**813,972,243**	**99,287,091**	**227,492,916**	**1,393,372,249**	**14,236,312**	**288,747,140**	**1,696,355,702**	**12,900,940**	**197,124,236**	**316,126,310**	**1,855,242,792**

PRELIMINARY COST ESTIMATES FOR SYSTEM-WIDE PLAN TWO — 2

Cost Item	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
TRIBUTARIES											
Fall Creek	167,602,949	22,722,304	47,581,313	237,906,567	3,902,607	60,452,294	302,261,468	2,451,227	15,763,424	86,792,257	311,862,607
Pogues Run	163,874,847	30,969,627	47,474,449	242,318,923	4,071,727	61,597,662	307,988,312	2,476,755	24,575,225	79,307,703	325,253,563
Pleasant Run	83,791,795	35,545,787	29,834,396	149,171,978	2,094,485	37,816,616	189,083,078	470,129	-	51,969,438	177,939,307
Eagle Creek	26,387,314	11,497,177	9,471,123	47,355,613	999,824	12,088,859	60,444,297	169,285	-	16,737,845	57,062,275
TRIBUTARIES Subtotal	**441,656,905**	**100,734,895**	**134,361,280**	**676,753,080**	**11,068,643**	**171,955,431**	**859,777,155**	**5,567,396**	**40,338,649**	**234,807,243**	**872,117,753**
CENTRAL System											
Upper White	22,338,502	7,203,469	7,385,493	36,927,463	144,767	9,268,058	46,340,288	847,326	11,382,345	1,505,130	62,109,210
Lower White	214,758,082	29,449,234	61,051,829	305,259,146	5,141,895	77,600,260	388,001,301	3,510,350	25,296,706	108,104,071	408,457,461
CENTRAL System Subtotal	**237,096,584**	**36,652,704**	**68,437,322**	**342,186,609**	**5,286,662**	**86,868,318**	**434,341,589**	**4,357,676**	**36,679,052**	**109,609,201**	**470,566,672**
AWT SYSTEM											
Interplant Connection	88,390,432	-	22,097,608	110,488,040	1,511,960	28,000,000	140,000,000	361,520	-	54,546,219	126,775,108
Southport AWT	141,195,000	-	35,298,750	176,493,750	-	44,123,438	220,617,188	1,722,500	61,772,813	-	275,479,216
Belmont AWT	110,126,547	-	27,531,637	137,658,183	-	34,414,546	172,072,729	1,422,500	48,180,364	-	215,778,549
AWT SYSTEM Subtotal	**339,711,979**	**-**	**84,927,995**	**424,639,973**	**1,511,960**	**106,537,983**	**532,689,916**	**3,506,520**	**109,953,177**	**54,546,219**	**618,032,873**
Baseline Projects											
Baseline Projects Subtotal	**-**	**-**	**-**	**189,300,000**	**-**	**-**	**189,300,000**	**1,300,000**	**24,900,000**	**27,200,000**	**208,800,000**
Total without WaterShed Improvements	**1,018,465,468**	**137,387,598**	**287,726,597**	**1,632,879,663**	**17,867,265**	**365,361,732**	**2,016,108,660**	**14,731,592**	**211,870,877**	**426,162,663**	**2,169,517,298**
WaterShed Improvements	**-**	**-**	**-**	**63,320,000**	**-**	**-**	**63,320,000**	**130,000**	**-**	**-**	**64,720,000**
Total with WaterShed Improvements	**1,018,465,468**	**137,387,598**	**287,726,597**	**1,696,199,663**	**17,867,265**	**365,361,732**	**2,079,428,660**	**14,861,592**	**211,870,877**	**426,162,663**	**2,234,237,298**

System Summary

PRELIMINARY COST ESTIMATES FOR SYSTEM-WIDE PLAN TWO			0.5								
Cost Item	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
TRIBUTARIES											
Fall Creek	308,793,215	35,765,395	86,139,652	430,698,262	7,228,183	109,481,611	547,408,057	3,515,443	21,836,544	168,246,246	546,767,740
Pogues Run	270,103,689	43,711,752	76,476,200	390,291,641	6,571,934	99,215,894	496,079,468	4,401,608	32,486,589	136,117,647	521,981,932
Pleasant Run	124,975,958	53,666,818	44,660,694	223,303,470	2,448,005	56,437,869	282,189,345	702,895	-	77,033,457	265,740,983
Eagle Creek	33,015,707	14,413,670	11,857,344	59,286,722	999,824	15,071,636	75,358,182	206,570	-	20,714,881	71,138,516
TRIBUTARIES Subtotal	**736,888,569**	**147,557,635**	**219,133,891**	**1,103,580,095**	**17,247,947**	**280,207,010**	**1,401,035,052**	**8,826,516**	**54,323,133**	**402,112,231**	**1,405,629,171**
CENTRAL System											
Upper White	33,532,188	10,856,791	11,097,245	55,486,223	231,341	13,929,391	69,646,954	1,200,566	16,332,482	2,962,166	91,840,734
Lower White	362,078,691	44,768,201	101,711,723	508,558,614	7,620,253	129,044,717	645,223,585	4,106,250	24,666,365	199,629,695	643,008,816
CENTRAL System Subtotal	**395,610,879**	**55,624,991**	**112,808,967**	**564,044,837**	**7,851,594**	**142,974,108**	**714,870,539**	**5,306,817**	**40,998,847**	**202,591,861**	**734,849,550**
AWT SYSTEM											
Interplant Connection	88,390,432	-	22,097,608	110,488,040	1,511,960	28,000,000	140,000,000	361,520	-	54,546,219	126,775,108
Southport AWT	141,195,000	-	35,298,750	176,493,750	-	44,123,438	220,617,188	1,745,000	61,772,813	-	275,739,928
Belmont AWT	110,126,547	-	27,531,637	137,658,183	-	34,414,546	172,072,729	1,422,500	48,180,364	-	215,778,549
AWT SYSTEM Subtotal	**339,711,979**	**-**	**84,927,995**	**424,639,973**	**1,511,960**	**106,537,983**	**532,689,916**	**3,529,020**	**109,953,177**	**54,546,219**	**618,293,586**
Baseline Projects											
Baseline Projects Subtotal				189,300,000			189,300,000	1,300,000	24,900,000	27,200,000	208,800,000
Total without WaterShed Improvements	**1,472,211,426**	**203,182,626**	**416,870,853**	**2,281,564,905**	**26,611,501**	**529,719,101**	**2,837,895,507**	**18,962,353**	**230,175,156**	**686,450,311**	**2,967,572,307**
WaterShed Improvements	**-**	**-**	**-**	**63,320,000**	**-**	**-**	**63,320,000**	**130,000**	**-**	**-**	**64,720,000**
Total with WaterShed Improvements	**1,472,211,426**	**203,182,626**	**416,870,853**	**2,344,884,905**	**26,611,501**	**529,719,101**	**2,901,215,507**	**19,092,353**	**230,175,156**	**686,450,311**	**3,032,292,307**



	Construction Cost ($)	Project Cost ($)	Present Worth ($)
12	1,152,982,353	1,393,377,503	1,545,377,354
6	1,291,960,739	1,568,280,844	1,722,599,685
4	1,393,372,249	1,696,355,702	1,855,242,792
2	1,696,199,663	2,079,428,660	2,234,237,298
0.5	2,344,884,905	2,901,215,507	3,032,292,307

Fall Creek

Level of Control Cost Summary											
Number of Events	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
	$ 108,522,716	$ 12,248,064	$ 30,192,695	$ 150,963,476	$ 2,542,865	$ 38,376,585	$ 191,882,927	$ 1,405,128	$ 6,981,070	$ 59,523,785	$ 193,105,932
0.5	$ 308,793,215	$ 35,765,395	$ 86,139,652	$ 430,698,262	$ 7,228,183	$ 109,481,611	$ 547,408,057	$ 3,515,443	$ 21,836,544	$ 168,246,246	$ 546,767,740
2	$ 167,602,949	$ 22,722,304	$ 47,581,313	$ 237,906,567	$ 3,902,607	$ 60,452,294	$ 302,261,468	$ 2,451,227	$ 15,763,424	$ 86,792,257	$ 311,862,607
4	$ 141,651,137	$ 17,893,962	$ 39,886,275	$ 199,431,373	$ 3,254,926	$ 50,671,575	$ 253,357,874	$ 1,989,183	$ 11,625,525	$ 75,065,390	$ 259,011,014
6	$ 126,991,520	$ 15,209,983	$ 35,550,376	$ 177,751,878	$ 2,792,419	$ 45,136,074	$ 225,680,372	$ 1,764,249	$ 9,862,120	$ 67,722,768	$ 230,074,920
12	$ 108,522,716	$ 12,248,064	$ 30,192,695	$ 150,963,476	$ 2,542,865	$ 38,376,585	$ 191,882,927	$ 1,405,128	$ 6,981,070	$ 59,523,785	$ 193,105,932

Pogues Run

Level of Control Cost Summary											
Number of Events	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
	$ 92,657,521	$ 15,845,986	$ 26,896,583	$ 135,400,090	$ 3,068,718	$ 34,617,202	$ 173,086,010	$ 1,195,763	$ 9,178,068	$ 52,997,504	$ 175,207,927
0.5	$ 270,103,689	$ 43,711,752	$ 76,476,200	$ 390,291,641	$ 6,571,934	$ 99,215,894	$ 496,079,468	$ 4,401,608	$ 32,486,589	$ 136,117,647	$ 521,981,932
2	$ 163,874,847	$ 30,969,627	$ 47,474,449	$ 242,318,923	$ 4,071,727	$ 61,597,662	$ 307,988,312	$ 2,476,755	$ 24,575,225	$ 79,307,703	$ 325,253,563
4	$ 130,967,295	$ 23,933,891	$ 37,903,379	$ 192,804,564	$ 3,619,217	$ 49,105,945	$ 245,529,727	$ 1,873,954	$ 17,269,041	$ 67,325,637	$ 255,507,314
6	$ 115,815,447	$ 21,044,311	$ 33,920,735	$ 170,780,493	$ 3,425,526	$ 43,551,505	$ 217,757,524	$ 1,621,718	$ 14,402,372	$ 61,289,484	$ 225,119,707
12	$ 92,657,521	$ 15,845,986	$ 26,896,583	$ 135,400,090	$ 3,068,718	$ 34,617,202	$ 173,086,010	$ 1,195,763	$ 9,178,068	$ 52,997,504	$ 175,207,927

Pleasant Run

Level of Control Cost Summary											
Number of Events	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
	$ 22,219,464	$ 8,470,993	$ 7,672,614	$ 38,363,071	$ 1,718,978	$ 10,020,512	$ 50,102,562	$ 122,678	$ -	$ 14,650,533	$ 46,846,872
0.5	$ 124,975,958	$ 53,666,818	$ 44,660,694	$ 223,303,470	$ 2,448,005	$ 56,437,869	$ 282,189,345	$ 702,895	$ -	$ 77,033,457	$ 265,740,983
2	$ 83,791,795	$ 35,545,787	$ 29,834,396	$ 149,171,978	$ 2,094,485	$ 37,816,616	$ 189,083,078	$ 470,129	$ -	$ 51,969,438	$ 177,939,307
4	$ 57,651,332	$ 24,043,983	$ 20,423,829	$ 102,119,144	$ 2,011,261	$ 26,032,601	$ 130,163,007	$ 322,829	$ -	$ 36,201,937	$ 122,346,218
6	$ 43,868,716	$ 17,979,632	$ 15,462,087	$ 77,310,434	$ 1,828,278	$ 19,784,678	$ 98,923,390	$ 244,730	$ -	$ 27,749,384	$ 92,900,132
12	$ 22,219,464	$ 8,470,993	$ 7,672,614	$ 38,363,071	$ 1,718,978	$ 10,020,512	$ 50,102,562	$ 122,678	$ -	$ 14,650,533	$ 46,846,872

Eagle Creek

Level of Control Cost Summary											
Number of Events	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
	$ 7,467,687	$ 3,172,541	$ 2,660,057	$ 13,300,285	$ 856,992	$ 3,539,319	$ 17,696,596	$ 62,416	$ -	$ 5,243,237	$ 16,745,915
0.5	$ 33,015,707	$ 14,413,670	$ 11,857,344	$ 59,286,722	$ 999,824	$ 15,071,636	$ 75,358,182	$ 206,570	$ -	$ 20,714,881	$ 71,138,516
2	$ 26,387,314	$ 11,497,177	$ 9,471,123	$ 47,355,613	$ 999,824	$ 12,088,859	$ 60,444,297	$ 169,285	$ -	$ 16,737,845	$ 57,062,275
4	$ 13,652,448	$ 5,893,836	$ 4,886,571	$ 24,432,854	$ 999,824	$ 6,358,170	$ 31,790,848	$ 97,651	$ -	$ 9,096,925	$ 30,018,158
6	$ 10,051,194	$ 4,309,284	$ 3,590,120	$ 17,950,598	$ 856,992	$ 4,701,898	$ 23,509,488	$ 76,948	$ -	$ 6,793,341	$ 22,232,324
12	$ 7,467,687	$ 3,172,541	$ 2,660,057	$ 13,300,285	$ 856,992	$ 3,539,319	$ 17,696,596	$ 62,416	$ -	$ 5,243,237	$ 16,745,915

Upper White

Level of Control Cost Summary											
Number of Events	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
	$ 4,965,459	$ 1,606,046	$ 1,642,876	$ 8,214,381	$ 27,662	$ 2,060,511	$ 10,302,553	$ 164,702	$ 2,567,272	$ 301,894	$ 13,565,175
0.5	$ 33,532,188	$ 10,856,791	$ 11,097,245	$ 55,486,223	$ 231,341	$ 13,929,391	$ 69,646,954	$ 1,200,566	$ 16,332,482	$ 2,962,166	$ 91,840,734
2	$ 22,338,502	$ 7,203,469	$ 7,385,493	$ 36,927,463	$ 144,767	$ 9,268,058	$ 46,340,288	$ 847,326	$ 11,382,345	$ 1,505,130	$ 62,109,210
4	$ 13,804,462	$ 4,448,229	$ 4,563,173	$ 22,815,864	$ 78,738	$ 5,723,650	$ 28,618,252	$ 577,277	$ 7,451,388	$ 555,219	$ 39,340,242
6	$ 8,959,509	$ 2,895,353	$ 2,963,715	$ 14,818,577	$ 53,028	$ 3,717,901	$ 18,589,506	$ 371,761	$ 4,819,883	$ 383,315	$ 25,498,155
12	$ 4,965,459	$ 1,606,046	$ 1,642,876	$ 8,214,381	$ 27,662	$ 2,060,511	$ 10,302,553	$ 164,702	$ 2,567,272	$ 301,894	$ 13,565,175

Central System

Level of Control Cost Summary											
Number of Events	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
	$ 93,420,700	$ 21,906,813	$ 28,831,878	$ 144,159,391	$ 2,516,472	$ 36,668,966	$ 183,344,829	$ 3,471,298	$ 29,336,862	$ 28,478,655	$ 231,051,705
0.5	$ 362,078,691	$ 44,768,201	$ 101,711,723	$ 508,558,614	$ 7,620,253	$ 129,044,717	$ 645,223,585	$ 4,106,250	$ 24,666,365	$ 199,629,695	$ 643,008,816
2	$ 214,758,082	$ 29,449,234	$ 61,051,829	$ 305,259,146	$ 5,141,895	$ 77,600,260	$ 388,001,301	$ 3,510,350	$ 25,296,706	$ 108,104,071	$ 408,457,461
4	$ 116,533,591	$ 23,073,190	$ 34,901,695	$ 174,508,477	$ 2,760,385	$ 44,317,215	$ 221,586,077	$ 3,141,025	$ 25,925,106	$ 46,134,983	$ 257,901,494
6	$ 107,419,545	$ 22,170,233	$ 32,397,444	$ 161,987,222	$ 2,719,733	$ 41,176,739	$ 205,883,694	$ 3,148,054	$ 26,551,633	$ 39,974,966	$ 244,601,158
12	$ 93,420,700	$ 21,906,813	$ 28,831,878	$ 144,159,391	$ 2,516,472	$ 36,668,966	$ 183,344,829	$ 3,471,298	$ 29,336,862	$ 28,478,655	$ 231,051,705

Interplant

Level of Control Cost Summary											
Number of Events	Base Construction Cost	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration	Project (Capital) Cost	Annual Operation & Maintenance	Replacement Cost ($)	Residual Value @ 20 years	Present Worth ($)
	$ 88,390,432	$ -	$ 22,097,608	$ 110,488,040	$ 1,511,960	$ 28,000,000	$ 140,000,000	$ 361,520	$ -	$ 54,546,219	$ 126,775,108
0.5	$ 88,390,432	$ -	$ 22,097,608	$ 110,488,040	$ 1,511,960	$ 28,000,000	$ 140,000,000	$ 361,520	$ -	$ 54,546,219	$ 126,775,108
2	$ 88,390,432	$ -	$ 22,097,608	$ 110,488,040	$ 1,511,960	$ 28,000,000	$ 140,000,000	$ 361,520	$ -	$ 54,546,219	$ 126,775,108
4	$ 88,390,432	$ -	$ 22,097,608	$ 110,488,040	$ 1,511,960	$ 28,000,000	$ 140,000,000	$ 361,520	$ -	$ 54,546,219	$ 126,775,108
6	$ 88,390,432	$ -	$ 22,097,608	$ 110,488,040	$ 1,511,960	$ 28,000,000	$ 140,000,000	$ 361,520	$ -	$ 54,546,219	$ 126,775,108
12	$ 88,390,432	$ -	$ 22,097,608	$ 110,488,040	$ 1,511,960	$ 28,000,000	$ 140,000,000	$ 361,520	$ -	$ 54,546,219	$ 126,775,108

Southport

Level of Control Cost Summary											
Number of Events	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
	$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 1,125,000	$ 61,772,813	$ -	$ 268,555,848
0.5	$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 1,745,000	$ 61,772,813	$ -	$ 275,739,928
2	$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 1,722,500	$ 61,772,813	$ -	$ 275,479,216
4	$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 1,657,500	$ 61,772,813	$ -	$ 274,726,046
6	$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 1,367,500	$ 61,772,813	$ -	$ 271,365,750
12	$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 1,125,000	$ 61,772,813	$ -	$ 268,555,848

Belmont

Level of Control Cost Summary											
Number of Events	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)
	$ 98,383,897	$ -	$ 24,595,974	$ 122,979,871	$ -	$ 30,744,968	$ 153,724,838	$ 1,895,000	$ 43,042,955	$ -	$ 200,002,871
0.5	$ 110,126,547	$ -	$ 27,531,637	$ 137,658,183	$ -	$ 34,414,546	$ 172,072,729	$ 1,422,500	$ 48,180,364	$ -	$ 215,778,549
2	$ 110,126,547	$ -	$ 27,531,637	$ 137,658,183	$ -	$ 34,414,546	$ 172,072,729	$ 1,422,500	$ 48,180,364	$ -	$ 215,778,549
4	$ 110,126,547	$ -	$ 27,531,637	$ 137,658,183	$ -	$ 34,414,546	$ 172,072,729	$ 1,450,000	$ 48,180,364	$ -	$ 216,097,198
6	$ 105,407,797	$ -	$ 26,351,949	$ 131,759,746	$ -	$ 32,939,936	$ 164,699,682	$ 1,705,000	$ 46,115,911	$ -	$ 210,512,431
12	$ 98,383,897	$ -	$ 24,595,974	$ 122,979,871	$ -	$ 30,744,968	$ 153,724,838	$ 1,895,000	$ 43,042,955	$ -	$ 200,002,871

F A L L C R E E K W A T E R S H E D *Plan Two*

CONTROL TECHNOLOGY 1: Remote Treatment in Fall Creek/Pogues Run and Storage/Conveyance Elsewhere

ENRCCI factor:	105%
Untreated Overflows / Year:	**12**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	FC-1																			
1	Regulator Modification	21						$ 62,912	$ 1,321,148	$ 422,768	$ 435,979	$ 2,179,895	$ -	$ 544,974	$ 2,724,869	$ -	$ -	$ 660,574	$ 2,513,980	40
2	Interceptor Connection	21						125,824	2,642,297	845,535	871,958	4,359,790	$ -	1,089,947	5,449,737	$ -	$ -	$ 1,321,148	$ 5,027,960	40
3	Deep Tunnel		VFC-1	40.0	20 ft	18,790		4,561	85,703,215	4,713,677	22,604,223	113,021,115	$ 1,725,357	28,686,618	143,433,089	$ 370,103	$ -	$ 53,147,286	$ 130,754,258	50
4	Regulator	1						524,265	524,265	167,765	173,008	865,038	$ -	216,259	1,081,297	$ 14,223	$ -	$ 262,133	$ 1,162,419	40
	Remote Treatment																			
1	Mechanical Screens		20.0					$ 0.05	$ 972,850	$ 311,312	$ 321,040	$ 1,605,202	$ -	$ 401,301	$ 2,006,503	$ 14,792	$ 561,821	$ -	$ 2,495,342	10
2	Deep Pumping Facilities		20.0					$ 0.29	$ 5,791,487	$ 1,853,276	$ 1,911,191	$ 9,555,953	$ 80,000	$ 2,408,988	$ 12,044,941	$ 628,576	$ 3,344,584	$ 80,000	$ 21,192,621	10
3	Sludge Pumping Facilities		1.0		Sludge Vol	Dewatering		$ 0.42	$ 419,412	$ 134,212	$ 138,406	$ 692,030	$ 5,000	$ 174,258	$ 871,288	$ 14,950	$ 242,211	$ 5,000	$ 1,179,775	10
4	Subsurface Storage			2	5%	2		$ 1.59	$ 3,176,386	$ 1,016,443	$ 1,048,207	$ 5,241,037	$ 40,923	$ 1,320,490	$ 6,602,449	$ 28,026	$ -	$ 1,629,115	$ 6,407,098	40
5	EHRC	QFC-1	20.0					$ 0.17	$ 3,406,004	$ 1,089,921	$ 1,123,981	$ 5,619,906	$ 409,225	$ 1,507,283	$ 7,536,414	$ 107,445	$ 1,966,967	$ 409,225	$ 9,762,141	10
6	Chlorination		20.0					$ 0.04	$ 749,340	$ 239,789	$ 247,282	$ 1,236,411	$ 9,182	$ 311,398	$ 1,556,992	$ 78,853	$ 432,744	$ 9,182	$ 2,712,258	10
7	Dechlorination		20.0					$ 0.04	$ 749,340	$ 239,789	$ 247,282	$ 1,236,411	$ 9,182	$ 311,398	$ 1,556,992	$ 78,853	$ 432,744	$ 9,182	$ 2,712,258	10
	CSO 216																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 216	14.7		30	1,650		$ 123	$ 202,419	$ 89,064	$ 72,871	$ 364,354	$ 47,346.31	$ 102,925	$ 514,625	$ 12,807	$ -	$ 168,798	$ 609,129	50
	CSO 135																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 135	43.3		48	700		$ 262	$ 183,493	$ 80,737	$ 66,057	$ 330,287	$ 24,104	$ 88,598	$ 442,988	$ 12,627	$ -	$ 134,199	$ 546,463	50
	CSO 141																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 141	43.3		48	2,000		$ 262	$ 524,265	$ 230,677	$ 188,735	$ 943,677	$ 68,867	$ 253,136	$ 1,265,681	$ 14,684	$ -	$ 383,427	$ 1,313,421	50
	CSO 066																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 066	52.4		60	655		$ 285	$ 186,806	$ 82,195	$ 67,250	$ 336,251	$ 22,554	$ 89,701	$ 448,507	$ 12,641	$ -	$ 134,638	$ 552,001	50
	CSO 050 & 050A																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	CSO 050 & 050A	56.0		60	2,937		$ 285	$ 837,576	$ 368,534	$ 301,527	$ 1,507,637	$ 101,125	$ 402,191	$ 2,010,953	$ 16,547	$ -	$ 603,671	$ 2,009,969	50
					ALTERNATIVE TOTAL				$ 108,522,716	$ 12,248,064	$ 30,192,695	$ 150,963,476	$ 2,542,865	$ 38,376,585	$ 191,882,927	$ 1,405,128	$ 6,981,070	$ 59,523,785	$ 193,105,932	

POUGES RUN W A T E R S H E D *Plan Two*

CONTROL TECHNOLOGY 1: Remote Treatment in Fall Creek/Pogues Run and Storage/Conveyance Elsewhere

ENRCCI factor:	105%
Untreated Overflows / Year:	12
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
Upper Pogues																				
	PgR-1																			
1	Regulator Modification	3						$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	40
2	Interceptor Connection	3						$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	40
3	Interceptor (Sewer Construction)	QPgR-1	0.0		0	5,783		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	50
	PgR-2																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QPgR-2	50.0		60	3,216		$ 44	$ 917,176	$ 62,698	$ 15,674	$ 995,548	$ 110,735	$ 276,571	$ 1,382,854	$ 14,977	$ -	$ 661,041	$ 1,345,360	50
4	Mechanical Screens		50.0					$ 0.04	$ 2,106,247	$ 673,999	$ 695,061	$ 3,475,307	$ -	$ 868,827	$ 4,344,134	$ 18,740	$ 1,216,357	$ -	$ 5,248,548	10
5	Pumping Facilities		50.0					$ 0.13	$ 6,587,429	$ 2,107,977	$ 2,173,852	$ 10,869,258	$ -	$ 2,717,314	$ 13,586,572	$ 204,763	$ 3,804,240	$ -	$ 18,108,693	10
6	Subsurface Storage		VPgR-2	4.0				$ 1.41	$ 5,630,981	$ 1,801,914	$ 1,858,224	$ 9,291,118	$ 81,845	$ 2,343,241	$ 11,716,204	$ 40,811	$ -	$ 2,897,335	$ 11,264,109	40
	CSO 017																			
1	Total separation							133,000	19,019,000	4,754,750	5,943,438	$ 29,717,188	$ 1,485,859	$ 7,800,762	$ 39,003,808	$97,510	$ -	$ 17,830,313	$ 34,441,343	50
Lower Pogues																				
	PgR-4																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
	PgR-5																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Deep Tunnel		VPgR-5	20.0	18 ft	10,852		4,257	46,197,332	2,540,853	12,184,546	60,922,732	$ 1,121,022.91	15,510,939	77,554,693	$ 205,407	$ -	$ 28,839,422	$ 70,727,789	50
	Remote Treatment																			
1	Mechanical Screens		10.0					$ 0.05	$ 542,347	$ 173,551	$ 178,975	$ 894,873	$ -	$ 223,718	$ 1,118,591	$ 13,668	$ 313,206	$ -	$ 1,453,934	10
2	Deep Pumping Facilities		10.0					$ 0.33	$ 3,271,050	$ 1,046,736	$ 1,079,446	$ 5,397,232	$ 33,333	$ 1,357,641	$ 6,788,207	$ 395,338	$ 1,889,031	$ 33,333	$ 12,425,785	10
3	Sludge Pumping Facilities		0.5		Sludge Vol	Dewatering		$ 0.51	$ 257,464	$ 82,388	$ 84,963	$ 424,815	$ 1,667	$ 106,620	$ 533,102	$ 9,403	$ 148,685	$ 1,667	$ 725,532	10
4	Subsurface Storage			1	5%	2		$ 1.79	$ 1,791,771	$ 573,367	$ 591,284	$ 2,956,422	$ 20,461	$ 744,221	$ 3,721,104	$ 20,823	$ -	$ 916,347	$ 3,669,838	40
5	EHRC	QPGR-1	10.0					$ 0.20	$ 2,041,719	$ 653,350	$ 673,767	$ 3,368,836	$ 204,613	$ 893,362	$ 4,466,810	$ 71,282	$ 1,179,092	$ 204,613	$ 5,893,657	10
6	Chlorination		10.0					$ 0.05	$ 543,252	$ 173,841	$ 179,273	$ 896,365	$ 4,591	$ 225,239	$ 1,126,196	$ 51,521	$ 313,728	$ 4,591	$ 1,898,981	10
7	Dechlorination		10.0					$ 0.05	$ 543,252	$ 173,841	$ 179,273	$ 896,365	$ 4,591	$ 225,239	$ 1,126,196	$ 51,521	$ 313,728	$ 4,591	$ 1,898,981	10
					ALTERNATIVE TOTAL				$ 92,657,521	$ 15,845,986	$ 26,896,583	$ 135,400,090	$ 3,068,718	$ 34,617,202	$ 173,086,010	$ 1,195,763	$ 9,178,068	$ 52,997,504	$ 175,207,927	

PLEASANT RUN W A T E R S H E D *Plan Two*

CONTROL TECHNOLOGY 1: Remote Treatment in Fall Creek/Pogues Run and Storage/Conveyance Elsewhere

ENRCCI factor:	105%
Untreated Overflows / Year:	**12**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	+ Project (Capital) Cost ($)	+ Annual Operation & Maintenance Cost ($)	+ Replacement Cost ($)	- Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	PgR-1																			
1	Regulator Modification	23						$ 62,912	$ 1,446,972	$ 463,031	$ 477,501	$ 2,387,504	$ -	$ 596,876	$ 2,984,380	$ -	$ -	$ 723,486	$ 2,753,407	40
2	Interceptor Connection	23						$ 125,824	$ 2,893,944	$ 926,062	$ 955,002	$ 4,775,008	$ -	$ 1,193,752	$ 5,968,760	$ -	$ -	$ 1,446,972	$ 5,506,813	40
3	Interceptor (Sewer Construction)	QPIR-1	35.0		42	23,510		$ 201	$ 4,732,963	$ 2,082,504	$ 1,703,867	$ 8,519,333	$ 809,532	$ 2,332,216	$ 11,661,082	$ 40,673	$ -	$ 3,649,310	$ 10,967,322	50
	PgR-2																			
1	Regulator Modification	18						$ 62,912	$ 1,132,413	$ 362,372	$ 373,696	$ 1,868,481	$ -	$ 467,120	$ 2,335,602	$ -	$ -	$ 566,206	$ 2,154,840	40
2	Interceptor Connection	18						$ 125,824	$ 2,264,826	$ 724,744	$ 747,393	$ 3,736,963	$ -	$ 934,241	$ 4,671,203	$ -	$ -	$ 1,132,413	$ 4,309,680	40
3	Interceptor (Sewer Construction)	QPIR-2	60.0		60	10,671		$ 285	$ 3,043,258	$ 1,339,034	$ 1,095,573	$ 5,477,865	$ 367,428	$ 1,461,323	$ 7,306,616	$ 29,787	$ -	$ 2,193,383	$ 6,951,521	50
	CSO 017																			
1	Total separation							133,000	1,729,000	570,570	574,893	$ 2,874,463	$ 143,723	$ 754,546	$ 3,772,732	$9,432	$ -	$ 1,724,677	$ 3,331,419	50
	PgR-3																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QBW	105.0		72	8,375		$ 366	$ 3,064,577	$ 1,348,414	$ 1,103,248	$ 5,516,239	$ 288,368	$ 1,451,152	$ 7,255,759	$ 29,659	$ -	$ 2,127,115	$ 6,920,347	50
	BW																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QPIR-3	3.0		15	3,831		$ 56	$ 212,891	$ 110,703	$ 80,899	$ 404,493	$ 109,927	$ 128,605	$ 643,025	$ 13,128	$ -	$ 237,661	$ 719,264	50
					ALTERNATIVE TOTAL				$ 22,219,464	$ 8,470,993	$ 7,672,614	$ 38,363,071	$ 1,718,978	$ 10,020,512	$ 50,102,562	$ 122,678	$ -	$ 14,650,533	$ 46,846,872	

EAGLE CREEK W A T E R S H E D *Plan Two*
CONTROL TECHNOLOGY 1: Remote Treatment in Fall Creek/Pogues Run and Storage/Conveyance Elsewhere

ENRCCI factor:	105%
Untreated Overflows / Year:	12
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	+ Project (Capital) Cost ($)	+ Annual Operation & Maintenance Cost ($)	+ Replacement Cost ($)	- Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	EC-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QEC-1	45.0		48	13,091		$ 262	$ 3,431,447	$ 1,509,837	$ 1,235,321	$ 6,176,605	$ 450,754	$ 1,656,840	$ 8,284,199	$ 32,230	$ -	$ 2,509,622	$ 7,856,463	50
	EC-2																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QEC-2	45.0		48	11,798		$ 262	$ 3,092,562	$ 1,360,727	$ 1,113,322	$ 5,566,612	$ 406,238	$ 1,493,213	$ 7,466,063	$ 30,185	$ -	$ 2,261,776	$ 7,093,752	50
					ALTERNATIVE TOTAL				$ 7,467,687	$ 3,172,541	$ 2,660,057	$ 13,300,285	$ 856,992	$ 3,539,319	$ 17,696,596	$ 62,416	$ -	$ 5,243,237	$ 16,745,915	

UPPER WHITE W A T E R S H E D ***Plan Two***

CONTROL TECHNOLOGY 1: Remote Treatment in Fall Creek/Pogues Run and Storage/Conveyance Elsewhere

ENRCCI factor:	105%
Untreated Overflows / Year:	**12**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	UW-2																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	251,647	80,527	83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QUW-1	17.0		36	900		$ 158	$ 142,495	$ 62,698	$ 51,298	$ 256,492	$ 25,825	$ 70,579	$ 352,896	$ 12,402	$ -	$ 111,322	$ 461,064	50
4	Mechanical Screens		17.0					$ 0.05	$ 848,293	$ 271,454	$ 279,937	$ 1,399,684	$ -	$ 349,921	$ 1,749,605	$ 14,445	$ 489,889	$ -	$ 2,193,777	10
5	Pumping Facilities		17.0	Delta V	Requied V			$ 0.18	$ 3,082,316	$ 986,341	$ 1,017,164	$ 5,085,821	$ -	$ 1,271,455	$ 6,357,276	$ 99,497	$ 1,780,037	$ -	$ 8,515,935	10
6	Subsurface Storage		VUW-2	0.0	1.0			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	40
7	Chlorination	QUW-1	2.0					$ 0.13	$ 257,442	$ 82,381	$ 84,956	$ 424,779	$ 918	$ 106,424	$ 532,121	$ 19,179	$ 148,673	$ 918	$ 838,059	10
8	Dechlorination		2.0					$ 0.13	$ 257,442	$ 82,381	$ 84,956	$ 424,779	$ 918	$ 106,424	$ 532,121	$ 19,179	$ 148,673	$ 918	$ 838,059	10
					ALTERNATIVE TOTAL				$ 4,965,459	$ 1,606,046	$ 1,642,876	$ 8,214,381	$ 27,662	$ 2,060,511	$ 10,302,553	$ 164,702	$ 2,567,272	$ 301,894	$ 13,565,175	

CENTRAL SYSTEM W A T E R S H E D ***Plan Two***
CONTROL TECHNOLOGY 1: Remote Treatment in Fall Creek/Pogues Run and Storage/Conveyance Elsewhere

ENRCCI factor:	105%
Untreated Overflows / Year:	12
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	LW-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QLW-1	40.0		48	3,930		$ 262	$ 1,030,181	$ 453,280	$ 370,865	$ 1,854,326	$ 135,324	$ 497,413	$ 2,487,063	$ 17,738	$ -	$ 753,433	$ 2,452,060	50
	LW-2																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QLW-2	35.0		48	12,800		$ 262	$ 3,355,298	$ 1,476,331	$ 1,207,907	$ 6,039,536	$ 440,751	$ 1,620,072	$ 8,100,359	$ 31,771	$ -	$ 2,453,930	$ 7,685,077	50
	LW-3																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QLW-3	0.0		0	10,220		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,520	$ -	$ -	$ 133,485	50
	OO8																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Deep Tunnel	QCS-2	-		0 ft	5,500		-	-	-	-	$ -	$ -	$ -	$ -	$ 11,520	$ -	$ -	$ 133,485	50
	CSO 046																			
1	Total separation							133,000	2,793,000	921,690	928,673	$ 4,643,363	$ 232,168	$ 1,218,883	$ 6,094,413	$15,236	$ -	$ 2,618,437	$ 5,435,019	50
	CS-2																			
1	Regulator Modification	6						$ 62,912	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
2	Interceptor Connection	6						$ 125,824	$ 754,942	$ 241,581	$ 249,131	$ 1,245,654	$ -	$ 311,414	$ 1,557,068	$ -	$ -	$ 377,471	$ 1,436,560	40
3	Deep Tunnel		VCS-2	8.0	13 ft	9,218		3,497	32,233,957	1,772,868	8,501,706	$ 42,508,530	$ 952,229	$ 10,865,190	$ 54,325,949	$ 147,335	$ -	$ 20,292,603	$ 49,554,729	50
4	Mechanical Screens	QCS-2	210.0					$ 0.03	$ 7,115,987	$ 2,277,116	$ 2,348,276	$ 11,741,378	$ -	$ 2,935,344	$ 14,676,722	$ 54,012	$ 4,109,482	$ -	$ 17,624,522	10
5	Deep Pumping Facilities		210.0					$ 0.21	$ 43,683,774	$ 13,978,808	$ 14,415,645	$ 72,078,227	$ 756,000	$ 18,208,557	$ 91,042,784	$ 3,182,166	$ 25,227,380	$ 756,000	$ 141,927,949	10
					ALTERNATIVE TOTAL				$ 93,420,700	$ 21,906,813	$ 28,831,878	$ 144,159,391	$ 2,516,472	$ 36,668,966	$ 183,344,829	$ 3,471,298	$ 29,336,862	$ 28,478,655	$ 231,051,705	

AWT and Interplant *Plan Two*
CONTROL TECHNOLOGY 1: Remote Treatment in Fall Creek/Pogues Run and Storage/Conveyance Elsewhere

Untreated Overflows / Year:	12	Planning Period:	20	Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	Interplant																			
1	Interceptor (Sewer Construction)	QSAWTP	185.0		144	32,932		$ 2,684	$ 88,390,432		$ 22,097,608	$ 110,488,040	$ 1,511,960	$ 28,000,000	$ 140,000,000	$ 361,520	$ -	$ 54,546,219	$ 126,775,108	50
	SOUTHPORT AWT																			
1	Raw Wastewater (Captured CSO) Pump Station for EHRC (75-MGD firm capacity)								$ 8,376,300		$ 2,094,075	$ 10,470,375	$ -	$ 2,617,594	$ 13,087,969		$ 3,664,631	$ -	$ 15,158,568	10
2	New 354-MGD Headworks Facility w/ Screening								$ 29,079,200		$ 7,269,800	$ 36,349,000	$ -	$ 9,087,250	$ 45,436,250		$ 12,722,150	$ -	$ 52,624,551	10
3	New 354-MGD Grit Removal Facility with blending and flow split								$ 8,754,000		$ 2,188,500	$ 10,942,500	$ -	$ 2,735,625	$ 13,678,125		$ 3,829,875	$ -	$ 15,842,091	10
4	New 125-MGD/275-MGD Primary Clarifiers								$ 33,184,000		$ 8,296,000	$ 41,480,000	$ -	$ 10,370,000	$ 51,850,000		$ 14,518,000	$ -	$ 60,052,997	10
5	New 15-MG EHRC Basin w/ grit removal and primary settling		0.0						$ -		$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	10
6	New 75-MGD EHRC Facility		0.0						$ -		$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	10
7	EHRC Annual O&M		0.0									$ -			$ -	$ -	$ -		$ -	10
8	New ANS Aeration Equipment								$ 5,100,000		$ 1,275,000	$ 6,375,000	$ -	$ 1,593,750	$ 7,968,750		$ 2,231,250	$ -	$ 9,229,457	10
9	New ANS Return Activated Sludge (RAS) Pumping								$ 3,778,000		$ 944,500	$ 4,722,500	$ -	$ 1,180,625	$ 5,903,125		$ 1,652,875	$ -	$ 6,837,037	10
10	New ANS Final Clarifiers (8 units each @ 155' diameter)								$ 35,041,400		$ 8,760,350	$ 43,801,750	$ -	$ 10,950,438	$ 54,752,188		$ 15,330,613	$ -	$ 63,414,329	10
11	New Effluent Pump Station on ANS (154-MGD firm capacity)								$ 3,865,600		$ 966,400	$ 4,832,000	$ -	$ 1,208,000	$ 6,040,000		$ 1,691,200	$ -	$ 6,995,566	10
12	New 15 MG – Sec. Effluent Equalization Basin w/Aerators								$ 3,608,000		$ 902,000	$ 4,510,000	$ -	$ 1,127,500	$ 5,637,500		$ 1,578,500	$ -	$ 6,529,388	10
13	Add Supplemental Disinfection Process (chlorination /dechlor.)								$ 4,656,000		$ 1,164,000	$ 5,820,000	$ -	$ 1,455,000	$ 7,275,000		$ 2,037,000	$ -	$ 8,425,951	10
14	Yard Piping and Valves								$ 5,752,500		$ 1,438,125	$ 7,190,625	$ -	$ 1,797,656	$ 8,988,281		$ 2,516,719	$ -	$ 10,410,284	10
15	Wet Weather Secondary Annual O&M		4,500.0									$ -	$ -	$ -	$ -	$ 1,125,000	$ -	$ -	$ 13,035,629	10
									$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 1,125,000	$ 61,772,813	$ -	$ 268,555,848	
	Belmont AWT																			
1	New Headworks Facility with Screens		160.0						$15,661,800		$ 3,915,450	$ 19,577,250	$ -	$ 4,894,313	$ 24,471,563		$ 6,852,038	$ -	$ 28,343,118	10
2	New Grit Facility w/ Flow Split		160						$3,063,515		$ 765,879	$ 3,829,394	$ -	$ 957,348	$ 4,786,742		$ 1,340,288	$ -	$ 5,544,035	10
3	New Intermediate Clarifiers								$36,168,000		$ 9,042,000	$ 45,210,000	$ -	$ 11,302,500	$ 56,512,500		$ 15,823,500	$ -	$ 65,453,134	10
4	New Return Sludge Pumping								$9,247,500		$ 2,311,875	$ 11,559,375	$ -	$ 2,889,844	$ 14,449,219		$ 4,045,781	$ -	$ 16,735,176	10
5	Effluent Disinfection - Chlorination/Dechlorination								$8,310,000		$ 2,077,500	$ 10,387,500	$ -	$ 2,596,875	$ 12,984,375		$ 3,635,625	$ -	$ 15,038,585	10
6	Belmont Anaerobic Digestor Facility BE-78-001								**$18,688,000**		**$ 4,672,000**	**$ 23,360,000**	**$ -**	**$ 5,840,000**	**$ 29,200,000**		**$ 8,176,000**	**$ -**	**$ 33,819,624**	**10**
7	Yard Piping and Valves								$7,245,082		$ 1,811,270	$ 9,056,352	$ -	$ 2,264,088	$ 11,320,440		$ 3,169,723	$ -	$ 13,111,405	10
8	Annual O&M		7,580.00									$ -	$ -	$ -	$ -	$ 1,895,000	$ -	$ -	$ 21,957,794	10
					ALTERNATIVE TOTAL				$ 98,383,897	$ -	$ 24,595,974	$ 122,979,871	$ -	$ 30,744,968	$ 153,724,838	$ 1,895,000	$ 43,042,955	$ -	$ 200,002,871	

F A L L C R E E K W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor: 105%

Untreated Overflows / Year: **6**

Planning Period: 20

Discount Rate: 5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	FC-1																			
1	Regulator Modification	21						$ 62,912	$ 1,321,148	$ 422,768	$ 435,979	$ 2,179,895	$ -	$ 544,974	$ 2,724,869	$ -	$ -	$ 660,574	$ 2,513,980	40
2	Interceptor Connection	21						125,824	2,642,297	845,535	871,958	4,359,790	$ -	1,089,947	5,449,737	$ -	$ -	$ 1,321,148	$ 5,027,960	40
3	Deep Tunnel		VFC-1	62.0	24 ft	18,577		5,169	96,028,742	5,281,581	25,327,581	126,637,903	$ 1,919,013.13	32,139,229	160,696,146	$ 413,260	$ -	$ 59,536,258	$ 146,477,709	50
4	Regulator	1						524,265	524,265	167,765	173,008	865,038	$ -	216,259	1,081,297	$ 14,223	$ -	$ 262,133	$ 1,162,419	40
	CSO 216																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 216	24.7		36	1,650		$ 158	$ 261,241	$ 114,946	$ 94,047	$ 470,234	$ 47,346.31	$ 129,395	$ 646,976	$ 13,137	$ -	$ 204,091	$ 734,046	50
	CSO 135																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 135	75.8		60	700		$ 285	$ 199,640	$ 87,842	$ 71,870	$ 359,352	$ 24,104	$ 95,864	$ 479,320	$ 12,718	$ -	$ 143,888	$ 580,754	50
	CSO 141																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 141	107.2		72	2,000		$ 366	$ 731,874	$ 322,025	$ 263,475	$ 1,317,374	$ 68,867	$ 346,560	$ 1,732,801	$ 15,852	$ -	$ 507,992	$ 1,754,305	50
	CSO 066																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 066	122.8		84	655		$ 511	$ 334,466	$ 147,165	$ 120,408	$ 602,038	$ 26,313	$ 157,088	$ 785,439	$ 13,484	$ -	$ 226,992	$ 869,209	50
	CSO 050 & 050A																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	CSO 050 & 050A	97.0		72	2,937		$ 366	$ 1,074,684	$ 472,861	$ 386,886	$ 1,934,432	$ 101,125	$ 508,889	$ 2,544,446	$ 17,881	$ -	$ 745,935	$ 2,513,498	50
					ALTERNATIVE TOTAL				$ 104,250,771	$ 8,224,859	$ 28,118,907	$ 140,594,537	$ 2,186,768	$ 35,695,326	$ 178,476,632	$ 500,556	$ -	$ 64,175,219	$ 163,788,720	

POUGES RUN W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	6
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
Upper Pogues																				
	PgR-1																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QPgR-1	0.0		12	5,783		$ 49	$ 284,992	$ 148,196	$ 108,297	$ 541,484	$ 165,942	$ 176,856	$ 884,282	$ 13,731	$ -	$ 336,937	$ 935,816	50
	PgR-2																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QPgR-2	100.0		72	3,216		$ 73	$ 1,176,817	$ 103,805	$ 25,951	$ 1,306,573	$ 110,735	$ 354,327	$ 1,771,635	$ 15,949	$ -	$ 816,826	$ 1,695,669	50
4	Mechanical Screens		100.0					$ 0.04	$ 3,778,136	$ 1,209,003	$ 1,246,785	$ 6,233,924	$ -	$ 1,558,481	$ 7,792,405	$ 27,240	$ 2,181,873	$ -	$ 9,340,848	10
5	Pumping Facilities		100.0					$ 0.11	$ 10,731,022	$ 3,433,927	$ 3,541,237	$ 17,706,186	$ -	$ 4,426,546	$ 22,132,732	$ 325,568	$ 6,197,165	$ -	$ 29,406,695	10
6	Subsurface Storage		VPgR-2	7.5				$ 1.26	$ 9,464,182	$ 3,028,538	$ 3,123,180	$ 15,615,900	$ 122,768	$ 3,934,667	$ 19,673,335	$ 60,703	$ -	$ 4,854,859	$ 18,826,802	40
	CSO 017																			
1	Total separation							$ 133,000	$ 19,019,000	$ 4,754,750	$ 5,943,438	$ 29,717,188	$ 1,485,859	$ 7,800,762	$ 39,003,808	$97,510	$ -	$ 17,830,313	$ 34,441,343	50
Lower Pogues																				
	PgR-4																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-4	105.0		0	8,167		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,520	$ -	$ -	$ 133,485	50
	PgR-5																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-5	240.0		0	7,650		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,520	$ -	$ -	$ 133,485	50
					ALTERNATIVE TOTAL				$ 48,228,858	$ 13,886,126	$ 15,234,542	$ 77,349,525	$ 1,885,303	$ 19,808,707	$ 99,043,536	$ 563,741	$ 8,379,038	$ 25,726,289	$ 102,096,943	

PLEASANT RUN W A T E R S H E D *Plan One*
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	6
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	+ Project (Capital) Cost ($)	+ Annual Operation & Maintenance Cost ($)	+ Replacement Cost ($)	- Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	PgR-1																			
1	Regulator Modification	23						$ 62,912	$ 1,446,972	$ 463,031	$ 477,501	$ 2,387,504	$ -	$ 596,876	$ 2,984,380	$ -	$ -	$ 723,486	$ 2,753,407	40
2	Interceptor Connection	23						$ 125,824	$ 2,893,944	$ 926,062	$ 955,002	$ 4,775,008	$ -	$ 1,193,752	$ 5,968,760	$ -	$ -	$ 1,446,972	$ 5,506,813	40
3	Interceptor (Sewer Construction)	QPIR-1	90.0		72	23,510		$ 366	$ 8,603,146	$ 3,785,384	$ 3,097,133	$ 15,485,663	$ 809,532	$ 4,073,799	$ 20,368,994	$ 62,442	$ -	$ 5,971,420	$ 19,186,150	50
	PgR-2																			
1	Regulator Modification	18						$ 62,912	$ 1,132,413	$ 362,372	$ 373,696	$ 1,868,481	$ -	$ 467,120	$ 2,335,602	$ -	$ -	$ 566,206	$ 2,154,840	40
2	Interceptor Connection	18						$ 125,824	$ 2,264,826	$ 724,744	$ 747,393	$ 3,736,963	$ -	$ 934,241	$ 4,671,203	$ -	$ -	$ 1,132,413	$ 4,309,680	40
3	Interceptor (Sewer Construction)	QPIR-2	185.0		96	10,671		$ 1,022	$ 10,908,739	$ 4,799,845	$ 3,927,146	$ 19,635,729	$ 428,666	$ 5,016,099	$ 25,080,494	$ 74,221	$ -	$ 6,973,909	$ 23,714,089	50
	CSO 017																			
1	Total separation							$ 133,000	$ 1,729,000	$ 570,570	$ 574,893	$ 2,874,463	$ 143,723	$ 754,546	$ 3,772,732	$9,432	$ -	$ 1,724,677	$ 3,331,419	50
	PgR-3																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QBW	260.0		120	8,375		$ 1,538	$ 12,881,762	$ 5,667,975	$ 4,637,434	$ 23,187,171	$ 336,430	$ 5,880,900	$ 29,404,501	$ 85,031	$ -	$ 8,065,487	$ 27,814,867	50
	BW																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QPIR-3	10.0		24	3,831		$ 81	$ 309,295	$ 136,090	$ 111,346	$ 556,731	$ 109,927	$ 166,664	$ 833,322	$ 13,603	$ -	$ 295,504	$ 896,607	50
					ALTERNATIVE TOTAL				$ 43,868,716	$ 17,979,632	$ 15,462,087	$ 77,310,434	$ 1,828,278	$ 19,784,678	$ 98,923,390	$ 244,730	$ -	$ 27,749,384	$ 92,900,132	

EAGLE CREEK W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%

Untreated Overflows / Year:	**6**	Planning Period:	20	Discount Rate:	5.875%

															+	+	+	-		
Item No.	**Item Description**	**No. of Regulators**	**Flowrate (MGD)**	**Volume (MG)**	**Pipe Diameter (inches)**	**Pipe Length (feet)**	**Land (acres)**	**Unit Cost ($)**	**Base Construction Cost ($)**	**Site Adjustment ($)**	**Construction Contingency (25%)**	**Construction Cost ($)**	**Land Costs ($)**	**Engineering, Legal & Administration (25%)**	**Project (Capital) Cost ($)**	**Annual Operation & Maintenance Cost ($)**	**Replacement Cost ($)**	**Residual Value @ 20 years ($)**	**Present Worth ($)**	**Asset Life (years)**
	EC-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QEC-1	80.0		72	13,091		$ 366	$ 4,790,300	$ 2,107,732	$ 1,724,508	$ 8,622,541	$ 450,754	$ 2,268,324	$ 11,341,618	$ 39,874	$ -	$ 3,324,934	$ 10,742,161	50
	EC-2																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QEC-2	80.0		72	11,798		$ 366	$ 4,317,217	$ 1,899,575	$ 1,554,198	$ 7,770,990	$ 406,238	$ 2,044,307	$ 10,221,535	$ 37,074	$ -	$ 2,996,568	$ 9,694,463	50
					ALTERNATIVE TOTAL				$ 10,051,194	$ 4,309,284	$ 3,590,120	$ 17,950,598	$ 856,992	$ 4,701,898	$ 23,509,488	$ 76,948	$ -	$ 6,793,341	$ 22,232,324	

UPPER WHITE W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	6
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	UW-2																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	251,647	80,527	83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QUW-1	35.0		48	900		$ 262	$ 235,919	$ 103,805	$ 84,931	$ 424,655	$ 30,990	$ 113,911	$ 569,556	$ 12,944	$ -	$ 172,542	$ 664,456	50
4	Mechanical Screens		35.0					$ 0.04	$ 1,559,290	$ 498,973	$ 514,566	$ 2,572,829	$ -	$ 643,207	$ 3,216,036	$ 16,658	$ 900,490	$ -	$ 3,917,853	10
5	Pumping Facilities		35.0	Delta V	Requied V			$ 0.15	$ 5,124,659	$ 1,639,891	$ 1,691,137	$ 8,455,687	$ -	$ 2,113,922	$ 10,569,609	$ 161,296	$ 2,959,491	$ -	$ 14,110,757	10
6	Subsurface Storage		VUW-2	0.0	1.0			#DIV/0!	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	40
7	Chlorination	QUW-1	25.0					$ 0.03	$ 831,085	$ 265,947	$ 274,258	$ 1,371,290	$ 11,019	$ 345,577	$ 1,727,885	$ 90,432	$ 479,951	$ 11,019	$ 3,043,404	10
8	Dechlorination		25.0					$ 0.03	$ 831,085	$ 265,947	$ 274,258	$ 1,371,290	$ 11,019	$ 345,577	$ 1,727,885	$ 90,432	$ 479,951	$ 11,019	$ 3,043,404	10
					ALTERNATIVE TOTAL				$ 8,959,509	$ 2,895,353	$ 2,963,715	$ 14,818,577	$ 53,028	$ 3,717,901	$ 18,589,506	$ 371,761	$ 4,819,883	$ 383,315	$ 25,498,155	

CENTRAL SYSTEM W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	6
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
LW-1																				
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QLW-1	65.0		60	4,266		$ 285	$ 1,216,550	$ 535,282	$ 437,958	$ 2,189,791	$ 146,880	$ 584,168	$ 2,920,839	$ 18,822	$ -	$ 876,811	$ 2,859,013	50
LW-2																				
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QLW-2	55.0		60	9,264		$ 285	$ 2,642,039	$ 1,162,497	$ 951,134	$ 4,755,669	$ 318,987	$ 1,268,664	$ 6,343,320	$ 27,378	$ -	$ 1,904,210	$ 6,052,639	50
CS-2																				
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Deep Tunnel		VCS-2	1.0	25 ft	10,091		5,321	53,695,033	2,953,227	14,162,065	$ 70,810,325	$ 1,042,369	$ 17,963,174	$ 89,815,868	$ 236,060	$ -	$ 33,259,389	$ 81,933,069	50
OO8																				
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Deep Tunnel		0.0	0.0	0 ft	5,500		-	-	-	-	$ -	$ -	$ -	$ -	$ 11,520	$ -	$ -	$ 133,485	50
CSO 046																				
1	Total separation							$ 133,000	$ 2,793,000	$ 921,690	$ 928,673	$ 4,643,363	$ 232,168	$ 1,218,883	$ 6,094,413	$15,236	$ -	$ 2,618,437	$ 5,435,019	50
CS-3																				
1	Regulator Modification	6						$ 62,912	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
2	Interceptor Connection	6						$ 125,824	$ 754,942	$ 241,581	$ 249,131	$ 1,245,654	$ -	$ 311,414	$ 1,557,068	$ -	$ -	$ 377,471	$ 1,436,560	40
3	Deep Tunnel		VCS-3	66.0	25 ft	9,218		5,321	49,052,737	2,697,901	12,937,660	$ 64,688,298	$ 952,250	$ 16,410,137	$ 82,050,684	$ 216,647	$ -	$ 30,383,892	$ 74,860,947	50
4	Mechanical Screens		180.0					$ 0.03	$ 6,201,150	$ 1,984,368	$ 2,046,380	$ 10,231,898	$ -	$ 2,557,974	$ 12,789,872	$ 45,832	$ 3,581,164	$ -	$ 15,344,377	10
5	Deep Pumping Facilities		180.0					$ 0.21	$ 38,690,809	$ 12,381,059	$ 12,767,967	$ 63,839,835	$ 648,000	$ 16,121,959	$ 80,609,794	$ 2,733,670	$ 22,343,942	$ 648,000	$ 124,703,408	10
					ALTERNATIVE TOTAL				$ 157,499,822	$ 23,662,745	$ 45,290,642	$ 226,453,208	$ 3,340,654	$ 57,448,466	$ 287,242,328	$ 3,305,165	$ 25,925,106	$ 71,294,991	$ 317,427,337	

AWT and Interplant *Plan One*
CONTROL TECHNOLOGY 1: Storage and Conveyance

Untreated Overflows / Year:	6	Planning Period:	20	Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	Interplant																			
1	Interceptor (Sewer Construction)	QSAWTP	180.0		144	32,932		**$ 2,684**	**$ 88,390,432**		**$ 22,097,608**	**$ 110,488,040**	**$ 1,511,960**	**$ 28,000,000**	**$ 140,000,000**	**$ 361,520**	**$ -**	**$ 54,546,219**	**$ 126,775,108**	**50**
	SOUTHPORT AWT																			
1	Raw Wastewater (Captured CSO) Pump Station for EHRC (75-MGD firm capacity)								$ 8,376,300		$ 2,094,075	$ 10,470,375	$ -	$ 2,617,594	$ 13,087,969		$ 3,664,631	$ -	$ 15,158,568	10
2	New 354-MGD Headworks Facility w/ Screening								$ 29,079,200		$ 7,269,800	$ 36,349,000	$ -	$ 9,087,250	$ 45,436,250		$ 12,722,150	$ -	$ 52,624,551	10
3	New 354-MGD Grit Removal Facility with blending and flow split								$ 8,754,000		$ 2,188,500	$ 10,942,500	$ -	$ 2,735,625	$ 13,678,125		$ 3,829,875	$ -	$ 15,842,091	10
4	New 125-MGD/275-MGD Primary Clarifiers								$ 33,184,000		$ 8,296,000	$ 41,480,000	$ -	$ 10,370,000	$ 51,850,000		$ 14,518,000	$ -	$ 60,052,997	10
5	New 15-MG EHRC Basin w/ grit removal and primary settling		0.0						$ -		$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	10
6	New 75-MGD EHRC Facility		0.0						$ -		$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	10
7	EHRC Annual O&M		0.0									$ -			$ -	$ -	$ -		$ -	10
8	New ANS Aeration Equipment								$ 5,100,000		$ 1,275,000	$ 6,375,000	$ -	$ 1,593,750	$ 7,968,750		$ 2,231,250	$ -	$ 9,229,457	10
9	New ANS Return Activated Sludge (RAS) Pumping								$ 3,778,000		$ 944,500	$ 4,722,500	$ -	$ 1,180,625	$ 5,903,125		$ 1,652,875	$ -	$ 6,837,037	10
10	New ANS Final Clarifiers (8 units each @ 155' diameter)								$ 35,041,400		$ 8,760,350	$ 43,801,750	$ -	$ 10,950,438	$ 54,752,188		$ 15,330,613	$ -	$ 63,414,329	10
11	New Effluent Pump Station on ANS (154-MGD firm capacity)								$ 3,865,600		$ 966,400	$ 4,832,000	$ -	$ 1,208,000	$ 6,040,000		$ 1,691,200	$ -	$ 6,995,566	10
12	New 15 MG – Sec. Effluent Equalization Basin w/Aerators								$ 3,608,000		$ 902,000	$ 4,510,000	$ -	$ 1,127,500	$ 5,637,500		$ 1,578,500	$ -	$ 6,529,388	10
13	Add Supplemental Disinfection Process (chlorination /dechlor.)								$ 4,656,000		$ 1,164,000	$ 5,820,000	$ -	$ 1,455,000	$ 7,275,000		$ 2,037,000	$ -	$ 8,425,951	10
14	Yard Piping and Valves								$ 5,752,500		$ 1,438,125	$ 7,190,625	$ -	$ 1,797,656	$ 8,988,281		$ 2,516,719	$ -	$ 10,410,284	10
15	Wet Weather Secondary Annual O&M		7,330.0									$ -	$ -	$ -	$ -	$ 1,832,500	$ -	$ -	$ 21,233,592	10
									$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 1,832,500	$ 61,772,813	$ -	$ 276,753,810	
	Belmont AWT																			
1	New Headworks Facility with Screens		250.0						$21,038,400		$ 5,259,600	$ 26,298,000	$ -	$ 6,574,500	$ 32,872,500		$ 9,204,300	$ -	$ 38,073,137	10
2	New Grit Facility w/ Flow Split		250						$4,710,815		$ 1,177,704	$ 5,888,519	$ -	$ 1,472,130	$ 7,360,648		$ 2,060,982	$ -	$ 8,525,149	10
3	New Intermediate Clarifiers								$36,168,000		$ 9,042,000	$ 45,210,000	$ -	$ 11,302,500	$ 56,512,500		$ 15,823,500	$ -	$ 65,453,134	10
4	New Return Sludge Pumping								$9,247,500		$ 2,311,875	$ 11,559,375	$ -	$ 2,889,844	$ 14,449,219		$ 4,045,781	$ -	$ 16,735,176	10
5	Effluent Disinfection - Chlorination/Dechlorination								$8,310,000		$ 2,077,500	$ 10,387,500	$ -	$ 2,596,875	$ 12,984,375		$ 3,635,625	$ -	$ 15,038,585	10
6	Belmont Anaerobic Digestor Facility BE-78-001								**$18,688,000**		**$ 4,672,000**	**$ 23,360,000**	**$ -**	**$ 5,840,000**	**$ 29,200,000**		**$ 8,176,000**	**$ -**	**$ 33,819,624**	**10**
7	Yard Piping and Valves								$7,245,082		$ 1,811,270	$ 9,056,352	$ -	$ 2,264,088	$ 11,320,440		$ 3,169,723	$ -	$ 13,111,405	10
8	Annual O&M		6,820.00									$ -	$ -	$ -	$ -	$ 1,705,000	$ -	$ -	$ 19,756,221	10
					ALTERNATIVE TOTAL				$ 105,407,797	$ -	$ 26,351,949	$ 131,759,746	$ -	$ 32,939,936	$ 164,699,682	$ 1,705,000	$ 46,115,911	$ -	$ 210,512,431	

F A L L   C R E E K   W A T E R S H E D ***Plan One***

CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	4
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	FC-1																			
1	Regulator Modification	21						$ 62,912	$ 1,321,148	$ 422,768	$ 435,979	$ 2,179,895	$ -	$ 544,974	$ 2,724,869	$ -	$ -	$ 660,574	$ 2,513,980	40
2	Interceptor Connection	21						125,824	2,642,297	845,535	871,958	4,359,790	$ -	1,089,947	5,449,737	$ -	$ -	$ 1,321,148	$ 5,027,960	40
3	Deep Tunnel		VFC-1	76.0	27 ft	18,577		5,625	104,501,866	5,747,603	27,562,367	137,811,836	$ 1,919,013.13	34,932,712	174,663,561	$ 448,179	$ -	$ 64,620,133	$ 159,226,704	50
4	Regulator	1						524,265	524,265	167,765	173,008	865,038	$ -	216,259	1,081,297	$ 14,223	$ -	$ 262,133	$ 1,162,419	40
	CSO 216																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 216	31.3		42	1,650		$ 201	$ 332,174	$ 146,157	$ 119,583	$ 597,914	$ 56,815.57	$ 163,682	$ 818,412	$ 13,566	$ -	$ 256,120	$ 893,838	50
	CSO 135																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 135	97.1		72	700		$ 366	$ 256,156	$ 112,709	$ 92,216	$ 461,081	$ 24,104	$ 121,296	$ 606,480	$ 13,036	$ -	$ 177,797	$ 700,772	50
	CSO 141																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 141	151.6		96	2,000		$ 1,022	$ 2,044,635	$ 899,639	$ 736,068	$ 3,680,342	$ 80,345	$ 940,172	$ 4,700,859	$ 23,272	$ -	$ 1,307,126	$ 4,553,218	50
	CSO 066																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 066	171.5		96	655		$ 1,022	$ 669,618	$ 294,632	$ 241,062	$ 1,205,312	$ 26,313	$ 307,906	$ 1,539,531	$ 15,369	$ -	$ 428,084	$ 1,580,948	50
	CSO 050 & 050A																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	CSO 050 & 050A	125.0		84	2,937		$ 511	$ 1,499,631	$ 659,838	$ 539,867	$ 2,699,336	$ 117,979	$ 704,329	$ 3,521,643	$ 20,324	$ -	$ 1,017,758	$ 3,432,224	50
					ALTERNATIVE TOTAL				$ 114,924,203	$ 9,659,016	$ 31,145,805	$ 155,729,025	$ 2,224,570	$ 39,488,399	$ 197,441,993	$ 547,969	$ -	$ 70,617,079	$ 181,246,904	

POUGES RUN W A T E R S H E D *Plan One*
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	4
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
Upper Pogues																				
	PgR-1																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QPgR-1	0.0		30	5,783		$ 123	$ 709,447	$ 312,157	$ 255,401	$ 1,277,005	$ 165,942	$ 360,737	$ 1,803,683	$ 16,029	$ -	$ 591,610	$ 1,800,546	50
	PgR-2																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QPgR-2	125.0		96	3,216		$ 80	$ 3,287,670	$ 112,939	$ 28,235	$ 3,428,844	$ 129,191	$ 889,509	$ 4,447,544	$ 22,639	$ -	$ 2,101,793	$ 4,038,867	50
4	Mechanical Screens		125.0					$ 0.04	$ 4,560,082	$ 1,459,226	$ 1,504,827	$ 7,524,136	$ -	$ 1,881,034	$ 9,405,170	$ 32,390	$ 2,633,447	$ -	$ 11,268,437	10
5	Pumping Facilities		125.0					$ 0.10	$ 12,556,417	$ 4,018,053	$ 4,143,617	$ 20,718,087	$ -	$ 5,179,522	$ 25,897,609	$ 377,985	$ 7,251,331	$ -	$ 34,374,566	10
6	Subsurface Storage		VPgR-2	9.5				$ 1.21	$ 11,504,882	$ 3,681,562	$ 3,796,611	$ 18,983,056	$ 163,690	$ 4,786,686	$ 23,933,432	$ 71,354	$ -	$ 5,916,131	$ 22,871,495	40
	CSO 017																			
1	Total separation							$ 133,000	$ 19,019,000	$ 4,754,750	$ 5,943,438	$ 29,717,188	$ 1,485,859	$ 7,800,762	$ 39,003,808	$97,510	$ -	$ 17,830,313	$ 34,441,343	50
Lower Pogues																				
	PgR-4																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-4	150.0		0	8,167		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,520	$ -	$ -	$ 133,485	50
	PgR-5																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-5	400.0		0	7,650		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 11,520	$ -	$ -	$ 133,485	50
					ALTERNATIVE TOTAL				$ 55,412,208	$ 15,546,595	$ 16,917,783	$ 87,876,587	$ 1,944,682	$ 22,455,317	$ 112,276,586	$ 640,946	$ 9,884,778	$ 28,327,202	$ 116,245,024	

PLEASANT RUN W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	4
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	+ Project (Capital) Cost ($)	+ Annual Operation & Maintenance Cost ($)	+ Replacement Cost ($)	- Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	PgR-1																			
1	Regulator Modification	23						$ 62,912	$ 1,446,972	$ 463,031	$ 477,501	$ 2,387,504	$ -	$ 596,876	$ 2,984,380	$ -	$ -	$ 723,486	$ 2,753,407	40
2	Interceptor Connection	23						$ 125,824	$ 2,893,944	$ 926,062	$ 955,002	$ 4,775,008	$ -	$ 1,193,752	$ 5,968,760	$ -	$ -	$ 1,446,972	$ 5,506,813	40
3	Interceptor (Sewer Construction)	QPIR-1	120.0		84	23,510		$ 511	$ 12,004,963	$ 5,282,184	$ 4,321,787	$ 21,608,933	$ 944,454	$ 5,638,347	$ 28,191,734	$ 81,999	$ -	$ 8,147,432	$ 26,540,808	50
	PgR-2																			
1	Regulator Modification	18						$ 62,912	$ 1,132,413	$ 362,372	$ 373,696	$ 1,868,481	$ -	$ 467,120	$ 2,335,602	$ -	$ -	$ 566,206	$ 2,154,840	40
2	Interceptor Connection	18						$ 125,824	$ 2,264,826	$ 724,744	$ 747,393	$ 3,736,963	$ -	$ 934,241	$ 4,671,203	$ -	$ -	$ 1,132,413	$ 4,309,680	40
3	Interceptor (Sewer Construction)	QPIR-2	260.0		120	10,671		$ 1,538	$ 16,413,456	$ 7,221,921	$ 5,908,844	$ 29,544,220	$ 428,666	$ 7,493,222	$ 37,466,108	$ 105,185	$ -	$ 10,276,740	$ 35,404,060	50
	CSO 017																			
1	Total separation							$ 133,000	$ 1,729,000	$ 570,570	$ 574,893	$ 2,874,463	$ 143,723	$ 754,546	$ 3,772,732	$9,432	$ -	$ 1,724,677	$ 3,331,419	50
	PgR-3																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QBW	355.0		132	8,375		$ 2,101	$ 17,597,171	$ 7,742,755	$ 6,334,982	$ 31,674,909	$ 384,491	$ 8,014,850	$ 40,074,250	$ 111,706	$ -	$ 10,942,794	$ 37,875,116	50
	BW																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QPIR-3	15.0		30	3,831		$ 123	$ 469,967	$ 206,786	$ 169,188	$ 845,941	$ 109,927	$ 238,967	$ 1,194,835	$ 14,507	$ -	$ 391,907	$ 1,237,815	50
					ALTERNATIVE TOTAL				$ 57,651,332	$ 24,043,983	$ 20,423,829	$ 102,119,144	$ 2,011,261	$ 26,032,601	$ 130,163,007	$ 322,829	$ -	$ 36,201,937	$ 122,346,218	

EAGLE CREEK W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor: 105%

Untreated Overflows / Year: **4**

Planning Period: 20

Discount Rate: 5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	+ Project (Capital) Cost ($)	+ Annual Operation & Maintenance Cost ($)	+ Replacement Cost ($)	- Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	EC-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QEC-1	100.0		84	13,091		$ 511	$ 6,684,459	$ 2,941,162	$ 2,406,405	$ 12,032,026	$ 525,880	$ 3,139,477	$ 15,697,383	$ 50,763	$ -	$ 4,536,555	$ 14,837,293	50
	EC-2																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QEC-2	100.0		84	11,798		$ 511	$ 6,024,311	$ 2,650,697	$ 2,168,752	$ 10,843,760	$ 473,945	$ 2,829,426	$ 14,147,131	$ 46,888	$ -	$ 4,088,531	$ 13,385,165	50
					ALTERNATIVE TOTAL				$ 13,652,448	$ 5,893,836	$ 4,886,571	$ 24,432,854	$ 999,824	$ 6,358,170	$ 31,790,848	$ 97,651	$ -	$ 9,096,925	$ 30,018,158	

UPPER WHITE W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor: 105%

Untreated Overflows / Year: **4**

Planning Period: 20

Discount Rate: 5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	UW-2																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	251,647	80,527	83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QUW-1	65.0		60	900		$ 285	$ 256,680	$ 112,939	$ 92,405	$ 462,024	$ 30,990	$ 123,254	$ 616,269	$ 13,061	$ -	$ 184,998	$ 708,545	50
4	Mechanical Screens		65.0					$ 0.04	$ 2,627,626	$ 840,840	$ 867,116	$ 4,335,582	$ -	$ 1,083,896	$ 5,419,478	$ 21,038	$ 1,517,454	$ -	$ 6,520,646	10
5	Pumping Facilities		65.0	Delta V	Requied V			$ 0.12	$ 7,923,774	$ 2,535,608	$ 2,614,845	$ 13,074,227	$ -	$ 3,268,557	$ 16,342,784	$ 244,051	$ 4,575,979	$ -	$ 21,756,187	10
6	Subsurface Storage		VUW-2	0.1	1.1			$ 2.67	$ 267,475	$ 85,592	$ 88,267	$ 441,333	$ -	$ 110,333	$ 551,666	$ 12,899	$ -	$ 133,737	$ 658,436	40
7	Chlorination	QUW-1	52.8					$ 0.02	$ 1,175,718	$ 376,230	$ 387,987	$ 1,939,935	$ 23,874	$ 490,952	$ 2,454,761	$ 143,114	$ 678,977	$ 23,874	$ 4,489,074	10
8	Dechlorination		52.8					$ 0.02	$ 1,175,718	$ 376,230	$ 387,987	$ 1,939,935	$ 23,874	$ 490,952	$ 2,454,761	$ 143,114	$ 678,977	$ 23,874	$ 4,489,074	10
					ALTERNATIVE TOTAL				$ 13,804,462	$ 4,448,229	$ 4,563,173	$ 22,815,864	$ 78,738	$ 5,723,650	$ 28,618,252	$ 577,277	$ 7,451,388	$ 555,219	$ 39,340,242	

CENTRAL SYSTEM W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	4
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	LW-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QLW-1	90.0		72	4,266		$ 366	$ 1,560,942	$ 686,814	$ 561,939	$ 2,809,695	$ 146,880	$ 739,144	$ 3,695,719	$ 20,759	$ -	$ 1,083,445	$ 3,590,371	50
	LW-2																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QLW-2	80.0		72	9,264		$ 366	$ 3,389,969	$ 1,491,586	$ 1,220,389	$ 6,101,943	$ 318,987	$ 1,605,233	$ 8,026,163	$ 31,585	$ -	$ 2,352,968	$ 7,640,964	50
	CS-2																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Deep Tunnel		VCS-2	1.5	32 ft	10,091		6,386	64,434,040	3,543,872	16,994,478	$ 84,972,390	$ 1,042,369	$ 21,503,690	$ 107,518,449	$ 280,316	$ -	$ 39,702,793	$ 98,091,400	50
	OO8																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Deep Tunnel		0.0	0.0	0 ft	5,500		-	-	-	-	$ -	$ -	$ -	$ -	$ 11,520	$ -	$ -	$ 133,485	50
	CSO 046																			
1	Total separation							$ 133,000	$ 2,793,000	$ 921,690	$ 928,673	$ 4,643,363	$ 232,168	$ 1,218,883	$ 6,094,413	$15,236	$ -	$ 2,618,437	$ 5,435,019	50
	CS-3																			
1	Regulator Modification	6						$ 62,912	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
2	Interceptor Connection	6						$ 125,824	$ 754,942	$ 241,581	$ 249,131	$ 1,245,654	$ -	$ 311,414	$ 1,557,068	$ -	$ -	$ 377,471	$ 1,436,560	40
3	Deep Tunnel		VCS-3	112.0	32 ft	9,218		6,386	58,863,285	3,237,481	15,525,191	$ 77,625,957	$ 952,250	$ 19,644,552	$ 98,222,758	$ 257,077	$ -	$ 36,270,221	$ 89,622,282	50
4	Mechanical Screens		175.0					$ 0.03	$ 6,055,620	$ 1,937,798	$ 1,998,355	$ 9,991,773	$ -	$ 2,497,943	$ 12,489,716	$ 44,490	$ 3,497,121	$ -	$ 14,981,184	10
5	Deep Pumping Facilities		175.0					$ 0.22	$ 37,748,201	$ 12,079,424	$ 12,456,906	$ 62,284,531	$ 630,000	$ 15,728,633	$ 78,643,164	$ 2,682,633	$ 21,799,586	$ 630,000	$ 121,843,572	10
					ALTERNATIVE TOTAL				$ 178,053,559	$ 24,925,387	$ 50,744,736	$ 253,723,682	$ 3,322,654	$ 64,261,584	$ 321,307,920	$ 3,343,617	$ 25,296,706	$ 84,262,116	$ 347,443,657	

AWT and Interplant ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

Untreated Overflows / Year:	4	Planning Period:	20	Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	Interplant																			
1	Interceptor (Sewer Construction)	QSAWTP	175.0		144	32,932		**$ 2,684**	**$ 88,390,432**		**$ 22,097,608**	**$ 110,488,040**	**$ 1,511,960**	**$ 28,000,000**	**$ 140,000,000**	**$ 361,520**	**$ -**	**$ 54,546,219**	**$ 126,775,108**	**50**
	SOUTHPORT AWT																			
1	Raw Wastewater (Captured CSO) Pump Station for EHRC (75-MGD firm capacity)								$ 8,376,300		$ 2,094,075	$ 10,470,375	$ -	$ 2,617,594	$ 13,087,969		$ 3,664,631	$ -	$ 15,158,568	10
2	New 354-MGD Headworks Facility w/ Screening								$ 29,079,200		$ 7,269,800	$ 36,349,000	$ -	$ 9,087,250	$ 45,436,250		$ 12,722,150	$ -	$ 52,624,551	10
3	New 354-MGD Grit Removal Facility with blending and flow split								$ 8,754,000		$ 2,188,500	$ 10,942,500	$ -	$ 2,735,625	$ 13,678,125		$ 3,829,875	$ -	$ 15,842,091	10
4	New 125-MGD/275-MGD Primary Clarifiers								$ 33,184,000		$ 8,296,000	$ 41,480,000	$ -	$ 10,370,000	$ 51,850,000		$ 14,518,000	$ -	$ 60,052,997	10
5	New 15-MG EHRC Basin w/ grit removal and primary settling		0.0						$ -		$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	10
6	New 75-MGD EHRC Facility		0.0						$ -		$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	10
7	EHRC Annual O&M		0.0									$ -			$ -	$ -	$ -		$ -	10
8	New ANS Aeration Equipment								$ 5,100,000		$ 1,275,000	$ 6,375,000	$ -	$ 1,593,750	$ 7,968,750		$ 2,231,250	$ -	$ 9,229,457	10
9	New ANS Return Activated Sludge (RAS) Pumping								$ 3,778,000		$ 944,500	$ 4,722,500	$ -	$ 1,180,625	$ 5,903,125		$ 1,652,875	$ -	$ 6,837,037	10
10	New ANS Final Clarifiers (8 units each @ 155' diameter)								$ 35,041,400		$ 8,760,350	$ 43,801,750	$ -	$ 10,950,438	$ 54,752,188		$ 15,330,613	$ -	$ 63,414,329	10
11	New Effluent Pump Station on ANS (154-MGD firm capacity)								$ 3,865,600		$ 966,400	$ 4,832,000	$ -	$ 1,208,000	$ 6,040,000		$ 1,691,200	$ -	$ 6,995,566	10
12	New 15 MG – Sec. Effluent Equalization Basin w/Aerators								$ 3,608,000		$ 902,000	$ 4,510,000	$ -	$ 1,127,500	$ 5,637,500		$ 1,578,500	$ -	$ 6,529,388	10
13	Add Supplemental Disinfection Process (chlorination /dechlor.)								$ 4,656,000		$ 1,164,000	$ 5,820,000	$ -	$ 1,455,000	$ 7,275,000		$ 2,037,000	$ -	$ 8,425,951	10
14	Yard Piping and Valves								$ 5,752,500		$ 1,438,125	$ 7,190,625	$ -	$ 1,797,656	$ 8,988,281		$ 2,516,719	$ -	$ 10,410,284	10
15	Wet Weather Secondary Annual O&M		8,680.0									$ -	$ -	$ -	$ -	$ 2,170,000	$ -	$ -	$ 25,144,281	10
									$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 2,170,000	$ 61,772,813	$ -	$ 280,664,499	
	Belmont AWT																			
1	New Headworks Facility with Screens		300.0						$24,786,950		$ 6,196,738	$ 30,983,688	$ -	$ 7,745,922	$ 38,729,609		$ 10,844,291	$ -	$ 44,856,878	10
2	New Grit Facility w/ Flow Split		300						$5,681,015		$ 1,420,254	$ 7,101,269	$ -	$ 1,775,317	$ 8,876,586		$ 2,485,444	$ -	$ 10,280,918	10
3	New Intermediate Clarifiers								$36,168,000		$ 9,042,000	$ 45,210,000	$ -	$ 11,302,500	$ 56,512,500		$ 15,823,500	$ -	$ 65,453,134	10
4	New Return Sludge Pumping								$9,247,500		$ 2,311,875	$ 11,559,375	$ -	$ 2,889,844	$ 14,449,219		$ 4,045,781	$ -	$ 16,735,176	10
5	Effluent Disinfection - Chlorination/Dechlorination								$8,310,000		$ 2,077,500	$ 10,387,500	$ -	$ 2,596,875	$ 12,984,375		$ 3,635,625	$ -	$ 15,038,585	10
6	Belmont Anaerobic Digestor Facility BE-78-001								**$18,688,000**		**$ 4,672,000**	**$ 23,360,000**	**$ -**	**$ 5,840,000**	**$ 29,200,000**		**$ 8,176,000**	**$ -**	**$ 33,819,624**	**10**
7	Yard Piping and Valves								$7,245,082		$ 1,811,270	$ 9,056,352	$ -	$ 2,264,088	$ 11,320,440		$ 3,169,723	$ -	$ 13,111,405	10
8	Annual O&M		5,800.00									$ -	$ -	$ -	$ -	$ 1,450,000	$ -	$ -	$ 16,801,478	10
					ALTERNATIVE TOTAL				$ 110,126,547	$ -	$ 27,531,637	$ 137,658,183	$ -	$ 34,414,546	$ 172,072,729	$ 1,450,000	$ 48,180,364	$ -	$ 216,097,198	

F A L L C R E E K W A T E R S H E D ***Plan One***

CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**2**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	FC-1																			
1	Regulator Modification	21						$ 62,912	$ 1,321,148	$ 422,768	$ 435,979	$ 2,179,895	$ -	$ 544,974	$ 2,724,869	$ -	$ -	$ 660,574	$ 2,513,980	40
2	Interceptor Connection	21						125,824	2,642,297	845,535	871,958	4,359,790	$ -	1,089,947	5,449,737	$ -	$ -	$ 1,321,148	$ 5,027,960	40
3	Deep Tunnel		VFC-1	110.0	32 ft	18,577		6,386	118,623,740	6,524,306	31,287,011	156,435,057	$ 1,919,013.13	39,588,518	197,942,588	$ 506,376	$ -	$ 73,093,257	$ 180,475,030	50
4	Regulator	1						524,265	524,265	167,765	173,008	865,038	$ -	216,259	1,081,297	$ 14,223	$ -	$ 262,133	$ 1,162,419	40
	CSO 216																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 216	44.7		48	1,650		$ 262	$ 432,519	$ 190,308	$ 155,707	$ 778,534	$ 56,815.57	$ 208,837	$ 1,044,187	$ 14,130	$ -	$ 316,327	$ 1,106,932	50
	CSO 135																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 135	140.0		84	700		$ 511	$ 357,444	$ 157,275	$ 128,680	$ 643,399	$ 28,121	$ 167,880	$ 839,400	$ 13,619	$ -	$ 242,587	$ 919,755	50
	CSO 141																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 141	235.0		108	2,000		$ 1,289	$ 2,577,288	$ 1,134,007	$ 927,824	$ 4,639,118	$ 80,345	$ 1,179,866	$ 5,899,330	$ 26,268	$ -	$ 1,626,718	$ 5,684,376	50
	CSO 066																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 066	263.6		120	655		$ 1,538	$ 1,007,517	$ 443,308	$ 362,706	$ 1,813,531	$ 26,313	$ 459,961	$ 2,299,805	$ 17,270	$ -	$ 630,823	$ 2,298,520	50
	CSO 050 & 050A																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	CSO 050 & 050A	179.0		96	2,937		$ 1,022	$ 3,002,341	$ 1,321,030	$ 1,080,843	$ 5,404,214	$ 117,979	$ 1,380,548	$ 6,902,742	$ 28,777	$ -	$ 1,919,384	$ 6,623,421	50
					ALTERNATIVE TOTAL				$ 131,620,973	$ 11,568,673	$ 35,797,412	$ 178,987,058	$ 2,228,587	$ 45,303,911	$ 226,519,556	$ 620,663	$ -	$ 80,639,158	$ 207,967,234	

POUGES RUN W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	2
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
Upper Pogues																				
	PgR-1																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QPgR-1	0.0		48	5,783		$ 262	$ 1,515,913	$ 667,002	$ 545,729	$ 2,728,643	$ 199,130	$ 731,943	$ 3,659,717	$ 20,669	$ -	$ 1,108,678	$ 3,545,271	50
	PgR-2																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QPgR-2	210.0		120	3,216		$ 143	$ 4,946,679	$ 202,211	$ 50,553	$ 5,199,443	$ 129,191	$ 1,332,159	$ 6,660,793	$ 28,172	$ -	$ 3,097,199	$ 5,998,446	50
4	Mechanical Screens		210.0					$ 0.03	$ 7,115,987	$ 2,277,116	$ 2,348,276	$ 11,741,378	$ -	$ 2,935,344	$ 14,676,722	$ 54,012	$ 4,109,482	$ -	$ 17,624,522	10
5	Pumping Facilities		210.0					$ 0.08	$ 17,480,996	$ 5,593,919	$ 5,768,729	$ 28,843,644	$ -	$ 7,210,911	$ 36,054,555	$ 561,559	$ 10,095,275	$ -	$ 48,265,522	10
6	Subsurface Storage		VPgR-2	14.5				$ 1.13	$ 16,314,450	$ 5,220,624	$ 5,383,769	$ 26,918,843	$ 286,458	$ 6,801,325	$ 34,006,626	$ 96,537	$ -	$ 8,443,683	$ 32,429,567	40
	CSO 017																			
1	Total separation							$ 133,000	$ 19,019,000	$ 4,754,750	$ 5,943,438	$ 29,717,188	$ 1,485,859	$ 7,800,762	$ 39,003,808	$97,510	$ -	$ 17,830,313	$ 34,441,343	50
Lower Pogues																				
	PgR-4																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-4	260.0		48	8,167		$ 262	$ 2,140,863	$ 941,980	$ 770,711	$ 3,853,554	$ 281,223	$ 1,033,694	$ 5,168,472	$ 24,441	$ -	$ 1,565,741	$ 4,951,814	50
	PgR-5																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-5	650.0		72	7,650		$ 366	$ 2,799,236	$ 1,231,664	$ 1,007,725	$ 5,038,625	$ 263,400	$ 1,325,506	$ 6,627,532	$ 28,089	$ -	$ 1,942,942	$ 6,332,719	50
					ALTERNATIVE TOTAL				$ 75,107,835	$ 22,097,173	$ 23,064,582	$ 120,269,590	$ 2,645,261	$ 30,728,713	$ 153,643,564	$ 910,989	$ 14,204,758	$ 35,875,911	$ 160,772,002	

PLEASANT RUN W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	2
Planning Period:	20
Discount Rate:	5.875%

															+	+	+	-		
Item No.	**Item Description**	**No. of Regulators**	**Flowrate (MGD)**	**Volume (MG)**	**Pipe Diameter (inches)**	**Pipe Length (feet)**	**Land (acres)**	**Unit Cost ($)**	**Base Construction Cost ($)**	**Site Adjustment ($)**	**Construction Contingency (25%)**	**Construction Cost ($)**	**Land Costs ($)**	**Engineering, Legal & Administration (25%)**	**Project (Capital) Cost ($)**	**Annual Operation & Maintenance Cost ($)**	**Replacement Cost ($)**	**Residual Value @ 20 years ($)**	**Present Worth ($)**	**Asset Life (years)**
	PgR-1																			
1	Regulator Modification	23						$ 62,912	$ 1,446,972	$ 463,031	$ 477,501	$ 2,387,504	$ -	$ 596,876	$ 2,984,380	$ -	$ -	$ 723,486	$ 2,753,407	40
2	Interceptor Connection	23						$ 125,824	$ 2,893,944	$ 926,062	$ 955,002	$ 4,775,008	$ -	$ 1,193,752	$ 5,968,760	$ -	$ -	$ 1,446,972	$ 5,506,813	40
3	Interceptor (Sewer Construction)	QPIR-1	189.0		102	23,510		$ 1,171	$ 27,534,997	$ 12,115,399	$ 9,912,599	$ 49,562,994	$ 944,454	$ 12,626,862	$ 63,134,311	$ 169,356	$ -	$ 17,465,453	$ 59,520,821	50
	PgR-2																			
1	Regulator Modification	18						$ 62,912	$ 1,132,413	$ 362,372	$ 373,696	$ 1,868,481	$ -	$ 467,120	$ 2,335,602	$ -	$ -	$ 566,206	$ 2,154,840	40
2	Interceptor Connection	18						$ 125,824	$ 2,264,826	$ 724,744	$ 747,393	$ 3,736,963	$ -	$ 934,241	$ 4,671,203	$ -	$ -	$ 1,132,413	$ 4,309,680	40
3	Interceptor (Sewer Construction)	QPIR-2	385.0		144	10,671		$ 2,223	$ 23,719,514	$ 10,436,586	$ 8,539,025	$ 42,695,124	$ 489,904	$ 10,796,257	$ 53,981,285	$ 146,473	$ -	$ 14,721,612	$ 50,978,622	50
	CSO 017																			
1	Total separation							$ 133,000	$ 1,729,000	$ 570,570	$ 574,893	$ 2,874,463	$ 143,723	$ 754,546	$ 3,772,732	$9,432	$ -	$ 1,724,677	$ 3,331,419	50
	PgR-3																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QBW	500.0		168	8,375		$ 2,460	$ 20,600,282	$ 9,064,124	$ 7,416,101	$ 37,080,507	$ 384,491	$ 9,366,249	$ 46,831,247	$ 128,598	$ -	$ 12,744,660	$ 44,252,604	50
	BW																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QPIR-3	25.0		42	3,831		$ 201	$ 771,229	$ 339,341	$ 277,642	$ 1,388,211	$ 131,912	$ 380,031	$ 1,900,154	$ 16,270	$ -	$ 594,649	$ 1,898,841	50
					ALTERNATIVE TOTAL				$ 83,791,795	$ 35,545,787	$ 29,834,396	$ 149,171,978	$ 2,094,485	$ 37,816,616	$ 189,083,078	$ 470,129	$ -	$ 51,969,438	$ 177,939,307	

EAGLE CREEK W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**2**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	+ Project (Capital) Cost ($)	+ Annual Operation & Maintenance Cost ($)	+ Replacement Cost ($)	- Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
EC-1																				
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QEC-1	140.0		96	13,091		$ 1,022	$ 13,382,644	$ 5,888,363	$ 4,817,752	$ 24,088,759	$ 525,880	$ 6,153,660	$ 30,768,299	$ 88,441	$ -	$ 8,555,466	$ 29,061,745	50
EC-2																				
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QEC-2	140.0		96	11,798		$ 1,022	$ 12,060,992	$ 5,306,837	$ 4,341,957	$ 21,709,786	$ 473,945	$ 5,545,933	$ 27,729,663	$ 80,844	$ -	$ 7,710,540	$ 26,204,830	50
					ALTERNATIVE TOTAL				$ 26,387,314	$ 11,497,177	$ 9,471,123	$ 47,355,613	$ 999,824	$ 12,088,859	$ 60,444,297	$ 169,285	$ -	$ 16,737,845	$ 57,062,275	

UPPER WHITE W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	2
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	UW-2																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	251,647	80,527	83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QUW-1	120.0		84	900		$ 511	$ 459,571	$ 202,211	$ 165,446	$ 827,228	$ 36,155	$ 215,846	$ 1,079,229	$ 14,218	$ -	$ 311,898	$ 1,144,403	50
4	Mechanical Screens		120.0					$ 0.04	$ 4,405,826	$ 1,409,864	$ 1,453,923	$ 7,269,613	$ -	$ 1,817,403	$ 9,087,016	$ 31,312	$ 2,544,364	$ -	$ 10,887,458	10
5	Pumping Facilities		120.0	Delta V	Requied V			$ 0.10	$ 12,200,698	$ 3,904,223	$ 4,026,230	$ 20,131,151	$ -	$ 5,032,788	$ 25,163,939	$ 367,801	$ 7,045,903	$ -	$ 33,406,831	10
6	Subsurface Storage		VUW-2	1.0	2.0			$ 1.79	$ 1,791,771	$ 573,367	$ 591,284	$ 2,956,422	$ 20,461	$ 744,221	$ 3,721,104	$ 20,823	$ -	$ 916,347	$ 3,669,838	40
7	Chlorination	QUW-1	96.0					$ 0.02	$ 1,551,583	$ 496,506	$ 512,022	$ 2,560,111	$ 44,075	$ 651,047	$ 3,255,233	$ 206,586	$ 896,039	$ 44,075	$ 6,141,200	10
8	Dechlorination		96.0					$ 0.02	$ 1,551,583	$ 496,506	$ 512,022	$ 2,560,111	$ 44,075	$ 651,047	$ 3,255,233	$ 206,586	$ 896,039	$ 44,075	$ 6,141,200	10
					ALTERNATIVE TOTAL				$ 22,338,502	$ 7,203,469	$ 7,385,493	$ 36,927,463	$ 144,767	$ 9,268,058	$ 46,340,288	$ 847,326	$ 11,382,345	$ 1,505,130	$ 62,109,210	

CENTRAL SYSTEM W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	2
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	LW-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QLW-1	135.0		84	4,266		$ 511	$ 2,178,162	$ 958,391	$ 784,138	$ 3,920,691	$ 171,360	$ 1,023,013	$ 5,115,065	$ 24,308	$ -	$ 1,478,258	$ 4,924,789	50
	LW-2																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QLW-2	115.0		84	9,264		$ 511	$ 4,730,415	$ 2,081,382	$ 1,702,949	$ 8,514,746	$ 372,151	$ 2,221,724	$ 11,108,622	$ 39,292	$ -	$ 3,210,400	$ 10,538,980	50
	CS-2																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Deep Tunnel		VCS-2	10.0	43 ft	10,091		15,743	158,851,386	8,736,826	41,897,053	$ 209,485,265	$ 3,083,746	$ 53,142,253	$ 265,711,263	$ 675,798	$ -	$ 98,394,577	$ 242,129,375	50
	OO8																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Deep Tunnel		130.0	0.0	8 ft	5,500		2,737	15,051,656	827,841	3,969,874	$ 19,849,371	$ 568,156	$ 5,104,382	$ 25,521,908	$ 75,325	$ -	$ 9,599,149	$ 23,330,181	50
	CSO 046																			
1	Total separation							$ 133,000	$ 2,793,000	$ 921,690	$ 928,673	$ 4,643,363	$ 232,168	$ 1,218,883	$ 6,094,413	$15,236	$ -	$ 2,618,437	$ 5,435,019	50
	CS-3																			
1	Regulator Modification	6						$ 62,912	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
2	Interceptor Connection	6						$ 125,824	$ 754,942	$ 241,581	$ 249,131	$ 1,245,654	$ -	$ 311,414	$ 1,557,068	$ -	$ -	$ 377,471	$ 1,436,560	40
3	Deep Tunnel		VCS-3	190.0	43 ft	9,218		15,743	145,117,619	7,981,469	38,274,772	$ 191,373,860	$ 2,817,135	$ 48,547,749	$ 242,738,744	$ 618,367	$ -	$ 89,887,707	$ 221,207,209	50
4	Mechanical Screens		165.0					$ 0.03	$ 5,762,574	$ 1,844,024	$ 1,901,649	$ 9,508,247	$ -	$ 2,377,062	$ 11,885,308	$ 41,878	$ 3,327,886	$ -	$ 14,250,889	10
5	Deep Pumping Facilities		165.0					$ 0.22	$ 35,854,758	$ 11,473,523	$ 11,832,070	$ 59,160,351	$ 594,000	$ 14,938,588	$ 74,692,939	$ 2,579,085	$ 20,706,123	$ 594,000	$ 116,087,169	10
					ALTERNATIVE TOTAL				$ 373,548,072	$ 35,851,867	$ 102,349,985	$ 511,749,924	$ 7,838,717	$ 129,897,160	$ 649,485,800	$ 4,069,288	$ 24,034,009	$ 207,386,779	$ 644,008,990	

AWT and Interplant *Plan One*
CONTROL TECHNOLOGY 1: Storage and Conveyance

Untreated Overflows / Year: 2	Planning Period: 20	Discount Rate: 5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	Interplant																			
1	Interceptor (Sewer Construction)	QSAWTP	165.0		144	32,932		**$ 2,684**	**$ 88,390,432**		**$ 22,097,608**	**$ 110,488,040**	**$ 1,511,960**	**$ 28,000,000**	**$ 140,000,000**	**$ 361,520**	**$ -**	**$ 54,546,219**	**$ 126,775,108**	**50**
	SOUTHPORT AWT																			
1	Raw Wastewater (Captured CSO) Pump Station for EHRC (75-MGD firm capacity)								$ 8,376,300		$ 2,094,075	$ 10,470,375	$ -	$ 2,617,594	$ 13,087,969		$ 3,664,631	$ -	$ 15,158,568	10
2	New 354-MGD Headworks Facility w/ Screening								$ 29,079,200		$ 7,269,800	$ 36,349,000	$ -	$ 9,087,250	$ 45,436,250		$ 12,722,150	$ -	$ 52,624,551	10
3	New 354-MGD Grit Removal Facility with blending and flow split								$ 8,754,000		$ 2,188,500	$ 10,942,500	$ -	$ 2,735,625	$ 13,678,125		$ 3,829,875	$ -	$ 15,842,091	10
4	New 125-MGD/275-MGD Primary Clarifiers								$ 33,184,000		$ 8,296,000	$ 41,480,000	$ -	$ 10,370,000	$ 51,850,000		$ 14,518,000	$ -	$ 60,052,997	10
5	New 15-MG EHRC Basin w/ grit removal and primary settling		0.0						$ -		$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	10
6	New 75-MGD EHRC Facility		0.0						$ -		$ -	$ -	$ -	$ -	$ -		$ -	$ -	$ -	10
7	EHRC Annual O&M		0.0									$ -			$ -	$ -	$ -		$ -	10
8	New ANS Aeration Equipment								$ 5,100,000		$ 1,275,000	$ 6,375,000	$ -	$ 1,593,750	$ 7,968,750		$ 2,231,250	$ -	$ 9,229,457	10
9	New ANS Return Activated Sludge (RAS) Pumping								$ 3,778,000		$ 944,500	$ 4,722,500	$ -	$ 1,180,625	$ 5,903,125		$ 1,652,875	$ -	$ 6,837,037	10
10	New ANS Final Clarifiers (8 units each @ 155' diameter)								$ 35,041,400		$ 8,760,350	$ 43,801,750	$ -	$ 10,950,438	$ 54,752,188		$ 15,330,613	$ -	$ 63,414,329	10
11	New Effluent Pump Station on ANS (154-MGD firm capacity)								$ 3,865,600		$ 966,400	$ 4,832,000	$ -	$ 1,208,000	$ 6,040,000		$ 1,691,200	$ -	$ 6,995,566	10
12	New 15 MG – Sec. Effluent Equalization Basin w/Aerators								$ 3,608,000		$ 902,000	$ 4,510,000	$ -	$ 1,127,500	$ 5,637,500		$ 1,578,500	$ -	$ 6,529,388	10
13	Add Supplemental Disinfection Process (chlorination /dechlor.)								$ 4,656,000		$ 1,164,000	$ 5,820,000	$ -	$ 1,455,000	$ 7,275,000		$ 2,037,000	$ -	$ 8,425,951	10
14	Yard Piping and Valves								$ 5,752,500		$ 1,438,125	$ 7,190,625	$ -	$ 1,797,656	$ 8,988,281		$ 2,516,719	$ -	$ 10,410,284	10
15	Wet Weather Secondary Annual O&M		9,130.0									$ -	$ -	$ -	$ -	$ 2,282,500	$ -	$ -	$ 26,447,844	10
									$ 141,195,000	$ -	$ 35,298,750	$ 176,493,750	$ -	$ 44,123,438	$ 220,617,188	$ 2,282,500	$ 61,772,813	$ -	$ 281,968,062	
	Belmont AWT																			
1	New Headworks Facility with Screens		300.0						$24,786,950		$ 6,196,738	$ 30,983,688	$ -	$ 7,745,922	$ 38,729,609		$ 10,844,291	$ -	$ 44,856,878	10
2	New Grit Facility w/ Flow Split		300						$5,681,015		$ 1,420,254	$ 7,101,269	$ -	$ 1,775,317	$ 8,876,586		$ 2,485,444	$ -	$ 10,280,918	10
3	New Intermediate Clarifiers								$36,168,000		$ 9,042,000	$ 45,210,000	$ -	$ 11,302,500	$ 56,512,500		$ 15,823,500	$ -	$ 65,453,134	10
4	New Return Sludge Pumping								$9,247,500		$ 2,311,875	$ 11,559,375	$ -	$ 2,889,844	$ 14,449,219		$ 4,045,781	$ -	$ 16,735,176	10
5	Effluent Disinfection - Chlorination/Dechlorination								$8,310,000		$ 2,077,500	$ 10,387,500	$ -	$ 2,596,875	$ 12,984,375		$ 3,635,625	$ -	$ 15,038,585	10
6	Belmont Anaerobic Digestor Facility BE-78-001								**$18,688,000**		**$ 4,672,000**	**$ 23,360,000**	**$ -**	**$ 5,840,000**	**$ 29,200,000**		**$ 8,176,000**	**$ -**	**$ 33,819,624**	**10**
7	Yard Piping and Valves								$7,245,082		$ 1,811,270	$ 9,056,352	$ -	$ 2,264,088	$ 11,320,440		$ 3,169,723	$ -	$ 13,111,405	10
8	Annual O&M		5,690.00									$ -	$ -	$ -	$ -	$ 1,422,500	$ -	$ -	$ 16,482,829	10
					ALTERNATIVE TOTAL				$ 110,126,547	$ -	$ 27,531,637	$ 137,658,183	$ -	$ 34,414,546	$ 172,072,729	$ 1,422,500	$ 48,180,364	$ -	$ 215,778,549	

F A L L C R E E K W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**0.5**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	FC-1																			
1	Regulator Modification	21						$ 62,912	$ 1,321,148	$ 422,768	$ 435,979	$ 2,179,895	$ -	$ 544,974	$ 2,724,869	$ -	$ -	$ 660,574	$ 2,513,980	40
2	Interceptor Connection	21						125,824	2,642,297	845,535	871,958	4,359,790	$ -	1,089,947	5,449,737	$ -	$ -	$ 1,321,148	$ 5,027,960	40
3	Deep Tunnel		VFC-1	162.0	39 ft	18,577		12,950	240,568,945	13,231,292	63,450,059	317,250,296	$ 4,670,110.35	80,480,101	402,400,507	$ 1,017,521	$ -	$ 149,011,477	$ 366,618,774	50
4	Regulator	1						524,265	524,265	167,765	173,008	865,038	$ -	216,259	1,081,297	$ 14,223	$ -	$ 262,133	$ 1,162,419	40
	CSO 216																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 216	75.3		60	1,650		$ 285	$ 470,580	$ 207,055	$ 169,409	$ 847,045	$ 56,815.57	$ 225,965	$ 1,129,826	$ 14,345	$ -	$ 339,164	$ 1,187,761	50
	CSO 135																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 135	237.7		108	700		$ 1,289	$ 902,051	$ 396,902	$ 324,738	$ 1,623,691	$ 28,121	$ 412,953	$ 2,064,765	$ 16,682	$ -	$ 569,351	$ 2,076,297	50
	CSO 141																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 141	432.4		144	2,000		$ 2,223	$ 4,445,769	$ 1,956,139	$ 1,600,477	$ 8,002,385	$ 91,823	$ 2,023,552	$ 10,117,760	$ 36,814	$ -	$ 2,759,285	$ 9,663,434	50
	CSO 066																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Interceptor (Sewer Construction)	CSO 066	480.4		156	655		$ 2,460	$ 1,611,203	$ 708,930	$ 580,033	$ 2,900,166	$ 30,072	$ 732,560	$ 3,662,798	$ 20,677	$ -	$ 996,794	$ 3,584,160	50
	CSO 050 & 050A																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	CSO 050 & 050A	304.0		120	2,937		$ 1,538	$ 4,517,369	$ 1,987,642	$ 1,626,253	$ 8,131,264	$ 117,979	$ 2,062,311	$ 10,311,554	$ 37,299	$ -	$ 2,828,400	$ 9,840,776	50
					ALTERNATIVE TOTAL				$ 258,136,041	$ 20,286,400	$ 69,605,610	$ 348,028,051	$ 4,994,921	$ 88,255,743	$ 441,278,715	$ 1,157,561	$ -	$ 159,314,533	$ 403,830,401	

POUGES RUN W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**0.5**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
Upper Pogues																				
	PgR-1																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QPgR-1	0.0		72	5,783		$ 366	$ 2,116,215	$ 931,134	$ 761,837	$ 3,809,186	$ 199,130	$ 1,002,079	$ 5,010,395	$ 24,046	$ -	$ 1,468,859	$ 4,820,088	50
	PgR-2																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QPgR-2	400.0		168	3,216		$ 328	$ 7,910,640	$ 463,799	$ 115,950	$ 8,490,388	$ 147,647	$ 2,159,509	$ 10,797,544	$ 38,514	$ -	$ 4,894,031	$ 9,681,391	50
4	Mechanical Screens		400.0					$ 0.03	$ 13,554,260	$ 4,337,363	$ 4,472,906	$ 22,364,529	$ -	$ 5,591,132	$ 27,955,662	$ 102,880	$ 7,827,585	$ -	$ 33,570,517	10
5	Pumping Facilities		400.0					$ 0.04	$ 17,480,996	$ 5,593,919	$ 5,768,729	$ 28,843,644	$ -	$ 7,210,911	$ 36,054,555	$ 1,646,074	$ 10,095,275	$ -	$ 60,832,044	10
6	Subsurface Storage		VPgR-2	26.0				$ 1.02	$ 26,427,158	$ 8,456,691	$ 8,720,962	$ 43,604,811	$ 531,993	$ 11,034,201	$ 55,171,004	$ 149,448	$ -	$ 13,745,572	$ 52,514,406	40
	CSO 017																			
1	Total separation							$ 133,000	$ 19,019,000	$ 4,754,750	$ 5,943,438	$ 29,717,188	$ 1,485,859	$ 7,800,762	$ 39,003,808	$97,510	$ -	$ 17,830,313	$ 34,441,343	50
Lower Pogues																				
	PgR-4																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-4	475.0		120	8,167		$ 1,538	$ 12,562,586	$ 5,527,538	$ 4,522,531	$ 22,612,656	$ 328,094	$ 5,735,187	$ 28,675,937	$ 83,210	$ -	$ 7,865,646	$ 27,128,997	50
	PgR-5																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QPgR-5	1200.0		192	7,650		$ 3,101	$ 23,717,311	$ 10,435,617	$ 8,538,232	$ 42,691,160	$ 439,001	$ 10,782,540	$ 53,912,701	$ 146,302	$ -	$ 14,669,387	$ 50,924,724	50
					ALTERNATIVE TOTAL				$ 126,562,877	$ 41,708,718	$ 40,090,239	$ 208,361,833	$ 3,131,723	$ 52,873,389	$ 264,366,945	$ 2,287,983	$ 17,922,861	$ 62,361,163	$ 281,096,310	

PLEASANT RUN W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**0.5**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	+ Project (Capital) Cost ($)	+ Annual Operation & Maintenance Cost ($)	+ Replacement Cost ($)	- Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	PgR-1																			
1	Regulator Modification	23						$ 62,912	$ 1,446,972	$ 463,031	$ 477,501	$ 2,387,504	$ -	$ 596,876	$ 2,984,380	$ -	$ -	$ 723,486	$ 2,753,407	40
2	Interceptor Connection	23						$ 125,824	$ 2,893,944	$ 926,062	$ 955,002	$ 4,775,008	$ -	$ 1,193,752	$ 5,968,760	$ -	$ -	$ 1,446,972	$ 5,506,813	40
3	Interceptor (Sewer Construction)	QPIR-1	330.7		132	23,510		$ 2,101	$ 49,400,299	$ 21,736,131	$ 17,784,108	$ 88,920,538	$ 1,079,377	$ 22,499,979	$ 112,499,893	$ 292,770	$ -	$ 30,719,556	$ 106,085,050	50
	PgR-2																			
1	Regulator Modification	18						$ 62,912	$ 1,132,413	$ 362,372	$ 373,696	$ 1,868,481	$ -	$ 467,120	$ 2,335,602	$ -	$ -	$ 566,206	$ 2,154,840	40
2	Interceptor Connection	18						$ 125,824	$ 2,264,826	$ 724,744	$ 747,393	$ 3,736,963	$ -	$ 934,241	$ 4,671,203	$ -	$ -	$ 1,132,413	$ 4,309,680	40
3	Interceptor (Sewer Construction)	QPIR-2	736.2		192	10,671		$ 3,101	$ 33,084,246	$ 14,557,068	$ 11,910,329	$ 59,551,643	$ 612,380	$ 15,041,006	$ 75,205,028	$ 199,533	$ -	$ 20,462,928	$ 70,984,258	50
	CSO 017																			
1	Total separation							$ 133,000	$ 1,729,000	$ 570,570	$ 574,893	$ 2,874,463	$ 143,723	$ 754,546	$ 3,772,732	$9,432	$ -	$ 1,724,677	$ 3,331,419	50
	PgR-3																			
1	Regulator Modification	7						$ 62,912	$ 440,383	$ 140,923	$ 145,326	$ 726,632	$ -	$ 181,658	$ 908,290	$ -	$ -	$ 220,191	$ 837,993	40
2	Interceptor Connection	7						$ 125,824	$ 880,766	$ 281,845	$ 290,653	$ 1,453,263	$ -	$ 363,316	$ 1,816,579	$ -	$ -	$ 440,383	$ 1,675,987	40
3	Interceptor (Sewer Construction)	QBW	918.8		216	8,375		$ 3,610	$ 30,233,065	$ 13,302,548	$ 10,883,903	$ 54,419,516	$ 480,614	$ 13,725,033	$ 68,625,163	$ 183,083	$ -	$ 18,620,453	$ 64,801,998	50
	BW																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QPIR-3	55.0		60	3,831		$ 285	$ 1,092,574	$ 480,732	$ 393,327	$ 1,966,633	$ 131,912	$ 524,636	$ 2,623,181	$ 18,078	$ -	$ 787,456	$ 2,581,259	50
					ALTERNATIVE TOTAL				$ 124,975,958	$ 53,666,818	$ 44,660,694	$ 223,303,470	$ 2,448,005	$ 56,437,869	$ 282,189,345	$ 702,895	$ -	$ 77,033,457	$ 265,740,983	

EAGLE CREEK W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**0.5**
Planning Period:	20
Discount Rate:	5.875%

															+	+	+	-		
Item No.	**Item Description**	**No. of Regulators**	**Flowrate (MGD)**	**Volume (MG)**	**Pipe Diameter (inches)**	**Pipe Length (feet)**	**Land (acres)**	**Unit Cost ($)**	**Base Construction Cost ($)**	**Site Adjustment ($)**	**Construction Contingency (25%)**	**Construction Cost ($)**	**Land Costs ($)**	**Engineering, Legal & Administration (25%)**	**Project (Capital) Cost ($)**	**Annual Operation & Maintenance Cost ($)**	**Replacement Cost ($)**	**Residual Value @ 20 years ($)**	**Present Worth ($)**	**Asset Life (years)**
	EC-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QEC-1	220.0		108	13,091		$ 1,289	$ 16,868,994	$ 7,422,358	$ 6,072,838	$ 30,364,190	$ 525,880	$ 7,722,517	$ 38,612,587	$ 108,051	$ -	$ 10,647,276	$ 36,465,456	50
	EC-2																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Interceptor (Sewer Construction)	QEC-2	220.0		108	11,798		$ 1,289	$ 15,203,035	$ 6,689,336	$ 5,473,093	$ 27,365,464	$ 473,945	$ 6,959,852	$ 34,799,260	$ 98,518	$ -	$ 9,595,766	$ 32,877,360	50
					ALTERNATIVE TOTAL				$ 33,015,707	$ 14,413,670	$ 11,857,344	$ 59,286,722	$ 999,824	$ 15,071,636	$ 75,358,182	$ 206,570	$ -	$ 20,714,881	$ 71,138,516	

UPPER WHITE W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**0.5**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	UW-2																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	251,647	80,527	83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QUW-1	200.0		102	900		$ 1,171	$ 1,054,088	$ 463,799	$ 379,472	$ 1,897,358	$ 36,155	$ 483,378	$ 2,416,892	$ 17,562	$ -	$ 668,608	$ 2,406,936	50
4	Mechanical Screens		200.0					$ 0.03	$ 6,777,130	$ 2,168,682	$ 2,236,453	$ 11,182,265	$ -	$ 2,795,566	$ 13,977,831	$ 51,440	$ 3,913,793	$ -	$ 16,785,259	10
5	Pumping Facilities		200.0	Delta V	Requied V			$ 0.09	$ 17,480,996	$ 5,593,919	$ 5,768,729	$ 28,843,644	$ -	$ 7,210,911	$ 36,054,555	$ 517,643	$ 10,095,275	$ -	$ 47,756,659	10
6	Subsurface Storage		VUW-2	2.5	3.5			$ 1.53	$ 3,819,275	$ 1,222,168	$ 1,260,361	$ 6,301,804	$ 40,923	$ 1,585,682	$ 7,928,408	$ 31,341	$ -	$ 1,950,560	$ 7,668,846	40
7	Chlorination	QUW-1	168.0					$ 0.01	$ 2,011,614	$ 643,716	$ 663,833	$ 3,319,163	$ 77,131	$ 849,074	$ 4,245,368	$ 291,290	$ 1,161,707	$ 77,131	$ 8,252,377	10
8	Dechlorination		168.0					$ 0.01	$ 2,011,614	$ 643,716	$ 663,833	$ 3,319,163	$ 77,131	$ 849,074	$ 4,245,368	$ 291,290	$ 1,161,707	$ 77,131	$ 8,252,377	10
					ALTERNATIVE TOTAL				$ 33,532,188	$ 10,856,791	$ 11,097,245	$ 55,486,223	$ 231,341	$ 13,929,391	$ 69,646,954	$ 1,200,566	$ 16,332,482	$ 2,962,166	$ 91,840,734	

CENTRAL SYSTEM W A T E R S H E D ***Plan One***
CONTROL TECHNOLOGY 1: Storage and Conveyance

ENRCCI factor:	105%
Untreated Overflows / Year:	**0.5**
Planning Period:	20
Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	LW-1																			
1	Regulator Modification	2						$ 62,912	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
2	Interceptor Connection	2						$ 125,824	$ 251,647	$ 80,527	$ 83,044	$ 415,218	$ -	$ 103,805	$ 519,023	$ -	$ -	$ 125,824	$ 478,853	40
3	Interceptor (Sewer Construction)	QLW-1	241.0		120	4,266		$ 1,538	$ 6,561,321	$ 2,886,981	$ 2,362,076	$ 11,810,379	$ 171,360	$ 2,995,435	$ 14,977,174	$ 48,963	$ -	$ 4,108,153	$ 14,232,989	50
	LW-2																			
1	Regulator Modification	5						$ 62,912	$ 314,559	$ 100,659	$ 103,805	$ 519,023	$ -	$ 129,756	$ 648,778	$ -	$ -	$ 157,280	$ 598,567	40
2	Interceptor Connection	5						$ 125,824	$ 629,118	$ 201,318	$ 207,609	$ 1,038,045	$ -	$ 259,511	$ 1,297,557	$ -	$ -	$ 314,559	$ 1,197,133	40
3	Interceptor (Sewer Construction)	QLW-2	200.0		108	9,264		$ 1,289	$ 11,937,740	$ 5,252,606	$ 4,297,587	$ 21,487,933	$ 372,151	$ 5,465,021	$ 27,325,105	$ 79,833	$ -	$ 7,534,795	$ 25,844,658	50
	CS-2																			
1	Regulator Modification	3						$ 62,912	$ 188,735	$ 60,395	$ 62,283	$ 311,414	$ -	$ 77,853	$ 389,267	$ -	$ -	$ 94,368	$ 359,140	40
2	Interceptor Connection	3						$ 125,824	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
3	Deep Tunnel		VCS-2	32.0	55 ft	10,091		25,755	259,883,960	14,293,618	68,544,394	$ 342,721,972	$ 5,045,068	$ 86,941,760	$ 434,708,800	$ 1,098,292	$ -	$ 160,975,444	$ 396,043,473	50
	OO8																			
1	Regulator Modification	1						$ 62,912	$ 62,912	$ 20,132	$ 20,761	$ 103,805	$ -	$ 25,951	$ 129,756	$ -	$ -	$ 31,456	$ 119,713	40
2	Interceptor Connection	1						$ 125,824	$ 125,824	$ 40,264	$ 41,522	$ 207,609	$ -	$ 51,902	$ 259,511	$ -	$ -	$ 62,912	$ 239,427	40
3	Deep Tunnel		300.0	0.0	12 ft	5,500		3,345	18,396,468	1,011,806	4,852,068	$ 24,260,342	$ 568,156	$ 6,207,124	$ 31,035,622	$ 89,109	$ -	$ 11,606,037	$ 28,362,917	50
	CSO 046																			
1	Total separation							$ 133,000	$ 2,793,000	$ 921,690	$ 928,673	$ 4,643,363	$ 232,168	$ 1,218,883	$ 6,094,413	$15,236	$ -	$ 2,618,437	$ 5,435,019	50
	CS-3																			
1	Regulator Modification	6						$ 62,912	$ 377,471	$ 120,791	$ 124,565	$ 622,827	$ -	$ 155,707	$ 778,534	$ -	$ -	$ 188,735	$ 718,280	40
2	Interceptor Connection	6						$ 125,824	$ 754,942	$ 241,581	$ 249,131	$ 1,245,654	$ -	$ 311,414	$ 1,557,068	$ -	$ -	$ 377,471	$ 1,436,560	40
3	Deep Tunnel		VCS-3	310.0	55 ft	9,218		25,755	237,415,249	13,057,839	62,618,272	$ 313,091,360	$ 4,608,888	$ 79,425,062	$ 397,125,311	$ 1,004,333	$ -	$ 147,058,038	$ 361,814,401	50
4	Mechanical Screens		185.0					$ 0.03	$ 6,346,047	$ 2,030,735	$ 2,094,196	$ 10,470,978	$ -	$ 2,617,744	$ 13,088,722	$ 47,198	$ 3,664,842	$ -	$ 15,706,335	10
5	Deep Pumping Facilities		185.0					$ 0.21	$ 39,630,807	$ 12,681,858	$ 13,078,166	$ 65,390,832	$ 666,000	$ 16,514,208	$ 82,571,039	$ 2,784,240	$ 22,886,791	$ 666,000	$ 127,551,596	10
					ALTERNATIVE TOTAL				$ 586,173,097	$ 53,163,854	$ 159,834,238	$ 799,171,188	$ 11,663,792	$ 202,708,745	$ 1,013,543,725	$ 5,167,205	$ 26,551,633	$ 336,171,156	$ 981,096,767	

AWT and Interplant *Plan One*
CONTROL TECHNOLOGY 1: Storage and Conveyance

Untreated Overflows / Year:	0.5

Planning Period:	20

Discount Rate:	5.875%

Item No.	Item Description	No. of Regulators	Flowrate (MGD)	Volume (MG)	Pipe Diameter (inches)	Pipe Length (feet)	Land (acres)	Unit Cost ($)	Base Construction Cost ($)	Site Adjustment ($)	Construction Contingency (25%)	Construction Cost ($)	Land Costs ($)	Engineering, Legal & Administration (25%)	Project (Capital) Cost ($)	Annual Operation & Maintenance Cost ($)	Replacement Cost ($)	Residual Value @ 20 years ($)	Present Worth ($)	Asset Life (years)
	Interplant																			
1	Interceptor (Sewer Construction)	QSAWTP	185.0		144	32,932		**$ 2,684**	**$ 88,390,432**		**$ 22,097,608**	**$ 110,488,040**	**$ 1,511,960**	**$ 28,000,000**	**$ 140,000,000**	**$ 361,520**	**$ -**	**$ 54,546,219**	**$ 126,775,108**	**50**
	SOUTHPORT AWT																			
1	Raw Wastewater (Captured CSO) Pump Station for EHRC (75-MGD firm capacity)								$ 8,376,300		$ 2,094,075	$ 10,470,375	$ -	$ 2,617,594	$ 13,087,969		$ 3,664,631	$ -	$ 15,158,568	10
2	New 354-MGD Headworks Facility w/ Screening								$ 29,079,200		$ 7,269,800	$ 36,349,000	$ -	$ 9,087,250	$ 45,436,250		$ 12,722,150	$ -	$ 52,624,551	10
3	New 354-MGD Grit Removal Facility with blending and flow split								$ 8,754,000		$ 2,188,500	$ 10,942,500	$ -	$ 2,735,625	$ 13,678,125		$ 3,829,875	$ -	$ 15,842,091	10
4	New 125-MGD/275-MGD Primary Clarifiers								$ 33,184,000		$ 8,296,000	$ 41,480,000	$ -	$ 10,370,000	$ 51,850,000		$ 14,518,000	$ -	$ 60,052,997	10
5	New 15-MG EHRC Basin w/ grit removal and primary settling		75.0						$ 4,319,000		$ 1,079,750	$ 5,398,750	$ -	$ 1,349,688	$ 6,748,438		$ 1,889,563	$ -	$ 7,816,083	10
6	New 75-MGD EHRC Facility		75.0						$ 14,128,000		$ 3,532,000	$ 17,660,000	$ -	$ 4,415,000	$ 22,075,000		$ 6,181,000	$ -	$ 25,567,404	10
7	EHRC Annual O&M		26.0									$ -			$ -	$ 6,500	$ -		$ -	10
8	New ANS Aeration Equipment								$ 5,100,000		$ 1,275,000	$ 6,375,000	$ -	$ 1,593,750	$ 7,968,750		$ 2,231,250	$ -	$ 9,229,457	10
9	New ANS Return Activated Sludge (RAS) Pumping								$ 3,778,000		$ 944,500	$ 4,722,500	$ -	$ 1,180,625	$ 5,903,125		$ 1,652,875	$ -	$ 6,837,037	10
10	New ANS Final Clarifiers (8 units each @ 155' diameter)								$ 35,041,400		$ 8,760,350	$ 43,801,750	$ -	$ 10,950,438	$ 54,752,188		$ 15,330,613	$ -	$ 63,414,329	10
11	New Effluent Pump Station on ANS (154-MGD firm capacity)								$ 3,865,600		$ 966,400	$ 4,832,000	$ -	$ 1,208,000	$ 6,040,000		$ 1,691,200	$ -	$ 6,995,566	10
12	New 15 MG – Sec. Effluent Equalization Basin w/Aerators								$ 3,608,000		$ 902,000	$ 4,510,000	$ -	$ 1,127,500	$ 5,637,500		$ 1,578,500	$ -	$ 6,529,388	10
13	Add Supplemental Disinfection Process (chlorination /dechlor.)								$ 4,656,000		$ 1,164,000	$ 5,820,000	$ -	$ 1,455,000	$ 7,275,000		$ 2,037,000	$ -	$ 8,425,951	10
14	Yard Piping and Valves								$ 5,752,500		$ 1,438,125	$ 7,190,625	$ -	$ 1,797,656	$ 8,988,281		$ 2,516,719	$ -	$ 10,410,284	10
15	Wet Weather Secondary Annual O&M		9,370.0									$ -	$ -	$ -	$ -	$ 2,342,500	$ -	$ -	$ 27,143,077	10
									$ 159,642,000	$ -	$ 39,910,500	$ 199,552,500	$ -	$ 49,888,125	$ 249,440,625	$ 2,349,000	$ 69,843,375	$ -	$ 316,046,783	
	Belmont AWT																			
1	New Headworks Facility with Screens		300.0						$24,786,950		$ 6,196,738	$ 30,983,688	$ -	$ 7,745,922	$ 38,729,609		$ 10,844,291	$ -	$ 44,856,878	10
2	New Grit Facility w/ Flow Split		300						$5,681,015		$ 1,420,254	$ 7,101,269	$ -	$ 1,775,317	$ 8,876,586		$ 2,485,444	$ -	$ 10,280,918	10
3	New Intermediate Clarifiers								$36,168,000		$ 9,042,000	$ 45,210,000	$ -	$ 11,302,500	$ 56,512,500		$ 15,823,500	$ -	$ 65,453,134	10
4	New Return Sludge Pumping								$9,247,500		$ 2,311,875	$ 11,559,375	$ -	$ 2,889,844	$ 14,449,219		$ 4,045,781	$ -	$ 16,735,176	10
5	Effluent Disinfection - Chlorination/Dechlorination								$8,310,000		$ 2,077,500	$ 10,387,500	$ -	$ 2,596,875	$ 12,984,375		$ 3,635,625	$ -	$ 15,038,585	10
6	Belmont Anaerobic Digestor Facility BE-78-001								**$18,688,000**		**$ 4,672,000**	**$ 23,360,000**	**$ -**	**$ 5,840,000**	**$ 29,200,000**		**$ 8,176,000**	**$ -**	**$ 33,819,624**	**10**
7	Yard Piping and Valves								$7,245,082		$ 1,811,270	$ 9,056,352	$ -	$ 2,264,088	$ 11,320,440		$ 3,169,723	$ -	$ 13,111,405	10
8	Annual O&M		5,690.00									$ -	$ -	$ -	$ -	$ 1,422,500	$ -	$ -	$ 16,482,829	10
					ALTERNATIVE TOTAL				$ 110,126,547	$ -	$ 27,531,637	$ 137,658,183	$ -	$ 34,414,546	$ 172,072,729	$ 1,422,500	$ 48,180,364	$ -	$ 215,778,549	

TOTAL SEWER SEPARATION COST ESTIMATE

CSO Area	CSO Acres	Persons per Acres	Total Sewer Separation Base Cost, Including BMPs *Subtotal* ($)	Site Adjustment ($)	Estimate Contingency (25%)	Engineering, Legal & Administration (25%)	Estimated Capital Cost ($)	Cost per Acre	O&M Cost	Present Worth Cost
Central Sub-Network[1]	1,888	3.8	156,954,000	52,409,820	52,340,955	65,426,193.75	327,130,969	173,294	829,194	336,741,325
Eagle Creek[2]	1,615	3.3	134,239,500	31,400,085	41,409,896	51,762,370.31	258,811,852	160,269	658,396	266,442,662
Fall Creek[1]	13,307	6.4	1,105,941,750	369,277,778	368,804,882	461,006,102.34	2,305,030,512	173,221	5,773,943	2,371,950,507
Pleasant Run[2]	6,718	8.1	558,411,000	130,615,530	172,256,633	215,320,790.63	1,076,603,953	160,245	2,702,876	1,107,930,289
Pogues Run[1]	6,016	8.7	500,008,500	166,955,805	166,741,076	208,426,345.31	1,042,131,727	173,233	2,616,696	1,072,459,230
White River[1]	5,405	6.4	449,220,000	149,997,600	149,804,400	187,255,500.00	936,277,500	173,237	2,352,060	963,537,877
State Ditch[1]	457	2.3	38,024,250	12,698,003	12,680,563	15,850,703.91	79,253,520	173,425	209,500	81,681,627
Total	**35,405**		2,942,799,000	913,354,620	964,038,405	1,205,048,006	**6,025,240,031**	170,179	**15,142,665**	**6,200,743,517**

[1] - Urban Areas

[2] - Suburban Areas

Appendix D-1

Public Outreach Documentation – Pre CSO LTCP Approval

City of Indianapolis CSO Advisory Committee
Minutes of July 24, 2000 Meeting
Prepared by Jodi Perras, 7/31/00

Members Present: Bob Bowen, Merri Anderson, Thomas Cobb, Rachel Cooper, Dennis Charles, Daniel Fugate, Ray Humke, Bruce Jacobs, Gary Koss, Don Murray, John S. Myrland, Mark Sneathen, Kevin Strunk, Rosemary Spalding (temporary representative for environmental groups). **Members Absent:** Rev. David Woodrupp

Welcome: Mayor Peterson welcomed the committee and thanked them for agreeing to serve on the City of Indianapolis CSO Advisory Committee. The committee's role, he said, will be to provide citizen input and advice into the city's decision-making process. The committee will review public comment and the long-term control plan as it is developed. In addition, the Wet Weather Technical Advisory Group will continue to meet and provide the city with more technical advice. The sewage overflow problem needs a long-term solution, and the city is committed to solving it, he said.

Mission: Greta Hawvermale, director of the Department of Public Works and Department of Capital Asset Management, described the committee's mission. The purpose of the committee is to:

1. Review the consultants' report on the city's options for controlling combined sewer overflows and improving water quality in Indianapolis;
2. Review opinions and feedback received from Marion County residents during a three-month public participation process; and
3. Advise the mayor on how the city should proceed in developing a long-term control plan for combined sewer overflows.

Educational Presentation: After committee members introduced themselves, B.J. Bischoff of Crowe Chizek and Jodi Perras of Perras & Associates conducted an educational presentation on combined sewer overflow issues. The presentation described the water quality problems caused by sewage overflows, other sources of pollution in Indianapolis waterways, available options for improving water quality, and some of the technologies used to capture and treat sewage overflows. B.J. and Jodi were to give the same presentation five more times during public meetings throughout Marion County from July 25-31.

Audience Q&A: Following the presentation, the audience raised the following questions and comments:

1. *What's the difference between a reclamation facility and a treatment facility?* A: The primary purpose of the reclamation facility would be to introduce more stream flow to Fall Creek. It would function like a mini treatment plant.
2. *Would it help if residents cleaned gutters on the street?* A: Yes.
3. *Are new septic tanks still being allowed in Marion County?* A: Yes. The Board of Health issues the permit.
4. *Why don't we have a representative on the committee from the near Northside? A vortex separator is being proposed for that neighborhood. It would disrupt the community.* A: The city will look into that request.
5. *All three options involve treating rainwater, which doesn't require treatment. The problem is the sewer system. You're never going to address those sewer systems with this plan. You're going to push it onto the streets when the streets flood..* A: The city has rejected the idea of totally separating its sewers for two reasons. First, it would be very costly and disruptive to the city, requiring virtually every street in the combined sewer area to be dug up. Second, it is not an environmentally effective

option. Stormwater is not clean water. It carries many pollutants. Cities that have separated their sewers are now finding themselves subject to more stringent stormwater requirements.
6. *Why not a 10-year plan?* A: The 20-year schedule is based on the construction capacity of the Indianapolis market. A 10-year plan also could be more expensive, depending on the financing method.
7. *The city should eliminate septic systems and pay for the cost, rather than requiring homeowners to foot the bill.*

Committee Process and Discussion: Following the questions from the public, B.J. and Jodi discussed the committee's process and timeline. B.J. said the committee process will be designed to form consensus. B.J. defined consensus as "everyone can live with the decision and support it publicly." The committee also offered the following suggestions and requests:

1. People don't understand the difference between $840 million and $1.3 billion. To help the public understand the options, we should translate the total costs of each option into sewer user costs per month.
2. It's important to include other watershed issues, and point out there will be other costs beyond fixing CSOs.
3. We should show the percent capture on each stream on a map, to help people understand how each stream would be affected.
4. We should identify industrial sites that cause problems along these streams. However, we need to differentiate between industries violating their permit and industries complying with their permit requirements.
5. Do we have information from other cities and what they've done? Need cost comparisons and a review of types of projects they've installed. Look at Columbus, Ohio, and Dayton, Ohio, as examples of other large cities on small streams.
6. Are there no projects planned along Eagle Creek? Answer: a 9-foot diameter pipe is proposed to carry sewage to the Belmont treatment plant. This would equal 4 overflows per year along Eagle Creek.
7. Need to coordinate White River aeration projects with work already being done on the river banks in that same area. Answer: The city is coordinating with the Corps of Engineers already.
8. How long does the 12-storm option solve the problem? Will we be required to come back later and do more?
9. What about other cities that purchase sewage treatment services from Indianapolis? What impact do they have on the problem?
10. The committee should be given a presentation on the Barrett Law and septic system issues.
11. The city should arrange a tour for the advisory committee of the streams, CSOs and treatment plant in August, after the public input sessions are over. The tour should be scheduled on a Saturday morning, with a second tour scheduled for those who cannot make the first tour.
12. We should add a video of an overflow to the presentation. Could we bring samples of an overflow to these meetings so people can see what it looks like?
13. Could we hold future advisory committee meetings outside the City-County Building, preferably in some of the combined sewer neighborhoods, at facilities with adequate parking?

The city agreed to follow up on issues raised by the advisory committee. The meeting was adjourned.

Next Meeting: Wednesday, August 2, 2:30 – 4:30 p.m., City-County Building, Room 260

City of Indianapolis CSO Advisory Committee
Minutes of Aug. 2, 2000 Meeting
Prepared by Jodi Perras, 8/4/00

Members Present: Merri Anderson, Dennis Charles, Daniel Fugate, Bruce Jacobs, Mark Sneathen, Phyllis Zimmerman, Leon Bates, Roland Dorson (for Chamber of Commerce), Jeff McClain (for Eli Lilly) **Members Absent:** Bob Bowen, Thomas Cobb, Rachel Cooper, Ray Humke, Gary Koss, Kevin Strunk,

Minutes: Committee members received minutes of the July 24 meeting. Any errors or changes should be forwarded to Jodi Perras (perrasjodi@cs.com or fax 841-3946). B.J. Bischoff also passed around a committee membership list and reminded members to submit their resumes or biographies to Sandhya Markand at DPW/DCAM (Fax: 327-4577) as soon as possible.

Report on Public Education Sessions: A series of six public education meetings concluded on Monday evening, July 31. The committee received a list of questions and comments received during the public education sessions, as well as through the website and the telephone hotline since July 11. The questions and comments cover many issues, including cost/financing, using existing sewers for storage, sewer system maintenance and repair, storage tunnels and tanks, treatment plants, stormwater pollution, septic systems, industrial discharges, dam removal/modifications, sewer infiltration/inflow, planning, flood/drainage problems, bacteria, sewer bills, and the proposed Fall Creek reclamation facility. City staff are developing answers to the questions. At least some answers should be posted on the website by Monday, Aug. 7.

In all, 164 people attended the public education sessions. The highest attendance was at the July 24th meeting (54 people). The lowest was on Saturday, July 29 (13 people). Channel 16 taped the July 25 session and has been broadcasting it on its two local government cable stations. Committee members expressed concern about the low attendance and brainstormed ideas for improving turnout at the August meetings. Committee members were encouraged to promote the August input sessions within their personal and professional circles.

Other Cities' CSO Programs: In response to a committee member's request on July 24, Jodi distributed information on eight other cities' CSO programs: Richmond, VA; Lynchburg, VA; Washington, DC; South Bend, IN; Mishawaka, IN; Fort Wayne, IN; San Francisco, CA; and Portland, OR. The information was drawn from June 2000 information compiled by the engineering firm Greeley & Hansen, as well as a November 1994 report from the Association of Metropolitan Sewerage Agencies. (For comparison purposes to the other cities, Indianapolis has 28,000 acres of combined sewers.) Jodi drew attention to three items on the table: level of treatment, per capita costs, and approach.

First, cities have taken different approaches to deciding the appropriate level of treatment. Some have targeted a certain number of overflows per year, others have described their control as a certain size storm. San Francisco developed different goals for different uses of its waterways (highest control for shellfish beds, mid-level control for beaches, less control for shipping areas). Portland had different goals for its two receiving streams, based on their size and ability to handle overflows. Portland also had different goals for summer and winter storms, because people have less contact with the streams during the winter.

Second, per capita costs for controlling sewage overflows in the eight cities generally has been between $1,000 and $1,500. The options described in the Indianapolis report fall in or near the same range.

Third, the "knee-of-the-curve" approach taken by most cities is a cost-benefit analysis that communities may use to determine the cost effectiveness of control alternatives for meeting water quality standards. City staff will prepare a presentation for the committee at a later date on the knee-of-the-curve and how it would be applied to Indianapolis' CSO problem.

Committee members asked what other cities, such as Carmel, Anderson and Muncie, are doing north of us in the White River watershed. Where are they in the planning process? Jodi said of the 106 Indiana communities with CSOs (Carmel is not one, but Anderson and Muncie are), the state has issued 86 permits and these communities are in various stages of CSO control planning. Staff can provide some additional information at a later meeting on other cities upstream of Indianapolis in the White River watershed.

Other questions from committee members included:

What is the current condition of the city's combined sewers? Do the proposed solutions include additional money for rehabbing the sewers? Answer: Greeley & Hansen has studied the conditions of all the sewers in the city. Sewers that were in poor condition have been rehabbed. The proposed solutions do not increase existing sewer maintenance budgets. City staff will prepare a brief synopsis of the Greeley & Hansen study.

If we install inflatable dams in the sewers, if the water backs up enough, the dam will deflate. If we get into large, prolonged storms, we could have CSOs belching pollution in a prolonged way. Is that going to get us where we need to be or want to be? Answer: No. Inflatable dams are a near-term solution and would help capture some sewage, but not enough to meet the goals. We also have to build new storage facilities.

Do we have more information on Chicago and its experience with tunnels? Answer: The information we currently have on Chicago is out of date. We can get you more information at a future meeting.

Other Communities Receiving Wastewater Treatment Services from Indianapolis: Jodi distributed a pie chart showing other communities within and near Marion County that receive sewage treatment services at the two Indianapolis treatment plants. The chart showed that 91.2 percent of the average daily flows at the plants in June 2000 came from the Indianapolis sewage collection system, with the remaining 8.8 percent from other communities. These communities include Greenwood (3.3%), Lawrence (2.9%), the Ben Davis Conservancy District (1.4%), and Beech Grove (1.0%). Other customers include Boone County Utilities near Zionsville, Tri-County Utilities near Martinsville, and haulers disposing of septic tank septage, restaurant grease and special waste. Together, these other customers make up 0.2% of the average daily flows in June 2000. Of all the non-Indianapolis customers, only the Boone County Utilities flows through the combined sewer system. The other communities' flows are transported to Southport via sanitary sewers. Boone County is required under its agreement with the city to build storage that would hold all flows during wet weather.

Optional Tour: Carlton Ray is arranging a committee tour of the Belmont Treatment Plant and CSO-related sites on Saturday, August 26 from 9 a.m. to 1 p.m. The tour will begin at the plant and continue in two city vans to view CSO outfalls, stream segments, a vortex separator, inflatable dam, and storage tank at the Riviera Club. Information about the tour, including directions to the Belmont plant, will be sent out as soon as possible. The plant is located at 2700 S. Belmont, near Raymond & Harding.

A committee member suggested the tour should include a private lift station and package plant serving a trailer park. Staff said there are no package plants in Marion County, but a private lift station could be included in the tour.

Another committee member suggested including a tour of an industrial pretreatment operation as part of the tour. City staff will consider that suggestion.

Future Briefings: In response to suggestions from committee members, staff also are preparing future briefings for the committee on septic systems, industrial pretreatment, and financial issues, including sewer bill issues and federal financial capability tests on the affordability of CSO options.

Meeting Locations: Future meetings will be held in the City-County Building, as originally planned, because the meeting dates and times have been released already. However, committee members may park in the Market Square Arena south garage and the city will cover their parking costs.

Public Input Sessions: B.J. reviewed a draft agenda for the public input sessions, which will begin August 17th. Committee members are encouraged to attend as many input sessions as possible. The facilitators will prepare a report summarizing citizen feedback, but it will be no substitute for attending the meetings and hearing first-hand about citizen concerns. The meetings will begin with a brief review of the problem, the city's goals, and the three strategies, followed by small, facilitated group discussions to gather public input on several key issues:

- What are the sensitive areas along our waterways?
- Do we want a different level of control for White River vs. the tributaries?
- How would you prioritize non-CSO options, such as septic systems, inflow reduction, conservation, etc.?
- What are your preferences and preferred locations for tunnels vs. tanks, fountains vs. artificial waterfall, reclamation facility vs. dam modifications/removals?
- How should the city communicate its progress?

Committee member suggestions included:

- It's important that the public understand this is all part of a long-term solution that goes beyond CSOs.
- There's only so much money the city can spend. How high a priority are CSOs, compared to police, fire, roads? Do we want citizens to rank clean waterways vs. roads? Some committee members were concerned that this question falls outside the mission of the committee.

Other Business: Committee members also discussed the following issues:

- Why not build new treatment plants elsewhere in the county? Don't the interceptors lack capacity to move the sewage to our existing treatment plants?
- We need to ensure accountability of contractors and the city during construction. Pogues Run project missed asbestos during the planning phase and generated dust in the neighborhood. Specs for projects need to be clear. Need to identify potential impacts on neighborhoods, citizen concerns, and have a knowledgeable person at DPW/DCAM to field citizen complaints.
- We should develop public service announcements to demystify the issue and get everyone supporting the same goals. Should the city place more emphasis on the WaterWise education program?

- How do we get citizens to pay attention, provide input, and buy into the solution? Paul Whitmore, DPW/DCAM's new public information officer, will be working on communicating the message and promoting the August meetings.
- Could we develop a cost comparison of a 20-year plan vs. a 10-year or 15-year plan?
- Should we invite the news media on the CSO tour?
- Who will inspect and maintain the tanks and tunnels? Answer: Inspection and maintenance will be required, and was figured into the cost estimates.
- How long will it be before a citizen living along Fall Creek sees a noticeable difference on the stream? Do we ever reach that level? Answer: You'll see a tremendous improvement on the stream segments under any of the options. While you won't be able to swim and wade, you will see noticeable improvements in water quality, fish habitat and aesthetics.

Other Notes: Groups that want a city spokesperson to attend a meeting to talk about CSOs, contact Mona Salem, chief operations officer for DPW, 327-4908. Additional issues booklets are available, including Spanish-language versions. The city also plans to send a video of the educational presentation to neighborhood groups.

Public Comments: Tom Neltner of Improving Kids' Environment suggested the city send a letter to the 400 citizens who attended meetings on the CSO issue last fall. IDEM should have a list of the attendees. He also said the summary of other cities' CSO projects has errors for Fort Wayne and Mishawaka. Also, those cities' CSO plans have not been approved by EPA. Tom said EPA requires cities to consider a 1-storm or less option, yet Indianapolis has not done that. Mona said the 1-storm option is not included in the CSO report, but such an option was considered. Tom said the committee also should understand the use attainability analysis requirement for communities who decide they cannot meet water quality standards and want to alter the designated use of a stream. Jodi said the use attainability analysis concept would be explained to the committee at a later meeting, probably in conjunction with the financial issues briefing.

Christopher Swatts of the Indianapolis Chamber of Commerce asked whether the city had calculated operation and maintenance costs, in addition to capital costs. Also, what type of monitoring will be conducted once projects are put in place? Jodi said Chapter 4 of the report outlines the projected operation and maintenance costs. Chapter 6 provides a framework for compliance monitoring. A more specific compliance monitoring program will be developed as part of the long-term control plan. Chris also suggested the committee should understand Indiana's water quality standards in comparison to other states.

Next Meeting: Monday, August 28, 2:30 – 4:30 p.m., City-County Building, Room 224

Followup Items:

Who	**Task**
Committee	Attend optional tour on Saturday, August 26, 9a.m. – 1 p.m.
Committee	Submit resumes or biographies to Sandhya Markham ASAP
Committee	Attend as many public input sessions as possible in August
All	Promote attendance by citizens at August input sessions
DPW/DCAM	Provide additional information on other CSO communities upstream of Indianapolis
DPW/DCAM	Provide synopsis of Greeley & Hansen study of existing sewer conditions
DPW/DCAM	Provide additional information on Chicago's CSO program
DPW/DCAM	Prepare presentation on knee-of-the-curve cost-benefit analysis
DPW/DCAM	Prepare presentation on state/federal use attainability analysis requirements

DPW/DCAM	Prepare presentations on industrial pretreatment, septic systems and financial issues
DPW/DCAM	Post citizen comments, questions and city's answers on website

City of Indianapolis CSO Advisory Committee
Minutes of Aug. 28, 2000 Meeting
Prepared by Jodi Perras, 8/29/00

Members Present: Merri Anderson, Daniel Fugate, Bruce Jacobs, Mark Sneathen, Phyllis Zimmerman, Leon Bates, John Myrland, Donald Murray, Kevin Strunk, Ray Humke. **Members Absent:** Dennis Charles, Bob Bowen, Thomas Cobb, Rachel Cooper, Gary Koss,

Minutes: Committee members received minutes of the Aug. 2 meeting. One correction was noted: Stu Grauel was in attendance for Ray Humke of IPALCO, who should not have been listed absent. Merri Anderson requested that the minutes be sent in plain text format, since she could not open the attachment to the e-mail last time.

Public Education Sessions: Committee members received a copy of the final summary of the July Public Education sessions, as well as the questions and comments receiving during the first phase of the public participation process, and the city's answers. The questions, comments and answers are posted on the city's website. The committee also received copies of press clippings collected since its last meeting on Aug. 2.

Timeframe, format, and content of CSO Advisory Committee's report to the mayor: Jodi Perras advised the committee that the city would like to begin receiving some key recommendations from them by early October. The key issues are sensitive areas, the level of control, other options for improving water quality, and some suggested projects along each waterway. This will allow the city to prepare a draft long-term control plan, allow public review and comment, and submit a final plan to IDEM and EPA by sometime in January or the first quarter of 2001.

Follow-up Issues: In response to earlier requests, the committee received information on the Chicago CSO tunnel project and the executive summary of a 1996 Greeley and Hansen study of city sewer conditions. The committee also received a Muncie newspaper article about treatment plant and sewer improvements in Muncie, which lies upstream of Indianapolis along the White River. Committee members also asked for:

- information on Noblesville and Speedway CSO projects,
- information on a recent Indiana Association of Cities and Towns meeting on CSO issues,
- a briefing from the Indianapolis Water Company to explain their water withdrawal policies,
- a breakdown of project costs into monthly sewer bill estimates,
- a report on what people pay for cable television service in Marion County, including both basic and expanded services.

Tour Observations: B.J. asked committee members who attended the Aug. 26 tour to discuss things they learned. Leon Bates was pleased to see the level of automation at the wastewater treatment plant. Bruce Jacobs noted the opportunity to see the types of devices considered along the waterways. He also encouraged the city to get staff at the treatment plant involved in the final design, to make sure it will work in the field. Mark Sneathen mentioned the stormwater control project on Pogues Run and suggested the city consider street curbing to release stormwater more slowly to the sewers, as has been done in other cities. Merri Anderson noted the importance of notifying citizens about the impacts of construction projects before they begin. Kevin Strunk asked whether committee members who missed the tour could have a separate tour of the treatment plant. (Yes, contact Carlton Ray at 327-8482.) John Myrland said the tour offered a good overview of the problems and the options. He agreed with suggestions that the city needs a public information campaign, and said the corporate community would support it. Bruce Jacobs said he would like to see further information on the costs and benefits of the different options (inflatable dam, screen, vortex, gates). Merri Anderson asked how much assistance the city receives from the soil and water conservation district. Could we get information on watershed groups and what they are doing to improve water quality?

Public Input Session Summary: The committee received a draft summary of the public input sessions, as well as copies of the facilitator agenda and Powerpoint presentation used during the sessions. The committee then reviewed the key questions asked during the public input sessions and offered their own observations:

1. **What sensitive areas along our streams deserve priority attention?** The draft report identifies the top seven sensitive areas identified by residents at each meeting location, and the percent of total votes cast at each location for those top priorities. The percentages do not reflect the total number of *people* supporting each option, but rather the total number of *votes*. Each person had eight votes to distribute however they wished. Jodi noted that the top three sensitive areas seem to be places where children play or wade, parks, greenways or public areas; and areas with the most severe impacts, such as raw sewage in yards or most serious water quality problems. A number of committee members felt human contact with the streams was the most important concern, especially areas where children come in contact with the water.

2. **What level of control do we want for White River and its tributaries?** Jodi summarized the results from the five public input sessions. Most people who attended the meetings seemed to prefer the 4-storm option for all streams, although people most concerned about cost were willing to choose lesser control on White River than on the neighborhood streams. Committee member questions included:

   - Are there other areas like the Ben Davis Conservancy District, where homeowners pay a sewer fee based on property value instead of water usage? (Issues in this district are somewhat unique. It was formed in the 1970s to provide sewage treatment services to an area then outside the Indianapolis city limits.)
   - How do the overflow targets affect the overall volume of sewage overflows?
   - How would a 4-overflow target on the tributaries improve conditions on White River?
   - What would it cost to achieve less than 4 overflow events per year?

   Committee members also discussed the costs and benefits of greater CSO control on the White River. Some comments and concerns:
   - Surprise that people would be willing to spend an additional $500 million for the 4-storm option, which would provide minimal bacteria benefit along the White River.
   - It’s hard to criticize other sources of bacteria if we’re not willing to clean up our own problem. We need to improve water quality piece by piece.
   - People living along Fall Creek have kids who may be in contact with the stream 6-9 months of the year. They won’t be satisfied with 12 overflows per year.
   - Even with zero overflows per year, we’ll still have public health problems. We should look at a knee-of-the-curve analysis to make sure we are not spending high amounts of money for diminishing returns.
   - We should consider addressing other issues, such as septic systems and stormwater, as part of a watershed-based plan.
   - The city has invested millions of dollars in downtown redevelopment, yet we still have a substandard sewer system that detracts from quality of life and economic development.

3. **What other options do we want to consider to improve water quality?** Jodi noted a lack of clear direction from the public input sessions on septic systems, stormwater, industrial pretreatment, infiltration/inflow reduction, streambank restoration and pollution prevention. The draft report summarizes the public comments receiving at least 5 percent of the vote at the public input sessions. Septic system comments were divided between citizens who wanted the city to accelerate its conversion of septics to sewers, and citizens on septics who didn't want the city to force them to connect to the sewer system. Citizens also expressed concerns about the Barrett Law process and the costs to citizens who are required to connect to sewers. Committee member comments:

   - There's strong disagreement between people on septic systems and people who want septics removed.
   - We need greater public education on these issues.
   - We should fix the sewer system so it can handle more flows before you add 18,000 homes on septic systems or any new developments. CSOs are the starting point.
   - Stormwater is less urgent than CSOs and septics. The city needs new regulations on stormwater drainage.

4. **What are neighborhood concerns along each waterway?** Jodi reviewed some of the neighborhood concerns about specific construction projects, such as tunnels, tanks, aeration facilities and the Fall Creek Reclamation Facility. Committee member comments:

   - The major issue on the Fall Creek Reclamation Facility will be what it looks like when it's finished – how it is designed to blend into the neighborhood.
   - Do we need the Fall Creek facility if we focus on water conservation, especially during peak, predictable times during the summer? What is the cost of the reclamation facility vs. the cost of wellfield replacement to reduce withdrawals?
   - The best incentive for water conservation is increasing sewer bills, since they are tied to water usage.
   - Have we considered the possibility that water usage will decrease when rates increase? Will the sewer rate increases generate enough money to pay for the CSO project?

5. **How can we build community support to clean our waterways?** Committee members were asked to review this section of the report on their own time. They will be asked to make recommendations about these issues at a later date.

Formation of Subcommittees: The committee discussed options for breaking into subcommittees to come up with draft recommendations for the larger group to consider. The subcommittees, their assignments, and members are:

1. **Level of Control and Other Options:** This subcommittee will look at the 12-, 7- and 4-overflow options along each stream, as well as other options such as septics, stormwater, industrial pretreatment, etc. and make recommendations on long-term goals for our waterways. They were asked to consider possible tradeoffs between higher levels of CSO control and other water quality improvements, such as septics/stormwater control. Should Indianapolis pursue a long-term watershed-based plan or focus only on a long-term plan for controlling CSOs? Members: John Myrland of Indianapolis Chamber (chair), Merri Anderson of MCANA, Kevin

Strunk (geologist), Dan Fugate of WESCO, and Don Murray of Eli Lilly. [Members added since the Aug. 28 meeting include Tom Cobb (attorney) and Dennis Charles (financial).]

2. **Sensitive Areas and Construction Issues:** This subcommittee has been asked to develop criteria for prioritizing the construction schedule, as well as looking at different construction options and making recommendations or registering any concerns with the final outcome of those projects (Fall Creek treatment facility, tunnels v. tanks, waterfalls v. fountains, dam removal/modification). Members: Mark Sneathen of RQAW (chair), Leon Bates of Mapleton-Fall Creek, Bruce Jacobs of NESCO, and Phyllis Zimmerman of the Sierra Club. [Additional members include Gary Koss (union) and Stu Grauel (IPALCO).]

The meetings will be public noticed so interested citizens can attend. Jodi will contact committee members who did not attend the meeting and notify the subcommittee chairs of any new members recruited.

Public Comments: Glenn Pratt asked the status of a request for information on the Pogues Run project that was submitted six months ago. Answer: The city is working on the request. He also asked how the septic system issue would be addressed. Answer: That will be addressed by the subcommittee on Level of Control and Other Options.

Next Meeting: Thursday, September 14, 2:30 – 4:30 p.m., City-County Building, Room 224

Followup Items:

Who	**Task**
Committee	Develop recommendations in subcommittees for consideration by full committee
Perras	Contact committee members about subcommittee options, notify chairs
Crowe/Perras	Prepare minutes and distribute
DPW/DCAM	Provide additional information on other CSO communities upstream
DPW/DCAM	Prepare presentation on financial issues, sewer bill impacts
DPW/DCAM	Prepare presentations on industrial pretreatment, septic systems, stormwater
DPW/DCAM	If possible, provide information on:

- Noblesville and Speedway CSO projects,
- Indiana Association of Cities and Towns meeting on CSO issues,
- Indianapolis Water Company water withdrawal policies,
- What people pay for cable television service in Marion County, including both basic and expanded services.
- Costs and benefits of the different options (inflatable dam, screen, vortex, gates).
- Watershed groups and what they are doing to improve water quality
- How do the overflow targets affect the overall volume of sewage overflows?
- How would a 4-overflow target on the tributaries improve conditions on White River?
- What would it cost to achieve less than 4 overflow events per year?

City of Indianapolis CSO Advisory Committee
Minutes of Sept. 14, 2000 Meeting
Prepared by Jodi Perras, 9/15/00

Members Present: Merri Anderson, Daniel Fugate, Bruce Jacobs, Mark Sneathen, Phyllis Zimmerman, Leon Bates, John Myrland, Donald Murray, Kevin Strunk, Stu Grauel, Dennis Charles, Bob Bowen, Thomas Cobb.
Members Absent: Rachel Cooper, Gary Koss.

Minutes: Minutes of the August 28 meeting were received. No corrections were noted.

Estimated Sewer Bills: Jodi Perras presented information on estimated average residential sewer bills that would result from a 20-year plan under the 12-, 7- and 4-storm targets suggested in the consultants' report. Deputy Controller Bart Brown, DPW Chief Financial Officer Larry Lazart and other staff were available to answer the committee's questions.

CSO Plan	*$840 m*	*$1.08 b*	*$1.30 b*
Fees Only	$26.69	$29.21	$31.59
Reduced Cost	$25.57	$27.87	$29.93
Grants Received	$25.96	$28.57	$30.85
Both	$24.83	$27.02	$29.06

The figures represent the average residential bill that would be required to finance the sewage overflow projects and to operate and maintain the city's sewage collection and treatment system. The line labeled "fees only" assumes the entire cost would be financed through sewer user fees under State Revolving Fund loans at 3.5 percent interest. The line labeled "reduced cost" assumes that the city would save money during the life of the project through improvements in technology that would reduce costs over time. The third line, "grants received," assumes the city would receive some assistance in the form of federal or state grants. The fourth line, "both," assumes the city would benefit from both reduced costs and grants.

Comments and questions from committee members:

Q: Do the estimates represent only the costs of fixing sewage overflows? A: No, they include the CSO repair costs as well as wastewater treatment plant improvements, WWTP operation, sewer maintenance, and Barrett Law projects over a 20-year period. In all, the fees would fund up to $2 billion in projects, if the $1.3 billion target is chosen. Barrett Law cost estimates assume the same pace the city is currently pursuing (60 years to complete all conversions). Stormwater improvements are not included in the fees. They would be funded from a different account.

Q: Could the committee receive a year-by-year breakdown, or in 5-year increments, showing the increase in sewer fees and breaking out the sources of funds and categories of expenditures? A: We will try to provide those for the committee's next meeting.

Q: How do industrial fees relate to these residential estimates? A: Industrial users currently contribute $17 million per year in user fees. Residential users contribute $44 million. (NOTE: Answer given during meeting was $54 million. $44 million is the correct figure.)

Q: Why not pay $10 today, invest it, and do some things with it later? Then we can avoid bills going up $13 in one month. A: There are two possible approaches. You could collect more money up front, build up cash reserves, and pay for more projects out of cash. Or you can let the citizens keep their money until the city needs it, and do more bonding for the project. Either way, the city found the same end result – about $31 per month.

Q: Could the city lay out the two scenarios in black and white so the advisory committee could review them? A: Yes.

Q: Could the city separate the CSO expenditures from the normal sewage expenditures? Also, what inflation rate was assumed? A: We will provide that information to the committee.

C: For people on fixed incomes, $10 - $20 is a bigger adjustment. Should we explore some type of means testing?

Q: How did the city determine the rate increase needed each year? A: The rate increase is based on two parameters: not going below $30 million in the bank balance and maintaining 125 percent coverage on bonds. The result was a 7.5 – 10 percent rate increase each year, starting in 2006 and ending in 2020.

Q: Where did the $184 million estimate for the first five years come from? A: Five years is the period in which we have the most certainty. There will be some time needed to receive approval of the long-term control plan from EPA and IDEM. Then, there will be time needed to plan and do engineering work. Costs will go up as construction projects begin. Some construction will occur during the first five years.

Financial Capability Assessment: Mark Westphal of Quandt Inc. presented information on the U.S. Environmental Protection Agency requirements for assessing the financial capability of the community to afford CSO controls. The financial capability assessment takes a two-phased approach: 1) developing a residential indicator (the cost of wastewater treatment and CSO control as a percent of median household income), and 2) developing a permittee financial indicator (based on debt, socioeconomic, and financial conditions in the community).

Residential Indicator: Marion County's adjusted median household income (MHI) is $37,870.65, or about 3 percent below the national adjusted MHI of $39,045.02. The consultants also developed an adjusted MHI for Center Township ($23,714.62, 39 percent below the national MHI). EPA guidance allows permittees to look at the costs of individual communities served by the sewage collection and treatment system. The team developed separate figures for Center Township to illustrate the impacts on the lowest income levels in the community. Based on the projected sewer fees outlined above, the projected cost per household for Marion County residents would range from 0.8 percent to 1 percent of the median household income. Projected costs per household for Center Township residents would range from 1.3 to 1.6 percent of the median household income.

Permittee Financial Indicator: Permittee financial indicators include six factors: bond rating, overall net debt as a percent of full market property value, unemployment rate, local and national MHI levels, property tax revenues as a percent of full market property values, and property tax collection rate. Using benchmarks supplied by EPA, which rate a community on a scale from "strong" to "mid-range" to "weak," both Marion County and Center Township indicators were developed. Marion County received a 2.5 score, which is considered mid-range. Center Township received a 2.33 score, also considered mid-range. However, separate ratings for Center Township were not available for several factors, such as unemployment rate, and property tax collection rate. These numbers might be developed later as part of the long-term control plan.

Financial Capability Matrix: The two indicators are plotted on an EPA matrix, which assesses whether the costs to a community are considered a low burden, medium burden or high burden. For Marion County, monthly sewer bills below $31.56 would be considered a low burden, and between $31.56 and $63 would be considered a medium burden. For Center Township, monthly sewer bills below about $20 would be considered a low burden, and between $20 and $40 would be considered a medium burden. EPA guidance says: "Based on the data across many Federal and State programs, EPA found that for a water bill of less than 1% of median household income per year may not be difficult for the consumer, between 1% and 2% more information is needed, and greater than 2% may be difficult for the consumer."

Committee member questions and comments:

Q: Why single out Center Township? Is the intent to stigmatize the area? If rates are truly going to be a problem for them, we need to look at some ways we could deal with that. A: The intent was not to stigmatize, but to illustrate how the sewer rates would affect the lowest income population in Marion County.

C: Under EPA guidelines, it appears the lowest socioeconomic group could afford $20 per month.

C: Not saying they couldn't afford it, but increasing rates from $10 to $30 in one month is a hardship for people on fixed incomes.

C: Pulling Center Township out was informative. At 1.5% of median household income, Center Township is right on the border of affordability. By showing Center Township, we're considering all the residents of Marion County.

C: Most of the CSOs are in Center Township, but we shouldn't use that as an argument that the rest of the county doesn't want to pay for a Center Township problem. All parts of the county contribute to the problem.

C: Should there be a means test for people on fixed incomes, with abatement from the charges? This would apply throughout the county, not just Center Township.

Public Comments on Financial Capability Assessment:

C: Center Township residents have been paying for projects outside of Center Township for some time now. It's about time Center Township got its due.

Level of Control Subcommittee: John Myrland described the major recommendations of the Level of Control/Other Options Subcommittee. The group felt the city should take a watershed approach to addressing water quality problems. The subcommittee felt the city should move more quickly to convert septic systems to sewers, and also make it easier and more affordable. The subcommittee suggested the city revisit the idea of a stormwater utility to pay for stormwater projects that are needed to improve water quality and drainage problems. Financing should be fair and equitable, taking into account what people can afford and not burdening anyone in the community. The city also should consider improvements in erosion control. On level of control, the subcommittee recommended that projects should be designed to achieve maximum environmental and human health benefits in an affordable and technically sound manner. The city also should develop better information comparing the benefits of sewage overflow controls to stormwater and septic system controls.

Public comment on level of control issues:

C: 20 years is too long. There's no reason this could not be accomplished in eight years if we were determined. I'd be surprised if the feds would consider 20 years. The city should pick up 75% of the costs of converting septic tanks to sewers.

C: If I save ahead to buy something, I don't pay as much in the end as if I buy on a credit card. We should figure out what we want to try to accomplish in meeting water quality criteria, and then figure out the cost. We're doing it backward. We should come up with the best plan that gets the water clean enough so we don't have to be afraid of it. Don't stretch over 20years. Do it now – eight, ten, 71/2 years. Once we get our minds behind it, we can build a whole coliseum in a few years. We don't need 20 years to build a 21st Century sewage collection system.

C: Cost is a factor, but don't get the cart before the horse. Health is the prime factor.

Committee discussion:

C: We should get as much control as we can get. We shouldn't drag it out longer than it needs to be. We may have to come up with a length of time that's practical and affordable to everyone.

Q: Why 20 years? Why not 15 or 10? A: This is a $1 billion program in four major watersheds. To manage the construction projects in a fiscally sound manner, we projected spending $200 - $300 million every five years. That seems reasonable and financially prudent. People have done projects in a shorter period of time, but it can waste money. We want to maximize the benefits without hurrying the project.

C: Atlanta is spending $1.9 billion on transportation over three years. A 20-year plan is too tentative. Do it right the first time. Take the big step.

C: We should look at ways to say yes to doing it quicker rather than reasons to say no and do it over 20 years.

C: The level of control recommendation included here is well-put: "The city should select CSO control targets to achieve maximum environmental and human health benefits in an affordable and technically sound manner."

C: I'd like to see more specifics: 4 overflows or less at such and such cost. This is a good recommendation, but not specific enough.

C: We considered 4 overflows or less, but we didn't know the impact on bacteria if we accelerate the conversion of septics to sewers, especially in light of the diminishing returns on the White River of moving from 7 overflows to 4. Would the citizenry be better served if we had four overflows everywhere else but less on White River? We need more information so we can quantify that. For the most part, we all felt four or fewer was the way to go, but we need better information.

C: I live on the river. Everything that comes down the other creeks, we're affected by. I have a problem with saying seven through my neighborhood and four everywhere else.

C: What can we reasonably accomplish and where can we prioritize? We need more information.

Q: Why 20 years? It can be done in less. A: You can spend more money in 10 years. It's a question of how much you pay for and how fast. With a 20-year plan, you get to the $30 sewer rate slower (in 20 years) and pay for another 20 years. With a 10-year plan, you get there faster (in 10 years) and pay another 20 years beyond that.

Q: Can we get cost figures if we accelerate septic system conversion from 60 years to 10 years and add stormwater improvements?

Sensitive Areas Subcommittee: Mark Sneathen outlined the subcommittee's recommendations. They include taking a watershed approach to prioritization, rather than a CSO-by-CSO approach. They also recommended making sure citizens are informed throughout the project.

Public Comment on the subcommittee recommendations:

Q: Why are greenways higher than streams adjacent to neighborhoods? Greenways don't necessarily involve much water contact by users, while kids are in the water adjacent to neighborhoods.

Committee Discussion on the subcommittee recommendations:

C: Neighborhoods and parks are more important than greenways, but we felt it was impractical to single out one neighborhood or park. We need to look at the whole watershed to deal with the issue, so the greenway was a better fit to ensure a watershed approach.

C: The city needs to do more than notify neighborhood association presidents. They need flyers and door signs or street signs. You need to work with the association, plus a lot more.

C: Rather than the reclamation facility, what about doing something about the Water Company withdrawals? Do they have sufficient plans for the future or sustainable withdrawals?

C: The reclamation facility has greater benefits than just putting water in Fall Creek.

C: The Water Company issue will be placed on the agenda for discussion at the next meeting. A suggestion: The committee could decide the issue is outside the scope of their mission, or they could decide to recommend that the city and the Water Company work to ensure there is a long-term, sustainable plan for managing water withdrawals and drinking water sources.

Next Steps:

Jodi will combine the subcommittee recommendations into one document and send it out to the committee in advance of the next meeting. Committee members should come prepared to discuss any specific changes to the draft and finalize the recommendations.

The city will try to provide financial information in response to the committee's questions prior to the next meeting, if possible.

A tentative agenda for the next meeting will include:

- Financing scenarios
- Timeframe scenarios
- Committee recommendations on Level of Control/Sensitive Areas
- Begin discussing committee recommendations on neighborhood concerns and building community support

Jodi will send a committee roster to committee members, including phone, addresses and e-mails.

Next Meeting: Thursday, October 12, 2:30 – 4:30 p.m., City-County Building, Room 224

Followup Items:

Who	**Task**
Perras	Combine recommendations into one document and send to committee for review and comment
Committee	Review draft recommendations, provide comments, come prepared to discuss and finalize at Oct. 12 meeting.
Crowe/Perras	Prepare minutes and distribute
City	Provide information on different financial and project timeframe scenarios.
Perras	Send committee roster to committee.

WET WEATHER ADVISORY COMMITTEE
MEETING NOTES

September 21, 2000

1. Welcome/Introduction

- Meeting opened at 2:07 pm
- Intro presented by Bill Beranek.
- Bill Beranek discussed the agenda and introduced Robin Garibay of the Advent Group.
- Carlton Ray discussed the role of the Advent Group in the CSO Program.

2. Presentation by Robin Garibay

- Robin stated that the City contacted the Advent Group to review all data and work performed on the CSO program to date.
  - Robin's role was to assimilate the comments made by Advent staff members.
  - She stated that the City has developed a phased approach to the CSO program.
  - DQO (Data Quality Objectives) – Team evaluated if additional data needs to be collected and what that data should be.
- Bill Beranek asked if the City knew why EPA requested specific information in the 308 request. Rosemary Spalding said phone discussions with EPA indicated that the EPA did not have a real basis for requesting specific items.
- Advent reviewed the published data and reports to determine the value and accuracy of the available data and model.
- Robin Garibay said that in order to put together an accurate model you have to first understand the key components to prepare an accurate model – most key component is the flow through the system.
  - Phase I included the CSO Operational Plan which should include the model of the interceptor sewer model.
  - Phase II – CSO Characterization
  - Phase III – CSO Impacts on Watershed
  - Report to Citizens concluded the previous phases
- After reviewing the data and the model, Advent concluded that the information developed supported the conclusions that have been drawn to date.
  - Robin Garibay said that the model is rugged, accurate, and meets the sensitivity checks.
  - Ralph Roper asked if the model is sufficiently constructed to determine how one option is beneficial to the system compared to other options.
  - Robin Garibay said that most critical portion of the model is the hydraulic aspect, which is felt to be very sound.
- Glenn Pratt said the citizens may not view addressing largest discharges as important priority wise when compared to sensitive areas such as neighborhoods on tributaries.
- Robin Garibay discussed the various models which were used in the CSO evaluation

- Robin reiterated that the models and methods used in the CSO study were sound.

3. To be Completed Activities

- John Kupke expressed concern on the sampling/data collection period of time (criteria) used – would not want it to be an unreasonably small period.
- Ralph Roper said need for ammonia renewal at the plant is a concern and must be addressed especially in light of permit limits.
- Robin stated that the City might use additional sources to get flows beyond the USGS gages.
- Ralph Roper asked if the evaluation of the industrial Users (IU's) is to determine who are the "heavy hitters" and where the City should spend money most effectively on work with the Ius to hold discharges during peak flow periods for later release.
- Dick Van Frank asked how long it would take to gather additional data – he feels model should allow selection of most economical/env. solution
- Advent is to develop a Work Plan which is to be completed and submitted to IDEM by October 1st.
- Carlton Ray said LTCP to be completed by early next spring.
- Robin stated that the most critical storm events are likely to occur in the fall with respect to hydraulics.
- General discussion occurred on the detail of data and info to be included in the LTCP vs. the facilities. Plans which will come later. Rosemary Spalding said that the city needs to discuss this issue internally.

4. Next Meeting

- The next meeting is October 10, 2000, 1-3 PM at the DCAM Offices on North Sherman Drive.

WET WEATHER ADVISORY COMMITTEE
MEETING NOTES

October 10, 2000

1. Welcome/Introduction

- Glenn Pratt recommended that everyone obtain a copy of the IDEM guidelines for CSO's mandate that there shall not be any discharges.
- Bill Beranek said that the state guideline now states that there not be "any violation" of WQS.
- Bill Beranek then had everyone introduce themselves.
- John Kupke is concerned that the new state document on the 431 guideline should be evaluated closely to assure that it is a workable document. Bill Beranek suggested that he evaluate the cover sheet for potential conflicts.

2. Purpose of the LTCP

- Bill Beranek stated that we need to determine "what is a LTCP and what should be included in such a document?" He understood that the City was planning to submit in the spring to IDEM and EPA with further sampling continuing through the rest of 2001. Bill believes that the City needs to make a commitment to the regulatory agencies that the City plans to do further evaluation and modification to LTCP over an extended period.
- Dick Van Frank said that the EPA guidance is very clear that the City needs to prepare a LTCP for submittal.
- Mona Salem stated that the City currently has sufficient information to date for the preparation of a LTCP. She said that the affordability does not necessarily drive the LTCP. City is very aware of pollution sources and can use a model to develop an approach to resolve the problems. She said that the City is not going to wait years until additional data is gathered in response to the 308 request and work plan. Mona stated the LTCP would be dynamic and change as data is developed and that the City still needs to do pilot testing for items such as real-time control.
- Bill Beranek agreed with Mona and summarized her statements.
- Dick Van Frank read the requirements in the 308 request regarding preparation of the LTCP and collection of additional data.
- Rosemary Spalding concurred with Mona's interpretation that a LTCP can be prepared at the same time the additional data is gathered for the 308 request.
- Mona stated that the City wants "buy-in" from IDEM & EPA that the direction and work-plan being prepared by the City will be satisfactory for the regulators. She stated that the goal is to look system wide at the problems and determine how those problems can be resolved. She wants the regulators to agree on the tools the City is using and will let the City draw conclusions that are acceptable by the regulators.
- Glenn Pratt expressed concern that once the LTCP is approved, all input from the outside is cutout. Glenn said the LTCP is supposed to be the "best estimate" of what it takes to reach the water quality goals.

- John Kupke expressed a concern that the LTCP will not be specific enough to include information supplied by Citizen's Committee and others.
- Mona Salem said that the City would bring an outline of what will be included in the LTCP to the next WWTAC meeting.
- Merry Anderson said that she respects the WWTAC but as a member of the Citizen's Committee she believes that the citizens are focused on the money and not on the real issues. She thinks that the issues must be kept to the forefront.
- Dick Van Frank said that everything he is hearing is very "fuzzy".
- Rosemary Spalding said the LTCP is the 1st step in an interactive process -- Rosemary believes that our interactive process will allow for both public and regulatory input.
- Glenn Pratt is concerned that the "process" will not move forward.
- Mona Salem said that deadlines will be included in the LTCP and that document will set out the schedule for implementation.
- Bill Beranek recommended that the discussion of these issues be postponed until the outline of the LTCP is made available at the next meeting.
- John Kupke asked if the City knows what they plan to include in the LTCP – Carlton Ray said that the comments received from the WWTAC numbers would be included.
- Ralph Roper said there are some very strategic decisions that will be necessary to put together the LTCP. He said that the best way to verify the validity of the model is to use the model.
- Carlton Ray said that the optimization of the system and the plant is necessary and should be included in the LTCP.
- Mona said these items might be too specific. She stated that she asked the group to perform a GAP analysis of what information is missing from the data developed thus far. Only 3-4 members of the group had submitted final comments on the report.
- John Kupke asked if the concept worked take a system approach.
- Mona Salem said the LTCP would be a "map".
- John Kupke said that he thought that the WWTAC should review a summary of the plan for the LTCP to determine if the City is pursuing a "reasonable approach".

3. <u>308 Work Plan (Robin Garibay)</u>

- Comments have been received from EPA on the work-plan submitted on October 1, 2000.
- Plan includes the to monitoring of 12 additional outfalls (42, 118, 51, 63, 66, 101, 143, 16, 84, 145, 117).
- Ken Crichton asked if sufficient funding is being supplied to the sampling program – where is the cost/benefit break point? Significant discussions by several members of the committee occurred regarding these issues.
- John Kupke asked if the additional data would change the conclusions previously developed. Carlton stated that the additional sampling would support the existing model.
- The City is waiting to better understand the upstream and downstream DO of the six dams. They plan to collect chlorophyll A samples and perform a DO/Aeration study in-stream with samples taken at CSO's 39, 117, 118, 51, 63, 108, 129 (BOD Sampling).

- Robin said that the City will not sample algae at night
- Robin Garibay said that the workplan focuses on sampling needed to meet the 308 request – other sampling is under consideration but will not be indicated in the workplan since the city does not want to be bound to such concurrent sampling.

4. <u>DMY Zoning for Floodplains</u>

- Donna Price is lead DCAM staff person regarding this issue.

City of Indianapolis CSO Advisory Committee
Minutes of Oct. 12, 2000 Meeting
Prepared by Jodi Perras, 10/25/00

Members Present: Merri Anderson, Bruce Jacobs, Mark Sneathen, Phyllis Zimmerman, Leon Bates, Roland Dorson for John Myrland, Donald Murray, Kevin Strunk, Dennis Charles, Bob Bowen, Thomas Cobb. **Members Absent:** Rachel Cooper, Gary Koss, Daniel Fugate, Stu Grauel.

Minutes: Minutes of the September 14 meeting were received. No corrections were noted.

Roles and Responsibilities: To clear up some confusion, Greta Hawvermale, director of DPW/DCAM, reminded the committee of its role and responsibilities. The committee is responsible for reviewing the report and the feedback obtained during the public participation process, and to advise the mayor on how the city should proceed in developing a long-term control plan. The committee has been asked to issue recommendations under the five key questions asked during the public input sessions: 1) What areas deserve priority attention? 2) What level of control do we want for each stream? 3) Should we pursue a broader watershed approach? 4) What are neighborhood concerns before and during construction? 5) How can we build community support for cleaning our waterways? The public participation process was very successful, although the city would have liked greater participation. The city hopes to increase participation as we move forward.

The city also is consulting with the Wet Weather Technical Advisory Committee on technical, engineering and environmental issues. For example, they have been asked to analyze the report for gaps that need to be filled in order to convert it into a long-term control plan. They are reviewing sampling and monitoring plans. They will advise the city on technical issues relating to specific options being considered along each stream. The input from the two advisory groups will help the city develop a long-term control plan by early in 2001. Other groups who play a role in the process include city staff, the public at large, the mayor, City-County Council, and EPA and IDEM.

Once the long-term control plan is submitted to IDEM and EPA, the process will be out of the city's control. The city expects it will have to make adjustments on priorities and funding after receiving comments from IDEM and EPA. The legislative and executive branches of city government will have to work together, with the executive branch presenting projects and the City-County Council approving the funding. In the future, the CSO Advisory Committee may be asked to continue providing a forum for public input and dialogue.

Question: A lot of people are concerned about the city's 20-year timetable. Is it possible that could be shortened?
Answer: Given the commitment of resources and the uncertainties of negotiations with IDEM and EPA, 20 years is a good place to start. In considering the price tag associated with the improvements and how much the market would bear, the city felt 20 years was the most reasonable. EPA and IDEM will look at the fees, overall costs, demographics and timeframe during their review of the plan.

Q: What work would be accomplished in the first five years?
A: The city plans to begin some projects during the first five years. Until we get feedback from EPA and IDEM, we don't know exactly what they will be.

Q: Why wasn't the water company issue placed on the agenda, as promised during the last meeting?
A: There wasn't room on the agenda for this meeting.
Comment: You should make a note at the bottom of the agenda that the topic was tabled.

Q: For the November meeting, is there any legislative agenda the committee needs to be aware of?
A: We will see if Jennifer Simmons, who is coordinating the city's legislative agenda, would be available to brief the committee at its November meeting.

C: In the question, "What areas deserve priority attention," the word "deserve" is troubling. It seems to imply that some areas deserve attention and some don't.
A: We'll look at ways to rephrase the question.

Q: Has the city been forced to cancel some CSO projects under pressure from environmental groups?
A: There are projects on the drawing board that are not going forward. We need to understand how those projects fit in with the long-term control plan. The city decided to step back and look at a number of projects, but none have been canceled.

Q: How many other CSO projects are being constructed right now?
A: The Capital Improvement Plan includes a netting project on Fall Creek, the Pogues Run project and a number of projects proposed for State Revolving Fund funding. Staff can provide specific information to the committee later.

Financial Issues: Deputy City Controller Bart Brown presented three spreadsheets showing projected receipts and disbursements from the Indianapolis Sanitation Liquid Waste Fund under three 20-year scenarios: $1.3 billion, $1.08 billion and $840 million. The spreadsheets included projections for CSO-related construction projects, other sewage-related capital improvements, estimated sewer rate increases required each year, and the average residential bill. The spreadsheets include many assumptions about future costs and revenues, and should not be seen as definite.

Q: Does the DCAM CIP line item include all CSO construction costs each year?
A: No, the DCAM CIP line indicates cash disbursements each year. Some costs will be paid out of bonds. Total construction costs are shown on the second page under "Capital Improvement Program."

Q: Can the city raise the rates of other communities who receive sewage service from Indianapolis?
A: The city has inter-local agreements with those communities. The agreements allow Indianapolis to increase the amount of money it charges those communities. The communities would decide how they would raise sewer rates or other revenue to cover the increased costs.

<u>Process Issues</u>

LTCP and UAA Next Steps: Mona Salem, Chief Operations Officer for the Department of Public Works, said the DPW/DCAM board had approved a contract with Camp, Dresser & McKee on October 11 to develop and finalize the long-term control plan. CDM will be incorporating the comments from the committee and public input, as well as work with the technical committee to address their comments. After the plan is drafted, it will be released for a 30-day public comment hearing. The city will hold a public hearing during the comment period. Then, the plan will be revised and submitted to IDEM and EPA for their approval. CDM also will work on a Use Attainability Analysis, which would collect information to justify a temporary suspension of water quality standards during wet weather events.

EPA 308 Request and Workplan: Carlton Ray said the city has received two requests for information from EPA under Section 308 of the Clean Water Act. This is the information-gathering step EPA takes as it is preparing to take an enforcement action or pursue a consent decree in federal court. The first 308 request asked the city to document the operation of our sewer collection and treatment system since 1995, including CSO and SSO abatement projects and what effect they had to reduce overflows. The second requested additional monitoring of CSO discharge points and sampling of the receiving streams. Robin Garribay of the Advent Group in Virginia and Camp Dresser & McKee have prepared a workplan for additional sampling and monitoring to support both EPA's request and the next phase of CSO control planning. This will allow the city to use the new data for site-specific facility planning, in addition to meeting EPA's needs. The city is now negotiating this workplan with EPA.

Q: Can a committee member receive a copy of the 308 response?

A: The response is contained in many boxes of materials. Citizens are welcome to review the information and request copies of any part of it. The city will provide the committee with copies of the EPA requests.

Future Meetings: Jodi Perras said the November 15 meeting was scheduled to be the last meeting of the advisory committee. The committee's work will officially be over, and committee members are not obligated to continue their participation. However, the city wants committee members to remain informed about the city's progress so they can answer questions they receive from other citizens. We hope to schedule a meeting on the day the draft long-term control plan is released for public comment, or the day after. Committee members also are encouraged to attend the public hearing. The city will inform them of comments received during the public comment period and of changes made to the plan as a result of those comments. The city may also convene future meetings of the committee during negotiations with IDEM and EPA, if public dialogue on the issues is warranted. The city will continue to communicate with the committee via e-mail, fax and mail.

Q: Why isn't the city meeting with IDEM and EPA already, and finding out what they expect?
A: The city is meeting with them regularly, and we have discussed the report and the long-term control plan. They are not clear on exactly what they will expect, and may disagree internally on what they will require.

Draft Recommendations: The committee then discussed the draft recommendations, as prepared by Jodi Perras on September 21. Recommendations revised and approved by the committee are below:

A. Overall Recommendations
1. The long-term control plan should be designed to achieve the greatest benefits to the health of Indianapolis citizens, and also should address the needs identified by citizens and the CSO Advisory Committee, within the constraints of state and federal law. The city should try to complete the overall project in less than 20 years.
2. The city should take a holistic approach to improving water quality in Indianapolis, addressing sewage overflows, septic systems, stormwater and other issues as part of a watershed-based plan. The plan should consider all factors that contribute to contamination, and optimize various pollution reduction projects to achieve the greatest improvement in water quality and human health.
3. Financing for the long-term control plan and other options should be fair and equitable.

B. What areas along our streams should receive priority attention?
1. The tributaries are a higher scheduling priority than White River.
2. The city should place highest scheduling priority on areas where people, especially children, come in contact with a stream. This would include placing the highest priority on stream segments along parks, wading areas used by children, and adjacent to school properties. The next priority is designated greenways, followed by stream segments adjacent to neighborhoods, followed by popular fishing holes.
3. In determining where to start the work, the city should select the watershed where projects would have the most impact for the greatest number of people.
4. In prioritizing the solutions within each watershed, the city should select the most practical and cost effective options first. In other words, begin with solutions that achieve "the biggest bang for our buck." In some instances, the city may want to place a higher priority on eliminating outfalls that are most upstream.
5. The city should address sewage overflows on several fronts at once. For example, if the engineering and construction work necessary to address a heavily contaminated section of a stream is long and involved, the city should pursue planning and engineering on that section while constructing improvements in another location that requires a less complicated solution.
6. The city also should consider the status of projects already underway and work to finish them as quickly as possible.

C. What level of control do we want for White River and its tributaries?

1. The city should select CSO control targets to achieve maximum environmental and human health benefits in an affordable and technically sound manner.
2. The city should develop better information comparing the benefits of sewage overflow controls to stormwater and septic system controls.

D. What other options do we want to consider to improve water quality?

1. The city should accelerate the conversion of septic systems to sewers. At the same time, the city should aggressively seek legislative improvements or other alternatives to the Barrett Law process.
2. The city should revisit the idea of creating a stormwater utility to fund stormwater control projects, but should improve land use and zoning practices to prevent the utility from funding undesirable development.
3. The reclamation facility along Fall Creek is an important solution for cleaning Fall Creek. In developing a strategy for Fall Creek, the city should first select (with citizen input) a location for the reclamation facility that would make the most positive impact on the stream, then determine what storage methods and facilities are needed to supplement the benefits of the reclamation facility, followed by additional processes and practices to improve Fall Creek's water quality.
4. The city should seriously consider the problems that may exist in installing real-time controls in very old sewer pipes that may not be able to handle the pressure from sewage pressing against the pipe walls.
5. In addition to addressing bacteria and dissolved oxygen problems, the city should improve erosion control by enforcing existing laws and programs.

Public Comment

Dick Van Frank of the Audubon Society said: 1) The recommendations should direct the city to select CSO control targets that achieve maximum benefits to the environment. The city needs to meet water quality standards and the requirements of the Clean Water Act. This is in EPA and state policy. The committee should obtain copies of the 308 requests and review them. EPA is explicit about what it will require. 2) He suggested removing recommendation D4, which urges the city to consider problems in installing real-time controls. The city also needs to consider sewer maintenance, plant maintenance and other things. 3) The whole project is affordable to the city. You can afford two times as much as you've allotted. The city should speed up. 4) Will citizens be able to provide public input into the contractor's work? The city may not be meeting the spirit of the public participation requirements.

Ed Paynter said the committee should ensure that any plan specifies which components are dependent for their start or finish on other components. If you have 25 major projects, some can start on day one, some need to wait for others to start or finish. The city should list them and how they fit in relative to each other. What are the criteria for setting the schedule? Is it how much capacity the city has to manage the project, or start-and-stop dependencies among projects?

Glenn Pratt said: 1) The committee should strike the statement on real-time control. Real-time control is one of the most effective, efficient tools the city could use. The recommendation implies real problems. Of course the city will look at potential problems. 2) The committee's focus on watersheds should be increased even more. Public education on fertilizer use and other issues are needed. 3) The timeframe should be accelerated. With good engineers and contractors, it could be completed in six to eight years. Realistically, you might consider eight to ten years. People are willing to pay more now. 4) He also suggested the city should pay for 75% or two-thirds of the septic tank conversion costs, rather than requiring property owners to pay the construction costs.

Pete Drum said the committee should add criteria in recommendations under B to set a priority on areas where activities lead to the most full body contact, such as boating, jet-skiing and water skiing.

Committee Discussion of Public Comments:

C: All are good comments and good concerns. The city should take them into consideration.

C: The city should pay close attention to the comments. We're concerned about where this is heading. The options might not meet the water quality standards we're required to meet.

C: I wouldn't want us to pursue a variance to violate water quality standards.

C: The lowest target we've talked about is four storms. Is that enough?

C: Other cities have been allowed four storms.

C: We should add the following language to A1: "within the constraints of state and federal law." (Committee members agreed. Change noted in the recommendations above.)

The meeting was adjourned.

Next Meeting:
November 15, 2:30 – 4:30 p.m.
City-County Building, Room 107

Action Items:

Committee	Review public input on neighborhood concerns and building community support and be prepared to discuss and finalize recommendations in those areas.
City	Contact Jennifer Simmons about briefing the committee on CSO-related legislative priorities.
City	Provide copies of EPA's 308 requests to committee members.
City	Provide list of CSO-related projects underway or on the drawing board.

WET WEATHER TECHNICAL ADVISORY COMMITTEE
MEETING MINUTES

November 13, 2000

In Attendance:

Committee	City Staff	Legal Consultant
Bill Beranek	Carlton Ray	Rosemary Spaliding
Ken Crichton	Jim Parks	
Pete Drum	Tom White	Technical Consultant
John Kupke	Mona Salem	Robin Garibay
Glenn Pratt	Bob Masbaum	
Ralph Roper	Amanda Mikesell	Interested Party
Dick Van Frank		Bill Harting

1. Introduction

- Bill Beranek had everyone introduce him or herself.
- Dick Van Frank suggested that meeting notices should be sent out as a reminder.

2. Minutes

- Mona Salem said that minutes would be sent out prior to the next meeting so that corrections, comments, clarifications, etc. can be made.
- John Kupke agreed that sending the minutes of the last meeting for review would be very helpful.

3. 308 Request

- Dick Van Frank wants to know the City's response to the 308s.
- Rosemary Spalding said that she previously submitted the City's letter to US EPA to Dick in addition to the draft sampling and analysis work plan.
- Dick Van Frank commented that he has yet to see the letter.
- Mona Salem said that everything is public knowledge. She requested Dick to make a note of what he needs or stop by the City County Building to review the file.
  - ♦ Please contact Sandhya Markand at 327-7868 for information.
- Rosemary Spalding stated that the City has received (3) 308s.
  - ♦ The 1st 308 requests information on past actions.
  - ♦ The 2nd is specific to the LTCP.
  - ♦ Rosemary stated the City's substantive response is the draft work plan to the US EPA.
  - ♦ The 3rd 308 requests information about maximizing treatment at the AWTs during wet weather events.
- Dick Van Frank requested a copy of the 3rd 308.

- Mona Salem clarified the 308 requests:
  - ♦ 1st is existing data
  - ♦ 3rd directly relates to the 1st 308
    *****the City has been asked to summarize specific data in the 308
  - ♦ Therefore, it can be said that (3) is a subset of (1), except in a different format.
- Dick Van Frank said that the LTCP must be done right.
- Bill Beranek suggested that Dick meet with the City.
  - ♦ List of ideas and/or advice about what will be good for the City.
- Dick Van Frank said that he was "flabbergasted" that copies of the 308s were not provided to the Mayor's Advisory Committee.
- Glenn Pratt corrected Dick stating that all members of the Mayor's Committee did receive the 308.
- Bill Beranek said he would meet with Dick after today's meeting to get him on the same page.

4. **<u>Supplemental Flow</u>** (Added to agenda on 11-13-00)

- Pete Drum presented information on E. coli ~~data~~, streamflow, rainfall, BOD, DO, and water temperature collected by the City, NWS, and USGS, and Oxygen Percent Saturation which was calculated from the City's data. His submission concluded with a graph of Percent Saturation vs. rainfall, which Pete suggested at least superficially seems to condrict the output of DO modeling, in that modeling predicts catastrophic sags in DO as a result of heavier rainfalls, while real-world data collected by the City of Indianapolis show no significant effect of heavier rainfall on DO (Percent Saturation), except perhaps to increase DO after storms greater than about 1-inch. He also pointed out that this would be consistant with the fact that rainwater is highly oxygenated, and at some point further rainfall would counteract any DO suppression from a fixed amount of BOD ejected from the sewers.
  - ♦ See handout titled "E.Coli Sampling – White River and Tributaries"
- Ralph Roper suggested that the model is looking at extreme circumstances (low flows in late summer and fall).
- Ken Crichton added that E. coli is only in intestines of warm-blooded animals, but that it had also been shown to increase in catfish.
  - ♦ There should be a good tie between engineering and what we do to the stream.
- Dick Van Frank suggested that an attempt be made to differentiate between E. coli sources of human and animal.
- Robin Garibay stated that Virginia Tech studied a river in which the focus was to target where E. coli was coming from.
  - ♦ They tested dogs, humans, beavers, raccoons, etc.
  - ♦ She said she would email the URL of the Virginia Tech site where this information can be obtained.
    *http://www.novaregion.org/4milerun/bacteria.html

5. **Supplemental Flow Monitoring and Sampling and Analysis Program**

- Robin Garibay stated that the draft sampling program has been submitted to US EPA.
  - ♦ The City has had several discussions with US EPA regarding contents of the program.
  - ♦ The final submittal is Nov. 21, 2000, which will reflect the changes made to the work plan.
- Ralph Roper said that CSO 008 is currently monitored. It should possibly be placed in the above section.
- Dick Van Frank questioned whether or not a 15-minute interval for flow monitoring would capture the first flush.
- Glenn Pratt said it sounded like the City didn't want to spend money.
  - ♦ It is foolish to be cheap up front.
- Ralph Roper suggested a 5-minute sampling interval could be used.
- Robin Garibay stated there would be two (2) time of travel studies completed under low and mean flow conditions.
- Ken Crichton asked who would pick the site.
  - ♦ Robin Garibay stated that the contractor will do it.
- Glenn Pratt questioned why he did not see any ammonia/metals mentioned.
  - ♦ The City is still concerned but EPA does not need that information.
  - ♦ Glenn Pratt would like to see additional outfall sampling.
- Dick Van Frank suggested ammonia and toxicity/metals and additional outfall sampling be done.
- John Kupke expressed concern about the +/-20% DO predicted vs. DO observed for lower oxygen levels. He believes that will be difficult to achieve.
- Robin Garibay discussed objectives 4 and 5:
- Glenn Pratt stated that in addition to the plan, we need to look at how costs will be effected.
- John Kupke asked if there was an industrial component of concern.
- Carlton Ray stated it goes back to the original statement in which all potential pollutants are a concern to the City.
- Robin Garibay stated that there is nothing that implicates that discharge is contributing to parameter concerns in IDEM's 303d.
- Bill Beranek clarified that 7.4 relates to 6.
- Robin Garibay further clarified that the toxicity ranking is merely used to rank CSOs, and that is it.
- Bill Beranek then asked if this would trap us.
- Robin Garibay said that toxic weighting for copper is based on (2) things: human health and aquatic toxicity.
  - ♦ Copper is more toxic than ammonia.
- Ken Crichton said that in the real world it will not just go into one CSO.

- Robin Garibay pointed out that there is a scoring system, in which the toxic weighting factor is normalized to copper.
  - ♦ Robin Garibay then restated that Nov. 21st is when this needs to go back to EPA.
- Dick Van Frank asked why there are attachments.
- Robin Garibay reviewed why those attachments were included and pointed out where they were referenced in the plan.
  - ♦ Attachment 2 is referred to on page 11.
  - ♦ Attachment 3 is referred to on page 12.
- Dick Van Frank then asked if there were revisions to the 1997 CSO Operation Plan.
  - ♦ page 1
- Robin Garibay clarified that is should in fact read differently: "1997 revisions…generated in 1995"

6. **<u>Draft Long Term Control Plan Outline</u>**

- Carlton Ray discussed the draft of the CSO LTCP outline and welcomes comments.
- Glenn Pratt was curious about how septic was to be handled.
- Carlton Ray said that was discussed in 2.6.
- Bill Beranek suggested that there are general things missing from the outline, such as specifying what the examples are.
- Mona Salem discussed 3.3-3.6.
  - ♦ Adding 3.7 as "others" to address these issues
- Ralph Roper brought up section 7 (Financial). He discussed whether industry will pay an disproportional amount in the proposed sewer line increase.
- Mona Salem reconfirmed that the LTCP needs to be dynamic, and sewer rates have not been increased in some time.
- Glenn Pratt and Ralph Roper suggested that proposed sewer rates (particularly volume vs. loadings) must be laid out in the LTCP and state why these costs exist.
- Dick Van Frank said that 6.6 and 8.4 are saying the same thing.
- Mona Salem clarified that 6.6 briefly mentions the idea while it goes into further detail in 8.4.
- Bill Beranek said that additional comments need to be submitted to Carlton by Nov. 17th.
- Dick Van Frank pointed out that we need to be consistent with EPA.
- It was then discussed how the committee should look at the plan, section by section or as an entire document.
- Mona Salem said that they would come back with a more detailed outline of the LTCP for the Dec. 12th meeting.

7. **<u>Discussion of Possible Near-Term CSO Projects</u>**

- PER 3 (See Handout)
- Mona Salem said that the City is ready to go out with these projects.
- Mona Salem said that this list of projects have not been submitted to EPA because the City wanted this committee's input as well as the public's input.
- Carlton Ray discussed each of the projects in detail.
- Dick Van Frank suggested that the committee be made aware of the public meetings that way support could be generated.
- Glenn Pratt asked about the status of the wetlands project by the fairgrounds.
- Bob Masbaum noted that environmental sampling would soon be underway.

8. **TMDL** (Added to agenda 11-13-00)

- Due to the length of the meeting, this item was postponed until the next meeting to be held on Dec. 12th.
- Glenn Pratt did say that the State's TMDL committee work will be completed in December.
- Mona Salem added that the City thinks that TMDLs are a good idea.

City of Indianapolis Combined Sewer Overflow Advisory Committee
REVISED Minutes of Nov. 15, 2000 Meeting
(Revisions to previous minutes noted below in *italics*)
Prepared by Jodi Perras, 2/6/01

Members Present: Merri Anderson, Bruce Jacobs, Mark Sneathen, Phyllis Zimmerman, Leon Bates, John Myrland, Donald Murray, Kevin Strunk, Bob Bowen, Thomas Cobb. **Members Absent:** Rachel Cooper, Gary Koss, Daniel Fugate, Stu Grauel, Dennis Charles.

Minutes: Minutes of the October 12 meeting were received. No corrections were noted.

Water Company/Water Conservation: The committee discussed low flow issues on Fall Creek and related water withdrawals by the Indianapolis Water Company. Some committee members suggested the city might want to begin a community discussion on water conservation or the use of surface water for drinking water. Other committee members agreed that water conservation and water usage were important issues, but they should not distract from the need to remedy the sewage overflow problem. Committee members agreed not to make an official recommendation on the issue.

Legislative Briefing: Jennifer Simmons, the mayor's liaison to the Indiana General Assembly, was unable to attend the meeting. She told Jodi Perras that she knows of two possible pieces of legislation related to CSO issues. The Indiana Association of Cities and Towns may propose legislation to increase State Revolving Fund money to pay for CSO projects. Sen. Beverly Gard is developing legislation related to septic systems, which was the subject of a summer study committee. The legislation may address issues related to the committee's recommendations on the Barrett Law.

EPA 308 Request: Mona Salem, chief operating officer for DPW, briefed the committee on two EPA requests for information under Section 308 of the Clean Water Act (308 requests). The first request, sent May 12, asked for background information and existing data on CSOs and sanitary sewer overflows. The city sent several boxes of information to EPA. Recently, EPA asked the city to summarize some of the information in tabular form. The city is summarizing that information now.

The second request, sent May 26, asked for data that does not exist. The city has negotiated a workplan to gather the data that EPA has requested. EPA has approved the workplan. Other items requested in the May 26 letter will be addressed in the long-term control plan.

Questions from Committee Members:

Q: How did the city respond to EPA's request for an outfall-by-outfall account of "each date since January 1, 1995, that pollutants were discharged from the particular location, the duration and volume of the discharge, and the reason for the discharge?"
A: The city provided a workplan for sampling specific CSO outfalls, but not all. EPA has backed off on some of its requests that the city was unable to answer.

Q: How did the city choose which outfalls to sample in the workplan?
A: The city used standard statistical methods.

Q: What happens next?
A: EPA has preliminarily approved the sampling workplan. It will be sent to them officially on Nov. 21. The city plans to turn the workplan into a scope of work and send it out for bids, with the goal of contracting with a firm to do the sampling.

Recommendations: The committee discussed recommendations involving neighborhood concerns and building community support. Draft recommendations are listed below. These recommendations still need to be reviewed and approved by committee members:

E. What are neighborhood concerns along each waterway?

1. The city should hold public meetings in neighborhoods to get input from citizens and business owners who will be affected by construction projects. Before setting meeting dates, the city should contact neighborhood associations to avoid conflicts with other meetings or events that will attract many neighborhood citizens. When practical, use existing neighborhood association meetings to keep citizens informed.
2. After meeting dates are established, the city should use flyers, door hangers, street signs, the news media, and other methods to announce the location, time and topic of the meeting at least two weeks in advance. The city also should notify neighborhood association presidents, City-County Councilors, and ward and precinct committee chairs via postcard or e-mail, four to six weeks in advance, if possible.
3. During facility planning, the city should present options to the neighborhood; be prepared to explain the costs and benefits; be honest about any drawbacks; and provide opportunities for citizens to see similar facilities already built elsewhere.
4. During construction, the city should provide a mechanism to raise issues and problems, such as providing a contact name and phone number or creating an advisory committee that includes the contractor, city and community representatives. The city should work to maintain access to businesses and institutions, minimize disruption, and keep the neighborhood informed throughout the project.
5. Any new facilities or structures must be "neighborhood friendly." Specifically, they should look attractive, blend into the neighborhood, minimize odors, and limit noise and lighting. Before introducing an idea to a neighborhood, city staff should ask, "Would we want this facility/structure next to our house?"

F. How can we build community support to clean our waterways?

1. The city should develop an aggressive marketing campaign designed to build public confidence through ongoing, timely and accurate information about the CSO project. The campaign could include a website, speakers bureau, partnerships with radio and television stations, public education materials, public service announcements and other marketing tools.

2. The project needs a carefully designed message identifying sewage overflows as a serious problem that we all share, with affordable solutions that have broad community support. The campaign should communicate the impact on sewer user fees, including comparing Indianapolis's rates to other cities' rates. The campaign also should identify things individuals can do to reduce sewage overflows.

3. During implementation, the city should work with the business community, Marion County Health Department and others to raise awareness of sewage overflow issues and link the project's benefits to improved economic development and quality of life.

CSO Projects: Mona Salem and Carlton Ray described six CSO projects the city hopes to pursue in the near future, after consultation with citizens and EPA's approval. These projects are located in different watersheds and are designed to test technologies or address sewage overflows consistent with the goals of the long-term control plan. The projects include modifications to Lift Station 507 near the White River at 56th Street, the first phase of a city-wide real-time control project, consolidation of CSOs 034 and 035 on Pogues Run, an in-line storage project at CSO 101 along Pogues Run in Brookside Park, construction of a 2 million gallon storage tank in conjunction with the White River

Waterfront project, and an inflatable dam project at three CSOs along Fall Creek between 32nd and 34th streets. The city is planning a public meeting to discuss the project details. The committee suggested that the city work closely with neighborhoods affected by these projects to gather their input and address concerns before the projects are finalized.

Public Comments:

C: Baseflow on Fall Creek is germane to meeting water quality standards. The city should compare the costs of finding a new water supply with the cost of a new water reclamation facility. It is within the purpose of the committee to recommend a shorter implementation schedule. The city has not learned much from the Pogues Run project.

C: The city should review plans to multiply industrial rates, which are based on both volume and concentration. The city should help industry install systems to prevent discharges during storm events. The city could implement the project in 6-10 years and increase fees more quickly. The state will perform a watershed evaluation next year. The city's sampling and modeling should be used in that evaluation. The city should address septic systems at the same time as CSOs. The city should do monitoring for toxics along Pogues Run.

Rates: Committee member Bob Bowen presented a spreadsheet with an alternative sewer rate schedule for the city to consider. *Don Murray discussed the industrial impact of the proposed sewer rate increase. It was recommended that the city examine the cost impact/affordability on industrial and commercial interests, as was done on the residential side. The point was made that if industrial rates are doubled or tripled, industry may pursue more economical treatment alternatives rather than using the city system. This could reduce the projected revenue stream for the CSO project, and thus spread the cost impacts on the remaining users.*

Future Role: Committee members asked about future meetings. Could the committee present their final recommendations to the mayor in person? Committee members also asked about their role during City-County Council hearings on the sewer rate increase or the CSO project. The committee asked for some direction from either Greta Hawvermale or the mayor on their role during council meetings.

The meeting was adjourned.

WET WEATHER TECHNICAL ADVISORY COMMITTEE
MEETING MINUTES

December 12, 2000

In Attendance:

Committee	City Staff	Legal Consultant
Bill Beranek	Carlton Ray	Rosemary Spalding
Pete Drum	Jim Parks	
John Kupke	Tom White	
Glenn Pratt	Mona Salem	
Ralph Roper	Amanda Mikesell	
Chris Swatts		
Dick Van Frank		

Absent:

Committee
Merri Anderson
Eli Bloom
Beulah Coughenour
Ken Crichton
Jeff Frey

1. **Introduction**

- Bill Beranek had everyone introduce themselves.
- Changes:
  - Chris Swatts resigned his position at the Chamber of Commerce, and Sue McCaffrey will be the Chamber's representative.
  - Jeffrey Frey replaced Charlie Crawford as the USGS representative.

2. **Minutes**

- Dick Van Frank said that "the minutes should be better stated and reflect the meeting more".
  - He directed everyone's attention to section 4 "Supplemental Flow" specifically comments made by Ralph Roper and Ken Crichton (bullets two and three respectively).
  - More specifically, Dick said that it should read "Ralph Roper said rerun model using Pete Drum's data for E. coli to see how they match," and he would like that accurately stated. Bill Beranek noted the discrepancy and said that it would be done.

3, **TMDL Update**

- Glenn Pratt was unsure of what TMDL update the WWTAC wanted, Fall Creek/Pleasant Run, Kokomo Creek/IDEM, Sierra Club.
- IDEM is planning to complete TMDLs for Fall Creek and Pleasant Run. The TMDLs were reportedly to be completed this month.
- Glenn Pratt stated that there was no E. coli TMDLs developed for Kokomo Creek, only DO and ammonia
- Dick Van Frank said that Kokomo Creek had failing septic tanks.
- Glenn Pratt suggested that this was an opportunity for the City to receive money from the State as well as show that the City has an excellent model.
  - Indianapolis would lead the State.
- Dick Van Frank stated that Fall Creek TMDL should go up to Geist Dam.
- Carlton Ray added that the City's Water Quality model go to Geist.
- Glenn Pratt noted that it would be cheaper for IDEM to give money to the City, and he has far more confidence in the City's contractor than the State's in terms of developing a model.
- Bill Beranek questioned how to "marry" the LTCP for Fall Creek with the TMDLs.
  - Bill Beranek confirmed that Tim Method/Matt Rueff said they would work with the City.
- Mona Salem agreed. Mona continued by saying she had a meeting in Washington, D.C. to pursue US Army Corp (USACE) grant money for watershed work on the Upper White River.
  - USACE is looking to do more watershed planning/funding.
- Glenn Pratt mentioned that this would be a chance for Indiana to be a model.
  - He also mentioned the Sierra Club meeting stating that all States are in trouble for TMDLs and some cities are being sued.
  - Glenn Pratt recommended the City continue to take a leadership role.
- Mona Salem added that the City needs to develop a program and/or draft a proposal saying what will be accomplished and by whom.
- Glenn Pratt noted that the IDEM should be rushing to get the paperwork done.
- Mona Salem agrees. She continued by saying that Greta Hawvermale, staff, and herself agree with this approach. In addition, the State must get something in writing.
- Dick Van Frank stated the City is likely to develop TMDLs right, while the State's present course is lacking.
- Ralph Roper questioned who the primary players were when developing TMDLs…IDEM staff, USGS, and ISDH? Also, is there agreed protocol?
- Bill Beranek noted that legislation is established.
- Glenn Pratt mentioned that the issue of how one gets listed and unlisted must be acknowledged instead of bringing forth other interests in front of IDEM.
- Mona Salem stated that the State went out for RFQ's for developing TMDLs.

- Dick Van Frank suggested going through guidance.
- Rosemary Spalding said that she would be surprised if there were no guidelines for protocol.
- Bill Beranek wondered how much this would cost. $20,000 or $20 million?
- Carlton Ray added that we need to get the stakeholders together.
- John Kupke raised the question of a wet weather TMDL. He also questioned if Kokomo Creek did dry weather as well as wet weather.
- Glenn Pratt said no. Glenn noted there are three sets of data.
- Dick Van Frank noted high stream flow/low stream flow
  - Concept in dry weather TMDL…wet weather is different.
- John Kupke asked Mona what the City was looking at? Different people are doing different things to the samples.
- Jim Parks wondered what the cost for the TMDL for Kokomo Creek was.
- Dick Van Frank said that it was worth $3.75.

4. **CSO LTCP Update**

- Carlton Ray reviewed the detailed outline of the LTCP. The following comments were made and recommended as Carlton reviewed the detailed outline.
- Dick Van Frank said that "Basins" should be more specific (Section 2.0).
  - He questioned what happened to Pogues Run?
  - Dick also wanted a clarification on what was meant by "Bacteria Problems" (2.3.1)… E. Coli or other?
- Carlton Ray said that Pogues Run was accidentally left out in the table of contents and Bean Creek is with Pleasant Run.
- Bill Beranek brought up E. coli being used as an indicator to detect pathogens. It was also mentioned that some publications seem to be pointing to E. coli as the problem when other pathogens are present.
  - Bill also suggested that in 2.2.2 (Urbanization) to discuss agriculture use in Marion County as well.
- Dick Van Frank questioned why Mercury and PCBs (2.3.3) is not a subset of "Metals and Organics" (2.3.4).
- Carlton Ray said, Mercury and PCBs need it be specifically discussed but will review with consultants.
- Glenn Pratt wants endocrine disruption included as well.
- Bill Beranek brought up salts particularly to the AWTs.
- John Kupke mentioned that we should be focusing on the CSO-LTCP and other related water quality issues holistically.
- Ralph Roper said that was an excellent point and suggested that a section on "Other" be included. [Section 2.6 Non CSO Sources]

- Carlton Ray added that ammonia is discussed under 2.3.6 (Wet Weather Impacts on Water Quality).
- Bill Beranek stated he felt that the organization of the report does not matter as long as items are mentioned, i.e. pesticides, etc.
- Glenn Pratt said that urban runoff would need to be examined as well.
- Glenn Pratt said that the LTCP was being looked at holistically.
- Ralph Roper drew the group's attention to 2.6 (Non-CSO Pollution Sources).
- Pete Drum suggested that two items were missing: odor and aesthetics (trash, floatables, etc.) and requested that these items be addressed in the LTCP.
- Glenn Pratt noted that the stream banks need to be restored and must be addressed in the CSO LTCP.
- Bill Beranek urged that sediments be included as well (with odor and appearance).
- Ralph Roper wanted to know if the LTCP followed U.S. EPA chapters adding that chapter numbers might be helpful in locating specific items.
- Carlton Ray said yes, plus IDEM draft guidance document.
- Glenn Pratt asked what the status of the permit was.
- Mona Salem started by saying that the City has not received the permits and doesn't know when IDEM will issue the permits.
- Bill Beranek said that we need to call out Southern Avenue diversion structure.
- Carlton Ray noted that a detailed description of the model and how it was developed chronology was located in section 2.5.
- Mona Salem asked where we would be referencing the Work Plan.
- Carlton Ray stated that it would be included as a reference.
- Dick Van Frank suggested that "leaching" be changed to "failed" in 2.6.2.
    - Another suggestion was to leave off the first word changing it to Septic System then have "failed" as a subset.
- Bill Beranek stated he recommended that the word "Illicit" in 2.6.3 should be removed.
- Mona Salem brought up wording such as unauthorized vs. illegal.
- Bill Beranek wants to know what the meaning behind "Effects of Urbanization" (2.6.4) is.
- John Kupke asked the sources of bacteria problems.
    - How much is from animals? Urban storm water? Septic tanks?
- Bill Beranek questioned what "Sediment Oxygen" (2.6.6) was, then suggested it be moved to 2.3.
    - It was concluded that 2.6.6 would probable be moved to 2.3, and be listed as problems then sources of those problems.
- Ralph Roper would like watershed added somewhere in the document.
- Bill Beranek also suggested that "Upstream of Marion County" be added.

- Carlton Ray said that there was the possibility of adding another subset.
- Pete Drum suggested that the focus needs to shift from only water intakes in Marion County to water intakes upstream of Marion County.
- Bill Beranek suggested adding 2.7 (Industrial Impacts on Water Quality) to 2.6 (Non-CSO Pollution Sources).
- Dick Van Frank questioned what 3.2.1 means.
- Carlton Ray said that it is referring to how to evaluate.
- Carlton Ray continued with the outline.
- Dick Van Frank said that there needs to be a section on monitoring base flow.
- John Kupke suggested adding several pictures of the dam and CSOs to the LTCP for clarification purposes.
- Carlton Ray continued with industry (Section 4).
- Dick Van Frank asked what the point of section 4.4 is, and how 4.4.1 and 4.4.2 fit under 4.4.
- Carlton Ray suggested that it can be modified.
- Bill Beranek added that it is being called out because it highlights for U.S. EPA what we are already doing.
- Carlton Ray stated that it might be wise to put in a new 4.7.
- Jim Parks had one suggestion that 4.4 be moved to 4.7 and move everything up.
- Ralph Roper suggested that basic kinds of considerations need to be tied and/or linked together.
- John Kupke stated that there are three concepts: (1) design criteria, (2) list options, and (3) mix and match.
- Mona Salem added that Section 4 lays out the method for arriving at plan in Section 6. This is a method, then, as a result, these are the recommendations.
    - The results of the analysis will be in Section 6.
- Dick Van Frank added that potential mine was left out.
    - Jim Parks noted that it was under White River in Section 4.6.1.
- John Kupke brought up Section 8 (Use Attainability Analysis).
- Rosemary Spalding suggested that before recommendations we need to have UAA/affordability.
- Dick Van Frank did not agree with this. He stated that we need to put down what is needed to meet Water Quality Standards (WQS).
- Rosemary Spalding noted that U.S. EPA often wants zero discharge, therefore, any CSO will cause WQS violations. Other sources exceed WQS as well, but any CSO will contribute to violation of WQS.
- Dick Van Frank asked about the term “naturally occurring fecal matter”.
- Rosemary Spalding added that the water quality data shows that even without overflows Indianapolis does not meet WQS criteria.

- Carlton Ray asked everyone to get comments to him in the next few days regarding this.
- Dick Van Frank questioned 7.4.
  - Dick continued by stating that EPA is very specific when it says total area.
- Carlton Ray continued on with Section 8.
- John Kupke stated that it would be very beneficial to include an Executive Summary.
- Bill Beranek would like the statute number to be included in 8.1.3 instead if Senate Enrolled Act 431.
  - Bill concluded by saying that on behalf of the group, the outline looked good.

5. **<u>Meeting Dates for Next Year</u>**

- It was decided that the meeting times for next year would move from 1pm to 1:30pm on the second Tuesday of the month.
- The dates for 2001 are as follows:
  - January 9th
  - February 13th
  - March 13th
  - April 10th
  - June 12th
  - August 14th
  - October 9th
  - December 11th

6. **<u>308 Update</u>**

- Rosemary Spalding discussed the opportunity for WWTAC to provide input for supplemental/environmental projects in lieu of fines or penalties that the City could potentially pay because of violations of the City's NPDES permit.
  - Rather see money go toward public health, than for fines or penalties leveled by USEPA.
  - Criteria for money:
    (1) Must be a new project, not an existing project.
    (2) No educational programs because they are already funded.
  - Some examples could be stream bank restoration, septics, greenways, etc.
- Plan on brainstorming at the next meeting then prioritize them in how and/or what the City wants to see accomplished.
- Dick Van Frank asked Rosemary to send the URL in order to read the policy regarding this issue.

- Rosemary Spalding said she would email Carlton since he has the email addresses of the entire committee.
  - **URL: http://es.epa.gov/oeca/sep/sepfinal.html**
- Rosemary Spalding added that there was no reason why ideas couldn't be pulled from the LTCP outline.
  - If people have any questions, call Rosemary at 375-0448.
- John Kupke wondered if there was any idea of how much money was at stake.
  - Rosemary stated that the amount could be at least 7 figures, but no exact amount.
- Rosemary Spalding stated that the higher the quality, the better off the chances would be of receiving authorization from USEPA to implement project instead of penalties.
- John Kupke said that the goal should be to minimize the penalty then maximize the benefits to the City.
- Mona Salem offered the example of septic tank improvements.
- Glenn Pratt stated that this would benefit the area as well as being a great Public Relations opportunity.
- Chris Swatts wondered about the timeline for this.
- Rosemary Spalding said that she is waiting for EPA to get back to her. Moreover, she noted that this is not something that will occur overnight but in the near future.

7. **<u>E. coli and Urban Watershed</u>**

- Due to time constraints, E. coli will be discussed at the next meeting to be held January 9th, 2001 at 604 N. Sherman Dr.

8. **<u>Adjourn</u>**

- Mona Salem thanked everyone for a good year and their support with the committee.
- Bill Beranek adjourned the meeting.

WET WEATHER TECHNICAL ADVISORY COMMITTEE
MEETING SUMMARY

January 9, 2001

In Attendance:

Committee	City Staff	Consultants
Merri Anderson	Amanda Mikesell	Rosemary Spalding
Bill Beranek	Jim Parks	George Pendygraft
Eli Bloom	Carlton Ray	
Beulah Coughenour	Paul Werderitch	
Pete Drum	Tom White	
Jeff Frey		
John Kupke		
Glenn Pratt		
Ralph Roper		
Dick Van Frank		

Absent:

Committee
Ken Crichton

1. **Introduction**

- Bill Beranek had everyone introduce him or herself.
- Dick Van Frank and Glenn Pratt recommended attending the "Hoosier Health: Sewage in Our Streams" conference at the Indianapolis Children's Museum on January 19, 2001 (see handout).

2. **Minutes**

- John Kupke mentioned that it would be better if the minutes would consist on an introduction/conclusion paragraph creating a 2-page summary of what occurs during the meeting. The more detailed minutes could be supplemental information for those interested individuals.
- Bill Beranek will work with Amanda Mikesell to make this transition.
- Corrections:
  - Page 3 - John Kupke pointed out that Bill Beranek's comment on E. coli was incorrectly recorded. It should have been as follows: E. coli is targeted not because it causes diseases (although in unusual circumstances it may) but rather because it is the best indicator we have of the potential for the presence of pathogenic organisms from human waste. It is its role as an indicator that must be emphasized throughout the design and public communication of the project.
- In light of the fact that the minutes from the Dec. 12th, 2000 meeting were not presented for review until Jan. 8th, Glenn Pratt suggested the committee have

extra time to review them. All changes and/or additions will be sent to Amanda.

3. **Supplemental Environmental Projects**

- Rosemary Spalding led the discussion on supplemental environmental projects (SEPs) that are allowed by EPA for penalty in an enforcement action instead of cash fines paid to EPA (see "EPA Supplemental Environmental Projects Policy" handouts). These supplemental projects are good because the money will benefit the community verses cash penalties. The City has received three 308 EPA requests, one of which was for enforcement of past violations. These violations include:
  - Dry weather discharges
  - By-passes at the Belmont AWT when flow is not maximized through the treatment plant
  - CSO Outfalls not listed in the 1985 NPDES permit
- Rosemary noted that before we can enter into an agreement for a supplemental environmental projects with EPA, the projects MUST be negotiated with US EPA and IDEM and finalized. The group then brainstormed for potential project ideas:
  - Fall Creek stream restoration/sediment removal and volume enhancement
  - Fish restock in White River; have fish exchange in which safe fish will be traded for contaminated ones
  - Fountain in Fall Creek at Meridian St. for oxygen supplement
  - Solids management (reduce sludge loadings)
  - Develop a wetlands/park downstream from Belmont plant
  - Develop a Greenway from the master plan
  - Create a park at 21st and Sherman
  - Add and develop more riparian corridor along tributaries and White River
  - Build park/nature center
  - Get neighborhoods involved allowing citizens to take ownership and empower the community
  - Dam improvement – remove Boulevard Place Dam on Fall Creek; modify Stout Dam
  - Enhance illegal dumping and cleanup projects of surrounding areas of White River
  - Paint exchange (make it publicly known)
  - Develop a comprehensive adopt-a-stream program with churches and schools
  - Expand items to be recycled (only 2 recycle bins in CSO areas)
  - Accelerated septic system (extension of sewer) improvements
- A great deal of discussion centered around the need for a **Storm Water Utility**. A special meeting has been set up specifically to discuss and listen to

presentation on Storm Water Utility. The meeting is scheduled for **Tuesday, January 23rd at 2:30pm at 604 N. Sherman**. The meeting should only take about an hour.

4. **CSO LTCP Update**

- Carlton Ray led the discussion about the CSO LTCP. At one time, it was said that one of the Mayor's people would advise him on this important issue, and Merri Anderson questioned if that idea was just for show or if the Citizens Advisory Committee would be able to sit down and speak to the Mayor. Carlton said he would discuss the suggestions with his superiors.
- Discussion then moved to industry (see handout on Objective 4 and 5). The question what is quality of data for study on industrial discharge aggregated for was brought up; as well as why the use of national averages instead of actual data. Carlton explained that actual data provided by Tim Heider was used. Several individuals questioned the data and/or process in which it was collected. Bill stated that there must be some kind of miscommunication and that he would work with Carlton and Tim to assist in sorting this matter out, which many people agreed was a good idea.
- Carlton then briefly mentioned two other handouts: a map of Lift Station 521 and CSO 103, which was originally listed as a SSO instead of a CSO in the 1985 NPDES permit; and Indianapolis AWT Treatment Process Flow Chart for both Belmont and Southport. In addition, he added that the City has a draft NPDES permit that substantially reduce year round ammonia limits that has an ammonia limit that was derived by IDEM using old Federal criteria. Furthermore, there is the potential to save a great deal of money if the newer Federal criteria for ammonia is used. Ralph Roper has been brought aboard to assist the City with this matter.
- Ralph gave an overview of a project nearing completion that addresses several aspects of how to eliminate wet-weather overflows of primary effluent at the Belmont AWT plant. This work was undertaken to further develop some of the concepts identified in the June 28th, 2000 Indianapolis CSO report and to provide assistance to the CSO project team's development of the 'long-term control plan." The principal investigators for this work are Dave Hackworth of WREP and Dr. Roper (serving as a sub-consultant). The project was initiated in mid-October 2000 and Jim Parks (DPW) and Andy Miller (Greeley and Hansen) are providing interfacing with the CSO abatement team.
    - The project was subdivided into the following four components with a task report prepared for each:
      1. Review of existing Belmont AWT facility
      2. Analysis of Wet-Weather Treatment Options
      3. Analysis of Effluent Treatment Requirements
      4. Storage versus Treatment Considerations
- The purpose of the first task was to provide the "groundwork" for the subsequent tasks by conducting a fundamental assessment of the existing treatment plant. This task included activities such as evaluating dry-weather

and wet-weather flows and loadings, reviewing treatment plant hydraulic capacities, and developing a 57-month database of daily operational data for subsequent use in various dynamic computer simulations.

- The second task evaluated via computer simulation the effluent quality expected from four generic processes for treating wet-weather overflows of primary effluent. The four processes cover a wide range for the degree of treatment: (1) conventional primary treatment; (2) “enhanced” high-rate clarification; (3) clarification of the existing “bio-roughing” effluent; and (4) advanced treatment including nitrification and filtration. Computer models were developed that simulated the scenario in which the alternative processes would double the current 125 mgd peak daily flow capacity downstream of the existing primary clarifiers. The models also assumed some form of storage facility that would attenuate instantaneous flow rates above 300 mgd so that both raw and primary effluent overflows would be collected and treated. Daily performance data (e.g., treated effluent flowrate and effluent concentrations of BOD, suspended solids and ammonia-N) were generated for each process for the 57-month period of record. This provided a basis from which the relative merits of the generic processes could be assessed.
- Considering that the cost differential for the various wet-weather treatment options at the Belmont plant could be very large, the purpose of the third task was to evaluate what degree of treatment of Belmont wet-weather overflows is needed to be protective of White River. The starting point for this task was an analysis of EPA’s newly adopted 1999 water quality criteria for ammonia that supercede those used by IDEM for developing the City’s proposed effluent ammonia limits. The ammonia limit evaluation along with the simulated performance data from the four generic wet-weather treatment processes were used to address the following questions:
    - Are the current effluent ammonia-N limits protective of White River?
    - Is some form of aggressive wet-weather treatment needed beyond conventional primary treatment?
    - Is nitrification and/or filtration (i.e., AWT treatment) necessary for treatment of wet-weather overflows?
- For the fourth task, a series of dynamic computer simulations were performed that evaluated the effectiveness of storage volume versus treatment rate for reducing wet-weather raw and primary effluent overflows. The study evaluated the trade-offs of treatment rate vs. storage volume for abating primary effluent overflows alone at the Belmont plant, raw and primary effluent overflows at the Belmont plant. Scenarios that modeled the combined treatment capacity of Belmont and Southport 2-plant system were also evaluated.
- Draft versions of these task reports have been submitted to DPW for review over the past month.

5. **E. coli and Urban Watershed**

- This topic will be moved again because of time to next month's meeting. It will, however, be the first item of business to discuss.
- There were handouts distributed both this month and last month on E. coli that have not been discussed.
  - "Four Mile Run Bacteria Sources Determined: DNA Analysis Provides First-Ever Glimpse of Urban Stream Microbes" by the Northern Virginia Regional Commission
  - "E. coli Membrane Filter Data" and key information
  - "Ranking of Bacteriological Study Site Exceedance of the Water Quality Standard for E. coli"
  - City of Indianapolis Bacteria Monitoring Sites, 1996 (map)

Other handouts not discussed include:

- Aerial photo of Belmont plant
- Nonpoint source 319 grant funds
- Watershed management area spreadsheet
- Draft guidance for the CSO control policy with fact sheet

WET WEATHER TECHNICAL ADVISORY COMMITTEE
MEETING SUMMARY

February 13, 2001

In Attendance:

Committee	City Staff	Consultants
Merri Anderson	Amanda Mikesell	Rosemary Spalding
Bill Beranek	Jim Parks	George Pendygraft
Eli Bloom	Bob Masbaum	
Beulah Coughenour	Paul Werderitch	
Ken Crichton	Kevin Kirk	
Pete Drum		
John Kupke		
Glenn Pratt		
Dick Van Frank		
Phyllis Zimmerman		

Absent:

Jeff Frey	Mona Salem
Ralph Roper	Carlton Ray

1. Introduction

- Bill Beranek called the meeting to order and had everyone introduce him or herself.

2. Minutes

- Eli Bloom noted an error on page 2 of the January 9th minutes, in which a bullet point states, "Enhance illegal dumping and cleanup…." It should read, "Enhance projects that prevent illegal dumping and promote cleanup projects of surrounding areas of White River."

3. Agenda Modifications

- Dick Van Frank asked that an update be provided on the Supplemental Sampling and Analysis Plan.
- Merri Anderson requested a legislative update, and update on the increased sewer user fee proposal and a discussion of the "Sewage in Our Streams" Conference.

4. E. coli and Urban Watershed (carried over from previous month)

- Paul Werderitch described the Ambient Bacteriological Study. Several suggestions were provided to increase the clarity of the data provided.
  - Revise the map to eliminate superfluous information.
  - Revise the spreadsheet to include watershed, sort the spreadsheet by watershed, and revise column headings for additional clarity.

- Dick Van Frank noted that this information had been provided previously. He indicated that he was interested in discussing the E. coli DNA study that was performed in Northern Virginia. Dick described what he felt were several deficiencies in the study and concluded by saying that he felt that the state of the art of DNA testing was not at a point where it could provide useful information regarding sources of bacteria contamination.
- The discussion then focused on how bacteriological data could be presented to make it easy for citizens to understand and note where the most exceedances occur.
- John Kupke felt that the focus should be on the number of days water quality did not meet standards. Proposed CSO control programs should be evaluated in terms of reduction in days of exceedance.
- Bill Beranek suggested that the analysis should provide information on the impact of target storms.
    - Paul Werderitch noted that the 1997 Bacteriological Study analyzed dry-weather vs. wet-weather bacteria levels referring to Section 8.
    - Merri Anderson asked if the watershed teams were, or had ever, collected rainfall data.
    - Dick Van Frank pointed out that there are other sources of bacteria. He described a cattle ranch on Moore Road that is located near the upper end of Eagle Creek Reservoir.
- Phyllis Zimmerman pointed out that sources of contamination vary by watershed and that no one culprit was responsible in all cases. She described a neighborhood along Pleasant Run upstream of the CSO area.
    - Ken Crichton noted that septic tanks do not have to be a problem if they are installed and maintained properly.
    - Bill Beranek noted that Indiana does not have a regulatory framework that insures proper installation and maintenance. He also noted that we need data to help us understand the source of contamination.
    - George Pendygraft noted that the Marion County Health Department considers CSO and septic tanks to be equal contributors to bacteria problems.
    - Pete Drum pointed out that reducing or eliminating CSO discharges does not mean the streams will always meet Water Quality Standards. This point must be emphasized to the citizens.
- Councilor Coughenour said that she felt the CSO LTCP should look at water quality in a comprehensive manner and include all sources of water quality impairment including stormwater.

5. CSO LTCP Update

- Bob Masbaum presented the current time line for release of the CSO LTCP. All dates are approximate and subject to revision.
    - Feb. 21: Consultant forwards final draft to City

- Feb. 26: City final comments to Consultant
- March 12: Release of document for public comment
- March 28: Public Hearing
- April 16: Comment period ends
- April 30: Final document submitted to IDEM/US EPA

- Several committee members asked if the committee would receive copies of the document. Bob Masbaum responded that enough copies of the draft report were going to be printed. Members will receive their own copy.
- **The committee decided to cancel the scheduled March 13th WWTAC meeting, moving it to Tuesday, March 27th at 1:30pm in Conference Room C at 604 N. Sherman instead**.
- John Kupke said that the items the committee would be most interested in seeing include the list of recommended projects, costs, time line, and watershed.
- Glenn Pratt said that tying the LTCP to development of TMDLs would be appropriate.

6. EPA Update

- Rosemary Spalding discussed the status of the EPA 308 requests. She noted that the Supplemental Sampling and Analysis Plan was moving forward. An RFP has been prepared and will be issued in March 2001.
- Dick Van Frank asked if the SSAP was needed to complete the LTCP.
- Rosemary reiterated the position stated by the City previously that the model is currently sufficient to complete the LTCP. The work done as part of the SSAP will refine the model so that facility plans could be prepared.
  - John Kupke said the relevant question is whether or not the model was good enough to allow development of the LTCP. He indicated it was his recollection that Robin Garibay had indicated it was. Attached is a copy of an email from Robin Garibay to this effect.
  - Bill Beranek said that he had developed notes of the meeting with Robin and would like to confirm that revisions were made to correct any inaccuracies to the notes.
  - Dick Van Frank said that he thought the model was accurate enough for flow but not for DO and bacteria and that these issues would be resolved before the LTCP was released.
- Glenn Pratt suggested that we could all agree on the upgrades at the AWT and that the model issues could be worked out as we move forward with the AWT work.
- Dick Van Frank asked why we couldn't use the bacteria data compiled by Pete Drum and see how well it fits.
- Rosemary Spalding noted that City staff along with Beulah Coughenour and George Pendygraft was scheduled to meet with EPA officials in Chicago to discuss EPAs list of alleged violations. She pointed out that the City remains

committed to moving forward with the CSO program but wants to do so while maintaining flexibility and public input. Additionally, she felt that any action by EPA should only address past actions and the LTCP

  - George Pendygraft pointed out that a Consent Decree would trump the NPDES permit and eliminate public input.
  - Beulah Coughenour suggested that EPA was trying to make a name for itself and that was the reason for their hurry-up attitude.
- Glenn Pratt said that while he felt the LTCP might not be ready to be released, he understood the City's need to release it for political reasons. He wanted to be sure that the City moves forward with verification of the model over the next year. We can still make changes over the next year.

7. Legislative Update

- Glenn Pratt noted that there were several legislative proposals at the State level to address the septic tank and water quality issues.
  - 235
  - 338
  - Clean Water Indiana (1662)

8. Next Meeting

- Tuesday, March 27th at 1:30pm, Conference Room C at 604 N. Sherman.

WET WEATHER TECHNICAL ADVISORY COMMITTEE MEETING SUMMARY

March 27, 2001

In Attendance:

Committee	City Staff	Consultants
Merri Anderson	Bob Masbaum	Pam Thevenow
Bill Beranek	Amanda Mikesell	
Eli Bloom	Jim Parks	
Beulah Coughenour	Carlton Ray	Guests
Jeff Frey		Cornell Burris
John Kupke		David Martin
Glenn Pratt		
Dick Van Frank		

Absent:

Ken Crichton
Pete Drum
Ralph Roper
Phyllis Zimmerman

1. Introduction/Announcements

- Bill Beranek called the meeting to order and had everyone introduce him or herself.
- It was stated that the Barrett Bill (Senate Bill 338) passed out of the House today, March 27, 2001.
- **All comments on the CSO LTCP are due to the City by Thursday, April 12, 2001.**

2. Discussion of CSO LTCP

- Leading the discussion, Bill Beranek suggested going through the LTCP chapter by chapter, saying, "How can this chapter be improved without getting into philosophy." Bill added that this version was better and incorporated many of provided by both the WWTAC and the Citizens Advisory Committee. The document itself will not be rewritten unless there is a **fatal flaw** found.
- NOTE: [page number, (section, location)]

Executive Summary:

- Glenn Pratt stated that we need to explicitly state that the City is working on other water quality initiatives.
- Dick Van Frank [ES-7, (F, 1st paragraph)]: Where it says "IDEM guidelines" it should say "DRAFT IDEM guidelines." On the same page, 2nd paragraph, "fixed service costs" are not included in EPA guidelines.

- Merri Anderson [ES-5, (C, Treatment Technologies)]: Instead of just saying "reduce," spell out how much reduced.
- Eli Bloom [ES-1, (B, 1st paragraph)]: 'Ag-land' needs to be mentioned in the sentence "Land use in Indianapolis is primarily urban, with less than 2% of the land area in Marion County containing natural forests and species." In addition, 'square miles' need to be referred to rather than "square river-miles."
- Merri Anderson [ES-1, (B, 4th paragraph)]: The word "virtually" may need to be replaced, "The City of Indianapolis manages the wastewater collection system serving virtually the entire population of Marion County," because it could mean different things to regulators.
- Beulah Coughenour [ES-1, ES-4]: "Water quality or hydrology." This is mostly an urban drainage area. What is the purpose of this paragraph? It is a contrast with State law, which requires us to look at it.
  - John Kupke suggested that it be stated that this is in contrast. The LTCP is a public referendum.
  - Dick Van Frank disagreed saying that the LTCP is not a public referendum, rather EPA requirements.
  - Bill Beranek noted that this is a **core** issue, and this paragraph establishes the City's position.
- Dick Van Frank [ES-10, (figure ES-4)]: The graph should have an additional line reflecting costs pertaining to "CSOs only."
  - Eli Bloom [ES-10, (figure ES-3)]: If you add a line on figure ES-4, a bar must be added to figure ES-3.
- Glenn Pratt [ES-13, (Recommended Program, 3rd paragraph)]: The sentence regarding the "85 percent capture alternative.." does not mention viral or bacteria contamination. "The number one concern is human health [bacteria], not a couple of fish."

Section 1

- Dick Van Frank [1-1, (1.2, 2nd paragraph)]: The word 'permitted' should not go in this sentence, "Indianapolis's combined sewer system serves the older parts of the city, and includes 135 permitted overflow points—approximately 15 percent of the state total."
- Dick Van Frank [1-1, (1.4.1, 1st sentence)]: Water Pollution Control Board (WPCB) established water quality standards, not IDEM.

Section 2

- Eli Bloom [2-1, (2.2, 3rd paragraph)]: Instead of saying "96th Street and Keystone Avenue," it would be closer to say '96th Street and Allisonville.'
- Beulah Coughenour [2-1, (2.2, last paragraph)]: Questioned the accuracy of the following statement (specifically the flow during dry weather in Fall Creek), "The White River and its two largest tributaries, Fall Creek and Eagle Creek, are the major sources of water for public and industrial supply for **Indianapolis** because they generally have sufficient streamflows even during dry periods." She suggested inserting a period after **Indianapolis** and deleting the rest of the sentence.

- Eli Bloom [2-1, (2.2, last line)]: Noted that the “above sea level” should be replaced with the appropriated National Geodetic Vertical Data (NGVD).
- Dick Van Frank [2-11, (2.4.1.2,last paragraph)]: Commented that “lack of actual data is no excuse.”
- Jeff Frey [2-3, (2.2.2, last paragraph)]: Add a reference following the first sentence regarding the USGS study.
- Dick Van Frank [2-39, (2.8.1)]: Assumptions about sources of bacteria cannot be backed up, and how much septic tanks affect in-stream water quality is overstated. Additionally, DNA typing for the Virginia study will not stand up. The City is drawing conclusions that the data just does not support. Dick suggested adding an appendix.
  - Jeff Frey also questioned the conclusions not the study.
  - John Kupke stated that it was his understanding that even if you removed all of the CSOs, you still would not want to swim in the specified areas because the bacteria levels are would **still** be much higher than the standards allow.
  - Bill Beranek reaffirmed that the conclusion is okay, but it is over-interpreted.
  - Jeff Frey suggested reviewing other sources.
- Beulah Coughenour [2-43, (2.8.5, 3rd paragraph)]: Believes that the following statement can be applied and should remain as is, “The Northern Virginia Planning District Commission estimated that more than 5,000 pounds of fecal material is deposited in the watershed on a daily basis, based on one-third of a pound of solid waste per dog. The watershed also contains a variety of mammals and waterfowl.”
- Pam Thevenow [2-42/43, (2.8.3, 1st paragraph)]: Brought up the point that out of “535 major stormwater outfalls,” the 24 found does not seem to be very much. She suggested defining/referencing who did this work.
- Beulah Coughenour [2-43, (2.8.3, last paragraph)]: Questioned the statements regarding “illicit discharges” wondering if this is how it is really done.
- Dick Van Frank [2-50, (3rd bullet point)]: Asked, “What about Fall Creek, Pogues Run, and Pleasant Run?”
- Merri Anderson stated that impacts from places including Speedway should be adding somewhere in Section 2: Existing Conditions.

Section 3

- Merri Anderson [3-1, (3.2.1, list)]: As with list in Executive Summary, define “reduce” and “improve.”
- John Kupke [3-15/16, (3.6.3.1)]: Draw more attention to the Continuous Deflective Separators (CDS). People in Louisville, Kentucky really like them.
- Glenn Pratt [3-5, (3.3, Industrial Pretreatment)]: There needs to be greater emphasis on this section. Discuss the abatement technologies, moving one or two of the ideas from Section 4: Alternatives Evaluation. “A big chunk of ammonia comes from industry.”
- Eli Bloom questioned where increased enforcement fits in.

- Pam Thevenow stated that IDEM, MCHD, the City, and IDNR are working co-operatively to improve enforcement.

Section 4

- Dick Van Frank [4-1, (4.2.2, CSO Control Goals)]: Questioned the meaning of **sewer infrastructure problems** in the following statement, "While CSOs are the most significant source of bacteria in Indianapolis streams, bacteria exceedances are also caused by many other factors, such as failed septic systems, upstream pollution, urban stormwater, and **sewer infrastructure problems**."
  - Carlton Ray explained that occasionally we have breaks, backups, etc. in the lines.
- Dick Van Frank [4-10, (Table 4-3)]: Wondered what "Not Reported" meant (see footnotes).
  - Bob Masbaum explained that that particular information was not reported in the study.
  - Bill Beranek suggested adding a citation or inserting "See Appendix" to clarify why it was not reported.
- John Kupke [4-62, (Table 4-16)]: Questioned what the "TBD" was referring to in the table in respect to limits.
  - Jim Parks stated that the 10/15 limits were left over from the 70s, with Carlton Ray adding that people were working on it.
  - This report does not preclude us from going further later.
- Dick Van Frank stated that this does not address bacterial contamination of streams that flow through neighborhoods. In addition, there is no recognition of the order of magnitude of the violations.
- John Kupke discussed the essence, dividing 50/50 between AWTs and watersheds. He feels comfortable with the way it turns out.
  - Dick Van Frank added that he would like the final analysis of augmenting flow by natural means.
  - Bill Beranek stated that a matrix should be established that analyzes the costs and benefits of various methods to augment flow in the stream and treat the flows (both numeric and narrative). Make sure that both alternatives (plant and return flow from Belmont) are still alive.
- Eli Bloom asked if there was any cost sharing with upstream operations.
  - Carlton Ray stated "as the TMDL process moves forward, we will get into that deeper."

Section 6

- Dick Van Frank [6-4, (Tables 6-3/6-4)]: The poorest township in Marion County should not be used. He did recognize the fact that some people will need help with this project, and other financial commitments also need to be kept in mind.
- Cornell Burris (guest from the 42nd and Sherman area) addressed the committee asking that septic tanks be included with stormwater and CSOs in

the LTCP since they too are a component of the sewage problem. He advocated that the City should pay for the sewer extensions as well, noting that "when people cannot pay their fees, they will be forced to move or leave their homes, which some are already doing."

Section 7

- Dick Van Frank [7-17/8, (Figures 7-5/6)]: Add a separate line for "CSO only."
- John Kupke [7-12/13, (Table 7-3)]: Round numbers.
- Glenn Pratt stated that we need full data from SSAP including language that they may change based on future modeling.

*****REMINDER: All comments due to the City April 12th.*****

3. Next Meeting

- The next meeting has been rescheduled for **Tuesday, April 17th** from **1:30-3:30pm, Conference Room A at 604 N. Sherman**. This meeting was originally scheduled for *April 10th*; however, it was pushed back to coincide with the comment period for the LTCP.

WET WEATHER TECHNICAL ADVISORY COMMITTEE
MEETING SUMMARY

April 17, 2001

In Attendance:

Committee	City Staff	Consultants
Bill Beranek	Bob Masbaum	George Pendygraft
John Kupke	Amanda Mikesell	
Glenn Pratt	Carlton Ray	
Ralph Roper		
Dick Van Frank		

Absent:

Merri Anderson
Eli Bloom
Ken Crichton
Beulah Coughenour
Pete Drum
Jeff Frey
Phyllis Zimmerman

1. **Introduction/Minutes**
   - Page 4 of the March minutes has been corrected. Dick Van Frank's statement now reads, "Dick Van Frank added that he would like the final analysis to include augmenting flow by natural means."

2. **308 Discussion** (prompted by letter received by Dick Van Frank)
   - With the comment period formally closed, this meeting will be spent discussing the LTCP and the comments made.
   - Dick Van Frank asked if the contract to do sampling had been let yet.
     - Carlton Ray said that it had and the contract would expire Dec. 31, 2001.
   - Dick also asked if any other 308s had been received.
     - Carlton mentioned the 4th 308 that had been drafted and discussed with US EPA.
     - Dick brought out a (4th 308) letter he received dated April 12, 2001 from Jo Lynn Traub of US EPA (a copy was made and distributed to those who attended the meeting). This letter prompted an intense discussion because neither George Pendygraft nor City staff had seen and/or received this letter. Only draft, unsigned versions had been viewed.
     - George Pendygraft mentioned that the City is to meet with Region 5 Friday, April 20, 2001.
     - Ralph Roper and John Kupke asked what this 308 means.

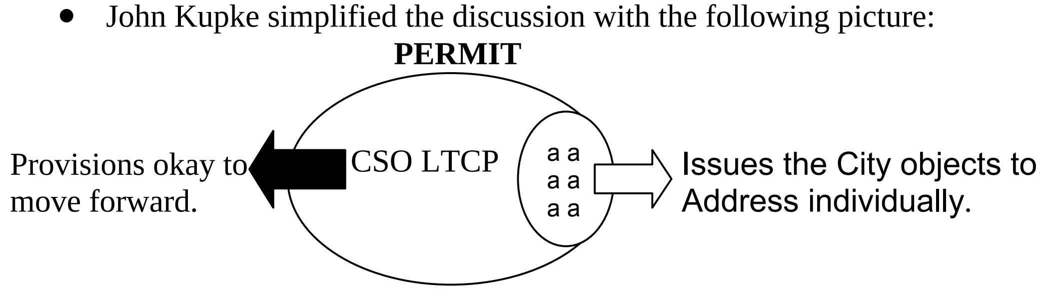
- Dick does not feel the City has enough data for the LTCP. He went on to say that the 2nd 308 laid out a lot of how things should be done; and the City issued a "work plan" in response, however, EPA wants more sampling analysis done calling for the LTCP to be done by December 31, 2001.

- Glenn Pratt stated that one of his concerns is how this all fits together adding that we should try to have an integrated approach between the City and IDEM. He added that rather than having IDEM pay to develop TMDLs, the money should be transferred to the City with the work plan for additional work to include TMDL work upstream of county.
  - Carlton stated that another contract would be needed and that a scope of work is currently being drafted with Cindy Wagner at IDEM.
  - Glenn then stated, "We have more trust in the City to do TMDL work then IDEM."

3. **CSO LTCP Discussion**

- Carlton began by saying that of the 28 letters received nearly 1/3 were Barrett Law related. The comments that related to the LTCP were divided into six major areas, which do not include the technical items received by the WWTAC as well as individual letters (handout attached):
  - In general, people thought 20 years were too long. They would like to see it done in 10-15 years.
  - Several people believe that instead of 85% it should be 90+. It was noted that we should go to the knee of the curve for CSO control only; omitting stormwater and septic.
  - Focus more on streams and less on White River.
  - People commended the City on the holistic approach.
  - It was questioned why Center Township was used verses the Marion County Median Household Income (MHI) of 2%. That prompted discussion on how to assist the poor relative to payment of their sewer bills.
  - People either thought the process of eliminating septic tanks was moving along too slow or too fast. As stated before, 1/3 of the letters received were Barrett Law related primarily the 42nd and Sherman project.
- It was noted that no comments were received regarding the treatment plant options.
- George Pendygraft asked for a description of what the procedure for finalizing the LTCP is.
  - Carlton said that comments and letters have been reviewed and currently the LTCP is being finalized. The comments will also be included as an appendix, and the LTCP will be submitted to IDEM and US EPA at the end of April.
- George Pendygraft then questioned if the LTCP is DOA in light of the 4th 308.

  - Glenn Pratt stated that the LTCP is good, but it will require revisions. Even though he does not agree with all aspects of the LTCP, Glenn suggested that the City submit it to EPA at the end of April.
- George mentioned that he is concerned with the Stormwater Utility Fee. EPA's 308 letter dated April 12, 2001, is a concern. "There is something bizarre going on in Region 5." It appears to be more of a knee-jerk reaction instead of being thoroughly thought out. It was also clarified that a 308 is a self-enforcing request for items, whereas a 309 is a "you are in violation…this is what you need to do…NOW," and this April 12, 2001 letter from EPA is extremely close to being a 309. Ralph questioned if the latest 308 was the result of the City being too accommodating, and Dick thought it was the opposite. General consensus with respect to the April 12, 2001 308 was confusion.
  - Glenn Pratt added that IDEM needs to get the permit out. Glenn stated that IDEM has been asked when they will issue the permit, however, a straight answer has never been received. Additionally, Glenn noted that there is not a lot of trust between EPA and IDEM. George stated that the appropriate procedure to deal with this is via the NPDES permit, and EPA's current action is not justified. Dick added that if the State would have issued the permit a few years ago, we would not be in this mess, which most of the committee agreed with.
  - George explained that right now there are alleged violations out there, which were followed by draft letters (which he views as being illegal).
  - Bill Beranek reminded everyone that the "308 bullet" is still heading for us. Bill mentioned three possible options: (1) As stated before, have the Mayor go to the Governor stating the urgency of getting the permit out; (2) EPA could change its mind; or (3) Encourage bringing forth a "mini-permit." Glenn noted that getting the permit out would not be instantaneous. Region V is not totally thrilled with the permitting process, which can take years, adding that objections can be filed by the City on terms and conditions related to the LTCP.
  - Attached is a draft summary of the conclusions by the committee regarding the City's options as prepared by Bill Beranek.
  - John Kupke simplified the discussion with the following picture:



4. **Next Meeting**

- The next meeting is scheduled for **Tuesday, May 8, 2001 at 604 N. Sherman in Conference Room A from 1:30-3:30pm**.

WET WEATHER TECHNICAL ADVISORY COMMITTEE
MEETING SUMMARY

May 8, 2001

In Attendance:

Committee	City Staff	Consultants
Merri Anderson	Dan Dovenbarger	George Pendygraft
Bill Beranek	Bob Masbaum	Pam Thevenow
John Kupke	Amanda Mikesell	
Ralph Roper	Carlton Ray	
Dick Van Frank	Mona Salem	
Phyllis Zimmerman	Paul Werderitch	

Absent:

Eli Bloom
Ken Crichton
Beulah Coughenour
Pete Drum
Jeff Frey
Glenn Pratt

1. **Introductions**
   - Bill Beranek called the meeting to order and had everyone introduce him or herself.

2. **Minutes/Announcements**
   - The minutes from the April 17th meeting were briefly reviewed and accepted as is.
   - Mona Salem made an announcement regarding the upcoming Five Cities Plus Conference to be held at the Radison Hotel on Monument Circle May 17th and 18th. WWTAC members are invited and encouraged to attend the sessions on Thursday and Friday and the dinner dance Thursday evening. The conference will wrap up around 2pm with an optional tour of the Belmont AWT.

3. **Discussion on the Final LTCP**
   - Carlton Ray went through the final CSO LTCP section by section noting the spots where changes were made. In addition, a "Responsiveness Summary" including questions and comments, public hearing, and news clippings was added as Appendix H as well as Appendix I - Supplemental In-Stream Water Quality Modeling Information.
   - NOTE: [page number, (section, location)]

   Executive Summary
   - [ES-4, (B, 3rd paragraph)] – The following text was added, "Further, a number of systemic conditions prevent the attainment of recreational use standards in

- Indianapolis waterways, including the urban character of Marion County, low flow conditions in many streams, and waste from pets and wildlife."
- [ES-5, (B, 3rd paragraph)] – The following was added, "The long-term control plan represents a continuous and evolving process. The City is collection additional data under the S*upplemental Flow Monitoring and Sampling Analysis Program for Combined Sewer Overflows*, described in Section 9. The sampling and analysis program will be used to further verify the City's water quality and flow models, and provide supporting information for facility planning and design."
- [ES-7, (E, Right hand column, half way down the page)] – "The City released a draft long-term control plan for public review and comment….A complete record of the public comments received can be found in the appendix to this report." Those comments are in Appendix H.
- [ES-8, (F, 1st paragraph)] – Added, "IDEM draft guidelines issued in October 2000 allowed communities to base the financial capability assessment on the township with the lowest median household income in the sewer service area."
- [ES-11, (G, figure ES-4)] – CSO Controls was inserted.
- [ES-14, (G, 2nd paragraph)] – Added text, "It prioritizes controls…Marion County waterways." On the same page, 3rd paragraph – the last sentence was inserted.
- [ES-17, (I, last paragraph)] – The last paragraph was added.

<u>Section 1</u>

- [1-1, (1.2, 2nd paragraph)] – The word "permitted" was removed from the following sentence, "Indianapolis's combined sewer system serves the older parts of the City, and includes 135 overflow points – approximately 15 percent of the state total."
- [1-1, (1.4.1,1st paragraph)] – The first sentence was added.
- [1-3, (1.5.3, Long-Term Control Plan)] – The following was added, "Data used in compiling…design and construction."

<u>Section 2</u>

- [2-1, (2.2, 3rd paragraph)] – The location of White River was moved to Allisonville Road.
- [2-2, (2.2)] – The elevation was properly stated as "national geographic vertical datum (NGVD)."
- [2-3, (2.2.2, last paragraph)] – USGS reference was added.
- [2-11] - Added…. The literature values were later calibrated to actual measured value in the streams. The city will collect additional DO data for the facility planning process.
- [2-16, (2.4.2.3, last paragraph)] – Entire paragraph was added.
- [2-16 to 2-17] – Sections 2.4.3 up to 2.5 were added to report.
- [2-39, (2.7.3)] – Text was added, "From 1996-1999, the observed….the entire range of storm events that occurred."
- [2-40, (figure 2-17)] – This figure was added.

- [2-41] – Discussion was brought up about the term “fecal”…It was conclude that it is correct just not uniform.
- [2-44, (2.8.2, 5th paragraph)] – The entire paragraph was added.
- [2-46] – Dick Van Frank felt that the conclusions derived from the Four Mile Run study were not appropriate for the Indianapolis study. Mona Salem stated that when the stormwater utility fee is passed, more funding would be obtained to do more studies.
- [2-52, (2.10, 3rd bullet)] – The phrase “or its tributaries” was added to the text.

Section 3
- [3-5, (3.3, Industrial Pretreatment)] – Text was added to the second half of the paragraph going from “The City has begun evaluating…potential burden on industrial users.”
- [3-16, (3.6.3.1, 1st paragraph on page)] – The entire paragraph was added beginning with “Other technologies…vortex separator technology.”

Section 4
- [4-4, (table 4-1)] – Table was revised.
- [4-5, (table 4-2)] – The metals category was added to the table.
- [4-7, (4.3.3, 1st paragraph)] – The title was changed and the 1st paragraph was added.
- [4-11, (table 4-3)] – The source was referenced under the table.
- [4-25, (4.5.1)] – The first sentence and the last sentence were added.
- [4-30, (4.5.2, 1st paragraph)] – “Another method would be increased water conservation,” was added as the last sentence in this paragraph.
- [4-55 to 4-66, (4.8.2)] – Section 4.8.2: AWT Permitting Alternatives was added to the report.
- [4-96] – The recommended alternatives will require tiered effluent limits, as allowed under IC 13-18-19-2 and possibly effluent blending.
- [4-106, (4.9, 3rd paragraph)] – The following statement was added to the 3rd paragraph, “The flexibility of tiered, flow proportional limits would allow the City to provide maximum treatment to wet weather flows and the highest protection of water quality in the most cost-effective manner.” Additionally, the 5th paragraph also had a sentence added, “Tiered, flow proportional limits would include enforceable dry-weather and wet-weather end-of-pipe effluent limits that would meet or exceed in-stream water quality standards. These limits would allow the City to send more flow to and through the Belmont and Southport treatment plants, thus providing greater water quality protection for the White River and its tributaries.”

Section 5
- [5-19 to 5-21, (5.10)] – Section 5.10: Public Comment on LTCP was added.

Section 6
- [6-1, (6.2, 2nd paragraph)] – The following sentence was added tot he report, “IDEM’s draft guidance document, “Integration of the Long Term Control

Plan and Use Attainability Analysis, " (October 1, 2000), specified that communities should base their financial capability assessment on the township in the sewer service area that registers the lowest MHI."

- [6-2, (6.2.1, 1st paragraph)] – The above sentence was added to this paragraph as well.
- [6-4, (6.2.1.2, 3rd paragraph)] – "The state refers to this benchmark as the Municipal Affordability Screener, which is calculated as follows: MAS = [Annualized Project Cost per Household / Annualized Median Household Income] x 100%," was added.
- [6-7, (2nd paragraph)] – The above text regarding IDEM's draft guidance document was added as the 1st sentence.

Section 7

- [7-7, (figure 7-5)] – The CSO Control only was added.
- [7-17, (7.3.1.8, 2nd paragraph)] – The following sentence was added, "The City is reviewing other cities' CSO notification programs as potential models for Indianapolis." The entire paragraph was also revised.
- [7-20, (7.3.5.1, 1st paragraph)] – The third sentence was added to the paragraph, "An alternative…Southport AWT plants."
- [7-30, (7.5.7, figure 7-7)] – This figure was modified to end at 20 years.

Section 9

- [9-5 to 9-6, (9.7.1)] – Sections 9.7.1: Progress Reports to Public and 9.7.2: Right to Know were added. The last paragraph in section 9.8 was also added.

4. **Wet Weather Permitting Strategy**

- Carlton Ray directed everyone's attention to page 4-55 to 4-66 section 4.8.2 (AWT Permitting Alternatives), and noted that any and all comments on this section would be appreciated.
  - Carlton also noted that special attention should be paid to the last paragraph on page 4-61 referencing the tables on pages 4-62 to 4-64.
- Dick Van Frank questioned if we should wait to discuss this at the next meeting, and how EPA feels about it.
  - Ralph Roper mentioned that EPA hasn't yet seen it.
  - Bill Beranek stated that it would be discussed at the next meeting and Ralph would walk the group through.
  - Ralph stated that he does not like the term "tiered limits" and would like to get away from it. It boils down to trying to come up with a strategy based on technology.
- John Kupke asked if all wet weather flows discharged from the plant were intended to meet the permitted disinfection standard.
  - Carlton stated that the goal was to disinfect all dry weather flow via ozonization and then use the existing chlorine content tank for wet weather disinfection to meet the permit limit.

5. **308/Workplan Update**

- Carlton reviewed the schedule of completion of supplemental analysis.
- Merri Anderson asked if when the letter refers to "Board" if it meant the DPW Board. Carlton clarified that it is referring to the DPW Board.
- It was noted that "sensitive area" in the draft IDEM guidance document is defined differently than the USEPA guidance document. IDEM guidance document potentially designates all waterways sensitive. Bob Masbaum added that by making all streams sensitive, it would take away all sensitivity removing prioritization.
- George Pendygraft stated that Region V still find the City's data to be incomplete, and has not changed its position regarding data collected for the LTCP. Some of the concepts in the LTCP will be acceptable; however, he does not believe Region V will accept the alternative approach of IDEM dragging its feet.
  - Dick Van Frank said that he absolutely agrees with George.
- Carlton clarified that EPA is potentially disregarding the "knee of the curve" cost benefit analysis and only focusing on the amount of money spent on CSOs up to 2% of the total Median Household Income.
  - George added that EPA is looking at the affordability rather than the knee of the curve.
  - Bill saw affordability and cost effective in a different light.
  - Dick suggested copying this section from EPA's guidance, and George agreed.

6. **Next Meeting**
- Future meetings are listed below:
  - August 14
  - October 9
  - December 11

WET WEATHER TECHNICAL ADVISORY COMMITTEE
MEETING SUMMARY

August 14, 2001

In Attendance:

Committee	City Staff	Consultants
Merri Anderson	Pinkie Evans-Curry	Rosemary Spalding
Bill Beranek	Vaneeta Kumar	Jodi Perras
Eli Bloom	Amanda Mikesell	
Beulah Coughenour	Carlton Ray	Interested Citizens
John Kupke	Mona Salem	Phyllis Zimmerman
Glenn Pratt	Paul Werderitch	
DeVonne Richburg-Pollard	Tom White	
Ralph Roper		

Absent:
- Ken Crichton
- Pete Drum
- Jeff Frey
- Dick Van Frank

1. **Introductions**
   - Bill Beranek called the meeting to order and had everyone introduce him or herself.

2. **Minutes/Announcements**
   - The minutes from the May 8th meeting were briefly reviewed with the notice of one error.
     - John Kupke pointed out on page 4 under "4. Wet Weather Permitting Strategy," the third bulleted item was corrected to read as follows: John Kupke asked if all wet weather flows discharged from the plant were intended to meet the permitted disinfection standard. Carlton stated that the goal was to disinfect all dry weather flow via ozonization and then use the existing chlorine contact tank for wet weather disinfection to meet the permit limit.

3. **Discussion of EPA's Comments to the CSO LTCP**
   - A good bit of time was spent with discussions regarding when the committee received EPA's comments and the newspaper article. Glenn Pratt stated that the committee should have received the comments promptly rather than having to contact EPA for a copy. Rosemary Spalding commented on the time frame from when EPA's comments were composed, sent, and then received by the Director's Office. Mona Salem added that there is a certain procedure that must be followed when obtaining information: **Should you need any public documents or information, you must go through the**

Public Information Officer, Paul Whitmore. Paul may be reached at 327-4669. Mona then made a general comment about the CSO LTCP, saying that it has not been rejected or approved; EPA's comments are not a surprise to the City; nor do they reflect the job done by the consultants. Furthermore she added that this is a "negotiation process" in which EPA will have a position as will the City. Misunderstanding Mona's comment, Glenn did not fully agree with what was said; however, Bill Beranek noted that it is ultimately the City's call as to what policy is. Councillor Beulah Coughenour also wanted to clarify the article in the *Indianapolis Star* saying that she did not use the word 'repudiation,' rather she stated that she did not think EPA would except the LTCP as is. Ralph Roper noted that EPA was going to comment as they did regardless if the City had added another layer of detail to the LTCP stating that they will always ask for more detail. He stated the LTCP is an excellent piece of work with a tremendous amount of value. Glenn then mentioned that he has yet to receive the TMDL study plan scope of work. With John Kupke's question regarding a timeline (is the City on a timeline as far as EPA's comments), the committee began to look at EPA's comments.

- Note: Each comment made by EPA will be listed separately followed by the comments made by the committee.

<u>Comment 1</u>

The LTCP report does not reflect a thorough attempt to identify all sensitive areas in the City's water bodies, and then to five full consideration to the protection of those areas as described in US EPA's 1994 CSO Control Policy. The identification and protection of sensitive areas is a cornerstone of the 1994 CSO Control Policy. The Policy specifically identifies "outstanding National Resource Waters, National Marine Sanctuaries, waters with threatened or endangered species and their habitat, waters with primary contact beds" as sensitive areas. The Policy further provides that

"For [sensitive areas', the long-term CSO control plan should:

a. prohibit new or significantly increased overflows;

b. i. eliminate or relocate overflows that discharge to sensitive areas wherever physically possible and economically achievable, except where elimination or relocation would provide less environmental protection than additional treatment; or

ii. where elimination or relocation is not physically possible and economically achievable or would provide less environmental protection than additional treatment, provide the level of treatment for remaining overflows deemed necessary to meet WQS for full protection of existing and designated uses. In any event, the level of control should not be less than those described in Evaluation of Alternatives below; and…

The City's receiving streams are all designated "fishable/swimmable" by the State. Although the City has an ordinance providing that *"[i]t shall be unlawful for any person to fish, bathe, wash, operate boats in or enter any public waterways, where not authorized for such purposes,"* the LTCP Report acknowledges that the White River and its tributaries are in fact frequently used by its citizens, particularly children, for swimming, wading and canoeing. Nevertheless, in spite of the combination of the State's designation and reported actual use, the LTCP Report fails to consider any such areas as sensitive.

The City also should have identified the location of all drinking water intakes (Section 2.1 indicates that the White River, Fall Creek and Eagle Creek are drinking water sources) and their relationship to CSOs, and should have contacted appropriate local, State and Federal agencies, including the Fish and Wildlife Service, to determine if any other sensitive areas exist within the water bodies. The LTCP Report should clearly document the extent and results of this effort.

Committee Response

- Councillor Beulah Coughenour asked if the LTCP really stated that White River was "frequently used" as suggested in EPA's comment because she did not find that statement made anywhere in the plan. Carlton Ray informed her that she was in fact correct.
- Carlton added that a better job of describing what, where, and how people are using these waterways needed to be done.
- Merri Anderson questioned if there were any CSOs above the intake (referring to Speedway). Carlton confirmed that there are none, and this is something that would need to be illustrated in the LTCP.
- John Kupke mentioned that he believed EPA was referring to the "sensitive areas."

Comment 2

The LTCP Report presumes that a use cannot be considered "actually attained" unless water quality meets the standards. However, IDEM's LTCP guidance, consistent with federal requirements, makes clear that a use is an "existing" use if the water body is actually used for recreation, even if the water quality of the water body has not been adequate to support the recreational use that has been occurring. The City's LTCP makes clear that there are several water bodies that are in fact being used for recreational purposes during and after wet weather (when CSOs are occurring). The City's LTCP assumes that the City will be able to obtain revisions to the State's water quality standards that would allow for raw sewage discharges into those water bodies. That does not appear to be a valid assumption since Indiana's WQS will have to be consistent with the existing use; i.e., they likely will have to reflect the recreation that has in fact been occurring and will have to contain criteria to protect that recreational use. The LTCP Report needs to address this issue.

Committee Response

- Councillor Coughenour noted EPA’s false accusations about when people are using the waterways specifically for recreational purposes. She further explained her point and compared what was occurring to sharks: if a person chooses to swim where there are sharks, then that makes it a “swimmable” area (according to EPA’s comment) even though there are sharks. Councillor Coughenour also added that if we accept these premises “we are dead.”
- Merri mentioned that the LTCP shows several maps with dots, which were gathered from the public meetings, however, there is no actual documentation saying where, when, and how people use these areas.
- Phyllis Zimmerman brought up that “kids are wading in these areas nonetheless so we need to clean up our waterways.”
- Glenn Pratt noted that there is no way to get zero, and by “saying we are going to get most of the shit out of there is a lot different than zero.”
- John stated that with a little flexibility this can be done cost effectively, but it will not be good to be locked in by EPA.
- Rosemary Spalding clarified that the term “sensitive area” is defined legally, and once that happens stricter guidelines, etc. will be applied, which is why items were labeled as “high priority” [including streams by schools and in neighborhoods] rather than “sensitive area.”

Comment 3

As we have repeatedly informed you, the City must obtain additional CSO monitoring data to calibrate and validate the hydraulic model and revise its LTCP to reflect those data. Specifically, this can be accomplished by the City’s implementation of its November 21, 2000, “Supplemental Flow Monitoring and Sampling and Analysis Program for Combined Sewer Overflows.” The City should wait until it completes implementation of that Program, and should consider the information generated through implementation of that Program, before finalizing its LTCP Report.

Committee Response

- Okay.

Comment 4

In spite of noting that “controlling CSOs is the most critical factor in improving bacteriological conditions in the White River” (see Section 2.8.1), the LTCP Report’s recommendations are based on the premise that “even if all CSOs were eliminated, waterways would not meet the state’s water quality standards for bacteria.” The LTCP Report goes on to note that “therefore, cost-effectiveness was a major factor in evaluating the bacteria benefits of CSO alternatives.”

There are several problems with how the cost-effectiveness of bacterial controls was considered. First, the LTCP Report focused on reductions in days of noncompliance with bacteria water quality standards. This measure of performance totally ignores the very meaningful benefits, which result from reductions in bacterial levels, even if the reduced levels are above WQS. For example, an e. coli count of 1,000/100 ml in a water body poses significantly less human health risk than a count of 100,000/100 ml, but both exceed the State's "fully swimmable" water quality standards. The City's cost/benefit analysis for bacteria control incorrectly assumed that there is no benefit in such a reduction. This type of analysis will also be useful to the extent the LTCP Report will be used in assessing the feasibility of attaining something less than a "fully swimmable" recreational uses (e.g., secondary contact).

Second, in evaluating the benefit of bacterial reductions, it is important to bear in mind that fecal coliform and e. coli are primarily indictor organisms. Other sources of these organisms, such as urban and agricultural runoff may be meaningful sources of human pathogens, but not on the same scale as sewage. It is appropriate to give additional "weight" to the elimination of fecal coliform load, which has a sewage origin.

Third, the LTCP Report at page 4.5.1.2 and figures 4-12 and 4-13 illustrate the degree to which Fall Creek is impacted by CSOs from a bacterial standpoint. Figure 4-12 shows that with 85 percent capture, expected e. coli counts during a one-year storm will still reach <u>100,000/100 ml</u>. Disinfection of all discharges during that storm would result in levels similar to those shown for CSO elimination (i.e. almost two orders of magnitude reduction). There is no analysis of the cost effectiveness of measures that would achieve disinfection (as opposed merely to measures, which achieve certain levels of capture). See also Figures 4-33 and 4-34.

Fourth, the LTCP Report cost-performance curves focus on percent capture and percent BOD removal. Curves also should be developed based on percent of bacteria removed.

<u>Committee Response</u>

- Carlton stated that the City has additional data that can be used to provide graphs, etc. Everything has been documented in the LTCP already, however, that information can be clarified. In addition, Indiana does not have "secondary contact" WQS thus the ability to go to the second tier is not available.
- Glenn added that major reduction would be a huge step.
- Councillor Coughenour noted what appeared to be contradictory statements from comment 2 to comment 4 saying that one was based on legality while the other on logic.

<u>Comment 5</u>

Even given the City's narrow focus on the number of days that water quality standards are met, the City's knee of the curve analyses suggest a higher level of capture would be cost-effective. Specifically, the City's figures consistently show that the knee of the curve is between 92 percent and 96 percent capture and control, not 85 capture. See, for example, Figures 4-14, 4-15, 4-18, 4-19, 4-21, 4-35.

It also appears that the City carried out its cost/benefit ("knee of the curve") analyses in a less than ideal manner. These types of analyses should have been carried out for all control alternatives, or suites of controls, which passed initial screening, on an outfall-by-outfall basis (not just on a system-wide basis). This type of analysis is intended to be used in identifying the optimal sizing of each alternative considered. Indianapolis also should provide an analysis of the annual household cost for wastewater for all of the alternatives is has evaluated not just the one that it is proposing.

For each water body for which controls were evaluated, the City carried out cost benefit analyses for four control technologies: 1) high rate treatment, 2) high rate treatment with disinfection, 3) surface storage, and 4) subsurface storage/transport conduits. Analyses were carried out based on both percent capture and percent biochemical oxygen demand (BOD) load reduction. The City carried out these analyses assuming that only one technology would be applied to any given water body, on a water body-wide basis. In fact, like many LTCPs, the City's Recommended Plan combines technologies and controls within each sewershed. The cost/benefit of realistic combinations and sizes of controls should have been evaluated, instead of generic, "one technology" assumptions.

Committee Response

- Carlton explained, via a knee of the curve and financial capability threshold illustration on the grease board.
- Rosemary added that EPA is looking at the City of Indianapolis like another city with ¼ of the outfalls, which does not make sense to look on an outfall by outfall basis.
- Carlton mentioned that it could be done with watersheds, which would draw similar conclusions.
- John noted that outfall by outfall carries too high of a cost and could not be done. Ralph Roper added that major things like storage vs. treatment might get lost as well, while Bill Beranek stated that too much detail is not good.

Comment 6

In past discussions with the City, US EPA expressed concern regarding Indianapolis' lack of modeling and monitoring on the smaller creeks (Eagle Creek, Pleasant Run, and Pogues Run), given the expected high level of CSO impact on the small creeks. Our concern was somewhat reduced by Indianapolis' response that, in light of the public's interest in protection of those creeks, Indianapolis expected to propose a high level of CSO control for those creeks.

Indianapolis has failed to follow through on that representation. Instead, discharges to the three smaller creeks were largely evaluated in terms of the impacts those creeks' discharges would have on the White River (see Sections 4.6, 4.7). Furthermore, the Recommended Plan proposes the same 85 percent capture for those creeks as for the system as a whole. In evaluating levels of control, it appears that the City focused on what levels of capture were necessary in each creek to achieve specific system-wide levels of capture (see Table 4-25). Given the public's interest in protecting those creeks and that small creeks are often used for recreation (especially by children), it would be appropriate for the City to more thoroughly evaluate and consider the impact of various levels of control on the individual creeks, as well as on the White River, rather than focusing solely on system-wide performance measures.

One area of particular concern is what happens in the smaller tributaries after a CSO event during a low flow period? As the tributaries return to being “a series of puddles,” which now include substantial CSO contribution, what happens to dissolved oxygen and bacteria levels?

Committee Response

- Carlton stated that there is currently a capture level of 85%; and there is additional money targeted for septic tank conversions as well, which also contribute to the problem.
- Glenn stated that the tributaries need to be close to 100% capture, while White River could be 65% capture. Furthermore, he added that this is where it is critical to get maximum capture near small streams and stop treating small streams like White River is ridiculous.
- Bill Beranek noted that this comment has some validity to it.

Comment 7

We have a number of concerns regarding the City’s Financial Capability Assessment. Examples of this include the following:

- The City has based its ability to pay solely on the finances of Center Township, its township with the lowest median household income. Under US EPA’s “Economic Analysis Guidance for Water Quality Standards,” the total wastewater expenditures should be compared to the median household income of all of Marion County, rather than just Center Township.

- The City has assumed that no state revolving fund (SRF) loans will be used, since the State cannot guarantee the amount that will be available. Zero SRF funding seems very unlikely. The City should describe how it intends to finance its LTCP, and should explain how various, realistic funding scenarios (using realistic assumptions regarding SRF funding) would impact its financial capability assessment.

- Indianapolis should provide an analysis of the annual household cost for wastewater for all of the alternatives it has evaluated, not just the one that it is proposing.

- Indianapolis has updated 1990 census data to 1999 dollars (at a 3 percent per year CPI), and then compared current project cost impacts to those 1999 incomes. It is not clear what year dollars are used as the basis for the project costs, but assuming that they are in 2000 or 2001 dollars, further inflation of income values would be in order. The appropriate CPI factor would have been 1.38 and adjusted MHIs for Center Township and Marion County would have been as follows:

	Center Township (median	Marion County (average

	household income, in $s)	method/weighted method; median household income, in $s)
1999	$23,715	$37,870/$38,243
2001	$25,269	$40,353/$40,721

- The City has included the cost of measures, such as the Phase III WWTP upgrades, the need for which it proposes to assess after implementation of earlier phased controls. Inclusion of costs which may not in fact be expended may be artificially inflating the expected cost of the Recommended Plan; this may in turn result in the City not including other appropriate measures on the basis of overall affordability. Moreover, several of the proposed control measures may include costs, which should not be considered totally attributable to CSO control. These include several of the WWTP upgrades and the 041/042 Storage Project (these may be in part delayed maintenance/replacement items), as well as measures such as streambank restoration, and several projects (Pogues Run Storage Box and wetlands) which may actually be needed primarily to address flooding concerns, regardless of their impacts on CSOs.

  Committee Response

  - Councillor Coughenour commented that everything was presented to her as if the money was all coming from SRF, and she wondered if that was true.
  - Carlton said that the City had computed the financial capability assessment based on current bond rates.
  - Ralph mentioned that it would be beneficial to look at SRF funding vs. bonding issues and sensitivity analysis that illustrates a range. John added it would be good to provide charts, graphs, etc. regardless of the type of funding (SRF or bond).

Comment 8

The LTCP provides very little information regarding Indianapolis' separately sewered areas, the characteristics of those areas, and the impact those areas have on CSO discharges. By omission, the LTCP Report implies that the separate areas and their wet weather flow characteristics are not really relevant to the development of a LTCP. This is not so. In any "mixed" system, separate wet weather contribution is important in that, at a minimum, it competes with wet weather combined flows for treatment plant capacity.

In the City's case, the four large system relief points (008, 039, 117, 118) make the separate areas even more relevant to Indianapolis' LTCP development effort (see Section 2.7.1). These points relieve the main interceptor system, which carries both separate and combined sewage to the treatment plants. These four relief points represent a significant fraction of Indianapolis' current average annual CSO discharge (34 percent of BOD and 26 percent of TSS loads discharged; page 2-31). Furthermore, the LTCP Report notes that "pollutant concentrations are higher at system relief points than at other combined sewer outfalls." This is likely due, at least in part, to the separate sewage inclusion. The

LTCP should more clearly describe Indianapolis' separate sewered areas, their current wet weather flow characteristics and their current impact on CSO discharges.

The LTCP should also more clearly discuss how the separate areas' wet weather flow characteristics were addressed in the computer modeling. As noted in the LTCP Report on page 2-39, Indianapolis' model incorporates estimated inputs to the interceptor model from separate sewer areas based on 1980s flow monitoring data (see Section 2.7.3). A document referenced in the LTCP Report, the *Technical Memorandum: CSO Model Calibration (CDM, 1997)* [see page 2-9], specifically recommended actual modeling of separate areas to allow more precise characterization of separate I/I contributions during larger storm events. Additional separate area wet weather flow characterization is appropriate, and may allow for consideration of alternatives for reducing CSOs by using available storage in the sanitary sewer system. (See page 4-23).

Committee Response

- Tom White mentioned that it is mostly combined sewers, not sanitary sewers that are coming through these points.
- Carlton added that a better job of describing what has been done is needed here for clarification.
- John stated that implementing the permanent flow monitors that the City installed 10 years ago is more than most communities have done.

Comment 9

The LTCP Report does not provide estimates of individual CSO activation frequencies or volumes during a typical year under current conditions for the range of alternatives considered, including its recommended plan. Instead if provides only estimates of overflow volume ranges and average frequencies by interceptor system (see Table 2-8). The LTCP Report should provide much greater detail regarding expected system performance, on an outfall by outfall basis, for the entire range of alternatives considered.

Committee Response

- Carlton mentioned that EPA is interested in seeing this done for every outfall.
- Glenn added that the current information is merely rough estimates as to what is coming out of the outfalls. In order to change that, the City must go out and gather more data (i.e., chalking CSOs).
- Mona reminded every that the LTCP is a "dynamic document" that will continuously change as more information and the latest data becomes available. She further added that the City is in fact chalking outfalls daily and more monitors have been installed.

Comment 10

The LTCP Report does not clearly present how percent capture is being calculated, nor what a *"system-wide average of 12 overflows"* means. The LTCP Report needs to clarify this point. Moreover, table 2-8 is confusing. For example, it is not clear what is meant by “Optimized Conditions?” Several items in this table would benefit from further clarification. For example, average overflow frequency appears to be the total number of overflows occurring in a year divided by the number of outfalls experiencing overflows. That does not necessarily equal the number of overflow events (any time any one or more overflows is active) per year. Also, why are eight small CSOs mot included in this table?

Committee Response

- Carlton noted that the eight small outfalls in question would be added to the table as well as meanings will be clarified to indicate storm event as one vs. number of overflows per storm.
- Glenn mentioned that the larger a city is the more vulnerable it is to these events resulting in greater penalties.

Comment 11

The city has identified septic areas as potential sources impacting its receiving waters (see Sections 2.8.1 and 2.8.2), and has targeted 18,000 residences for “accelerated connection” to the system. The LTCP report does not provide sufficient evidence that a significant number of those systems have in fact failed. Appendix G provides ratings, which indicate the percent of failed septics by neighborhoods, however this information does not readily translate into actual numbers of failed septics. In particular, the LTCP Report notes that the City’s consultants based their estimate of the impact of failed septics on their experiences in other communities. Better justification should be provided for a proposed measure with an estimated cost of $32.4 million.

Committee Response

- Carlton mentioned that the Barrett Law Master Plan had been summarized and inserted into the LTCP, which explains how neighborhoods are rated. He suggested possibly giving EPA the entire Barrett Law Master Plan or further data.
- Glenn stated that the amount of money being spent needs to be increased, and data from the Marion County Health Department should be included.
- John and Ralph added that this request “just becomes a black hole” and the justification given is appropriate.

Comment 12

The city has looked at industrial user IU discharges, based on a weighted toxic concentration for each IU. There are also several toxic pollutants, which have specifically been identified in the receiving streams. The City has identified IUs that discharge particular pollutants, as well as those with large volume discharge and high “toxicity ratings.” While these are positive steps, the LTCP Report fails to make any specific recommendations regarding measures that will be implemented to address IU impacts (see Section 2.10).

Committee Response

- Carlton stated that the control measures must be prioritized.

- Glenn stated that the City should target the top 6 SIUs.

Comment 13

We have concerns regarding how various control technologies were considered in the alternatives evaluation:

- The design bases and expected operating characteristics for the various technologies were not clearly laid out. Some of the assumed removal efficiencies are questionable (i.e., 60 percent BOD removal for "high rate treatment," which may be a swirl concentrator; see Section 4.6.1.3). Also, the TSS removal performance associated with high rate treatment is assumed to vary depending on whether disinfection is provided; it is not clear why this assumption was made.

- Many technologies were originally described, but do not appear to have received serious consideration.

- CSO outfall technology considered appear to have been largely limited to swirl concentrators, screening, netting and trash racks. This is not appropriate, especially for large, active outfalls such as the interceptor relief points, where high-rate treatment options such as ballasted flocculation should also be evaluated.

  Committee Response

  - Carlton noted that the City did look at a broad range of items including reclamation facilities, however, a better explanation would be needed. Moreover, he stated that the City is concerned about treatment facilities scattered throughout neighborhoods and the corresponding operational considerations.
  - Bill said that an explanation should be given as well as the cost benefit.

Comment 14

The proposed 20-year schedule does not appear to be justified. Relatively little work is to be carried out in the first five years, with work on the collection system being largely postponed until after ten years.

Committee Response

- Bill mentioned that this was "clearly a City strategy issue."
- Ralph added that if changes are not made to the treatment plants first, then the other items would need to be placed on hold. The City must have the ability to treat additional sewage. Bill concurred that when dealing with these issues order must be a concern.
- Glenn noted that things that are scheduled for 20 years could be completed in 4 years, particularly the septic tank conversion program. He also added that you are better off with low volume and high exposure first.

Comment 15

Although the City has evaluated the impacts of various alternatives on compliance with e. coli criteria in the White River between River Miles 255-200, the City must evaluate the impacts further downstream to determine the extent to which the City's CSOs cause or contribute to the magnitude and duration of exceedances of criteria in those downstream reaches.

Committee Response

- Carlton noted that a better job would need to be done with explaining why milestone was picked and additional documentation would need to be provided.
- Merri questioned if other communities reviewed the LTCP and commented on it. Carlton informed the committee that other communities were sent the LTCP.
- Glenn wondered if the State had commented on it indicating that it could be useful in making the City's case. Rosemary said that the State has not made independent comments as of yet, however, they are involved in the discussions with EPA and the City. She further stated that the State needs to approve the LTCP just as EPA does. Rosemary believes the State will defer to EPA for comments.

Comment 16

The LTCP Report refers on page 1.5.2 to the negative effects of "sewer infrastructure problems" but does not elaborate on the nature of those problems.

Committee Response

- Carlton stated that the City could point out these items in the LTCP to EPA and if they needed further elaborate on this issue.

4. **Other**
    - The following items were brought up to be added to the agenda:
        - Glenn Pratt asked about the item Dick Van Frank wanted discussed several meetings ago that has not been discussed.
        - John Kupke raised the point of State Analysis, which is currently in draft stages only.
        - Glenn also mentioned that status of the permit, which Mona Salem noted that the City is still working through it.
        - Merri Anderson wanted to discuss meeting times.

5. **Next Meeting** (to be held at 604 N. Sherman)
    - Future meetings are listed below:
        - **October 23, Conference Room C** (originally scheduled for Oct. 9th)
        - December 11, Conference Room A

WET WEATHER TECHNICAL ADVISORY COMMITTEE
MEETING SUMMARY

SPECIAL MEETING

October 3, 2001

In Attendance:

Committee	City Staff	Consultants
Merri Anderson	Pinkie Evans-Curry	Robin Garibay
Bill Beranek	Bob Masbaum	George Pendygraft
Eli Bloom	Amanda Mikesell	Rosemary Spalding
Beulah Coughenour	Paul Werderitch	
Pete Drum		Interested Citizen
Glenn Pratt		Phyllis Zimmerman
DeVonne Richburg-Pollard		
Ralph Roper		
Pam Thevenow		
Dick Van Frank		

Absent:

Ken Crichton
Jeff Frey
John Kupke

1. Introductions

- Bill Beranek called the meeting to order and had everyone introduce him or herself, and he reminded everyone that this was a special meeting that should provide some answers as well as provoke questions which may be unanswerable at this point in time.
- Pinkie Evans-Curry added that Cyndi Wagner from IDEM was invited to attend, however, may not be able to show up. If that is the case and TMDLs are not discussed, they will be addressed at the meeting on October 23rd, which is rescheduled from October 9th.
  - Merri Anderson suggested during the meeting that those individuals interested in TMDLs should meet with the City outside and/or off-line of the regularly scheduled meeting on October 23rd. Pinkie said that the State needed to be present at such a meeting, and she would follow up with Cyndi at IDEM.

2. Data Sampling Update (Robin Garibay)

- Robin Garibay gave an update on the implementation of the "Supplemental Flow Monitoring and Sampling and Analysis Program for Combined Sewer Overflows," which was submitted to IDEM and US EPA in November 2000. There are three program objectives, which Robin went through individually providing a review of the objective and the status. *Robin provided a seven-*

page handout that included a glossary and hypotheses for the program objectives, which are:

1) Support implementation of LTCP facilities planning process for CSOs
2) Confirmation of pollutant characteristics attributed to CSOs that have reasonable potential to exceed (RPE)
3) Program objectives attained through specific data quality objectives

Objective 1 – Confirm Flow and Volume [which dictate design]
Note – Items listed below are from Robin Garibay's presentation.

- *Hypothesis*: Model spatial sensitivity is sufficient to define individual abatement design specifications.
- *Decision*: Individual CSO control structure(s) can be designed from model predictive ability.
  - YES – Model is sufficiently sensitive for use in design criteria
  - NO – Re-calibrate model
- *Data Input to Decision*: Indianapolis CSO output. At minimum, 13 additional outflow locations will be monitored.
- *Input Decision Criteria*: Model output meets predictive vs. actual performance standards for flow and volume.
- *Decision Rule*: Design information fits LTCP goals.
- *Decision Criteria*: Design specifications result in acceptable model response:
  - +/-20% flow
  - magnitude and timing of peaks temporally similar
- *Possible Sampling and Analysis Techniques*: At a minimum, sample three (3) events at specific outflow locations (e.g., outfall, interceptor, and/or diversion structure).
- *Sampling Events*:
  - Started in mid-July (all flow monitors up and running), ~10 flow-monitored storm events
  - All CSOs have discharged during at least one (1) event
  - August 23, 2001 – all flow-monitored CSOs discharged except Outfall 117
  - September 23, 2001 – all flow-monitored CSOs discharged
  - Storms varied 0.2-inch to 1.75-inch
  - CALAMAR system operating well
- *Data Validation*: Storm event flow data in process of being confirmed as being representative and of good quality.
- *Data Application*: Validated flow data will be used to confirm flow and volume based on the following criteria of comparison of model response (model runs should be performed within two (2) months of data validation):
  - +/-20% flow; and
  - magnitude and timing of peaks temporally similar
- ***Committee Discussion***:
  - It was noted that Outfall 063 was replaced with 065 and 125 replace Outfall 129. Bob Masbaum added that WREP is chalking all non-flow

monitored CSOs seven days a week and can provide the Committee with that data.
  - Robin Garibay mentioned that the objectives were listed in priority order making Objective 1 priority number one. All of the flow monitors were up and running in mid-July and they kick on with a sensor. 19 storm events have met criteria with at least one CSO discharging during each. She was surprised to find that CSO 117 did not discharge as expected/predicted.
  - Dick Van Frank asked if the model predictions confirmed previous monitoring.
    - Robin noted that the analysis has not been done.
  - Robin discussed the storm event that occurred on Sept. 23rd, in which there was a system-wide discharge effect. She proceeded to explain the Calamar System that gives estimated rainfall amounts.
    - That prompted discussions on the storm event on Sept. 19th, in which it apparently rained more. Dick asked why the 23rd was used versus the 19th where, based on data he has, more rain occurred. Robin reminded everyone that the flow monitors get kicked on with a sensor.
  - Robin then mentioned that the City will need to provide photos and schematics from the data collected, and US EPA will validate all of the data.
- ***Questions regarding Objective 1***:
  - Pete Drum: What is wrong if the data does not confirm what was predicted and/or hypothesized? – Robin noted that the models undergo sensitivity tests, and they look at underlying assumptions. This is something that is done multiple times and tweaking does occur, which is what was done for the LTCP.

<u>Objective 2</u> – Confirm Dissolved Oxygen Control
Note – Items listed below are from Robin Garibay's presentation.

- *Hypothesis*: 87% capture of system-wide CSO volume will assure that CSOs are not contributing to or causing exceedances of the in-stream DO criteria.
- *Decision*: 87% capture results in attainment of water quality criteria
  - YES – Implement next steps of LTCP using this approach
  - NO – Re-evaluate percent capture required
- *Data Input to Decision*: Indianapolis CSO model (hydrology/hydraulics, DO, bacteria) output (CDM developed)
- *Decision Rule*: Capture (volume) improves in-stream quality
- *Decision Criteria*: Predictive performance
  - +/-20% DO predicted vs. DO observed
  - DO sag spatially similar
  - Diurnal DO variability incorporated
- *Possible Sampling and Analysis Techniques*:
  - Algae Productivity and Respiration
  - Sediment Oxygen Demand (SOD) kinetics

- Biochemical Oxygen Demand (BOD) time-series data over a storm event(s)
- Re-aeration effects on DO due to dams or other control structures
- Diurnal variations for DO as caused by BOD, SOD, algae effects

- *Sampling Events*:
  - In-stream sampling
    - Mean flow conditions = < 1000 cfs
    - Low flow conditions = < 300 cfs
  - Outfall sampling
    - Two (2) storm events:
      - 0.2-inch < 2-inch
      - more than 60 hours from last 0.1-inch rain
      - discharge from all monitored outfalls for one (1) event
      - discharge time > 2-hours
- *Sampling Event Measurements*:
  - In-stream sampling
    - Has not been conducted yet, White River close to mean flow conditions
    - EGS Group/Astbury Labs contracted to perform studies
  - Outfall sampling
    - ISCO Model 2900
    - Astbury Labs conducting BOD and Chlorophyll-a analysis
- *Data Validation*: Storm event outfall monitoring data in process of being confirmed as being representative and of good quality.
- *Data Application*: Validated data will be used to determine that the model response is acceptable as defined by the following criteria (model runs should be performed within two (2) months of data validation):
  - +/-20% DO predicted vs. DO observed;
  - DO sag spatially similar; and
  - Diurnal DO variability incorporated

▪ ***Committee Discussion***:
  - Robin Garibay mentioned that we want to use this model to ensure that exceedances do not occur, and it required a bit of sampling efforts.
    - Data continues to be collected.
    - Chlorophyll-a probes have been fussy.
  - Robin noted that dam re-aeration still needs to occur, which should occur week of October 8, 2001 if weather holds out. She also discussed the use of dye pinkish in color to determine time-of-travel, which has prompted much discussion regarding drinking water color. Both Robin and Bob Masbaum noted, however, that EPA stated that it was okay to start upstream of drinking water intake.
  - Glenn Pratt mentioned that he is concerned with the tributaries not White River itself.

▪ ***Questions regarding Objective 2***:

- Dick Van Frank questioned if data, etc. would be shared with the Committee once it has been done? – Robin stated that there will be lots of graphs and a report will be generated to respond to the 308.

Objective 3 – Confirm Bacteria Control
Note – Items listed below are from Robin Garibay's presentation.

- *Hypothesis*: 100% capture of system-wide CSO volume will assure that CSOs are not contributing to or causing exceedances of the in-stream DO criteria.
- *Decision*: 100% capture results in attainment of water quality criteria
  - YES – Implement next steps of LTCP (e.g., cost assessment) using this approach
  - NO – Evaluate watershed management
- *Data Input to Decision*: Indianapolis CSO model (hydrology/hydraulics, DO, bacteria) output (CDM developed)
- *Decision Rule*: Capture (volume) improves in-stream quality
- *Decision Criteria*: Predictive performance
  - +/-50% bacteria counts (95% Cl)
- *Possible Sampling and Analysis Techniques*:
  - Bacteria time-series data over storm event(s)
- *Sampling Events*:
  - Outfall sampling
    - Two (2) storm events:
      - 0.2-inch < 2-inch
      - more than 60 hours from last 0.1-inch rain
      - discharge from all monitored outfalls for one (1) event
      - discharge time > 2-hours
- *Sampling Event Measurements*:
  - Outfall sampling
    - ISCO Model 2900
    - Astbury Labs conducting E. coli analysis
- *Data Validation*: Storm event outfall monitoring data in process of being confirmed as being representative and of good quality.
- *Data Application*: Validated data will be used to determine that the model response is acceptable as defined by the following criteria (model runs should be performed within two (2) months of data validation):
  - +/-50% E. coli counts using the 95% confidence intervals around E. coli
- ***Committee Discussion***:
  - Robin Garibay flew through this section a bit since it is like BOD and DO with the same collection spots. She mentioned that over time you know what the bacteria load is.
  - Dick Van Frank stated that the City will continue to exceed Water Quality Standards (WQS); and if there is no discharge occurring, the CSOs are not contributing to the bacteria.
    - The City is saying that there is a chance that we would still exceed WQS for bacteria.

- Dick then asked where the violation of WQS on Fall Creek was coming from then. It was noted that if there is less than 100% of capture then violated WQS would be violated.
- Pam Thevenow asked if sampling occurs right out of the outfall then where does the "days of exceedance" come from. Robin explained that there is bacteria input from the CSO, and the model is used to aid in determining options for the biggest "bang for the buck," which would be time-series.
  - Pam pondered how the days of exceedance is determined, stating that if an overflow occurs three (3) days later and there are 12 total overflow events then the days of exceedance for WQS would be 36.
- Glenn Pratt stated that the State was going to do a TMDL, however, it was decided to do everything at once. Glenn has yet to receive the work plan from either the City or State as requested.
- Pete Drum pointed out the numbers in dry weather for E. coli in the June data, asking that if someone knows why all the tributaries had five (5) plus digits for E. coli during the month of June for dry weather to please let him know. He also noted that the two (2) months prior there was also little rainfall, however, E. coli remained at standard levels.
  - Paul Werderitch noted that this was abnormal but not unknown to occur.

▪ ***Questions regarding Objective 3***:
- Glenn asked if upstream data is being collected for the TMDL as promised; and where the work plan is, which is part of the TMDL not for the 308 Request? – Pinkie Evans-Curry questioned who made that particular promise. Rosemary Spalding added that IDEM is contracting with the City, however, it is not an overnight process. Glenn then mentioned that "if this is not going to be done right, then we are going to court with the State." Robin passed out Cyndi Wagner's TMDL presentation in her absence, noting that the program did proceed this summer.
- Bill Beranek asked if the information provided in Cyndi's presentation was for Fall Creek? – Dick mentioned that the contract was sent out for the TMDL on Fall Creek, however, no sampling is being done on Mud Creek which goes through mixed areas (septic/sewer, agricultural, etc.). Glenn noted that the State was to have delegated this to Robin in order for it to be completed, which could have been handled in two (2) weeks.
- Glenn asked where the contract is currently? – Pinkie informed him that it is with City attorneys. She continued by saying that the State is still a big part and must be present at such discussions. Glenn added if the contract is still with the City, it then needs to get to the State and so on. It was his hope that this would be used as a model for how things should be done. Pinkie reminded the Committee that we all have the same end result in mind and confrontation will not help us achieve that result.
  - Glenn added that there must be a compliance schedule as well, and there are major philosophical differences with the State.

- Robin summarized that data is being collected; they are seeing some things that are a bit surprising (i.e., CSO 117 not discharging as anticipated); and she anticipates showing the Committee a lot of graphs, etc. by the end of the 1st quarter/beginning of the 2nd quarter (with the flow monitoring available a bit sooner).
- Glenn told Pinkie that he appreciates her attitude, etc. on this matter.

3. Possible Agenda Items for October Meeting

- Update of LTCP status (meetings with EPA, etc.)
- 308 Request status
  - Rosemary Spalding mentioned that we have complied with the request.
- Data from WREP CSO chalking
- Ralph Roper's explanation of proposal for plan (Roper/Hackworth Plan)

4. Next Meeting

- ***October 23rd 1:30-3:30pm Conference Room C***
- December 11th 1:30-3:30pm Conference Room A

WET WEATHER TECHNICAL ADVISORY COMMITTEE
MEETING SUMMARY

October 23, 2001

In Attendance:

Committee	City Staff	Consultants
Merri Anderson	Pinkie Evans-Curry	Mark Burgess
Bill Beranek	Bob Masbaum	Rosemary Spalding
Beulah Coughenour	Amanda Mikesell	
Pete Drum	Carlton Ray	
Jeff Frey		Interested Citizens
John Kupke		Phyllis Zimmerman
Glenn Pratt		
Dick Van Frank		

Absent:

Eli Bloom
Ken Crichton
DeVonne Richburg-Pollard
Ralph Roper

1. Introductions

- Bill Beranek called the meeting to order and had everyone introduce him or herself.

2. Minutes

- Minutes from the August 14th meeting were distributed via email.

3. Questions and Answers (Bob Masbaum)

a.) Chalking

- Bob Masbaum distributed a handout with the results of the CSO chalking program (an empty square = no discharge; 0 = discharge during wet weather; 1 = discharge during dry weather). It is important to note that these results only answer whether or not there was an overflow.
  - Glenn Pratt suggested that it would be beneficial to know if the flow was just a trickle or a major flow. Dick Van Frank would like some sort of indication in the data/results as to which CSOs have flow monitors.
  - Merri Anderson asked if there was any particular reason why CSOs are numbered the way they are. Bob said that there was no real method in the numbering system of the CSOs, other than some may have been numbered at various points in time.

- Councillor Coughenour stated that data/results really do not seem like they make sense unless the amount of rainfall is known. There is no way to determine how much rain will make a CSO overflow.
  - Bob indicated that the CALAMR system was used and data was plugged into the model. Carlton Ray added that the system/formula is a pretty accurate way of calculating.
  - Jeff Frey questioned how the 19 monitored CSOs were selected, and how long has this been done. Bob explained that they tried to pick a variety in order to be representative of the entire system, and some outfalls have been monitored since 1997 with the others in July 2001.
- Glenn mentioned that it is frustrating that the monitoring has been discussed for four-years and some were just started this year. He added that he wants to have it done right.

b.) Aerial Photos

- Pinkie Evans-Curry stated that infrared photos were not used for the aerial photos with respect to septic tanks.
  - Jeff Frey indicated that infrared would not document if there were a problem, it would only illustrate location.
- Bill Beranek asked if the location of septic tanks in Marion County was known.
  - Phyllis Zimmerman mentioned that she knows some septics that are not on the map, such as those on the west side of Pleasant Run above 10th Street. Some of these are from the 1950's and they are not on the Barrett Law list.

c.) LTCP Negotiations (Rosemary Spalding/Mark Burgess)

- Rosemary Spalding distributed EPA's comments to the City's LTCP as well as a page listing the comment status. Some comments have been resolved while others are still ongoing. The comments were sorted based on classification (technical, financial, legal) and length of clarification (easy vs. difficult). A recommendation was then made to EPA/IDEM on how to approach discussing the comments; and it was decided that a technical staff level group would review the comments and proceed as far as they could then would involvement management when needed. There have been a series of conference calls and meetings for these discussions as well as interim phone calls between the parties. At this point in time, there have been three meetings, which have proven to be very productive, and two more are scheduled for November and December. At the conclusion of the discussions with EPA, an amended Plan will be presented for additional comments by the public, WWTAC, CSO Advisory Committee, etc. John Kupke questioned when this process was to be done by. Rosemary answered that the meetings should be concluded by the end of the year, changes will be made to the Plan, and then it will be ready for public review hopefully around the first quarter of next year. She also noted that she remains very optimistic about the timetable.

- Bill Beranek suggested running through the resolved comments.
- Comment 4: Mark Burgess stated that EPA is of the opinion that the City needs to evaluate more alternatives; however, we wanted to meet DO limits. We have agreed to go back and evaluate other alternatives and screen them. Rosemary clarified that EPA wants to see these alternatives evaluated even though EPA agrees they may not be the recommended approach.
- Comment 5 (b): This is being addressed as part of the alternatives evaluation just discussed regarding Comment 4.
- Comment 8: This will be addressed as part of the supplemental flow analysis. Glenn Pratt suggested that it might be more efficient to build storage in the separate sewer areas.
- Comment 9: This comment was resolved after the City provided additional information and after discussion with EPA.
- Comment 11: Mark indicated that EPA was provided a copy of the Barrett Law Master Plan in addition to information on the work that has been done.
- Comment 12: Mark mentioned that this comment dealt with industrial users, and it is done on a case by case basis and updates will be provided to EPA periodically.
- Dick Van Frank said that he would like to review the comments that remaining ongoing (particularly Comments 1 and 2) rather than discuss the items that have been agreed on.
- Comments 1 and 2: Rosemary indicated that these comments go hand in hand, with Comment 1 being about "Sensitive Areas" and Comment 2 covering "Existing Use." We have elaborated by providing documentation on sensitive areas, which is defined differently. The City would like to take part in discussions that determine how "sensitive areas" and "existing use" are defined. EPA is satisfied with the information submitted in other areas.
  - Rosemary discussed that Marion County has "no sensitive areas" because there is an Ordinance making full-body contact in any public waterway unlawful in this county.
    - Title II Public Order and Safety, Chapter 321 Beaches and Swimming Pools, Section 321-2 states, "It shall be unlawful for any person to fish, bathe, wash, operate boats in or enter any public waterways [*waterway shall mean and include not only all streams, but every kind or body of water, either natural or artificial*], or to send, drive or ride any animal into any public waterways, where not authorized for such purposes. However, the department of parks and recreation may set aside certain places and designate the rules for swimming, wading, bathing, boating and fishing by persons in any such places."

    - Pete Drum commented that legal, full body contact regularly occurs in White River.
    - Jeff Frey and Bill Beranek mentioned that DNR and the Health Department might be able to help us document use such as fishing.
- Comment 3: This comment is pending by virtue that the discussion surrounding it is still ongoing.
- Comment 6: Dick indicated that there was a lack of modeling on the creeks. Mark mentioned that Pleasant Run and Pogues Run became major contributors with wet weather (Comment 4 plays a role in this as well). Dick added that the last sentence on page 4 is what he finds interesting/has issue with. Glenn Pratt mentioned that we are not doing a good job on the tributaries, with Dick inserting that people are given access to these waterways.
    - Councillor Coughenour questioned how we were answering the third paragraph of Comment 6. Mark stated that they are looking to gather dissolved oxygen on these small tributaries where they know that there is a problem.
    - That sparked a question from Merri Anderson regarding the amount of flow the reclamation facility could handle. Mark indicated that the Fall Creek plant makes sense to put in today. Phyllis Zimmerman questioned the possibility of putting in a mini-plant of sorts to consolidate septics.

4. Other

a.) TMDL Contract Information/Update

- Pinkie Evans-Curry updated the Committee on the status of the TMDL Contract. There is a discrepancy with the date. Pinkie will be meeting with Lance Myers of IDEM regarding the Contract.
- Glenn Pratt and Dick Van Frank indicated that they would like to see the Contract itself. Pinkie, however, does not want to release it until after she has met with Lance.
- Rosemary Spalding noted that part of the problem is the varying levels of understanding with respect to TMDLs.
- Dick mentioned the reason for wanting to see the Contract is to ensure that it is done right the first time. Glenn added that the work plan is 100% necessary. It was later mentioned that Mud Creek could be a source of bacteria in Fall Creek.

b.) Meeting Time

- Merri Anderson brought up the possibility of changing the meeting time from the afternoon to the morning. Nothing was settled other than there is no way one specific time would be good for everyone involved. We have to go with what is best for the majority. The Committee did feel as if the second week of every other month was a good schedule to follow, adding additional meetings if necessary.

- It was, however, discussed and decided that an additional meeting would be beneficial next month (**Fri. Nov. 16 1:30-3:30pm**). Pinkie Evans-Curry asked the Committee if they thought the question/answer format of this meeting was useful, and it was determined that the November meeting would be a continuation of this process and/or forum.

5. Next Meeting

- **Fri., Nov. 16, 1:30-3:30pm, 604 N. Sherman Conf. Rm A**
- Tues., Dec. 11, 1:30-3:30pm, 604 N. Sherman Conf. Rm A

WET WEATHER TECHNICAL ADVISORY COMMITTEE
MEETING SUMMARY

November 16, 2001

In Attendance:

Committee	City Staff	Consultants
Merri Anderson	Pinkie Evans-Curry	Mark Burgess
Bill Beranek	Bob Masbaum	Rosemary Spalding
Pete Drum	Amanda Mikesell	
John Kupke	Carlton Ray	
Glenn Pratt	Tom White	
Ralph Roper		
Dick Van Frank		

Absent:

Eli Bloom
Councillor Beulah Coughenour
Ken Crichton
Jeff Frey
DeVonne Richburg-Pollard

1. Introductions

- Bill Beranek called the meeting to order and had everyone introduce him or herself.

2. Minutes

- The following corrections were made to the minutes from the October 23rd meeting:
  - Page 3 of 4, under Comments 1 and 2: Pete Drum's comment with respect to the Ordinance was changed to reflect that legal, full body contact regularly occurs in White River. In addition, the wording from the Ordinance was added to the minutes.
  - Page 3 of 4, under Comment 3: Rosemary Spalding clarified that Comment 3 is pending by virtue that the discussion surrounding it is still ongoing.
- Dick Van Frank mentioned the email he sent October 25th in which he questioned the accuracy of the data used in the presentation made by Robin Garibay of the Advent Group at the October 3rd meeting.
  - John Kupke mentioned the difficulty in getting all flow monitors operating the way we want. Bob Masbaum gave a brief description of the current chalking situation. At this point, Mark Burgess of CDM added that it was a QA/QC issue, and the same results were not achieved with monitoring and chalking. John would like to see the City get back together with WREP and discuss the importance of chalking and the manner, in which it needs to be done, adding we are never going to have a perfect model.

- Merri Anderson commented that if there is a problem with contract compliance on these issues (i.e. chalking) then it needs to be resolved. She added four (4) items of concern: scope of contracts, sewer cleaning, IWC purchase, and the State cut on flow monitors.
- John suggested that at the next meeting use one area (Pleasant Run) and walk through an in depth analysis including what we have done and how we are using the data. Glenn Pratt and Bill Beranek would also like to see a walk through of chalking depth issues, i.e. is there a value to be gained from depth issues (looking at values/problems). The Committee agreed that maps would be useful too.
- Dick requested a copy of the summary sheets for the flow monitoring and chalking reports on a monthly basis.

3. Fall Creek TMDL

- Pinkie Evans-Curry informed the Committee that there is no work plan as of yet, however, it has not gone by the wayside.
- Glenn Pratt reiterated his concern about looking at all impacts. He also mentioned that if this were tied together in one package water quality could be improved in a cost-effective basis.
- Merri Anderson questioned if the Committee would be included in any presentations that may be given. Pinkie indicated that everything is still being worked on and a stakeholders group will be used in addition to public/business involvement.
- Pinkie said she would follow up with Glenn, Dick Van Frank, John Kupke and Pete Drum on this issue.

4. NPDES Permit

- Rosemary Spalding explained that the permit was issued October 26th and it will be effective December 1st. Additionally, there were three (3) appeals filed. Dick Van Frank questioned the affect of the appeals. Rosemary stated that the following appeals were made:
  - The Chamber of Commerce appealed the cyanide limits and did not ask for a stay.
  - Councillors Coughenour and Langsford appealed attachment A and have asked for a stay.
  - Glenn Pratt believes a study should be done to exam endocrine disrupters in fish. He also mentioned that the City would be in violation after the first rainfall.
- John Kupke asked about the three-year compliance provision on E. coli.
  - Rosemary confirmed that yes there is a three-year provision on E. coli for CSO discharges as mandated by SEA 431. By rule, the compliance schedule can only be three years. The hope is to have an approved LTCP and Use Attainability Analysis (UAA) in that time period. Rosemary further stated that the City has in writing a letter from EPA-OECA saying that no enforcement actions will be taken against the City for wet weather

discharges for one-year as long as we are working to obtain an approved LTCP and an enforceable agreement to implement the approved LTCP.
  - Glenn mentioned the use of a Consent Decree; however, Rosemary stated that the Consent Decree proposed was not in the City's best interest.
- Ralph Roper asked if the variance is not approved if we still need to meet the limits.
  - Rosemary answered yes, but not until the compliance schedule expires in three years and only if the UAA is not approved.

5. Citizens Concerns

- Merri Anderson mentioned that backups were occurring at the newly renovated Hawthorne Community Center located at Mount and Ohio (2700 West). She originally addressed this concern at the WREP/Environmentalist Meeting. Bob Masbaum will check with Jim Parks regarding commitments made with respect to sewer backups at the above meeting.
- Carlton Ray mentioned that citizens' concerns need to be sent to the Mayor's Action Center where a work order will be generated.

6. 2002 Meeting Dates

- 2002 meeting dates were discussed. Some Committee members believe that meetings should be scheduled every month while others would like them to be every other month. It was determined that since there are several issues the Committee is concerned with, including the Long-Term Control Plan, it would be beneficial to meet monthly from January to April then every other month beginning in June. Amanda Mikesell will email the Committee asking for meeting day and time preference.
- Several Committee members would prefer morning meetings. The only days ruled out were Tuesday morning and Friday afternoon.
- The following ways to make the meetings more efficient were mentioned:
  - Focus agenda on either policy or technical issues/discussions.
  - Split committee into a policy group and a technical group.
  - Determine the agenda earlier and send to the Committee prior to the meeting date.

7. Next Meeting

- **Tues., Dec. 11, 1:30-3:30pm, 604 N. Sherman Conf. Rm A**
  - CSO LTCP Comments with be the first agenda item at this meeting, which will be lead by Rosemary Spalding and Mark Burgess of CDM.

WET WEATHER TECHNICAL ADVISORY COMMITTEE
MEETING SUMMARY

December 11, 2001

In Attendance:

Committee	City Staff	Consultants
Merri Anderson	Pinkie Evans-Curry	Mark Burgess
Bill Beranek	Bob Masbaum	Rosemary Spalding
Councillor Coughenour	Amanda Mikesell	
John Kupke	Carlton Ray	
Glenn Pratt	Paul Werderitch	
Pam Thevenow	Tom White	
Dick Van Frank		
Phyllis Zimmerman		

Absent:

Ken Crichton
Eli Bloom
Pete Drum
DeVonne Richburg-Pollard
Ralph Roper

1. Introductions

- Bill Beranek called the meeting to order and had everyone introduce him or herself.
- An announcement was made by Glenn Pratt regarding a meeting that will be held regarding the Fall Creek TMDL in January, which is being set up by the State.

2. Minutes

- The following corrections were made to the minutes from the November 16th meeting:
  - Page 1 of 3, under *Minutes*: The text regarding Dick Van Frank's email and Robin Garibay's presentation was modified and now reads as follows. "Dick Van Frank mentioned the email he sent October 25th in which he questioned the accuracy of the data used in the presentation made by Robin Garibay of the Advent Group at the October 3rd meeting."
  - Page 1 of 3, under *Minutes*: John Kupke's comment was corrected to read, "John Kupke mentioned the difficulty in getting all flow monitors operating the way we want."

3. CSO LTCP Response to EPA (Mark Burgess of CDM and Rosemary Spalding)

- Comment 13: This comment deals with concerns on various control technologies. Mark Burgess stated that the number and location of the outfalls makes outfall by outfall analysis less appropriate, which was recognized by EPA. The City is looking at additional bacteria control options for outfall groups.

  - Dick Van Frank questioned if the relative contribution of each outfall in the group was known. Mark indicated that assuming the model is accurate, yes.
  - John Kupke asked what technology is being looked at. Mark stated that hybrids including storage plus ballasted floc or screening and disinfection is being considered. Dick indicated that this was above and beyond what is currently in LTCP.

- Comment 14: This comment regards (a) scheduling and (b) sequence.
  - Mark mentioned that the 20-year schedule is still on the table and it might be discussed at the meeting with EPA on Dec. 12th (14a). Glenn Pratt stated that the Chamber and environmentalists concur with EPA on this issue, which is political not technical.
  - With respect to 14b (sequencing), EPA says that sequencing makes sense, however, they would like to see it compressed. Dick is interested in seeing the justification for the Fall Creek AWT, and he feels that IWC should be required to discharge more flow. Glenn Pratt feels that Fall Creek should have a higher priority because of environmental justice issues. Merri Anderson stated that McANA has a subcommittee looking at water management plans and including reuse in the new water company operating contract.
- Comment 15: Comment 15 deals with E. coli impacts downstream on White River. Mark noted that this item relates to supplemental sampling and analysis and time of travel studies are being done. There is no answer yet, and there is agreement on the principle of how to approach this. Bill Beranek clarified that we are doing what EPA has asked us.
- Comment 16: Mark stated that the City is providing additional data to EPA regarding sewer infrastructure problems.
- Comment 17: Comment 17 is in regards to die-off rate used in the water quality model. Supplemental sampling and analysis will confirm the die-off rate used.
- Comment 18: Comment to be discussed at meeting on Dec. 12th with EPA. Dick noted that the calibration protocol allows a wide range of values at +/- 20%.
- Comment 19: Sewer Separation. Mark mentioned that a set of criteria for determining which areas should be looked at for sewer separation was added. It has already been agreed to not do a total separation.
- Comment 20: Real Time Control. Mark noted that Table 2-8 has been revised and EPA is satisfied. The revised table will be provided to the Committee.
- Comment 21: The text regarding capture level and DO requirements was revised and accepted by EPA.
- Comment 22: This comment deals with cost per gallon captured. It was discussed and determined that both cost per gallon of capacity and cost per gallon captured are meaningful, and Table 4-9 was modified to reflect that and accepted by EPA. The Committee will be provided with the revised table.

- Comment 23: Removal percent for swirl concentrators. Glenn questioned what the removal efficiency was. Mark mentioned that it was 30-60 percent as stated, but the technology was suppose to be EHRC (ballasted flocculation) instead of vortex separators. The text has been revised and accepted by EPA.
- Comment 24: The change was made. Intermediate clarifiers were moved to phase 1 while EHRC was moved to phase 3. EPA was in agreement. Mark noted that this change would be reflected in several places throughout the text.
- Comment 25: Tables ES-5 and 4-18 were modified and satisfied EPA. The Committee will be provided with the revised tables.
- Comment 26: Mark explained this statement to the Committee. This prompted discussion on growth in the area. Dick suggested looking at housing and office units rather than just population, i.e. there used to be big lots with only one house on them whereas now there are several homes on the same lot. John mentioned that we should be conservative on new growth and prepare the calculation from there.
    - Councillor Coughenour, in agreement with Dick, added that sewer hookups needed to be looked at rather than people.
    - This comment also prompted discussion on the proposed plant along Fall Creek. Councillor Coughenour asked if it was proposed and/or discussed at the public meeting. It was indicated that the plant was mentioned, and Phyllis Zimmerman added that she did not recall much resistance to the plant at these meetings. Pinkie noted that once the negotiations are completed with EPA another series of public meetings will be held on the revised plan. That prompted the question of what happens if it comes to a choice between citizens and EPA with respect to the plant, who wins? Pinkie stated that we would have to wait and see at that point what the outcome would be. John added that the treatment plant should not be a run of the mill plant; and Glenn noted that if it is built and operated correctly, there should not be an odor problem. Merri Anderson stated that she knows of two main objections and/or concerns with respect to this proposed plant: 1) contamination access by kids; and 2) odor concerns, which currently plague the area. Mark Burgess added that the plan was written with enough flexibility that alternatives should not be a problem.
- Comment 27: Mark noted that the DO levels and “50% reduction” was clarified throughout the text, and EPA was satisfied.
- Comment 28: Mark stated that clarification is needed from the City and Ralph Roper is assessing this issue.
- Comment 29: Semantics issue. Text was revised and EPA was satisfied with the revision.
- Comment 30: Tables 4-26 and 4-27 were revised to EPA’s satisfaction. The Committee will be provided with the revised tables.
- Comment 31: Figure 7-3 was modified to clarify BOD resolving this issue.
- Comments 1 and 2: Dick asked what the statuses of these comments were. Rosemary Spalding mentioned that they were discussed with EPA and the ball is currently in their court, and further discussions will not take place until we hear back from them.

4. Other

a.) **2002 Meeting Dates**

Note: Meetings are the third Wednesday of the month and are scheduled from 9:30-11:30am at 604 North Sherman in Conference Room A.

- January 16
- February 20
- March 20
- April 17
- June 19
- August 21
- October 16
- December 18

b.) Chalking

- Glenn Pratt asked about chalking.
- Carlton Ray stated that discussions remain ongoing with WREP. Bill Beranek added that the City is looking into it.
- Glenn remains unhappy with the rate of progress.
- John Kupke questioned if there were pictures available of the chalkings. Carlton indicated that he would show John photos.

5. Next Meeting

- **January 16th, 9:30-11:30am, 604 N. Sherman Conf. Rm. A**

WET WEATHER TECHNICAL ADVISORY COMMITTEE
MEETING SUMMARY

February 20, 2002

In Attendance:

Committee	City Staff	Consultants
Merri Anderson	Barbara Lawrence	Rosemary Spalding
Bill Beranek	Bob Masbaum	
Councillor Coughenour	Amanda Mikesell	
Ken Crichton	Jodi Perras	
Pete Drum	Carlton Ray	
Jeff Frey	Mark Richards	
Ralph Roper	Mona Salem	
Pam Thevenow	Paul Werderitch	
Dick Van Frank		
Phyllis Zimmerman		

Absent:

Eli Bloom
John Kupke
Glenn Pratt
DeVonne Richburg-Pollard

1. Introductions

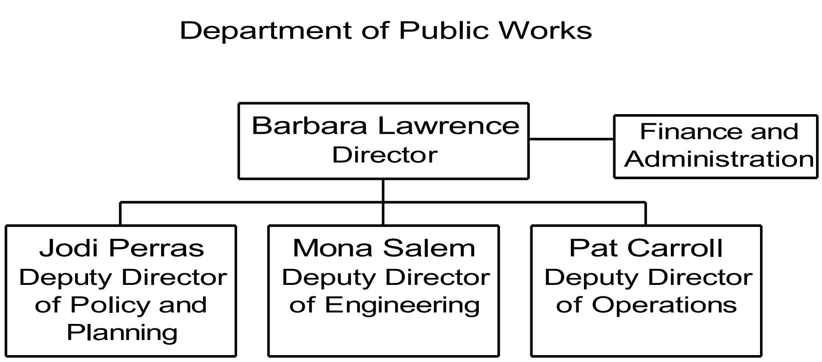
- Bill Beranek called the meeting to order and had everyone introduce him or herself.

2. Minutes

- The minutes from the December 11th Meeting were reviewed and accepted as written.

3. DPW Management Changes

- Jodi Perras noted that there is no department-wide organizational chart. The diagram below outlines the top two levels, which includes the Director and the Deputy Directors.



a.) Policy and Planning Responsibilities
   - Strategic planning
   - Public information
   - Customer service
   - Office of Environmental Services

b.) Engineering Responsibilities
   - Facility planning
   - Construction
   - Storm/wastewater
   - Transportation

c.) Operations Responsibilities
   - WREP contract
   - Solid waste
   - Street maintenance
   - Snow removal

- Merri Anderson mentioned that she would like to see the township coordinators host neighborhood association meetings at least quarterly on issues of concern. This worked well in the past.

4. Update on City/EPA/IDEM Negotiations

a.) Overview
- Jodi Perras informed the Committee that the City met with EPA and IDEM at the end of January and the meetings continue to be extremely positive. Additionally, the City is meeting with environmental justice claimants at the conclusion of the EPA/IDEM meetings.
- Rosemary Spalding added that the 308 Request work plan has been integrated into the LTCP review process since one or more of EPA's comments dealt with the 308 Request.
   - 19 flow monitors/samplers are in place
   - EPA's consultant, Mark Klingenstein, spent an entire day with the City and its consultants. Moreover, EPA will be sending a letter accepting the data pursuant to the 308 Request, which will allow us to move forward.
      - Dick Van Frank was very satisfied with what Mark Klingenstein said.
   - Clarification:
      - EPA requires that chalking be done, however, they and the City are concerned with the data associated with the chalking.
      - The flow monitors will stay in place and the data will continue to be collected.
   - CDM will run the model to begin recalibration, then a series of information sessions will be held in order to bring everyone up to date.
   - Open issues:
      - Affordability
      - Length of Implementation Schedule

        - Existing Use/Sensitive Areas
- Dick noted that even though the City can proceed with the model, he feels money was wasted and we are now getting on the right track.
    - If the data does not match what the model says, then it will be revisited.
- Ralph Roper added that the MRO/DMR reports are very important and the model will allow the City to prepare these reports without monitoring every outfall. This will save money.
- Dick mentioned that the current recalibration only covers the hydraulic model and does not deal with in-stream water quality.
    - Ralph stated that the objective of modeling is not perfection. There is a point of diminishing returns in data collection.

b.) Data Consistency Issues

- Mona Salem answered Dick Van Frank's questions regarding chalking.
    - There are four (4) inspectors that review WREP's work; however, it is not on every outfall.
    - WREP now has an individual chalking, whose work is checked by a supervisor, adding a quality control mechanism.
    - Merri Anderson asked if the way in which the contract was written was a cause of this problem. Mona noted that there is a Compliance Policy Committee that meets in addition to Amendments that review WREP compliance issues.
- Dick also asked a question in regards to Robin Garibay's presentation with respect to outfall 117. There is a contradiction in the information pertaining to the system-wide discharge that occurred on September 23, 2001.
    - Mona noted that WREP's report/data was reviewed with their timesheets, however, the chalking data may have been bad and four (4) CSOs remain inaccessible. Moreover, EPA has accepted the data provided by the flow monitors as being accurate for this event.
    - Bill Beranek added that as more events come up, the September 23rd event becomes less important.
    - Ralph Roper mentioned that this is a good quality check and there is a learning curve.

c.) Alternatives Analysis

- Jodi Perras noted that once the hydraulic and water quality models are calibrated, EPA has asked the City to look at alternatives that were not previously looked at, i.e. remote treatment facilities in lieu of and in addition to storage tanks and tunnels. The City will use five (5) types of criteria for the alternatives analysis:
    1. Financial
        - Capital and O&M costs
        - Cost benefit
    2. Neighborhood issues
        - Safe and secure once built
        - Chemicals

3. Engineering
    - Proven technology
    - Will it work
4. Operations
    - Tanks on tributaries will be harder to operate
5. Environmental benefits (water quality)
    - Bacteria and DO
    - Reduce solids and floatables

- Jodi added that different factors would be used when analyzing the alternatives. Public input will also be used to identify advantages and disadvantages, and build a community consensus.

d.) Use Attainability Analysis

- Jodi Perras stated that this is the next big area, and uses and areas (where people fish, kids have contact, etc.) are being identified using what little existing guidance there is. This will be a public process as well.
- Dick Van Frank mentioned that we need to develop adequate data and it is extremely important that it be done right.
- Rosemary Spalding agreed that this is important, which is why the City is moving forward with the UAA.
    - Pam Thevenow stated that MCHD have been receiving calls about what laws we currently have regarding this. There is a double-edged sword in which you can say that there is a law, however, you must realize that people, including children, are either unaware of it or simply ignore it.
    - Rosemary added that the City is starting a thorough characterization. EPA is thrilled that we are moving forward with the UAA.
    - Bill Beranek said this is the right way to go.
- Dick added that there is a disconnect between EPA and IDEM where IDEM has stricter standards than EPA on existing use.
- Pete Drum responded to someone's comment that since swimming is not legal anywhere in the White River or tributaries in Marion County, full body contact standards need not be met. Further, he knows many water skiers that use the river, both above Broad Ripple dam and at Lake Indy, and they all suffer full body contact, at least when they intentionally stop skiing and sink into the water, or when they unintentionally fall down. Water skiing, and more recently jet skiing, frequently entail full body contact, and quite legally so. Moreover, existing use of this river in Marion County entails legal full body contact from these legal activities and has done so for at least the 33-years that Pete has lived on the river.

5. Wrap-up/Next Meeting

- Words from Barbara Lawrence:
    - The City is moving forward on construction projects proactively and the department will be a more efficient agency. Barbara's background is in finance and she will be looking at ways to creatively and affordably finance capital projects.

    - There are several projects that we need to move forward on and get done.
- Questions raised by Merri Anderson to Barbara:
    - Water Company purchase: Barbara indicated that there is a separate Board, the Board of Waterworks; and DPW is serving more in an advisory role rather than direct involvement. Councillor Coughenour added that most of the questions should be answered by May.
    - Septics: Barbara stated that she is familiar with the issue from a previous life and is striving to get a better understanding. Councillor Coughenour commented on her appreciation for individuals to have the ability to bring issues and concerns to the table.
    - Opinion on watersheds: Barbara indicated that is does not have a personal opinion on watersheds at this time and she is still in the learning process. Councillor Coughenour suggested having the White River watershed organization give a presentation.
- Councillor Coughenour also commented on the NDPES Permit stay. She said she supports DPW's efforts to move forward with the Long Term Control Plan, but she remains concerned about the costs.
- Next Meeting: **March 20h, 9:30-11:30am, 604 N. Sherman Conf. Rm. A**

WET WEATHER TECHNICAL ADVISORY COMMITTEE
MEETING SUMMARY

March 20, 2002

In Attendance:

Committee	City Staff	Consultants
Merri Anderson	Bob Masbaum	Rosemary Spalding
Bill Beranek	Amanda Mikesell	Willie Gonwa, TEI
Councillor Coughenour	Jodi Perras	Philip Gray, TEI
John Kupke	Mark Richards	Brian Neilson, TEI
DeVonne Richburg-Pollard	Mona Salem	Zig Resiak, TEI
Glenn Pratt	Paul Werderitch	Kelley Schultz, TEI
Ralph Roper	Tom White	
Pam Thevenow		
Dick Van Frank		
Phyllis Zimmerman		

Absent:

Eli Bloom
Ken Crichton
Pete Drum
Jeff Frey

1. Introductions

- Bill Beranek called the meeting to order and had everyone introduced him or herself.
- Jodi Perras added TMDL Sampling to the agenda.

2. Minutes

- The minutes from the February 20th Meeting were reviewed and the following corrections were made:
  - Page 3 of 5 – Dick Van Frank noted that under "b.) Data Consistency Issues," the first bullet should be changed to read, "Mona Salem answered Dick Van Frank's questions regarding chalking."
  - Page 4 of 5 – Dick also mentioned that the comments made by Pete Drum regarding full body contact should be added under "d.) Use Attainability Analysis," which was done.
- John Kupke commented that the minutes seemed well prepared.

3. Criteria for LTCP Alternatives Analysis

- The handout "Indianapolis CSO Long Term Control Plan CSO Control Alternatives Evaluation" (March 4, 2002) was distributed via email.
- Jodi Perras summarized that purpose of this is to agree on the evaluation factors the City, EPA and IDEM will use in a systematic evaluation of the alternatives. Moreover, comments and input are welcomed.

- Dick Van Frank noted that under “CSO Control Alternatives to be Evaluated” chlorination needs to include dechlorination.
- Dick also noted that peak bacteria level reduction and days of bacteria exceedance, under “Water Quality Benefits,” needs to include by how much it exceeds.
  - Glenn Pratt added that when the exceedance occurs is likewise important and should be included. Summer overflows are of greater concern than winter overflows.
  - Jodi stated that the wording for peak levels would be revised.
  - It was noted that the time of year is hard to assess during the alternatives evaluation, however, Mona Salem added that it would be looked at.

4. TMDL Sampling

- Jodi Perras briefly mentioned TMDL Sampling. The City is currently working on sampling protocol; however, input is needed from the Committee prior to the April meeting. Committee members were asked to contact Bob Masbaum at 327-4794 or Paul Werderitch at 327-4935 if they wanted to be involved in reviewing the TMDL sampling plan. Glenn Pratt, Dick Van Frank and Pam Thevenow expressed interest in being involved in such a review.

5. Real Time Control Presentation (Triad Engineering Inc.)

- For the Real Time Control presentation made by Triad Engineering Inc., a packet containing the following information was distributed:
  1. Presentation Agenda
  2. Slide Handouts (entire presentation)
  3. Various Maps
  4. Draft Early Action Project Descriptions
  5. Preliminary Evaluation of Early Action Projects
  6. Strategy Descriptions
  7. Effectiveness
  8. Implementation
  9. Equipment and Data Needs
  10. Costs
  11. Preliminary Control Strategy Evaluation Summary
- ***Note:*** The following merely provides a brief outline of the presentation made by Triad Engineering Inc. Please refer to the entire presentation, which was provided in the packet, for further detail.
- Brian Neilson provided a brief introduction and outlined the following four (4) objectives for the presentation: 1.) identify RTC options applicable to Indianapolis, 2.) develop common understanding of program benefits and strategy selection process, 3.) introduce early action projects, and 4.) present what current project thoughts/ideas.
  - Brian also noted that the bottom line with respect to Real Time Control is to identify a control strategy to minimize combined sewer overflow volume and frequency via optimizing the collection and treatment system.

- Willie Gonwa then spoke on how the system can be operated to help achieve the objectives of the CSO LTCP since Real Time Control serves as a subset of the LTCP, allowing for active management of the collection system based on the conditions of the system. The system could have a variety of features:
  - Localization (Operational) Modes
    - Local: controls at each individual location
    - Regional: controls grouped into regions
    - Global: control operator controls entire system
  - Automation
    - Manual: controlled by human decisions and actions
    - Fully Automatic: controlled by computers and technology
  - Reactivity
    - Reactive Control: reacts to flow and level sensors in system
    - Predictive Control: predicts flows through rainfall sensors
  - Control Algorithms – the "thinking" (mathematical or logical) process
    - If – Then
    - Proportion Integrational Derivative (PID): utilizes a three-term linear equation to modulate gate position, i.e. used in cruise control
    - Fuzzy: provides a method to control system operations with qualitative and ambiguous operating rules, i.e. fast/slow, hard/soft
    - Linear Optimization: uses a mathematical technique to determine a set of parameters that will result in an optimal value
- Philip Gray continued by discussing Real Time Control Strategy Development and Evaluation.
  - Six (6) Operational Goals:
    - Protect tributaries
    - Maximize the effectiveness of the wastewater systems
    - Maintain operational simplicity
    - Reduce CSO frequency and volume
    - Expandable/adaptable
    - Optimize staffing
  - Four (4) Categories of Evaluation Criteria:
    - Effectiveness
    - Implementation
    - Equipment and data needs
    - Costs
- Due to time constraints, Mona Salem suggested having Triad come to the April Wet Weather Meeting to conclude.
  - Merri Anderson offered a portion of the NATE Meeting, which is Monday, March 25th from 4:00-6:00pm at 1802 N. Illinois.
- The following comments were made by the Committee throughout the presentation:
  - Merri Anderson asked what was meant by failure on page 9, slide 1.
    - It was explained that a failure could be the physical breakdown due to complexity, or if the system reverted back to the old method.

- Glenn Pratt noted that there must be a way to control and/or override the system.
  - Willie Gonwa stated that with any system, there is an override mechanism.
  - Brian Neilson added that a requirement was implementation of a foolproof system and some sort of “button” will be in place.
  - Bill Beranek agreed that the system should be simple and foolproof.
  - Bill suggested the default position for an inflatable dam should be inflated. Triad representatives said the default position could be set at either open or closed. However, having the dam inflated as a default position could cause basement backups.
- John Kupke questioned the magnitude difference when the bar is set (page 10, slide 3).
  - Willie noted that there was a cost jump, i.e. connection between overflows and rainfall…there is not supposed to be a correlation.
- Glenn commented on page 16 referring to the volume of staff turnover.
- Someone questioned what the difference was between needs and implementation on page 17, slide 3. It was explained that the needs were more nuts and bolts (vendor) related.
- Dick Van Frank congratulated the City for pursuing the real-time control program.

6. Next Meeting

- The next meeting is scheduled for Wednesday, April 17th from 9:30-11:30am at 604 N. Sherman Drive Conference Room A.

WET WEATHER TECHNICAL ADVISORY COMMITTEE
MEETING SUMMARY

April 17, 2002

In Attendance:

Committee	City Staff	Consultants
Merri Anderson	Barbara Lawrence	Rosemary Spalding
Bill Beranek	Bob Masbaum	Matti McCormick
Councillor Coughenour	Amanda Mikesell	Stacy Goodwin
Pete Drum	Jodi Perras	Brian Neilson
John Kupke	Carlton Ray	
DeVonne Richburg-Pollard	Mark Richards	
Glenn Pratt	Paul Werderitch	
Ralph Roper	Tom White	
Pam Thevenow		
Dick Van Frank		
Phyllis Zimmerman		

Absent:

Eli Bloom
Ken Crichton
Jeff Frey

1. Introductions

- Bill Beranek called the meeting to order and had everyone introduce him or herself.
- The following items were added to the agenda:
  - Barbara Lawrence's comments to the Water Works Board regarding the present relationship with WREP.
  - CSO Public Notification Program

2. Minutes

- The minutes from the March 20th Meeting were reviewed and accepted as is.

3. Use Attainability Analysis (Matti McCormick, McCormick Group)

- Matti McCormick distributed and reviewed proposed UAA public outreach schedule and explained the attached survey. The objective of the survey is to find out where and how people use the waterways of Marion County. The handout included a schedule of activities, draft questionnaire, and maps of Pleasant Run, Pogues Run, Fall Creek, White River North and White River South. Further, the survey is to be child focused with a demographic profile, and the surveyors will physically be at the various streams in addition to churches, day care centers, etc.
- Matti then went through the questionnaire question by question taking comments from the Committee.

- Dick Van Frank questioned how many people would be surveyed.

  *Mattie answered that 500 people during the month of June was the target, however, they would take more if that should occur.
- Glenn Pratt mentioned that schools are not in session and how would those affected people be included in the survey.

  *John Kupke stated that the survey is just one tool. It would be beneficial if the various neighborhood associations, the Mayor's committee, etc. would identify where people are using the water.

  *Pete Drum added that the survey should be sent to recreational providers, i.e. the Water Skiing Association, and he will provide a list of such organizations to Matti. Pete also indicated that waterskiing should be added to question 2a-2c as it is the only legal form of full body contact. Jodi Perras stated that this would be added.
- Merri Anderson asked if the survey covered ditches.
- John asked that "frequency" be added to question 2c.
- Dick questioned what was going to be done on the site (referring to the stream).

  *Matti stated that three (3) interviewers would be on each of the sites on Monday, Wednesday and Saturday for a four-hour shift that would be at various times throughout the month of June with the goal being to capture primary respondents.

  *John wondered if they would drive, etc. Matti replied that each person would have a certain distance to cover in their designated area, and it can be modified as time progresses. Pam Thevenow added that she is pleased the surveyors will be roaming since the waterways are not like the Monon Trail where there are many people.
- Tom White mentioned that there are lots of bridges where kids play, and this area should be checked/monitored as well. Additionally, weather is a factor too. Pam added that the Marion County Health Department has been tracking where people are, i.e. location of the fishing holes, forts, etc., and can provide that information to Jodi and will continue to document this throughout the season.
- Pete asked if they would be going north of Kessler and south of Thompson with respect to White River.
- Merri questioned how many times the surveyors would visit each stream, and if they would be familiar with the area since many of the users may not be able to identify street location on the map.

  *Matti answered that the surveyors will visit each site multiple times and they will each be familiar with the given area.
- Bill Beranek wondered if anyone had knowledge of use during the winter months. Additionally, it needs to be remembered that people may lie, etc. about their use.

4. Comments to Water Works Board (Barbara Lawrence)

- At a previous meeting, Merri Anderson asked if Barbara Lawrence could explain the comments she made at the Water Works Board regarding WREP.

- Barbara Lawrence explained that her comments made to the Water Works Board on March 5, 2002 were in the context of an entity providing information about a vendor. When she first took over as Director, several people approach her regarding concerns they had with United Water (WREP), which led to discussions regarding contractual issues and communication. She added that this was a two-way street and all areas of staff have been involved in fruitful and productive talks to resolve the issues.
- Merri mentioned that she was not attempting to second guess, but wanted to know what was going on since WREP initially had a five-year contract that bumped up to ten.
- Glenn Pratt stated that since nothing was brought up at the AWT Advisory Committee Meetings, as far as he was aware everything with WREP was fine. He added that he would have liked prior notice of Barbara's remarks.
    - Barbara noted that the treatment plants are operated well and her comments were more toward the sewage collection system.
    - Councillor Coughenour mentioned that it normally is not appropriate to go public with items that should be handled internally. However, it was appropriate to discuss those issues in connection with the water company decision. Further she stated that the Compliance Policy Committee knew of these problems, and commended Barbara on her efforts and honesty.
    - Barbara added that the City and WREP are now moving forward and communication has improved on all sides.
    - Glenn indicated that the channels of communication need to be open and WWTAC committee members should be informed when issues of this nature come up, because they receive calls from the news media.
    - Bill Beranek added that it appears the City and WREP will work through the issues toward a productive relationship.

5. **Real Time Control Presentation** (Brian Neilson, Triad Engineering, Inc.)

- The focus of the presentation was on Early Action Projects.
- 20-25 projects were reviewed for the potential to break ground in 2002. Of these, six (6) projects were selected with three (3) alternatives.
- Dick Van Frank asked what the process was that operators need to learn in order to throw a switch, and who would control it. Brian Neilson stated that if something were to happen, the inflatable dams would ensure that the system returns to the same condition as before construction.
    - Brian commented that Triad is to provide merely a road map, not to dictate to the City who should operate it.
- Committee members discussed the need for involvement of the system operators in development of the RTC system, and training and transfer of knowledge to the operators. Jodi Perras and Bob Masbaum assured the committee that this would take place.
    - Jodi clarified that the RTC projects are in addition to other in-system storage projects being done. Together, they represent a significant reduction in sewage overflows to Indianapolis streams.

6. Updates

- TMDL (Stacy Goodwin, IDEM)
  - A handout on the Fall Creek/Pleasant Run and White River TMDL Preparation was distributed.
  - The schedule for both the Fall Creek/Pleasant Run and White River is on going with the conclusion being in 2003.
  - John Kupke asked who the consultants were. Bob Masbaum stated that Robyn Garibay of the ADVENT Group, with CDM as a sub-consultant providing technical support.
  - Dick Van Frank questioned why the City is providing training to IDEM. Stacy Goodwin indicated that it is training on the model by CDM, in which IDEM modelers will go through the process for developing and running the model.

    *Dick asked why a standard model was not being used. Bob said that the model being used is the one for the LTCP.

    *Glenn added that after a brief meeting with staff he remains concerned about the sampling points and issues not being addressed, and further discussions need to be held. Moreover, Glenn noted that IDEM is ignoring what needs to be done, including recognizing an emerging problem in which Hamilton County is likely to have the same problems with failing septic systems.
  - John mentioned that this can be done right, and it would set Indianapolis apart from other cities and assist in mapping out milestones.
  - Dick noted that he would like to view the contract from the Delaware County and Hamilton County TMDLs.
- CSO Public Notification Program
  - The CSO Public Notification Program was briefly discussed. Jodi Perras mentioned that not all of the comments have been incorporated as of yet, however, the plan will be updated and distributed to the Committee. It is her hope to have this program ready by the first part of May.
- NPDES Permit
  - Rosemary Spalding briefly touched on the NPDES Permit. Currently, the focus is on reaching an agreement on lifting the stay from unchallenged portions of the permit so that the City may move forward on those items.
  - The City intends to move forward on everything except areas that may cause third party lawsuits.
  - A meeting will be held April 23, 2002 with all participating parties.
- LTCP Negotiations
  - Rosemary Spalding commented on the LTCP negotiations with EPA and IDEM. Much progress has been made in resolving technical issues and reviewing the hydraulic model. EPA did give the go ahead for the calibration of the hydraulic model. The recalibration will lead

to sizing and costing of the various CSO alternatives that have been added to the analysis.

7. Next Meeting

- The next meeting is scheduled for Wednesday, June 19th from 9:30-11:30am at 604 N. Sherman Drive Conference Room A.

City of Indianapolis Combined Sewer Overflow Advisory Committee
Minutes of April 22, 2002 Meeting
Prepared by DPW

Members Present: Merri Anderson, Phyllis Zimmerman, Kevin Strunk, Bob Bowen, Thomas Cobb, Stu Grauel, Dennis Charles, Bruce Jacobs. **Members Absent:** Rachel Cooper, Daniel Fugate, Mark Sneathen, Don Murray, Leon Bates, John Myrland.

Introductions: Jodi Perras said the purpose of the meeting was to inform the committee members about the Use Attainability Analysis, CSO Public Notification Program, and provide updates on the CSO Long Term Control Plan and permits. Introductions were made by Barbara Lawrence, Director of the Department of Public Works, who started in January, and the Deputy Directors, Mona Salem (Engineering), Pat Carroll (Operations), and Jodi Perras (Policy and Planning).

Use Attainability Analysis: Rosemary Spalding gave a brief overview of the purpose and process of the UAA, and its relationship to the LTCP and waterway usage. Rather than wait for EPA and IDEM, the City decided to be more proactive moving forward with the UAA with respect to IDEM's Guidance Document.

Matti McCormick of the McCormick Group discussed the draft UAA Public Input Questionnaire. Input has already been received from the Wet Weather Technical Advisory Committee, and revisions were as made as follows:

- Document where people are seen playing in the streams
- Add water skiing
- Add frequency of use
- Include various organizations in the survey

The survey will take place in June with the information being collected by surveying actual and observed users, individuals along the waterways, and door to door. Matti then went through the draft questionnaire question by question. The committee members and public made the following comments:

- (Kevin Strunk) In questions 1a and 1b, cleanliness of the water should be added, i.e. if the water was clean would individuals be inclined to use it. Rosemary Spalding noted that we need to be careful not to say that the water will be clean and it is safe for use.
- (Merri Anderson) Notes should be made of where children are and whether or not they are supervised, as it may influence their use.
- (Tom Neltner) As written, this survey will only look at current use. Something should be added about previous use.

CSO Public Notification Program: Jodi provided a brief background of the proposed IDEM rule, mentioning that it may not be a requirement until next year. During the recreational season from April 1st to October 31st, the City will notify interested citizens through an email list-server and a telephone hotline on days that CSO discharges have occurred or have the potential to occur. Moreover, the warning messages will be in place whenever .25-inch of rain is forecasted for Marion County and will remain for 72 hours after the event. The committee and the public made the following comments and questions:

- (Merri Anderson) Get to the point with the warning so that if someone does not want to read or listen to the entire message, they will still be informed of the warning.
- (Kevin Strunk) How many emails will people get, i.e. 72 hours worth or will one (1) cover the entire 72-hour time period? How can someone be removed from the email list-server?
  - Jodi mentioned that this was still being looked at, however, she is leaning toward just one (1) email to cover the entire 72-hour time period, with another to be sent on day three if rain is and/or has been forecasted.
  - A remove button and/or phrase will be placed at the bottom of each email warning sent so that a person may be removed at any time.
- (Merri Anderson) It was suggested that a color code be established indicating the level of contamination, i.e. yellow – caution, red – high levels, and black – no contact for any reason.
- (Tom Neltner) Will everyone get the email warnings or will they be geared for the specific waterway? It was suggested to ask each person on the email list-server which watershed they are interested in.
  - At this time, everyone on the email list-server will receive the warnings. As time progresses, the system may be altered according to watersheds.
- (Stu Grauel) It is important to note that this program has the potential to be spun the wrong way with respect to the news media unless the City talks to them first in order to cut off any misunderstandings. Jodi noted that unlike the Knozone program, the CSO Public Notification Program does not have an advertising budget at this time, however, there are signs located at the outfalls and various other spots throughout the CSO area.
- (Dick Van Frank) It was suggested to have the news media mention the warnings during the daily news program.
  - Jodi stated that she does not have a problem if reporters choose to do that, however, she will not proactively ask the various weather people to state the warning in their forecasts. Unlike ozone, which depends upon a combination of pollution, sun, and wind, CSOs are relatively easy to predict.
- Since schools are not in during the summer months, it is important to contact local principals as well as day care centers about this program.

Long Term Control Plan Update: Updates were given on EPA/IDEM negotiations, Real Time Control projects, and early action projects.

- Negotiations with EPA and IDEM
  - Rosemary Spalding updated the committee on the ongoing negotiations with the various regulatory agencies. All comments have been addressed that can be, however, some still remain open.

    *Sensitive use – to be addressed within the UAA
    *Existing use – to be addressed within the UAA

*Financial issue – EPA's economic consultant requested further documentation and information. The median household income is just one element of the financial analysis.
*Community evaluation of controls – Initially, all of the controls that would have violated dissolved oxygen standards were ruled out to prevent fish kills. EPA asked the City to look at other alternatives looking at both DO and bacteria. The City has developed a wider range of alternatives to evaluate. EPA has also allowed the City to move forward to update and recalibrate its hydraulic and water quality models based on more recent data collected last fall.

- Several advocacy groups filed an environmental justice complaint against the City, which prompted an EPA investigation. EPA recently accepted their complaint for further investigation. As an alternative to the formal investigation, however, the groups have been included in portions of the negotiation process so that environmental justice issues can be addressed in the revisions to the long-term control plan. These negotiations are going well.
- The public will have an opportunity to review the options being considered for CSO control, and to comment and participate in the process.

- Real Time Control Projects/Other CSO Early Action Projects
  - Carlton Ray presented a powerpoint presentation to the committee saying these RTC projects are like the "low-hanging fruit" the City should move forward on.
    *East Bank Storage Tank
    *West Bank Storage Tank
    *Fall Creek Inline Storage (Fall Creek between 32nd and 34th Street)
    *Pogues Run (CSO 101)
    *Arsenal Tech (divert to Pogues Run box, eliminating two (2) outfalls)
    *Treatment Plants (pumping stations, storage tanks for P.E. Bypass)
    *Bring ozonation online at both locations
  - Carlton said these RTC projects would store 5 million gallons every time it rains. The sewage can then be transported for treatment keeping it from overflowing into our rivers and streams. Carlton then addressed questions from the committee and public.
  - (Merri Anderson) Do any of these projects disturb greenways, and how do you work with them in the early stages of the projects?
    *Carlton stated that greenways would be brought in the early stages and that they would be worked with up front.
  - (Bob Bowen) You say these projects will store 5 million gallons, what is the total gallonage?

*Carlton indicated that 43-inches of rain every year is estimated, and we have 60 overflows and about six or seven billion gallons overflow each year. We treat 66 billion gallons every year so we lose about ten percent.

- (Tom Neltner) Advises the City to work closely with IPS (Tech and Harshman).

  *Carlton responded saying the City has worked and will continue to work with IPS. For example, they want to build a soccer field, and we are trying to work around that.

Treatment Plant Permits: Jodi Perras went through the history of the NPDES permits, which the state issued on October 26, 2001. The permit was appealed by the Chamber of Commerce, Councilors Coughenour and Langsford, and Glenn Pratt. Jodi reported that an Administrative Law Judge stayed the permits, however, the City's position was to let it move forward and lift the stay on the vast majority of the permit. Jodi pointed out that that has not happened yet, but everybody needs to agree. Further, negotiations are ongoing and the City is still operating under the permit issued in 1985. The City is moving forward in anticipation that these requirements will be enforced.

Future of the Committee: Jodi Perras asked for ideas about the future of the committee, i.e. should the committee continue meeting in this forum or does anyone have other thoughts.

- (Kevin Strunk) We should continue meeting although we have been meeting pretty sporadically. Additionally, there are a few vacancies that should be filled. This is a valuable committee. Bob Bowen agreed.
- (Stu Grauel) It is a problem that you have so many groups. Jodi indicated that that is what is being looked into right now.
- (Merri Anderson) I saw all of this material last week at the Wet Weather Technical Advisory Committee meeting. Since the Wet Weather Technical Advisory Committee is stable, can the two (2) committees be blended to include all necessary parties?
- (Barbara Lawrence) We would like to hear more of your opinions. Think about this topic and email us what you think.
- (Merri Anderson) We may need to broaden our scope.
- (Jodi Perras) The Stormwater Ordinance created a stormwater technical committee as well.
- (Dick Van Frank) I see the possibility of a big disconnect here. We are all talking about the same water; and we must coordinate or there will be some bad decisions. EPA says downstream groups should be represented.

Merri Anderson thanked Director Lawrence for coming to speak at the neighborhood meeting on April 20th and says DPW is more responsive. She also mentioned that the Earth Day Indiana Festival was on April 27th.

The meeting was adjourned at 5:54pm.

WET WEATHER TECHNICAL ADVISORY COMMITTEE
MEETING SUMMARY

June 19, 2002

In Attendance:

Committee	City Staff	Consultants
Merri Anderson	Karl Jacobs	Rosemary Spalding
Bill Beranek	Barbara Lawrence	George Pendygraft
Pete Drum	Bob Masbaum	Evan Haas
DeVonne Richburg-Pollard	Jodi Perras	
Glenn Pratt	Carlton Ray	
Ralph Roper		
Pam Thevenow		
Dick Van Frank		
Phyllis Zimmerman		

Absent:

Eli Bloom
Ken Crichton
Coucillor Beulah Coughenour
Jeff Frey
John Kupke

1. Introductions

- Bill Beranek called the meeting to order and had everyone introduce him or herself. A discussion of Existing Use was added to the agenda.

2. Minutes

- The minutes from the April 17th Meeting were reviewed and accepted as is.

3. CSO Projects Update

- Bob Masbaum provided an update of the current CSO projects, which was distributed to the committee. The following comments were offered:
  - Dick Van Frank recommended avoiding existing trees in the construction of the equalization basins.
  - Merri Anderson asked about WREP sewer cleaning requirements. Carlton Ray indicated that WREP cleans smaller sewers and that the City issues contracts to clean the larger sewers.
  - Bill Beranek noted that neighborhoods are looking for improved street sweeping.
  - Ralph Roper stated that he felt that the combination of collection system and AWT projects is an appropriate approach.

4. Existing Use

- Jodi Perras described the presentation she gave in Washington, DC at the Designating Attainable Uses Symposium on June 3rd and 4th. Some of the points she made in the presentation were:
  - How to define existing use and "actually attained"
  - Indy was seeking to identify uses through the UAA process and determine how to best protect them
  - The City supports the need to protect existing uses, but notes that existing use is poorly defined. Does actual or occasional use constitute an existing use?
  - IDEM presumes an existing use if waterbody flows through an urban area
  - Water quality is a threshold issue. If water quality has not met the standards, the existing use has not been "actually attained."
- Glenn Pratt indicated that he sympathized with the "How clean is clean?" question, however, he is troubled by IDEM's all or nothing approach. Glenn is also concerned about the separation of full and partial body contact, noting that children could have full body contact in water that may only support partial body contact in adults. Jodi suggested that the sensitive area designation will help protect children, and flow is only one factor to be considered.
- Merri Anderson stated that she did not feel that the warning signs met the spirit of the law. Dick Van Frank said that the signs were there to demonstrate a lack of water quality. Jodi reiterated that the goal is to protect dry weather uses and mitigate downstream impacts, adding that this was the City's goal to work with the WWTAC and the community to develop an affordable, common sense and technically sound plan to protect human health and the environment.
- Bill Beranek noted that a designated use is a statement of what we want the waterbodies to be. Indiana does not have a way to determine existing uses. Rosemary Spalding mentioned that even if a secondary standard existed, the City still would not be able to meet it and that existing uses cannot be changed even through a UAA. Further, she stated that there is a difference between an actual use and an existing use under the law. Rosemary pointed out that EPA issued an Advance Notice of Proposed Rulemaking that addressed many of these questions, however, that notice was never acted on. She also indicated that this issue has been dodged in the past by other cities by the use of consent decrees and that the City does not wish to enter into a prescriptive and inflexible Consent Decree. Glenn Pratt noted that one effect of a Consent Decree is to negate the NPDES permits. Rosemary went on to note that guidance for EPA would likely not be available until 2003-2004, however, the City needs guidance prior to that and will seek out individual guidance from EPA.
- Glenn indicated that he feels that cleaning up the tributaries should be first priority, as he is concerned that EPA will only look at volume reductions. The city needs to integrate urban runoff and septic tanks.

- Bill admonished those present to keep in mind that parameters other than bacteria also present a problem and that these should enter into the City's evaluations.

5. Stormwater Utility Update

- Jodi Perras distributed a copy of the brochure that was being sent to non-residential customers who were not billed during the first round of bills. She also noted that these bills were being sent out beginning this week.
- Merri Anderson asked if properties that had received a zoning variance were being billed at the commercial rate. She also asked if a rumor that another City agency was refusing to pay its bill. Barbara Lawrence indicated that she was looking into that question, noting that government bills had not been sent out yet.
- Dick Van Frank asked how township schools were being notified. Jodi said that they had all been called individually.
- Dick also questioned how stormwater was being coordinated with CSOs and other water quality issues. He is concerned that projects may be working at cross-purposes or that opportunities may be missed. Dick also asked if stormwater BMPs were required in the combined area. Jodi indicated that they were.
- Merri questioned if the Stormwater Technical Advisory Committee (SWTAC) would replace the stormwater subcommittee of the WWTAC. Jodi noted that the SWTAC was set up in the Ordinance, adding that the City was looking at all of the City's advisory committees to review their missions and membership.
- Phyllis Zimmerman asked if the credit manual provides credits for alternative paving methods. Bill Beranek indicated that there was some provision for that. Dick stated that he hopes that other city agencies are aware of credits and alternative paving methods. Education opportunities abound, starting with the Parks Department.
- Glenn Pratt mentioned that he would like to see staff added and he would also like to see incentives to get people to do the right thing. Jodi responded that DMD will provide credit information to developers, and the interest-free payment option is a one-time offer and is not available to residences.

6. CSO Program Manager (David Haywood, Montgomery Watson Harza)

- David Haywood of Montgomery Watson Harza, the CSO Program Manager, gave a presentation of the roles of the CSO Program Manager. A copy of the presentation has been attached for your information.

7. Other Issues

- Merri Anderson noted that the next MCANA NATE meeting would be held on June 24th and include a presentation on stormwater projects. The July 22nd meeting would feature a presentation on air quality.
- Glenn Pratt mentioned that the Star has a new environmental reporter.

8. NPDES Permit Update

- Rosemary Spalding stated that the stay had partially been lifted on May 17, 2002. She noted that the briefing schedule has been put in place and is as follows:
  - May 24 – Initial briefs
  - July – Responses due
  - August 26 – Hearing on briefs
  - Fall – Motions will be ruled on
- Glenn Pratt stated that he was very disturbed by IDEM's position regarding citizens' standing to file appeals, adding that IDEM has effectively cut citizens out of the process.

9. Next Meeting

- The next meeting will be held July 17th from 9am to 2:30pm at 604 North Sherman **(DMD Conference Room 2)**. EPA will be in attendance and the purpose of the meeting is to discuss the model calibration efforts.

WET WEATHER TECHNICAL ADVISORY COMMITTEE
MEETING SUMMARY

August 21, 2002

In Attendance:

Committee	City Staff	Others
Merri Anderson	Tricia Banta	Rosemary Spalding
Bill Beranek	John Chavez	George Pendygraft
Councillor Coughenour	Amanda Mikesell	David Haywood, MWH
Pete Drum	Jodi Perras	Srini Vallabhaneni, CDM
Glenn Pratt	Carlton Ray	David Hurley, MCHD
Ralph Roper	Mona Salem	
Pam Thevenow	Paul Werderitch	
Phyllis Zimmerman	Tom White	

Absent:

Eli Bloom
Ken Crichton
Jeff Frey
John Kupke
DeVonne Richburg-Pollard
Dick Van Frank

1. Introductions

- Bill Beranek called the meeting to order and had everyone introduce him or herself. The agenda was accepted as presented.

2. Minutes

- The minutes from the June 19th Meeting were reviewed and accepted as is.

3. LTCP Update

- Jodi Perras provided an update of the upcoming meeting with EPA and IDEM, which is being held to review model recalibration. Additionally, Jodi added that there would be public involvement during the screening of alternatives.
- Srini Vallabhaneni of CDM gave a presentation discussing the impact of model recalibration on average annual overflow estimates and the process for alternatives analysis (see handout). If you did not receive a color copy of this handout, please contact Amanda Mikesell at 327-2339 or via email at amikesel@indygov.org.
- Srini noted that the model was calibrated to 20% accuracy established in the supplemental monitoring and sampling plan, using the reliable flow monitoring data. Srini stated that additional flow monitoring data and modeling analysis is useful in refining the CSO estimates. On the system-wide basis, the recalibration reduced the overflow volume approximately 10%, which is not significant change (based on the 20% accurate model). It was noted that the CSO volumes estimates changed considerably for some individual stream reaches (e.g., Pleasant Run). Committee

members asked the City to revise the scales used on various graphs so they are consistent, making it easier to read the volumes estimates. Srini mentioned that the last few graphs show what hydraulics look like based on the refined model with water being drawn away from Pleasant Run and thereby reducing the CSOs along that interceptor. Carlton Ray added that staff is working with WREP to provide information on the importance of getting more flow to the Southport AWT for treatment.

- Tom White noted that the graphs show Pogues Run modeled overflow volumes to be slightly higher at 10% than what was originally thought while Pleasant Run was lower. He also reminded the Committee that CSO 118 is a large outfall that overflows frequently.
- Srini showed the Committee maps of the three (3) alternatives, which include 1) LTCP Base Case (revised Storage/Conveyance Option), 2) Bacteria Focused Alternative, and 3) Hybrid Alternative. The latter of the three alternatives would use remote treatment facilities to reduce bacteria peaks in overflows from the "storage and conveyance" alternative. Rosemary Spalding noted that EPA wanted us to look at additional alternatives that would provide greater bacteria control than the LTCP recommended plan, which relied primarily on storage/conveyance for CSO control.
- Glenn Pratt questioned what type of treatment was being proposed at the remote facilities. Bill Beranek indicated that the regulatory focus is primarily on sewage indicators such as E. coli, with little regard for infectious diseases. Ralph Roper noted that a conventional water treatment facility would remove disease-causing organisms. Jodi asked how the Committee felt about including infectious disease control as a factor in evaluating CSO control alternatives. Bill added that IDEM and EPA do not think of infectious disease as a factor. Glenn questioned the wisdom of designing CSO controls only to kill indicators. Councillor Coughenour pointed out that E. coli is the basis for water quality standards that Indianapolis must meet. Glenn stated that we would not be able to meet the standards. Pam Thevenow, however, noted that even though the standards may not be met, we can get closer to them than what we currently are. Srini reminded everyone that the goal for bacteria alternative evaluation was to respond to EPA's comments on reducing E. coli levels.
- Ralph asked that Srini review Alternative 2, which would involve remote treatment facilities at consolidated CSO outfalls. Srini reviewed the map, stating that Alternative 2 is a screening mechanism to evaluate the bacteria controls throughout the system, which typically yields in the highest cost. In developing Alternative 3, the City was told by EPA to use its best engineering judgement to determine the placement of remote treatment facilities to achieve high volume bacteria reduction from the overflows from the Alternative 1 CSO controls. Jodi added that the various alternatives would be brought forth to the WWTAC, Mayor's CSO Advisory Committee and EJ claimants to evaluate the costs and potential benefits – both qualitative and quantitative.
- Glenn noted that it would be near impossible to eliminate all overflows from the tributaries, however, it is more important to look at the tributaries rather than White River.

4. Mercury Issues

- John Chavez distributed the draft "Mercury Sampling and Analysis Plan," which was submitted to IDEM for review on August 15, 2002, per the NPDES Permits of the Belmont and Southport AWTs. John directed everyone's attention to page 16. This table shows the number of sampling sites and samples that are to be collected from a variety of sources ranging from non-industrial representative facilities to the wastewater treatment plants.
  - Some stakeholders have questioned why the City is doing the analysis when detailed studies on the domestic sources of mercury are readily available and applicable to Indianapolis. It was explained that the "Mercury Sampling and Analysis Plan" was created in compliance with the requirements of Part III, Section B.1.b for the NPDES Permits for the Belmont and Southport AWTs. Further, John noted that the City is interested in discussing with IDEM and interested stakeholders how the analysis plan might be modified to move resources planned for sampling toward source reduction and public outreach.
- John discussed a recent meeting with Tom Neltner at which they brainstormed possible educational/outreach activities that could be undertaken to reduce mercury from the AWT influent. The following things are either being considered or undertaken by the State:
  - Asking dentists to remove and dispose of mercury that is no longer being used, and to clean their under-sink traps for mercury that might have settled over the years;
  - Developing partnerships with dentists, veterinarians, hospitals, laboratories, etc. to encourage mercury source reduction activities;
  - Additionally, John noted that per an AMSA study there is mercury contained in various household products, including Dawn dishwashing soap, which continually get washed down the drains.
- Ralph Roper stated that IDEM should have a number of pollutant loading studies from other communities. John indicated that he had not been able to find these studies when he worked at IDEM. Ralph suggested that the City contact consultants including CDM, HNTB and Greeley and Hansen to see if they could provide copies of their studies. Ralph also mentioned a project in Chicago to detect minute mercury vapors using a lumex monitor. He thought something of this nature could be used in the sewer collection system. Glenn Pratt added that mercury is likely to be under the sewer below the joints rather than in it. He also suggested that major hospitals such as Methodist and St. Vincent be looked at.
- John then asked what needed to be done to change the mercury analysis plan. Glenn suggested that it might be better if this was discussed at another meeting so interested individuals, including Tom Neltner and Dick Van Frank, could be in attendance. Glenn added that he appreciates the City looking into this matter and feels that steps in the right direction are being taken.

5. NPDES Permit Update

- Rosemary Spalding provided a legal update regarding the NPDES Permit since the stay was partially lifted on May 17, 2002. The briefing schedule for dispositive motions is proceeding. Response briefs were just filed and the final reply briefs are due August 26th. The ALJ may schedule oral arguments or rule based on the briefs. In any event, a decision probably will not be made until sometime this fall.

- In the meantime, Jodi Perras noted that the City is working hard to comply with portions of the permit that have not been stayed and to continue progress on CSO-related planning and compliance. Among the City's activities are:
  - Meeting new effluent limits and sampling procedures
  - Submitting dry and wet weather SOPs for the AWTs
  - Submitting hydraulic schematics for the AWTs
  - Developing a pollutant loading study
  - Developing a Mercury Sampling and Analysis Plan
  - Attachment A (stayed by the administrative law judge)
    - Continue flow monitoring at selected CSO outfalls
    - Revise CSO Operational Plan
    - LTCP
    - E. coli compliance schedule (stayed)
    - Reporting volume quantity and quality
    - SRCER
    - Whole Effluent Toxicity (WET) testing (City passed the first test)
- Bill Beranek indicated that the good news is that we have passed the first WET test.
- Councillor Coughenour provided the Committee with an update of a CSO conference that was recently held in Cincinnati. She indicated that the phrase, "If you do not have it down in writing, it is not considered to have been done," was continuously repeated throughout the conference, meaning that the City needs to carefully document how and when projects, etc. are completed. How to deal with EPA discussions and negotiations was also discussed providing a procedural rather than technical method on how to remain out of trouble. Councillor Coughenour added that there will be a CSO Partnership Meeting coinciding with the WEFTEC Conference in Chicago, and she would provide Jodi with the relevant information.
- George Pendygraft noted that he was surprised by IDEM's filing, in which they said that all petitions should be dismissed because you must show that you are being physically harmed. IDEM's position would preclude almost any citizen from appealing an agency decision. Rosemary mentioned that this comes from a recent decision by Judge Pendrod and affirmed by Judge Keeler, and is now in the Court of Appeals. George further added that if the case is dismissed and this goes through, Indianapolis would be forced to comply with the permit and thus be subject to fines. Councillor Coughenour questioned if it would be helpful to have other groups and organizations file amicus briefs. Rosemary said that she would suggest it.

6. Other Issues

- Merri Anderson informed the Committee that Indianapolis residents connected to the Town of Speedway's sewers are angered that they are being charged higher fees and taxes, which are about to be raised again. A suit has been filed claiming taxation without representation, as these residents do not have a representative for them in Speedway, and they would like to be released from Speedway's sewer system and connected to the City of Indianapolis' (approximately 3,000 to 5,000 homes).

- Merri noted that the next MCANA NATE meeting would be held on August 26th from 4-6pm at 1802 N. Illinois at the INRC. The HAZMAT 5-year plan and the street sweeping contract are on the agenda. These meetings are held monthly on the fourth Monday of the month.
- Glenn Pratt mentioned that even though he is unsatisfied with US Filter, he appreciates the work being done by the Marion County Health Department and the City.
- Merri stated that she would like an update on two questions brought up at the June 19th meeting (page 3, under Stormwater Utility Update):
  - Merri asked if residential properties that had received a zoning variance to operate a business were being billed at the commercial rate. She also asked about a rumor that another City agency was refusing to pay its bill. Barbara Lawrence indicated that she was looking into that question, noting that government bills had not been sent out yet.
    - Jodi Perras responded that the City's consultants reviewed residential properties that appeared to operate as a business, and in some cases people were sent into the field to determine whether the property should be billed in the residential or commercial category.
  - Merri questioned if the Stormwater Technical Advisory Committee (SWTAC) would replace the stormwater subcommittee of the WWTAC. Jodi noted that the SWTAC was set up in the Ordinance, adding that the City was looking at all of the City's advisory committees to review their missions and membership.

7. Next Meeting

- The next meeting will ***tentatively*** be held **October 16th from 9:30am to 11:30am** at **604 North Sherman Conference Room E**. Jodi Perras mentioned that the City is planning a technical workshop in the same general timeframe to review the CSO control alternatives evaluation. We may use the 16th for this workshop.

Wet Weather Technical Advisory Committee
Meeting Summary
October 16, 2002

In Attendance:

Committee	City Staff	Others
Merri Anderson	John Chavez	Rosemary Spalding
Bill Beranek	Victoria Cluck	George Pendygraft
Councilor Coughenour	Barbara Lawrence	David Haywood, MWH
John Kupke	Jodi Perras	Christine Kahr, MWH
Glenn Pratt	Carlton Ray	Matti McCormick
DeVonne Richburg-Pollard	Mona Salem	Mike Haskin
Ralph Roper	Paul Werderitch	
Pam Thevenow	Bob Masbaum	
Dick Van Frank	Pegg Warnick	

Absent:

Eli Bloom
Ken Crichton
Jeff Frey
Pete Drum
Phyllis Zimmerman

1. Introductions

Bill Beranek called the meeting to order and everyone introduced her or himself.

2. Minutes

The minutes from the August 21, 2002 meeting were accepted. The committee noted that Amanda Mikesell has done a great job of preparing minutes.

3. UAA Outreach Update

Jodi introduced Matti McCormick of the McCormick Group and Mike Haskin of Greeley and Hansen, the City's contractors working on the Use and Attainability Analysis (UAA). Matti and Mike presented a summary of their work. The goal of the public outreach was to define water contact and uses along the 5 Indianapolis streams affected by Combined Sewer Overflows (CSOs). The major accomplishments were:

- Designed and implemented a non-random survey along CSO-affected streams. The goal was to complete 500 surveys, or 100 per stream. This goal was met.
- Five meetings were held along the streams affected by CSOs and one meeting with people representing recreational users. 121 people participated in these meetings, representing 39 neighborhood groups.
- All the information attained at the meetings were captured on maps and spreadsheets.

Pam Thevenow noted that it looks like all the streams are being used anywhere there is access. Jodi and the contractors noted that all were surprised by the amount of full body contact in Marion County. There was even some swimming on Pleasant and Pogues Runs when the water is high. A number of people who lived in neighborhoods for 40 plus years described the use patterns as longstanding. At the outreach meetings, many adults said they did these things when they were kids when water was high, as the kids do now.

The City also asked residents for priorities in selecting where to focus first. An often-heard theme was look where kids are in the water and target these areas. Jodi also noted that people near Pogues and Pleasant Runs said they have noticed improvements in water quality since the City has begun work around these areas.

In Rocky Ripple, they wanted to know when CSOs are overflowing. They want real time data. Six people at this meeting said they swim and need real time information.

Glenn Pratt noted that he has heard some people say, "Don't take away the CSOs, because it is where the flow comes from." Jodi noted that the City has not received comments like this. Mike Haskin mentioned that at the Pogues Run meeting, people said that they tell kids to stay out of the water after the rain, but that kids are kids and they go into the water anyway.

Jodi also mentioned that the City is planning a separate meeting at Eagle Creek, because the City did not get sufficient input at the one meeting held. Merri Anderson added that she felt the Eagle Creek meeting was not well publicized or held in the right location, and that the neighborhood association board said that they received no correspondence. Matti made every effort to contact every neighborhood group in the area and that all were offered a meeting who had opportunity in their group's agenda and had time and interest in hosting a meeting. However, when people in the impacted areas didn't show at the Eagle Creek meeting, the City scheduled another meeting for these people. This meeting has been scheduled for October 30th. Merri mentioned that she wouldn't rely on the MDC neighborhood association list, because she did not feel it was reliable. She wants to make sure neighborhoods feel they have input.

Dick Van Frank noted that the Holliday Park meeting was very well done. Dick also asked for a definition of playing at the stream bank. He felt that when kids play on the banks, they get in the water. Dick's concern was that people answering the survey may be confused about the difference between playing on the bank and wading. Jodi noted that the City used clear and consistent definitions to avoid any such confusion.

Maps of stream use around Holliday Park were passed out. Glenn Pratt thought that the information noted on the maps was good, but that it left out neighborhood steams where septics may be impacting a neighborhood stream. Jodi noted that use surveys have also been sent to parks departments and local health agencies, including downstream public works, state parks, and conservation officers.

John Kupke asked what are the implications of finding more contact on the White River? Jodi noted that one question would be, should there be higher levels of control on the tributaries, because there is more contact there? However, the City found that the White River also has a lot of contact. To answer John Kupke's question, Bill Beranek noted that the EPA may want the focus to be on the White River. However, it is too early to say where we should focus at this time. This will come later with more conversions with the public, the regulatory agencies, and after more analysis.

Rosemary Spalding mentioned that the City is collecting information on water contact for a temporary suspension of water quality standards. It will also be used in setting priorities for the long-term control plan. The City is gathering data to demonstrate that the full body contact standard has not been met during wet weather since 1975. As a legal matter the temporary suspension makes sure that the use does not get worse. Jodi clarified that an actual use is not an "existing use" unless the water quality data confirmed it was met. Just because people swam, doesn't mean that the swimmable standard was met. What it does show is where the sensitive areas are. There are both federal and state guidance about sensitive areas.

Dick thought that the bottom line was that there is more use of rivers than we thought, and the public expects to be able to use the water.

Councilor Coughenour asked if there are data on illnesses from contact with water? Pam stated that the Marion County Health Department does have data, but that it does not track from where the illness came. In most cases this information is not reported. It is hard to tell where the illness was picked up vs. where it was spread. It is very expensive to get this level of data, and it requires the doctors to decide to ask questions. Some members felt that it is important to return to the question of health data, because the LTCP is based on health. Ralph believes that CSO discharges are a quality of life issue and that E. coli is the wrong indicator. Bill agreed. Glenn noted that the point is to get the best reduction we can for an amount of money.

4. LTCP Update

Alternative Technologies Status – The City was too optimistic about how quickly staff and consultants could compile the information needed for the CSO technologies analysis. Therefore, the planned September workshop had to be postponed. There is a workshop scheduled in the next few weeks. The approval letter from the US Environmental Protection Agency (US EPA) took longer than we anticipated.

Rosemary stated that US EPA approved the hydraulic and water quality models, based on sampling. Dick thought that while all modeling data has holes, the model is suitable for planning. The City will continue to collect data and will review the model, as more data is available. Rosemary said that there is a new requirement of the permit, which is for the City to submit a calibration and verification plan. The City is working on this.

A handout of CSO Control Alternatives, description of Evaluation Criteria was distributed. The City is looking for comments on the handout.

Merri asked about what other local infrastructure improvement can be made at the same time – even in other departments? Coordination with other projects should be a criterion.

Dick asked how pathogen reduction would be measured? Jodi answered that it would not be an absolute number, but more of a qualitative measure, such as which is more likely to reduce pathogens? Dick believed that the standard is E. coli and that the criteria should reflect this. However, Bill noted that the language the City presented was in response to prior comments from the WWTAC. And Glenn thought that all overflows were not equal and that the criteria should be more than cost per unit removed.

John Kupke asked how the criteria would be used? How do you weigh the different variables? And Bill asked how swimming and other issues would be incorporated? Jodi and David Haywood both noted that how the criteria would be applied still needed to be decided. Jodi noted that the next step is to synthesize uses, community concerns, data, and technologies into a plan. The City will continue to take comments on the criteria descriptions.

5. NPDES Permit Update

Rosemary provided an update on the National Pollutant Discharge Elimination System (NPDES) permit. The City is waiting for a response from the Office of Adjudication. George Pendygraft noted that Councilor Coughenour had asked US EPA Region 5 to review the Indiana Department of Environmental Management's (IDEM) permitting program based on their objection to citizens' appeals of permit decisions. The letter to Region 5 was a prelude to a possible citizens' suit. IDEM sent a letter to the President of the Council about how objections to an NPDES permit can be made. However, most agreed that the City must move forward or face fines.

Mercury: John Chavez provided an update on the Mercury Sampling and Analysis Plan (MSAP). The MSAP was submitted on August 15 to IDEM. IDEM reviews the plan to determine if it meets the permit requirements. IDEM is two weeks into its four week review. The City requested that after the review, that IDEM, the City, and other stakeholders talk about next steps. The request was made because the City would like to take more of a source reduction approach rather than a sampling plan. John Chavez is putting together a list of people who would like to participate in the meeting. Glenn commented that John Chavez is doing a good job of trying to address our concerns and clarifying them.

Effluent Toxicity Testing: John Chavez then updated the group that three rounds of testing were completed. Belmont passed all three tests, and Southport passed two of three. Confirmation sampling was being conducted on October 16. It was noted that the failure at Southport was 3-5 days after the tornado, which may have contributed to the failure.

6. Septic Conversion Program Update

Pegg Warnick gave a presentation on the conversion of homes on septic tanks to sewers. The City ramped up the process this year. Over the last 10 years, the City converted about 4,000 properties (an average of 400 per year.) Now, the City has 800-900 conversions a year planned in the budget. Pegg noted that the City is looking at neighborhoods holistically. The City looks at sewers, septics and drainage and the following year the City resurfaces the roads. This gives people at least six months to connect without added disruption. Pegg is finding that people want water too. However, the biggest concern with septic conversion is always the cost to homeowners.

Criteria for Conversion:

- Problems with septics
- Watershed
- Stream bacteria problem
- City water
- Public petition
- Human health risk is main criterion

Note: The City may connect low priority areas if they are connected to high priority areas.

Carlton Ray noted that based on holistic approach, we felt it was important to look at septics too. The City condensed its 60-year plan to a 20-year conversion process. The State Revolving Fund (SRF) is paying for much of this work. The SRF is a low interest loan. The Environmental Quality Service Council is proposing changes to the SRF program. Carlton encouraged everyone to comment on the changes. Jodi has spoken at both subcommittee meetings.

Updates on Specific Projects: 2nd Sherman project is moving and Devon is going to design. The City is working with people on a solution for the 56th and Grandview project. Citizens want the conversion sooner than the City can get there. In addition, the neighborhood nearby would like to be added too. This is unusual.

7. Next meeting

The next meeting will be on December 11th in the Gold Building at 9:30 AM.

Handouts:

Maps of uses of White River
Observed activity list
CSO Control Alternatives Evaluation, Draft Description of Evaluation Criteria

Wet Weather Technical Advisory Committee
Meeting Summary
December 11, 2002

Attendees:
Bill Beranek
Beulah Coughenour
John Kupke
Glenn Pratt
Ralph Roper
Dick Van Frank

City Representatives
John Chavez
Victoria Cluck
Bob Masbaum
Jodi Perras
Carlton Ray
Tom White

Others
Rosemary Spalding
David Haywood
Gary Mercer

Introduction
Bill Beranek opened the meeting with introductions.

Minutes
A change was requested to the Oct. 16 meeting minutes. Deleting the words "the tributaries of." The change was noted and will be made.

Review of Handout
The *Long Term Control Plan CSO Control Technology Alternatives Evaluation* was handed out for review. The City believes it has addressed all of the Committee's comments. Jodi noted that the City intends to use the evaluation criteria definitions in negotiations with IDEM and EPA and in working with the public and stakeholders to evaluate alternatives against each other. Bill asked for comments.

Ralph asked if there was a scheduling aspect/criteria included? David noted the criteria are meant to evaluate the benefits and impacts of different technologies. Addressing implementation will be the second step.

Bill asked what the scope of issues the criteria will be applied to? Is it one outfall or a whole neighborhood? Is it a strategic plan or a tactical plan? Are the criteria neighborhood-specific?

The City answered that the criteria are meant to be used strategically in evaluating one technology or alternative against another, and a later step will be to look at specific sites for facilities in neighborhoods. John Kupke questioned whether the group needed to cross this bridge yet?

Dick asked if the Cost per Additional Day Meeting Bacteria Standard should be waterbody-specific rather than system-wide. Bill suggested it would be the same if we take off *waterbody* and *system wide* on all of them. Dick disagreed and wants the criteria to apply system-wide rather than to individual *waterbodies*. Jodi mentioned that the change to Page 4 was made in response to Dick's question in his written comments: "Is this location specific or does it apply to the total system?"

Glenn wondered if we prejudiced the data by method of collection. The whole document shifts between tactical and specific. Ralph stated that there are various levels of strategic because of the "connectiveness" of the system. Bill considered whether you could make a less than optimal selection for one waterbody because it is better for the whole. Ralph thought that we may need another criteria for how options affect the whole system.

Merri stated that truck traffic should consider not just frequency but also dust, dirt and mud, and that trucks mean noise and vibration to neighborhoods too. She asked what could be done to mitigate these impacts because there is no enforcement. Bill noted that the document doesn't deal with construction level detail, but that it could be dealt with under *impacts on neighborhoods*. Jodi clarified that noise was listed under construction. John C. stated that it could be broken up into *construction* and *operation*.

John K. noted that there are many impacts and that we need to be targeted to the right solution. Then we identify the issues for construction. The basic objective of the handout has been met and he would like to see it implemented.

Long Term Control Plan update
Gary Mercer of CDM provided a Powerpoint presentation on water quality benefits of each technology alternative that EPA asked the city to evaluate. The technologies included storage with conveyance, remote treatment at CSO outfalls, and two hybrid alternatives that combine an 85% capture level of storage/conveyance combined with remote treatment options. The information will be presented to EPA and IDEM during the city's next meeting with them.

Conversations on the Power Point presentation
Instream model
The in-stream water quality model was updated spatially in the following ways:
- White River: 96th Street (County line) to Petersburg.
- Fall Creek: 79th Street to confluence with White River
- Pogues Run, Pleasant Run, and Eagle Creek were added to the water quality model

The following processes were updated:
- Flow
- BOD/DO
- Bacteria (E. coli)
- Nutrients (P and N) and Algae (added to model)

And the following loads were updated for estimated BOD, TP, NH_3 and NO_3 and E. coli:
- CSOs
- Point Sources/withdrawals
- Non-point sources (Stormwater et al.)

The calibration efforts included flow calibration results using USGS flow data. E. coli and DO were modeled using OES and Marion County Health Department sampling results. Data were from 1996, 2000 and 2002, mostly during dry weather and some sampling for wet weather to look for the high-end levels.

Shown on graph Existing conditions using design storms for:
1 month storm - 85% capture
1.7 month storm - 92% capture or 7 overflows per year
3 month storm - 96% capture or 4 overflow events per year
6 month storm - 98% capture or 2 overflow events per year.

EPA required the city to use standard design storms for the model runs, rather than actual storms that historically have caused the worst DO problems in Indianapolis. The standard design storms assumed a 24-hour rain, with peak intensity in middle of storm, equal rainfall across the county, 25 degrees C, and average flows from April – October. Previously, the city had used an intense storm with short duration, and a peak intensity at the beginning of the storm and low flows during August. The city's design storm was based on the worst-case DO scenario we experience. John K would like to see the various storms/capture levels translated into *rainfall in inches so there's a common understanding of the amount of rain that will be captured*. Gary agreed to provide that information.

Gary explained that the implications were that larger storms cause larger drops in DO. EPA's concern is the quick hitting storms. When questioned, Gary answered that the DO drop at Chevy dam was likely due to longer residence time and BOD from sediment. The dam provides cooling water for the IPL Perry steam plant. The City would need to talk with IPL before considering removing the Chevy Dam. Jodi mentioned that the City was looking at adding aeration before the dam because it is more cost effective and has a positive impact on aesthetics. In Fall Creek, the magnitude of the storm does not have as big of an impact on DO.

Findings Slide
Low DO occurs during storm events under certain conditions, such as low flow, medium – large storm, and high temperatures. Storms in CSO areas show the biggest impacts. On Fall Creek, the impacts are all from CSOs. Modeled bacteria includes Non Point Sources (NPS).

When asked why DO goes up on Pogues Run during dry weather, Gary responded that we don't know. Ralph noted that he has some data that he will get to Glenn, if needed. Gary was also asked what happens at river mile 130 to increase bacteria concentrations during dry weather. He noted that it may be a tributary.

Bacterial Finding
- CSO discharges contribute to high E. coli counts and exceedences of E. coli standard during storm events
- CSO control can eliminate E. coli from CSOs for storms smaller then the design level of the CSO control
- When storms exceed the design level, then high E. coli counts will occur in the streams
- Other sources of E. coli also contribute to the wet weather exceedences of the E. coli standard

The LTCP needs to control all impacts causing problems: stormwater, runoff, septics, etc. Right now, the City and EPA are looking at CSO technologies. We will need to find a combination of approaches that will achieve the standard in an affordable manner.

What ifs
If we use the model to evaluate storage, remote treatment, and storage with treatment, what would E. coli and DO levels look like?
  - 3 month storage would likely meet the DO standard. This is a lot of storage.
  - 1 month storage is the City's proposal.

Glenn needed to leave early, so he read a sewage song.

<u>"Beneath the Ground, Raw Sewage</u>
Tune: St. Christopher. Words: Susan Raccoli 4/4/93.

Beneath the ground, raw sewage
Can't find a place to go.
The soil is clay, it does not perk,

The water table's not low.

Our septic failure is a curse,
We hate this third world smell.
Though sewers may be expensive
They would serve us very well.

Upon the ground raw sewage
Mine eyes at times can see,
It bubbles up, it does not leave,
Mosquitoes sing with glee.

Will typhoid, even cholera
Invade our neighborhood?
No cost can be too great
To keep from spending what we should.

The septic men have been here,
They shake their heads and say:
'Repairing septic systems
Should not be the long-term way.

For septic is not how to serve
A growing place like this.
Put sewers in now and
You will have not sewage but pure bliss!'"

Ralph asked if the simulations assume some BOD treatment, but Gary could not remember.

Impact of Using EPA's Required Design Storm
The committee discussed the impacts on the city of using EPA's standard design storm rather than the worst-case DO storm used in developing the LTCP. The type of storm EPA required historically occurs in Indianapolis only when river levels are high, and is more typical of a November storm event. As a result, we could overshoot the need, and pay high costs, but show no benefits. We don't want to waste money. Is there a way to move incrementally and evaluate? Carlton responded that the regulators would like to set a specific level. The uniform design storm is more conservative and will capture more than is needed. Bill asked if EPA agreed with this assessment. Gary thought that EPA didn't know yet. They use a default approach. The LTCP adds conservative assumptions on top of conservative assumption.

The models include background levels of NPS impacts. The model shows that any CSO has a large impact on the streams. If we have a storm higher than the control level, then we will see an exceedence. We would see fewer CSO-caused exceedances because the smaller storms will be captured. The storage benefits on Fall Creek appear smaller on the graphs because the stream is dominated by CSO impacts in the downstream section.

Bill asked if the storage option considers that cleaner water will be discharged. Gary said that it did. Ralph wondered if it would help the presentation to show a line on the graph representing no storage. Gary agreed that it would. Dick stated we should find a clear way to present the data to the public. The city agreed.

It was also decided that flow arrows would be placed on all graphs.

Benefits of treatment at the CSO - Modeled using ballasted flocculation, and UV disinfection. Treatment will continue throughout storms, will disinfect and discharge treated water that will add to the flow. The treatment is a little better than storage alone.

Hybrid approach – One month storm capture plus treatment of levels up to 1.7-month storm. However, the City would have to build and maintain two technologies. The storage would be used more often. Some of the treatment options used were very large. E. coli levels using the hybrid approach are slightly better than other methods.

During wet weather, the flow is much higher than baseline. The CST should look at flow during a larger rain event. Higher flow may have a larger effect on DO levels than E. coli.

Findings
DO exceedences can be eliminated with CSO control, but other improvements, like dam removal, supplemented stream flow, or aeration need to be considered to keep costs affordable.

Bacteria
CSO control can eliminate E. coli from CSOs for storms smaller than the design level storm.

Dick noted that monitoring and continuing evaluation were included in EPA's comments. He also asked when another draft of the LTCP was expected. Jodi answered that it was expected later next year, possibly. It depends on approval of the UAA, because the LTCP depends on UAA acceptance and IDEM agreeing to a temporary suspension of the designated use during wet weather events.

John K. emphasized that if the conclusion of the technology review was that any overflows will cause an exceedence of the standards, then EPA is saying we have to store or treat a very large amount of sewage.

Meeting Announcements
MCANA meeting: Merri announced that the MCANA meeting was cancelled. They don't expect to have one in December. They need a new location that is free, has free parking and accessible. Please let Merri know if you have any ideas for a new location. The meeting are held on the 4th Monday of month from 4-6 PM.

Next meeting of the WWTAC will be on February 19th
Location to be announced.

Jodi thanked the Clean Stream Team for providing holiday refreshments and wished everyone a happy holiday season.

CSO Workshop Minutes
March 19, 2003

Attendees
Advisory Group Members: Gary Duncan, Kevin Hardie, R.M. Van Frank, Merri Anderson, Phyllis Zimmerman, Tom Neltner, Jason Welty, Kevin Strunk, Don Murray, Rosemary Spalding, Devonne Pollard, Tom Cobb, John Kupke, Ralph Roper, Dennis Charles

Barbara Lawrence, Jodi Perras, Bob Masbaum, Daniel Hudson, Paul Werderitch, Gary Mercer, Amanda Mikesell, Mark Burgess, David Haywood, Mona Salem, Carlton Ray

Meeting Part I
Opening Remarks (Barbara Lawrence)
- Barbara thanked everyone for taking time to attend the workshop and addressed the City's decision to appeal the NDPES permits. The City, after much consultation, decided to appeal the permits in order to maintain legal protection from requirements the City cannot meet. Barbara reiterated that this does not mean that the City is reducing its commitment to reduce raw sewage overflows. It was done to protect the City against actions, including suits, fines and litigation, and does not diminish the City's plan and efforts to improve water quality. The City continues to talk to EPA and IDEM, and Barbara feels that they understand why this step was taken.

Program Update (Jodi Perras)
1. Status of Long-Term Control Plan (LTCP) negotiations:
   - The hydraulic and water quality models were reviewed, recalibrated and approved by EPA middle of last year.
   - The City evaluated additional control technologies, i.e. storage and conveyance, remote treatment, hybrid of storage and remote treatment, and system-wide sewer separation, per EPA's request. Remote treatment would involve enhanced high-rate clarification with disinfection.
2. Status of Use Attainability Analysis (UAA):
   - The City has been meeting regularly with IDEM to discuss outline; approach and data requirements and will continue to meet. Discussions on how to determine existing uses are also ongoing.
3. Outstanding LTCP and UAA issues:
   - Affordability has been tabled; however, the City will soon be discussing this issue with EPA.
   - A design storm is used to size and evaluate CSO technologies. In the 2001 LTCP, the City used a brief, intense summer storm that typically results in lower DO levels, fish kills, etc. EPA wanted the City to use a standard design storm (SCS) that falls over 24 hours. This type of storm typically occurs in Indianapolis in the spring or fall, yet EPA also wanted the City to assume summer type temperatures, flows and algae growth. The City raised this issue to EPA.
     - Tom Neltner questioned why we wouldn't want to analyze technologies using more than one storm.
     - John Kupke noted that low flow in streams was a key issue because a longer storm makes the volume look much larger. We need to try to hit what we need to do and then go beyond that if needed. It would be a waste of money if it were something that is not needed

  - Tom Neltner noted that we would still do the knee of the curve and that there is a preconceived notion.
  - Gary Mercer explained that it is better to spend the money where it is needed. It is not necessarily appropriate to design for larger storm events that rarely occur.
  - Ralph Roper questioned why one storm is used to evaluate technologies. Frequency reduction and size reduction should be looked at and/or determined after obtaining five years worth of rainfall data. Gary said that analysis would be done at a later stage.
  - John Kupke added that as a City and community, we should not take what EPA is saying without understanding the ramifications.
- Determination of existing use is a key issue. The result of this will guide us as to whether or not a temporary suspension of water quality standards during wet weather is possible.
- Data and information are needed to support the request for temporary suspension under the UAA.
  - Merri Anderson questioned how temporary the temporary suspension is. Jodi said that the law allows four days after an event, however, it may be different for each stream.
  - Dick Van Frank wanted to know about the time frame for submitting the UAA. Jodi said the City is rethinking whether to submit the LTCP and UAA simultaneously, or to submit the UAA after the LTCP is approved.
- Wet weather permitting is another key issue.
  - Dick Van Frank noted that this has been going on for some time now. Jodi noted that the City needs to do some work informing and educating IDEM about the need for this.

4. Schedule for moving forward with LTCP:
   - The City has been working with EPA during this entire process and obtaining their "sign off" so that it can be approved more quickly. This process takes additional time. The steps below still need to be completed. Items marked with a * will require public input.
     - Agree on design storm used to evaluate alternatives (based on Tom's comments today, the City may need to put a star by this as well)
     - Evaluate cost and performance of CSO technologies based on selected design storm*
     - Combine best technologies and controls into 2-3 alternatives for each stream*
     - Analyze affordability and agree on overall program cost*
     - Agree on preferred alternatives and level of CSO control for each stream*
     - Agree on how to protect sensitive areas*
     - Agree upon schedule for implementation*
     - Develop compliance monitoring plan*
     - Revise and publish LTCP
     - 30-day public comment period*
     - Finalize LTCP and submit for approval
       - Merri Anderson asked about a final date for approval of the LTCP, and Jodi indicated hopefully by this time next year.

5. Early Action Projects:
   - The bottom slide on page 7 illustrates that water quality expenditures have increased during the Peterson Administration with spending at roughly $10 million in 2001 up to an estimated $70 million in 2003. Tom questioned where spending was prior to Mayor Peterson taking office. Jodi and Barbara noted that it would be somewhere around the amount for 2001 (approximately $10 million). Dick Van Frank noted that a lot of planning went on prior to the Peterson Administration.

- Workshop binders included a status report on early action projects since 2000. In 2002, the City completed 15 early action projects worth more than $70 million in total project costs. In 2003, the City is planning 12 early action projects worth more than $35 million.
  - Merri Anderson asked if a couple of projects along the east bank of the White River are City projects. Barbara noted that IUPUI is doing some campus housing work, and this was related to that.
  - John Kupke asked what was meant by facility planning for the Fall Creek tunnel, is size and storm design involved? Bob Masbaum explained that the City is trying to lay out basic parameters to eliminate CSO 275 and understand where CSOs are and what it would take to combine them, etc. The City has not actually started design of these projects yet, and as we work with EPA on the design storm, we will be able to begin work on facility planning.
  - Mark Burgess noted that the greatest impact of the design storm issue will be the Fall Creek facility, improved storage on Pogues Run, and the Belmont to Southport interplant connect. Design storm does need to be resolved rather quickly.
- A Public Meeting on AWT projects will be held March 26th in the General Assembly Room at 6:30pm to take public comment on State Revolving Fund (SRF) funded AWT projects, i.e. Belmont Wet Weather Chlorination/Dechlorination facilities, sludge cake pumping, etc.
  - Dick Van Frank questioned the amount of funds available in SRF to meet the City's needs. Barbara and Jodi stated that the City could exhaust all SRF funding, and other sources of funding will need to be looked at. In addition to SRF funding, the City would seek grant funds and bonds on the open market.
- Septic Tank Conversion Milestones:
  - By the end of 2003, an additional 362 properties now served by septic systems are expected to be added to the City's sanitary sewer system.
  - Some 4,500 properties have been converted from septic systems to sanitary sewers over the past ten years.
  - A potential 4,100 properties, represented by 21 projects, are currently in design, and it is anticipated these projects will bid over the next two years. Preliminary engineering reports are underway for an additional ten projects made up of an estimated 1,977 properties.
  - Since 1999, the final construction costs have been less than the engineer's estimate, resulting in lower assessments.

6. Clean Stream Team (CST):
   - The CST is a combination of City staff and consultant staff. The public also is an integral part along with local consultants.
     - Current activities of the Clean Stream Team include regulatory negotiations for LTCP and UAA, NPDES permit requirements, design standards for CSO projects, quality assurance/quality control plans, schedule and performance tracking, public outreach and education, and staff training and skills transfer. The WWTAC will be asked to comment on several NPDES permit deliverables, including the CSO Operational Plan (CSOOP) and Stream Reach Characterization Evaluation Report (SRCER).
   - Questions:
     - Dick Van Frank said that coordination is needed on what Clean Stream Team is doing and what is going on at the treatment plants so that the two things fit together. Jodi noted that the team's contract includes this coordination, and WREP personnel were in attendance at the workshop.

  - Merri Anderson asked if WREP, the WWTAC and citizens are considered a part of the Clean Stream Team. Jodi said the City wants everyone to join the team to help improve water quality in Indianapolis.

7. Control Technology Evaluation (Gary Mercer)

- Gary noted that much of this information is what EPA has seen and reviewed. Some information may change once the design storm has been determined. Gary began by walking through the CSO Control Technologies. Each technology was looked at with a variety of control levels and number of overflows that would result.
  - Control Technology 1 is storage combined with conveyance to wastewater treatment plants.
  - Control Technology 2 would consolidate overflow sites and apply remote treatment using enhanced high rate clarification (EHRC) with disinfection.
  - Control Technology 3 is a combination of control technology 1 at 85% capture with EHRC for overflows beyond 85% capture.
  - Control Technology 4 is similar to control 3, using EHRC at some locations and screening with disinfection added at other locations.
  - Control Technology 5 involves system-wide sewer separation.
    - Merri Anderson commented that sewer separation does not solve the need for stormwater treatment and should be explained so that others understand the disadvantages.
- Major findings:
  - Control 1 is the most effective technology for the removal of BOD, followed by the hybrid technologies. Tom Neltner questioned how sewer separation compares to that. Gary noted that this analysis was not done.
  - Controls 1-4 are equally effective in reducing *E. coli* bacteria.
  - CSO control alone will not reduce exceedance of daily maximum bacteria standard of 235 *E. coli* colonies/100 ml without implementing stormwater and septic system controls.
  - CSO control will reduce the days that very high (>2,000 colonies/100 ml) instream *E. coli* bacteria levels occur.
  - The SCS Type II storm may not be the appropriate design storm for evaluating effectiveness of CSO facilities. The SCS storm puts the peak intensity in the middle of the storm, therefore storage tanks and tunnels would fill before the peak hits.
    - Tom said that he felt sewer separation was not adequately evaluated and that the City was not considering separation as a viable option. Ralph Roper questioned if separation may be appropriate for certain areas of the city. Bob Masbaum and Jodi emphasized that sewer separation is being considered on a case-by-case basis and several separation projects are underway to address isolated CSOs.
    - This remains an ongoing discussion with EPA.
    - Gary went over the existing DO conditions with respect to the SCS distribution for White River and Fall Creek. Storms are simulated for midnight because that causes the lowest DO levels. The SCS storm causes DO to fall below the standard, but not to zero as the previous design storm did.
- Preliminary findings:
  - There is a large dry weather problem of meeting *E. coli* standards that needs to be addressed. By only reducing CSOs, the number of days water quality standards are met will not decrease.
    - Tom asked if stormwater programs will have an impact on the days of exceedance, and Gary answered yes, they will.
- Gary spent further time reviewing the various control technologies.

  - For control 2, remote treatment facilities would be somewhere within the circles shown on maps. Dick Van Frank asked about the size of these facilities. Gary noted that the plants would be smaller, requiring three acres or more for each location.
  - With control 3, all CSOs would be controlled at some level with conveyance pipes and treatment facilities at roughly 13-14 sites.
  - Control 4 was developed to provide the most cost-effective *E. coli* reduction through a combination of 85% capture with remote treatment or screening and disinfection. Ralph Roper questioned how the screening and disinfection locations were selected. Gary noted that it was done according to best engineering judgement and factors agreed to by EPA. Gary also mentioned that screening and disinfection could be added to a proposed storage facility instead of constructing a remote treatment facility.
  - Gary noted that control 5 states that stormwater pollution impacts may increase. Tom Neltner said the stormwater impacts should be compared against the impacts of CSOs.

8. Criteria Evaluation Process Discussion (David Haywood)

- David went through the five evaluation criteria for the CSO Control Alternatives and the underlying issues for each criteria. These criteria are neighborhood issues, engineering issues, operating issues, water quality benefits, and financial issues. The specifics regarding each of these were located in the workshop binder.
  - Tom Neltner mentioned that the cost per additional day over 2,000 colonies/100 ml *E. coli* should be added on the financial issues slide. David indicated that it would be looked at and added.
  - Scoring of the alternatives sparked conversation including where "public input" would fall. Jodi noted that the first scoring would involve a technical discussion with the various committees, i.e. WWTAC, CSO Advisory Committee. The general public would get involved later after alternatives have been selected for each stream. Dick Van Frank remains concerned about the public input portion as the committee memberships are dwindling. Jodi is open to any suggestions, however, with respect to the technical aspects, it would be nearly impossible to ask the general public to take time for a half-day or full-day technical workshop.
  - Conversations were also held regarding the stormwater impacts of sewer separation. Control 5 is discounted because it does not treat stormwater. However, the City's Chapter 700 Stormwater Requirements need to be analyzed and considered. Mona Salem noted that any stormwater facility would be put in according to ordinance, with the cost then placed on the private developer. Rosemary Spalding added that steps need to be taken to ensure that we are comparing apples to apples when evaluating the different technologies.
- David mentioned that sample worksheets were included in the binder for the technology scoring. These exercises will be needed at a later date.

<u>Meeting Part II</u>

Technical Portion (Gary Mercer)

- Tom Neltner reiterated that we need a storage facility for a three-month storm. Gary added that EPA feels that the SCS storm is a comfortable storm for them. However, the City believes that the HUFF storm may be better because it typically occurs in the summer months and causes the greatest DO impacts. Jodi noted four different types of factors can affect DO: type of storm, flow of stream, temperature of stream, and algae. EPA is requiring the City to assume a springtime storm with summertime flows, temperature and algae growth. Both DO and *E. coli* benefits from CSO storage were looked at and graphed for both White River and Fall Creek.
  - Dick Van Frank questioned if the graphs took plant overflows into consideration. Gary noted that it does and further stated that plant expansion is also considered/analyzed.

  - Gary explained the remote treatment control graphs for DO and *E. coli* on both White River and Fall Creek. He then proceeded with the hybrid controls for DO and *E. coli* for White River and Fall Creek. John Kupke mentioned that each of the graphs needs to be lined up and/or overlapped to determine the system-wide effect.
- Preliminary findings:
  - DO:
    - DO exceedances can be eliminated with CSO control.
    - The use of 'design' storm needs to be considered to ensure the most severe DO problems are solved.
    - Other improvements, i.e. dam improvements, instream aeration, need to be considered for maximum cost-effectiveness.
  - *E. coli*:
    - When storms do not exceed the designed control level, CSO controls can eliminate *E. coli* discharges from CSO outfalls.
    - High *E. coli* counts will occur in the streams when storms exceed the design level.
- Gary then went through the graphs associated with performance of technologies, which include facility size vs. % capture, facility size vs. overflow frequency, BOD reduction vs. % capture, BOD reduction vs. overflow frequency, *E. coli* bacteria reduction vs. % capture, and *E. coli* bacteria reduction vs. overflow frequency.
  - Findings:
    - Control 1 is the most effective technology for removal of BOD from CSOs, followed by the hybrid technologies and remote treatment, with the exception of control 5.
    - Controls 1-4 are equally effective in their reduction of *E. coli* bacteria.
- Gary reviewed the performance of technologies for *E. coli* days of exceedance for 235 colonies/100 ml daily maximum standard as well as the days of exceedance of 2,000 colonies/100 ml on both White River and Fall Creek various levels of CSO control.
  - Dick Van Frank would like to know how the septic contributions figure into this. Gary noted that this would be discussed at the TMDL meeting at the end of March/beginning of April.
  - 5,000 and 10,000 *E. coli* targets are also being looked at, at EPA's request.
  - Findings:
    - CSO control alone will not reduce the days of exceedance of the daily maximum bacteria standard of 235 *E. coli* colonies/100 ml without implementing stormwater and septic system controls.
    - CSO controls will reduce the number of days that greater than 2000 *E. coli* colonies/100 ml occur on the streams.
- Questions:
  - Dick Van Frank noted that CSO controls do significantly reduce bacteria levels, and inquired if anyone knew the number of disease cases caused at 10,000. John Kupke mentioned that it might be difficult to draw conclusions based on previous studies, and Jodi added that disease rates are often community specific and based on tolerance.

Wrap-Up

- Jodi thanked participants for coming, and mentioned that the City would make an announcement regarding the committees (per Dick Van Frank's early comment).

Wet Weather Technical Advisory Committee
Meeting Summary

April 16, 2003

Attendees
WWTAC Members: Bill Beranek, Merri Anderson, Beulah Coughenour, Glenn Pratt, Pam Thevenow, R.M. Van Frank

Clean Stream Team: Jodi Perras, Gary Mercer, Julia Graham, Karen Snyder, Victoria Cluck, Wanda Bryant Wills, Rosemary Spalding, Carlton Ray, Len Ashack, Amanda Mikesell, Tom White

CSO Operational Plan Update
Bob Barr briefly described the contents in the CSOOP. Comments were requested back by April 25th. Glenn Pratt commented that the schedule for several WWTAC members would be busy the next week due to the closing days of the legislative session.

CSO Public Notification Program Update
Victoria Cluck gave a presentation on the changes to this year's program (attached.) The major improvements to this year's program include:

- When the chance of getting a 1/4 inch of rain is 50% or greater, a warning is sent.
- Rain gauges are used to trigger warning messages, in cases when the chance of rain was less than 50%, but it rained anyway.
- A pager service notifies message senders of maintenance or emergencies that may cause overflows.
- The process has been streamlined to place all responsibility in one office and to require less staff time from fewer staff people.
- Additional improvements are being evaluated.

Merri would like more emphasis on the public health hazard in the email message. Dick Van Frank agreed. The City agreed to incorporate a health message in the email message.

Bill Beranek reflected that the time period implies that the water is safe for recreation after 3 days when this is likely not the case. Jodi Perras and Rosemary Spalding thought they remembered a line last year that stated the rivers and creeks are never really safe for recreation. Amanda Mikesell replied that this was in the phone message, but not the email. This concept will be added to the email message.

Additional comments on the email message were given to Victoria at the end of the meeting. The City will revise the message based on the committee's comments.

Update on Permit Appeal
Rosemary S. said the City withdrew its permit appeal after signing a tolling agreement with EPA. The tolling agreement provides legal protection similar to a "no action assurance" letter. The protection will remain in effect until 2004 as long as we continue making progress on the Long Term Control Plan (LTCP). Judge Penrod, who was overseeing the permit appeal, resigned. There will be a new judge for the proceedings. Things are in abeyance until we hear from the new judge. Reilly is asking to appeal the permit. Glenn Pratt's' appeal remains. In terms of permit compliance, the City is proceeding as if the permit became effective on Feb. 20, even

though we have not received any rulings in writing.

A copy of the EPA letter is attached to these meeting notes.

Rosemary reviewed some of the legal issues associated with E. coli levels in the permit. The City has three basic options for obtaining legal protection from E. coli violations: a variance, a consent decree, and relying on the three-year compliance schedule for E. coli. The committee discussed the advantages and disadvantages of the various options.

Glenn would like the City to provide $25,000 for an endocrine disrupter study, which is the basis of his permit appeal. EPA has agreed to fund part of the study already.

Responses to issues
Jodi Perras distributed a summary of issues raised by the WWTAC in the past year, and how the City has addressed each issue. (Handout attached.) If there are any comments, please email them to Victoria (vcluck@indygov.org).

Glenn reiterated that street sweeping is still a problem. He also thinks that the City needs more staff, and would like an introduction of new staff. Jodi says that we will do this. Glenn would also like the City to develop a sewer cleaning program for dry periods. Glenn knows about the overall sewer cleaning, but he wants more specific cleaning in August to prevent first-flush discharges that can cause fish kills.

Dick stated that when he asked about unanswered questions, he was talking about the UAA and existing use, which the city has listed as an unresolved issue. Jodi noted that we would put these items on the next agenda for further discussion.

Total Maximum Daily Load (TMDL)
Dick raised issues regarding the presentation at the last Total Maximum Daily Load (TMDL) meeting held by IDEM. Jodi noted that IDEM is the final decision-maker on the TMDL and issues should also be raised with IDEM through the public comment process. Glenn stated that he trusts the city more than the state on the TMDL issue and wants to discuss issues with the City as well.

Glenn asked how CDM selected the loadings attributed to dry weather discharges from failing septic systems. Gary explained the assumptions of the TMDL model. Glenn agrees that we need an integrated program, but thought that the impacts from septics should be lower. Gary noted that the impact from improved septics won't be seen in the White River, but will be seen in the tributaries which will impact the White River. Dick stated he believed the percent contribution from failing septics is too high.

Glenn wants to see TMDLs conducted on the smaller streams that aren't listed in the 303d report included in the TMDL. Sampling of smaller tributaries to Fall Creek and Pleasant Run was done to support the TMDL. At this point, the scope of the TMDL analysis needs to be confined to those streams on the 303d list, per IDEM.

For the contribution from stormwater and wildlife, Gary stated that we use data from 71st street to estimate these contributions. We have studies that measure and extrapolate this.

The characterization up and downstream on Fall Creek is mis-shown, because there is a mixing area. Gary agreed.

Wet Weather Pilot Study
Len Ashack went over wet weather pilot study presentation (attached.) The pilot study will test three alternative treatment technologies for wet-weather flows at the Belmont treatment plant. Alternative wet-weather permit limits will be required to implement the selected technology. The City's analysis shows that the revised permit limits will meet water quality standards in the White River due to higher flows in wet weather.

Glenn would like a tour of the pilot when it's operating. The City will try to arrange such a tour, which may be held on short notice because the systems will only operate in wet weather. A dry-weather demonstration for the committee may be possible.

INDIANAPOLIS
CLEAN STREAM TEAM

MEETING MINUTES

Date:	Friday, June 18, 2003
Time:	9:30 a.m. to 11:30 a.m.
Location:	Clean Stream Team Office, 9th Floor Training Room
Subject:	Mayor's Raw Sewage Advisory Committee/Wet Weather Technical Advisory Committee

Jodi Perras led introductions and a review of the agenda. Dick Van Frank asked that the agenda be amended to include discussion of the number of overflows in the collection system and at lift stations.

Update on Permit Appeal

Rosemary Spalding updated participants on the status of the NPDES permit appeal. On February 20, 2003, Judge Wayne Penrod issued a verbal order dismissing the standing of all parties except Glenn Pratt, and lifting the stay of the permit. However, Judge Penrod left the Office of Environmental Adjudication (OEA) before issuing a final written order. Citizens Gas and Riley Tar and Chemical have appealed Penrod's decision because they did not receive notice of the Feb. 20 hearing.

On a similar Eli Lilly & Co. case involving standing before the OEA, the Indiana Court of Appeals has recently reversed Judge Penrod's ruling that an individual owning property adjacent to the Lilly facility did not have standing to appeal their permit. It is uncertain how this ruling will affect the appeal of the city's NPDES permit. However, the city is proceeding forward with Attachment A deliverables such as the CSO Operational Plan and Hydraulic Model Calibration and Verification Plan as if the permit is in effect.

A hearing was originally set for June 16 on the permit appeal. Following the Court of Appeals decision, IDEM filed a motion to postpone the June 16 hearing. A new hearing is scheduled for August 12.

Glenn Pratt said he felt IDEM's original position on the standing of parties to appeal the permit was unfortunate. George Pendygraft also disagreed with the decision by Judge Penrod dismissing parties for lack of standing.

Update on EPA/IDEM Negotiations

Perras provided a review of the city's meeting with EPA and IDEM in Chicago on May 27. The city is waiting for a final decision from EPA and IDEM that they will accept the Huff storm for alternatives analysis. The city will be preparing a draft methodology for evaluating alternatives, using Pleasant Run as an example watershed. This methodology will be developed by the end of June and discussed with EPA and IDEM in July.

Pratt asked if the city was looking at tributaries as opposed to just the White River. Perras responded yes.

The city also will work with U.S. EPA/IDEM on legal mechanism for enforcement of the Long Term Control Plan.

Pratt asked how internal disagreements at IDEM on water quality standards and "what is clean" might affect the city's schedule. Can we learn from what Ohio, Michigan, and other states are doing on this issue? Perras said the program's technical team plans to work side-by-side with IDEM staff to work through these issues. MWH has worked on several long-term control plans in Ohio and other states, and can bring some expertise to bear to help IDEM.

Van Frank said the schedule for completion of the long-term control plan is ambitious. He is worried that IDEM might be bottleneck on process because it is slow to make decisions. Rosemary noted that IDEM has deferred to U.S. EPA on LTCP issues in Indianapolis. Pratt noted that if the city can gain consensus with U.S. EPA, it might help with some IDEM issues.

City-County Counselor Beulah Coughenour asked whether Region V would help with the existing use issue. Could precedents in other states help? Could the CSO Partnership help U.S. EPA get a reasonable interpretation of existing use passed? Perras indicated the CSO Partnership is working on this issue at the national level, where a group of states and EPA were working on guidance regarding existing use.

Barbara Lawrence indicated that the city is working hard on the existing use issue and needs to continue working with all parties involved.

Van Frank agreed that the city should move forward with the long-term control plan and wait on other issues with IDEM.

Pratt said he was in favor of a consent decree. The permit requires the city to meet water quality standards and a consent decree would allow more time to meet the permit requirements. Counselor Coughenour said she was opposed to a consent decree.

Van Frank said the CSO guidance allows for revisions to water quality standards. Would this be done at the legislative level? Spalding said revisions to water quality standards can only be done through a use attainability analysis or rule-making.

Pratt noted that a variance would still require meeting water quality standards at the end of a permit. He said the city should be cautious in using the word temporary when talking about a variance.

Van Frank said "temporary" means days after an event. Pratt said the suspension would be in effect forever under current water quality standards. Perras noted that Massachusetts and U.S. EPA changed the use designation for Boston Harbor to a CSO subcategory in the state's water quality standards.

Existing Use White Paper

Perras reviewed a white paper and flow chart on existing use, noting that IDEM's interpretation of existing use is that actual uses equal an "existing use" under the Clean

Water Act. The city feels that a more accurate interpretation of existing use under the Clean Water Act would require that water quality standards supporting the use have been attained.

Pratt and Pendygraft noted that prior to 1990, Indiana had partial body contact recreational standards. In 1990, the state declared all waters as fishable/swimmable and eliminated the partial contact standards.

Counselor Coughenour said a UAA isn't really a downgrade in the stream because people will continue to use streams as they are today. Spalding noted that we need continuing education of the public after the long-term control plan is completed and being implemented.

Perras said the city needs the support of advisory committee members with IDEM to resolve the existing use issue.

Van Frank said secondary contact standards (i.e., 2000 CFU) will not solve CSO-related issues. He suggested putting disinfection in the collection system. Perras reminded him that even with disinfection units, some storms will be too large to be treated fully and affordably.

Pendygraft said he believes IDEM established its policy and is now failing to fix errors in the policy. We need to look at this as a statewide issue, he said. Van Frank said IDEM is not serving business and people by not resolving policy issues in several areas (*E.coli,* air, etc.)

Dr. Roper asked if there was a silver bullet for communities. Is it Senate Enrolled Act 431? He noted that people would not be using the river during/after the storm events that will cause an overflow after long-term control plan has been implemented.

Counselor Coughenour said the city would get more value for human life by spending money on items other than improving water quality.

Pratt said the city should spend more money where kids are going to be.

Van Frank said IDEM should make a new guidance document to change IDEM's definition on existing use because the current one is not a good one.

Dr. Roper suggested adding charts to the white paper showing cost-effectiveness for overflow events vs. cost. Perras said the city could pull a generic chart from U.S. EPA guidance documents.

Pratt said he wants to make sure that treatment plants are able to handle new loads/flows after the long-term control plan is complete. The city needs to evaluate capacity issues.

Counselor Coughenour said the chart in the existing use paper was well done.

Hydraulic Model Calibration and Verification Plan (HMCVP)

Copies of the Hydraulic Model Calibration and Verification Plan were distributed to interested advisory committee members. Comments are due to the city at the July meeting. The final plan will be submitted to IDEM in August.

Van Frank asked whether chalking issues had been resolved. Perras said the city is installing new real-time monitors that measure overflow activation by monitoring water levels in the pipe and duration of flow. The monitors do not measure the volume of flows. This system eliminates the need for chalking.

The city's network of 25 rain gauges and Calimar radar data also will be used in the hydraulic model verification and calibration. Quality assurance and quality control on the data is done by CDM and ADS. Dan Hudson of United Water said rain gauge data is updated monthly and radar data is updated as needed. Rain data also will be used for real-time control in the future.

Van Frank asked if the city is using the Huff storm. Perras said U.S. EPA agreed to use Huff due to it being more appropriate for summer type storms; the city will use a simulated year's storm events to evaluate levels of control.

Pratt said future calibrations should review whether projects are making an impact on system.

Lift Station Overflows

Van Frank cited a new overflow report showing a 178-hour overflow with 460,000 gallons in volume. There are other items in recent reports that didn't make sense. What is the city doing? Carlton Ray said the city would look into these reports.

Van Frank also questioned overflow reports at Lift Station 403 (1 MG), Lift Station 405 (1 MG) and Lift Station 151 (failed; sewer clogged). Ray said two of those are SSOs in the Fall Creek watershed. The city has projects targeting infiltration and inflow in these areas. Clark Deitz is also working on a redesign to relocate flow from the Fort Harrison Lift Station away from the combined sewer area to Southport via the sanitary sewer system.

Van Frank said he brought the issue up a year ago, but there is still no resolution. Ray said he would send information to Mr. Van Frank on the Fall Creek project (design completion, construction, start/finish dates).

Announcements

Barbara Lawrence announced that Jodi Perras would be leaving her position as DPW deputy director for policy and planning, effective June 27. She will be returning to Perras & Associates, the consulting firm she operated before joining the city last year.

Wrap up/Next meeting

Next meeting is scheduled for Tuesday, July 29, 9:30-11:30 a.m. in the Clean Stream Team office, 9th Floor, 151 N. Delaware Street.

Final Minutes

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Meeting Date: July 30, 2003

Time: 9:30 am to 11:30 am

Location: Clean Stream Team Office Training Room
151 N. Delaware, 9th Floor
Indianapolis, IN 46204

Purpose: Wet Weather Technical Advisory Committee and the Mayor's Raw Sewage Overflow Advisory Committee

Attendees: Dave Volker, Dick Van Frank, Bill Beranek, Tim States, Glenn Pratt, Kevin Strunk, Ralph Roper, Phyllis Zimmerman, Pam Thevenow, Merri Anderson, Beulah Coughenour, Jodi Perras, Tom Ungar, Bob Masbaum, Rosemary Spalding, Chris Kahr, Victoria Cluck, Bob Barr, Art Hamid, Julia Graham, David Haywood, Doug Sword, Tom White, Paul Werderitch, John Chavez and Mona Salem

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NPDES Permit Appeal Update

Rosemary Spalding summarized the current standing of the NPDES permit appeal. A hearing will be held on August 12, where the administrative law judge may issue a ruling on the still pending permit appeals.

Glenn Pratt noted that IDEM has filed additional motions to dismiss everyone who has appealed the permit. He expressed concern that IDEM has taken this position.

Kevin Strunk asked what the August 12 hearing might mean to the city. Ms. Spalding answered that the judge could reinstate all parties, reaffirm Judge Penrod's decision dismissing most of the parties, or dismiss all of the parties.

EPA and IDEM negotiations update

Ms. Spalding reported that the EPA meeting on July 29 went well and the city should receive comments back in a few weeks.

Bob Barr summarized the Presentation Supplement for Pleasant Run Alternatives Evaluation given to EPA and IDEM and to advisory committee members. (Members who did not receive a copy of the presentation may obtain one by calling Jodi Perras at the Clean Stream Team office, 327-8714). The presentation booklet contains the results of a Phase 1 analysis of Pleasant Run CSO control alternatives. Phase 1 involves an initial screening of alternatives for each watershed. Phase 2 will more closely evaluate a shorter list of alternatives for each watershed to develop the best two or three options for each. Phase 3 will develop a recommended plan for all watersheds.

Pleasant Run was briefly characterized using a land use map, hydrograph and photographs of the stream. Mr. Barr explained the following conclusions:

- Dissolved oxygen is not a problem due to number of pools and ripples

- The system normally has very low flows, but these fluctuate greatly during wet weather events

The city has analyzed 101 CSO control alternatives for Pleasant Run (20 combinations of control technologies at five levels of control, plus system-wide sewer separation.) These alternatives were summarized in a one-page matrix provided in the presentation handout.

The alternatives fell within the five control technology categories established previously in negotiations with the U.S. Environmental Protection Agency and the Indiana Department of Environmental Management:

Control Technology 1: storage and conveyance to advanced wastewater treatment (AWT) plants for treatment (evaluated options included increased conveyance capacity, in-line storage, off-line storage, and limited off-line storage);

Control Technology 2: remote treatment facilities using enhanced high-rate clarification (EHRC) and disinfection,

Control Technology 3: a hybrid option that combines storage/conveyance with EHRC and disinfection,

Control Technology 4: a hybrid option that combines storage/conveyance with EHRC and disinfection at storage sites and screening and disinfection at selected combined sewer overflow outfalls, and

Control Technology 5: total sewer separation.

Within categories one through four, the city also evaluated partial sewer separation combined with each alternative. Partial sewer separation would employ detachment of curbside catch basins combined with stormwater best management practices to reduce the flow of stormwater within the combined sewer system. Individual alternatives were developed and screened for CSO capture rates of 93 percent (12 overflows per year), 96 percent (6 overflows), 97 percent (4 overflows), 98 percent (2 overflows), and 99 percent (0.5 overflows).

Mr. Strunk asked if any of the control technologies overlap. Mr. Barr replied that some are very close, but all are a little different. Overall there are at least 90 distinct alternatives.

Mr. Pratt thought the method needed to include cost for septic system removal and urban run-off. The City replied that this is just a comparison of CSO control alternatives, so these issues do not need to be addressed at this time. Septic system and stormwater costs will be incorporated during a later analysis phase.

Mr. Pratt said it appeared that the city is going back to step one of this process by considering screening and disinfection. Ms. Spalding responded that the EPA asked for this technology to receive further evaluation because technologies were screened out too early in the city's previous alternatives analysis. The new analysis also represents a shift from analyzing the system as a whole to analyzing the best alternatives for each watershed.

Mr. Barr explained that partial separation meant separating storm drains within a practial distance from the stream and redirecting it to the stream implementing best management practices (BMPs). Dick Van Frank asked if these BMPs include wetlands. Mr. Barr replied that it does include wetlands. The city is looking at several BMPs and also looking at enhancing base flow. Mr. Strunk mentioned that the stormwater has a street pollutant problem. He also asked where the water augmentation will come from. Mr. Barr and Ms.

Perras explained that BMPs will help treat street pollutants and release stormwater more slowly to the streams to augment flows.

Mr. Pratt asked if the alternatives considered redirecting the CSOs to the White River as an alternative. Mr. Barr said they do.

Mr. Strunk said he was glad that geology has been considered.

Evaluation Criteria

Ms. Perras described the 28 evaluation criteria previously developed with the advisory committees' input, and how the city ranked and used each criterion in the evaluation of alternatives. The criteria fall within five categories: engineering issues, water quality benefits, financial issues, operating issues and neighborhood issues. Two new criteria were added to engineering issues (land requirements and expandability) based on the shortage of available land in some watersheds and an EPA consultant's request.

The point of this evaluation was to narrow down the 101 alternatives to fewer alternatives that could be studied in more detail.

Merri Anderson asked if other cities have used the same criteria. Ms. Perras answered that similar criteria can be found in EPA's long-term control plan guidance. Although the specific criteria were developed by the city with the input of EPA, IDEM and the committees, the criteria used are similar to those used by other communities.

Mr. Strunk stated that he is looking forward to this committee having a discussion on the affordability issues, including projected sewer rates in comparison to current rates and those in other cities. Additional city policy representatives need to participate in those discussions, he said. Ms. Perras said the city will have those discussions with the committees at a later date.

Ralph Roper pointed out that good alternatives will stay ranked high no matter how you rank them. He agreed that this criteria evaluation is a good approach.

Mr. Strunk asked that the city use another name for the engineering category, such as technology issues, since not all issues relate to engineering. Ms. Perras agreed to rename the category.

Ms. Perras explained how the city ranked *E. coli* criteria highest in the Water Quality Benefits category. Mr. Pratt asked why the Pathogen Reduction criteria was so low when it should be the number one concern, and *E. coli* is only an indicator of pathogens. Mr. Van Frank shared the same concern. Mr. Pratt suggested removing or combining the pathogen and *E. coli* issues. Ms. Spalding clarified that the pathogen criteria was added to separate the level of treatment between a remote treatment facility and the Advanced Wastewater Treatment Plant (AWT) facility. John Chavez brought up the point that it is hard to rank pathogens. Mr. Pratt suggested that the city could use a medical microbiologist in ranking these criteria. Mr. Van Frank pointed out that this question was raised when the list was first put together.

Ms. Perras referred to Table 3, which defines high-medium-low rankings for each criteria. The city's definition for the pathogen reduction category is based on human exposure. Mr. Van Frank asked how one would measure it? Ms. Perras replied that there is no numeric measurement, but technologies that would transport pathogens away from neighborhood streams received a high ranking and those that discharged high amounts of sewage into neighborhood streams received the lowest ranking. Dr. Roper pointed out that the pathogens and *E.coli* criteria combined carry 45% of the weight in the water quality benefits category. Dr. Roper thought this was an appropriate weight. Mr. Pratt said he would prefer 80% of the weight be related to pathogens due to human health concerns. Ms. Spalding said that the EPA will be looking for alternatives that will meet water quality standards, such as dissolved oxygen. Mr. Pratt said he would rank dissolved oxygen different between White River and the tributaries. Mr. Van Frank recommended changing the name of the pathogens criteria to "chance of human exposure to pathogens." Ms. Perras agreed.

Ms. Perras went on to explain the financial issues subcategories. Financial criteria include capital cost, operating cost, "present worth" cost, and several criteria to measure costs compared to benefits, such as cost per day gained meeting *E. coli* standards or cost per pound of BOD removal. Alternatives that ranked in the lower third of the cost range received the highest ranking, while those falling in the highest third of the cost range were ranked the lowest. Ms. Anderson asked for further clarification on present worth cost. Ms. Perras defined it as the capital cost plus the operations and maintenance costs over 20 years. Present worth costs enable comparison of life cycle costs between alternatives. Some alternatives carry high construction costs but low operating costs over their life cycle, while others cost less to design and build but have significant operating costs.

Ms. Perras then described the overall criteria rankings based upon the weight factors. She pointed out the top ranked criteria, which included present worth cost, reliability, days of *E. coli* exceedance, cost per additional day meeting bacteria standard, dissolved oxygen compliance, capital cost, peak *E. coli* levels and operating cost.

The presentation booklet also contains information about water quality benefits of the alternatives and the basis for developing costs. This information was not presented in detail during the meeting. However, Mr. Barr offered to go over those sections in more detail with anyone interested.

<u>Pleasant Run Evaluation Conclusions</u>

Using the weighted criteria and definitions, the city then evaluated each of the 101 alternatives considered for Pleasant Run. The results of the city's analysis for Pleasant Run led to the following conclusions:

- Technology 1 (storage and conveyance) ranks highest and should be carried forward. In-line storage appears to be favored over off-line storage.
- Technology 2 (remote treatment) and Technologies 3 and 4 (hybrid technologies) have minimal application to Pleasant Run and should not be carried forward.
- Technology 5 (sewer separation) should be carried forward.
- Partial sewer separation and stormwater best management practices (BMPs) may have merit and should be carried forward in combination with selected Technology 1 alternatives.

Therefore, the following alternative clusters will be carried forward as the city continues to evaluate CSO control options for Pleasant Run:

1. In-line storage/no sewer separation
2. Conveyance to AWT plants with partial sewer separation and stormwater BMPs

3. In-line storage with partial sewer separation and stormwater BMPs
4. Limited off-line storage/conveyance with partial sewer separation and stormwater BMPs
5. Total sewer separation

These alternatives will need further evaluation during the next phases of analysis. This additional evaluation will include consideration of neighborhood issues, overall program costs, level of control, public opinion, and ability to meet the specific needs of the Pleasant Run watershed.

Ms. Perras explained that neighborhood issues were not evaluated during this phase of alternatives screening, but will be used in the next phase. The purpose of the initial phase was to identify alternatives that can feasibly be built and operated at reasonable cost, and will achieve sufficient water quality benefits. Neighborhood issues will be applied to the shorter list of alternatives surviving the initial screening.

Dr. Roper asked if the scores were published in the booklet. Mr. Barr replied that the scores are not contained in the booklet, only the rankings for each alternative under each criterion.

Mr. Van Frank asked if the affordability question will be addressed in Phase 2, because the city and EPA have different definitions for affordability. Mr. Barr replied that Phase 3 will look at affordability, because it must be studied when looking at all watersheds. Mr. Strunk would like to separate the techincal vs. affordability discussions, because affordability is a political issue. Dr. Roper mentioned that the level of control is more likely to effect affordability, not the technology.

Mr. Pratt asked if the City had looked at different overflows for each river (i.e., four overflows in Pleasant Run and eight in White River. Ms. Perras replied that the analysis of different controls for each watershed will come in Phase 3.

Ms. Spalding noted that this will be a long and detailed process to get our case in line with EPA.

Mr. Van Frank supports the city’s method. He said he was skeptical at first, but the progress is good.

Dr. Roper asked about sewer separation and partial sewer separation. Mr. Barr said that total sewer separation looks good according to the evaluation criteria but may drop out later in Phase 2. For example in the Pleasant Run watershed Bean Creek may be a good candidate for complete sewer separation. Partial sewer separation may remove 20-40% of the stormwater from the combined sewer system. Dr. Roper mentioned from a broad perspective that there would be no way to send water to the Belmont AWT plant without removing some of the stormwater through BMPs.

Mr. Pratt said where to best spend money is an important point to consider. He views septic systems, stormwater and combined sewers as one pie. Mr. Barr replied that in these issues will be analyzed together in later phases.

Mr. Van Frank, Ms. Anderson and Mr. Strunk asked about the schedule. Mr. Barr replied that the City doesn’t know at this point, because they are waiting for comments from IDEM and U.S. EPA. The schedule will greatly depend on nature of comments. Ms. Perras replied that the U.S. EPA said to go ahead with the other watersheds, so at this time the City is on the same schedule passed out at the last meeting. Ms. Anderson added that with all of the stuff to do and with the election coming up (new council people to educate) there is a lot left to do with the long-term control plan. Mona Salem supplemented that while all of this was going on, the city is designing and constructing early action projects to reduce sewage overflows, so progress is being made.

Ms. Anderson also asked how much the budget will be cut. Ms. Salem answered that the capital budget for CSO projects will be the same and expanded in some areas. Mr. Pratt expressed concerns that it would be easier for the city to cut costs on stream cleanup than on Wishard Hospital or other city services. Ms. Salem reiterated that the CSO capital budget was not being reduced.

Dr. Roper asked how the number of overflows relate to other studies. Mr. Barr replied that these capacities are all relative to Pleasant Run. Ms. Salem added that the number of overflows are based on U.S. EPA guidance.

Mr. Strunk asked if EPA would trade volume vs. number of overflows. Ms. Salem and Ms. Perras said the key is percent capture. Mr. Pratt added that where it is and when it occurs is important. One must consider small overflow vs. large storms. Mr. Strunk thought it would be good to talk about percent capture as it relates to number of overflows when the information goes to the public.

Triennial Review of *E.coli* Standards

Ms. Perras asked the committee to read the handout on the triennial review of *E.coli* standards. The handout represents Ms. Perras' notes from the July *E. coli* workgroup meeting. The workgroup has developed draft definitions for primary and secondary contact recreation, and is considering two subcategories of primary contact to distinguish between areas deserving the highest protection and those with lesser health risks.

Action Items from Last Meeting

Ms. Perras reminded committee members to turn in any comments they have on the Hydraulic Model Calibration and Verification Plan. Comments were due at the meeting.

Future Meeting Dates

Future meeting dates will be the 3rd Wednesday of every **odd** month. The next two dates are September 17 and November 19. Depending on U.S. EPA, an October meeting may be needed but at this point it is not planned. The meetings will be held at the Clean Stream Team office.

Minutes

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Meeting Date: September 17, 2003

Time: 9:30 am to 11:30 am

Location: Clean Stream Team Office Training Room
151 N. Delaware, 9th Floor
Indianapolis, IN 46204

Purpose: Wet Weather Technical Advisory Committee and the Mayor's Raw Sewage Overflow Advisory Committee

Attendees: Victoria Cluck, Jodi Perras, Carlton Ray, Bob Barr, Phyllis Zimmerman, Merri Anderson, Dave Voelker, Vince Parker, Mona Salem, Bill Beranek, Richard Van Frank, Pam Thevenow, Glenn Pratt, Rosemary Spalding, John Kupke, Pat Carroll, Kevin Strunk, David Haywood, Beulah Coughenour, Tom White, Bob Masbaum, Paul Werderitch, Chris Kahr, John Chavez

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Ms. Perras welcomed advisory committee members. She asked if there were any corrections to the previous meeting minutes. Kevin Strunk asked that his comment about percent capture be clarified to indicate that he wanted percent capture to be related to the number of overflows when the city talks about alternatives with the public. No other corrections or additions to the minutes were offered.

1) UPDATE ON EPA/IDEM NEGOTIATIONS

The City has had additional discussions with EPA about the alternative analysis for Pleasant Run. During a conference call on Sept. 15, EPA and IDEM agreed that the alternatives proposed for further screening on Pleasant Run make sense. This will allow the city to proceed with its analysis for other watersheds.

The Sept. 15 meeting followed an August 28 technical meeting among IDEM, EPA and Clean Stream Team staff. IDEM and EPA had asked the city to display cost-performance results and total scores in a more “transparent” way. Technical staff agreed upon graphs that could be used to visually compare the different alternatives based on four criteria: 1) Cost per gallon captured/treated; 2) Cost per pound of BOD load reduction; 3) Cost per percent E. coli load reduction; and 4) Total scores. These graphs, which display the city’s analysis in a more visually appealing and understandable manner, were accepted by EPA and IDEM on the Sept. 15 call.

Committee members received a memorandum and supporting materials submitted to EPA and IDEM for the Sept. 15 call. The materials included revised good-fair-poor definitions for the evaluation criteria. The revisions were made in response to questions and comments from IDEM and EPA, but did not change how the city used the criteria to evaluate Pleasant Run alternatives or its conclusions.

There was extensive discussion about how the cost-performance graphs were labeled into categories of good, fair and poor. Committee members said the good-fair-poor labels signify a value judgment regarding different alternatives. Glenn Pratt said members of the public may believe a "good" alternative is what we want to do. Mona Salem suggested committee members should focus on the total score comparison, which did not include the good-fair-poor labels. Instead, it distinguished between "best performing" alternatives with the top scores and "poorer performing" alternatives with the lowest scores. Ms. Perras said the graphs would not be used in public presentations because they tend to be too complicated for general public understanding. The city will look for less complex ways to explain the alternatives analysis results to people. Kevin Strunk suggested using labels of "good-better-best" rather than "good-fair-poor."

Mr. Pratt urged the city to focus on the seasons in which overflows occur. He said we need to focus on when people are visiting the waters, from April to November. He said he is most concerned with where it overflows and when it overflows, not total volume of overflows. Ms. Perras and Chris Kahr said the seasonality of overflows will be addressed during later phases of the analysis. At this stage, the regulatory agencies wanted something different. Mr. Pratt expressed concern that he had raised this issue before and he had still not seen the analysis. Ms. Salem said the city will take his concerns into account during the second level of screening.

Ms. Salem mentioned that the model used to screen alternatives is robust and had been tested in various ways to see if the Pleasant Run results would remain the same. The difference between the top-ranking and low-ranking alternatives is so drastic that changes to some of the model's assumptions still yield the same results.

Bill Beranek asked about the level of sensitivity in the final screening shown in the total score comparison table. Ms. Kahr said the model was designed to screen 100 alternatives to 20 to identify the most favorable technologies for a watershed. The city tested the model against a lot of different parameters and found that conveyance and storage technologies keep rising to the top for Pleasant Run.

Dr. Beranek said it appeared that because one technology ranks significantly worse than others in the cost-performance graphs, it may be inflating the ranking for other technologies. It appears that the final ranking of technology A and B depends on whether you evaluated technology C, he said. Ms. Kahr said the city had run the analysis 15 or 20 different ways to test the model's sensitivity, but the analysis kept resulting in storage/conveyance as the best alternative for Pleasant Run. She said it's important to note that the model is only meant to help the city narrow the number of alternatives subjected to the next level of analysis.

Councilor Beulah Coughenour noted that the city was required to conduct the primary screening in order to satisfy the regulatory agencies. It's not surprising the city is back where it started in recommending the storage/conveyance alternative. However, it was a step the city had to take.

Ms. Perras said the important result of the Sept. 15 meeting was that EPA agreed with the city's conclusions for Pleasant Run and was no longer insisting that selected hybrid alternatives be carried forward. EPA's consultant, Mark Klingenstein, had wanted hybrids featuring screening and disinfection to be carried into the next phase of the analysis. They have now dropped that request for Pleasant Run.

Ms. Perras invited advisory committee members to review the information provided and let the Clean Stream Team know if they have questions. The city is partially finished with an analysis of Fall Creek. Information on that analysis will be presented at future meetings.

2) NPDES PERMIT APPEAL UPDATE

Rosemary Spalding provided an update on the NPDES appeal process. She stated that Judge Candace Vogel, the new administrative law judge who took over for Judge Penrod, held a hearing on August 12. Judge Vogel subsequently issued finbal orders dismissing all petitioners. The appeals were brought by City-County Councillors Beulah Coughenour and Lance Langsford, Reilly Industries, Inc., H.H. Sumco, Citizens Gas, the Indianapolis Chamber of Commerce and Glenn Pratt. Judge Candace Vogel ruled that all parties lacked standing to file an appeal. She also issued a final written order putting all stayed portions of the permits into effect on August 27.

Ms. Spalding reported that the attorney for Citizens Gas told her Citizens Gas will appeal the dismissal. Mr. Pratt indicated he would petition EPA to withdraw the NPDES permitting program from IDEM due to the agency's position on the standing of citizens to challenge a permit.

Mr. Van Frank said he felt the judge's decision was wrong and removed the right of most people to appeal a permit. Ms. Spalding agreed that the judge's decision was not a long-standing interpretation of the Administrative Orders and Procedures Act and had not been IDEM's interpretation as recently as 1996.

Councillor Coughenour said she participated in the CSO Partnership meeting recently in Washington, D.C. During the meeting, CSO communities had an hour-long meeting with Tracy Mehan, EPA's Assistant Administrator for the Office of Water. Mehan was not aware of a lot of the issues raised by the communities and asked if they had discussed issues with their EPA regional administrators. Councillor Coughenour also talked with Paul Calamita, counsel for the Partnership, who indicated a willingness to work with the city to raise issues with Region V, particularly on the issue of existing use.

3) PUBLIC OUTREACH PLAN

Ms. Perras said that EPA, after looking at Pleasant Run methodology, asked the city to address how the public will be involved in making decisions on the type of alternatives that will be selected. She reminded committee members that the city has conducted public outreach on CSO issues dating back to the 1990s, when the Wet Weather Technical Advisory Committee was formed. The public outreach program has been conducted in a number of phases:

Phase I:	Formation of Wet Weather Technical Advisory Committee (1990s)
Phase II:	Formation of Mayor's Raw Sewage Overflow Advisory Committee and Public Education/Input Sessions (2000)
Phase III:	Public Comment Period on draft LTCP (2001)
Phase IV:	Stream Use Survey and Neighborhood Outreach Meetings (2002)

The next step will be Phase V, outreach on the revised LTCP alternatives analysis. Ms. Perras presented a conceptual plan for this phase which included:

- Continued advisory committee involvement in reviewing methodologies for alternatives analysis and public outreach, the results of the city's alternatives analysis, costs and benefits, status of EPA negotiations, and the recommended plan and its impacts on rates.
- General community awareness building through a speaker's bureau, newsletter, news media and web site.
- Open house meetings to review alternatives in an interactive setting with booths containing information on watersheds, costs, neighborhood issues and projects. Attendees would fill out a written survey and have other means to provide input. Citizens who could not attend an open house would get similar information and input opportunities on the web site.
- Document public input and incorporate it into the city's plan
- 30-Day comment period on the city's draft recommended plan

During discussion, the following questions and suggestions were made:

Ms. Anderson suggested that there should be coordination with the stormwater committee, which was created by the stormwater utility ordinance. Carlton Ray said he would provide a list of members on the stormwater committee.

Mr. Strunk said the committee should directly advise the Mayor, since they are the Mayor's Raw Sewage Overflow Advisory Committee.

Mr. Van Frank said there should be at least one meeting in each quadrant of the city.

Ms. Anderson noted that she didn't think the format as proposed would be effective in reaching out to the community. She has seen the same format of open houses and discussion used at other community meetings, particularly with the airport. People don't show up and those who do attend don't know what questions to ask. She suggested the city use the same format used in 2000, with an educational presentation and an opportunity for people to provide input and ask questions.

It was suggested that citizens should have the facts prior to coming to any meeting. That information should go out in brochures and be put on the public access channel.

It was also suggested that the meetings be held on a watershed basis, and almost be neighborhood-specific, where people can find their homes on a map. Plus, people should be able to write and turn in anonymous notes that state their opinions.

Councillor Coughenour said community outreach also should include a web site. The web can help explain why people should care about the issue and how it affects them. Then citizens can tune into Channel 16 and find out more information. At some point, there should be interactive opportunities. The average citizen wants to know a) how will this help and b) how much will it cost me? Other outreach methods might include a CD-Rom with educational information, a video, and electric or water bill stuffers.

4) LABOR DAY STORMS

Pat Carroll stated that the Labor Day Flood on September 1 was similar to the a 1978 storm in which 6-10 inches of rain fell in 24 hours. 7.2 inches of rain were recorded at the airport. One fortunate thing was that since the rain came on a holiday, there was no rush hour traffic.

For the first several days, DPW staff went to flooded areas to clean out grates and put up high water signs and road barricades. The lift stations were on high water alarms most of the first day. The National Guard helped fill sandbags by putting on three shifts of 50 soldiers per shift. City staff worked 12-hour shifts for two days. White River at Morris Street went from 5 feet before the flood to 20 feet on Sept. 1 and 2.

The damage estimate of residences associated with the flooding has been placed at $8.5 million. There was $1 million in response expenses and damage to roads. The City will use information from the flood to update its flood preparedness plan.

Mr. Ray estimated that 20 to 45 billion gallons of water fell in the county during the storm. About 300 to 400 million gallons of CSOs went into the river, which was small in comparison to the amount of rain that fell on the city. Belmont and Southport Advanced Wastewater Treatment Plants treated 500 million gallons per day. Carlton emphasized that the long-term control plan could not capture all the flow from a storm of this magnitude. The cost would be unaffordable and not cost-effective.

He also noted that the Pogues Run flood control project worked extremely well. The 43-acre basin along Interstate 70 was full but the 7-acre basin in Brookside Park was not full. The Pogues Run box was running half full, confirming that the city’s plans to use one half of the box for CSO storage should be workable. Mr. Pratt asked if the city use the Pogues Run box for CSO storage, how much capacity should be reserved for Pogues Run flows?

Mr. Ray also noted that the Cottage Homes neighborhood, which receives flood protection from the Pogues Run basin, did not have any flooding. Mr. Van Frank noted that his neighbors along Howland Ditch had sewage in their basement and manholes erupting in their back yards. He said the interceptor there was running full most of the time. While he said he doesn’t expect the system to control all sewage with a rain of that magnitude, he believes the interceptor is running higher than it should be.

Mr. Strunk said the Warfleigh pump station was missing a signal during the storm. He emphasized that the system needs redundant signals so the city is aware of problems in the field.

John Chavez provided information on water quality samples taken by Office of Environmental Services staff on September 2 after the storm. Stormwater dilution helped keep E. coli levels down in most streams. Mr. Strunk asked why White River was showing different numbers at different locations. Mr. Chavez said higher levels were seen downstream of confluences with Fall Creek and Pleasant Run due to CSO impacts. John Kupke asked Mr. Chavez to distribute a copy of the sampling data. Mr. Chavez said he would distribute it after it goes through additional quality assurance/quality control.

5) TMDL Update

This agenda item was postponed until the next meeting.

The meeting was adjourned at 11:45 p.m.

Minutes

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Meeting Date: December 3, 2003

Time: 4:30 to 6:30 p.m.

Location: Clean Stream Team Office Training Room
151 N. Delaware, 9th Floor
Indianapolis, IN 46204

Purpose: Mayor's Raw Sewage Overflow Advisory Committee

Wet Weather Technical Advisory Committee

Attendees: Rosemary Spalding, Beulah Coughenour, Glenn Pratt, John Kupke, Richard Van Frank, Ralph Roper, Patrick Carroll, Kevin Strunk, David Haywood, Bob Barr, Chris Kahr, Barbara Lawrence, Jodi Perras, Vince Parker, Dave Voelker, Paul Werderitch, Don Murray, Merri Anderson, Amanda Mikesell, Carlton Ray, Leon Bates, John Chavez, Doug Sword, Gary Mercer, Tim Blagsvedt, Deana Haworth, Wanda Wills

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Jodi Perras welcomed advisory committee members and reviewed the agenda. She thanked the Clean Stream Team and Glenn Pratt for bringing holiday refreshments.

1) OPENING REMARKS

In opening remarks, Barbara Lawrence said she feels the Clean Stream Team is covering a lot of ground and meeting with regulators on a regular basis. Ms. Lawrence appreciates the opportunity to learn more from specific groups and their concerns.

Noting the upcoming holiday season, Ms. Lawrence thanked the committee members for all of their hard work and their partnership. She also presented City-County Councilwoman Beulah Coughenour with a plaque recognizing her as an honorary member of the Clean Stream Team.

2) REVIEW MINUTES OF SEPT. 17 MEETING

Ms. Perras presented final, revised meeting minutes from the July 30, 2003, committee meeting and reviewed the draft minutes of the September 17 meeting. No corrections were made to the September meeting minutes. As follow-up to the September meeting, she also provided a list of Stormwater Advisory Committee Members and July-September water quality sampling data. John Chavez noted that the graph presented does not include September data. Another graph will be sent with September data.

3) EPA-IDEM NEGOTIATIONS UPDATE

Rosemary Spalding provided an update on EPA-IDEM negotiations. The technical meetings that were scheduled for November 12 were moved to November 20. The meeting went smoothly and Ms. Spalding said the city will keep forging ahead with a goal of getting approval for the LTCP as soon as possible.

Kevin Strunk asked for clarification on the total maximum daily load (TMDL) meeting on the White River scheduled by IDEM for December 4. He asked how the report would impact Marion County. The TMDL meeting pertains to the White River north of the Marion

County line. Glenn Pratt said that he had reviewed the document and felt that it provided no new information. He was disappointed it did not discuss septic system issues. Mr. Pratt asked if the city would be formally commenting. Carlton Ray answered that the city is tracking down the report and would consider commenting after reviewing the document.

Mr. Strunk asked how the TMDL affects the city's TMDL for White River downstream of 96th Street. John Kupke asked if data and conclusions were consistent with the city's TMDL findings. Mr. Ray said that the city would be reviewing the report to determine if the findings were consistent.

Dick Van Frank said he felt the IDEM report was not a TMDL because it did not contain a load allocation.

4) FALL CREEK ALTERNATIVES ANALYSIS
Gary Mercer provided an overview of the Fall Creek alternatives evaluation. He noted that the report and methodology was similar to the Pleasant Run analysis. Mr. Mercer reminded the committee that the 2001 LTCP Recommendation for Fall Creek recommended a storage tunnel with a water reclamation facility to augment stream flows in the CSO area. He provided an overview of the methodology used and a description of the alternatives considered:

- Control Technology 1 (CT1): Storage and/or conveyance to AWT plants
- CT2: Remote treatment facilities using Enhanced High Rate Clarification (EHRC) and Ultraviolet Light (UV) disinfection
- CT3: A hybrid option of CT1 sized at 12 untreated overflows per year level with EHRC and UV disinfection to control flows beyond that level.
- CT4: A hybrid option that combines CT1 sized at 12 untreated overflows per year with screening and chlorine disinfection/dechlorination to control flows beyond that level.
- CT5: Total sewer separation

There was extensive discussion on the five descriptions of alternatives provided. Mr. Van Frank asked why the city used 12 untreated overflows per year as the baseline for the hybrid alternatives. Mr. Pratt suggested that they use the national default: six untreated overflows per year. Mr. Mercer responded that the team had considered different scenarios that provided between 0.5 and 12 untreated overflows per year as part of the analysis. EPA was agreeable to using 12 as the baseline for storage in a hybrid option, with treatment being added on to the storage to achieve levels of control at 6, 4, 2 and 0.5 overflows per year. Mr. Van Frank said there was not agreement by members of the committee that 12 was enough control.

Mr. Pratt also pointed out that when considering Control Technology 4, which includes screening and chlorine disinfection, you must take into consideration that without a significant reduction of solids, chlorine doesn't achieve desired pathogen controls. John Kupke, however, noted that treatment technologies added onto a storage facility at the 12-overflow level of control would be treating a diluted discharge without a high solids content. The quality of the discharge would be significantly different, he said. Mr. Pratt said it would be better to release the discharge to the waterways than to treat it. Mr. Ray pointed out that the city was asked by EPA to evaluate all five options outlined.

Mr. Mercer provided information about the water quality model results, showing that Fall

Creek would not meet the geometric mean of 125 cfu/100 ml even with CSOs controlled to one overflow every two years or sewer separation. Stormwater discharges in the Fall Creek watershed will still contribute to exceedances of the E. coli standard. The geometric mean would improve, however, from its current value of 372 to a value between 144 and 172, depending on the level of control chosen.

Mr. Van Frank pointed out that at 16th and Fall Creek, the standards for *E. coli* are being met ten out of twelve months and asked what the geometric mean represents in terms of day-to-day conditions in the stream. Mr. Mercer said that Fall Creek does not meet the standard a significant portion of the time, but violates the geometric mean on the lower end of Fall Creek.

Mr. Mercer also provided the modeled number of days per year that E. coli bacteria levels would exceed the single sample maximum of 235 cfu/100 ml. The number of days would improve from the current 190 to 134-136 per year for all levels of CSO control. Total sewer separation would result in 142-145 days per year exceeding the single sample maximum standard, he said. Stormwater discharges will cause these exceedances.

Mr. Pratt agreed that the stream would violate the limit, but by how much? If we are lowering peak E. coli values from 100,000 to 800, we need to emphasize that when talking to the public, he said. Mr. Mercer noted that the Fall Creek packet includes evaluation of days exceeding 2,000, 5,000, and 10,000 cfu/100 ml. Significant improvement can be shown in reducing some of these peak levels from CSO controls.

Mr. Mercer said the results of the alternatives analysis showed:

- CT1: Ranks highest across all levels of control. Storage tunnel appears to be most highly favored.
- CT2: Treatment alone scores poorly. Remote treatment combined with a storage tunnel scores very well.
- CT3 and CT4: Scores poorly compared to CT1
- CT5: Scores poorly because of financial issues (cost).

Based on this analysis, the city selected the following alternatives for further evaluation:

- Storage tunnel
- Conveyance
- Remote treatment and storage tunnel

Mr. Pratt asked why the preferred alternatives did not include a 15 mgd treatment plant to augment flow on Fall Creek. Mr. Mercer pointed out that city has reconsidered placing a treatment plant on Fall Creek because it would be more expensive than piping treated effluent from the Belmont advanced wastewater treatment plant. Mr. Roper noted there is a plan to upgrade the Southport plant to accommodate captured CSOs.

Mr. Van Frank pointed out that he did not see natural flow augmentation mentioned in the presentation and suggested that it could have a significant impact, especially since the city now owns the water company. Mr. Mercer pointed out that this phase of the analysis was used to evaluate CSO control options. Flow augmentation will be considered in future analysis and could involve a Fall Creek treatment plant, piping Belmont effluent, evaluating

Water Company withdrawals, or natural flow augmentation. Mr. Ray pointed out that they were focused on what EPA-IDEM had asked them to do in keeping all options open.

Mr. Roper suggested that it seems more logical to explore expansion of the Southport plant. Mr. Strunk voiced concern about Fall Creek going dry and suggested looking at options to use the reservoirs to provide flow. Leon Bates also expressed concern that flows needed to be added to Fall Creek. Ms. Perras reminded the committee that the analysis presented by Mr. Mercer was not the final answer for Fall Creek but just a first step to screen technologies for further review.

Mr. Roper inquired about the statement in the draft report that suggested partial separation of sewers will eliminate 30% of the problem and asked if it was being carried forward. Mr. Mercer said that this approach will be considered but that the initial estimate of 30% reduction has been revised downward.

John Kupke asked if the storage/conveyance alternatives included a tunnel. Mr. Mercer said the alternatives included a tunnel with conveyance to the Belmont AWT plant, conveyance to Belmont via a new sewer, and a tunnel with remote treatment.

Mr. Van Frank asked if real-time control options were being considered in conjunction with the tunnel options. Mr. Mercer said that they weren't really considering it at this point. Mr. Ray pointed out that the current real-time control projects will be incorporated into the plan, and could make the tunnel slightly smaller.

Mr. Roper pointed out that the wet-weather treatment process known as "enhanced high-rate clarification" might not be the best option for application at the Belmont facility due to the relatively high soluble biological oxygen demand (BOD) concentration from large industries in the area. Enhanced high-rate clarification may not be as effective at Belmont as it would be at Southport. Leon Bates asked if Southport could handle the loads 20 years from now with expected growth in the city. Mr. Roper said the expansion plans under development for the Southport and Belmont facilities are set up to handle 20 years of expected growth with provisions that would enable further expansion to accommodate perhaps as much as 50 years of growth.

Mr. Strunk asked if a reclamation plant was still in the offering. Mr. Ray pointed out that we are looking at various methods of flow augmentation, including piping highly oxygenated water from the existing treatment plants to Fall Creek and possibly Pleasant Run, Pogues Run and industries along the route. Mr. Strunk recommended that the city look at alternative drinking water supplies to allow more flow from Geist, Morse and Eagle Creek reservoirs into area streams. Merri Anderson suggested the city may need to consider building a new reservoir, such as the proposed Highland Reservoir. Mr. Van Frank said the water company needs to become less reliant on surface water.

Ms. Perras reminded the committee that Pleasant Run analysis and conclusions were similar to those in 2001. Similarly, the team is finding similar conclusions with the Fall Creek analysis.

Mr. Strunk suggested providing a brief description of the conclusion at the beginning of the summary memo. Ms. Spalding pointed out that it is important to make sure people don't think this is a conclusion for Fall Creek because additional analysis will be required.

5) 2004 Public Outreach Program

Ms. Perras provided an overview of the Clean Stream Team public outreach program for the committee. She reviewed copies of the current newsletter and the updated program Web site. She also provided an overview of the sign program, gave examples of the fact sheet and discussed the Clean Stream Team Honorary Membership program. She also introduced Wanda Wills and Deana Haworth, two members of the public outreach team who will be working on these activities.

Mr. Pratt asked when the CSO video would be updated. He suggested that it would be a plus if the video highlighted some of the issues and problems. Ms. Perras said a video will be produced in the first quarter of 2004.

Ms. Coughenour suggested that the Clean Stream Team begin a public awareness program on downspout disconnections. She suggested using materials already developed by Richmond, Va., and other programs as a basis for outreach. Ms. Perras said that she has been collecting information from other programs, such as bill stuffers, and plans to use them in 2004.

Ms. Anderson said that she doesn't think bill stuffers are effective. Ms. Anderson also suggested that the team make a concerted effort to provide as much of the program materials as possible in Spanish. She suggested a Spanish version of the Web site as well.

Mr. Strunk requested advance notice of public outreach events to allow the committee members to attend.

Mr. Van Frank suggested that the advisory committee should be larger. He suggested that invitations to participate be distributed to additional community members. Mr. Strunk suggested that an effort be made to draw in some opinion leaders.

6) Next Meeting

Ms. Perras asked for feedback on meeting date and time. The next meeting date will be Wednesday, January 21. The city will consider moving the meeting time to 4:30 – 6:30 p.m. to allow more people to attend. Councillor Coughenour cautioned that that timeframe could come in conflict with City-County Council committee meetings.

Minutes

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Meeting Date: January 21, 2004

Time: 4:30 to 6:30 p.m.

Location: Clean Stream Team Office Training Room
151 N. Delaware, 9th Floor
Indianapolis, IN 46204

Purpose: Mayor's Raw Sewage Overflow Advisory Committee

Wet Weather Technical Advisory Committee

Attendees: Jim Garrard, Rosemary Spalding, Mona Salem, Jodi Perras, Glenn Pratt, John Kupke, Richard Van Frank, Patrick Carroll, Bob Masbaum, David Haywood, Tom Neltner, Gary Mercer, Merri Anderson, Kevin Strunk, Phyllis Zimmerman, Carlton Ray, Ralph Roper, Victoria Cluck, Gavin Gilchrist, Wanda Wills, Deana Haworth, Jim Parks, George Sprouse, Len Ashack, Pam Thevenow, John Chavez, Don Murray

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1) INTRODUCTIONS/AGENDA REVIEW
Jodi Perras welcomed the advisory committee members and introduced Jim Garrard, the new DPW director. Garrard stated that he appreciates the committee's involvement and help on wet weather issues and he looks forward to working with them.

Kevin Strunk asked why he has been getting notices from the state's revolving loan fund. Ms. Perras stated that the state must have put him and some of the other committee members on the revolving loan fund mailing list due to their previous involvement and interest in the issue.

Ms. Perras reviewed the agenda.

2) REVIEW MINUTES OF DEC. 3, 2003 MEETING
Ms. Perras presented draft minutes from the December 3, 2003 committee meeting. Ralph Roper said he had comments on the minutes that he would send to Ms. Perras. John Kupke referenced the second page of the minutes and asked if it is less expensive to have flow augmentation at Fall Creek. Gary Mercer answered that it's less expensive than having a remote treatment facility. Glenn Pratt noted that he felt it was not comparing apples to apples and that it is always cheaper to do less treatment. Further, he wanted to clarify that flow augmentation was still being considered for an option in Fall Creek. He feels it is better to have an overflow downstream instead of at the top of the stream. Carlton Ray stated that the city is considering putting a treatment plant along Fall Creek, along with other options for flow augmentation.

3) BELMONT WET-WEATHER TREATMENT PILOT STUDY

Jim Parks, DPW Senior Project Engineer and Len Ashack of Bernardin Lochmueller & Associates, gave a presentation on the Bio-Roughing System Clarification (BRSC) Pilot Studies. The goal of the study was to provide information to EPA and IDEM on how the city could increase wet weather capacity at the Belmont advanced wastewater treatment (AWT) plant. The primary goal is to mitigate the primary effluent (PE) bypass. These bypasses will be reduced in frequency but not totally eliminated for back-to-back peak rainfall events like the city experienced in September 2003. The city proposes increasing biological treatment capacity to the 275-300 MGD range to match the biological system to the primary clarifier capacity in a way that is cost-effective and able to be operated during wet weather. Other project goals include meeting secondary treatment standards and improving water quality during wet weather.

The PE Bypass Mitigation Wet Weather Treatment Strategy includes providing secondary biological treatment through the existing Bio-Roughing towers by constructing intermediate clarifiers and progressively uncoupling the two-stage nitrification system. This enables Belmont's soluble BOD load to be reduced by conversion to biomass that can be settled and removed in the clarifiers. The settled Bio-Roughing effluent would then be disinfected for discharge through either a re-established outfall or recombined with fully treated effluent for discharge through Belmont's main outfall 006.

Richard Van Frank asked if U.S. EPA's proposed blending policy would have any impact on this approach. Mr. Parks responded that blending is in the news now but the City's plan does not include blending as defined by EPA. EPA's policy defines blending as bypass of primary effluent around biological treatment for recombining with secondary effluent prior to discharge. The City's proposal is "2 steps ahead of blending" because instead of blending primary effluent with secondary effluent, the City will be providing secondary treatment for wet weather flows and continue tertiary treatment for normal flows. The city is proposing to provide treatment beyond primary settling alone for wet weather flows because it is possible to also remove soluble BOD. Normal plant flows up to about 150 mgd will continue to receive full advanced (tertiary) treatment of ammonia removal, effluent polishing through filtration, and ozone disinfection Glenn Pratt noted that if you're having overflows, BOD and ammonia are not as important. Mr. Parks said the city has come up with what he views as an elegant solution and credited Dr. Ralph Roper with being instrumental in the analysis and development of it. Jim Parks also credited David Hackworth, formerly of WREP and the AWT Advisory Committee, including Mr. Van Frank, who wrote a letter to IDEM supporting the concept.

Mr. Parks discussed the estimated environmental improvement from the BRSC Project. Compared to current conditions, implementation of the BRSC project is expected to reduce BOD and TSS loads by approximately 2 million pounds per year.

Len Ashack stated that the study's primary objective was to demonstrate to EPA and IDEM the ability of these technologies to meet secondary wastewater treatment standards and improve White River water quality during wet weather events. The secondary objectives were to develop design criteria for full-scale facilities and support wet weather permitting.

Four clarification systems were pilot tested as part of this project.

- Actiflo® Microsand Ballasted High Rate Clarification process by US Filter/Kruger that requires sand and does not have grit removal
- DensaDeg® 4D High Rate Clarification System by Ondeo Degremont, Inc. that doesn't require sand and does have grit removal
- Solids Contact Clarification System by WesTech that is a conventional system but does have a reaction zone
- Bench Scale Studies of Conventional Clarification

All four systems are capable of producing the same quality of effluent when the units are working properly. Actiflo® has been used in more locations throughout the world than the others.

In October 2003, IDEM legal and NPDES permitting staff observed all the systems. There were 32 pilot unit runs consisting of wet weather runs and simulated flows from May to November 2003. A preliminary draft of the pilot study report was submitted to the city on December 1, 2003.

Mr. Van Frank asked whether the final report would have data from the individual units tested. How much difference was seen between the three systems? Mr. Ashack said the report would contain data from all units tested. Preliminary findings are that each technology is capable of producing good quality effluent, and could meet secondary effluent limits. There was little ammonia removal from any of the units, but each did an excellent job of removing phosphorous.

Mr. Pratt suggested that in the final report, the team should investigate operational issues and what has worked in other cities. Jim Parks said operational issues were not covered in the pilot study but would be part of the Design Criteria report. John Kupke asked whether the purpose of the Pilot study was to determine the design criteria and not to select one technology over another. Len Ashack said that was correct. At a later date the city will review design specifications and operating issues before making a decision on a technology.

The Pilot Studies' final report is due to the city at the end of February. The final design criteria report is due May 31, 2004. Public information meetings will be held this spring or summer.

There was some discussion about ammonia discharges. Mr. Pratt asked whether there had been discussions with IDEM and whether they had any problems with revised ammonia limits. We need to make sure they acknowledge that the city is moving in the right direction, he said. Mr. Ashack said the city would draft suggested permit language and would have to lay the groundwork on how to justify the permit modification within the current rules. Mr. Pratt noted that IDEM wants stream flow monitoring, but you can't measure flow in a stream to decide on an instantaneous basis what you're going to do to operate the plant. Mr. Ashack said the city needs to work with IDEM on what they're comfortable with and what's reasonable.

Dr. Roper said the city had reviewed five years of raw sewage ammonia data and how it changes with plant flows. If you take wet weather biological effluent and recombine it with tertiary plant effluent, it appears the plant would be in compliance with weekly and monthly ammonia limits. The city should do as much biological treatment as it can. With this solution we can double the amount of flow getting biological treatment, he said.

4) EPA-IDEM NEGOTIATIONS UPDATE

Rosemary Spalding recapped the history of the long-term control plan negotiations with EPA and IDEM. She noted that the city has been conducting a technology screening analysis of each watershed and evaluating up to 101 alternatives for each watershed using various criteria. When the advisory committees last met, they heard a presentation on the Fall Creek watershed analysis. When the Fall Creek analysis was presented to EPA and IDEM, there were questions and comments. The city has now responded to the first set of EPA/IDEM comments and is now in the second round of questions. Mr. Van Frank requested a written copy of the second round of questions and comments for review.

In analyzing Pleasant Run and Fall Creek, trends have emerged. Based upon these trends, the engineers believe we should not expect different results if the watershed-by-watershed analysis continues. In a telephone call with Jodi Traub, U.S. EPA's Region V water division director, Barbara Lawrence discussed not continuing a watershed-by-watershed technology review, instead suggesting that a system-wide alternatives evaluation begin. The committee was given a copy of a letter from Ms. Lawrence to Ms. Traub that outlined the city's approach.

Based on our current pace and approach, the city wouldn't be in a position to submit the revised LTCP until the end of 2005 at the earliest. This timeline is not acceptable to the city. The city is also aware that the advisory committee would not be pleased with this timeline either.

Ms. Spalding said that the city's early action projects are making a difference. However, delays that result from not having an approved long-term control plan continue to delay water quality improvements in the city.

Mona Salem also noted that the City-County Council will not approve expenditures or bond issues without an approved long-term control plan. As an example, she said, all those involved know we will need a large storage facility along Fall Creek, and even if we started today it would take about two years to finish the design work.

Merri Anderson asked where septic systems would be addressed in the city's proposed system-wide alternatives. Ms. Spalding pointed out that the system-wide alternatives are for CSO control, and do not represent the final plan that is being proposed to EPA. The city is simply asking approval to move to the next step of CSO control alternatives analysis.

Mr. Kupke noted that the septic program will depend on final negotiations on CSO issues and how other things fit into the LTCP. CSOs are the lynchpin in the process and need to be "job one."

Ms. Spalding interjected that the city is asking to take what was learned from the first two watersheds and move to the next phase of analysis.

Mr. Van Frank asked what reason is there to believe that the analysis on smaller streams will apply to larger waterways like White River. Gary Mercer noted that in many cases, the tributaries have the same drainage areas and annual overflow volume that are comparable to White River. We know the technologies we should look at. We should reduce the time spent on the number of alternatives, he said.

Ms. Spalding reported that before the advisory committee meeting, the city met with EPA and IDEM to discuss the city's proposal to proceed to the system-wide analysis in more detail. EPA and IDEM were not comfortable with the city's proposal, because they feel that the city agreed to a process and should stick with it. The city is asking to be allowed to adjust the process based on findings in the first two watershed analyses.

The city is now going to consider the things EPA suggested in the meeting and we will spend additional time investigating their suggestions. The meeting will be followed up by a conference call to discuss findings of the investigations. Ms. Spalding stated that she feels that EPA and IDEM worry that accepting the city's proposal may result in a lack of documentation that will be needed in the future. The city is willing to modify its proposal to address their concerns, but continues to be concerned about the additional time it will require.

Ms. Spalding pointed out that one concern is that everything has taken longer than planned. For example, Fall Creek was anticipated to go quicker than Pleasant Run because it was the second stream, but actually Fall Creek is taking longer. IDEM and EPA said in the earlier meeting that their feedback should shave up to seven months off of the process.

Tom Neltner stated that in finishing Pleasant Run and Fall Creek, the city has dealt with two of the extremes, and he didn't understand why that isn't enough. Mr. Neltner asked whether it would be helpful for public interest groups to talk to EPA and find out their concerns. Mr. Van Frank said the City-County Council could use EPA and IDEM's reasoning as justification not to approve the plan.

Ms. Perras noted that EPA said they really wanted documentation but that they did not care if each watershed was not submitted separately. EPA also indicated that it would take them a long time to agree to the city's proposal. Several WWTAC members said EPA's position was bothersome, because it would lead to just repeating the same studies over and over again. Mr. Kupke said he felt that EPA is wasting our time and the city's money. He added: "Environmentally, I feel this is something we can bring to the table. We've tried to have a sense of urgency and this just distracts. Perhaps we need a written resolution or a letter."

Ms. Spalding noted that when we get to facility planning, we can make modifications that still wouldn't preclude moving forward. Mr. Pratt asked whether there was anyone at IDEM who would understand and could help. Ms. Spalding said EPA is taking the lead on the technical portion.

Mr. Neltner said he would call individuals at both EPA and IDEM.

Mr. Kupke said he would draft a short resolution to EPA urging them to move forward. The committee would review the language in the letter and try to submit it this week. Each committee person would sign it.

Ms. Perras thanked everyone for their support. Merri Anderson asked whether we should circulate the resolution to those who don't attend most of the WWTAC meetings. Ms. Perras responded that the draft resolution would be sent to everyone on the committee distribution list.

5) FALL CREEK MODELING ISSUES

Gary Mercer presented information on the water quality model versus Marion County Health Department (MCHD) sampling data. Currently, Fall Creek exceeds water quality standards approximately 190 days a year, based on data collected by MCHD and DPW's Office of Environmental Services (OES) from 2001 and 2002 in the CSO area below the Keystone Dam.

Mr. Neltner said that he is on the stream a lot and it appears to be cleaner. Mr. Mercer said the stream is cleaner but the improvements are a small step forward. Particularly, we need to take care of septics, stormwater and CSOs.

Mr. Van Frank shared a summary of MCHD *E. coli* data for Fall Creek with the committee. Mr. Pratt suggested that the city needs to look at days it exceeds 5,000 or 10,000 colonies/100 ml. This would present a better picture of water quality improvements. The city said it also had prepared those analyses.

Mr. Mercer said that stream action changes water quality daily. One year varies from the next. Single samples are less accurate than the model's simulation of effects over the course of a typical year.

Mr. Neltner said that from observations and sampling, he sees that CSOs are not the only issue. Mr. Mercer said that there are a number of days greater than 2,000 and the city needs to make people aware that there is a stormwater issue there. We may not see the benefit that is expected even if other changes are made. Mr. Neltner said stormwater upstream of the Keystone Dam doesn't seem to have violations, and there is not a lot of stormwater downstream of 38th Street. Above 71st Street, the stream meets standards consistently. Mr. Mercer said there are not a lot of storm drains upstream of 71st Street.

Mr. Van Frank said another problem is the buildup of *E. coli* in sediments in Fall Creek. It may not be the same strain as in the human intestine. Pam Thevenow agreed with that theory, but said there's no data to back that up. Tom Neltner said Ron Turco at Purdue University has published studies on the issue.

Mr. Van Frank said sanitary sewer overflows and lift stations that are overflowing might be another source of problems. He was concerned that we're assuming the background is all stormwater, when it's a combination of septics, legacy issues and lift stations. Ms. Perras said all sources are being considered and need to be addressed. Mr. Van Frank said that needs to be clear in the city's documents.

Mr. Mercer said there are a lot of dry-weather problems in Fall Creek, which is impacted by the fact that there isn't a lot of flow in the stream in the summer.

Mr. Mercer also reported on CSO 103 impacts. CSO 103 is located at Sherman Drive near a pump station. It discharges to Meadow Brook, which makes its way to Fall Creek. To date, the city has worked to upgrade the pumping capacity at the lift station and has done some pipe line rehab work. The city is currently managing a design contract to reduce inflows into that system. Summer construction is planned to reduce the overflows. Stormwater from parking lots at Mozel Sanders Apartments also flows to Fall Creek via Meadow Brook. Mr. Van Frank asked if there is some way wetlands or best management practices can go there. Mr. Ray said we need to first eliminate the CSO before we create wetlands to address stormwater issues.

6) EAST BANK TANK PROGRESS

Bob Masbaum of DPW Engineering made a presentation on the White River East Bank CSO Storage project.

The East Bank tank project is a three million gallon storage tank on White River at CSO 039, the second largest BOD discharge point and the fourth largest TSS discharge point. It is also a collection system nexus. The city also put in a pinch valve nearby to better route sewage flows through the system.

The tank is upstream of the CSO. It is located south of the New York Street bridge and west of the IUPUI campus. Ms. Anderson asked whether the channel that CSO 039 discharges into will still remain. Mr. Masbaum exclaimed you won't actually see the tank when finished, because it should blend in with the rest of the floodway. The electrical building won't be noticed by the public either. It will be notched into the hill under an overlook.

The city has planned for two more tanks that will increase the storage in that area to 10 million gallons. The design of the project will also allow for the capture of CSOs 037 and 038 in the future. Final completion is expected by November 2004. Cost is $5,797,649, or $1.93 per gallon.

Mr. Masbaum also affirmed that based on a six-month period in 2001, the project would reduce overflows from roughly 29 to approximately five. Once the other storage tanks come on line, it would be reduced to only one overflow in that period.

6) OTHER BUSINESS AND NEXT MEETING

It was agreed that the next meeting will be March 17 from 4:30 p.m. to 6:30 p.m. The meeting was adjourned at 6:25 p.m.

Minutes

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Meeting Date: March 17, 2004

Time: 4:30 to 6:30 p.m.

Location: Clean Stream Team Office Training Room
151 N. Delaware, 9th Floor
Indianapolis, IN 46204

Purpose: Mayor's Raw Sewage Overflow Advisory Committee

Wet Weather Technical Advisory Committee

Attendees: Rosemary Spalding, John Kupke, Richard Van Frank, Ralph Roper, Patrick Carroll, David Haywood, Jodi Perras, Don Murray, Merri Anderson, Carlton Ray, Leon Bates, John Chavez, Tim Blagsvedt, Mona Salem, Kevin Hardie, Bill Beranek, Bob Masbaum, Tracy Baker

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Jodi Perras welcomed advisory committee members and reviewed the agenda. She thanked the Clean Stream Team for bringing St. Patrick's Day refreshments.

1) OPENING REMARKS

Jodi Perras reviewed the agenda. She noted that the interplant connect study has contributed to an agreement among the city, U.S. EPA and IDEM on how to proceed with the alternatives analysis. Ms. Perras said she would walk through the schedule and explain how the committee will be involved in the development of the long-term control plan.

2) REVIEW MINUTES OF JANUARY 21 MEETING

Ms. Perras presented draft minutes from the January 21, 2004 committee meeting. There were no additions or corrections. Ms. Perras asked attendees to submit any changes by e-mail.

3) INTERPLANT CONNECTION STUDY

Ms. Perras turned the meeting over to Carlton Ray and Dr. Ralph Roper to facilitate the interplant connection study presentation. A copy of the study's executive summary was provided in the handout materials. Mr. Ray explained that the Clean Stream Team is comprised of many consulting firms with different areas of expertise. The lead on this project is Mr. Roger Kelso of RW Armstrong. Srini Vallabhaneni of CDM provided modeling support. VS Engineering did the actual routing for sewers. City staff included Jim Parks, John Morgan, Bob Masbaum and Mr. Ray. One of the chief contributors on this study is Dr. Roper. Mr. Ray indicated that EPA and IDEM are pleased by the amount and quality of work the city has done to optimize the treatment plants and evaluate the ideal size for the interplant tunnel.

Dr. Roper said the study essentially includes two facility plans: 1) a plan for conveying captured CSO to the Southport facility, and 2) a Southport treatment plan to provide effective treatment of captured CSOs and accommodate future service area growth over the next 25 years.

The Southport plant was originally built in the 1960s to relieve Belmont of its dry weather flow limitations. In the late ’60s, a second module of the Southport plant was completed along with a Southwest diversion structure and interceptor to further relieve the Belmont plant of capacity limitations. Today, one third of the flow received at Southport is from the combined sewer area serviced by the Southwest diversion interceptor

The objective of the interplant connection facility plan was to address these fundamental questions:

1) Once you capture CSO flows in the deep tunnel, what do you do with them?
2) What is the flow rate at which captured CSO needs to be treated?
3) Where should we send the captured CSO – Belmont, Southport or to a new plant?
4) To what extent should the captured CSO be treated?

Dr. Roper explained in detail the overall plan for the Belmont facility. A current construction project will add 34 million gallons of wet weather storage basins, which will reduce the primary effluent overflow frequency by more than 50 percent. In the secondary treatment process, the city will upgrade the bioroughing system with intermediate clarifiers. This will allow progressive “uncoupling” of the two-stage nitrification system, providing two pathways for biological treatment during wet weather. The bioroughing with intermediate clarifiers will essentially become a secondary biological treatment process. The uncoupled secondary treatment process will be capable of treating flows up to 300 million gallons per day (mgd), with 150 mgd sent to the bioroughing/intermediate clarifiers and the other 150 mgd send through the oxygen nitrification system. This will double the plant’s current secondary treatment capacity and equal its primary treatment capacity, eliminating the primary effluent overflows. However, it will not solve the raw sewage overflows occurring upstream of the plant headworks. Once the PE bypass is eliminated, the storage basins can reduce headworks overflows. Current plans will reduce overflows to 4-6 events per year at Belmont.

Dr. Roper said the interplant connect project team looked at flow-splitting strategies, reviewing whether Belmont’s increased capacity would be sufficient enough to accommodate the flow rates from increased CSO capture in the system. The team reviewed historical data from 1996-2000 to evaluate the use of Belmont as the preferred treatment location, and sending excess flows to Southport. The analysis showed that even with the doubled capacity, Belmont would not have enough treatment capacity to handle all wet weather flows and flows from the deep tunnel. Additional treatment capacity is needed, but where? At Belmont, Southport, a new facility? What treatment rate is needed? What pumping rate from the interplant tunnel would be required? A model of the tunnel was set up to evaluate how pumpout rates would affect the size of the tunnel. The analysis showed that as tunnel dewatering rates increase, they would have a dramatic effect on the size of the tunnel needed. According to the analysis, the maximum treatment rate needed to handle capture CSOs would be 150 mgd, and it could be as low as 75 mgd.

Dr. Roper noted that the Belmont plant has little land available for expansion and some of that space is needed for future solids processing. Building a new, separate facility would have drawbacks in terms of siting, permitting, performance, intermittent operations, and cost-effectiveness. Therefore, the team concluded the bulk of capture CSOs should be conveyed to Southport for treatment.

John Kupke asked whether the 150 mgd was a sustained rate. Over what duration would that rate occur? Dr. Roper said the city experiences approximately 60 rain events per year, with about half of them causing less than 25 million gallons of overflows. Half are more significant events. A handful of rain events create demands of 400-500 mgd. Mr. Kupke asked whether the team looked at large flow events in evaluating the wet weather characteristics of the tunnel and captured flow. Dr. Roper said the team didn't look at particular events, but rather looked at aggregate results from several hundred events over a 5-year period that included essentially the full range of precipitation events.

The team also looked at possible routes for the interplant tunnel. One of the biggest issues was a number of underground rock quarries on the alignment path between Southport and Belmont, which create a roadblock to a tunnel. The team settled on using the same route as the existing Southwest Diversion, using a 12-foot diameter (144-inch) sewer from the existing Southwest Diversion structure. The new sewer would have its own storage volume of 8-10 mgd and could be used to capture CSOs in the immediate area. Before the deep tunnel is constructed, the line could be used to store captured CSOs. Eventually it would be used to convey dewatering flow from the deep tunnel.

The team also reviewed the degree of treatment needed at Southport, including advanced primary treatment, conventional biological treatment, or advanced biological treatment. The analysis determined that conventional biological treatment could meet ammonia requirements when combined with AWT effluent. By upgrading the existing air activated sludge process with new aeration equipment and adding larger clarifiers, the Southport treatment facility can achieve 300 mgd biological capacity during wet weather. The analysis took into account 150 mgd flows of captured CSO from the interplant connect, 50 mgd for growth and 25 mgd of additional relief for Belmont to reserve capacity there for future growth.

Dick Van Frank asked what future growth rates were based on. Dr. Roper said the team reviewed flow projections from recent master plans for the various sewer areas and total system flow data from the past 37 years. A regression analysis of the 37 years of flow data was performed to enable extrapolation of what flows would likely be 20 years in the future. This resulted in a projected 25 mgd annual average net increase in dry weather flows. Mr. Van Frank said he was concerned about the trend of additional housing in the downtown area and larger houses being built on smaller lots in suburban areas. Dr. Roper said the overall concept provides for relieving the Belmont plant of 25 mgd (by sending it to the Southport facility) so that Belmont will continue to have capacity for future residential and industrial growth.

Mr. Van Frank asked how quickly the tunnels would empty. Dr. Roper said the city tried to avoid blanket assumptions on tunnel dewatering rates. A computer model of the tunnel looked at a five-year period of operation and could set the dewatering rate at varying capacities so that the effect of dewatering rate on tunnel volume could be examined. The analysis did not lock into one dewatering rate.

Dr. Roper noted that the system-wide approach needs to accommodate the watershed analysis for CSO control, Belmont and Southport facility plans, and tradeoffs in how large the tunnel should be. This analysis included overflow frequency, tunnel volume and cost.

Merri Anderson asked how the storage facilities were being constructed at Belmont. Mr. Ray said they are concrete, double-lined, open basins. The basins will be aerated to help reduce odors. Ms. Anderson noted that the city's comprehensive plan assumes all of Marion County will be built out by 2020 and projects at least 20,000 people living downtown.

Mr. Van Frank asked what "built out" means. In suburban areas, single houses are being replaced to 4-5 much larger homes on the same lot. There may be a lot more people per unit area than in the past if the trend continues.

Dr. Roper noted that growth can be addressed early on. The Southport plant is underutilized because there is not enough headworks pumping capacity. The city needs to divert flow from Belmont to Southport soon to relieve Belmont. An additional service population of 20,000 people represents 4-8 mgd peak flow, which is well within the existing capacity of the treatment plants.

Dr. Beranek asked how the city dealt with BOD, suspended solids and ammonia from the system. As the city projects capacity increases, is the load a problem? In the winter is there a problem? Do there need to be changes in the plants to accommodate loads? Dr. Roper said pollutant concentrations were developed through the model, which included an evaluation of how mass rates of soluble BOD and ammonia changes with higher rain events.

Mr. Kupke noted that he felt the city had looked at a system-wide approach and determined that the interplant connect should be a 144-inch diameter sewer. We wouldn't want to back up later to find another size was needed. The city looked at the optimization between the variables to justify its approach. "I sense you're able to move ahead because you've bracketed the conditions. There is additional capacity in dry weather," he said.

3) EPA-IDEM NEGOTIATIONS UPDATE

Rosemary Spalding reported that the city, EPA and IDEM had come to agreement on how to proceed with the alternatives analysis. The three agreed to commit to a schedule that will deliver a revised long-term control plan by the end of the year. The commitment to move forward came from the top of all three agencies, she said.

Mona Salem said EPA came to Indianapolis to discuss the alternatives analysis and the interplant connection analysis. All three agencies worked on a schedule and committed to a lot of meetings and input. The advisory committee members will play a key role in the process. At this point, $200 million has been spent on projects over the last three years. Ms. Salem stated that the engineering department has been working on facility plans and designs and they are eager to begin construction. However, there is much work to be done in regards to asking the Council for funding, securing bonds and identifying other funding opportunities.

David Haywood discussed how the city will move forward to the alternatives analysis stage. Previous analyses have focused on technology screening and analysis, to screen out technologies that are not viable. The alternatives analysis will combine technologies together to achieve a goal or the level of control. The analysis will evaluate three plans:

1) Plan 1: White River, Fall Creek, Pogues Run, Pleasant Run and Eagle Creek would have storage and conveyance to the city's existing advanced wastewater treatment (AWT) plants. State Ditch and Lick Creek would have local sewer separation. Storage/conveyance would be evaluated at the following overflow frequencies: 12, 6, 4, 2, and 0.5 overflows/year.
2) Plan 2: Storage and conveyance for White River, Pleasant Run and Eagle Creek. A hybrid combining storage/conveyance at 12 overflows/year with enhanced high-rate clarification (EHRC) and disinfection beyond 12 overflows for Fall Creek and

Pogues Run. State Ditch and Lick Creek would have local sewer separation. Alternatives would be evaluated at the following overflow frequencies: 12, 6, 4, 2, and 0.5 overflows/year.

3) Plan 3: Total sewer separation.

The alternatives to be analyzed are displayed on the table below.

<table>
<tr><th></th><th>Plan 1</th><th>Plan 2</th><th>Plan 3</th></tr>
<tr><td>White River</td><td rowspan="5">Storage/Conveyance with treatment at AWT plants</td><td>Storage/Conveyance to AWT plants</td><td rowspan="6">System-wide Sewer Separation</td></tr>
<tr><td>Fall Creek</td><td rowspan="2">Hybrid (Storage/conveyance at 12 overflows/year with remote EHRC and disinfection)</td></tr>
<tr><td>Pogues Run</td></tr>
<tr><td>Pleasant Run</td><td rowspan="2">Storage/Conveyance to AWT plants</td></tr>
<tr><td>Eagle Creek</td></tr>
<tr><td>State Ditch/Lick Creek</td><td>Local Sewer Separation</td><td>Local Sewer Separation</td></tr>
</table>

Mr. Van Frank questioned whether the Pogues Run treatment facility had previously been shared with the committee. Ms. Salem and Mr. Haywood clarified that the treatment facilities on Pogues Run and Fall Creek would be EHRC facilities with disinfection.

Leon Bates and Mr. Kupke questioned whether the separate wastewater reclamation facility that had been proposed in 2001 for Fall Creek was still an option. Where would it be located? Did it fall out of favor because of economic reasons? Mr. Ray said the city had concluded that if there is capacity at Southport it didn't make sense to build a new plant on Fall Creek. The Plan 2 EHRC facility on Fall Creek would be located somewhere near its convergence with the White River near 10th Street.

Mr. Haywood said the city would perform hydraulic and water quality modeling on each alternative and would look at sizing, siting and costing the required facilities to meet the various levels of control. The city's existing early action projects are part of the baseline analysis in the model.

4) SCHEDULE FOR MOVING FORWARD
CSO EARLY ACTION PROJECTS-PHASE II

Ms. Salem noted that the city had been able to move forward previously with more than $200 million in CSO projects because EPA, IDEM and the public had agreed they were projects that would be part of the long-term control plan. That agreement allowed the city to finance and obtain funds for the projects and move forward. Today, the city has a lot of projects it could move forward on but no funding to do so. An agreement on the projects is needed in order to receive Council approval for funding.

Mr. Ray provided a brief description of the projects shown in a table provided as a handout. See attached.

During discussion, Ms. Salem indicated that MWH's contract expires at the end of the year and the city will look at other management concepts for the program. Mr. Van Frank expressed concern regarding any changes within the program management team. Ms. Salem explained that consulting firms have contracts with the city and when the contracts expire the city will look at all possible options to move forward on existing projects. As an example, she noted that DLZ has the stormwater program management contract and works with two firms who have direct contracts with the city. MWH has all subcontracts as subs to them. The city needs to consider how the contract is going to be structured in the future.

Mr. Van Frank questioned the Lake Sullivan wetland project, which would convert a rugby field into a wetland to treat contaminated runoff from the Crooked Creek area. Ms. Salem noted that the rugby field near Riverside Park and the Velodrome is contaminated with E. coli and has been closed. The White River Citizens Advisory Committee has donated $50,000 to the project, provided the city funds the remainder of the project. Mr. Bates had concern about removing parkland that children play on and asked if the wetland could be placed on one of the golf courses. Ms. Salem noted again that the field is contaminated and was being relocated elsewhere. The Parks Department is going to create a trail around the wetlands and an educational center for children.

Don Murray asked about odor issues at the treatment plants. Mr. Ray indicated that the city had selected Greeley & Hansen and CMID from the City's RFQ to do an odor study based on a scope of work developed by Jim Parks and Joe Watson. The study will review current operational issues and long-term issues. The study should be finished by the end of the year or the beginning of 2005.

With respect to the long-term control plan, Mr. VanFrank asked how funding will be addressed. Mr. Ray stated that a rate analysis and financial capability analysis will be conducted. The team is updating the financial analysis completed in 2001 based on new data from the city and the 2000 census. Ms. Spalding stated that the City-County Council is the funding body for the city, and we need to make efforts to bring council members up to date. She also indicated that we seek the controller’s assistance.

5) Schedule for Moving Forward

Ms. Perras reviewed the schedule for completing the long-term control plan by the end of November. (See attached schedule.) The schedule includes four separate activity areas: outreach, financial, technical and revising the report.

The schedule includes six more advisory committee meetings this year. The next meeting is scheduled for April 14 to discuss recreational use data collected over the past two years, neighborhood issues, equity issues and sensitive areas.

In May, the committee will be looking at alternative analysis information to be presented at public outreach meetings in June, cost effectiveness and financial capability information.

Watershed-based meetings for the public will be held between June 9 and 22, and the team will record comments made at those meetings.

Following those meetings, the city will select a preferred plan and conduct more detailed modeling. This modeling will involve a five-year continuous simulation of rainfall so the city can review how the plan will perform over a long period of time. Related to that is optimizing the plan for the deep tunnel. The tunnel carries the single largest cost within the plan and requires a detailed analysis. Mr. Van Frank inquired how many tunnels we are talking about, and Ms. Perras stated just one tunnel. Mr. Ray indicated that in discussions between operations and engineering staff, it was agreed that one tunnel would be preferable to two from an operational standpoint.

Following the detailed modeling, the team will finalize the draft report, schedule a public hearing, and have a 30-day comment period on a draft long-term control plan. The comment period is scheduled in October. A special meeting will be called in October for the committee to review the plan. The goal is to submit the plan to EPA and IDEM by November 19th.

Mr. VanFrank asked if documentation and committee discussion could be shared in e-mail format. Ms. Perras indicated that e-mail would be fine for discussion between meetings.

Mr. Kupke noted that the city had come up with a list of Phase Two early action projects that the advisory committee had endorsed or supported earlier. In that vein, we should be supportive of these projects, he said. Don Murray and other committee members also voiced their support.

Ms. Spalding stated the importance of each representative of Audubon and MCANA, etc. to share with their organizations the information on what projects are being done.

Mr. Bates and Mr. Van Frank encouraged the city to work with the news media to get the CSO issues in front of the public again. The city needs to publicize the work that it is doing, Mr. Van Frank said. Ms. Perras said the team has developed a communications plan to do just that.

6) Next Meeting
The next meeting will be April 14, 2004 from 4:30 p.m. to 6:30 p.m. The meeting was adjourned at 6:50 p.m.

Minutes

INDIANAPOLIS
CLEAN STREAM TEAM
151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Meeting Date: April 14, 2004

Time: 4:30 to 6:30 p.m.

Location: Clean Stream Team Office Training Room
151 N. Delaware, 9th Floor
Indianapolis, IN 46204

Purpose: Mayor's Raw Sewage Overflow Advisory Committee

Wet Weather Technical Advisory Committee

Attendees: Rosemary Spalding, Mona Salem, Jodi Perras, Richard Van Frank, Patrick Carroll, Don Murray, Bob Masbaum, David Haywood, Tom Neltner, Merri Anderson, Kevin Strunk, Kevin Hardie, Phyllis Zimmerman, Victoria Cluck, Jim Parks, Carlton Ray, Tim Blagsvedt, Pam Thevenow, Deana Haworth, Lori Pugh

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1) INTRODUCTIONS/AGENDA REVIEW

Jodi Perras called the meeting to order and reviewed the agenda. She announced that the Clean Stream Team had produced an eight-minute educational video that would be shown at the end of the meeting.

2) REVIEW MINUTES OF MARCH 17, 2004 MEETING

Ms. Perras presented draft minutes from the March 17, 2004 advisory committee meeting. Dick Van Frank noted that the minutes were well done. Minutes were approved.

3) NEIGHBORHOOD ISSUES

Ms. Perras noted that neighborhood issues were the fifth criteria category to be applied as the city looked at the CSO control alternatives. Ms. Perras noted that the Clean Stream Team went through a process to rank and apply weighting factors to the other criteria categories (technical, operating, financial, and water quality benefits). At this meeting, the Clean Stream Team will weight and rank the neighborhood issues with the advisory committee members and city staff.

She noted that the advisory committee members have better technical knowledge than the general public on these issues and can make some recommendations. The city will take the committees' input to the general public to help them evaluate the alternatives against the neighborhood issues, which are important to and more understandable by the public. Neighborhood issues will be considered in the selection of the recommended plan.

David Haywood walked the committee through a review of the neighborhood issue criteria and the process for weighting the criteria, comparing and ranking the plans, and computing total scores and rankings.

Mr. Haywood then reviewed how neighborhood issues would be evaluated:

- Review neighborhood issue criteria (developed with assistance from advisory committees, EPA and IDEM)
- Develop criteria weight (with input from advisory committees)
- Compare plans and rank with each of the individual criteria (with input from advisory committees)
- Compute total score and rank

Mr. Haywood noted that the result will be what the group thinks is the best plan based upon neighborhood issues.

Review Neighborhood Issue Criteria

Mr. Haywood reviewed the neighborhood issue criteria with the committee, as follows:

Siting concerns

- How close are facilities (remote treatment facility, not necessarily the sewer system) to homes, parks, schools, etc?
- How difficult would it be to site this alternative at the projected locations? (Dick Van Frank pointed out that the treatment facility would be at the end of the storage tunnel. Is there any point of concern, except at the end, that there is a structure there? Mr. Haywood said there would be one entry point along the tunnel. Don Murray said the impacts of a storage tunnel would be similar to a sewer under this criterion. Tom Neltner agreed.)
- What effect would this alternative have on the existing area?

Safety and security

- Are there public safety issues associated with the proposed alternative, such as use of chemicals for treatment, creation of habitat for vector/nuisance populations (i.e. mosquitoes and flies)?

- Are there security issues, such as potential for vandalism, terrorism, sabotage, etc. (Mr. Haywood pointed out that security issues would apply more to the remote treatment facility than to tunnels or sewers.)

Neighborhood Disruption (construction)

- Disruption may include physical disturbance, rerouting, temporary blocking of facilities, etc.
- How much disruption will be caused to the use of streets, sidewalks, parks, yards, etc., during construction?
- How long will the disruption last?

Mr. Haywood noted that we don’t know how long each project will take. We are still at the high level of planning. We can make a relative comparison, however.

Mr. Van Frank noted that with the tunnel there would be minimal disruption. Mr. Haywood agreed, except for the drop shaft.

Aesthetics

- How long will the alternatives have a visual impact on the existing landscape?
- Can the alternative be seen from a home or public gathering place, such as a park?

- Can the design of any new facilities consider/incorporate surrounding architecture, landscaping, neighborhood themes, etc.?
- How will environmental justice concerns be addressed?

Noise

- How much and when will noise occur during construction?
- How much noise will be present in the long-term from operating procedures such as pumps, blowers, etc.?

Mr. Van Frank asked whether the tunnel would involve blasting or boring operations. Mr. Haywood responded that it depends on the geological condition. Few do blasting of tunnels in the Midwest.

Don Murray said he doesn't want to confound the short-term noise issue with the long-term. The longer-term issue should be viewed differently. The group agreed to move the construction noise to the neighborhood disruption during construction.

Pam Thevenow said in her experience with neighborhood issues, sewer construction becomes controversial due to damage to trees, gardens, and landscaping. Ms. Perras said that factor would be considered under neighborhood disruption and aesthetics.

Odor

- Are odors expected to be reduced in surrounding areas during long-term operation?
- Are odors in the areas going to be increased during long-term operation?

Mr. Neltner noted that the two criteria are effectively opposites, so they same issue is double-counted. Mr. Haywood said the team would just address one of the issues and modify the system to ignore the other one.

Truck Traffic

- How frequently will trucks travel through a neighborhood for regular operation and maintenance activities?

After the criteria were reviewed, Kevin Strunk noted the importance of exchanging information with the neighborhood during construction in a way that works for the residents and the contractor. Ms. Perras noted that while his concerns were important, the question he raised was not a function of the plan the city chooses. Rather, it's related to how the city will do outreach during the construction of whatever plan is chosen, whether it is a tunnel, sewer, or remote treatment facility.

<u>Description of Plans</u>

Mr. Haywood then reviewed the plans by watershed, as shown below.

PLAN 1

- Fall Creek: Deep Tunnel Storage
- Pogues Run: Upstream Storage (Spades Park); Downstream conveyance via existing sewer system; convert half of existing box culvert to storage tunnel
- Pleasant Run and Eagle Creek: Relief interceptor sewer
- Upper White River: Upstream storage with disinfection (Riviera Club) to capture three

CSOs near that location
- Central System: Deep Tunnel Storage (to the Fall Creek confluence), west side relief interceptor sewers.
- AWT plant upgrades with interplant connection

PLAN 2
- Fall Creek: Deep Tunnel Storage and remote enhanced high rate clarification (EHRC) facility with UV disinfection
- Pogues Run: Upstream Storage (Spades Park); Deep tunnel storage and remote treatment
- Pleasant Run and Eagle Creek: Relief interceptor sewer
- Upper White River: Upstream storage with disinfection (Riviera Club) to capture three CSOs near that location
- Central System: Deep Tunnel Storage (to the Pogues Run confluence), Downstream interceptor sewers (East and West).
- AWT plant upgrades with interplant connection

PLAN 3

Separate storm sewer and sanitary sewer for:

- Fall Creek
- Pogues Run
- Pleasant Run
- Eagle Creek
- Upper White River
- Central System

Mr. Neltner noted that the spreadsheet provided as a handout showed watershed improvements under Plans 1 and 2, but not under sewer separation. Watershed improvements include septic tank elimination, stormwater capital improvement projects, streambank restoration and sediment removal, illicit connection removal, flow augmentation in tributaries, temporary aeration for Fall Creek and White River, removal of Boulevard Dam, White River permanent aeration, and modification of Stout Dam.

Mr. Van Frank said the watershed improvements should be applicable across the board, including sewer separation. Mr. Haywood agreed they should be applied across the board. He said he would check to be sure the watershed improvement projects are included in the modeling of water quality benefits under sewer separation.

<u>Weighting Neighborhood Issues</u>

Mr. Haywood then guided the committee and city staff through the process of ranking and weighting neighborhood issues against each other. The process was similar to that used by the city in 2003 to weight technical, operating, financial and water quality issues during the watershed-based technology screening process. In the table shown on the following page, each criterion listed in a row was compared to criteria listed in the columns.

For example, in reviewing siting concerns in the table's first row, the committee determined that siting concerns were less important than safety and security (a score of 1), more important than neighborhood disruption (3), about the same as aesthetics (2), less important than noise and odor (1), and more important than truck traffic during operation (3). This ranking gave siting concerns an overall score of 11 and, when compared to other criteria, a weight of 13.1 percent – the fourth highest criterion of seven within neighborhood issues.

Criteria 1 = Lower Than/Less Important Than 2 = Same As/Equal Importance 3 = Higher Than/More Important Than	Neighborhood Issues									
	Siting Concerns	Safety and Security	Neighborhood Disruption (Construction)	Aesthetics	Noise	Odor	Truck Traffic (Operation)	Sum	Criteria Weight	Rank
Siting Concerns		1	3	2	1	1	3	11	13.1%	4
Safety and Security	3		3	3	1	1	3	14	16.7%	3
Neighborhood Disruption (Construction)	1	1		1	1	1	2	7	8.3%	7
Aesthetics	2	1	3		1	1	2	10	11.9%	5
Noise	3	3	3	3		2	3	17	20.2%	1
Odor	3	3	3	3	2		3	17	20.2%	1
Truck Traffic (Operation)	1	1	2	2	1	1		8	9.5%	6
							TOTAL	84	100%	

Following the committee's initial weighting of criteria, safety and security ranked at the same level as noise and odor, with each receiving a 19 percent weight factor. The committee discussed whether safety and security elements were skewing higher than they should because people are relating to the terms "safety and security" and not the definition, which relates to "softer" issues such as vandalism, sabotage, terrorism, and habitats for flies and mosquitoes. Mr. Neltner noted that the definition of safety and security does not cover the hazards of injury or death from falling into a tunnel, etc. Ms. Perras noted that all alternatives should rank equally in the hazard category because they all should be designed with barriers and security systems to prevent injury to neighborhood residents. The city would do whatever needs to be done to prevent accidents. Merri Anderson noted that the safety and security issues should be considered as public health issues.

Mr. Neltner suggested changing the safety and security ranking to "1-lower than" instead of "2-same as" when compared to noise and odor. The committee and city staff agreed. This provided the following relative rankings: noise and odor received the highest scores (both with 20.2 percent weight factors), followed by safety and security (16.7 percent), siting concerns (13.1 percent), aesthetics (11.9 percent), truck traffic during operation (9.5 percent), and neighborhood disruption during construction (8.3 percent). The results of this interactive, consensus-based process are shown in the table.

Ranking of Plans 1-3

Mr. Haywood then guided the committee and city staff through an evaluation of the three control plan options against the neighborhood issue criteria. In this process, committee members and city staff reviewed each of the criteria descriptions and then ranked the proposed plans 1st, 2nd or 3rd, based on the committee's judgment. This process yielded the results shown in the table below:

Criteria Weight	Criteria Description		Rank		
			Plan 1	Plan 2	Plan 3
13.1%	Siting Concerns		1	2	2
-	1	How close are facilities to homes, parks, schools, roads, etc.?	1	3	1
-	2	How difficult would it be to site this alternative at projected locations?	1	2	3
-	3	What effect would this alternative have on the existing area?	1	2	3
Score Subtotal			3	7	7
16.7%	Safety and Security		1	3	1
-	1	Are there public safety issues associated with the proposed alternative, such as use of chemicals for treatment, creation of habitat for vector/nuisance populations (i.e. mosquitoes and flies)?	1	3	1
-	2	Are there security issues, such as potential for vandalism, terrorism, sabotage, etc.?	1	3	1
Score Subtotal			2	6	2
8.3%	Neighborhood Disruption (Construction)		1	2	3
-	1	How much disruption will be caused to the use of streets, sidewalks, parks, yards, etc., during construction?	1	1	3
-	2	How long will the disruption last?	1	2	3
Score Subtotal			2	3	6
11.9%	Aesthetics		1	3	2
-	1	How will the alternative have a visual impact on the existing landscape?	1	3	3
-	2	Can the alternative be seen from a home or public gathering place, such as a park?	2	3	1
-	3	Can the design of any new facilities consider/incorporate surrounding architecture, landscaping, neighborhood themes, etc.?	1	3	1
-	4	How will environmental justice concerns be addressed?	1	3	1
Score Subtotal			5	12	6

Criteria Weight	Criteria Description		Plan 1	Plan 2	Plan 3
20.2%	Noise		1	3	1
-	1	How much and when will noise occur during construction?			
-	2	How much noise will be present in the long-term from operating procedures such as pumps, blowers, etc.?	2	3	2
Score Subtotal			2	3	2
20.2%	Odor		2	3	1
-	1	Are odors expected to be reduced in surrounding areas during long-term operation?			
-	2	Are odors in the area going to be increased during long-term operation?	2	3	1
Score Subtotal			2	3	1
9.5%	Truck Traffic (Operation)		1	3	2
-	1	How frequently will trucks travel through a neighborhood for regular operation and maintenance activities?	1	3	2
Score Subtotal			1	3	2
Total Score			1.2	2.8	1.5
RANK			1	3	2

The results show that Plan 1 (storage and conveyance) is the preferred alternative for neighborhood issues, followed by Plan 3 (sewer separation), and Plan 2 (storage/conveyance with some remote treatment).

Equity Issues

Ms. Perras noted that in discussions with EPA, an issue relating to equity had come up. Committee members have emphasized that the tributaries are more important than White River. However, committee members haven't said that one tributary is more important than the others. EPA's consultant engineer has suggested that some tributaries might receive greater level of control (i.e. fewer overflows/year) than others if it doesn't cost much to achieve that higher level of control in the context of the overall plan. The city is concerned that this may lead to inequitable treatment of one part of the city vs. another. For example, Fall Creek is a larger watershed and more costly than Eagle Creek to provide equal levels of control. Would it be equitable to set a higher standard for Eagle Creek based on cost?

Mr. Neltner suggested that decisions should be based upon the knee-of-the-curve cost-effectiveness analysis for each watershed and the need to protect sensitive areas. The decision should be based on dollars per gallon.

Ms. Perras asked how the city would avoid another civil rights claim if it treated one watershed differently than another.

Ms. Anderson said Eagle Creek is more industrial. Residential areas and uses should drive sensitive area priorities.

Mr. Van Frank said if the city goes beyond the knee of the curve, it should do so based on some rational basis, such as protection of sensitive areas.

Ms. Perras said the committee's thoughts would provide a good lead-in to the discussion on April 28 when we look at recreational data.

The educational video will be shown at the beginning of the April 28 meeting.

4) OTHER BUSINESS AND NEXT MEETING

Next meetings:

Wednesday, April 28, 2004 (NOTE START TIME)
4:00 p.m. – 6:30 p.m.

Wednesday, May 19, 2004
4:30 p.m. -6:30 p.m.

Minutes

INDIANAPOLIS CLEAN STREAM TEAM
151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Meeting Date: April 28, 2004

Time: 4:00 to 6:00 p.m.

Location: Clean Stream Team Office Training Room
151 N. Delaware, 9th Floor
Indianapolis, IN 46204

Purpose: Mayor's Raw Sewage Overflow Advisory Committee

Wet Weather Technical Advisory Committee

Attendees: Rosemary Spalding, Mona Salem, Jodi Perras, Richard Van Frank, Patrick Carroll, Leon Bates, Bob Masbaum, Tom Neltner, Merri Anderson, Kevin Hardie, Glen Pratt, Carlton Ray, Rae Schnapp, Dave Voelker, Bill Beranek, John Chavez, Ralph Roper, John Kupke, Robert Barr, Deana Haworth, Lori Pugh, Tom White, Paul Werderitch

1) REVIEW EDUCATIONAL VIDEO

Jodi Perras called the meeting to order and played a new CSO educational video with the committee. She thanked Kevin Hardie and Leon Bates for donating their time to participate in the project. The video will be used as part of the city's outreach to neighborhood and civic groups through a speaker's bureau. It also will be aired on Channel 16.

Glen Pratt and Dick Van Frank complimented the video and suggested putting it on CD and distributing to schools and science teachers.

John Kupke asked if there would be a follow-up video to describe possible solutions. Ms. Perras said the options would be described in a PowerPoint presentation because of time constraints. The first watershed meeting will be taped and aired on Channel 16.

In response to a question from Merri Anderson, Ms. Perras said the city is planning to speak to different community groups from now through June 7 or 8 to promote the watershed meetings.

2) AGENDA REVIEW

Ms. Perras reviewed the agenda. Tom Neltner asked to add a discussion of equity issues to the agenda. He said he had done some research since the last meeting and thinks he might have more information that should be discussed by the committee.

Ms. Perras suggested reviewing that topic at the close of the meeting.

2) REVIEW MINUTES OF APRIL 14, 2004 MEETING

Ms. Perras presented draft minutes from the April 14 advisory committee meeting.

Minutes were approved and are now final.

3) RECREATIONAL USE DATA & PHYSICAL STREAM CHARACTERISTICS

Ms. Perras provided binders of recreational use data and physical stream characteristics to the committee.

Ms. Perras said the goals of the presentation are to:

1) review the feedback received from public and committees previously,
2) compare their recommendations on how the city should address recreational uses with actual use and stream data,
3) discuss whether the recommendations are still valid and
4) discuss the city's approach to using this information to develop the Long Term Control Plan.

Ms. Perras noted that the city sought feedback from the public in 2000 on types of areas they consider deserving of priority attention. Feedback included:

- Where children play and wade
- Worst water quality/most severe impacts
- Parks, greenways, public areas, schools
- Neighborhood creeks and drainage ditches
- Neighborhoods with septic systems

The Mayor's Raw Sewage Overflow Advisory Committee's recommendations from December of 2000 included:

- The tributaries are a higher scheduling priority than the White River.
- The city should place the highest scheduling priority on areas where people, especially children, come in contact with the stream.
- This would include placing the highest priority on stream segments along parks, wading areas used by children and adjacent school properties. The next priority should be designated greenways, followed by stream segments adjacent to neighborhoods, followed by popular fishing holes.

During meetings with neighborhood association leaders and environmental/recreational groups in 2002, similar priorities were identified for CSO control:

- Known swimming or wading by children
- Odors
- Located near a park or school
- Frequency of use
- Visual appearance

Using this feedback, the city has moved forward on early action projects to benefit and address water quality in parks, schools, and other priority areas, such as:

- Ellenberger Park
- Brookside Park
- White River State Park
- Howe Middle School
- IPS campuses on Pogues Run
- Indiana University-Purdue University at Indianapolis
- Fall Creek

- Neighborhoods with failing septic systems

The city gathered additional information in 2001 and 2002 to know more about how streams were used and how best to protect people using them. Sources of information included:

- Physical Stream Survey to review stream characteristics
- Public Non-random Intercept Survey to identify how people are using the streams
- Public Outreach Neighborhood Meetings to confirm and add to information gathered in the non-random intercept survey
- MCHD Public Access Stream Sampling Information to add to use reports
- Indy Parks Stream Use Survey to add to use reports
- Survey of Affected County and State Agencies to gather information on downstream uses
- Unpublished DNR survey of recreational use to add to sue reports

Ms. Perras described the methodology used and information available from each of those surveys.

Ms. Anderson asked how many parks were targeted in this effort. Ms. Perras responded that surveys were sent to 15-16 parks and eight were returned. The bigger parks were included in the responses.

Mr. Van Frank asked if the downstream replies came from people who are directly affected by the river. Ms. Perras said there was good response from conservation officers in the area. Mr. Pratt asked if county health officials responded to the survey. Ms. Perras said she did not remember, but felt the surveys captured a lot of areas where use occurs.

Bob Barr and Ms. Perras then presented the physical stream characteristics and use data by stream, as shown in the binders.

Fall Creek: Fall Creek is characterized by heavy vegetation, steep slopes and low stream flow throughout much of its length. Downstream of the Keystone Dam, the stream is adjusting to the withdrawal of water by Indianapolis Water. Access is limited by the vegetation, slopes and levees along much of Fall Creek, but people can access the stream at a number of locations. Access points include parks at 30th Street and 16th Street, Watkins Park, the Monon Trail at 10th Street, Boulevard Dam, and the confluence with White River. Reported uses that involve possible water contact include playing at the stream bank, fishing and wading. Early action projects along Fall Creek include inflatable dams at CSOs 063, 063A and 065 near 32nd and 34th streets, a sluice gate at CSO 58, and an inflatable dam at CSO 053.

Mr. Neltner pointed out that CSO 50 and 50A are not vegetated at all, but the map shows heavy vegetation. Mr. Van Frank also pointed out an area at CSO 52 that is not heavily vegetated. Mr. Barr noted that the survey was taken in 2001 and maintenance crews have been removing invasive honeysuckle plants along various streams.

Mr. Neltner also questioned water levels as being too low in some areas. Dave Voelker pointed out that the study was done in 2001, which was a dry year.

Mr. Bates pointed out that at 21st and Capitol/Fall Creek, there is a park that is not shown on the map. CSO 51 is a straight drop off. This is not a slope at all. There is just a guardrail.

John Kupke asked whether the city had determined there are broad areas where the stream is inaccessible? Ms. Perras said that the city was following IDEM's guidance to find things that encourage or discourage use. As the committee has pointed out, survey teams might miss a small opening when trying to characterize a stretch. Mr. Kupke asked that as a broad characteristic, would we say most streams are accessible? Ms. Perras agreed.

Mr. Voelker and Mr. Neltner said kids play in the hole at CSO 51. Mr. Neltner said that it is deep enough to be swimmable.

Mr. Neltner noted that the city has plans for greenways that connect to Fall Creek. Ms. Perras said the city could make reference to that.

Pleasant Run: Mr. Barr described Pleasant Run as a classic urban stream that includes large rocks, a wide channel carved by stormwater, but that is dry in many parts of the year. Pleasant Run is accessible along most of its reach and is lined by greenways, parks and residential areas. One exception is the Citizens Gas property in the central section, which is industrial and inaccessible. Ms. Perras said most uses are found at the parks and greenways. Uses include wading, playing at the streambanks, and fishing for crayfish. Swimming (defined as getting wet from head to toe) is reported in a few locations where very small pools have formed. One report of swimming at the downstream end is assumed to involve a stone quarry adjacent to the stream because the stream is not deep enough in this area for swimming. Early action CSO reduction projects include inflatable dams at CSOs 80 and 84 and sewer separation at the upstream end of Bean Creek.

Pogues Run: Mr. Barr said conditions on Pogues Run are similar to what we saw in Pleasant Run. It is an urban stream with very low flow most of the time, and very high flows following a wet weather event. Vegetation varies. Aggressive honeysuckle is found along much of its length. Pogues Run is more channelized, shallow and narrow at its downstream end than upstream. Ms. Perras said the greatest concentration of use is found in parks. Reported uses include wading, fishing for crayfish, and playing at the streambank. Swimming is reported in a couple of locations where small pools have formed. The city's early action projects include sewer separation to eliminate overflows into Forest Manor Park at the upstream end; an inflatable dam at CSO 101 to reduce overflows at Brookside Park; a consolidation sewer and storage tank to capture overflows along Spades Park; and rerouting overflows from the IPS campuses into the Pogues Run box. Flood control basins also have been installed on the upstream end of Pogues Run.

Mr. Neltner asked if there was any wading along Tech Campus? Ms. Perras said wading was not reported there.

Eagle Creek: Mr. Barr said Little Eagle Creek at its northern extension has a very small channel, 5-6 feet wide, with shallow water and heavy vegetation. It runs through a residential area, including near several trailer parks. Farther downstream, Eagle Creek is more accessible. Ms. Perras noted that the city was surprised that although Eagle Creek was not surrounded by parks, there were more reported locations where swimming occurs than anywhere else in the CSO area. Ms. Perras and the committee noted that there may be several reasons for this: some trailer parks have a policy not allowing children's swimming pools; water quality may be better or perceived to be better; parents allow their children to play there; and it may be more culturally acceptable in the neighborhood to swim in the creek. Early action projects include a West Belmont cutoff sewer and an Eagle Creek relief interceptor.

Mr. Roper asked how Speedway's wastewater treatment plant factors into the city's study. Ms. Perras responded that they have one overflow point at their plant. Committee members noted that some people may be swimming in Eagle Creek outside the recreation season, when Speedway is not disinfecting its effluent. The city has offered its treatment capacity to Speedway, but they have decided to do sewer separation and expand their own treatment plants.

White River: Mr. Barr noted that the upstream portions of White River are residential with some parkland. Further downstream, the park is lined by a series of city-owned golf courses and parks. Downstream of the 16th Street Dam, the river enters an urban canyon that continues to Morris Street. There are various access points along this stretch. Then the river is lined by industrial properties and begins to lose its urban character as it reaches the county line. Access is more limited in this stretch, but there are points where people can gain access to the water. Ms. Perras noted that a variety of uses are reported of White River throughout Marion County, including wading, playing at the stream bank, boating, canoeing, fishing and swimming. Uses involving water contact occur along the entire stream. Swimming is reported at Rocky Ripple, the Butler University campus, in an adjacent aggregate pit by the Indianapolis Museum of Art. Early action projects include addressing the upstream overflow points by upgrading the storage tank at the Riviera club; sewer separation on CSO 046; and the East Bank Storage Tank for CSOs 039/038/037.

White River Downstream: Mr. Barr noted that the river regains its natural character downstream of Marion County. The river is good for canoeing from the county line to Paragon. Water skiing occurs downstream from Paragon. Ms. Perras noted that reported uses are concentrated at population areas and parks. Uses include duck hunting, fishing, canoeing in the upstream areas. Water contact activities increase further downstream, with wading reported near McCormick's Creek State Park. Uses are reported wherever there are public access points.

Mr. Pratt, Mr. Neltner and Mr. Van Frank said the binder should include information on small neighborhood streams harmed by failing septic systems. Ms. Perras said the purpose of the study was to document what is happening in CSO areas. Information on septic systems will be included in the long-term control plan.

Ms. Perras also noted that Indy Parks has 22 facilities with swimming pools. These pools have approximately 285,000 users each year. There also are 8 spray areas, with 3 more in design and funded. Aquatic programs and spray areas are concentrated in the center city and near east side, with about 70 percent of them located in Center and Warren townships. Center Township has about 45 percent of the aquatic programs. There are limited aquatic resources near Eagle Creek, and the use of the few sites that do exist near Eagle Creek apparently is limited by cultural preferences.

Based upon the available data, the city has drawn the following preliminary conclusions:

- Recreational activities are reported to occur all along waterways throughout the CSO area.
- Swimming by small numbers of people is reported in a few locations, although prohibited by ordinance.
- Few areas on tributaries are deep enough to accommodate swimming.

- Non-random intercept survey shows:
  - Most popular activities are walking/jogging/biking along the waterways, followed by boating/canoeing and fishing.
  - Less popular activities are playing in the stream bank, wading and swimming.
- According to follow-up meetings and surveys:
  - Full-body contact activities occur *daily* in Rocky Ripple Area on the White River and on Pleasant Run near Meridian and Bluff. Number of users is small.
  - Full-body contact activities are reported to occur less frequently on other streams. Again, number of users is small.
- Partial body contact activities are reported to occur daily on a number of streams
- Both children and adults are reported to engage in these activities. More adult use than child use reported.
- Downstream of Marion County, minimal in-stream recreational activity was reported from the county line to south of Waverly.
- White River is impacted by other bacteria sources, including downstream sources.
- Reports of recreational activity in and around the river begin to increase south of Waverly, with fishing along the river being the most commonly reported activity.
- Most observed uses are reported south of Gosport.
- Uses are often found in parks and at public access points. However, a lack of parks in residential areas may lead to more stream use (Eagle Creek).
- Cultural norms in a neighborhood are a key factor influencing use.
- Full-body or partial-body contact activities (although limited) are reported at the most downstream reaches of CSO-impacted streams, and large CSOs are located at upstream end.
- Based on the data gathered, it appears that no one recreational area has obviously superior value to the overall community than any other area along these waterways.

During discussion of the conclusions, the following comments were made:

- Mr. Neltner said there are more than a “few” areas on the tributaries that are deep enough for swimming.
- Mr. Van Frank wanted to emphasize that there are other bacteria sources, including downstream sources, that contribute to exceedances in White River.
- Mr. Neltner didn’t feel the other bacteria sources were relevant to the overall study.
- Ms. Anderson asked why the city made a distinction between full-body and partial body contact. Mr. Ray and Ms. Perras noted that there is a greater risk from full-body contact of ingesting water.
- Mr. Neltner said the daily swimming in Rocky Ripple is a superior use that should be protected.
- Kevin Hardie noted that there is one individual who swims there on a daily basis. The overflows upstream of Rocky Ripple are infrequent. Based upon this, Mr. Neltner agreed that one individual did not equal a superior use.
- Mr. Neltner noted that the city’s early action projects already have been driven in large part by opportunities to address the “low hanging fruit.”

Ms. Perras asked the committee to again review their recommendations from December 2000 and determine whether they were still valid.

Mr. Van Frank noted that a few years ago, we believed no one used the water. Now we know they do so we need to address the issue on a system-wide basis. The question is deciding the scheduling priority of specific projects.

Mr. Kupke said the data could be used as an overlay to determine the most effective way to implement the city's program. There should be a higher priority on the tributaries, recognizing the data collected.

Mr. Van Frank said 2 overflows might be acceptable in some areas, but 4 acceptable in another. In some cases you might want 0.5 overflows.

Ms. Perras reviewed the advisory committees recommendations from December 2000 and asked if these still valid.

Ms. Anderson said she was concerned that some of the information gathered is not as reliable as she would like and may underestimate use, but she realizes the city needs to work with the data it has. She said she would place a higher priority on parks, but the city also needs to be concerned about secret swimming holes that aren't in parks.

Mr. Neltner said the research does not support giving parks and school properties a higher priority. He said the highest priority should be on wading areas and where streams have the least vegetation and least slope. The next priority should be fishing holes and then greenways. Ms. Perras asked what Mr. Neltner would do at a high priority area that he wouldn't do elsewhere. He said "do everything you can."

Mr. Van Frank said the problem he has is that there is wading all over the place. There is wading and CSOs going all along. How do you pick? There is no difference between parks and greenways.

Mr. Kupke said it is hard to make a decision without knowing the costs. Ms. Perras noted that this information will be provided at the next meeting.

Mr. Roper said the city should look forward to identify the impact of improvements on water quality and what segments of the watershed would be most attractive to frequency of use and diversity of use. Sweeping changes will take place when a deep tunnel is constructed. It is not certain whether the tunnel can be constructed in segments or whether the entire tunnel will need to be completed before a systemwide improvement is made.

Mr. Bates suggested additional educational programs on Channel 16 on the history of the sewer system, how the treatment plant works, and how projects are cleaning up the waterways. Mr. Hardie suggested a Web site to highlight projects and progress of construction.

4) OTHER BUSINESS AND NEXT MEETING
Next meetings:

Wednesday, May 19, 2004 (POSTPONED) 4:30 p.m. – 6:30 p.m.

Wednesday, July 21, 2004 4:30 p.m. -6:30 p.m.

INDIANAPOLIS
CLEAN STREAM TEAM
151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Minutes

Meeting Date: 06/16/04

Time: 4:00 to 6:00 p.m.

Location: Clean Stream Team Office Training Room
151 N. Delaware, 9th Floor
Indianapolis, IN 46204

Purpose: Mayor's Raw Sewage Overflow Advisory Committee

Wet Weather Technical Advisory Committee

Attendees: Rosemary Spalding, Jodi Perras, Dave Voelker, Tom Brown, Patrick Carroll, Don Murray, Bob Masbaum, David Haywood, Tom Neltner, Merri Anderson, Kevin Strunk, Phyllis Zimmerman, Glenn Pratt, Carlton Ray, Tim Blagsvedt, Gary Mercer, Pam Thevenow, Jesse Moore, Vince Parker, Jim Garrard, Deana Haworth, TaNaisha Lee

1) WELCOME AND INTRODUCTIONS

Jodi Perras called the meeting to order. She introduced DPW Director Jim Garrard, who welcomed everyone. Following introductions, Mr. Garrard said the committee would see results of the city's system-wide analysis, which was provided to U.S. EPA and IDEM in April.

2) REVIEW MINUTES OF APRIL 28, 2004, MEETING

Ms. Perras presented draft minutes from the April 28 meeting. Glenn Pratt said he has seen the Clean Stream Team educational video on Channel 16 and again wanted to say that it was well put together. Mr. Pratt congratulated the outreach staff on an excellent job. Minutes were approved.

3) SYSTEMWIDE EVALUTION PROCESS

Ms. Perras introduced Gary Mercer and Tim Blagsvedt from the Clean Stream Team to present the systemwide analysis. Committee members received a copy of the presentation that was given to EPA. The presentation included cost-benefit information and neighborhood rankings for each of the plans being considered. The neighborhood rankings were developed by the committee members at an earlier meeting.

4) ALTERNATIVE EVALUATION RESULTS

Mr. Mercer said the team reviewed a lot of different alternatives and narrowed it down to what they believe are the best alternatives systemwide. The selection was based on the previous Watershed Analysis and the Interplant Connection Facility Planning

Results.

The alternatives have been narrowed down to the three types of plans (with and without watershed improvements):

- **Plan 1 – Storage & Conveyance**
- **Plan 2 – Storage and Conveyance with Remote Treatment**
- **Plan 3 – Total Separation**

The systemwide evaluation process used NetStorm modeling for Plans 1, 2, 3. Completed and ongoing early action projects were incorporated into the baseline conditions. Capture levels ranged from 0.5 to 12 overflows per year. The results were based on CSO volume and flow for facility sizing.

Water Quality Modeling was also conducted for Plans 1, 2 & 3. The results measured BOD and *E. coli* loading and dissolved oxygen concentrations.

Pam Thevenow asked why sewer separation was included as an option. She thought it had been discounted a long time ago. Mr. Mercer pointed out that it has been included because it is the only option that eliminates CSOs. However, it is not a preferred option because of the cost and disruption. Rosemary Spalding also reminded the group that EPA is requiring sewer separation to be included in the evaluations.

Mr. Blagsvedt moved on to present an overview of the sizing and costing methodology for Plans 1, 2, and 3. The cost analysis was consistent with the methodology used to develop costs for Fall Creek.

Plan 1 – Storage & Conveyance: The major components of Plan 1 are:

- Fall Creek - Deep Tunnel Storage
- Pogues Run - Upstream Storage (Spades Park); Downstream Conveyance via Existing System
- Pleasant Run - Relief Interceptor Sewer
- Eagle Creek - Relief Interceptor Sewer
- Upper White River - Upstream Storage with Disinfection (Riviera Club)
- Central System - Deep Tunnel Storage (to Fall Creek Confluence); West Side Relief Interceptor Sewers
- AWT Upgrades w/ Interplant Connection

Mr. Blagvedt explained that the conceptual maps represent potential facilities and that they will evolve over time. At this point, they are no more than graphical representations on a map.

The spine of the plans is the Fall Creek and Central system tunnel. Tunnels range in diameter from 20-39 feet. At the 0.5 level of control, the diameters are very, very large and represent equivalent diameters since tunnel-boring machines are not made that large. The cost is based on constructing two tunnels in tandem. In the central system, tunnel diameter ranges from 14 to 55 feet.

Mr. Blagsvedt also pointed out the outlying sewer separation areas in Plan 1. In isolated areas where it makes sense, the city is planning to separate sewers and take storm flow off the system.

Early action projects along Pogues Run are included. A Spades Park storage tank is currently being designed with flexibility so there is expansion capability. Also in Pogues Run, one of the box culvert conversion projects is currently underway. If the level of control exceeds 4 overflows per year, a parallel interceptor will be needed to carry the flow through the tunnel.

Collection interceptor conduits along Pogues Run and Pleasant Run would convey wet weather flows into the central tunnel system. Also, a collection interceptor conduit along Eagle Creek will convey wet weather flows directly to the Belmont AWT plant.

Mr. Blagsvedt pointed out that a major component of these two plans are the AWT expansion programs and the interplant connect project.

Merri Anderson asked Mr. Blagsvedt to clarify if Netstorm is software and asked if the city was required to purchase it. Mr. Blagsvedt said that it is a hydraulic modeling software. Mr. Mercer added that it is public domain and widely used. It was not something the city had to buy.

Don Murray asked why the size of tunnel diameters varied along each watershed. Blagsvedt pointed out that on the upper reaches, small diameter tunnels would be used. Diameters would increase farther downstream.

Kevin Strunk asked for more information about the Riviera Club projects. Carlton Ray said that the projects would bring all three upper White River outfalls through the Riviera storage tank. Two outfalls are now directed to the tank. The furthest downstream outfall will be tied in with a new sewer line. Improvements are planned to the tank's washdown and disinfection system. This will be a fairly inexpensive approach and will significantly reduce untreated CSOs on the northern stretch of White River to 16th Street.

Mr. Strunk asked what the timeframe for the project is. Mr. Ray said that the city has a green light from EPA to proceed. A facility plan will be done first, then the project will go to design. He estimates construction will begin in 2006 or 2007. Mr. Strunk asked if it will be finished before the levy project. Mr. Ray responded that he anticipates it will be finished around the same time.

Mr. Murray said that, though he understands the routings are rough at this point, he would like to know what kind of surface disruption would be required. Mr. Blagsvedt responded that the tunnels and interceptors will utilize underground techniques.

However, the bulk of the collection interceptor construction is anticipated to be open-cut construction.

Plan 2 – Storage and Conveyance with Remote Treatment: The major components of Plan 2 are:

- Fall Creek - Deep Tunnel Storage & Remote Treatment
- Pogues Run - Upstream Storage (Spades Park); Deep Tunnel Storage & Remote Treatment
- Pleasant Run - Relief Interceptor Sewer
- Eagle Creek - Relief Interceptor Sewer
- Upper White River - Upstream Storage with Disinfection (Riviera Club)
- Central System - Deep Tunnel Storage (to Pogues Run Confluence); Downstream Interceptor Sewers (East and West)
- AWT Upgrades with Interplant Connection

The primary difference in Plan 2 vs. Plan 1 is the addition of two remote, high-rate treatment facilities. One is anticipated at the junction of Fall Creek and White River. The other is at Pogues Run and White River. The upstream tunnel at Fall Creek is the same as in Plan One, but flows will be treated with remote treatment facilities. A shorter tunnel along White River will pick up the CSOs along the river for conveyance to the AWT plants.

Mr. Murray asked how many additional treatment locations were anticipated in Plan Two. Mr. Blagsvedt answered two.

Mr. Pratt said that neither of the plans include a package treatment plant to add high quality flow to Fall Creek. Mr. Blagsvedt said that the flow augmentation would be done in another way and pointed out that there are multiple alternatives to augment flow.

Plan 3 – Total Separation: Mr. Blagsvedt pointed to a map of Plan Three, which gives everyone an idea of the size of the combined sewer basins and the relative acreage. The cost for sewer separation is based on a cost per acre. The overall cost is about $6.2 billion.

The major components of Plan 3 are separate storm sewers and sanitary sewers in the following sewer basins:

- Fall Creek
- Pogues Run
- Pleasant Run
- Eagle Creek
- White River

Ms. Anderson noted that the Fall Creek basin is overlapping the White River basin and asked if there is a reason Fall Creek takes precedence. Mr. Ray said that the maps show the sewersheds, not the surface watersheds. Ms. Perras noted that Fall Creek is the biggest sewershed and therefore becomes the most costly of the watersheds to address.

Ms. Anderson asked about State Ditch and asked if this is an area that has been suggested for complete separation. Mr. Blagsvedt said she was correct; State Ditch sewers will be separated under all three plans.

5) PERFORMANCE GRAPHS

Mr. Mercer said that costs have been generated for all of the plans. Costs include both operations and capital costs over 20 years, known as "present worth" costs.

Present Worth Cost vs. Overflow Frequency: Mr. Mercer asked attendees to refer to the graphs in the appendix of the presentation packet. He began with the Present Worth Cost vs. Overflow frequency graph. This graph can be used to determine the most cost-effective plan. Mr. Mercer pointed out that Plan 2 is higher in cost at the low end of controls. He also pointed out that this graph doesn't show the water quality benefits of the watershed improvements. Plan 3 is included with the legend but does not register on this chart because it is twice as expensive as the 0.5 overflow level of control for Plan 1 and Plan 2.

Present Worth Cost vs. Days of Exceedance: Mr. Mercer moved on to the graph showing "Systemwide Present Worth Cost vs. Days per Year over 235 cfu/100 mL *E. coli*." This graph shows that moving from 12 to 0.5 overflows would not gain many days of compliance with the state's *E. coli* recreational use standard. That is because stormwater would still cause exceedences. However, he pointed out that you do see improvements by implementing other watershed improvement projects.

Mr. Mercer said that EPA asked the city to not just look at the 235 cfu/100 mL *E. coli* standard, but also days per year under 10,000 cfu/100mL. Currently there are 54 days that the values are over 10,000. CSO controls would reduce these to 12 to 0.5, depending on the level of control. The graph shows you pay a lot of cost for little improvement in the number of days.

Pam Thevenow asked if the water quality impacts were systemwide. Mr. Mercer responded that this is just for the White River, but noted that in general it holds true for the other systems.

Mr. Pratt noted that it is important to put the major focus on the tributaries where the people are. Mr. Mercer said the city had generated this type of graph for each tributary. However, the cost allocation by tributary is not reliable because of the treatment plant costs that cannot be easily extrapolated by tributary.

Mr. Pratt asked if the planned stormwater improvements were separate from the city's drainage program. Mr. Ray said the stormwater utility fee pays for both drainage and water quality improvement projects, such as best management practices. The stormwater improvements in the plan assume compliance with the city's current stormwater permit requirements.

Systemwide Percent Capture vs. Overflow Frequency: Mr. Mercer noted that early action projects will significantly increase the percent of system flow captured and treated, from the current 62 percent to nearly 78 percent. Plans 1 and 2 will increase capture from 90-99 percent, depending on the level of control. CSO policy has a reference number of at least 85 percent capture.

Discharge Volume vs. Overflow Frequency: Mr. Mercer then presented a series of bar graphs. The first showed the systemwide annual volume discharged vs. overflow frequency. Early action projects will reduce discharge volumes by 3.5 billion gallons per year. Mr. Neltner pointed out that these are only the first phase of early action projects.

Ms. Thevenow asked if these graphs continue to evaluate the White River only. Mr. Mercer responded that these graphs represent systemwide figures.

Jesse Moore asked if the city is making an assumption that under Plan 1 and 2, zero overflow occurrences is not possible. Mr. Mercer said yes, since there is always a storm that will exceed the size of the facilities built to capture storm flows.

Mr. Strunk asked for the number of hookups we have in the system currently. Carlton estimated that there are 240,000 customers (combined and separate). Carlton said he would investigate the actual number and provide it to the committee. [NOTE: Actual number is about 217,000.]

Mr. Strunk asked if the team has a sense for where EPA wants the city to go. How many overflows per year are acceptable? Mr. Mercer replied that it is the billion dollar question. The city proposed 12 in its 2001 plan, but that was not accepted.

Mr. Neltner said he believed the decision is based on the knee of the curve, existing uses, and affordability. Ms. Spalding interjected that if existing uses must be protected, then affordability is not relevant. That makes the existing use issue vitally important for the city.

Ms. Perras also pointed out that it is important to realize that the overflow estimates are based on the concept of an average year. In wet years there will be more overflows; in dry years there will be fewer. It is important for the city and committee members to convey that information when setting expectations for the general public.

Mr. Pratt also pointed out that another question is when do these overflows occur? A lot of people will say that it is in January, so it doesn't matter. Ms. Perras said the team is generating that information for the committee.

Systemwide BOD Residuals vs. Overflow Frequency: In this comparison, there is a difference between Plan 1 and 2. Remote treatment facilities are less efficient at removing BOD than the centralized advanced wastewater treatment plants. BOD is a surrogate measure for the pollutants that cause dissolved oxygen to fall.

Ms. Anderson said that we have a BOD program caused by CSOs, but asked if there isn't also a problem based on shallowness of streams and the level of flow. Mr. Mercer said this is one reason why we are looking at flow augmentation. Though there haven't been any fish kills lately, there is still a potential during low flow periods.

Vince Parker asked if there is a target line for the BOD. Mr. Mercer responded that the focus is on meeting the DO standard. In general, the DO problem occurs in the lower part of Fall Creek. One of the things we are looking at to improve DO is removing the Boulevard Dam and doing BOD reductions.

Mr. Pratt asked if there any reason for keeping the dam in there. Mr. Ray responded that the dam has no current use and the city is moving forward to eliminate it.

White River *E. coli* Geometric Mean vs. Overflow Frequency: Mr. Mercer pointed out the current geometric mean is around 466 in the White River, above the state standard of 125. Early action projects pull it down to around 400. With CSO control and watershed improvements, we can drop down to the 160-190 range, still above the 125 standard. Even with sewer separation, we will not meet the standard.

Mr. Parker noted that the permit requires that CSOs do not cause a water standard violation. It seems like stormwater runoff is the cause. Ms. Spalding says permit language says, "may not cause or contribute to…" Therefore, CSOs may still be required to be controlled further. Their downstream effects also must be determined and controlled.

Mr. Strunk asked if the *E. coli* measurement was taken at the Hamilton or Johnson county lines. Mr. Mercer said that this is the average count within Marion County boundaries. Mr. Strunk asked what happens between the county lines. Mr. Mercer responded that there are exceedences upstream of Marion County, which brings the question that it is often not up to standard when it comes into the county.

Mr. Pratt said above the city, White River is meeting the standard most of the time. Mr. Ray pointed out that percentage wise, water quality exceeds the standard greater than 50 percent of the time.

Mr. Strunk said that the take home message is if you look at *E. coli* and look at costs for various levels of control, the geometric mean will stay the same regardless of how much money you are spending. He also noted that it would be nice to see this graph and the previous one (cost vs. overflows per year) together.

White River *E. coli* Days per Year over 235 vs. Overflow Frequency: Currently, 235 is the state's single sample maximum standard to protect full-body contact use of waterways. Mr. Mercer noted that no matter how much you spend on CSO control, you will be at 155 days per year over the *E. coli* standard. We could buy a little more with the watershed improvements and reduce the number of days to 140.

Mr. Pratt asked what the graph would look like if we removed the stormwater impacts, which mask any improvement that might be there. Mr. Mercer said there is no way to get stormwater under 235. Mr. Pratt said that is why there is a problem with meeting 235.

Mr. Strunk asked what does "control stormwater" mean? Mr. Mercer said this involves increasing street sweeping, installing stormwater BMPs and complying with other requirements in the city's stormwater permit.

Mr. Strunk expressed support for getting rid of septic systems. Ms. Perras noted that eliminating septic systems would create particular benefits in dry weather. Mr. Ray noted that the cost of accelerating the septic program is included in the Plan 1 and Plan 2 costs.

Cost per Gallon Captured: Mr. Mercer pointed out that this curve is fairly flat until you reach four overflows per year. Costs get marginally more expensive to capture the next gallon of flow.

Cost per Pound of BOD Removed: This is a similarly shaped curve. It is around $20 for every pound removed at 4 Overflows per year, but goes up to over $32-33 per pound removed at the higher end.

Cost per unit of *E. coli* removed per year vs. overflow frequency: This gives you a sense of the marginal cost issue for *E. coli* removal.

White River vs. Tributaries: EPA and IDEM also asked for a graph showing different levels of control on White River vs. the tributaries. A separate graph was provided showing those results. Mr. Mercer pointed out that Plan 2 is more expensive at all levels of control.

6) PERMIT APPEAL UPDATE

Ms. Perras asked Ms. Spalding to update the committee on a new court ruling regarding the city's NPDES permits. Ms. Spalding reminded the committee that the state Office of Environmental Adjudication had dismissed several people who appealed the city's permits, stating they did not having standing to appeal. On June 3, Judge Keeler reversed OEA and said that Citizen's Gas and Reilly had stated facts in their petition that demonstrated they do have standing. The judge also reinstated the stay of the permit, including Attachment A, which includes the city's CSO-related requirements.

Ms. Spalding noted that the stay is not a bad thing for the city because it means the clock has not started on compliance schedules for *E. coli*, mercury and cyanide. Mr. Neltner said he would like to get a copy of the written opinion. Ms. Spalding said she also is trying to get a copy. She has asked to be notified when OEA takes up the case again.

Ms. Thevenow asked if Judge Keeler expanded the interpretation of standing by his ruling. Ms. Spalding said she had not seen the ruling, but in the past you had to show actual harm to have standing. She said she believed both Citizen's Gas and Reilly had standing to appeal the permit, as well as Councillor Coughenour and Glenn Pratt, who had decided not to appeal the OEA ruling. Should it be noted that Glenn had left the meeting prior to this discussion).

Mr. Strunk asked if it is logical to assume that the judge would have granted standing to Mr. Pratt and Councillor Coughenour. Ms. Spalding thought that everyone had standing.

7) NEXT STEPS
Ms. Perras said that the team had originally planned the watershed meetings for June 9-20. This has been delayed in part because the financial analysis is not finished. We need information from the city's annual financial report, which has not yet been audited and completed. The current plan is to hold the meetings in July.

Ms. Anderson pointed out that neighborhood groups can't get people together more frequently than at their regular meetings. Ms. Perras responded that the team is trying to get on the agenda of existing community meetings to review the video. She noted that the team can go out to as many meetings as people want us to go to.

Mr. Ray also said the East Bank Storage Tank was nearly complete. It is an underground tank the size of a football field, with an automatic washdown facility. He anticipates that the project will be done ahead of schedule. It is being tested now.

Mr. Strunk wants to echo the importance of providing notice of the watershed meetings. He would like for the city to take advantage of various opportunities to reach out to the minority community, such as the Amos Brown Show.

Mr. Parker said that the city is trying to pick a target of overflows, but no CSO expenditure will achieve the water quality standard. Is it possible to achieve the standard with a stormwater improvement program? He said he is just stating a concern. Ms. Perras noted that he raises a good question.

Ms. Thevenow asked if the Barrett Law/Septic Conversion costs used in the plan estimates represent the cost the city faces or the total cost? Mr. Ray said that it is just the city's costs that were included.

Ms. Spalding noted that EPA guidance won't allow you to take credit for costs to residents. There is a $300 million cost borne by the city, and another $300 million to the residents. The cost is large for the small section of Marion County that is impacted.

Mr. Strunk pointed out two things about septics. First, a 5-acre tract with a septic system on it is different than in the inner city. Second, there is an affordability issue.

The costs of a septic upgrade can be half or a third of the property's value. The city has historically stepped in to help when costs rise this high. We need to factor that into our cost.

Mr. Ray asked whether the health department was still issuing permits for new septic systems. Ms. Thevenow said permits were still being issued. The problem is zoning for new developments in areas without sewers, she said.

7) OTHER BUSINESS AND NEXT MEETING

Next meeting dates:

- July 21 – Meeting Postponed
- September 15, 2004, 4:30 to 6:30 p.m.

Minutes

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Meeting Date: September 15, 2004

Time: 4:30 to 6:30 p.m.

Location: Clean Stream Team Office Training Room
151 N. Delaware, 9th Floor
Indianapolis, IN 46204

Purpose: Mayor's Raw Sewage Overflow Advisory Committee

Wet Weather Technical Advisory Committee

Attendees: Rosemary Spalding, Glenn Pratt, Jodi Perras, Richard Van Frank, Patrick Carroll, Don Murray, Bob Masbaum, David Haywood, Tom Neltner, Merri Anderson, Ralph Roper, Phyllis Zimmerman, Carlton Ray, Tim Blagsvedt, Deana Haworth, Jesse Moore, John Kupke, Leon Bates, Gary Mercer, Jhani Laupus

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1) WELCOME AND INTRODUCTIONS
Jodi Perras called the meeting to order and reviewed the agenda.

2) REVIEW MINUTES OF JUNE 16, 2004
Ms. Perras presented draft minutes from the June 16, 2004 advisory committee meeting. No additions or corrections were requested and minutes were approved.

3) UPDATE ON LTCP SCHEDULE
David Haywood presented a revised schedule for completing the long-term control plan. The tasks remain the same, but the dates have been adjusted based on new completion schedule. The final touches will be put on the draft LTCP based on input from watershed meeting. According to the current schedule, the final plan will be ready for presentation as part of the public hearing in February or March. The estimated submittal date is April 4, 2005.

Dick Van Frank asked whether there is one public hearing planned. Jodi Perras clarified that there are 5 watershed meetings planned, plus a meeting with the advisory committees on October 13th that will include a walk-through of the public meeting. When draft report is published, the advisory committee and the public will be able to comment on the plan during one formal hearing. Written comments will also be accepted.

Mr. Van Frank asked if the public hearing would be held in the evening. Ms. Perras responded that it would probably be in the evening.

Glen Pratt asked when the committee should expect to see the additional material on septics. He noted that the septic system impact was not in the document the committee was presented earlier on water quality.

Ms. Perras noted that the city is working on a draft of the LTCP, including the information on septic system impacts. The schedule does not allow the advisory committee's input of every single thing. It was also noted that Director Jim Garrard needs to review the information before it is shared with the advisory committee. Mr. Pratt also said he had spoken with someone at Health and Hospital and that person indicated that there was not a recent request from the city.

Gary Mercer noted that the Clean Stream Team has previously requested and used data from Health and Hospital in its analysis. Carlton Ray said that the city has years and years of data from Health and Hospital.

Ms. Perras agreed to try to share septic material with the committee before the public meetings.

4) FOLLOWUP TO JUNE MEETING
Ms. Perras announced that Gary Mercer would walk the committee through answers to questions posed by Mr. Van Frank following the June 16 advisory committee meeting on the LTCP alternatives.

Early action projects

1. Do the early action projects only represent the first phase and not the projects currently in design? Mr. Mercer explained that the second page of the handout (labeled "Completed and Ongoing Early Action Projects in Baseline Hydraulic Model") lists all of the early action projects plus additional projects that the city has discussed with EPA. The last five projects on the sheet were not included in the first early action project list, but have been added. The graphs showing benefits include all the projects on the list. Mr. Mercer noted that the cost shown on the cost-benefit graphs only included the cost for the original "early action project" list. Including the last five projects, the cost is closer to $600 million. All the projects have been approved regardless of which plan is chosen.

2. Will the early action projects really eliminate the PE bypass? If so, how? Carlton Ray responded that the city will always have outfall 007 for emergency purposes. He pointed out that a goal is to have zero overflows at that location once the plant expansion is complete. The expansion will equalize the primary capacity at the front end of the plant with the secondary capacity at the back end, removing the need for a PE bypass except in emergency situations. Ralph Roper pointed out the PE bypass flows will be treated and bona fide secondary treatment would be provided.

Watershed Improvements
3. Does Plan 3 consider watershed improvements? What is the definition of "watershed improvements"? Mr. Mercer pointed to a handout that included the watershed improvements planned for Plans 1, 2 and 3. Regardless of what plan is accepted, we will go forward with these things. Mr. Pratt noted that what was provided is a list of projects. However, there was no definition of how watershed improvements are defined. Mr. Van Frank said he is interested in a definition rather than a list of projects.

Rosemary Spalding said watershed improvements are a list of things the city intends to do that aren't recognized by EPA as CSO control measures. These projects provide a better bang for the buck. Mr. Van Frank requested that it say "watershed improvement projects" instead of "watershed improvements."

4. Do the watershed improvements include elimination of septics in problem areas? Mr. Mercer said yes. Merri Anderson asked if it is on the 20-year replacement schedule. Mr. Mercer said yes.

Ralph Roper asked if there is some issue in modifying the permit with IDEM. It is specific for that aspect of improvement.

Glenn Pratt asked Ms. Perras to send a note out to committee people letting them know when it goes to public notice and starts through the process at IDEM.

5. What reductions in BOD and E. coli were anticipated when the city calculated the benefits of full implementation and compliance with the NPDES stormwater permit? Mr. Mercer noted that the city assumed a 10% reduction in E. coli from its stormwater program. The BOD did not assume any reduction from a CSO program perspective. The major BOD is associated with CSOs that come at a very high strength. Tom Neltner noted that over the next 20 years, the stormwater permit will result in a 10% reduction in E. coli levels. Mr. Mercer said yes, it might achieve more but the city wasn't going to plan to see more.

Mr. Neltner said that these results are using a low estimate and it might be helpful to know if the stormwater is in full compliance with E. coli standard. What if stormwater were reduced as a source? What kind of numbers would we be looking at: 200-3,000 in E. coli bacteria? EPA would not require the city to get it under 125. Mr. Mercer said that the committee was provided with different measurements of high CSO concentrations. It is possible to do more, but even if you do a 70% reduction we wouldn't come up with different conclusions if we increase the percentage.

Mr. Van Frank pointed out that many techniques out there are method dependent. One would have trouble imagining why you wouldn't get more reduction assuming you were using the latest technologies. Mr. Mercer responded that existing urban areas can't easily be converted to stormwater treatment technologies. However, such progress can be made in new developments.

Mr. Pratt talked about working on public education for nutrient control. He feels that people are already being educated. They can do it for little money and get bonus credit for it. The push is to reduce all the use of phosphorous fertilizer.

Tunnel Sizing and Costs

6. Do the unrealistic tunnel sizes skew cost? For example, under Plan 1, the Central System tunnel starts at 14' and moves right to 25'. Is a 25' tunnel realistic? If they do not unrealistically skew costs, how did the city compensate? Mr. Mercer responded that a 25-ft. diameter tunnel is not unusual at all. In fact, 18'-35' is typical.

When the necessary tunnel size exceeded 35 feet, the city would build 2 side by side instead of a large diameter tunnel. Leon Bates asked if we are going to put a tunnel in on Fall Creek and if it would be one massive tunnel or several smaller ones. Carlton noted that we assume it is just one, but it could be several. We'll look at surcharging problems, etc. It would be a deep tunnel, 100-200 feet below and in the good quality rock.

Water Quality Benefits
7. Do the E. coli counts adjust for the higher dilution levels in the sewage discharged at the higher capture rates? Mr. Mercer responded that we did not decrease concentrations for higher dilution levels because the city did not collect enough monitoring data under big storms. Even under the big storms, if there is a CSO discharge it is causing a water quality violation out there. Mr. Van Frank questioned whether violations would occur at that level once a tunnel fills up. Mr. Mercer said the city is probably conservative in its estimates. Mr. Neltner asked if the bacteria is still above 100,000 counts/100 mL in the tunnel effluent. Mr. Mercer said any discharge from the tunnel would exceed the standards.

Mr. Bates asked how many overflows we will have on Fall Creek after this is constructed. Mr. Mercer explained that it would range from an average of 12/year to 1 every 2 years. Mr. Bates asked how it would impact how the sewers will run through the neighborhood. Mr. Mercer responded that it will not back up the system. We will try to see how we can relieve backups that exist.

8. Has EPA reviewed and provided input on the city's estimates of septic system and stormwater contributions to E. coli exceedences? If the city is planning to base its decision on the number of days of E. coli exceedences, we believe that the estimates need to be closely scrutinized.

Mr. Mercer responded that we have reviewed everything with EPA and have their concurrence on numbers. Further, he noted that we feel that the numbers are in line with the city's data and the Health and Hospital data as well.

Mr. Van Frank responded that part of the problem is the estimate of 100 gallons per person per day of septic overflowing. There are a lot of septic tanks that should be running with water 365 days per year.

Mr. Mercer pointed out that we used the data prepared during the Total Maximum Daily Load (TMDL) process. While a small percentage of septics are failing, their discharge is affecting streams, particularly during dry weather.

Mr. Van Frank asked how it is getting there when the septics are miles from the streams. Devon Creek and Pleasant Run have high counts and bad septic areas, but he questioned whether other streams have such impacts.

Phyllis Zimmerman pointed out that the Health Department does not have Pleasant Run septic areas on their map. She thinks that far more than a small percentage may be failed. Mr. Pratt asked if someone had done a water bill v. sewer bill check.

Mr. Mercer suggested that part of the process is that we feel septics are a large source. We will see if there are benefits or very few benefits. It is our best estimate at this time.

Mr. Neltner said septics are a factor in the overall equation. They get roots to the streams that contribute to water quality problems, both dry and wet. Mr. Van Frank says Mr. Mercer is right in some areas and not right in some areas. Mr. Pratt would like to say that the septics should be on a 5-6 year process not a 20-year process.

Terminology
9. The charts use the term "untreated overflows per year" in many places. This seems misleading since many CSO discharges will be occurring and the system counts it as one overflow. It would be better to call it "days of overflow per year." Mr. Mercer said this is right.

When Do Overflows Occur During the Year?
Ms. Perras reviewed the graphs labeled "Estimated Overflow Events Per Year, 1950-2003" with the committee. The graphs represent how the sewer system would perform under current conditions and if CSO control facilities were built, based on varying levels of capture. The graphs are based upon 54 years of rainfall data.

The results of this analysis are summarized in the chart below. The chart shows that under existing conditions, the system overflows 60 times per year, on average. This value ranges from a low of 47 overflows/year to a high of 79 overflows/year. During the recreational season of April 1 through October 31, overflows occur 37 times/year, on average. This value ranges from a low of 24 overflows/year to a high of 50/year during the recreational season.

	Avg. No. of Overflows/ Year	Annual Overflows: Min/Max (Range)	Avg. # OF during Rec. Season/Year	Rec. Season Overflows: Min/Max (Range)
Existing	60	47-79	37	24-50
93%	6	1-12	4.4	1-10
95%	4	1-10	2.8	0-6
97%	2	0-6	1.5	0-4

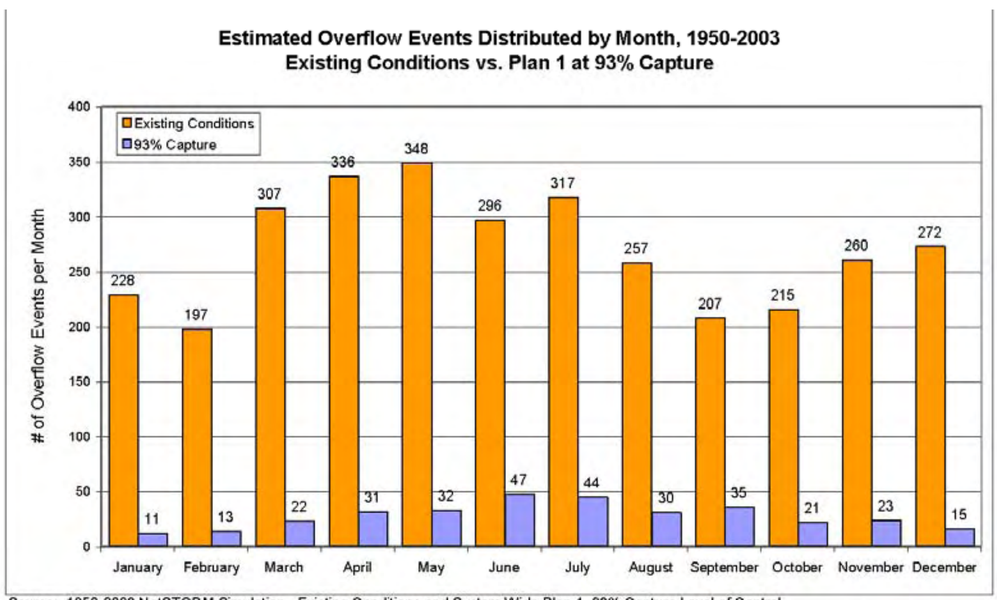
Values are also shown in the table to predict how the system would respond to storms with facilities that capture 93 percent, 95 percent or 97 percent of sewer flows. Note that annual overflows at 93 percent average 6 per year, but range from a low of 1 event to 12 events during the 54-year period that was studied. At 95 percent, the annual average is four events/year, but the range is from 1 event to 10, depending on weather conditions that year.

Mr. Ray pointed out that this shows there is variability from year to year. The public should not expect that there will be only 4 overflows each year. Ms. Perras added that the city will plan to use the percent capture for the public so they don't get caught on the number of overflows per year. Mr. Neltner pointed out that the chart should say estimated days of overflow per year.

Mr. Pratt said that this gives you the idea of what you are really talking about when you are looking at recreational activity time. One should be more concerned about a small overflow in April than a large overflow in December. Mr. Mercer said that larger/bigger storms are more likely in July than December.

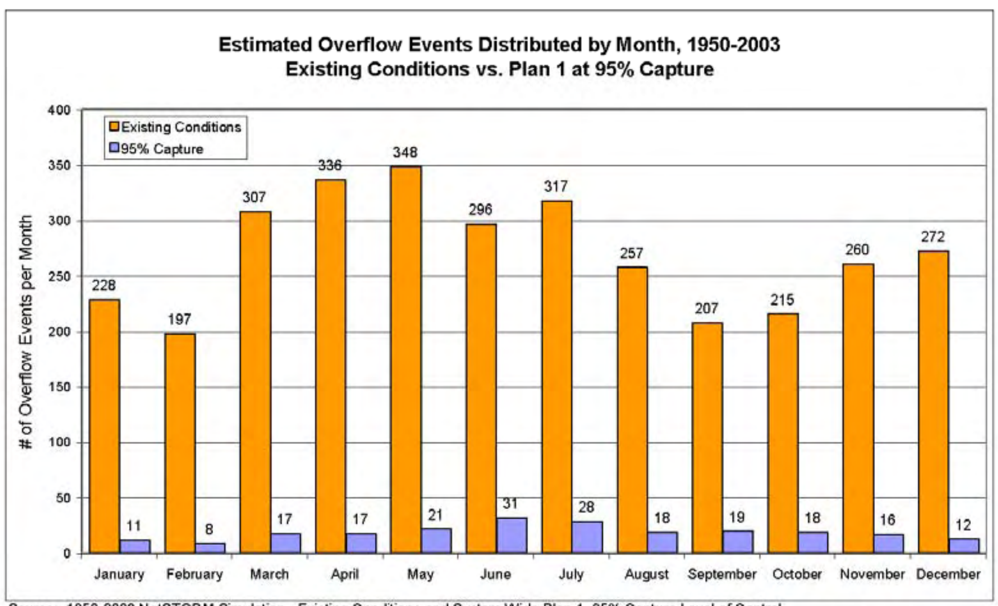
Ms. Perras noted that EPA was focused primarily on volume. With this information, you can see the benefit gained during the recreational season to determine if it is worth the cost of the higher level of control.

Ms. Perras then reviewed graphs that show estimated overflow events distributed by month. The first set of graphs showed over a 54-year period how many overflows would occur in each month. Each chart compares current conditions to a specific level of control: 93, 95 or 97 percent capture.



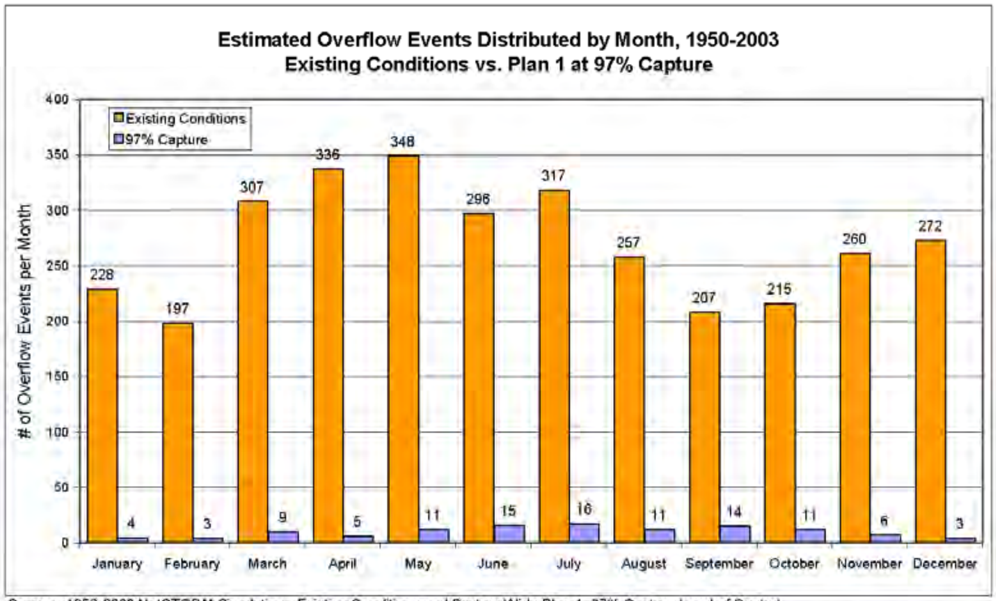
Source: 1950-2003 NetSTORM Simulation. Existing Conditions and System Wide Plan 1, 93% Capture Level of Control.

Note: (1) For existing conditions, there are 3240 events presented over 54 years of record for an annual average frequency of 60 events per year.
(2) For the 93% capture level of control, there are 324 events presented over 54 years of record.
(3) It is estimated that at least one CSO outfall structure would discharge for the plotted number of events each month.



Source: 1950-2003 NetSTORM Simulation. Existing Conditions and System Wide Plan 1, 95% Capture Level of Control.

Note: (1) For existing conditions, there are 3240 events presented over 54 years of record for an annual average frequency of 60 events per year.
(2) For the 95% capture level of control, there are 216 events presented over 54 years of record.
(3) It is estimated that at least one CSO outfall structure would discharge for the plotted number of events each month.



Source: 1950-2003 NetSTORM Simulation. Existing Conditions and System Wide Plan 1, 97% Capture Level of Control.

Note: (1) For existing conditions, there are 3240 events presented over 54 years of record for an annual average frequency of 60 events per year.
(2) For the 97% capture level of control, there are 108 events presented over 54 years of record.
(3) It is estimated that at least one CSO outfall structure would discharge for the plotted number of events each month.

At 93% capture, an estimated 324 overflow events would occur over 54 years, Ms. Perras said. The distribution of events changes from the current conditions because larger storms tend to occur in summer months. Similarly, you can see at 95% and 97% capture, the number of events in each month is going down. The distribution doesn't seem to change significantly.

Mr. Neltner disagreed, saying that the winter months are the biggest beneficiaries of going to 95% or 97% capture. Mr. Mercer agreed that the city would be capturing more of the winter storms than the summer storms. In estimating storm events, the city looked at each storm. If two storms are a day apart and the tunnel is still full, then it rains in the afternoon, an overflow is predicted.

Mr. Neltner said it was important to point out the difference in the winter vs. summer months. The greatest reduction takes place during the non-recreational season, he said.

5) EXISTING USE
Ms. Perras said the Clean Stream Team has updated some tables that were included in the Recreational Use binders. Committee members were asked to pick the new tables up before leaving the meeting.

Ms. Perras updated the committee on the status of existing use discussions with IDEM. She reminded the committee that EPA regulations say a state may remove a designated use "only if the designated use is not an existing use." An existing use is a use actually attained in the water body on or after November 28, 1975, whether or not they are included in the state's water quality standards. However, the term "actually attained" is not defined in state or federal regulations or policy.

Ms. Perras said the city's discussions with IDEM have centered around varying interpretations of what "actually attained" means. We know that urban waterways typically flow through residential neighborhoods and near parks, playgrounds and schools. We know that children and adults wade, play and occasionally swim in some CSO-impacted streams. Is actual or occasional use of these waterways automatically an "existing recreational use?"

IDEM Guidance notes that any decision regarding whether recreational uses are an "existing use" must be a water body-specific determination. It further states that, "People are unlikely to be engaging in recreational activity…during the winter or during severe storm events. Therefore, there may be specific time periods when IDEM will not consider a water body to have an existing use." Mr. Neltner asked whether IDEM or the Water Pollution Control Board makes the existing use determination. Ms. Perras noted that the Board would have to amend the rules in order to approve a Use Attainability Analysis, so the existing use determination is part of that action.

Ms. Perras said the city had approached IDEM with the concept of creating a "qualified use." Based on principles set forth in IDEM guidance, factors such as physical conditions, water hazards and steps taken by a municipality to prevent and control recreational use may affect the existing use determination for a specific waterway. Indianapolis suggests that actual recreational use may be categorized as a "qualified use" – and not an existing use – when at least one of these conditions are met. Dick Van Frank asked whether the term "qualified use" appears in IDEM's guidance. Ms. Perras said the city created that term and it was not found in the guidance.

The city has suggested five factors for determining a "qualified use," based upon the five principles in IDEM's guidance on page 52:

- Physical access, flow or substrate that are unsuitable for recreational use
- Waters that are dangerous due to physical hazards such as swift currents, rapids, dams or shipping traffic
- Limited extent of actual recreational uses
- Absence of recreational use during or immediately after a significant wet weather event
- Unsafe water quality combined with municipal programs to prevent and control access to the water

Glenn Pratt asked if the city has identified areas in Indianapolis with swift currents. Ms. Perras said during large storms there are areas with swift currents.

Ms. Perras then reviewed each of the five factors and the types of information a municipality could provide to support the existing use determination under each factor.

- **Physical access, flow or substrate:** Physical stream survey (slope, vegetation, barriers to access, adjacent land use, substrate, flow depth), USGS flow data, and a modeling hydrograph.

- **Physical hazards:** USGS gauge data, photographs during high & low flow, modeled analysis of flow after LTCP implementation, maps or photographs of dams or shipping traffic, shipping or public dock use data.

- **Limited extent of actual recreational uses:** Public meeting notes; public surveys on use; surveys of parks officials, health departments, police, and other government officials; physical stream survey.

- **Absence of use during or after a wet weather event:** Public meeting notes; public surveys on use; surveys of parks officials, health departments, police, and other government officials; physical stream survey.

- **Unsafe water quality and municipal programs to control access:** 303(d) list, TMDL studies, in-stream sampling; documentation of ordinances, signs, public notification & education programs, city investments on pools, splash parks, etc.

Ms. Perras said the city was developing a written submittal to IDEM indicating that while there are actual recreational uses on CSO-impacted waterways, qualifying factors show there are no “existing uses” on those streams. Modification to IDEM guidance to clarify state policy also may be needed, she said. The city has requested a written decision on existing use from IDEM prior to finalizing the recommended plan for CSOs. Agreement on the existing use issue will allow the city to pursue a Use Attainability Analysis and possible modification of water quality standards during wet weather event.

Mr. Pratt pointed out that the law is a lot about semantics. We don’t have a legitimate existing use where the kids are playing in the stream. We need to get from the agency that during particular times, like their guidance said, that IDEM will not consider to have the waterbody to have an existing use.

Mr. Kupke said that, philosophically, if it will change the solution we are undertaking, it is the right thing to do from the quality of life for the city. You are trying to take the path of least resistance.

Mr. Neltner asked what areas would be an existing use under the factors the city is suggesting. Ms. Perras responded that would be a question to ask of IDEM. Rosemary Spalding said it could be a beach with lifeguards. Ms. Perras responded that IDEM could interpret all beaches as having an existing or they could allow a community to demonstrate that it prohibits use during wet weather under that fifth factor.

Mr. Van Frank asked if anyone has talked to EPA and Gary Prichard. Ms. Perras said that the state is responsible for the existing use determination, but the city is also keeping EPA informed of its discussions. Ms. Spalding pointed out the city will seek a suspension of recreational use up to four days after a rain event. It is a recognition that after a rainfall event we have actual uses that don’t rise to the level of existing use. We don’t want the state to downgrade the designated use, but instead to suspend it during specific time periods as allowed under Senate Enrolled Act 431.

Mr. Bates pointed out that four days after it rains on Fall Creek, everything settles to the bottom. Mr. Ray said that the city will be reducing the amount of load that is in Fall Creek.

John Kupke pointed out that even if you have to go with total sewer separation, there is still bacteria that prevents meeting the water quality standards.

Mr. Van Frank said he has no trouble with the suspension of use. Tom Neltner said that the city needs to emphasize the temporary nature of the suspension of use.

6) NEXT STEPS
Watershed meetings will be held October 14-26. An E-mail invitation will be sent to the advisory committee members.

Next steps include a meeting on October 13 to go over what we will present at watershed meetings. The presentation will include rate information and cost.

7) NEXT MEETING DATE

Wednesday, October 13, 2004
4:30 p.m. – 6:30 p.m.

Minutes

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Meeting Date: October 13, 2004

Time: 4:30 to 6:30 p.m.

Location: Clean Stream Team Office Training Room
151 N. Delaware, 9th Floor
Indianapolis, IN 46204

Purpose: Mayor's Raw Sewage Overflow Advisory Committee

Wet Weather Technical Advisory Committee

Attendees: Rosemary Spalding, Glen Pratt, Jodi Perras, Patrick Carroll, Don Murray, Bob Masbaum, David Haywood, Tom Neltner, Merri Anderson, Ralph Roper, Phyllis Zimmerman, Carlton Ray, Lori Pugh, Jesse Moore, John Kupke, Gary Mercer, Pam Thevenow, Ralph Roper, Kevin Hardie, Bill Beranek, Jim Garrard

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1) WELCOME AND INTRODUCTIONS
Jodi Perras called the meeting to order.

2) REVIEW MINUTES OF SEPT. 15, 2004
Ms. Perras said the Clean Stream Team was working on the minutes of Sept. 15 and would have them prepared soon. She apologized for the delay.

3) PREVIEW OF PUBLIC MEETING PRESENTATION AND MATERIALS
Ms. Perras shared the PowerPoint presentation that had been prepared for the public outreach meetings.

Ms. Perras told the committee members that a more extensive effort was made this year to get the message out to the community about the outreach meetings. She noted the meetings were being promoted on Channel 16, as well as the www.indycleanstreams.org Web site. City representatives also planned to meet with the *Indianapolis Star* editorial board. In 2000, there weren't as many e-mail lists available. The Clean Stream Team is taking advantage of the number of e-mail lists available now. Fliers on the meetings have also been placed all over town, at DPW offices, libraries, coffee shops, etc. Advertisements were also being purchased in neighborhood weekly newspapers.

Kevin Hardie asked why the city was targeting publications outside of Marion County. Ms. Perras responded that those particular publications also circulated inside Marion County. Mr. Hardie asked specifically about Noblesville and Ms. Perras said she thought that had been changed and that the *Noblesville Ledger* was not a part of the media buy.

Merri Anderson noted that the *Westside Community News* was not on the list and should be because of its circulation. Ms. Perras said CST would get a flyer into the publication before the Oct. 21 meeting on the Westside.

Ms. Perras drew the committee members' attention to items around the room that will be available at the public meetings. Those items include binders, the trade show booth, maps and other information. Ms. Perras said all attendees will get a copy of the newsletter, which will also be mailed to the regular newsletter mailing list. Ms. Perras said residents don't have to come to the meeting to obtain information, because much of it also is in the newsletter and on the Web site.

Ms. Perras said she wanted to go quickly through the one-hour presentation, but asked that committee members stop her if they have questions.

The presentation outline included:
- Background information
- How can we reduce overflows? (a review of CSO control technologies)
- The options: Plans 1, 2 and 3
- The impacts on neighborhoods
- The benefits and costs: comparing the plans
- Priority areas
- Which plan do you prefer?
- Next steps

During the presentation, the following issues were discussed:

Level of Control: Ms. Perras stopped on a chart showing the level of control options (90-99 percent) translated into rainfall captured in a 24-hour period (below). She noted to the committee members that they had asked for this type of information before.

Flow Captured & Treated	Rainfall Captured in 24-hour Period
90%	0.93 inches
93%	1.35 inches
95%	1.57 inches
97%	1.99 inches
99%	2.92 inches

Public Input Methods: Ms. Perras noted that she would stop at key places within the presentation and refer attendees to the decision-making card in their booklet. The presentation and newsletter are coordinated to work with the questions.

Ms. Anderson asked whether the card is replacing the dot system used in the first round of public meetings. Ms. Perras responded affirmatively.

Cost and Rate Impacts: During the slide on sewer costs, Ms. Anderson asked if the figures for the average sewer costs in 20 years are current numbers or projected future costs. Ms. Perras said the figures represented today's rate, plus the cost of paying for the CSO control projects.

David Haywood noted that the rate estimates are based upon a modest amount of growth in the ratepayer base in 20 years. Tom Neltner asked if it was assuming a lot of growth from out of county? Mr. Haywood said no.

Mr. Neltner asked if cost-of-living increases were included in the figures. Ms. Perras said yes.

Ms. Anderson noted complete development build out would be a large figure. Mr. Haywood said the figures were more conservative than complete build out. John Kupke asked what ratepayer growth was expected and suggested that information be available for the meetings. Mr. Neltner agreed that it raised the question of how much capacity in the plans is reserved for future growth. Gary Mercer said that had been figured into the projects' cost. Carlton Ray noted that the plan includes 50 million gallons/day of additional capacity at Southport and reserves 25 mgd at Belmont to address growth needs. Mr. Roper noted that those gallons could be diverted from Belmont to expand the Southport plant to fit future needs.

Mr. Mercer noted that the city has used a growth level of 75 mgd as an allowance for planning purposes. Mr. Neltner noted that this figures leaves great margins for growth that could allow greater build out.

Mr. Neltner questioned whether the figures assume local ratepayers pay all costs. Ms. Perras nodded in the affirmative.

Ms. Anderson said people do need to understand that their rates may ultimately be $50 or $60 a month. Ms. Perras pointed out that these figures are for CSO projects only. Actual rates at the end of 20 years will be higher due to other needs, such as sanitary sewers, treatment plant upgrades, regulatory requirements, etc.

Effect of Inflation: Mr. Roper suggested rates be brought back down to present day dollars to provide a better comparison. Mr. Neltner agreed. Mr. Roper said people will say that the rate is going to quadruple, but with current day rates the costs are actually less than suggested. Mr. Roper said industry pays half that amount.

Jim Garrard noted that $1.4 million is the cost in present worth dollars, but that the rate is in future dollars.

Mr. Garrard suggested another column might be needed on the rate chart. Ms. Perras noted that rate projections are based on many assumptions that may not be accurate in the future because they deal with interest rates and bonding. Ms. Perras said putting the figures in today's dollars wouldn't be an accurate reflection of what people will be paying 20 years from now.

Mr. Neltner suggested the chart address cost of living adjustments and back out of the numbers that way. Mr. Mercer suggested the chart could separate how much of the rate increase is due to cost of living and how much is to address the CSOs.

Mr. Neltner said the $12.85 rate is just the wrong number. Ms. Perras said the CST would work on how to present the information to the public.

Bill Beranek asked how much the first rate increase would be. Ms. Perras responded that the rates would increase gradually during that time. The rate increase will depend on which option is chosen and the construction/design schedule.

Mr. Haywood said rate increase for 2005 and 2006 depends on the projects that are going to be implemented first. Mr. Haywood said he has assumed a "straight line going forward" with a 7-8 percent increase annually.

Mr. Roper suggested that the current conditions include what the rate will be in 20 years if no improvements are made. "That's the easiest fix," he said.

Rosemary Spalding said that the average audience is going to understand the $12.85 number. She said $12.85 is a correct number and that everyone knows $24 in 20 years is not $24 today.

Pam Thevenow said if the $12.85 is actually $25 in 20 years, then it becomes more of an emotional item than a mathematical issue. "If you think, 'Well, in 23 years from now, I'll pay $23, than $58 is not so bad."

Ms. Perras pointed out that the Stream Line newsletter has already been printed, and changing the information presented on rates may invalidate or draw into question some of the results. She said did not want one group to have a completely different understanding than another group.

Ms. Anderson said she was surprised during the last round of meetings at how people understood the problem. "I was not at all convinced that people would get the breadth and depth of the problem and I was surprised at the sophistication people had in understanding it." Anderson pointed out that the economy makes Ms. Thevenow's point more valid. "Every penny amounts to something because they don't know if there's going to be pennies in the future." Ms. Anderson said the group needs to give people enough information without confusing them, so they can make realistic choices.

(At the end of the meeting, Mr. Garrard noted that the current sewer rate of $12.85 would rise to about $20 in 2024 based on inflation alone.)

Overflow Volumes: Glenn Pratt questioned how the number of gallons treated would be affected by a snowmelt. Mr. Pratt said it was too bad the committee had not reviewed the chart previously. Mr. Pratt asked why they should bother if the committee was not going to have an impact. Pratt noted that they had all agreed that volume itself was irrelevant, with the timing of the event being much more important. He noted that in July rainfall has far more of a human health impact than in January when no one is outside.

Ms. Spalding noted that the EPA looks at volume. Ms. Perras noted that volume issues are exactly what are taking place in Milwaukee right now. She said if the public input shows that people are interested in this, then the city needs to do some education. The purpose of the question is to find out where the average citizen is now and what their values are.

Mr. Neltner said that people do talk in terms of gallons. Ms. Perras noted that newspaper reporters also focus on gallons.

Mr. Pratt said he wanted to see more information explaining this in the newsletter. Ms. Perras pointed out that there wasn't enough room in the brochure for everything the city wanted to include.

Mr. Kupke noted that he was bothered by the decision-making card, asking residents to rank priorities. He said he was troubled that he would have to choose one over the other. Ms. Spalding noted that they could rank two or more issues of equal importance.

Water Conservation: Mr. Pratt asked how the area's water shortage fit into the analysis and questioned how more water conservation could impact treatment and rates. Mr. Pratt also noted if rates are raised too high on industry that would want to build their own treatment plants. Mr. Roper noted that costs are insensitive to dry weather conservation.

Mr. Pratt suggested looking at the number of overflows and suggested that if a rainfall caused a "belch" in the system, perhaps conservation measures could prevent an overflow.

Mr. Pratt noted that the Board of Waterworks is running out of water and looking at conservation. He noted that the board is studying a system of the more you use the more you pay, which is the opposite of the existing business model. He said CST can't assume current rates of consumption in the rates.

Mr. Kupke said that conservation would not be able to discernibly affect the level of CSO control because the greatest influence on the levels in the sewers was rainfall intensity, not the dry weather flow.

Mr. Pratt said he wants to see that in writing. "If I'm Eli Lilly, what's the breakpoint? Or can I do it better myself?"

Ms. Perras said CST would take a look at this issue and present information to the committee.

EPA Level of Control: Ms. Perras asked the committee to turn its attention to a directive from the EPA to look at the different level of control on some areas as opposed to others.

Mr. Mercer noted that the team had presented some of the cost curves in previous meetings. The graphics analyzed cost effectiveness of bring down the number of overflows in different watersheds.

Mr. Pratt said Dr. Caine needed to be brought into this discussion with the EPA. He said the analysis should look at how many people are exposed and ignore volume. "What real human health impact are we getting for what we spend?"

Mr. Roper agreed because the extremities of the watersheds are where kids are more likely to be. "The revisions needed to reduce those smaller overflows can be done with little impact on overall costs."

Mr. Pratt noted the advantages of interceptors over tunnels. He said Chicago's tunnel was a big mistake.

Mr. Neltner noted that if the EPA is pushing the knee of the curve, the graph showed Fall Creek and Pogues Run at a '2.' He suggested the committee talk about two at Fall Creek and two at Pogues Run and three at the remainder of the watersheds.

Mr. Mercer noted that if you look at days of overflow/year on Eagle Creek or Pleasant Run, a relatively small investment results in fewer overflows. However, one fewer day on Fall Creek and Pogues Run represents a significant increase in cost due to the volumes that must be captured in those watersheds. Mercer said it's not that the EPA method isn't valid. The information can be looked at in different ways.

Mr. Neltner said he was concerned that the 'knee of the curve' concept was lost in the newsletter and that the EPA was just looking at a number. Mr. Mercer said it was presented that way because 'knee of the curve' is a fairly technical concept to present. Mr. Neltner agreed that he wouldn't use 'knee of the curve,' but cost effectiveness.

Mr. Pratt said it was no good looking at cost per gallon. "Gallons are not equal, it depends where they are and when they are."

What Are You Willing to Pay?: Mr. Neltner asked if the materials could include what the fee would be in 2024 if no improvements were made. Ms. Perras said they can translate $12.85 into 2024 dollars, but they can't say that this number will be the full sewer rate.

Priority Areas: Ms. Perras said she will be interested in what people and city councilors think about placing greater controls on one waterway versus others. Ms. Perras said it will be helpful to know what people think about this when talking next with the EPA. Ms. Spalding noted that the EPA asked that the last bullet on cost-effectiveness be added.

Mr. Mercer said it will be helpful to understand people's values. Ms. Perras said CST is trying to get at what people value so they have something to help them in developing these plans.

Mr. Pratt said the problem is there are issues such as Williams Creek dumping into Fall Creek. "The people most likely to respond will give you certain answers. We need to talk to Dr. Caine and find out where people get the most bang for the buck."

Ms. Perras said the form does ask residents to check their family income so answers can be sorted by income.

3) EXISTING USE UPDATE

Ms. Perras referenced a document titled "Information to Support a No Existing Use Determination for CSO-Impacted Portions of Marion County Streams" that had been sent to committee members' mailboxes that afternoon.

She apologized for the short turnaround but said the document should be submitted to IDEM within the next week or two to get a decision by the end of the year. She said it would be helpful if the committee members could look over the document and give her feedback in the next week.

Ms. Spalding explained that if there is a determination of "existing use" on existing waterways, then the option chosen is irrelevant, because separate sewers may have to be established to protect that use. She said they used IDEM's guidance in determining existing use. "The difficulty sometimes is some folks view this effort as the city trying to get out of something. Our goal here is not to just get a determination from the agency, but make sure those very interested in this issue understand it. We're not trying to get out of anything. We don't want to have this challenged if we can avoid it. And the way to avoid it is to make sure everyone knows what we are doing."

Mr. Neltner said he came to the meeting early and was able to review the document. He liked it. He said the information was presented much better than the earlier White Paper, which only told half the story. He suggested three ways to improve the document. They include:

- Making a commitment to limit access to areas that might become full-body contact recreation.
- Does the water quality data reflect the current situation or the situation after the plan is implemented?
- Make it clear in the Executive Summary that the city was asking for the use attainability analysis after the plan is complete.

Ms. Perras said she would take a look at Mr. Neltner's recommendations.

Mr. Beranek said he had not read the document but wanted the city to note that designated use and existing use are two different things. Ms. Spalding said they are asking IDEM to make a decision on existing use.

Mr. Neltner asked that it be clear the problems got worse after 1975. Ms. Perras said that the document looks at stream flow and water quality during large storm events. She said the city used 2000 and 2002 data and correlated water quality sampling to large storm events. All those large storm events would have created overflows in 1975.

Mr. Pratt noted that studies on Lake Erie years ago showed something interesting. Rainfalls of certain intensity closed the beaches but the days beaches closed didn't count in the averages.

Ms. Perras asked for comments as soon as possible on the existing use documentation and requested committee members' support on the issue before IDEM.

Mr. Pratt raised the septic system issue. He said we have violations on low flow from failing septics. He asked if that was in the city's long-term control plan. Mr. Neltner said septic systems were not related to existing use. Mr. Pratt said it may be impacting existing use. He has seen swimming pools affected by septics. "We're looking at spending all this money and we can't address that?" Mr. Garrard said the city was addressing it.

Ms. Thevenow said we need to figure out a better way to pay for septics than Barrett Law. "No one who wants to get public votes will say Barrett Law is a good idea. You pay $15,000 for your sewer and give me your vote next year. We've done all the real easy neighborhoods that can be financed by Barrett Law. Desperate people want it and the community doesn't want to pay for it."

Mr. Pratt said that former Mayor Goldsmith had a plan to eliminate septics by 2001. Everyone agreed to it but it was not implemented. Mr. Garrard said he hasn't spoken with anyone who likes the process. Ms. Anderson said it's sad because it prevents people from selling their homes.

Mr. Garrard asked if it's added to the sewer bill, how will that work for people who pay into the Barrett Law fund already and those who have already paid into it? Mr. Pratt said a line has to be drawn in the sand. Years ago, the cost of buying out all existing Barrett Law projects was $14 million, he said. He said that number has grown since then. "To me, this is petty cash. For the people who have done it 20 years ago, you have to draw the line somewhere. Rather than say, 'The bill is going to be $42, it's going to be $44.'"

Ms. Anderson said: "Is it fair? No, but I pay school taxes and I never sent a kid to school." Mr. Pratt noted that 40 years ago his hometown banned septics and paid the money to upgrade the sewer system. "We are the only major city in the country with this problem," he said.

Mr. Pratt said the city was also asking ratepayers to pay for the CSO problems, which is not something they contributed to. Mr. Neltner said it would cost $320 million to pay for Barrett Law and asked how that would get done. Mr. Pratt said it should be done in five years, not 20 years, because septic systems are "low-hanging fruit."

4) NEXT STEPS
Ms. Perras invited the committee members to the meetings and asked them to fill out the cards.

Ms. Perras said they could probably expect to get no more than a 10 percent response rate on the cards and that about 100 people total were expected at the meetings.

Mr. Kupke noted that part of the committee's chore should be talking to neighbors and that they should attempt to double the expected response.

Ms. Spalding said she forwarded the meeting information to Irvington organizations. She said people are more likely to go to meetings when they get a notice from someone they know.

Next meeting date: 4:30 p.m. to 6:30 p.m. Nov. 17, 2004

Minutes

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Date: 11/17/2004

Time: 4:30 to 6:30 p.m.

Location: CST Training Room

Purpose: Mayor's Raw Sewage Overflow Advisory Committee

Wet Weather Technical Advisory Committee

Participants: Jhani Laupus, Leon Bates, John Kupke, Bill Beranek, Dick Van Frank, Glenn Pratt, Merri Anderson, Jodi Perras, Rosemary Spalding, Dave Voelker, Patrick Carroll, Carlton Ray, Vince Parker, Tom Neltner, Bob Masbaum, David Haywood, Deana Haworth

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1) Welcome and Introductions

Jodi Perras called the meeting to order. She announced that Mona Salem has returned from maternity leave.

2) Review Minutes of September 15 and October 13

Dick Van Frank noted that there should be a change on page 4 of the September 15, 2004 minutes. The line that says "There are a lot of septic tanks that should be running with water 365 days per year" should read, "The ditches should be running with water 365 days per year." The change was noted. Otherwise, the minutes from both meetings were approved.

3) Review Public Comment Received

Jodi Perras reviewed comment card data collected at the public meetings, via mail and email with the committee. The results were shown in the order of the number of people choosing each ranking. Ms. Perras noted that the Clean Stream Team received 153 comment cards.

Ms. Perras reviewed the results of the neighborhood impact question where participants were asked to rank seven neighborhood issues from 1-7, with one being the highest ranking. Results are in order below, with the average score in parentheses (lower scores represent a higher ranking).

- **1st:** Odor during long-term operation (2.04 average)
- **2nd:** Siting issues, such as proximity of facilities to homes, parks and schools (3.39)
- **3rd:** Noise in long-term operation (3.48)
- **4th:** Aesthetics: How facilities and improvements look in the neighborhoods (3.75)
- **5th:** Truck traffic during long-term operation (4.66)
- **6th:** Security issues, such as the possibilities of vandalism and sabotage (5.14)
- **7th:** Neighborhood disruption during construction (5.26)

Histograms also were provided, showing how many people gave each choice a 1, 2, 3, etc.

Ms. Perras reviewed the results of the environmental benefits and cost impacts question where participants were asked to rank six choices that pertain to environmental benefits and cost impacts.

- **1st:** Making waterways safer for people who use them (3.23 average)
- **2nd:** Reducing the number of gallons that overflow each year (3.31)
- **3rd:** Reducing the number of times that sewers overflow each year (3.48)
- **4th:** Keeping the cost per gallon reasonable and cost-effective (i.e., don't spend beyond the point of diminishing returns (3.49)
- **5th:** Making waterways healthier for fish and other wildlife (3.50)
- **6th:** Keeping sewer rates affordable for most families and businesses (3.69)

Ms. Perras noted that the data was also run by income level to determine if sewer rates were a lower priority for the higher income people. The "safe for people" choice was high along all income levels. Ms. Perras also noted that the lower income respondents indicated that safety was a higher priority than those with higher incomes did.

Dick Van Frank asked for the breakdown of number of respondents per income level. The breakdown was listed in the handout: 38 at less than $50,000; 69 at $50,000-$100,000; and 30 at more than $100,000.

Some advisory committee members asked if the city felt that, given the number of responses received, it was possible to discern a pattern for the Indianapolis public. They were concerned that some members of the public would respond without fully understanding the implications of the question. Further, they noted, if you had 30 minutes to go through the details of a question, you might see that there is no difference based on income. Ms. Perras said it was not possible to correlate the responses to the public at large, since the sample was not random. Each person had access to the same level of information, and his or her choices seemed to be well thought.

Carlton Ray noted that people who are at lower income levels tend to put wildlife at a lower focus.

Tom Neltner was surprised that "safe for people" is 1 or 2 and "sewer rates" are 5 or 6 for each income level. He felt that this indicated that people are generally okay with spending more money as long as it is spent wisely.

Merri Anderson pointed out that it was discussed that Indianapolis' rates are already overly low.

Mr. Van Frank said that the information and presentation was good and people knew what they were responding to when they answered the question.

Glen Pratt asked what percent of the responses were from Web, E-mail, regular mail and how many were received at the meetings. The information was not available during the meeting. However, here is the breakdown: 60 by mail, 57 in person at meetings, and 36 via the Web site.

One member pointed out that Brookside Park got a higher turnout than they would have expected. Ms. Perras shared that the neighborhood association in that area is very active and that several of the attendees were still concerned about the Pogues Run project.

John Kupke shared that he held a session for staff in his office and had about 40 people attend and take materials. He indicated that the attendees took the information home to neighbors and spouses.

Ms. Perras said that Carlton Ray and Rosemary Spalding also presented to a Sierra Club meeting in late October as well.

Mr. Kupke said that he felt most of the people that responded had some kind of orientation or discussion before answering the questions.

Ms. Perras reviewed the results of the cost and level of control question, which said while long-term sewer rates are very difficult to predict, the city has estimated the impact on sewer rates from overflow projects. Participants were asked, "At the end of 20 years, how much would you be willing to pay to clean our waterways?" She pointed out that the top vote getter, with 40 percent of all votes, was 95 percent systemwide capture (costing the average homeowner $49-51 per month at the end of 20 years).

Percent Capture	Average Homeowner's Monthly Sewer Rate at End of 20-years	Votes Received	Percent of Total
90%	$44-46	23	15%
93%	$47-49	12	8%
95%	$49-51	59	40%
97%	$58	20	13%
99%	$73	14	9%
100%	$132	6	4%
Other		15	10%

She noted that the other category is respondents who wrote in different responses, from a suggestion to use lottery money to putting other dollar amounts in. Ms. Perras also shared a breakdown of this question by income level:

Percent Capture	Average Homeowner's	Votes Received				
		Total	< $50k	$50-$100k	>$100k	NA
90%	$44-46	23	7	11	2	3
93%	$47-49	12	3	5	3	1
95%	$49-51	59	12	26	17	4
97%	$58	20	5	10	5	0
99%	$73	14	1	9	3	1
100%	$132	6	4	2	0	0
Other		15	6	6	0	3

Mr. Ray noted that the breakdown is interesting, and the 95 percent capture is the highest on all income levels.

Ms. Anderson said that between 90 percent and 95 percent it was negligible.

Mr. Pratt felt the difference between $46 and $49 is no big deal to most people.

Rosemary Spalding said that there was a lot of speculation on who would come to the meetings. She said she feels like this response shows that there was a mix of people.

Ms. Perras responded that she wouldn't assume that but it does show that many seem to prefer the middle road.

Mr. Pratt said that the questions people asked at the meetings showed what was really bugging them.

Ms. Perras noted that the questions asked at all the meetings and responses to the questions were included on the Clean Stream Team Web site. She planned to send out e-mail to all meeting attendees and copy advisory committee members, including a link to the FAQs from the meeting.

Ms. Perras reviewed the responses to the priority area question that said in implementing the plan, the city could spend more resources and place higher standards on some streams than others. When asked about this, the largest number of residents (38 percent) wanted to treat all streams the same. Full results are shown in the graphic below.

Choice	Votes Received	Percent of Total
All streams should be treated the same	56	38%
Smaller streams should be a higher priority than the White River	40	27%
Some small streams should receive higher protection than other small streams	19	13%
Some streams should receive a higher level of control because it is cost-effective to do so	32	22%

Leon Bates noted that he just wants to make sure that there is no different treatment across the watersheds. He feels that no watershed should be treated better or worse than the others should.

Mr. Pratt pointed out that there is no understanding of the fact that smaller streams have more contact. He said he is more concerned about kids who don't know better than adults that are dumb and want to get in the White River.

Ms. Spalding pointed out that Ms. Perras did address that in her presentation. Ms. Perras noted that she realized there was a limited amount of time they could spend on that topic, given the amount of information in the overall presentation.

Mr. Van Frank said that there was one thing that could skew the response: the way the overflows were expressed. It was not expressed as days of overflow, which makes a considerable difference.

Some members expressed concern that respondents didn't understand the concept of spending more resources and placing higher standards on some streams than others, and that many would want their streams to have the higher priority or they would not understand that the White River was included in all streams. Ms. Perras said that she did point out that some advisory committee members were asking that all streams should not be treated the same when she introduced the question in the session.

Ms. Perras reviewed the preferred plan responses, where participants were asked to indicate which systemwide plan they prefer. She noted that fifty-nine percent of participants preferred Plan 1 (Storage/Conveyance), 26 percent chose Plan 2 (Storage/Conveyance with Remote Treatment Facilities), and 15 percent chose Plan 3 (Total Sewer Separation).

Mr. Van Frank wondered why people felt that strongly about Plan 1.

Mr. Pratt said that he felt somehow they were misinterpreting remote treatment.

Rosemary pointed out that Plans 1 and 2 were very similar, and that she assumed that it was because in the mid-range thought it was less expensive for the Plan 1.

4.) **Level of Control Discussion**

Ms. Perras asked each committee member to offer his or her opinion on the level of control question.

Leon Bates said that since 100 percent would require ripping up the streets, he would go for 99 percent because to rip up every street is a little extreme. If we can get to 99 percent without ripping up every street, that is what we should do. He felt the city should go as far as possible to control overflows.

Ms. Perras asked if he would spend the additional $1.3 billion dollars to go from 4 overflows/year to one every two years.

Mr. Bates said that if we don't get the system into a position where it will not overflow, these four-day incidents could grow into another problem. The requirements could go from how bad it is to how concentrated it is. In another 20 years, we would have to do this again. The interceptors are not going to get any bigger. The way we are talking about this is that if the city keeps growing this is going to be a problem.

Mr. Ray said that the city is sizing the tunnels for future growth. If we say it is 95 or 97 percent capture, it is a tinker toy effect where we can expand it to the next step down the road. We are thinking long term and not short term. We are designing this for future growth.

John Kupke would respect Leon's approach of going to a high level. He feels that if we are at 60 overflows per year, we have to go through a number of changes. He would go with 95 percent with a rationale of how closely can you estimate this? The difference is between $1.6 and $1.8 billion. There is a knee of the curve with a $500 million difference between 95 and 97 percent. One day he would like the city to be at 97 percent. He would like to go to a higher degree solution, but not do it immediately.

Glen Pratt said he doesn't feel satisfied that with short and intense rainfalls we will have the sewer capacity to get flows to the storage units. He would like to sit down with a couple of people and decide if we need to make sure that the sewage in some areas gets to storage.

The idea of spending another $500 million for another couple percents doesn't make a lot of sense to Mr. Pratt. He would like to take a chunk of that money and spend it on the septic issue. He estimated that the city could solve the whole septic issue for $300 million. He asked, "Why does the city go down the wrong path?" He feels that the mayor has said, "Well, no one is suing me on that," but Mr. Pratt feels that this means that the city will have more boarded up neighborhoods and more sewage in backyards.

Mr. Pratt's chosen level of control is 95 percent PLUS taking care of septics. He feels those are tied inseparably.

Mr. Van Frank said that his would be different on different streams. He feels that if overflows occur they should occur south of the treatment plants. He is looking at 96 percent control, with 99 percent on Fall Creek and Pogues Run and a lesser on White River. He feels that there is no problem on Eagle Creek. The problems are on the streams in the old city. He feels he can't give an answer that fits this matrix because they don't look at it the same way. He gives Fall Creek and Pogues Run a higher level of control because they are flowing through neighborhoods and more people are in the neighborhoods.

Mr. Kupke said he concurs with that also. He wants to see careful balance as the city goes through each step of the program. He is also in support of the septic tank issue.

Mr. Pratt indicated that what he really supports is Dick's proposal plus septics.

Tom Neltner said that the most cost effective, reasonable solution that protects kids is his choice. What was given is the 96 percent, which is what the EPA likes. He thinks EPA is right. He asked, "Do you give Fall Creek and Pogues Run the two overflows instead of three?" What he hears Leon saying is that he doesn't want neighborhoods to be treated differently.

Mr. Bates responded that though he feels the city would start out with good intentions, it could end up like they did in Broad Ripple. As we get into the program, it gets turned around and misused later down the road. He has faith in Ms. Perras, Ms. Spalding and others involved at this time, but he doesn't have faith in a new unknown administration.

Mr. Bates wants to clean up the entire problem, not have it said that some are okay and some don't need to be fixed. Then when later administrations come in, these places that aren't fixed are not that important.

Mr. Van Frank asked, "Where is that sewage coming out? If you talk about percent, is it coming out at one place? And at what time of year?"

Bill Beranek questioned Mr. Bates, "When he says that every stream should be treated identically what does he mean?" What measure needs to be identical – number of overflows, percent capture, or water quality?

Mr. Bates said if you go to Pleasant Run, you can probably eliminate those. But he was concerned that we not treat one waterway any different than the next. He wants the goal to be the same number of overflows per year in each stream.

Dr. Beranek said he would be in favor of where it is protecting people more and achieving similar water quality, but Mr. Bates is more in favor of 5 streams having all the same number of overflows. The four days or 95 percent should be the same.

Mr. Kupke would be in line with the comparable degree of water quality. When you do that you recognize that there are different sizes of streams. To the extent that that occurs, if the streams are smaller you need fewer overflows. It is just what is needed to have that comparable degree of water quality. If you live on the White River, you might be able to have more overflows and won't be able to tell the difference from various indicators.

Merri Anderson said that when she thinks about how it rains in Indianapolis, in the end, we are going to get about the same amount of rain although it will not be at the same time. If that averages out the same, then she would have the same amount on each stream. She thinks there are more people living along Fall Creek. She lives along Eagle Creek and she is worried about what the pollution is in the industries. She also thinks about the times you have a gully washer and water is coming from the reservoir. Also, right in the middle of her neighborhood is Speedway wastewater treatment plant where people are full-body contact swimming. But she feels she would agree with 95 percent but that the septic has to be addressed because she feels we can't pretend that it isn't going on and impacting people in their homes and running into the streams. Wherever it is coming from it still needs to be dealt with. She can see a different level of control because it is going to average out. There are people going into White River, but there are also areas where people aren't going into White River without a boat. In the long run, different levels of control on different streams would be her preference, and to include septic and choose 95 percent.

Vince Parker says that his response is "as much as we can afford." Ideally we would like no overflows and we have an infrastructure where the cost to get there is high. Look at comparative numbers and the engineers made an assumption. The reality is that 95 percent is a good number, plus or minus a percent. You don't know what the rain will be and I need to be responsible for my children. I think it is all about managing risks and we can't control all those risks. We need to put forth the resources we can afford to manage it the best we can. We know a lot more than we did 30 years ago. The 95 percent range is reasonable with what we know today.

Dave Voelker said that he looks at it and says that 100 percent is the way to go because costs will only be higher later on. He knows realistically, though, that 95 percent is the way to go. You might have three 100-year storm events in one year. He likes the idea of variable controls on the streams that are more accessible. There are more kids trying to get into the water. No matter what you do with the White River, you still have everything coming from upstream and you are never going to meet standards. Would agree that 95 percent is the way to go.

Ms. Anderson said that for Leon's benefit, she feels that what his concerns have going for them is that what is growing fastest is grass roots organizations and neighborhood associations. There are people who will be watching this position when we are gone. They are going to have an easier time because we have broken a lot of ground here and it will be easier for these people to get involved.

Mr. Pratt said that he is not worried about Fall Creek Place because it will be gentrified. A lot of those people are well able to take care of these things. Where the outer ring is concerns him.

Mr. Van Frank said that he was involved 20 years ago. Mayor Hudnut said $200-$300 million, and nothing was done until EPA said the city had to do something.

Mr. Ray said that EPA was not going to fund the work at that time because it was not justified in their framework. The city did get federal funding for the treatment plants.

Mr. Van Frank agreed that nothing was done until EPA threatened regulatory action and the new administration was more open to it.

Ms. Perras asked Dr. Beranek for his answer. He said that $1.7 billion is a ballpark with a reasonable expenditure. He also noted that he has asked three times for the knee of the curve information so he can see it and the city has not given it to him. He is reluctant to use a single number. He is interested in load, tributaries and septic tanks. He is interested in industrial increase and discharge. Does this take into account when the cost goes up $1, it captures where we are anticipating industry to be? It also needs to capture where the aquifer is so we don't damage it for the drinking water. He needs a further presentation on knee of the curve before he can be giving another number.

Mr. Pratt said cities did significant CSO work and there were major federal funds that went into this. Only Indiana sat down and said we aren't doing this because no one was suing us. Because we were cheap versus frugal, we need to pay a high cost now.

5.) Leak Busters/Grease Busters Update

Ms. Perras presented a draft video and brochure for the Correct Connect program. The intention is to develop a video that could be used at public meetings in neighborhoods where we know there is an issue. A city staff person would go out into a neighborhood with Correct Connect materials.

Ms. Anderson said that the video would not encourage her. She feels that it looks very complicated. She wondered if she is supposed to remember this. If that is the intention, she suggests that copies of the video be put in libraries.

Ms. Anderson also sees the need for this to be positioned with a reason WHY to disconnect. The viewer needs to know that this is something that is illegal. Can you be fined or told to disconnect it?

Ms. Anderson also suggested that the city should provide a tool kit or convince stores to put together a kit that they can sell or in the areas where this is a problem so these materials can be put together quickly for people. She also suggested that there are a couple of places that say if you need to dig, call first. That needs to be moved up higher.

She also requested that the permit information include answers to questions such as: Where do I get this permit? How do I know and why do I need a permit?

Carlton Ray said that for the sump pump disconnection you do need a permit. DMD says it is required to have a permit when you work on your plumbing system.

Mr. Bates pointed out that if you want to do it yourself you can, but if you want to pay someone you should use a licensed plumber.

Mr. Van Frank asked, "If I work on my plumbing myself do I need a permit?"

Mr. Bates said, "If you increase the operation or drastically change it, you do need a permit."

Mr. Pratt said other cities have gone in and found out that if the city took care of all of this in a big contract, they saved money. He can't believe how easy it is. He encouraged the city to take a look at how the other cities have done this because they figured they saved money.

Mr. Bates said that it is a good idea. Some of the suggestions need to be massaged a little bit. We need to make people understand that you can cause overflows … not just backups with illegal connections.

Mr. Pratt pointed out that it is only illegal to connect onto the sanitary sewers. He feels that this is an issue that will be brought up.

Mr. Bates said we need to work on the contractors to make sure that contractors are not reconnecting to the sewers.

Mr. Pratt said contractors are held liable if they reconnect with sewers.

Ms. Perras pointed out that the purpose of these materials is to raise awareness among the community and the council.

Mr. Pratt said that he doesn't think we are farther ahead than we were 10 years ago. The water company needs to send notices, start fining. When are we going to start a real program? When will you do something to follow up?

Mr. Van Frank asked whether we could get community services/work release folks to find and work on illegal connections.

Carlton Ray explained that there is a pilot project with meter readers this month. Then there will be a follow up with township coordinators.

Mr. Kupke said that there would need to be an amnesty program on this.

Mr. Pratt asked for a rough estimate of the city's cost to take care of all illegal connections for residents. What would it cost to do the disconnects with the people's permission?

Mr. Bates said that when the contractors go to pick up their license, every general contractor has to sign for this when they get their license. There would be a fine levied against them. The city can force him to obey the rules. DMD can help you with that. They should be the ones telling the contractors

6.) Water Conservation/Peak Flows Discussion

Carlton Ray reviewed materials showing the potential impact on tunnel size of water conservation measures. The tunnel size for 95 percent capture is approximately 190 million gallons. If there were a 5 percent reduction in dry weather flow, the tunnel size would still be 190 million gallons. If there were a 25 percent reduction in dry weather flow (which is highly unlikely), the tunnel size would decrease to 185 million gallons. Therefore, the impact of water conservation on the size of facilities would be negligible. That does not mean water conservation isn't important. It just means that it is not likely to achieve significant savings in the cost of building CSO control facilities.

Mr. Ray also said the city would design the tunnel so it can be expanded later to achieve 99 percent capture. If the next generation wants to spend another billion dollars to achieve a higher level of control, it can do so relatively easily. We are thinking ahead of the game that the next generation can get that next level if they so decide.

Mr. Pratt said that where water conservation is more important is if Fall Creek treatment hadn't been taken off the table. Where water conservation is more important has to do with loading. Is the big tunnel here the way to go? Or does it make more sense to store the sewage rather than greatly diluted wastewater? This is when you are looking at loading and not volume.

Mr. Pratt said when you are redesigning, if we can reduce the flow that is going there in dry times, we do not have to treat clean water.

Mr. Bates said that in his neighborhood, all the houses were built before World War II. When you flush you are flushing 15-20 gallons down the drain at once. You can't reduce this all the time.

Mr. Ray agreed that this is a harder issue to deal with … fixing the sewage plant is something that the city can control. We are a lot farther out on the water conservation issue.

Mr. Kupke said that we couldn’t design this around water conservation. This will become more prevalent although this will not change the process. They have a water use and a load process.

7.) Next Steps

Dr. Beranek asked for knee of the curve information. This has been mailed to him.

Mr. Van Frank asked for a curve showing where three overflows/year would stand. (See attached.)

Mr. Pratt asked for a cost estimate for the city to pay for all disconnects of illegal connections. Note: The city does not have this information.

Mr. Pratt also asked where do we stand on any changes for the schedule for submission? Ms. Perras said the schedule has not changed.

8.) Next Meeting Date

January 19, 2004, 4:30 to 6:30 p.m.

Minutes

INDIANAPOLIS CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Date: 02/24/05

Time: 1:00 to 3:00 p.m.

Location: CST Training Room

Purpose: Clean Stream Team Advisory Committee

Participants: Gary Mercer, Paul Werderitch, Tom White, Jim Parks, Patrick Carroll, Dave Voelker, Vince Parker, Pam Thevenow, Phyllis Zimmerman, Kevin Hardie, Mark Jacob, Mike Massonne, John Chavez, Mona Salem, Jodi Perras, James Garrard, Glenn Pratt, Tom Neltner, Richard Van Frank, Bill Beranek, Merri Anderson, Leon Bates, Deana Haworth, Carlton Ray, Rosemary Spalding, Bob Masbaum, Todd Cavender, Ralph Roper

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Welcome and Introductions

Jodi Perras called the meeting to order. Following introductions, Ms. Perras reviewed the upcoming schedule of meetings. The next meeting will be March 16, after which the committee will return to an every-other-month schedule. Meetings will be the third Wednesday of odd-numbered months, unless a special meeting is required due to LTCP developments.

Ms. Perras apologized for canceling the last meeting and noted that there was a meeting with EPA that day that resulted in the cancellation.

Meeting Minutes of November 17, 2004

Ms. Perras asked meeting attendees to review the draft minutes provided. Glenn Pratt had emailed a change and that adjustment had been made to the minutes. She also noted that Mr. Pratt's first name was misspelled and that it would be adjusted on the final version of the minutes. Meeting minutes were approved .

New Environmental Program Manager

Mona Salem introduced the new leadership of the Clean Stream Team: Mark Jacob and Mike Massonne of DLZ. Ms. Salem introduced Mr. Jacob as the new program manager, noting he had been leading the stormwater utility program for the last few years as the program manager. She said that as the contract with MWH ended in 2004, the city wanted to realize efficiencies of using a watershed-based approach. The city asked DLZ to step in as manager of the Clean Stream Team program, along with the existing contractors. The only change in the contractor groups is that DLZ replaced MWH.

Mark Jacob said that he appreciates the opportunity and is familiar with many advisory committee members since he worked with them during his previous employment with DPW. He introduced Mr. Massonne as the deputy program manager. He added that he appreciated the work and partnership of the existing team and the wealth of information that they have shared.

Jim Garrard said that he feels DLZ has done a great job so far and has been able to hit the ground running. He noted that the city probably should have made an announcement to the advisory committee before now and that he would take the blame for the oversight.

Glen Pratt noted that the only negative change he has seen so far is that there are no cookies at the meeting. Ms. Perras said that this change was her idea since the meeting was falling so close to the lunch hour.

Committee Name: Clean Stream Advisory Committee

Ms. Perras noted that she had started using "Clean Stream Advisory Committee" as the committee name. Since 2002, the Mayor's Raw Sewage Overflow Advisory Committee and the Wet Weather Technical Advisory Committee have been meeting together as one committee. However, the team has been maintaining two separate committee membership lists. Ms. Perras said the city would like to formally combine the two committees, if there were no objections.

Mr. Garrard asked the name be the "Clean Stream Team Advisory Committee" as an amendment. There were no objections.

Mr. Pratt noted that there is a group of people working on the city's reservoirs and trying to control the nutrients going into them. He wants this to be included in the Long Term Control Plan. Mark Jacob asked if Veolia Water had finished the nutrient study. Mr. Pratt said that Lenore Tedesco from IUPUI had been working on it. He envisions a lot of public outreach as a piece of this as they try to control phosphorous coming into the system.

Mr. Van Frank pointed out that there is an air committee for central Indiana. He feels water issues are moving into metropolitan area cooperation as well. Mr. Garrard agreed that this is a regional issue. Mr. Pratt noted that even though CSOs are the main area this group is interested in, he feels that the group should show a more holistic approach.

LTCP Negotiation Update

Ms. Perras asked Rosemary Spalding to provide an update on the progress with the LTCP negotiations. Ms. Spalding said that the city has been meeting periodically with EPA and IDEM in Chicago or Indianapolis, either in person or via conference call. The group is getting down to the final details on level of control.

Dr. Ralph Roper asked what the city was anticipating agreeing to and asked if the agreement is based on number of overflows or percent capture. Ms. Spalding said that parties have agreed to Plan 1 and are negotiating the level of control now.

Dr. Roper asked how the city is defining the level of control and percent capture. He noted that he has little confidence in the percent capture data being used. He feels the city should run a continuous rainfall simulation of the selected plan using the SWMM model to confirm facility sizes and percent capture, rather than using a single design storm in the NetStorm model. His concern is that what the city is thinking of as 95% capture is actually 90% capture.

Ms. Spalding noted that part of the discussion with EPA is how the city will measure this at the end of the day. Depending on what the final approval looks like, whether it be percent capture or number of overflows, the city will need to determine how success will be measured.

Gary Mercer pointed out that the city prefers percent capture. He said Dr. Roper's primary question is if the size of the tunnel is adequate. Originally there was a five-year simulation, but last year the city focused on a one-year simulation. The city feels comfortable that the facility sizing is adequate. The city does agree with the need for further analysis during facility planning.

Carlton Ray said that the city is working on a facility plan for the Fall Creek tunnel and the tunnel size is in the ballpark with the original estimates. The city is also concerned with using overflows per year as a performance measure, from a public outreach standpoint. The number of overflows is based upon average annual statistics, but overflows could exceed four in any given year. During the last three years we could have had 6-7 per year. Milwaukee has experienced this issue recently and we want to avoid that mistake.

Ms. Salem said that the city is talking to EPA and IDEM about the number of overflows and percent capture. NetStorm was one level of analysis and the city has done additional modeling to verify that the percent capture agreed to can be met.

Dr. Roper said that if we do modeling on a representative year, there might be trouble with the sizing of the facility. Ms. Salem said that the city has reviewed data over the past 50 years.

Mr. Van Frank said that he agrees with Dr. Roper's question and he has two additional questions. He said that the 95% capture is fine but wants to know 95% where? He feels that the terminology of four events is misleading. This is four days in which overflows can occur since all of those CSOs are there. Also, he wondered about the financial capability analysis and existing use. He asked if the city is negotiating a consent decree. Why aren't all these issues being discussed openly?

Ms. Spalding said that this is being discussed openly. The elements of the LTCP are public.

Ms. Perras reminded Mr. Van Frank that the city had sought the committee's input into level of control and existing use last year. She also noted that if you look at other cities, no one else has gone to the public and asked, "How much are you willing to pay?" She said that, like any other negotiation the city has, the city doesn't want to conduct the negotiations with EPA in a public forum.

Mr. Garrard also noted that they city needs to be able to talk openly and frankly with EPA. EPA needs to be comfortable with the fact that the city won't run to the public and try to fight this out in the newspaper.

Mr. Garrard said that the city has tried to have the advisory committee involved along the way. Negotiations with EPA and IDEM depend on a level of trust that all parties can talk frankly.

Mr. Van Frank asked again about financial capability.

Ms. Salem said that comments raised by this group are of immeasurable value to the city. She pointed out that the group has given the city good advice to be careful about the percent capture and the phraseology of days v. events. She said the city also brings the committee pieces of technical information to review.

Ms. Perras said that the group has talked previously about level of control and existing use. The city still owes the group a presentation and discussion on the financial capability analysis. The city has been working to answer questions posed by EPA and the information isn't ready for review yet.

Mr. Van Frank noted that since the city decided to use only Center Township, the committee has heard nothing else.

Dr. Roper noted that the city doesn't have to have everything figured out completely before coming to terms with EPA.

Ms. Spalding said that there is recognition that this is a dynamic process and that part of the process with EPA and IDEM is how to manage performance and how to adjust things over time. This process will continue for the next couple of decades and things will need to be adjusted as we go along. We don't have to have all of the details if we have flexibility.

Mr. Pratt said that he opposed percent capture from the beginning and that it is more about where overflows occur than total volume. He noted that one year you may have 2 overflows and one year you may have 7. If EPA accepts a standard design storm that we are designing for and sets a volume, a couple big storms can miss the target. Ms. Perras and Ms. Salem agreed that this is a good point.

Tom Neltner asked how much of the negotiations are contingent on Senate Bill 620. Ms. Spalding said that there wouldn't be much change at all.

Mr. Neltner said that EPA hasn't focused on that because it is a state issue. The city has made it clear that whatever LTCP is approved, the city will need a change to the water quality standards.

Ms. Perras asked Ms. Spalding to give an overview of Senate Bill 620 for those who are not familiar with it. Ms. Spalding said that the purpose of Senate Bill 620 is to create a tool that is available to CSO communities that protects them while they are implementing their LTCP. Any plan that involves residual overflows is going to violate water quality standards. When you have a permit that you can't comply with, you get a compliance schedule. One of the things this bill does is give the city protection while they are implementing the LTCP, as long as they are meeting the compliance schedule.

This would also create a sub-category of the recreational use category, recognizing that it is not safe for swimming during wet weather events that cause overflows. There would be a limited use subcategory that recognizes that swimming is not safe during that time.

Ms. Perras said that this has been a productive process because the environmental activists, governments, and municipalities have been supportive of it and worked together on the language.

Dr. Bill Beranek asked about parameters other than bacteria in the water quality standards. SB 620 does not address those parameters, which represent a future problem with non-compliance from CSO discharges. Ms. Spalding said that you can do a UAA for whatever parameters you determine.

Mr. Neltner said that we know that CSOs are going to exceed the arsenic standards. That could be the next level of problems to work through. The state shows no inclination of trying to wrestle with these issues involving CSO discharges.

Existing Use Update

Ms. Perras reminded the committee that existing use documents were submitted to IDEM last October. The city plans to meet with IDEM next week to discuss issues IDEM may have regarding existing uses. Without a determination of no existing use, the city cannot agree to a long-term control plan or proceed with a Use Attainability Analysis (UAA).

Mr. Van Frank asked what the holdup is. Ms. Perras said that IDEM has looked at the submittal and marked it up, but another meeting is needed to have further discussions. Mr. Garrard said that there is a new team at IDEM and the city needed to get them up to speed on what was presented.

Ms. Perras said that there had been several discussions last year with Tim Method and Felicia Robinson, who are no longer with the agency.

Mr. Garrard noted that he met with the commissioner earlier this week. He knows the ball is in their court and wants to have a decision in a few weeks.

Mr. Pratt said that one of the ways to solve it is to take existing use off the table. This is something the commissioner could do.

Fall Creek Alternatives Analysis

Ms. Perras noted that questions are still being raised about why the city has not included a treatment plant on Fall Creek in its latest plans. She invited Gary Mercer and Ralph Roper to present more detailed information on the Fall Creek Alternatives Analysis.

Mr. Mercer began his presentation with an overview of what the 2001 LTCP included for Fall Creek:

- Tunnel and Collector pipes to capture CSOs
- Pump station to dewater the tunnel
- New Wastewater Treatment Plant
    - 15mgd dry-weather flow capacity
    - 60mgd wet-weather peak capacity
- Boulevard dam removal and instream aeration

The functions of the Fall Creek Wastewater Treament Plant included in the 2001 CSO LTCP included:

- Treat base sanitary flow: an additional 15 mgd treatment capacity to the system.
- Treat wet-weather flows during a storm, up to 60 mgd.
- Dewater and treat Fall Creek tunnel flows after a storm.
- Provide additional creek flow, 15 mgd during/following wet weather.

Flow Augmentation included:

- 15 mgd up to 60 mgd during and after storms of treated effluent
- Along with Boulevard Dam removal and instream aeration, additional flow was projected to achieve the dissolved oxygen standard at 12 CSO overflows per year level

Mr. Mercer noted that there are several potential challenges for the Fall Creek Wastewater Treatment Plant:

- Siting and acceptance
- NPDES Permitting: very low flow stream

- Operations: additional treatment facility

Following submittal of 2001 LTCP, the city conducted additional analysis of tunnel and treatment options from 2001-2004. This included:

- Southport AWT plant analysis
- Interplant connection facility planning
- Tunnel configuration options

Dr. Roper provided an overview of the flow splitting strategies that were used to capture CSOs. Dr. Roper also reviewed the 2005 CSO LTCP conclusions, including:

- With improvements, adequate dry-weather treatment capacity exists at Southport and Belmont AWT plants for the next 20 years
- One tunnel for Fall Creek and lower White River, instead of two in previous plan
  - Tunnel flows dewatered to Southport AWT plant for treatment
- Additional wet-weather treatment capacity added to Belmont and Southport AWT plants
- Other Fall Creek plans include 2.5 mgd of additional creek flow, Boulevard dam removal and instream aeration

Mr. Mercer reviewed flow augmentation as part of the 2005 LTCP:

- 2.5 mgd of treated effluent (Belmont AWT plant) or from other source
- Boulevard Dam removal and instream aeration projected to achieve the dissolved oxygen standard at the 12 CSO overflows per year level or higher.
- Additional 2.5 mgd flow projected to improve compliance with *E. coli* bacteria standard during low-flow summer months

Mr. Pratt asked what the other sources are. He said the idea that Eli Lilly would use sewage effluent is unlikely to ever happen. He emphasized that, given the shortage of water already, any proposals of where that water will come from are not feasible to discuss.

Mr. Mercer responded that the city's default approach is to do water reuse from the Belmont plant to Fall Creek. We are looking at other opportunities if they present themselves.

Mr. Van Frank said that it is worth considering, but it is worth getting a larger volume than 2.5 mgd. If you are talking about removing the Boulevard Dam, it keeps water up to Meridian Street. The area is filled with sediment and there are islands with trees growing on it. The city will need to do something.

Mr. Ray said that the city will have to remove the dam and remove sediment banks after dam removal. Mr. Van Frank pointed out that the city can't get rid of the dam without addressing the upstream sediment problem. Mr. Ray responded that state may want us to remove the dam by taking out one portion of the dam at a time.

Mr. Van Frank said that he has trouble with what Mr. Ray is talking about. Mr. Neltner said there are a lot of other pollutants that are concerning that aren't being dealt with here. If you would go with 5 mgd per day, you might make a nicer ecology.

Mr. Mercer said that the city can go beyond 2.5 mgd, but doesn't want to commit to a higher number with EPA. Ms. Perras noted the need to do public outreach on these issues as we move further into the program. Mr. Van Frank said it would help if the city described flow augmentation as "a minimum of 2.5 mgd."

Dr. Beranek asked whether the effluent characteristics of the advanced wastewater treatment plants would meet the NPDES standards for Fall Creek. Mr. Mercer responded that he is not certain that we will get tighter criteria for a Fall Creek discharge. Mr. Ray noted that the state may require a polishing pond.

Mr. Mercer reviewed a map of Fall Creek that was included in Plan 1 of the 2005 LTCP draft as well as a map that showed the lower White River, where he pointed out the deep tunnel.

Pam Thevenow asked about the relationship between the deep tunnel and the wellfields. Mr. Ray said that if the city gets close to the wellfields, they will have to beef up the lining. Mr. Pratt said that Carlton Curry has expressed some concerns and requested that they brief him directly. Dr. Beranek asked if the tunnel would be in clay or sand. Mr. Ray said that the tunnel would be in rock. Mr. Ray also said that the city is aware of some shallow aquifers that must be protected. Mr. Ray suggested that perhaps the city could do a further presentation at an upcoming meeting to address what would be involved in the tunnel construction process.

Mr. Mercer discussed a slide that addressed unlocking the capacity at the Southport AWT Plant. There are two existing biological systems at Southport:

- Air Nitrification System (ANS) – retrofitted from the mid-1960's.
- Oxygen Nitrification Sytem (ONS) – new in early 1980's.

Unlike Belmont, where land is scarce, space for expansion at the Southport facility is available. Former sludge lagoons can be adapted to attenuate flow surges of primary and secondary effluent during wet weather. Existing ANS has substantial expansion potential (up to a peak of 150 mgd). Existing ONS can be re-rated to a peak of 150 mgd (from 120 mgd). Original primary clarifiers were not expanded when the AWT plants were built and have no reserve capacity.

Dr. Roper reviewed the Southport facility plan objectives, which were to:

- Abate current wet weather overflows at the headworks.
- Provide capacity for future dry-weather base flow from expanded service areas (50 mgd peak).
- Relieve Belmont of additional 25 mgd of dry-weather flow.
- Treat the captured CSO flows from the deep tunnel (75 mgd to 150 mgd).

He also addressed the peak hourly design flowrates of the Southport facility (during wet weather):

- Current peak flow = 200 mgd
- Service area growth = 50 mgd
- Belmont diversion (continuous) = 25 mgd
- Captured CSO from tunnel* = <u>150 mgd</u>
- Total Headworks Flow = 425 mgd
- Deduction for Flow Equalization = <u>-50 mgd</u>
- Total Effluent Flow = 375 mgd

*The captured CSO flow rate from the tunnel may be as low as 75 mgd

Mr. Mercer reviewed the existing biological treatment capacities:

- Belmont Oxygen Nitrification 150 mgd
- Southport Oxygen Nitrification 120 mgd
- Southport Air Nitrification <u>30 mgd</u>
- Total: 300 mgd

Mr. Mercer then reviewed the analysis of system annual flowrates from 1967 to 2002. Tom Neltner said that he was under the impression from previous presentations that flow numbers were decreasing. Dr. Roper said that we have seen a moderate reduction in base flow as a result of rate change. Mr. Ray said that the graph Mr. Neltner might be thinking of is the graph that shows industrial flow from industrial users tapering off. Mr. Neltner said he is sure that this is not the graph that was presented previously. Ms. Perras said the city would review what was presented before to clear up the issue.

Mr. Mercer then reviewed the future dry weather biological treatment capacity:

- Belmont Oxygen Nitrification 150 mgd
- Southport Oxygen Nitrification 150 mgd
- Southport Air Nitrification 75 mgd
- Total: 375 mgd

Dr. Roper pointed out that the purpose of this exercise is to plan for the future and show that existing plants are adequate with expansion. Jim Park said that the current annual average flow is at 170 mgd right now.

Mr. Neltner said that you can add extra capacity at Southport, which is a better investment than at Fall Creek. This doesn't really answer the question of why the extra 15 mgd at Fall Creek would be bad. Dr. Roper said that the Fall Creek plant is a dry weather issue and this is a wet weather plan.

Mr. Van Frank asked if this is the most cost effective way to solve the problem. Mr. Mercer said that there is a slide later on that shows expanding an existing plant is always cheaper than building a new one. This is more flexible. For the picture we are looking at now, this is the better solution.

Tom Neltner asked about the mine with storage capacity in the 2001 plan, and why that has not been talked about again. Dr. Roper said the underground quarries are constructed with a series of rooms with pillars. If you partition off a part of the underground structure, the problems associated with removing solids from the vault are enormous. Cleaning out the solids is a nightmare. Over time, the basins would fill up with sludge.

Ms. Salem said that this is why facility planning is important. The city did the facility planning and found out it wasn't a good idea.

Ms. Perras asked whether the presentation had answered everyone's questions about why a treatment plant was no longer planned on Fall Creek. Everyone said it had.

Mr. Pratt said that he still has the feeling that EPA is looking at the total amount the city spends. He would like to address maintaining flow in the river and would like to throw in septic tanks while we are doing it.

Ms. Spalding said she would like to respond to Mr. Van Frank's earlier question about a consent decree. She said the city is negotiating a consent decree with EPA, at EPA's insistence.

She said the city has policy and practical reasons why it doesn't believe a consent decree is right for Indianapolis. It doesn't make sense for EPA to spend enforcement resources on a city that is doing what they need to be doing. We think that this should be done through the permitting process and that is why Senate Bill 620 is important, she said. Ms. Spalding also noted that the city is trying to negotiate an "implementation consent decree" rather than a punitive consent decree. "We have said that we will negotiate and if we can come up with a consent decree that is implementation and not punitive, we will support it," she said.

Flexibility is an important and practical consideration when a consent decree places a city under the jurisdiction of a federal judge. Although EPA has said they want to negotiate an "implementation" consent decree, they have asked for both civil and stipulated penalties. However, it appears the implementation consent decree is much less prescriptive than other decrees the city has reviewed, she said.

Tom Neltner asked whether the penalties are related to CSOs or other issues. Rosemary Spalding said that EPA has a problem in Indiana because the older permits authorize CSO discharges.

Ms. Spalding also said that Attachment A to the 1985 permit did not have all the CSOs that are currently known. EPA is now saying that every discharge that was not listed in the 1985 permit is in violation of the permit.

Ms. Spalding said that we have made presentations to show that we have a strong nine minimum controls program and we are in our second generation of a Capacity Management, Operations and Maintenance (CMOM) program. However, obtaining CSO consent decrees is a priority for EPA headquarters.

Glen Pratt asked if there are penalties, can we have it redirected to IDEM?

Outline of Next Steps

Ms. Perras announced that the next advisory committee meeting is scheduled for March 16. An agenda will be sent out separately. Two meetings from now, we will discuss geology of tunnel construction.

Merri Anderson announced that on Monday at 1 p.m. at the Sherman Drive offices, the sanitary sewer standards manual will be discussed.

Margie Smith-Simmons announced that on Sunday, February 27, DPW is a sponsor of the bridge building competition at IUPUI. Also, she noted that Bob Harris was nominated as engineer of the year. Ms. Perras called for a round of applause for engineers.

John Chavez mentioned that the White River cleanup is scheduled for April 2 and that they are looking for hundreds of volunteers. It will start right across the street from the city garage. Jodi offered to send the information out to the committees.

The meeting was adjourned.

Remaining 2005 Meeting Dates (third Wednesday, 4:30-6:30 p.m.)

1) March 16
2) May 18
3) July 20
4) September 21
5) November 16

Minutes

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Meeting Date: 03/16/05

Time: 4:30 to 6:30 p.m.

Location: Clean Stream Team Office Training Room
151 N. Delaware, 9th Floor
Indianapolis, IN 46204

Purpose: Clean Stream Team Advisory Committee Meeting

Attendees: Angela Nusssmeyer, Jim Parks, Mike Massonne, Mark Jacob, Tricia Banta, Pegg Warnick, Kevin Hardie, Pam Thevenow, Carlton Ray, Dave Voelker, Vince Parker, Margie Smith-Simmons, Tom Neltner, Merri Anderson, Jodi Perras, John Chavez, Rosemary Spalding, Glenn Pratt, Ralph Roper, Dick Van Frank, Bill Beranek, Don Murray, John Kupke, Jim Ku, Leon Bates, Gary Mercer, Patrick Carroll, Deana Haworth

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1) WELCOME AND INTRODUCTIONS

Jodi Perras called the meeting to order. She shared a photo of Jim Garrard's new baby with the group and said that he was out of the office and unable to attend the meeting.

Following introductions, Ms. Perras reviewed the agenda. She apologized that the financial capability analysis was not yet ready to review, but promised it at the next meeting.

2) MEETING MINUTES OF FEBRUARY 24, 2005

John Kupke noted that Ralph Roper should be added to the attendees and pointed out that the current peak flow rate for the Southport facility on page 7 of the minutes should be listed at 200 mgd.

Mr. Kupke also noted that the comment that Jim Garrard made on page 3 of the minutes regarding the advisory committee's involvement and EPA/IDEM negotiations might need to be adjusted. Dick Van Frank pointed out that Mr. Garrard's comment should be taken in context.

Follow-up on AWT Flowrates:

Ms. Perras also asked the attendees to refer to a handout labeled "Analysis of System Annual Flowrates." There was some discussion during Dr. Roper's presentation at the February meeting on plant flow rate trends. She pointed out that what was shown in February and what had been shown previously are two different graphs. Dr. Roper's graph showed all-weather plant effluent (outflow), which has been increasing over time due to efforts to maximize flow through the plants during wet weather. Previously, the group had seen graphs with dry-weather plant influent (inflow), which has been decreasing over time.

3) CORRECT CONNECT UPDATE

Ms. Perras introduced Pegg Warnick of DPW Engineering to give the committee an update on status of the city's new Correct Connect program. Ms. Warnick is working with a team of people to develop and implement the program. Following a brief overview, the committee members would be asked to assist the city staff in brainstorming possibly questions and comments that could be expected from the public.

Attendees were provided copies of printed Correct Connect brochures. The first brochure gives a general overview of the program. The other two brochures give more specific information on disconnecting sump pumps and downspouts. Ms. Warnick said the city was kicking off a systematic approach to eliminating incorrect connections in our sewer system. Education is the first prong in 2005, followed by enforcement, which is anticipated to begin in 2006. The primary focus of the first phase is to let people know about incorrect connections.

Ms. Warnick explained that Veolia was hired to do neighborhood surveys using meter readers to identify homes with downspouts potentially connected to the sewer. She showed two color-coded maps with the Veolia data, showing homes with one or more downspouts in the ground, homes with none found, and homes where the meter reader was not sure. She acknowledged that this initial test was done visually and that it is necessary to go back and verify and check these findings. She noted that about 25 percent were illegally connected in one neighborhood.

Bill Beranek asked what the age of neighborhood is. Ms. Warnick responded that the neighborhood was between 40-50 years old.

Tom Neltner said the map showed his neighborhood in the CSO area. He noted that his downspouts are piped to a pond in the back yard, yet his property shows up as having an illegal connection. Mr. Neltner also said several neighboring properties that have downspout connected to the sewer were identified incorrectly on the map.

Ms. Warnick said that this shows additional work needs to be done to verify the visual tests.

Glenn Pratt asked if the city would be field checking or just sending a letter. Ms. Warnick responded that the city plans to use the information from the meter readers to do smoke or dye testing. She is also anticipating that the township coordinators will do a second site visit to verify the findings.

Ms. Warnick also noted that the city is planning to provide training to plumbers and contractors. Also, meetings with neighborhood associations are planned. She noted that the city understands the importance of getting the neighborhood associations on board and that it is hoped that the neighborhood groups can be a strong ally. Ms. Warnick distributed a draft letter to neighborhood associations and asked the group to brainstorm on frequently asked questions that could be anticipated from the public.

Mr. Beranek pointed out that the pilot neighborhood is one that is already unhappy with respect to government and their taxes. He suggested going to the neighborhood association first.

Ms. Perras agreed that this was a good point and reviewed the overall approach to the pilot neighborhood outreach.

1. Telephone call to neighborhood association.
2. Follow up with the letter: the letter would include results from the neighborhood tests.
3. Distribute brochures and door hangers to each home in neighborhood.
4. The city would then co-host a meeting with neighborhood association to show Correct Connect video and show the results of the meter reader tests.
5. The residents would then have time to disconnect. This also serves as fair notice that

beginning in 2006, enforcement is planned. The enforcement would include legal notice given to property owners. The property owners would then have 60 days to disconnect or demonstrate that there is no illegal connection.

Pam Thevenow asked, "What happens if they don't disconnect?" Ms. Perras said that this question is what the committee is working on now – determining what happens if the homeowner doesn't or can't disconnect.

Merri Anderson asked if the brochures that were provided were a test run or the final, printed version. Ms. Perras reminded the committee they had looked at a draft of the brochure earlier. This is the final version and will be used in the campaign.

Ms. Anderson said that she feels if it is illegal, let's call it illegal. The city shouldn't wait until later to figure out how to punish you. She would not recommend that we let people wait until 2006, or they will.

Margie Smith-Simmons noted that the city wants to take time to educate the homeowners and community before the enforcement phase.

Mr. Neltner said that it is disturbing to see that there are errors in the downspout data pertaining to his street. He also said that as he reads the ordinance, he doesn't think that an existing connection in a combined sewer area is illegal. He asked if the city is actually targeting the sanitary sewer neighborhoods with this effort. He asked if there is a different brochure for combined neighborhoods.

Ms. Perras said that the city is trying to identify the pilot neighborhood now. She does agree that this is a message that needs to be tailored. She noted that Portland had a message that worked for both types of neighborhoods.

Mr. Neltner said that he heard Matt Senseny say that it is illegal to have roof drain connected to a combined sewer area. He did not agree with that interpretation. Mr. Neltner noted that he is all for disconnecting, but for a lot of homes in the combined sewer area, there is not enough room.

Ms. Perras said that these are all good points and why we want to have the enforcement policy in place before we roll out the program.

Mr. Neltner noted that the brochures are wrong if they are distributed in a combined sewer area. Vince Parker pointed out that the brochure says "these incorrect and <u>possibly</u> illegal connections."

Mr. Van Frank noted that you don't want to get bogged down in the exact terminology. He suggested that there aren't many that know the difference between a combined sewer and a separate sewer.

Ms. Perras said that the program team will review the materials based on this feedback, but she noted that the city was careful of these issues in developing the content.

Leon Bates suggested that they just say "sewer" without using sanitary or combined. This would allow the city to work with people on a one-by-one basis.

Ms. Perras also pointed out that the other thing is that the city doesn't want is for this effort to come to a screeching halt because councilors are getting calls about this program.

Mr. Neltner suggested the city simply say, "don't connect to sewer."

Mark Jacob noted that some connections to storm sewers are allowed and the average resident doesn't differentiate between sanitary and storm.

Mr. Pratt asked if we need to look at modifying the city ordinance to write it in such a way that says "where feasible," and where it can be done we make it part of the ordinance.

Ms. Perras responded that the city is trying to work on what they have, but it is a good point.

Mr. Van Frank said that thought that part of 308 said that the city had to adopt an ordinance to solve this problem. Or maybe it is part of the LTCP.

Rosemary Spalding said that the permit requires that the city review the ordinance and revise it to make sure that construction of new combined sewer is prohibited. Mr. Neltner asked if she could double-check the permit to see if it mentions downspouts specifically.

Ms. Thevenow described a neighborhood at 38th and Keystone that has no drainage and no sidewalks. She anticipates that there will be a lot of complaints if these residents are going to pour rainwater into the street. This will cause icy streets and other problems and it is going to be worse. She noted that if she lived there, she could understand doing her part to help the sewer but she would need to be convinced that this is not going to make the neighborhood's drainage issue worse.

Dr. Beranek noted that this just means that the water would get to the system faster.

Carlton Ray pointed out that there would be places where the city will need to install small diameter pipes across the pavement to tie in their sump pumps into storm sewers. He also noted that there are a number of places where folks can disconnect and send this to the backyard.

Dr. Beranek said that he thought people would take the connections into the street like they did in Butler-Tarkington. Mr. Ray said that it is illegal to discharge into the street. Dr. Beranek asked if this was being enforced. Mr. Ray said that the city did enforce this in a sanitary neighborhood on the east side that was causing icy streets.

Mr. Bates said that he thought what Ms. Thevenow was talking about at 38th and Keystone was a neighborhood without storm sewers where downspouts would just run into the street. Mr. Ray said that the benefit is that at least some of the water is percolating into the ground and delaying the time of travel.

Mr. Van Frank said that he feels like there needs to be judgment on where this is enforced first. The focus needs to be on areas where disconnection is possible and where the city will get more bang for the buck.

Ms. Thevenow agreed that the city could do a better job convincing people to do this in some areas.

Mr. Bates said that some of these areas on are septic and well water.

Ms. Perras thanked the group for their questions and encouraged the group to send additional questions or thoughts to her or Ms. Warnick.

4) FATS, OILS AND GREASE (FOG) PROGRAM

John Chavez, administrator of DPW's Office of Environmental Services, presented information on the city's new Fats, Oils and Grease (FOG) program and asked for the committee's feedback. Mr. Chavez noted that this is the first step of an outreach and enforcement program that is being developed by DPW, DMD, Marion County Health Department and others.

Mr. Chavez noted that the outreach program would educate food preparation facilities about these issues. Fats, oils and grease are causing routine maintenance and blockage problems.

The audience for the campaign includes restaurants, bars, grills, hospitals, and anyplace else that has a large kitchen that prepares food. The city also would like to build a partnership with the restaurant association. The presentation to this advisory committee is the first presentation to an outside group. Mr. Chavez is meeting with the Public Works Board in the next week to give them this same presentation.

The Problem - Why Fats, Oils and Grease are a Problem

- When Fats, Oils and Grease (FOG) are disposed of improperly they can cause sewer backups. Backups expose the city to costly environmental penalties.
- Fats, Oils and Grease washed down sinks and floor drains build up over time and eventually create clogs.
- Fats, Oils and Grease lead to increased costs for maintaining sewers and wastewater treatment plants and cleaning grease clogs out of private and public property.

The Requirements

- Indianapolis City Code States:
  - No person shall discharge or cause to be discharged to any city sewer wastewater or pollutants, which cause, threaten to cause or are capable of causing…obstruction to the flow in city sewers. Sec. 671-4 (c) (3)
  - No person shall discharge or cause to be discharged to any sewer…solid or viscous substances and/or other pollutants, which may cause obstruction to flow in a sewer…such as, but not limited to, grease. Sec. 671-4 (d) (6)
- Restaurants, hotels, hospitals, schools and other food establishments are required to install a grease interceptor in the waste line leading from plumbing fixtures or equipment where grease may be introduced to the sewer system. Sec. 671-4 (g)
- Grease interceptors must be properly sized and installed, according to state plumbing codes. Sec. 671-4 (g)

Mr. Chavez shared photos that illustrate the problem. He also shared a video clip that showed a FOG-clogged lateral after a main sewer cleaning.

Mr. Chavez noted that DPW has entered into a memorandum of understanding with DMD and the health department. DMD will distribute FOG requirement information to developers applying for a permit. MCHD inspectors will monitor whether grease traps are installed and maintained properly. DPW's Office of Environmental Services will be responsible for enforcement.

The Sources

- Fats, Oils and Grease are usually a byproduct of cooking and are found in such things as food scraps; meat fats; lard, oil, margarine or butter; baking goods; sauces; and dairy products
- Fats, Oils and Grease from food preparation establishments are a major source of these wastes in city sewers.

FOG and You – Why should FOG matter to you?

- Sewer backups and clogs attract insects and vermin and create health hazards for restaurant employees and customers.
- Sewer backups can result in property damage and health code violations.
- Clogged sewers can cause sewer overflows, which release untreated sewage into our rivers and streams.
- FOG is a valuable resource. When recycled rather than dumped down the drain, FOG can be sold to rendering companies for use in soaps, fertilizers and animal feeds.

Ms. Anderson asked about the grease bins that are found behind a strip mall and wondered where the grease goes.

Mr. Chavez responded that if it is put in those containers, it is likely that the establishment is selling the grease to a rendering company. OES inspectors have visited several locations to help meet stormwater permit requirements that require the city to make sure that those are maintained. MCHD inspectors will also help.

Improper disposal of FOG is costly at a time when Indianapolis can least afford it.

- Increased sewer backups and overflows lead to extra maintenance, repairs and treatment costs by the city.
- The cost of FOG-related maintenance and treatment imposes an extra financial burden on the City of Indianapolis, estimated at $631,000 per year for direct labor, equipment and disposal.
- Sewer overflows can lead to expensive environmental penalties against the city.
- Increased costs for the city means increased costs for all ratepayers.

Where are our problem areas?

- The City of Indianapolis monitors all areas for potential FOG problems. A map was provided to show areas susceptible to grease blockages that undergo extra preventative cleaning – at the expense of all ratepayers.

FOG Programs from other cities: *City of Bloomington*

- Grease Waste Management Program helps restaurants and food establishments in Monroe County to properly manage and dispose of grease waste.
- City tracks the cleaning/recycling schedule at restaurants and encourages employees to be trained in BMP's for handling grease waste.

Mr. Chavez noted that the MCHD looks at steam table temps and reviews whether the restaurant has a grease trap. He feels that the next step is to start verifying how often the trap is maintained and cleaned.

Mr. Van Frank asked if MCHD has the authority to ask how the trap is maintained and cleaned. Ms. Thevenow said that the inspectors can ask those questions but under state law cannot enforce requirements more stringent than state requirements.

Mr. Chavez noted that the MOU provides that MCHD will inspect the grease interceptors. The MCHD inspectors can alert us to problems and we can go out and investigate further and do something about it, he said.

Mr. Pratt asked why there would be a need to re-inspect. Ms. Thevenow responded that DPW would need its own evidence.

FOG Programs from other cities: *City of St. Louis*

- Works with local health departments to help conduct grease inspections at restaurants during regular health inspections.
- Since 1996, the city has experienced a 60 percent reduction in FOG-related blockages.

Ms. Thevenow asked what would be done for education and training for new restaurants. Mr. Chavez responded that DMD is taking care of that piece.

FOG Programs from other cities: *City of Los Angeles*

- LA developed an English-Spanish poster and other materials to educate food service workers and restaurant owners about proper FOG disposal.

Best Management Practices:

- The Marion County Health Department has developed Best Management Practices (BMP's) for the operation and maintenance of grease traps and grease interceptors. These BMP's require:
    - Monitoring grease traps at least twice weekly and cleaning them when FOG reaches 20 percent of the grease trap depth. Monitoring grease interceptors at least weekly and cleaning them at least once every three months.
    - Disposing of waste cooking oil (deep fryer oil) through an established recycling company and never down the drain.
- "Dry wiping' pots, pans and dishware prior to dish washing to minimize the discharge of FOG and solids.
- Disposing of food wastes by solid waste removal or recycling rather than using garbage disposals.
- Verifying all grease interceptors cleaning and maintenance activities by a manager or supervisor to ensure that the device is operating properly.
- Keeping a log of maintenance activities to help demonstrate compliance with the use of best management practices.

The city's inspections of Indianapolis restaurants have found these to be the most frequent grease management problems:

- Lack of cleaning grease traps/interceptors
- Lack of regular maintenance of grease traps/interceptors
- Disposing of grease down a drain

- Using enzymes to break up clogged lines, thus moving the problem downstream into the sewer.

City's FOG blockage enforcement policy:

- First blockage: A field citation with date for compliance. We focus on educating establishment about FOG requirements.
- Second occurrence in a 12-month period: Notice of violation issued with no less than $500 penalty plus assessment of the city's costs of removing the blockage.
- Third occurrence in a 12-month period: Notice of violation, no less than $2,500 penalty, plus cost of removing the blockage. Notification that future occurrences will result in termination of service.
- Fourth Occurrence in a 12-month period: Notice of violation, penalty of no less than $2,500, cost of removing the blockage, termination of service.
    - (Authorized in Sec. 671-16 (a), 671-11 and 671-52)

Working Together with Other Organizations

- Our goal is to have restaurants in compliance with these requirements so that enforcement is not necessary.
- We'd like a partnership with the business community to promote better compliance and reduce sewer clogs and backups. Ideas include:
    - Co-produce training and education materials and workshops.
    - Attend annual association meetings as presenter and exhibitor
    - Develop awards program to recognize restaurants who have exemplary programs for managing fats, oils and grease
    - Develop fair and equitable fee structure for food preparation facilities
    - Further develop best management practices.

DISCUSSION AND QUESTIONS

Dr. Beranek asked if a restaurant pours grease down the drain, does it go to a grease trap? Mr. Chavez responded that it depends, because some of the floor drains don't have to have a grease trap. Sometimes things get switched around. Other times the hot water is pushing the FOG though.

Mr. Chavez also noted that many restaurants buy enzymes to clean their lines. These enzymes can move it out into our collection system.

Mr. Neltner said that if the enzymes were truly digesting oil, then it wouldn't separate later on. But it doesn't work. Mr. Pratt asked if there would need to be a change in the city ordinance for prohibition of enzymes.

Tricia Banta asked what the difference is between traps and interceptors. Mr. Chavez said that the terms are used interchangeably.

Don Murray asked if the traps are designed so the restaurant owners can get them open. Mr. Bates said that anyone could get them open with a wrench. Mr. Chavez said that sometimes the restaurants change the landscaping or pave over an interceptor. The bigger interceptors are generally outside.

Mr. Chavez said that they had reviewed the enforcement policy and put together a citation that has the BMPs on the back.

Ms. Thevenow asked how service is terminated. Ms. Perras noted that the slide needs to be updated to indicate that it is termination of water service.

Mr. Neltner said that the city instead should work with MCHD to pull the restaurant license. Ms. Thevenow said MCHD does not have authority to do enforcement on grease traps. The trap is required by plumbing code, not food code. The only thing that the state code has is that grease traps, if available, must be accessible for inspection.

Mr. Van Frank asked how the city could determine which restaurant caused the block if you have several going into same line. Mr. Chavez said that the city would look at maintenance records on interceptors. If the restaurant can't demonstrate maintenance of grease trap, the cost will be split among the restaurants. If the restaurant can verify that they are maintaining and disposing of grease, they will not be penalized.

Mr. Chavez noted that there are some challenging areas. For instance, Circle Center Mall has 40 restaurants with one lateral. Mr. Neltner asked if they each have grease traps. Mr. Chavez responded that it depends.

Mr. Neltner said that it seems that the MCHD finds someone and those same places might have other problems. He asked if the city couldn't deputize the MCHD and bring this into their purview. Ms. Thevenow said that it is impossible for the county to have a more stringent health code than the state. This was specifically about the food code.

Mr. Neltner said that there is room for significant efficiencies here. Ms. Thevenow said that the health inspectors are out to the restaurants more frequently so it can be somewhat more efficient. Mr. Neltner said that he understands the screening part. But notes that it might make sense for the repeat violation.

Mr. Chavez said that it goes back to knowing that we have blockage so DPW can be dispatched to fix this. Mr. Neltner said that this only leads him to the issue of having two inspectors (MCHD and DPW) come out to inspect different issues.

Ms. Anderson asked about the 12-month enforcement window, noting that there are issues with the zoning code enforcement for DMD because if someone is cited then they cannot be cited again for a 12-month period. Mr. Chavez responded that it is a rolling 12-month period.

Ms. Anderson said that the other question is that you mentioned hospitals and others with big kitchens. She said that she keeps telling Pat Carroll about a place where there is a blockage. There is a big senior center where they are making lunch every day and this might be contributing to the problem.

Mr. Carroll said that just like with the Correct Connect program, this is not done overnight. There is a lot that we need to do to educate folks.

Mr. Chavez said that the city has also looked at nursing homes. The big hospitals in town are not an issue generally. But they are all on the radar screen.

Ms. Anderson asked about the fees referred to in the presentation. Mr. Chavez responded that the city is looking into that. In the ordinance, there is no surcharge for grease. Other communities charge a grease surcharge. We are looking at how to equitably distribute such a fee, he said. This is a recommendation that will be worked out later this year.

Mr. Neltner asked if it would be possible to cross-reference those who have restaurant permits and those who have grease interceptors. Ms. Perras noted that the MCHD inspectors are out twice a year, so we are confident this will take care of it.

Mr. Bates said that there is one business we need to add -- car washes. He talked about a commercial drain cleaner who would dump the container down the car wash. Mr. Chavez said that he was aware of that particular case and that the drain cleaner had paid for the penalty and the cleanup.

Mr. Bates also noted that there is a product that can be purchased that you spray on the engine to clean the engine off and then the grease and oils goes down the drain. Mr. Chavez agreed that the city needs to look at this, but this will be phase two.

Ms. Perras noted that the city would also be reaching out to residents in the next year or two on this issue.

Mr. Kupke asked if this was an issue at the treatment plant or if it is primarily a collection system problem. Mr. Chavez responded that it is primarily a collection system problem.

Mr. Kupke asked if the city was trying to benchmark or quantify this so they can monitor progress as the program is implemented. Mr. Chavez noted that Mario Mazza is putting together performance matrix. In 1999, United Water sampled 600 different facilities and quantified BOD and suspended solid load. He said that it clearly demonstrated that food preparation facilities cause grease problems.

Vince Parker noted that the photo in the second slide should be substituted with a new photo or the person should be cropped out.

Mr. Chavez noted that he will be presenting to the Public Works Board next week and will be making a presentation to health and hospital board. There are also food tradeshows. Most importantly, the city will meet with chamber and restaurant association in the near future.

5) SANITARY SEWER MASTER PLAN

Ms. Perras introduced Tricia Banta and Mr. Ray to give an overview of the sanitary sewer master plan (SSMP). The committee would be asked for feedback on the SSMP.

Mr. Ray said he understands that the committee has been very involved with the CSO issue and he wanted to brief them on the sanitary issues the city is also working on. He pointed out that the city has 3,000 miles of sewer and a large percentage of the sewers are not combined sewers but actually separated sewers. The city hired HNTB in 2000 to research West Marion County. Then other areas of the city were researched as well. Jim Ku was the project manager and Mr. Kupke oversaw the work. Ms. Banta served as the project manager for DPW.

The city's goals were to look at where we had capacity issues and to understand how sanitary sewers impacted combined sewers. They looked at population growth and previous work by Dr. Roper, HNTB and CDM. The also wanted to ensure that everyone was working with each other and to look at the costs of infrastructure needs. This is a macro level plan for the separated area. Facility planning will follow to provide more detail.

Ms. Banta noted that the master plan, from a project engineer's perspective, is a great tool for engineers and a great beginning place.

Mr. Ray turned the presentation over to Mr. Kupke and Jim Ku and asked that questions be held until the end of the presentation.

Mr. Kupke said that he wanted to go back to the point where this effort began. He pointed out a 1946 Moore and Owens report. This talks about master planning and talks about roof drains. The next major sewer study occurred in the late 1970s and was the forerunner for the IMAGIS geographic information system mapping. There have been spots with some very in-depth sewer evaluations as well. This is the first time since the 1970s that the city has looked at this comprehensively.

Introduction

- Why Perform a Sanitary Sewer Master Plan?
    - Macro Level Planning
    - Consistent with CMOM (Capacity Management, Operations, and Maintenance)
    - Incorporate County Growth into Planning
    - Integration of Combined Sewer and Sanitary Sewer Needs

The purpose of the plan was to evaluate current and future sanitary sewer interceptor needs in Marion County.

The scope included:

- Analyze existing interceptor capacities (18 inches +)
- Estimate future flows from unsewered and undeveloped areas
- Identify interceptor needs and alternatives (current and future)
- Recommend a plan to provide adequate sanitary sewer service to all Marion County for both current and future build-out conditions

Mr. Kupke reviewed the map that showed the areas that were part of the study.

The methodology involved evaluating existing interceptor capacities during both dry and wet weather. This included:

- Reviewing maps, as-build drawings, populations projections, rainfall data, water usage, and sewer system flow data
- Determining Current And Future Interceptor Needs
- Evaluating Relief Sewer Alternatives
- Estimating Costs
- Prioritizing Projects

Sewer Capacity Analysis

- Data from 33 flow meters
- Capacity calculation
    - Sewer size, length, slope, and material used in construction.
    - Sewer information obtained from IMAGIS and record drawings.
- Compare actual flow vs. capacity calculation to identify surpluses and limitations

Mr. Kupke reviewed the sanitary sewer flow components and an illustration of how the city evaluated future flow. He also reviewed the definitions of "capacity surplus" or "limitation" under a dry and wet weather flow situation.

The study reviewed currently unsewered and undeveloped areas as well as the land use plan using 1990s data.

To provide an example, Mr. Kupke reviewed the study of north Marion County. This included an overview of existing interceptors in the northern section of the county and a future interceptor capacity assessment. As a result of this study, HNTB identified several **proposed interceptor projects for the north Marion County area.**

Projects identified in the plan also were prioritized based upon the following criteria:

- Magnitude of sewer needs
- Type of sewer needs (dry or wet weather)
- Known problems
- CSO control needs
- Development needs
- Barrett Law Master Plan projects

Proposed Priority 1 projects have a total estimated cost of $370 million, in 2003 dollars. Proposed Priority 2 projects have a total estimated cost of $280 million, in 2003 dollars.

Project Planning and Scheduling

- Facility planning is recommended for all proposed projects
- Project schedule is subject to change due to:
    - Growth trends
    - Regulatory Requirements
    - Funding
    - Facility Planning/modeling efforts
    - Infiltration/Inflow removal efforts (Correct Connect program)

Conclusion/Next Steps

- SSMP has helped city better understand its current sewer system and future needs
- Need to coordinate with DMD/City-County Council to incorporate into Comprehensive Plan.
- Need to coordinate with other governmental agencies
- Add proposed projects into Capital Improvement Program
- Update Master Plan every 5 years

QUESTIONS AND COMMENTS

Mr. Van Frank asked if this is completely outside of LTCP. Mr. Kupke responded that it is. The SSMP was initiated several years ago and should give an added level of comfort as the city looks at the LTCP and other needs. "We really couldn't understand what was in the outer area until these studies were complete," he said.

Mr. Ray said that the city did incorporate the SSMP data into the LTCP for sizing tunnels. "We take this study into account with the LTCP and vice versa," he said.

Mr. Van Frank said that it is $1 billion or something to carry out the LTCP and asked if this is money on top of that? Mr. Kupke responded that it is.

Mr. Pratt asked why the city didn't include this amount in the money you are committing to EPA that will be spent. Mr. Ray said that the city's financial capability analysis includes the SSMP with the other costs that will be faced by the city over the next 20 years.

Mr. Pratt said that as you talk to ratepayers, this is more money that needs to be spent.

Ms. Anderson asked whether or not this includes areas outside of Speedway sewers. The yellow area is out of Speedway as well. It includes Chapel Hill, Farley, and Ben Davis High School.

Mr. Neltner asked if this deals with out-of-county flows. Jim Parks said that Greenwood is the largest outside customer, followed by Lawrence, Beech Grove and other small utilities such as Hamilton Southeastern and Boone County. There is also a Tri-County area on the southwest area.

Mr. Ray noted that the city has recently learned that a Shelby County conservancy district wants to place a package treatment plant inside Marion County. The city expressed disinterest in having another treatment plant in our county. Potentially they may be awarded a conservancy district but wouldn't be allowed to zone any property. It is currently murky right now. Potentially, the flow could go to Southport. We would probably not want to serve outside of Marion County at this time, he said.

Mr. Neltner said that when Greta Hawvermale was DPW director she set a policy to not add any new contracts. Mr. Ray said that was true, but contracts were already in place with Greenwood. Mayor Goldsmith wanted to go out and aggressively add out-of-county customers.

Mr. Neltner asked if the moratorium on new contracts is still in place. Mr. Kupke said that it was assumed in the SSMP development.

Mr. Ray said that one of the reasons we have two regional treatment plants is that people have a hard time maintaining package plants and there is little oversight to them.

Mr. Van Frank asked if the city is taking sewage from southern Boone. Mr. Ray said that we are taking 600,000 gallons.

Mr. Van Frank noted that his favorite interceptor was on the map (Castleton interceptor). He wants to know when they will start work. Mr. Ray said that it is in the city's CIP for the next 5 years. "It is one of our big projects. We already have it designed," he said.

Mr. Pratt said that he thinks the presentation answers a lot of concerns and questions.

Mr. Ray said that our goal is not to have burps in the system. This is a macro level plan. Facility planning will include more detailed modeling in each watershed.

Tricia Banta said that sanitary sewer improvements are also planned on the east, west and south. Most of the improvements are outside of the combined sewer area and will not go through the CSO area.

6) ADJOURN

Mr. Van Frank said that in the mayor's hit list following the Indy Works announcement, he lists a number of things that he has committed to doing in the LTCP, including street sweeping, leaf collection, Tox Away Days, etc.

Mr. Pratt also asked when the city is going to raise the sewer rates.

Mr. Ray said that the potential Indy Works cuts are all options that are on the table to look at.

Ms. Perras adjourned the meeting at 6:30 p.m..

Remaining 2005 Meeting Dates (third Wednesday, 4:30—6:30 p.m.)

- May 18
- July 20
- September 21
- November 16

Revised Minutes

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Meeting Date: 05/18/05

Time: 4:30 to 6:30 p.m.

Location: Clean Stream Team Office Training Room
151 N. Delaware, 9th Floor

Purpose: Clean Stream Team Advisory Committee Meeting

Attendees: Bruce Doughten, Donnie Ginn, John Trypus, Leon Bates, Ralph Roper, Don Murray, John Kupke, Glenn Pratt, Margie Smith-Simmons, Imelda Oglesby, Jodi Perras, Carlton Ray, Dave Voelker, Bob Mausbaum, Pat Carroll, Pam Thevenow, Tim Method, Rosemary Spalding, Phyllis Zimmerman, Ken Coad, Mike Massonne, Mark Jacob, Merri Anderson, Bill Grout, David Egger, Mike Logan, Deana Haworth

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1) WELCOME AND INTRODUCTIONS
Jodi Perras called the meeting to order. Introductions were made.

Ms. Perras introduced Tim Method, the new coordinator of environmental compliance for DPW. Mr. Method noted that he was there to observe the meeting, although he would not be working on the CSO issues directly for some time. He will be working with all of the city's environmental programs and part of his job is to help coordinate city activities on wastewater, brownfields and other areas.

Ms. Perras noted that Jim Garrard would not be able to attend the meeting and that he sends his apologies to the group.

Ms. Perras noted that quite a bit of time would be spent in the meeting reviewing the preliminary study the city was conducting on the Fall Creek/White River Tunnel Evaluation Study. She wants to get the committee's input on the study and the city's plans to introduce the project to the public.

2) REVIEW MINUTES OF MARCH 16, 2005 MEETING
Ms. Perras asked for additions, corrections and changes to the March 16 Clean Stream Team Advisory Committee minutes. With no corrections or changes noted, the minutes were accepted as an accurate reflection of the meeting.

Ms. Perras noted that the meeting packets included a fact sheet on the Pogues Run project, a very prominent DPW project taking place just east of downtown. It is a very noticeable project since the construction has blocked several lanes of traffic on New York Street. She also distributed photos of the Clean Stream Team project signage at the construction site. This information is provided to the committee to illustrate another way the outreach team is trying to let the public know about current projects.

Ms. Perras also pointed out that "Join The Team" pledge cards were included in the packet as well. Committee members were invited to fill out the pledge to become members of the Clean Stream Team. Once pledge forms are submitted, attendees could receive a bumper sticker or window cling. She also noted that pledge forms could be made available if committee members were interested in distributing the forms to members of their organizations.

COMMITTEE INPUT
3) LTCP & UAA UPDATE

Ms. Perras noted that there was not a lot of activity on the Long Term Control Plan (LTCP) or the Use Attainability Analysis (UAA) since the last advisory committee meeting. Rosemary Spalding was asked to give the committee an update on activities. She shared that the city had submitted requested information to IDEM on existing use demonstration in regards to the Use Attainability Analysis. EPA and IDEM had made comments and changes were made and information was resubmitted. She mentioned that the city was hoping for a decision on the information by the meeting today, but the information was not available to date. She noted that a decision on existing use is necessary before the city can proceed with a UAA.

Ms. Spalding also said that the city was in the process of providing information to EPA on the LTCP financial capability analysis. The agencies have asked for several sets of information. She noted that the city is hoping that the next meeting with EPA and IDEM will allow them to finalize and get approval of financial capability analysis. This information will be shared with the committee at next meeting.

Glenn Pratt asked why the committee was not getting briefings more frequently and in advance. He noted that at a previous meeting, the city had admitted to the consent decree negotiations when asked by committee members. He feels that the committee is frequently informed of decisions after the fact, instead of being allowed to participate in a dialog with the city.

Ms. Spalding said that the goal of the committee is to get input on technical and policy matters. In some cases, the city does request input from the committee before the fact. For instance, they were asked to weigh in on the existing use submission. The consent decree, however, was something that the city was reluctant to share with the committee because it was something that the city really didn't want because they felt it was neither warranted or necessary. Further, she pointed out, it is not appropriate to negotiate a consent decree with the involvement of the public.

Mr. Pratt said that another example of his frustration was that the committee was asked to review and provide feedback on a brochure that was already printed. He noted that the committee could have proposed major changes to the brochure and nothing could have been done at that point. He understands some of Ms. Spalding's concerns and is okay with reviewing information in generalities if necessary. He said that he feels frustrated by this.

Ms. Spalding noted that the consent decree being negotiated was an implementation consent decree. The CSTAC has been in involved in the LTCP. This consent decree will ensure that the LTCP is implemented. The consent decree has no technical or policy aspects to it.

Mr. Pratt said that he has a philosophical difference with percent removal versus design criteria. He feels that the city should try to get EPA to accept design criteria. It seems like Indiana is being treated differently.

Ms. Perras assured Mr. Pratt that his concerns were noted. She said that in some cases there are things that the city does not share with the committee in advance. At other times the city shares a lot of information in advance.

Merri Anderson said that she does want to know if they are asked to review things after the fact. She doesn't like getting information in advance for some things, but not for other things. She wants to be able to represent the feelings of the community in how tax dollars and resources are being spent.

Leon Bates said that he agrees that sometimes the committee doesn't get the information they should when we should get it.

Ms. Spalding said that she feels it is a matter of perspective. Internally, there has been an effort to always ask if this is something that needs to be brought in front of committee. She noted that two items on the agenda for today's meeting are early in development. She also suggested that it is sometimes a matter of timing. Where necessary, the city has scheduled meetings more frequently so the committee can be involved.

Ms. Perras said that after the newsletter issue last year, Mr. Garrard said that he had heard the committee's concern and urged his staff and the team to try to share more information with the CSTAC in advance and in the development stages. However, there are times when the city is not ready to share things. Specifically, the financial info is something that the EPA is still asking basic questions about and the city doesn't want to present information to the committee that could change significantly. She agreed to pass the committee's concerns along to Jim.

Mr. Pratt said that he feels that in the past, the Advanced Wastewater Treatment Committee has had a much better relationship and has had major input and made a significant difference. However, he still believes that unlike the AWT Committee, this committee has not been allowed to significantly participate in the deliberative process, rather it has been much more of a show-and-tell participation (gets the sense that there are some issues where the committee is not really participating). He said that he believed the problem started when the Technical Wet Weather Advisory Committee was combined with the more general Mayor's Raw Sewage Committee, and the AWT-type technical focus was removed.

John Kupke said that he is not sure what all the issues are that are being discussed, but he is sensing that the components of the program that the committee has spent a lot of time on are remaining in place. He would be concerned if there were major changes in what they had weighed in on, but does not feel that this is the case.

Ms. Perras said that there had unfortunately not been a lot of activity between city and EPA/IDEM in the past few months. If there were a lot of activity, it would be different.

4.) UPDATE ON SANITARY SEWER DESIGN STANDARDS

Ms. Perras introduced Bill Grout from the DPW Engineering Division to give the committee an update on the sanitary sewer design standards.

Mr. Grout noted that there are design, administrative and construction guidelines for sanitary sewers and that there are is both an ordinance and standards.

He said that the latest version of standards were developed in 1989 and that there have been breakthroughs in technology and regulations during that time. The document needs to be updated to reflect these advances. He is working on a complete and total overhaul of standards and a partial overhaul of city's ordinance.

He said that he has set up two work groups to review these issues. One is an internal group made up of city people who are interested in the issue. Committee members include representatives from DMD, DPW and other city departments. They are currently going through the standards a section at a time to determine wants, needs and requirements for changes. Then, the document is sent out to an external work group, composed of builders, contractors, neighborhood groups, utilities, Concerned Clergy and Marion County Health and Hospital. The external group goes through the document a section at a time and makes comments as necessary. At this point, they are approximately halfway finished.

In updating the design standards and permit requirements, they are creating paper trails for the permitting process that do not exist now. He anticipates having a final draft within 60 days. A comment period will follow and Mr. Grout estimates that the work will be complete by the end of the year.

Soon, Mr. Grout hopes to have fee information to pass on to stakeholders for review.

Mr. Pratt feels that this is an area where significant progress is being made and that this is very positive for the city.

Carlton Ray noted that he feels Mr. Grout has done a good job at coordinating this effort. He has also worked on the development of a SCADA system.

Mr. Kupke asked if the city was considering increased fees for development and sewer availability.

Mr. Grout said that increased fees were being considered and that even the developers were anticipating paying quite a bit more.

Mr. Kupke said that he felt it was a good thing to bring the costs more in line with where they should be.

Ms. Anderson said that she didn't realize that there were so many variances toward these permits and the permit process before she became involved in the group. She also said that she was able to better understand appeals. She appreciates the fact that a lot of the information is being documented and institutionalized so the city can justify decisions that are being made. It has been a good process for her to participate in.

Mr. Grout said once adopted and implemented, the new guidelines will overhaul how permits are issued to meet these new requirements.

5.) WHITE RIVER/FALL CREEK TUNNEL PRELIMINARY STUDY

Ms. Perras introduced Mr. Ray to discuss the Fall Creek/White River Tunnel Evaluation Study. She noted that the purpose of the presentation was to answer the committee's questions about the tunnel itself, but also to receive input on how this project would be introduced to the public and to review ideas for some public meetings that are coming up.

Mr. Ray said that the presentation to the committee today would review the preliminary plan and facility planning on the tunnel that will be constructed parallel to White River. This plan also includes a pumping station near the Belmont treatment plant. This is a 10-15 year process, but the city wanted to get their hands around it by conducting this preliminary study. He noted that Bruce Dalton from the U.S. Army Corps of Engineers has been a great project manager for the project. The federal government pays for a portion of the project and the city provides matching funds, which allows the city to receive funding from the federal government. Mr. Ray feels that they have a good working relationship with the Corps and that they are very good about communicating possible issues.

Mr. Ray introduced the consultant team of Black & Veatch and G.E.C. He noted that the project is in the preliminary stages and there will be a lot more in-depth analysis and engineering to get the final locations, which are years away. This is a long process and an expensive job.

Mr. Ray introduced Donnie Ginn of Black & Veatch.

Mr. Ginn overviewed graphics posted around the room. He announced that there would be an opportunity after the meeting to review them. One display showed the alignment for the tunnel spine. Another board showed an aerial photograph of city with the I-465 loop and illustrated how the tunnel related to the overall city. Another graphic showed public and private well locations. Another display showed three tunnel alignments than were considered for the project.

Mr. Ginn introduced David Egger to present the technical part of project. Mr. Egger said he is a civil engineer by training and has been with Black & Veatch for 24 years. His current role is to help plan and design underground projects. He noted that there is a huge interest in underground works like these nationally. As our cities have grown and aged, it is now necessary to come back and fix them. He also noted that we are pushed to look at underground solutions in this day and age because there is little or no room above ground for the kinds of facilities we need to build.

Mr. Egger gave an overview of his presentation. He also introduced the project team members, some of whom were in attendance.

Project team members include:
- Department of Public Works – Engineering
- Department of Public Works – Operations
- Department of Public Works – Environmental Services
- U.S. Army Corps of Engineers – Louisville District
- Indianapolis Clean Stream Team
- Department of Parks and Recreation – Greenways
- Indianapolis DMD Planning Division
- Veolia Water Indianapolis
- Indianapolis Water
- United Water
- Black & Veatch and G.E.C., Inc.

He also reviewed the scope of work for preliminary evaluation study. The project will be done in phases, which include:
- Preliminary Study (current phase)
- Initial Geotechnical Exploration Program
- Facility Planning
- Detailed Design

- Bid Phase/Contract Award
- Construction

He noted that this is a 10-15 year overall schedule.

Ms. Perras asked if there were any questions on the scope of the study.

Ms. Spalding noted that Pam Thevenow, Bill Beranek and Ms. Spalding participate in Marion County Wellfield Education Board. They are very interested in this project and are happy that the CSTAC is involved in this. The board might want to get some info directly from them in the future.

Mr. Pratt noted that this is one area that Carlton Curry was originally concerned about and he feels that this needs to be a particular focus. Indianapolis has over 30% of people on private wells and Mr. Pratt feels that there needs to be a focus to find out where the private wells in the area are. He knows of no other city where nearly 1/3 of the community is on private wells.

Ms. Anderson asked what exactly is the scope of the study.

Mr. Egger said that there are a couple of activities that might be added. Their involvement would not end until the study is done. The study began in August 2004 and is expected to last for 10 months. There are 2-3 more months remaining. They are shooting for a 15% level of design.

Mr. Egger returned to the presentation and quickly reviewed a diagram that shows how a CSO works. He also reviewed an illustration that shows how a deep tunnel system works. He noted that there are two options during a wet weather event: treatment or diversion to tunnel storage and then treatment. Most cities like Indianapolis are beginning to look more and more at deep tunnels as a solution. Chicago has been working with tunnels since late 1970s. Minneapolis has used them as well. As a part of LTCP, this could be competitive as part of overall solution.

Mr. Egger noted that should the geology in Indianapolis be different, we wouldn't have to be so deep. But in this case, if the tunnel were to be less deep, it could cost as much as two times more per foot.

Mr. Egger explained how a tunnel would work. He said that in a rain situation, the sewer pipes are full and water is diverted to what is essentially a big bucket underground. The water goes to the storage tunnel through a series of drop shafts.

In Indianapolis, there are 60-70 events per year that cause overflows. When an event passes, pumps are turned on to pump the stored water to wastewater treatment plants.

He reviewed a some important terms for the committee.

- Storage tunnel or working tunnel
- Retrieval Shaft: Found at the upper end of the tunnel and used to retrieve the tunnel boring machine and other equipment. The city hasn't yet determined how many pieces the tunnel will be broken up to during construction. It is ambitious to build it all in one big bite.
- Consolidation sewer: Used to collect as many overflows as we can and drop them into the deep tunnel. Might be open cut sewers or a small near-surface tunnel. There are a lot of decisions that need to be made there.

- Connection tunnel: Used in some cases to connect the tunnel to a remote area we need to collect water from.
- Drop shaft: Used to direct water down to the deep tunnel. It is important not to get a lot of air in the water at that point.

Mr. Egger noted that the city is building a tunnel at Pogues Run right now. It is sort of like a consolidation tunnel but it is being built in the soft ground.

Mr. Egger noted that this is a project that will be reviewed on a national scale. It will cost hundreds of millions of dollars. It is important for its impact on economy and its footprint as well.

Mr. Egger reviewed the decision-making criteria that the city is using in the project.

- Impacts to water supply
- Geotechnical risk
- Underground easement acquisition
- Population impacts
- Environmental contamination
- Tunnel/sewer flexibility
- Operations and maintenance

Mr. Egger also reviewed the geology and hydrogeology of the area. He noted that the bedrock in this area is tilted and sloping to the southwest. It drops 50 feet for every mile. The other thing that is unique to this area is the karst features of the bedrock, influenced by groundwater over time. There could be fractures and solution cavities that reach down from upper material some distance into the rock. This is not uncommon in the Midwest. He also noted that there is a bit of shale at the southern end of the county. This is where you find oil, methane gases. Building a shaft and tunnel through this material needs to be done with care.

There is also the overburden, comprised of sands and gravel. There is an aquifer right in the center of the community. It is there because a glacier left a deep cut in our bedrock. In laying the tunnel, we want to set depth the carefully. He noted that this is a blessing from a water supply standpoint but needs to be addressed in tunnel planning, design, construction and operation.

Mr. Egger then reviewed tunneling technology. There have been many advancements made in recent years. Tunneling is now possible for hard ground or soft ground. There are hard rock machines that can now handle hard pressure water coming in at them, which is a cutting edge technology. On the soft ground side, there are advances too.

There has been some discussion of tunneling under the wellfield. The city has talked with local water providers about this and the water providers joined the group on a tour so they could understand how a project like this can be approached.

There are two kinds of goals in a project like this. Short term, or during construction, when you don't want to disrupt the water supply. This is achieved through construction methods and outreach to those that operate wellfields. They must always think about the fact that water is moving and so water that is contaminated could be moved outside of the area. There are also long-term goals, of where we want this project to be in 100 years. These goals focus more on infiltration (no leaks) and exfiltration.

Mr. Egger reviewed the groundwater monitoring plan, which provides an outline of what should happen from planning through construction. He noted that regional cooperation is important, as is developing some models of groundwater.

The plan includes:

- Goals of the groundwater monitoring plan
- Regional cooperation to monitor groundwater level and quality before construction
- Develop predictive models as tools
- Develop instrumentation and control specifications
- Map geology during construction
- Monitor the drawdown and recovery of groundwater level

Mr. Egger also reviewed plans to protect the groundwater and water supply.

- Structural controls during contruction
  - Short-term: pre-excavation and cut-off grouting
  - Long-term: contact grouting and permanent concrete liner

- Operational controls after construction
  - Controlling exfiltration
    - Limit tunnel fill level and duration of storage
    - Minimize or prevent surges, backflows and rapid pressure changes

Ms. Perras asked for questions on the groundwater and water supply topics.

Mr. Pratt asked who was taken on the tour from the water company. Mr. Egger responded that it was Brad Spinler.

Mr. Pratt suggested that they consider taking Mr. Curry on the tour. Mr. Ray said that the city was willing to do whatever they need to do. He also noted that Mr. Curry had been involved from the beginning. Mr. Pratt responded that when you look at the issue politically, he feels that Mr. Curry is one of the ones who has the potential to have the biggest problem with this project.

Ms. Anderson said that she does have an interest in hydrology and geology. She also asked when they are talking about running the tunnel to the plant, do they worry about the other parts of Marion County? Mr. Ray responded that the tunnel will stop at the Belmont plant. Its contents will be pumped into the interplant connection to get it to Southport.

Ms. Anderson asked if they would deliberately put the tunnel below the wellfields. Mr. Egger promised to address this later in the presentation.

Dr. Ralph Roper asked, regarding exfiltration, will the tunnel fill level be limited, or is it simply the total volume of the tunnel?

Mr. Egger said that the volume of the tunnel and its fill level does not count the shaft. They don't want to create a hydraulic constraint or surcharge in the tunnel. Therefore, there would be a limit of flow into the drop shaft, controlled through an emergency outfall. However, it is hard to prevent water from accumulating in the shaft during a wet weather event.

Don Murray asked if they would tunnel through shale. Mr. Egger said that this was very likely with the tunnel on the southern end.

Mr. Murray asked as they get into design criteria, how is it modified by the fact that we are in an earthquake zone and what is the danger of it fracturing? Mr. Egger noted that this is a major design criteria that can be addressed in the modeling and design so they would have the proper loading and reinforcement.

Mr. Kupke asked what are the community impacts from dropshafts and the tunnel, etc. Mr. Egger responded that the citizens would not likely know the tunnel construction is there if they are far from the drop shaft. At each shaft site, Black & Veatch typically has a mini public outreach process. Between the shafts, it is unusual for them to notice construction noise, but not unprecedented. Some have noticed a vibration in their basement.

Mr. Kupke said that these are the issues that can be expected during construction, but he was wondering about issues after construction or the long-term aspect. Mr. Egger said that the only real long-term issue is odor control.

Ms. Anderson asked for him to explain a little more about the earthquake planning. Mr. Egger said that there might be angled borings to see if any of the faults can be detected. They will build a model and do various scenarios with different modeling on the shaft.

Mr. Bates asked if you dig that tunnel long enough as one single tunnel, what stops it from cracking?

Mr. Egger said that this is a common misunderstanding and that the best place to be in an earthquake is in the bedrock, unless you are on a fault line. If you are at a fault, there are practices where you chamber out and oversize the tunnel and allow it to move. You need to be worried more at the soil/rock interface during an earthquake.

Mr. Egger also reviewed the tunnel components:
- Tunnel size, length and diameter
- Alignments to capture CSOs from 43 outfalls (27 along Fall Creek, 16 along White River)
- Working and retrieval shafts
- Consolidation sewers/drop shafts

He also provided specific information on the tunnel:
- Preliminary sized for 95% (189.5 MG) or 97% (310 MG) capture of CSO
- Three alternatives evaluated: west, central and east
- Length varies from 7.5-10 miles
- Diameter varies based on length and capture percentage; finished diameter ranges from 26-35 feet
- Expandable design for 99% (504 MG) capture
    - Unprecedented diameter for alignments evaluated (45 feet finished)
    - Design of “extension” shafts for future tunnel expansion

Mr. Egger presented a map that shows the three tunnel alignments that were evaluated.

He also provided an overview of the consolidation sewers and drop shafts:
- Sized for 99% CSO capture
- Consolidation sewers:
    - Used to group CSO outfalls
    - Direct flows to tunnel drop shafts

  - Cost savings over tunneling
  - Open-cut sewer construction
- Drop shafts:
  - Transfer CSO from consolidation sewers into tunnel

Mr. Egger also reviewed the working shaft alternatives as well as retrieval shaft alternatives.

He then addressed the recommended next steps on the project:
- Public meeting on preliminary study
- Geotechnical exploration program
- Land acquisition study
- Environmental site assessment
- Groundwater monitoring plan
- Continued public outreach and stakeholder involvement

Ms. Perras opened the floor for questions.

Dr. Roper asked whether the project's scope of work include a sanity check on the tunnel component of the program cost? Mr. Egger said that the project does include review of the tunnel cost estimates.

Mr. Pratt said that it concerns him that the 99% capture is still out there. He feels that this is not worth talking about unless EPA is requiring it.

Mr. Ray said that the city felt like they had to run the numbers on that option. On the consolidation or drop shaft, the city might go ahead and oversize now so we don't have to come back in the next generation to get that. He also doesn't want to box ourselves in to options.

Mr. Pratt said that he would like to see 92% there too, for argument's sake.

Ms. Perras said that the team's look around the country shows our range is within what is being done nationally.

Ms. Perras said that they would like the committee's input on plans for the public outreach component of this effort. They are considering a standard public meeting with a presentation similar to this but less technical with stations around the room with various information. She asked the committee for feedback on the format and also for input on other organizations the city should touch base with in terms of scheduling the meeting. Also, what briefings should take place with other organizations? The meetings will take place this summer.

Mr. Pratt asked what the city would be asking people to react to.

Ms. Perras said that she would like attendees to know that this is in the early phases and is coming, that the city has looked at different alignments and also ask for feedback on working shaft and retrieval shaft sites.

Mr. Pratt noted that if the city is not talking about price, you would want to hold it in the specific area impacted and talk specifically about how it will impact neighborhoods during and after.

Ms. Anderson also said that she is comfortable with the information station approach as long as there is a complete information presentation so people will be a little better prepared to ask questions.

Mr. Pratt also noted that he thought there should be a video on this project similar to the CST video that shows the problem and more specifics on why this is being done.

Mr. Bates noted that it is important to frame the bigger CSO issue. Remind people it is there.

John Kupke said that it is important to provide a visual timeline on this so people can think about it. Some of the aspects won't be decided until much later. Be clear on what the purpose of the meeting is.

Ms. Perras pointed out that on the aerial photographs, you can see that there are sites that are potential drop shaft sites that we should not share because they are so preliminary. Potential working and retrieval shafts should be identified.

Mr. Bates said that a lot of people will be concerned with vibrations.

Mr. Kupke said that it would be good to view a model drop shaft constructed on a non-residential site.

Mr. Pratt also said that they should estimate what noises can be expected.

Mr. Murray noted that the operational issues will also be a concern.

Ms. Perras said it is important to remember that this is still in the early phases and that not every question can be answered at this point. These meetings can also be used to get people on mailing lists and email lists for followup as the project proceeds.

Ms. Perras noted that the preliminary study that is in review will be distributed to the committee prior to or during the next meeting. The executive summary will be shared in draft form after city review.

Mr. Bates recommended the city develop an educational video on the tunnel. Mr. Pratt also suggested that Channel 16 run a PSA on the project and then make CDs available to public on the project.

6.) OTHER BUSINESS AND NEXT MEETING

Next meeting dates:

July 20, 4:30-6:30 p.m.
September 21, 4:30-6:30 p.m.
November 16, 4:30-6:30 p.m.

Meeting was adjourned.

Minutes

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Meeting Date: August 1, 2005

Time: 11:30 a.m. to 1:30 p.m.

Location: Clean Stream Team Office Training Room
151 N. Delaware, 9th Floor
Indianapolis, IN 46204

Purpose: Clean Stream Team Advisory Committee Meeting

Attendees: Rosemary Spalding, Glenn Pratt, Jodi Perras, Richard Van Frank, Don Murray, Ralph Roper, Phyllis Zimmerman, Mike Massonne, John Chavez, Timothy Method, Gary Mercer, Mona Salem, Kevin Hardie, Sue Swayze, Dave Voelker, Jhani Laupus, Pam Thevenow, Kevin Strunk, Jim Garrard, Margie Smith-Simmons, Bill Beranek, John Kupke, Leon Bates, Deana Haworth

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1) WELCOME AND INTRODUCTIONS

Jodi Perras called the meeting to order. Introductions were made.

Ms. Perras announced that Tom Neltner, formerly executive director of Improving Kids' Environment, has moved on and started a new job in Washington, D.C as director of training and education at the National Center for Healthy Housing where he will translate new research on such issues as lead and mold into training programs and guidance for government agencies, industries and others. Ms. Perras passed around an article from the Indianapolis Star that announced his new position.

Ms. Perras noted that there was a lot of information to review in the meeting. She reviewed the information provided in the packets. Packets include:

- Agenda
- Minutes
- Existing use letter from IDEM
- Copy of presentation
- Information to supplement Gary Mercer's presentation
- Definitions in Draft Long Term Control Plan

2) REVIEW MINUTES OF MAY 17, 2005 MEETING
Ms. Perras asked for comments on the minutes of the May 17, 2005 meeting that were included in the packet. She also mentioned that she had received some comments on changes to the minutes over the weekend from Glenn Pratt and that she will revise and distribute final minutes to the committee. No other comments on the minutes were made.

3) NPDES WET WEATHER PERMIT MODIFICATION
Rosemary Spalding said that the city wanted to make everyone aware of updates with the NPDES Wet Weather Permit modifications. The committee will remember that the application was submitted to IDEM a little over a year ago. The city hopes that the draft permit modification will come out for public comment sometime in the near future. According to Ms.

Spalding, this is not anticipated to cause a lot of public interest. Glenn Pratt asked that the committee be notified when the public notice was released. Dick Van Frank asked if there was information in the packet on this. Ms. Perras responded that draft language was not available and that she would distribute as soon as she received it.

4) IDEM EXISTING USE DECISION
Ms. Perras directed the group to the copy of the letter from IDEM on the existing use determination for CSO-impacted portions of Marion County streams. She wanted to review what decisions outlined in the letter mean to LTCP and UAA and also take time for committee discussion and questions

Ms. Spalding noted that the gist of the letter was that there is no existing use for recreation for a three-month storm event or larger for our streams by CSOs. This means that we can go ahead with the UAA as long as what the city is asking for is consistent with a three-month storm.

Mr. Van Frank noted that the letter is unclear whether the decision affects only Marion County streams or whether it extends outside the county. He asked where this would be made clear.

Ms. Perras responded that the city had specifically defined White River's affected stream reach (from 56th Street to State Road 58 near Elnora) and have discussed this with the agency. The city has asked IDEM to clarify this exact point because Mr. Van Frank and others have asked. IDEM will not answer directly, but because of the language in the letter that says "… for the portions of the CSO receiving streams the city has identified" we think it does include White River downstream from Marion County.

Mr. Van Frank asked how downstream counties feel about this. He noted that if he were in a downstream county he might see this as a reason for concern.

Ms. Perras said that through the UAA process, there will be public hearings outside of Marion County. Adjustments in use could be made at that time. She hopes that the counties to the south would see the benefits of moving forward versus not moving forward.

Leon Bates asked what would happen if Carmel or other cities north of us start causing a problem and Indianapolis found itself in the same boat.

Ms. Spalding responded that this has no bearing on what level of control the city will have or whether or not we get a revision to water quality standards. The existing use determination allows us to move forward with the UAA where these issues will be discussed and decided on.

Ms. Perras noted that this is the first hurdle in a long race.

Mr. Mercer said that the decision was made that people are not in the streams during these types of storms when velocities and flows are high. He noted that there is no one out there during these times.

Mr. Pratt said that he understands where Mr. Van Frank is coming from. He noted that he had asked how this is handled in Ohio, Kentucky and Illinois. None of those states have taken Indiana's interpretation of existing use. He said that he knows we have Reggie Baker out on his kayaks during these events. He would like to see how the state approaches "how clean is clean." We know that we need to address how we are going to be able to do this on a statewide basis. We need to do all the practical, pragmatic things to address septic, CSOs and runoff. He wants the city to get involved and show leadership.

Mr. Garrard said that he didn't think anyone disagrees with Mr. Pratt.

Mr. Pratt said that he wonders how one can totally argue with Illinois, Wisconsin, etc. They are all saying that they want to see how this turns out in Indiana.

Ms. Spalding said that we now have a determination and can move forward with UAA.

Mr. Pratt said that he feels we need to philosophically change.

Kevin Strunk asked if it is two-month event, what does that mean?

Ms. Spalding responded that the state's decision doesn't mean that there are existing uses during smaller storms. The state was silent on that issue.

Mr. Strunk asked if we care about that in the future.

Ms. Perras said yes, that is why it is important to get the IDEM guidance on this issue.

Mr. Van Frank said that they are talking about three months and larger, not less. That is their decision.

Ms. Spalding said that the city based its submittal on a number of factors, but the state chose just one (stream flow) to make their decision.

Mr. Van Frank said that at three months and above they are not, below they are saying there are.

Ms. Spalding said they are specifically not saying that. They recognize that this is a tricky issue. They elected to use clear information.

Ms. Perras said that she wanted to stop the discussion because we are getting to the point where we are speaking for IDEM.

Mr. Strunk asked if this allows us to move forward fully with EPA on the UAA.

Ms. Perras answered that essentially, it does, with storms bigger than three months.

Ralph Roper asked if it is likely that engineers will translate this into a performance requirement.

Mr. Mercer said we are using 95% capture as a performance requirement, which is generally equivalent to the three-month storm.

Dr. Roper said that one could view it as a maximum or average performance review.

Mona Salem said that we are looking at average.

Mr. Pratt said that the whole problem with localized rain is that it can cause an overflow to occur and affect a downstream area where there was no rain. He wants to make sure that we don't get grabbed by our rear end.

5) LTCP
Ms. Perras said that it was time to move to the presentation that would be the focus of the meeting. She wanted to review with the committee:

- Level of Control with Design and Performance Criteria
- Projected Benefits
- Implementation Schedule
- Compliance Monitoring Plan
- Discussion and Committee Feedback

Ms. Perras introduced Mr. Garrard to give some opening comments.

Mr. Garrard said that as the committee is aware, last fall EPA gave the city their preferred plan, which would achieve 96% capture of CSOs. Their plan equated to 2 overflows in a typical year on Fall Creek and Pogues Run, with 3 overflows on the remaining streams. EPA's proposed plan would cost about $2 billion (capital and operating costs over 20 years).

Mr. Garrard said that today, the committee will be presented with the city's analysis on the appropriate level of control for our LTCP. As the committee is aware, the city has looked at a range of options – from total sewer separation to 12 overflows per year. The city has also looked at the costs and benefits of those options, and looked not just a single benefit but a wide range of cost-benefit analyses, including reducing pollutant loads, meeting the dissolved oxygen standard, and reducing *E. coli* impacts, CSO volume and days of overflows each year.

Mr. Garrard also noted that the city has also considered our financial capability and the many economic challenges the city faces – not only to improve our water quality but to improve our quality of life, our economy and our children's health and safety.

Mr. Garrard said that the city has also considered the public's input during our meetings last fall and the feedback on level of control that this committee provided to us following those public meetings.

As we have just discussed, we also now have an existing use decision from IDEM that says our streams are not used and are not safe for recreational use above the 3-month storm event.

Mr. Garrard said that based on all this analysis, the city sees no reason to go beyond 95 percent capture with our LTCP. We also see no reason to treat one stream with a higher level of control than another. Unfortunately, EPA and IDEM have not yet agreed on this point.

Mr. Garrard also mentioned that there is a secondary question of where should the extra $300 million be allocated. We think it should not be spent on CSO control.

Mr. Garrard turned the discussion over to Mr. Mercer to explain in detail why the city thinks that 95 percent capture is the highest level of control we can agree to. Following his presentation, we will open it up for discussion.

Mr. Mercer said that there was a fair amount of material to review today. Some of it has been seen before.

Mr. Mercer reviewed the outline of the presentation:

- Status of LTCP Negotiations
- Important Terms to Understand
- LTCP Components & Design & Performance Criteria
- Projected Benefits of LTCP
- Implementation Schedule
- Compliance Monitoring Plan
- Discussion & Next Steps

Mr. Van Frank noted that the financial capability analysis was missing from the outline. Mr. Mercer noted that the topic would be included in the next advisory committee meeting. Mr. Strunk asked if it was available. Ms. Perras said it would be available on August 15.

Mr. Mercer reviewed the definitions of important terms that were provided in the packet of information. He noted that these have been agreed on by the city and EPA.

- Percent Capture
- Overflow Event
- Average Annual Precipitation

Ms. Perras noted that the city did receive advice from Toledo to define the average annual precipitation in the LTCP.

Mr. Van Frank asked what happens when you have heavy precipitation a few times and drought the rest of the year.

Mr. Mercer noted that it is more than inches per year. We also look at storm distribution as well.

Bill Beranek asked if capture means divert and asked if there is a point in time that you are starting this measure and will divert.

Mr. Mercer said that it is what you capture and treat, so it has to be in the system to be accounted for. The benefit of reverting stormwater is that you are letting more flow from somewhere else to get in.

Mr. Beranek asked if we do sewer separation or stormwater diversion, do we get credit?

Mr. Mercer said that after separation or diversion, the pipes now have the capacity to increase the amount of other flows to come in and increase your capture.

Mr. Mercer continued to review the definitions:

- CSO Control Measure
- Design Criteria
- Performance Criteria

Mr. Mercer then reviewed the systemwide options considered (Plans 1, 2 and 3).

Mr. Mercer then reviewed the level of control.

- Plan 1 with 95 percent system wide capture of CSOs
- Would achieve four overflows/year, based on <u>average</u> year's rainfall statistics (would range from 1-10 per year)

- $1.73 billion investment in reducing sewage overflows, based on today's dollars
- 20-year schedule to implement 45 major projects
- Treat all streams the same to ensure environmental equity

Mr. Van Frank asked when you say four overflows per year, it needs to say four days of overflow per year.

Mr. Mercer noted that part of this is EPA's language.

Mr. Van Frank said that this gives the public a false impression of what to expect.

Ms. Perras said that the city has tried to use language that is more specific than this.

Mr. Strunk asked if the city is proposing 95% capture.

Mr. Garrard said that the city is not planning to go beyond that.

Mr. Mercer reviewed the systemwide plan and a schematic that showed the plan, which would include:

- Deep tunnel
- Collection system improvements
- Belmont AWT & Southport AWT improvements
- Interplant Connection

Mr. Mercer noted that the handouts included a list of the components of the program and their costs. There are also more detailed schematics and photographs of the treatment plants.

He noted that the green areas are separation areas. Many are ongoing and plan to go fairly soon. The White River is being consolidated and on the west side, we are doing diversions of some flows down to the Southport plant. These are the basics of the plan.

Ms. Perras said that if the city did go to a higher level of control on Pogues Run (EPA's level of control) the box is no longer capable of handling the load so would need to go through downtown. We would also have to put another siphon or tunnel to CSO 008. Suddenly new facilities need to be constructed.

Mr. Van Frank said that the city has been collecting data for a number of years on CSO activation. He asked if that data had been analyzed and asked how it compares to this model. He has looked at some of it and has been surprised at the small number of overflows in some of those CSOs.

Mr. Mercer said that the city works to reconcile activation data every time it develops a DMR (discharge monitoring report) for IDEM. We have been looking at it and been trying to update the model as needed.

John Kupke asked, on the tunnel, if you go from 95% to 96%, is the tunnel itself materially different in size?

Mr. Mercer said that it would be larger, but that he does not know the exact size.

Mr. Kupke said that this is a paramount decision whether we go 95% or 96% capture.

Basically this sizes the cloth for what you have to work with.

Mr. Beranek asked if this is the strategy that can be expanded 20 years from now since the rates won't go down and there is extra money for capital expenses.

Mr. Mercer said that the hope is that someone 20 years down the road say, "they sure were smart." We are making sure that the collector pipes won't be the bottlenecks. We want to make sure that as you build those bigger, we won't have to dig up everyone's neighborhood.

Mr. Beranek asked if at the end of 20 years, are there now only 3 or 4 CSOs? Or are there still over 100?

Mr. Mercer said that in general, when the tunnel is full, you have to shut off flow. The CSOs would remain in place. There are options where you can push more flow through. Again, we haven't made all those decisions.

Ms. Salem noted that some will be consolidated on a project-by-project basis.

Mr. Van Frank asked if you can fill up the tunnel.

Mr. Mercer said that you don't want to surcharge a tunnel. There is an exfiltration problem then and you could expand that and crack the linings. This could contaminate the groundwater supply.

Mr. Pratt said that this is Carlton Curry's major concern. He wants to make sure that the city is trying to do whatever we can to keep down the number of overflows in neighborhoods where there are kids. He would rather have it overflow in areas where there are not kids. Having it in the White River is better than having it in Fall Creek.

Mr. Mercer said that you have to decide which CSOs and when to shut them down. You can also look at the size and try to upsize those.

Mr. Pratt said that if we are having a storm in a localized area, if there is a big overflow in one area can we avoid/prevent it in others?

Mr. Mercer said that many storms track in some parts of the city but not in others. With this solution, we can work the whole system and optimize it.

Mr. Beranek said that he would like to make sure that not all hospitals have a CSO downstream.

Mr. Mercer defined 95 percent capture of wet-weather sewage flows:

- EPA definition: Capture and treat 95% of the flow in the combined sewer system during wet-weather events
- Capture is determined by using a computer model developed for the city's combined sewer system

Mr. Mercer reviewed the cost-benefit analysis:

- 95% capture represents the system wide knee-of-the-curve, based upon numerous cost-benefit analyses
    - Cost vs. overflow frequency

- Cost vs. percent capture
- Cost vs. days of E. coli>10,000
- Cost per unit E. coli removed

He also reviewed a graph that shows the days *E. coli* is greater than 10,000 cfu/100mL. He noted that this shows how expensive a little benefit can be and shows that it does not make sense to try to improve water quality when there is no one in the streams.

Mr. Pratt noted that we have an administration in DC talking about excessive costs. How do you explain that? You also have Tom Easterly making comments about Indianapolis sewer rates when other cities are spending $100 per month.

Mr. Garrard said that he felt the administration would soon be aware of Easterly's comments.

Mr. Mercer moved on to review other cities' LTCPs based on level of control (OF events per year and percent capture) and plan cost.

Mr. Pratt said he would like to know if in other cities, like LA and others, are they allowing more? He wonders if you can have that as the outside limit.

Mr. Mercer said that there are only so many cities with CSOs and a limited list of cities we can compare to. We looked at cities with ongoing programs.

Mr. Mercer moved on to discuss the public input received. From the public's perspective, 95% capture was the preferred plan. It seemed reasonable for the public reception side.

Mr. Mercer when on to review some new information for the committee: the city's commitments to EPA and IDEM.

- Build the projects in CSO Plan according to agreed-upon design criteria and schedule
- After CSO projects are completed on each stream, monitor CSO facilities and streams:
- Confirm percent capture and other performance criteria
- Eliminate dissolved oxygen violations attributable to CSO discharge
- Improved *E. coli* bacteria levels

Mr. Mercer noted that we are held to how big the facilities are and what they are. After the CSO projects are completed on each stream, we are going to monitor both the facilities' operations and other performance criteria. This was shown in a handout that lists performance measures.

Ms. Perras noted that the list of "significant projects" included some early action projects and some that are already underway. We tried to consolidate projects into an overall list. This is meant to give the city some flexibility in how it reports to EPA. We don't want to report to EPA on a hundred projects as we move along.

Mr. Strunk said that his favorite project is at the Riviera Club. He noted an '08 bid year with 2010 completion. He knows we can get that taken care of and we dramatically improve the water quality on a recreation corridor. He asked if that particular project could be accelerated because it clears the whole thing down to 16th Street.

Ms. Salem said that this project is on a fast track, but the reason that it is in 2008 is that there is some work that has to be done before we are ready to revert those flows. There is a lot of work that has to be done at the tank, bringing it up to standard and operational. Then we can eliminate the flow there. We can provide more information on the scope of that job.

Ms. Perras also pointed out that there is a lot of work that is done before the bid year.

Mr. Kupke noted that part of this is the Riviera Club cooperating with some easements.

Dr. Roper noted that there is a solids management facility plan that is nearing completion. There are a handful of long term projects and some near term, immediate term projects that need to be rolled into this schedule.

Mr. Mercer reviewed the summary of benefits:

- Significantly reduce overflow volume, frequency and pollutant loads
- Prevent CSO-caused exceedances of dissolved oxygen standards
- Reduce—but not eliminate—E.coli bacteria standard violations
- Contain the first flush of sewage
- Improve ambient water quality and reduce stress on fish and other aquatic wildlife
- Significantly reduce or eliminate odors, floating sewage, and trash in neighborhood streams

Mr. Mercer also reviewed overflow volumes and overflow frequency before and after the 95% capture is in place. He also reviewed the number of days the *E. coli* levels would be above 235 cfu/100 mL and days above 2,000 cfu/100mL. Mr. Pratt said that this doesn't do anything about septics. Mr. Mercer said that septics are clearly part of the program.

Mr. Mercer reviewed the UAA/Wet Weather Limited Use

- State and federal law and regulations allow modification or removal of a waterway's designed use when that use is not attainable
- SEA 620, signed into law in April, created a CSO wet weather limited use subcategory for CSO-impacted waterways following implementation of an approved LTCP
- The state and U.S. EPA must approve a Use Attainability Analysis (UAA) to create the subcategory for each steam
- A UAA is "a structured scientific assessment" of the factors affecting the attainment of the use which may include physical, chemical, biological, and economical factors as described in 40 CFR Sec. 131.10(g)
- City's Position: State and federal approval of the UAA must be achieved during Phase I of LTCP implementation

Mr. Pratt asked if the city had looked at stormwater violations that have nothing to do with *E. coli (*urban runoff). Mr. Mercer responded that they feel that down the road, these things can be addressed.

Mr. Mercer reviewed the program phasing and implementation schedule.

- A minimum 20-year schedule is required to implement the LTCP control measures and the required sequence of activities

    Factors considered in developing schedule:
    - managing the impact to ratepayers
    - logical sequencing of construction projects
    - minimizing disturbance and maximizing benefits to neighborhoods
    - coordinating with other watershed improvement projects
    - timing to accurately evaluate the effectiveness of each project

  - coordinating technical, manpower and material needs

Mr. Mercer also reviewed EPA Critical Milestones:

- **Critical Milestone:** Significant dates by which progress in implementing the LTCP will be tracked by the city, U.S. EPA and IDEM
  - **Completion of Bidding Process:** (1) Indianapolis has allocated funds for a specific CSO Control Measure, (2) the bid for the specific CSO Control Measure has been accepted and awarded by the Department of Public Works Board for the construction of the CSO Control Measure and (3) a notice to proceed has been issued and remains in effect for the CSO Control Measure.
  - **Achievement of Full Operation:** Completion of construction and installation of equipment such that the system has been placed in full operation, and is expected to both function and perform as designed, plus completion of shakedown and related activities, as well as completion of in-situ modified operations and maintenance manuals. This specifically includes all control systems and instrumentation necessary for normal operations and residual handling systems.

Mr. Mercer also reviewed the schedule over the next twenty years.

Ms. Perras said that the Draft LTCP will be released for a 30 day public comment period sometime in the fall. Mr. Kupke asked if the city was presenting their argument to the EPA and where the city is on this issue. Mr. Mercer said that part of the issues is that the city does not feel that EPA's plan is right. Ms. Spalding said that the city has been consistently trying to correspond with EPA and that they have not provided any feedback that disagrees with the city's analysis.

Mr. Mercer then reviewed way the city will monitor progess

- Activities to determine whether CSO control measures are meeting Performance Criteria;
- Measures to assess the environmental benefits attributable to CSO control measures and other water quality improvements;
- A monitoring schedule, sampling locations, and associated monitoring procedures to collect data related to the Performance Criteria; and
- Evaluation and analysis of the monitoring data to determine whether CSO control measures are achieving the desired results and for reporting progress to regulatory agencies and the public

Mr. Mercer reviewed the points of the Compliance Monitoring Plan:

- The city will use its existing river monitoring network and locations and continue its monthly in-stream water quality sampling program
- Flow meters will measure flow and frequency of remaining CSO discharges
  - used with computer model to confirm percent capture
- In-stream water quality sampling stations will measure dissolved oxygen and bacteria
  - confirm elimination dissolved oxygen violations attributable to CSO discharges and improved E. coli bacteria levels

He also reviewed the Compliance Monitoring Reports:

- The city will submit milestone reports to the U.S. EPA and IDEM, following completion of construction of all LTCP projects in a watershed.
- In addition, the city will prepare public reports describing progress in the design,

construction, and effectiveness of water quality improvement projects.
- The city also will continue to implement its program to educate citizens on water quality issues and notify them of actual or impeding CSO occurrences.

Mr. Pratt said that EPA refuses just using design criteria. He feels like if we can agree that the design is relatively going to get there and for 5 years in a row we get there. He thought at one time EPA was open to accepting design criteria.

Ms. Spalding said that the question is do you comply with the Clean Water Act. We have planned in tandem with LTCP to have a UAA that is consistent with that level of control. What we want is not just a consent decree that says if you spend this much money and achieve these parameters of the consent decree.

Mr. Pratt said there are paper mills in Fox River and we signed an agreement and consider that if they did this they would be in compliance.

Ms. Perras said that they have said that, but for a ten-year storm.

Mr. Strunk said that he keeps seeing the mention of 20 years. This gets back to explaining things to the city. When he looks at implementation he sees two long bars and a lot of the work done in the next 5-6 years. Is there any way we can say we will have 68% done in 8 years.

Dr. Roper said that we are facing up to that on the solids management plan. There is continuous improvement that can be incorporated into plan. The bar for Belmont plant improvements can be broken down.

Ms. Salem said that this is a good suggestion, but also once we move forward we will be designing the communications package regarding progress on the projects and if you have feedback on what the average citizen would like to see, what do you think would be good information, please let Ms. Perras know.

Mr. Strunk said that this is the “here’s what it is and how will we do it” part of the sales pitch. Twenty years goes so far out. This also gets back to the cash. He noted that he has always been in favor of aggressively approaching this.

Ms. Perras said that we can go into this more at the next meeting if the committee wants, but a big piece of it is putting the tunnel in place and connecting the final pieces of it at the end. This is a long process, it is not just one project.

Dr. Roper mentioned that there are improvements to Belmont Plant that are separate from the tunnel. Those are big steps in terms of the load. The schedule also needs to take into account number of outfalls that have been eliminated or reduced. Some would say improvements to the plants are good, but the individual outfalls are also important. It is good to accelerate some projects and do them in advance.

Mr. Strunk said that at a neighborhood level, the people will see 1-2 articles in the paper. You only have 153 responses. He asked if 153 is enough out of 300,000 sewer hookups.

Ms. Perras said that this is what we got.

Mr. Pratt said that even though the percent of removal is small, any overflow you can remove from a neighborhood makes a difference.

Mr. Kupke asked what would be beneficial of the committee speaking as a whole in support of the city's plan.

Ms. Perras said that the city doesn't want to have any public outreach on the disagreement with EPA and IDEM at this point. To the extent that any people communicate to EPA, you could show support. The action is with EPA and IDEM at this point. We feel like the plan represents what we could live with and commit to as far as water quality with the city and improving quality of life in the community. This is not going to come without pain for elected officials.

Mr. Pratt asked where is the Association of Cities and Towns? To him, Easterly seems unbelievably naive that he would see no problem with everyone having a $100 bill. "I think someone needs to be talking to the governor's office."

Sue Swayze said that the Chamber of Commerce cares because of the cost to businesses. With all due respect to everyone, businesses and the average person just doesn't get this. Just like when they are buying a product, they need to understand the knee of the curve. I believe that as difficult as this issue is to explain, we need to completely talk about it in a different way.

Mr. Bates said that this is the same thing that some of us have said before. The average citizen can see streets, lights, snow plows but they can't go and put their arms around a sewer.

Ms. Swayze said that we also need the public pressure on IDEM and EPA. She thinks there need to be pressure by the public so state and city officials have to dance to be able to explain things. We can work at the political level, but it will be solved on the public level.

Mr. Strunk said that the average citizen doesn't quibble against this expenditure. To show people what is going on, most of them will say that they have I have $10-$20 a month for that. Let's ramp that county option income tax up.

Ms. Swayze said that it could be positioned as regardless of what we all want, EPA is making us do this. We can't blame anyone else but EPA.

Ms. Perras said it is also better to have our money spent here than in sending fines to Washington.

Mr. Strunk asked how much is the incremental cost.

Ms. Swayze said that there is a regulatory decision to be made, but there is also a public decision.

Mr. Pratt said that the $300 million is better spent to remove septics than reduce overflow.

Ms. Swayze said that as scary as it seems, if you show the truth, people react so much better to it. When she talks to people, they can relate to the fact that I am being forced by EPA and that I am trying to now answer the question of how best to do it.

Pam Thevenow said that it also needs to be clear that we want to at the same time because we want to be a healthy city.

Mr. Kupke noted that it is reason that the group is there. We ought to do this because it is the right thing to do. There will be requirements and we need to understand this. We need to save $300 million on this. The difference between 95 and 96 percent can't be measured in the streams. That is our position. Let's take that $300 million and put it in the right place. How do we as a group promote the right thing to do?

Mr. Pratt pointed out that we would have more of a public health benefit by spending $300 million on septic systems than spending it on CSOs.

6) NEXT STEPS

Ms. Perras said that the next meeting is scheduled for August 15. [Note: This has since been changed to September 12.] We'll provide lunch again. Financial capability analysis and flow augmentation information will be made available. We will also answer the question of what this committee can do. We know that there are things as we talk about a rate increase with the council. In the meantime we are continuing to work on the plan.

Mr. Pratt said that he would like to see the flow augmentation information ahead of time. Ms. Perras promised to see what she can do.

Minutes

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Meeting Date: September 12, 2005

Time: 11:30 a.m. to 1:30 p.m.

Location: Clean Stream Team Office Training Room
151 N. Delaware, 9th Floor
Indianapolis, IN 46204

Purpose: Clean Stream Team Advisory Committee Meeting

Attendees: Todd Cavender, Glenn Pratt, Rosemary Spalding, Ralph Roper, Michael Massonne, Merri Anderson, Jim Parks, Phyllis Zimmerman, Joe Ridge, Buzz Krohn, Mark Jacob, Carlton Ray, Jhani Lapus, Tim Method, Don Murray, Kevin Strunk, Dave Voelker, Jodi Perras, Margie Smith-Simmons, Dick Van Frank, Mark Fisher, Patrick Carroll, John Trypus, Donnie Ginn, Bob Masbaum, Gary Mercer, John Chavez, Jim Garrard, Deana Haworth

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1) WELCOME AND INTRODUCTIONS

Jodi Perras called the meeting to order and thanked the group for coming. Jim Garrard called for introductions.

2) MINUTES OF AUGUST 1 AND MAY 17, 2005 MEETINGS

Ms. Perras provided a revised version of the May 17 version that incorporated Glenn Pratt's suggested changes. Ms. Perras asked for other corrections or additions. None were noted.

3) LTCP UPDATE AND PLANS FOR RATE INCREASE

Mr. Garrard noted that at the previous meeting, Rosemary Spalding had mentioned that EPA is pursuing a consent decree, which the city doesn't necessarily agree with. He said that there are some key issues left to be resolved, including level of control. However, the work the city has done to date and the work planned over the next four or five years will continue even without a CD. One concern is that EPA wants to insert language on SSOs. Even though the city is working to eliminate the three constructed SSOs, EPA is pushing to have all eliminated by a date certain.

Mr. Garrard provided an update on negotiations with IDEM and EPA and answered committee members' questions.

Mr. Garrard also said that the city will introduce a rate increase for stormwater and sanitary. Councillor Cockrum has agreed to hold his increase until the city's sanitary proposal was ready. The Mayor will make the announcement on October 3. The last rate increase was 2001. This increase will fund the next 2-3 years worth of projects.

An advisory committee meeting will be scheduled for the same day to discuss the rate increase. The announcement is scheduled for the 10:30 a.m. and the advisory committee meeting is tentatively scheduled from noon-1 on October 3. Mr. Garrard requested that committee members note the meeting on their calendars and Ms. Perras would be sending out a confirmation of the time. Committee members will be given a preview of what will be taken to the council. The city would also need support from committee members at the council committee hearing.

Mr. Pratt said that one would assume there would be a differential rate increase for residential and business since a lot of the surcharge on business is based on load. One would assume there wouldn't be a surcharge.

Mr. Garrard said that they can go into more details at the briefing on October 3.

Dick Van Frank said that he didn't think the city would want to wait any longer and that the increase should be based on the cost of service.

Mr. Garrard said that this rate increase is crucial if we want to keep the program moving forward.

4) FINANCIAL CAPABILITY ANALYSIS

Ms. Perras introduced Buzz Krohn and Joe Ridge to review the financial capability analysis (FCA). Ms. Perras said that the FCA is a requirement of EPA guidance. We based this FCA on the 95% capture in a typical year plan. The EPA methodology is not based on any kind of economic standard. There is no support for the notion that spending less than 2 percent of median household income on wastewater is not a high burden.

Ms. Spalding said EPA's methodology looks at how much you should spend on controlling CSOs rather than looking at water quality improvements.

Mr. Krohn reviewed a service area map that showed consolidated city customers and retail service area customers. He explained that the consolidated city best represents the sanitary service area. Service area rate increases cannot be uniformly assessed to wholesale customers due to individual wholesale agreements. He also reviewed the sewer service area's weighted household income. Mr. Ridge pointed out that EPA's methodology requires that comparisons are made based on median household incomes.

Mr. Ridge gave an overview of the US EPA Phase I: Residential Indicator.

- U.S. EPA's Residential Indicator calculates the Cost Per Household as percentage of Median Household Income
- Cost Per Household estimate includes:
    - Impact of LTCP (capital and operating)
    - Impact of operating, maintaining and upgrading City's other wastewater collection & treatment systems
- Median Household Income Evaluation:
    - Both Consolidated City and Center Township
    - Both values were adjusted based on historical rate of change per census data

Mr. Ridge explained EPA's residential indicator. A low financial impact is when the cost per household is less then 1.0 percent of median household income (MHI). Mid-range is at 1.0 – 2.0 percent of MHI. A high impact is when the financial impact is greater than 2 percent of the MHI.

Mr. Ridge also reviewed the methodology for determining Phase 1 residential indicator:

- Project future costs of operating, maintaining and upgrading the existing wastewater system

- Assess the incremental impact of LTCP: operating and capital costs and residential share of billable flows
- Evaluate impact of service area growth: number of households, billable sales and income
- Determine projected costs over program life
- Project a cost per household for each future year of program
- Compare to projected household incomes

Mr. Ridge reviewed the key parameters and assumptions:

- Consolidated city retail service area
  - 277,000 households (2004)
- Billable sales growth will be nearly flat (0.25%)
- Capital program financed with cash, open market, and low-interest State Revolving Fund (SRF) bonds
  - Assumed 33 percent SRF financing
  - Weighed average interest rate of 6 percent over the forecast period, including costs of issuance

Mr. Ridge reviewed a graph that showed the Billable Sanitary Sewer Flows 1997-2004. He said that this chart showed that overall total billable sales have not changed over time and that this supports the assumption that sales will remain flat.

Mr. Ridge's next slide showed additional key parameters and assumptions:

- Capital costs escalated as follows:
  - Engineering News Record Construction Cost Index shows a 25-year average rate of inflation of 3.3 percent
  - Other major projects outside the LTCP will be in construction during same time period in Indianapolis and the Midwest, causing additional inflationary pressures
  - Peak construction period inflation was assumed at 5.3 percent (2008-2018)
- Operations and Maintenance costs were escalated as follows:
  - Contractual operations increase at 4 percent annual average
    - Stepped an additional 6 percent at contract renewal times
  - All other obligations
    - Increased 2.5 percent annually
    - Accounts for existing and new O&M brought online as a result of new capital projects

Mr. Strunk asked if 5.3 percent represents union workers with project labor agreements, or is it the non-union cost? Mr. Ridge said the 5.3 percent assumes some of both.

Mr. Ridge reviewed another slide that showed the Indianapolis-Regional Area: Major Capital Investment Programs/Projects 2001-2005. This shows expected construction activities over the next 20 years. This work will result in high demands on the labor force, construction capacity and consultants.

Mr. Ridge also reviewed a Comparison of Residential Indicators for the consolidated city, Center Township and people living at poverty level. This indicator shows Center Township and poverty level population above the 2 percent MHI threshold during LTCP implementation.

Mr. Strunk asked what happens if you get someone who can't afford to pay their sewer bill? Mr. Garrard said the city can put a lien on a house.

Mr. Van Frank pointed out that many at the poverty level are probably not paying for sewer bills directly.

Mr. Garrard noted that this graph illustrates where the most vulnerable people are.

Ms. Anderson asked if anyone looked at how many can afford to be in Center Township.

Mr. Ridge said that the whole process was based on MHI.

Mr. Ridge reviewed U.S. EPA Phase II: Financial Capability Indicators

- Bond Rating
- Debt Burden
- Unemployment Rate
- Median Household Income
- Property Tax Burden
- Property Tax Collection Rate

Mr. Pratt asked if state offices pay sewer fees. Mr. Krohn responded that there are no exemptions from water and sewer bills.

Mr. Ridge reviewed the U.S. EPA Financial Capability Indicators.

Bond Ratings

- Moody's Credit Rating
  - Aaa: Negative Operations and Maintenance costs escalated as follows:
    - "The negative outlook reflects the pressure of the City faces as unfunded pension liabilities continue to grow."
- Standard and Poors' Credit Rating
  - AAA: Negative
    - "The negative outlook reflects the budgetary structural imbalances that have grown in recent years that will threaten the city's liquidity position if allowed to continue beyond 2005." (EPA Rating: Strong)

Indianapolis Debt Burden

- Overall net debt: $2,306,795,000
- Market value of property: $39,047,432,000
- Overall debt burden: 5.908 percent
- Debt per capita: $2,892
- (EPA Rating: Weak)

Mr. Ridge also reviewed the Indianapolis Unemployment Rates, Marion County Unemployment Compared to Surrounding Counties and Marion County MHI Compared to National and State MHI.

He also reviewed the Property Tax Collection Rate/Revenue

- Full market value of real property: $36,808,011,015
- Property Tax Revenues as a Percent of Full Market Value: 3.085 percent (EPA

Rating: Mid-Range)
- Property Tax revenue (Paid in 2004): $1,135,502,840
- Property Tax Collection Rate: 102.8 percent (EPA Rating: Strong)

According to the overall financial capability indicators, service area wide indicates a medium burden and Center Township indicates a high burden.

Mr. Van Frank asked if EPA requires a 10-year schedule with a medium burden. Mr. Ridge responded yes.

Mr. Pratt said he thought the presentation was well done.

Mr. Strunk asked how much money will we be required to spend? As a county we never get to 2 percent.

Ms. Perras responded that EPA's 2 percent is an artificial ceiling that they have selected.

Mr. Ridge noted that the 2 percent has no meaning. The half that is below can be way below. For instance, the city of Syracuse has median household income less than 60 percent of the county's average. The effects are disparate based on where you live.

Ms. Perras said that we are not looking at 2 percent as a number we have to reach. We need to identify a plan that will protect waterways during the times that citizens are most likely to be using them. We need to get the right plan and implement it over a reasonable period of time and we think we have that. Over 20 years is going to make sense.

Mr. Van Frank said that 20 years ago, he heard the same arguments from the state regarding sulfur dioxide reductions – that rates were going to increase and the coal mining industry would collapse. As good as these arguments sound he doesn't think they are going to solve the problem. It could end up costing you much more. At some point, pursing the point you are pursuing now will be counterproductive. You will get whacked with a legal action and we are not going to get the problem solved. Certainly this is more complex with the attitude the state is taking.

Mr. Garrard said that he is not sure we would do any worse in court right now. If he remembers right, the knee of the curve says 95 percent is right. The UAA process needs to happen. Why sue the city now for the 1 percent issue before the UAA even happens? There is a process that IDEM should be driving and they aren't. We should be over there addressing this through the UAA process.

Ms. Anderson asked how much time and money do we waste if we go that route?

Mr. Garrard said that the worse case scenario, we are at 96 percent capture.

Mr. Van Frank said that he fully supports the work done and that the city deserves some credit for that.

Mr. Garrard said that the unknown for the city is working through the SSO issue. We feel comfortable that we are addressing this the right way. We are budgeting and planning to fix this.

Mr. Pratt said that there is a need to address infiltration.

Mr. Roper asked if it is true that the cost estimate is based on CSOs alone or if other improvements are included?

Mr. Ridge said that this includes the Barrett Law Master Plan, Sanitary Master Plan, Basin Master Plan (addressing mid- and large-diameter infrastructure needs), and all studies done at plant. The project team sequenced those projects and considered the total wastewater burden.

5) FLOW AUGMENTATION ANALYSIS
Carlton Ray introduced the flow augmentation presentation, saying the city has been working on this project with the Corp of Engineers under a 75/25 agreement. They have looked at various ways to augment flow for Fall Creek and other streams.

Mr. Ray said that this project is currently in the earliest stages of planning. He estimates 5-10 years to construct the pump station. We have upgraded the effluent filters and the plant will be going back to ozonation in the next year or two. For flow augmentation, the city is looking at water quality and the NPDES permitting phase. This was included as part of the contract for the tunnel study.

Mr. Ray reviewed the project goals:

- Augment flow in urban streams to help meet water quality standards & enhance neighborhoods
- Improve habitat and biodiversity
- Encourage effluent reuse

Mr. Ray reviewed the project team members

- Department of Public Works - Engineering
- Department of Public Works - Operations
- Department of Public Works - Environmental Services
- Department of Public Works – Transportation
- U.S. Army Corps of Engineers – Louisville District
- Indianapolis Clean Stream Teams (CST)
- Department of Parks and Recreation – Greenways
- Indianapolis DMD Planning Division
- Veolia Water Indianapolis
- Indianapolis Water
- United Water
- CST Technical Advisory Committee
- Black & Veatch
- GEC, Inc.
- Public

Mr. Ray introduced John Trypus of Black & Veatch, who reviewed the project phases:

- Current Phase: Preliminary Study
- Force Main Routing Study and Subsurface Investigation
- Facility Planning
- Detailed Design
- Bid Phase/Contract Award

- Construction
- 5-10 Year Project Scale

Mr. Trypus also reviewed the scope of preliminary evaluation study

- Project Summary and Description
- Construction and Project Considerations (size, length, depth, pipe materials and specifications, public impacts)
- Design and Pumping Considerations
- Force Main Routing Alternatives
- Outfall Structure Location Alternatives
- Preliminary Cost and Schedule
- Decision Screening
- Conclusions and Recommendations

Mr. Trypus reviewed the primary decision-making criteria

- Water Quality Impacts
- Land Acquisition and Easements
- Population Impacts
- Traffic Impacts
- Impacts on Parks
- Environmental Contamination
- Existing Infrastructure
- Operations & Maintenance
- Others

Mr. Trypus also provided an overview of system components. Mr. Pratt asked where citizen participation falls in this process. He noted that the AWT committee is successful because the committee is involved. Mr. Pratt suggested that the city look at the economics of a separate plan. The solution became complicated when stormwater was involved. He suggested that a workgroup be developed to participate on the team. Mr. Garrard said that was the purpose of the presentation today.

Mr. Strunk asked how much is being taken out at Keystone Avenue. Mr. Ray said it is 30-25 MGD.

Mr. Trypus reviewed the design and pumping considerations

- Pump Station Design – 60 mgd (Ultimate Capacity)
  - 20 mgd – Fall Creek
  - 5 mgd – Pogues Run
  - 5 mgd – Pleasant Run
  - 30 mgd – Water Reuse
- Use Treated Belmont AWT Effluent
- Dry Season Usage
  - Flow Augmentation from late Spring to early Fall
  - Water Reuse maybe year-round

The project team reviewed the following force main considerations:

- Preliminary Maximum Capacity – 60 mgd
- Six Alternatives Evaluated
  - Fall Creek/White River

  - Pleasant Run/Keystone Ave./Conrail Easement
  - Pleasant Run/Keystone Ave./E. 21st St.
  - Pleasant Run/Monon Trail/Conrail Easement
  - Pleasant Run/Keystone Ave./E. 21st St.
  - Pogues Run/Monon Trail
- Length from 15-17 miles
- Diameter Varies
  - Force Main Diameters Range from 16-54 inches

They also reviewed the outfall structure considerations:

- Preliminary Locations Evaluated
  - Fall Creek – Keystone Dam Alternative
  - Pogues Run – Four Alternatives
  - Pleasant Run – Six Alternatives
- Purpose is to Increase Dissolved Oxygen Levels in Effluent Discharge and Enhance Dry-Weather *E. Coli* Bacteria Compliance in Creeks
- Cascade Aerator Outfall Structure Alternatives Evaluated
  - Stair-Step
  - Side-Stream
  - Large Rocks Side-Stream
- Anticipated Height – 10 feet
- Constructed Wetlands Considered

They also reviewed the effluent quality considerations:

- NPDES Permit Requirements
- Concentration of Dissolved Solids in Effluent (e.g., sodium, chlorides)
- Flow Augmentation during Low Flow Periods may require Higher Quality Effluent
- Constructed Wetlands may simplify permitting
- Water Quality Assessment to be completed during Future Project Phases

Mr. Roper asked at what point dissolved oxygen becomes an issue. Mr. Trypus said that this is not part of the scope at this time.

Decision screening includes:

- Summary of Screening Factor Considerations
- Results of the Decision Screening Process
  - Force Main Alignment
    - Alt. 4B - -Pleasant Run/Keystone Ave./E. 21st St.
  - Fall Creek Outfall Location
    - Near Keystone Dam (Keystone Ave. & Fall Creek Pkwy)
  - Pogues Run Outfall Location
    - DPW Detention Pond/Constructed Wetlands Inlet (Emerson Ave. & 1-70)
  - Pleasant Run Outfall Location
    - Near Shadeland Ave. &* E. 21st St.

Recommended next steps:

- Public Meeting on Preliminary Study
- Water Quality and Permitting Evaluation
- Force Main Routing Study
- Land Acquisition Study

- Environmental Site Assessments
- Outfall Receiving Waters Monitoring Plan
- Continued Public Outreach and Stakeholder Involvement

Mr. Pratt noted that the advantage of this is that this keeps the system flushed out. This is really beneficial.

Mr. Strunk asked if the city needs to look at getting some more flow at Fall Creek Station that is not out of the creek by developing a new wellfield.

Mr. Ray said that the city is working closely with Indianapolis Water and Veolia on these issues.

Mr. Roper asked with the sewer rates escalating, is there a likelihood that the city of Lawrence would build their own treatment plant? Part of his concern with flow augmentation is that it is energy intensive.

6) ADJOURN

The meeting was adjourned.

Minutes

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Meeting Date: October 3, 2005

Time: 12:00 p.m. to 1:00 p.m.

Location: Clean Stream Team Office Training Room
151 N. Delaware, 9th Floor
Indianapolis, IN 46204

Purpose: Clean Stream Team Advisory Committee Briefing

Attendees: Mark Jacob, Michael Massonne, Don Murray, Pam Thevenow, Rosemary Spalding, Mona Salem, Carlton Ray, Jhani Lapus, Glenn Pratt, Phyllis Zimmerman, Dick Van Frank, John Kupke, Merri Anderson, James Garrard, Tim Method, Todd Cavender, Jodi Perras, Deana Haworth

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1) **WELCOME AND INTRODUCTIONS**

Jodi Perras welcomed attendees to the special session. She reviewed the packet of information provided.

She announced that following the mayor's announcement, there would be a series of media events in October to highlight septic issues and sanitary sewer issues in neighborhoods.

2) BRIEFING ON CLEAN STREAMS-HEALTHY NEIGHBORHOODS PLAN

Ms. Perras indicated the primary purpose of the meeting is to share the information on the rate increase. She said that many people would be familiar with the content in the presentation and that this presentation would be similar to the one given at the committee and council meetings.

Ms. Perras presented the following presentation that outlines the need for clean streams and healthy neighborhoods:

Raw Sewage Overflows

- 82 miles of combined sewer lines
- Overflows occur 45-80 times each year into the White River and neighborhood streams.
- 130+ overflow locations
- Historically, overflows spilled 7.8 billion gallons of contaminated water each year

Failing Septic Systems

- 30,000 homes in Marion County are on septics
- 18,000 systems in neighborhoods targeted for sewer service
- Failed septic systems are linked to high *E. coli* bacteria in neighborhood streams and drainage ditches

Sanitary Sewer

- Arteries need relief: Existing sanitary sewer interceptors are overloaded. Relief sewers and a force main are proposed.
- Small diameter sewers need rehab

Stormwater

- Drainage problems result in neighborhood flooding
- Poor neighborhood drainage affects many neighborhoods and streets throughout Marion County, causing basement flooding, street flooding and dangerous “black ice” in the winter
- Since 2001, stormwater utility has spent $11.5 million to plan, design and construct projects to combat these problems
- Part of the revenue was required to pay for past flood control debt
- Continued investment is needed; current stormwater revenues do not meet capital needs

Capital Improvement Program 2005-2008
Proposed CIP includes:

- Implementing required projects to reduce raw sewage overflows, including doubling secondary treatment capacity at Belmont and eliminating isolated overflows at State Ditch and Lick Creek
- Eliminating septic systems in approximately 30 high-priority neighborhoods by 2008
- Eliminating constructed sanitary sewer overflows (SSOs) and conducting high-priority rehab and inflow/infiltration reduction projects
- Implementing high priority stormwater projects to address neighborhood drainage and flooding, make drainage channel improvements and maintain or improve levees and Eagle Creek dam

CIP includes:

- $400 million in sanitary capital programs 2005-2008
- $35 million in flood control and drainage improvements
- Benefits will be seen throughout Marion County

Paying for Cleaner Streams and Healthier Neighborhoods: New rates will take effect on January 1, 2006, if approved by council

Ms. Perras reviewed the sanitary capital needs and current residential rates. From 2005-2008, a $325 million shortfall will be realized on capital needs of $400 million.

Ms. Perras also presented graphs showing residential rate comparisons. Indianapolis current sanitary and stormwater rates are low in comparison with other cities in Indiana, the Midwest and across the country.

The proposed sewer connection fees include:

- New connection fee: $2,500/EDU sewer connection fee for new connections and new developments to help pay into the sewer system that has been built by others before them
- Existing fees: Existing fees to cover application processing, lateral inspection and sewer service recording will remain in place

The $2,500 connection fee will be paid by developers or property owners to construction permitting

- Connection fee is assessed per “equivalent dwelling unit” or EDU
- Industrial and commercial connections would pay a proportional amount based upon

meter size

Ms. Perras reviewed a graph that showed the connection/availability fee comparison with other Indiana communities and other Midwestern communities.

Proposed Stormwater Fees

- Proposal: $1.00 increase to the current $1.25/month fee for each "equivalent residential unit (ERU)." One ERU equals 2,800 square feet of hard surface area.
- New Fee: $2.25 per equivalent residential unit
- Benefits: Approximately $25 million over next three years for projects to improve drainage and reduce neighborhood flooding

Ms. Perras reviewed a graph showing stormwater fee comparisons for Indianapolis as compared to other Indiana and Midwestern communities.

Septic Tank Elimination Program: No More Barrett Law Assessments

- If the Council approves the proposed rate increases, the city will stop using the state's Barrett Law for all new septic conversion projects
- Under the Barrett Law, the city may charge property owners for construction of city sewers in existing neighborhoods
- Under the new Septic Tank Elimination Program (STEP), the city will pay to bring sewers to neighborhoods with approximately 18,000 homes in the next 20 years
- Property owners will still be responsible for costs on private property

<u>Septic Tank Elimination Program: How Will It Work</u>

Existing Barrett Law Projects:

- Upon Council approval of the rate increase, property owners owing money for any existing Barrett Law sanitary sewer project will stop paying their assessments
- Any outstanding Barrett Law debts will be covered by the city
- The city will not reimburse property owners for any previous Barrett Law payments made, regardless of the method of payment they chose (i.e., lump sum or 10-, 20- or 30-year payment plans)

New Septic Tank Elimination Projects:

- For new STEP projects, the city will pay for all sewer construction in the public right-of-way
- The property owner will still be responsible for costs on their property (including abandoning the septic tank, installing a lateral to the home, and connecting to the sewer)
- This will reduce the average homeowner's payments to the city by 60-70 percent. Actual costs and savings will vary with each property
- The city is exploring options for creating an affordable load program to help qualified property owners finance the connection costs

Summary of Changes

- Average homeowner using 5,400 gallons of water would see rates rise from $9.59 per month in 2005 to $12.38 in 2006, $15.17 in 2007 and $17.96 in 2008. If approved, will appear on January water/sewer bills.
- New $2,500 fee for each new connection to the city sewers, to help pay into the

sewer system that has been built for them.
- $1.25/month residential stormwater utility fee will increase to $2.25.month, appearing on Spring property tax bills.
- If rate increase approved, no more Barrett Law assessments for septic tank owners.

Summary: Why This is Needed
- Our streams are polluted and our neighborhoods are unhealthy due to raw sewage overflows, failing septic systems and poor flood control and drainage.
- Proposed rate increases will have county-wide benefits:
    - Reducing raw sewage overflows in old city limits
    - Eliminating failing septic systems
    - Keeping up with the growing neighborhoods that need sewer capacity and treatment, and
    - Improving flood control and drainage.
- We've already invested $200 million in projects that are reducing overflows by more than 145 million gallons per year. But we need to do more.
- We have no choice. Regulators have made it very clear that we must address these problems or we will be paying fines to Washington or the state government.
- The proposed rate increase will pay for three years or projects to help solve these problems.
- Additional rate increases will be needed each year for the next 20 years to meet requirements and ensure cleaner streams and healthier neighborhoods.
- Even with these increases, our rates will still be very competitive and affordable when compared to other cities' rates.

Questions and Discussion

Dick Van Frank asked, relative to Mona Salem's meetings with area industries, is there any indication that it might be cheaper for them to handle treatment themselves?

Mona Salem responded that the city expects they will minimize flow in response to rate increases. They will have to dust projects off and review calculations in light of the increases. It will take a few years for them to implement these things. This is why the three-year phase is important to see how they react. She said that they are looking at it based on two scenarios - what is best for the finances and the flow. It has to be evaluated from both sides.

Glenn Pratt said that the industries are more worried about where we will be in 10-15 years and how that will impact them. A lot of their costs are not included in this for surcharges. It is not more flow. It is plant-related. They will look at what is it costing them to treat now versus what is coming.

Mr. Pratt asked if we are presently charging businesses a fair cost for what they are discharging.

Ms. Salem said that if you looked at your current costs, they were getting a little bit of a break. Further, she said, all of these numbers were shared with industry and this was taken into consideration. This is a significant rate increase for industry. Industry represents more than 50 percent of our base.

Merri Anderson asked if the stormwater fee is specifically going to pay for stormwater projects. Ms. Perras said yes.

Mr. Pratt asked what the homeowners need to pay for under the new STEP program. Ms. Perras said that homeowners would need to pay the costs of connecting their home to the new sewer, which includes shutting down their septic system, installing a lateral and the new $2,500 connection fee.

Mr. Pratt also asked if the city had talked with MIBOR and BAGI about these proposals. Ms. Perras said yes.

Mr. Pratt said last time, about 50 percent of the real estate folks (those who sell residential) were for it and 50 percent were against it (builders).

Mr. Pratt asked if people in the low income category can cover connection costs and STEP costs.

Ms. Anderson said that there are a lot of elderly people with no income to cover things like this. They have long lots with a long way to connect back.

Mr. Van Frank asked if thought had been given to working out a deal with a contractor to come in and do everyone in a neighborhood at one time.

Ms. Perras responded that Pegg Warnick gives neighborhoods considerable guidance on working with one contractor. Often they contract with the city's person to do their home too.

Mr. Van Frank said that there is a potential for a lot of abuse too.

Carlton Ray said that Ms. Warnick explains what the normal rates are so folks have a good idea of what they should be expecting as a good number. He has even had neighborhood groups hire a person as the coordinator for the neighborhood.

Mr. Pratt said that he favored charging new developments $2,500 but existing homes would pay $1,500. Ms. Perras responded that the city is suggesting one fee in order to be equitable.

Mr. Ray explained that the city will bring the lateral to the property line. The homeowner is responsible for the lateral to the property line.

Ms. Salem said that councillors are supportive of this generally. They all have some kind of problem in their district. She noted that the city would appreciate the advisory committee's support with this.

John Kupke suggested that the STEP program may be something we have to work on. The city can't handle all of this for homeowners.

Mr. Van Frank said that he is afraid some of these neighborhoods have people in them who would be sitting ducks for contractors.

Ms. Salem said these were good suggestions to follow up on.

Mr. Van Frank asked if changes could be made to the project map to differentiate these projects.

Mr. Garrard noted that the council committee meeting is scheduled for October 20 and the full council vote is scheduled for October 31.

Update on LTCP Negotiations

Mr. Garrard reported that the city is working with EPA and IDEM. Both sides left the meeting feeling optimistic. He hopes to know by the end of October how it is going to go.

Mr. Garrard and Mayor Peterson met with Tom Skinner, Region 5 Administrator, and IDEM Commissioner Tom Easterly on September 30. He will keep the committee up to date on progress.

Closing Comments

Mr. Kupke said that this is the right thing to happen and the people who have spent a lot of time on the advisory committee should feel good.

Ms. Salem said that the city really appreciates the committee's feedback and assistance. The rate increase could not have happened without committee support and ideas.

Mr. Garrard asked committee members to call their councilors and voice support, as well as attending the committee hearing on October 20.

Ms. Perras noted that Tom Neltner contacted her for a meeting regarding the environmental justice committee and what was filed under the previous mayor. We are planning that at the end of October. We hope the outcome will be that they drop their complaint against the city.

Mr. Van Frank said that there are some outstanding issues that need to be addressed.

Ms. Anderson said that she spoke to Tim Method last week to express concerns that funds raised through the stormwater increase would support capital projects.

Mr. Method said that the new stormwater revenues are dedicated to projects, as shown in the list the city has provided. The city was obligated to pay back past debts under the legislation creating the initial stormwater fee.

Mr. Garrard said that going forward it will be very clear that this increase is going to be going toward projects.

Ms. Anderson said a lot of people thought one thing and were surprised that they got another.

Mr. Van Frank suggested that the presentation needs to be clearer for the general public and take more of a layperson's approach.

The meeting was adjourned.

Minutes

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Date: February 16, 2006

Time: 11:30 a.m. to 1:30 p.m.

Location: CST Training Room, 151 N. Delaware

Subject: Clean Stream Team Advisory Committee

Participants: Rosemary Spalding, Sandhya Markand, Dave Voelker, Bela Jones, Mark Jacob, Merri Anderson, Glenn Pratt, Don Murray, Phyllis Zimmerman, Ralph Roper, Jodi Perras, Lauren Brown, Margie Smith-Simmons, Kevin Hardie, John Kupke, Tim Method, Dick Van Frank, Gary Mercer Bob Masbaum, Cathy Holdman, Kevin Strunk, Pam Thevenow, Jhani Laupus

1. Welcome & Introductions

Jodi Perras called the meeting to order and apologized that Jim Garrard, Mona Salem and Carlton Ray couldn't attend because of EPA-related meetings on the long-term control plan. She welcomed the group and called for introductions.

2. Minutes of October 3, 2005, Meeting

Ms. Perras provided minutes of the October 2005 meeting and a revised version of the September 2005 meeting minutes. No comments on the minutes were provided.

3. Announcements

Kevin Hardie announced information about upcoming clean ups with the Friends of White River:

- Fall Creek Cleanup (March 25) – Sponsored by Dirty Dozen Hunting and Fishing Club
- White River Cleanup (April 8) – 18th annual cleanup

Mr. Hardie also noted that the Clean Stream Team recently received the Friends of the White River Award and this recognition is up on the Friends of White River Web site. Ms. Perras thanked Mr. Hardie for the award.

Glenn Pratt discussed a few positive items. He said that Veolia, the city and the parks department are working together to educate people near watersheds and to solve problems with stormwater. IDEM, Veolia and the city of Zionsville are working to moderate phosphorous levels in sewer plants.

Pratt also discussed Senate Bill 369, which would set drought policies for the state. The water company has been working to develop a drought ordinance, so the city can better react to problems with the water supply during a drought.

Tim Method discussed the Belmont Wet Weather Permit Modification (issued 1-25-06). The city asked the state to modify the existing secondary treatment process at Belmont. The project is moving forward. They are expanding the process to treat more wet weather flows and create a separate wet-weather treatment process and outfall.

Mr. Pratt says he supports this and decided not to appeal because the project is worth moving forward with. Dick Van Frank also offered a supportive comment. He said it is a good project, is very innovative and helps solve the problem.

Ms. Perras mentioned that she attended a meeting of the National Association of Clean Water Agencies recently and they were very interested in the permit.

3. Update on Negotiations with EPA and IDEM

Ms. Perras introduces Rosemary Spalding and Gary Mercer as the next presenters.

Ms. Spalding explained that negotiations with EPA and IDEM are continuing. She gave some background for those not familiar with the situation: the city's position has been that a consent decree is not warranted or necessary to make sure the city is doing the right thing. However, EPA has insisted that the city be under a consent decree. The city agreed to begin negotiations on the consent decree with the understanding it would be an "implementation" decree and would not be overly prescriptive or punitive. Negotiations with EPA and IDEM, therefore, are continuing on two tracks – one of which is the LTCP itself and issues including the level of control, schedule and post-construction monitoring. The second issue is the consent decree language. If you look at other consent decrees in other communities, they are overly prescriptive, Ms. Spalding said. The city is making progress on these negotiations, ensuring that when finished with the LTCP, the city will be in compliance with water quality standards. This will require state and federal approval of a Use Attainability Analysis, or UAA, to refine the designated recreational use to a CSO wet-weather limited use subcategory. The city is having discussions with IDEM and EPA to make sure they know what the UAA process will be, and to maximize the chance of getting the UAA approved. Ms. Spalding said it has been frustrating that negotiations are taking longer than expected. Jim Garrard is in Chicago today to try to reach an agreement soon.

Mr. Mercer went over general agreements reached to date on the LTCP. These agreements include:

- The selected plan is Plan 1, Storage and Conveyance.
- The level of control will be 97 percent on Fall Creek and 95 percent on the remaining streams. This translates into an average of 2 overflows per year on Fall Creek and 4 overflows on the remaining streams.
- The implementation schedule has been agreed to, as outlined in Table 7-5, which was provided to the committee as a handout.

Mr. Mercer defined some of the terms used in Table 7-5 as follows:

- Design criteria: What is the size? How big is it (i.e. in gallons)?
- Performance criteria: An example is percent capture. What will the end result be?

- Milestones: Bid year is the year that a project is put out for public bid. Achievement of Full Operation is the year that the facilities are operational and turned back over to the city.

Ms. Perras mentioned that some CSO control measures on Table 7-5 may include several individual contracts and projects that will go out to bid. In this case, the "bid year" will be the first year that a project goes out for bid and "achievement of full operation" will be met when all projects have been completed and put into operation.

Mr. Van Frank and Mr. Strunk asked whether the performance criteria include requirements for ongoing operation and maintenance of the new facilities. Mr. Mercer and Ms. Spalding said the city's permit requirements will cover ongoing O&M requirements after the consent decree requirements have been met.

Mr. Pratt expressed concern that the city's Septic Tank Elimination Program was not enforceable under the consent decree. The city should push EPA to give the city full credit on any money spent on septics, and ensure that CSO improvements are integrated with septic system replacement to ensure we get the most cleanup and human health improvement for the money spent.

Ms. Perras said the city agrees money spent on other improvements should receive credit from EPA. However, the city disagrees with the concept of putting the entire capital program into a consent decree and making it subject to a federal judge's approval.

Ms. Spalding added that the city's septic tank elimination program would not be appropriate in a CD because the city is not legally responsible for pollution from failing septic systems.

Mr. Pratt said he wants the city's commitment in writing so the next mayor will continue the work that Mayor Peterson has begun. Ms. Perras said Mr. Pratt and the city will have to agree to disagree on that issue. Mr. Kupke said he thinks it's a policy issue for the city.

Mr. Kupke asked which of the criteria in the LTCP has pre-eminence if they have to be modified – design or performance criteria? Mr. Mercer said the performance criteria will govern the agreement and the city will have incentives to meet those performance criteria.

Dr. Roper asked if the table showing milestone dates and design/performance criteria will be part of the LTCP. Ms. Spalding said it would be enforceable under the consent decree.

Dr. Roper said the list of projects looks complete except for the solids processing improvements needed at the Belmont treatment plant. The system will fail if solids processing needs are not addressed, he said. Ms. Perras said the project is in the city's capital improvements program but is not on the LTCP list of required projects. Dr. Roper and Mr. Pratt encouraged the city to include the solids processing project in the LTCP list of projects.

Merri Anderson encouraged the city to use the advisory committee as a tool to help the city reach its goals. The committee can be an advocate for action and progress toward clean water goals. Ms. Anderson also asked about wastewater permits and their expiration date. How long is the permit good for? In the past, we operated under an expired permit.

Mr. Mercer and Ms. Spalding said the permit term is five years. The permit that will apply to the LTCP during implementation will be whatever permit is in effect at the time.

Mr. Van Frank asked whether the Fall Creek flow augmentation was an enforceable part of the CD. Ms. Spalding said it is in the LTCP but would not be an enforceable requirement under the CD. Mr. Van Frank and Mr. Pratt expressed concern that flow augmentation be required because it is needed.

Mr. Mercer agreed the project is a good one, but the city prefers to leave it out of the enforceable decree.

Ms. Perras said the city understands the committee's point of view in wanting to see certain projects in the enforceable requirements. However, the city wants to commit to things that need to happen and leave some flexibility for others.

Mr. Method reminded the committee that it wasn't the city's preference to have a CD in the first place. There is already a state and federal permit system that can encompass LTCP requirements. However, we recognize that consent decrees are the current federal approach. The city is making sure that what we agree to is absolutely necessary for federal purposes.

Mr. Pratt again emphasized the need to give the city full credit for addressing failing septic systems. Both Mr. Pratt and Mr. Van Frank expressed concern that the state permitting system lets permits expire without renewal.

Ms. Spalding said the committee's points are valid, but that doesn't mean it's good public policy to include all future projects into the CD and restrict flexibility of future administrations. The city is negotiating in part based on what other communities (i.e. Portland, Milwaukee) have learned from their experiences. People can disagree about trying to govern through consent decrees. We want to make sure that when it's done, we're in compliance with the law, she said.

Mr. Strunk asked about the Riviera Club project's status and the possibility to achieve greater control in order to clean up a large stretch of the White River that is used for recreation and fishing. Mr. Mercer said the city will push to get as much out of that project as it can. However, some overflows will still occur to relieve the sewer system in that area to prevent basement backups.

Post-Construction Monitoring

Mr. Mercer discussed the city's plan for post-construction monitoring. The city will continue to monitor rainfall, CSO activation, and in-stream water quality. Monitoring will be done for one year in each watershed, after completion of all the projects in that watershed. From that information, the city will confirm whether the system is performing as it was designed to. The city will need to demonstrate that the system is designed, constructed and operated correctly, or it will be required to do additional work.

Mr. Pratt asked how the monitoring program will separate out bacteria from urban runoff vs. CSOs. Mr. Mercer acknowledged that while we will see improvements in bacteria levels, other sources of bacteria will prevent us from meeting the state standards during wet weather. Ms. Perras said the city will monitor trends in bacteria levels but cannot commit to meeting the standards.

Mr. Van Frank asked to see the bacteria requirements in the LTCP. Ms. Perras said it would be provided to the committee.

Supplemental Environmental Projects

Ms. Spalding said the federal enforcement policy allows a community to offset part of its penalty with a "supplemental environmental project," or SEP. The city has submitted a proposal with two projects: 1) a $2 million septic tank elimination project and 2) $700,000 for water parks to provide safer water recreation. The city believes the water parks will provide an economical and safer water recreation alternative for kids who might play in the creeks. However, U.S. EPA says it is not an appropriate SEP under its policy.

Ms. Anderson asked if the money would come out of DPW's budget or the Parks Department budget. She and Phyllis Zimmerman said they do not want to see it come out of the Parks budget.

Mr. Strunk asked what the penalty amount would be. Ms. Perras and Ms. Spalding said they could not divulge what penalty amount EPA had requested because it is still being negotiated.

Mr. Van Frank asked if the city talked to the parks department. He would like to see something from Parks that they will maintain them. He said he’s not sure he could support the water park idea because there might be other projects with greater benefit, such as the wetlands project at the fairgrounds. He asked the city to provide a list of possible SEPs and their potential benefit, rather than asking the committee to endorse what the city has already decided upon.

Mr. Kupke said he would prefer that only construction costs for sewers be paid for with the recent rate increase. He thought it might be better to put all the money into STEP projects.

Ms. Spalding said both EPA and IDEM have been supportive of the STEP project. The city proposed water parks because they felt it was important to provide kids a safe place to recreate that they wouldn’t have otherwise. Ms. Perras said the city also looked at the stream use maps to identify where kids were using the creeks for recreation, and where water parks might be located.

Mr. Pratt, Mr. Strunk and others expressed doubt that the water parks would keep kids out of the creeks.

Pam Thevenow said the projects were good ideas but she wondered what other ideas the city considered, such as the wetland at Fall Creek and the fairgrounds. She reminded the committee that if the city builds the parks, people will use them. Summer is brutal when you are poor and can’t escape the heat. She said she might support the water parks, but would like to have a discussion about other options.

Mr. Pratt said he would like to see spray parks and the wetlands project.

Mr. Van Frank asked if the city would operate water parks during a water shortage in the summer months.

Ms. Anderson said there are places farther downstream from Ridenour Park on Eagle Creek that would be a better choice for a water park. She encouraged the city to look at other options and keep advocating for water parks where appropriate.

Ms. Spalding said time was tight to come to agreement with EPA and she didn’t know if another meeting with the committee would be possible to look at other options. A special meeting may be required.

4. Public Comment Period and Outreach Plan

Ms. Perras provided a distribution and outreach plan for the LTCP public comment period.

Mr. Van Frank asked if the city could try to make arrangements with the libraries so it is in highly visible location. Ms. Perras said the city would ask the library about that.

Mr. Strunk asked for longer notice on press conferences in the future and recognition of the committee at those events. Ms. Perras said she will try to provide as much notice as possible.

Mr. Van Frank asked whether the announcement would wait until the CD is in place. Ms. Perras said that was the city’s goal.

Mr. Kupke asked if there would be anything in the LTCP that the committee had not seen before, such as changes from the negotiations with EPA. Ms. Perras said she didn’t think there would be any surprises.

Ms. Spalding thanked the group for its invaluable input. Ms. Perras thanked the group for coming to the meeting.

Other: Mr. Pratt asked when the city would answer the flow augmentation questions that he had asked previously. Ms. Perras said she would try to put the issue on the next agenda.

The meeting was adjourned at 1:30 p.m.

Minutes

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Date: February 28, 2006

Time: 10:00 a.m.

Location: CST Training Room, 151 N. Delaware

Subject: Clean Stream Team Advisory Committee

Participants: Gary Mercer, Mark Jacob, Michael Massonne, Sandyha Markand, Kevin Strunk, Timothy Method, Rosemary Spalding, Mona Salem, Jim Garrard, Jodi Perras, Phyllis Zimmerman, Merri Anderson, Pam Thevenow, Dick Van Frank, Glenn Pratt, Ralph Roper, John Kupke, Vincent Parker, Deana Haworth

1. Welcome & Introductions

Jim Garrard welcomed the group and apologized that he was not able to attend the Feb. 16 meeting. He explained he was in Chicago meeting with the EPA Region 5 Administrator. This special meeting of the CSTAC was called to update the group on key issues.

2. Negotiations with EPA

Mr. Garrard said negotiations with EPA and IDEM are nearing a close. However, the sides have not reached agreement on some key issues. The city, EPA and IDEM have agreed on the level of control, however they have not agreed on the performance criteria that will be used to measure compliance when the plan is complete. The city's computer models are very good, but cannot predict performance to the level of accuracy that EPA is demanding.

Dick Van Frank asked if EPA wants to track the number or quality of overflows.

Ralph Roper asked if it is an average over one year or a period of years.

Mr. Garrard responded that the city has identified a typical five-year window of storm data that will be used to measure compliance. After construction is complete, the model will be run with those five years of data to determine if the city is in compliance.

Rosemary Spalding said that with 130+ outfalls in the city, an overflow at any point constitutes an overflow event.

Mr. Van Frank noted that the city will be eliminating some of the outfalls so there won't be 130 when measurement occurs. He asked if there is any allowance for a very unusual year over the five-year period.

Gary Mercer responded that the model will be run on the five-year period of 1996-2000, which has been identified as having typical rainfall.

Jodi Perras noted that the issue with EPA is that over the five years, there could be no more than 20 events at any one outfall. However, the city is concerned there might be an outfall that shows 21 or 22 when the model is run. It is hard to predict.

Glenn Pratt said that he feels like it is impossible (not hard) to predict. He thought that EPA was okay with using design criteria in other cities.

Ms. Spalding said that they want to use design criteria plus performance criteria in this case.

Mr. Garrard said that EPA wants certainty at the end of the 20-year implementation period.

Mr. Van Frank asked if the number of overflows was based on the model or actual.

Mr. Garrard responded that it is the model adjusted for real time data.

Mona Salem pointed out that the actual data will be impacted by the sizes of actual facilities. The actual size will be put in the model but the precipitation data used will be 1996-2000.

Mr. Van Frank asked if this is based on actual measured overflows at the outfall.

Mr. Mercer said actual data and monitoring after construction will be used to verify the model's accuracy. The model will then be run with the 1996-2000 rainfall data to determine whether the system as built will perform as it should over the long term.

Mr. Strunk asked if the city is supposed to present a model that says 20 overflows during a five year period.

Mr. Garrard said that 20 years from now, we will have a monitoring year. After we build all the projects, the modeling will tell us how they perform. EPA has the potential to require the city to do additional work if we are not in compliance. And we could be out of compliance if one outfall has one extra overflow.

Mr. Mercer said that the goal is to be in compliance at the end.

Mr. Strunk asked why this information is considered confidential.

Mr. Garrard said the city is concerned about talking publicly about the negotiations because it could harm the dialogue with the regulatory agencies.

Mr. Pratt said he was more concerned about overflows in a small tributary than the White River. He also pointed out that a water main break could cause an extra overflow.

John Kupke acknowledged that technology will change and the system will change over time. He compared EPA's requirements to building a house and deciding before the building starts what will be put on the mantle. He also said it will take the city's focus away from septic tanks. How do you bridge this impasse?

Mr. Garrard said that the groups are not at an impasse, but they aren't moving forward much either. The regulators' concern is that you might have 5 overflows where you should have had 4. Their concern is that there might be one or two outfalls that the city would not address. We might be hitting the percent capture performance measure but could allow a couple CSOs to discharge small amounts every time it rains.

Mr. Pratt asked which outfall where? He advocated putting in a pipe to take sewage over to White River.

Mr. Van Frank asked what if Dr. Roper comes up with a great idea in 10 years. Then what can we do?

Mr. Garrard responded that the city would need to convince a judge that it is the right thing to do.

Ms. Spalding said that EPA and IDEM want something that is easy to enforce. The city's goal is that after the projects are completed, we are in compliance.

Dr. Roper said that he understands the city's position. He asked why EPA agrees to different consent decrees elsewhere but not here. He noted that it is not like the city is discharging into Lake Michigan. You would think you could have a less stringent criteria.

Mr. Garrard said that we have low-flow streams.

Mr. Pratt said that their focus is on total volume. They are thinking gallons, not burps.

Dr. Roper noted that the low stream flow is not the issue. He asked if we can think of different criteria that make sense. The model is not perfect either. At the end of the day, it gets down to whether the city is in strict compliance.

Merri Anderson said the issue reminds her of the airport's requirements to do a noise mitigation study every five years. It involves a projection of noise impacts, but it turned out the projections were not correct. Technology will change. Things will change. If you do the best you can do, what is the worst that can happen? They will fine you? That will happen sometimes.

Ms. Spalding responded that the problem is when you put it in the context of the consent decree, you have to worry about what will happen. In other cities, at the end of the 20 years, EPA came back and said it was not good enough and the cities had to build more. We only want to have to do this once. The stakes are high. As a steward of the public trust, we have to be concerned that we are not subjecting the city to a future unknown liability.

Mr. Mercer said that we want to be able to decide in a rational sense. This is the flexibility that we want.

Mr. Pratt pointed out that no one has been thrown in jail. We all helped pay for Milwaukee and Chicago. Even through it wasn't perfect, they still have to do more. There is no way anyone can tell you that you will be in total compliance at the end of 20 years. I have almost never seen people who were going along and doing the right thing get hit over the head. He recommended that the city focus on making major improvements, such as converting all septic systems in 5-7 years.

Phyllis Zimmerman said if we are paying attention along the way, we should know whether we will be in trouble or not.

Mr. Garrard responded that there is a risk to the city. If you have to go back and fix it, it will cost more than if you would have done it during initial construction.

Mr. Van Frank pointed out that in the Clean Air Act, if you build it and operate it according to manufacturer's instructions, you are okay. If you build the tunnel and it is designed properly, that is all you should have to do. There might be some room for improvement.

Mr. Garrard also said that the penalty and supplemental environmental projects (SEPs) is another unresolved issue. The regulators have put a number on the table that is similar to Louisville or Cincinnati. The city feels it deserves a lesser penalty than those cities.

The group discussed the perception of the penalty and the city's desire to direct money toward local water quality improvements, rather than sending it to the federal treasury.

Mr. Garrard reviewed a couple of other issues in the negotiations. First, the city is required to address chronic sanitary sewer overflows (SSOs) under the consent decree. The city has identified seven areas that had an average of 1 or more SSOs for the last four years. The city will address these areas with projects in the Capital Improvement Plan and continue to implement its Capacity Management, Operation and Maintenance (CMOM) program.

Ms. Perras and Ms. Spalding said the city had spent several months working through that issue with EPA and IDEM.

Mr. Strunk expressed concern that the CSTAC hadn't been consulted on these issues during the negotiations. Perhaps one of the committee members might have been able to provide some insight to the city.

Mr. Garrard said if it became obvious to EPA that we talked publicly about this, it could hurt our negotiations.

Mr. Strunk said that there are 30,000 septic systems. Under the plan, in 20 years, 18,000 would be taken off line. He has never seen the map that shows where we are doing it. When will the other 12,000 be taken care of?

Ms. Salem said that the 12,000 are outside concentrated neighborhoods and don't have access to sewer service. The sanitary sewer master plan identifies where new sewer lines need to go. Those areas will be brought onto the sewer system as the city grows into outlying areas.

Pam Thevenow expressed concerns that some township associations are supporting developments with large houses on septic systems rather than developments with smaller homes that are worth less.

Mr. Strunk said that there is a double-edged sword. He doesn't like D4 housing (4 houses per acre). If it takes septics to reduce housing density, that's great.

Ms. Thevenow said that the STEP program makes a world of difference in the effort to convert septic systems to sewers.

Carlton Ray said that there was a public meeting in the past week on a STEP project, and the difference was huge.

3. Role of Advisory Committee

Mr. Garrard asked the group for their input on how the CSTAC should operate and function, specifically as we move into the implementation and construction phase of the city's plan.

Ms. Anderson described her experience with the sanitary sewer standards committee and noted that the city was talking to some of the parties outside of the meetings during that process. She asked whether the city was having similar meetings "off-line" with parties on the CSO issues.

Mr. Garrard said the city does sometimes brief the Chamber of Commerce infrastructure committee and Mr. Ray mentioned the city's briefings with the Industrial Dischargers Advisory Committee (IDAC).

Ms. Perras noted that there are no other groups, with the exception of IDAC regarding some technical issues. The CSTAC is the group the city goes to for feedback.

Mr. Pratt said that he feels the AWT group had been far more influential and had saved the city tens of millions of dollars. When the two CSO committees were combined, the technical focus was lost. For instance, he said he had not had his questions answered on the flow augmentation plans for Fall Creek.

Mr. Garrard said that at this point, there haven't been a lot of technical changes to the city's plan.

Mr. Pratt said that another group was set up to discus flow augmentation alternatives.

Ms. Salem said that the people who were involved in that group were the designers under contract, Black & Veatch and the Corps of Engineers.

Mr. Pratt said that he felt the CSTAC should have been involved in that work. He said there is a subgroup of the CSTAC that would like to be more involved in technical issues.

Mr. Van Frank said that in the past some members of the group had been involved in technical issues. Where we are now is some of the implementation and legal problems. He understands that the city will need all the friends they can get.

Mr. Van Frank said that the Feb. 16 presentation on supplemental environmental projects was a good example of how the CSTAC had not been used effectively. He said he had attended a parks meeting and learned that splash park discussions had been going on for 6-7 months.

Mr. Van Frank said he appreciated the fact that the CSTAC had gotten some details at this meeting on where the city stands on negotiations. He said that this is what the CSTAC needs in the future.

Mr. Strunk said he was concerned that some members don't show up. Some of those people may need a phone call to bring them back to the meetings. He is also concerned that the city was having internal discussions about SEPs without consulting the CSTAC.

Mr. Garrard acknowledged that the city should have discussed the SEP ideas with the CSTAC. He also asked whether the committee had the right mix of people. Can we get anything done with technical, policy people and financial people all involved? He also expressed concern about requiring staff to attend too many meetings.

Sandyha Markand said she doesn't know who is represented and who represents who at the CSTAC meetings.

Mr. Garrard said that the city would redistribute a list of the members and who they represent.

Mr. Kupke said he has participated in this from the perspective of a citizen of Indianapolis and tries to weigh what is the best interest of the community. While each member represents his or her own background, we are citizens first.

Ms. Anderson said that she is there to represent MCANA. Her main reason for being here is representing citizens. She feels like the group is not an advisory group but has become a group of individual advocates. She feels like it is a dog and pony show a lot of the time. She needs the opportunity to say things and do things that are different than what the city wants. MCANA is more interested in policy than in technical issues.

Ms. Thevenow asked whether the CSTAC would eventually be done with its work. What is the role of the advisory committee in the implementation phase? Is it a matter of following up on the things we agreed on?

Mr. Ray said the city's plan has benefited from the involvement of the committee. The holistic approach was adopted as a result of the committee's work. The original focus was just on CSOs, but based on the group's comments, it was expanded. The group needs to be commended for that.

Mr. Van Frank said that he appreciates Carlton's comments and agrees with John. He is not here as IKE, he is here as a citizen. He suggested a quarterly meeting with all interested parties and technical meetings more frequently.

Vincent Parker said that he feels that all of us have a lot of investment into making this plan successful. That will need healthy attention and focus as implementation occurs. He knows it is the city's job to seek wise counsel on this, but we need to make sure we all feel listened to. We need some accountability as projects are moving forward, good information on what is going on and what is not going on.

Dr. Roper said that he doesn't see any dramatic need to make changes in format or composition in this committee. It would become an administrative burden. Engineers in general can benefit from this and can benefit from other groups. It is helpful for engineers to hear from some who are environmentalists. And this is a great committee from that perspective. He feels that the CSTAC needs to be drawn into the projects in some fashion. The CSTAC has the opportunity to act as an advisory committee during the consent decree. There are some straightforward ideas that could bridge the gap. At the same time the CSTAC can move forward and move with the program.

Mr. Garrard said that these are great comments. He does agree there is benefit to a diverse group here.

Mr. Pratt said that he would like to see the city reopen the wetlands proposal at the fairgrounds. He thinks it would also be good to consider the water parks. He likes the idea of having public education, such as pill collection programs.

Ms. Anderson said she thought it would be helpful if the group developed an expectation statement. Then it can be revisited and make sure everyone knows what the expectations are.

4. Adjourn

Mr. Garrard thanked everyone for their input. The meeting was adjourned.

Meeting Minutes

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Date: 3/30/06

Time: 11:30 am to 1:00 pm

Location: Clean Stream Team Training Room

Subject: Clean Stream Team Advisory Committee

Participants: Gary Mercer, Mark Jacob, Bill Beranek, Cartlon Ray, Sandhya Markand, Tim Method, Kevin Strunk, Rosemary Spalding, Jim Garrard, Jodi Perras, Margie Smith-Simmons, Merri Anderson, Phyllis Zimmerman, Pam Thevenow, Dick Van Frank, Glenn Pratt, John Kupke, Deana Haworth

File Control Code: WWPM\7000\7500\CSTAC LTCP Comments & Responses

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The Indianapolis Clean Stream Team Advisory Committee held a special meeting on March 30, 2006, to provide comments on draft versions of Sections 7, 8 and 9 of the Indianapolis Long-Term Control Plan and Water Quality Improvement Report. Below is a summary of the comments received – both in writing and at the meeting – and the city's responses to each:

Section 7 (Selected Long-Term Control Plan)

1. I've closely examined the annual event frequencies shown in Figure 7-12. As stated, the long-term average of the model results for the 54 years is 4 for White River and tribs, and 2 for Fall Creek. The 5-year average event frequencies for the "representative period" of 1996 - 2000 are close to these long-term averages (4.2 and 2.6), but not exactly. Have the tunnel volumes have been increased slightly so that event frequencies for 1996 - 2000 now equal 4.0 and 2.0? Alternatively, does the CST envision selecting a different 5-year period (such as 1991 - 1995) where the event frequencies indeed averaged 4 and 2? (Roper)

Response: Since the development of Figure 7-12, approximately $30 million has been added to the LTCP cost. This additional cost is for larger CSO control facilities to ensure the ability to meet the performance criteria for the representative precipitation period of 1996-2000 via the modeling application agreed upon by the city and USEPA. To account for this, the CST will update the overflow frequency analysis and redraft Figure 7-12 and other overflow frequency figures to show 4.0/2.0 for the 1996-2000 period. The CST has reviewed the 1996-2000 precipitation period and found it consistent with a typical year. At this time, the CST has not reviewed 1991-1995 or other five-year periods within the 54-year record and does not envision selecting a different period.

2. The item that jumped out at me in the LTCP was the condition that Indy would not move beyond the 14 projects (I assume these were the early action projects) unless the water quality standards were revised. I understand the logic but the breadth of the statement caught me and seemed to undermine the commitments and the plan's credibility. (Neltner)

Response: The 14 projects listed do not depend upon the ultimate level of control in the LTCP (for example, 95 percent or 97 percent capture). EPA and IDEM have acknowledged the city's concern about being required to start construction on the remaining projects if the

UAA is not complete, meaning the ultimate level of control has not been decided. In other words, we shouldn't start digging a tunnel or installing relief sewers if we don't know how big they need to be. We remain committed to the plan, but want to make clear that its successful completion is tied to timely decisions on a UAA and revised water quality standards. IDEM and EPA have assured us that they understand the time constraints and intend to make a decision within this timeframe. However, we understand your concern with language the city would "cease implementation." New language is being negotiated that will allow the city to assert a "force majeure" event and seek a schedule modification if the level of control is not decided in a timely manner.

3. On page 7-4, under early action projects, the screens installed in Fall Creek were not mentioned even though they are mentioned in the projects list. Also, under dam removal, it should be mentioned that the streams would possibly need to be dredged. (Van Frank)

Response: We will add the screens at CSOs 62 and 135 on Fall Creek to the list of early action projects. The projects are shown on Table 7-1. Dredging is anticipated in the future but will depend upon how the streams react to the new infrastructure. When the dams are removed, issues regarding dredging also will need to be decided by the appropriate regulatory agencies, including U.S. Fish & Wildlife, the U.S. Army Corps of Engineers and the Indiana Department of Natural Resources.

4. On page 7-32, near the bottom of left-hand column, it says that the city will not begin construction of some projects until the UAA or some other legal mechanism is complete. Is this legal mechanism the consent decree? (Van Frank)

Response: No. This statement leaves open other possibilities that would allow the LTCP to meet water quality standards, other than a UAA. The consent decree is not the appropriate legal mechanism because after its requirements are met, the city still would not meet the current water quality standards. A change to the water quality standards is necessary, either through a UAA or other legal mechanism such as a permit or IDEM rule-making.

5. On page 7-28, the document reads ''the watershed improvement projects are designed to reduce E. coli bacteria discharges to the White River through both CSO Control Measures and watershed improvement projects.'' The watershed improvement projects should be outlined in more detail somewhere in the document. (Van Frank)

Response: Watershed improvement projects include streambank restoration and flow augmentation. Streambank restorations are designed to address chronic bank erosion to protect property and restore, to the best extent practical, the natural riparian habitat environment for aquatic life protection. Because these projects involve work within the stream floodway limits, special permitting will be required from regulatory agencies. Depending on the extent of the proposed projects in relation to the existing conditions, these could include IDNR, the US Army Corps of Engineers, and the US Fish &Wildlife Service. Each project will be site-specific and will require public input that helps define project scope. As such, providing more detail on specific projects at this time is not practical. These will be defined as results from the improvements associated with the CSO LTCP are measured. Similarly, for flow augmentation projects, special permitting and public input will be key and must be coordinated with the LTCP implementation.

6. The solids processing improvements needed at the Belmont treatment plant should be on the list of LTCP projects. The system will fail if solids processing needs are not addressed. (Roper and Pratt)

Response: The solids processing project is in the city's capital improvement program but is not on the LTCP list of required projects.

7. The fairgrounds wetlands and Devon Creek projects should be included in the watershed improvement projects list. (Van Frank and Pratt)

Response: There are a number of projects that could be included in the list of watershed improvement projects. For inclusion in the long-term control plan, the city decided to focus on projects having system-wide or multiple stream benefits, such as septic tank elimination, flow augmentation, dam removal and streambank restoration. Projects specific to a single stream were not included but will be considered on their own merits within the city's overall capital improvement plan. Difficulties with land acquisition and project financing have prevented the fairgrounds wetlands project from proceeding at this time.

Section 8 (Post-Construction Monitoring Program)

8. For the post construction monitoring program, it would be good form to include BOD, TSS and ammonia analyses at a few locations for some reasonable period of time (maybe during the 12-month recalibration period) to serve as a comparison with current data. After implementation of the LTCP, the concentrations of these pollutants should be much more dilute than currently measured because the bulk would generally be captured in the first flush. This would provide another measure of success for the completed LTCP. (Roper)

Response: We agree that BOD, TSS and ammonia concentrations should improve as a result of LTCP implementation. While we agree they are useful measures of success, we did not think they were a necessary part of the EPA-required post-construction monitoring program. We will consider these comments when we prepare reports to the public on improvements in water quality as a result of LTCP implementation..

9. On page 8-2, the LTCP refers to the documents used in analyzing baseline conditions, including a comprehensive watershed assessment. Is that assessment out of date? If it will be updated, the document should say so. (Van Frank)

Response: The assessment was conducted in 2001 and 2002. However, it is useful in establishing the pre-2002 baseline conditions before major sewer improvements began. The city will continue to assess conditions and update the watershed assessment as the plan is implemented.

10. The document notes 19 locations where CSOs are monitored, but that may change over time. Is there flexibility to change monitoring over time?

Response: Yes, the document notes that monitoring locations or methods may change with notification and approval by EPA and IDEM.

Section 9 (Use Attainability Analysis)

11. The UAA in Section 9 reads well and makes good sense. Nice job. (Roper)

Response: Thank you.

12. Regarding the UAA [PowerPoint presentation], on page 4, item #2 is missing. I assume it is the bullet point. Point #3 seems out of place. It is left unexplained on the page while the

other items are explained. And how does it fit with the heading paragraph. Also, it should reflect the exact language from UAA criteria 6. (Neltner)

Response: Yes, item #2 is the bullet point you noted. There was a numbering error on the slide. This slide was intended to indicate the three factors upon which the UAA is based. Item #3 indicates that the financial factor was one of them. The UAA itself (Section 9 of the LTCP) provides greater explanation and uses the exact language from UAA Criteria 6.

13. Regarding Page 7, is the City saying that the maximum streamflow in the CSO area is too high? It seems that it is pretty low compared to the sections downstream. Doesn't Factor 2 only come into play just upstream of the county line? (Neltner)

Response: As noted in the city's Existing Use submittal to IDEM in April 2005, USGS staff generally do not wade in White River at the Morris Street gauge to take flow measurements above 540 cfs. IDEM agreed in its decision letter that stream flows above the 3-month storm (595-2550 cfs) were not safe for recreation. Although flow is generally higher downstream of the CSO area, the White River streamflow within the CSO area ranges from 595 to 1180 cfs and is above 540 cfs.

14. Regarding Page 8, is 500 cfs in the CSO portion of Fall Creek sufficient to trigger Factor 2? (Neltner)

Response: As noted in the city's Existing Use submittal to IDEM in April 2005, USGS staff generally do not wade in Fall Creek at the Millersville gauge to take flow measurements above 340 cfs. IDEM agreed in its decision letter that stream flows above the 3-month storm (500-685 cfs) were not safe for recreation.

15. Regarding Page 10, I am confused why the term "widespread" is not being used. It is an essential part of Factor 6 but keeps getting omitted. (Neltner)

Response: The term "widespread" is used within Section 9 of the LTCP when Factor 6 is described. It should have been included in this PowerPoint presentation, as well.

16. The Septic Tank Elimination Program should be included as part of the consent decree. There is limited money and I would hate to see the CSO work done and not fix the septics that effect more kids. (Pratt)

Response: The city is strongly committed to the Septic Tank Elimination Program, through which the city now funds new sewer construction in neighborhoods served by septic systems. However, we do not believe the STEP program should be included in the federal consent decree. From a legal perspective, it would not be appropriate because the city is not liable for pollution from failing septic systems. More importantly, from a.policy perspective, the city would lose the ability to manage and schedule its own construction projects if the entire STEP program were under the control of EPA and a federal court.

17. What about the human-caused conditions that the city has no control over, such as farms and upstream wastewater treatment plants? (Van Frank)

Response: The analysis regarding human-caused conditions is based upon the hard surface area within Marion County that generates polluted stormwater and the combined sewer system itself. The UAA demonstrates that those conditions cannot be fully remedied without causing greater environmental damage than leaving them in place. The UAA does not seek to address all the human-caused conditions in the watershed, but only those that apply during the large storm events when CSOs will still occur. At this time, the UAA does not seek relief during smaller storm events when CSOs will be captured, but stormwater will still cause exceedances.

18. Natural flow conditions can and should be addressed. Where there is not enough flow in the streams, water can and should be added. (Anderson)

Response: The city's flow analysis is not based on low flow conditions during dry weather, but very high flow conditions during storms when CSOs will occur. To address the low-flow conditions in many tributaries, we are exploring various options to provide supplemental flow to those streams.

19. The city should be spending its money on other priorities. For example, the city should spend less money controlling CSOs on White River and devote more money under the federal consent decree to eliminating septics. (Pratt)

Response: EPA initially demanded an overflow frequency of two per typical year on Fall Creek and Pogues Run and three per typical year on the remaining streams. In no case did they say they would agree to less than four overflows per typical year. The city believes its plan falls at an acceptable level of control based upon regulatory agency requirements, cost-effectiveness, affordability, constructability and public input. The city has many other projects in its capital improvement plan. We are strongly committed to the Septic Tank Elimination Program. As stated earlier, we do not believe it is in the public interest to commit in a federal consent decree that would limit our flexibility in managing our capital improvement program.

20. Has the city done an analysis of eliminating septic systems and the impact on baseload and water quality? (Strunk)

Response: Yes, the city's analysis has been shared with the committee previously. If we eliminate failing septics, we expect exceedances of the bacteria standard to be reduced significantly during dry weather. However, urban stormwater runoff and upstream sources likely will continue to prevent the White River from meeting the standard during wet weather, even after CSOs are controlled.

21. Is the UAA a question of the standard or the use? Are there other water quality standards beyond E. coli we need to be concerned about, such as salt, arsenic or ammonia? (Beranek)

Response: The UAA is only based upon the recreational use and *E. coli* standards. We do not believe the other uses or parameters will be impaired by CSOs after the plan is implemented.

22. Is this a permanent change to the standards? (Beranek)

Response: The UAA must be reviewed every five years to make sure its conclusions still apply.

23. Is the UAA a state decision? How is EPA involved? (Beranek)

Response: The UAA is submitted by the state and must be approved by U.S. EPA before the standards and use can be changed.

24. Has the city updated the Stream Reach Characterization and Evaluation Report (SRCER)? (Van Frank)

Response: The SRCER was updated in June 2003. The analysis within the TMDLs and LTCP reflects baseline conditions prior to the initiation of major CSO improvements, which is appropriate. Stream assessments will be updated by watershed as the LTCP is implemented.

25. Re-order the documents that support the UAA so they are listed in the order of usefulness. (Beranek)

Response: Thank you for this suggestion. The list will be re-ordered as follows:

- SRCER (initial submittal and 2003 update)
- TMDL Studies
- Existing Use Determination
- LTCP
- CSOOP

26. Why are historic sites listed on a map within the UAA? (Anderson)

Response: The historic sites are part of the city’s basis for seeking relief based upon social and economic impacts. The only way to eliminate CSOs would be through sewer separation, which would have a detrimental affect on the historic sites within the combined sewer area.

DRAFT Minutes

INDIANAPOLIS
CLEAN STREAM TEAM

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Tel. (317) 327-8720
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Meeting Date: July 13, 2006

Time: 11:30 am to 12:45 pm

Location: Clean Stream Team Training Room

Subject: Clean Stream Team Advisory Committee Meeting

Attendees: Dick Van Frank, Ralph Roper, Bill Smith, Margie Smith-Simmons, Jodi Perras, Kumar Menon, Jim Garrard, Rosemary Spalding, Tim Method, Vince Parker, Dave Voelker, Carlton Ray, Kevin Hardie, Mark Jacob, Kevin Strunk, Jhani Laupus, Todd Cavendar

File Control Code: WWPM\7000\7500\CSTAC Meeting Minutes 7.13.06

Introductions

Jodi Perras welcomed the group and asked everyone to introduce themselves. Jim Garrard introduced the new DPW Director, Kumar Menon. Also, Bill Smith of CMID joined the committee for the first time as a new member.

Minutes of March 30 Meeting

Ms. Perras said the minutes from the March 30th meeting include the comments received from the committee on Sections 7-9 of the plan, and the city's responses. There were no additions or corrections to the minutes.

Update on LTCP Negotiations and Committee Questions

Mr. Garrard reminded committee members that the last time the committee met, the city was down to just a handful of remaining issues with EPA. Rosemary Spalding and Mr. Garrard traveled to Chicago for a meeting at the end of June to discuss the final issues with higher-level EPA managers. As a result of that meeting, the city has worked out a tentative agreement with EPA on the LTCP. The city will not sign or set anything in stone until the public has a chance to comment on the plan. The mayor plans to release the plan for public comment on July 19. The CSTAC will be invited and the mayor wants to recognize their efforts during the press conference, Mr. Garrard said.

Mr. Garrard said the final issues included EPA's approval of the plan and the need to acknowledge the variability in model predictions in determining final compliance. Satisfactory agreements were reached on both issues. EPA also agreed to include a process for determining compliance if every outfall does not meet the targets of 2 overflows per typical year on Fall Creek and 4 per typical year on the remaining waterways.

The plan will be released for a 30-day public comment on July 19. It will be available on CD-Rom, the city's Web site and in public libraries. The city will compile the comments received and respond to them.

After the public comment period, the plan will be finalized and submitted to EPA and IDEM for approval. The agencies will then file a complaint in U.S. District Court with the proposed consent decree, which will have the LTCP as an attachment. There will be a separate 30-day comment period on the consent decree, once the complaint is filed in federal court.

Dick Van Frank asked how the Use Attainability Analysis (UAA) fits into LTCP. Ms. Spalding said the UAA would be submitted with the LTCP as the last section in the document. The city will work with IDEM to provide any additional information needed to complete the UAA. When IDEM determines the UAA is complete, they will put it out for a separate public comment period.

Mr. Van Frank pointed out that there could be a long period of time before the UAA is resolved. Mr. Garrard said IDEM and EPA have five years to make a decision. Ms. Spalding said IDEM has agreed in the consent decree that it would act expeditiously to review our UAA. Within 270 days of when the UAA is deemed complete, IDEM will make a decision one way or the other. If they approve it and go through rulemaking, that will have to be done in 5 years. The five-year window is based on the need to know the ultimate level of overflow control before starting to build a tunnel or new sewer interceptors.

Mr. Van Frank asked whether planning of big projects is dependent on approval of UAA. Carlton Ray said planning and design do require understanding of the level of control. Mr. Garrard said the agencies will have more than enough time to make a UAA decision.

Ralph Roper asked whether discussion with IDEM on the UAA have been favorable so far. Ms. Spalding said the legislation passed by the Indiana General Assembly (Senate Enrolled Act 620) has helped. Also, IDEM has already received a draft of the UAA section and has offered no negative reaction. The city is using three of the six federal factors under which a UAA can be approved. Ms. Spalding said the city has discussed these factors with both IDEM and EPA, and so there should be no surprises for the agencies..

Mr. Van Frank asked whether the state rules to implement SEA 620 need to be in place prior to getting approval of the LTCP. Ms. Spalding said the rule does not have to be promulgated; IDEM has authority now to do UAAs and propose revisions to water quality standards. The statute gives IDEM authority to issue guidance and procedures, but is not necessary for this to occur.

Mr. Garrard said the consent decree also will require the city to address sanitary sewer overflows in any area that has more than one overflow event per year over a four-year period. Seven locations have been identified, at a cost of about $50 million over 10 years. The city once had 16 constructed SSO overflow locations. All but three have been eliminated. The consent decree will require elimination of the remaining three constructed SSOs and work to address four additional locations with chronic overflows.

Carlton Ray reviewed the list of SSO projects, which was projected on a screen. The first three involve elimination of the constructed SSOs at Lift Station 405, 403 and 115. Other projects include Sanitary Basin 41 improvements in a neighborhood near Stop 11 and County Line Road. The neighborhood includes a leaky sewer system the city took over. The project includes rehabilitating sewer infrastructure, sliplining and upgrading the lift stations. Another project involves rehabilitating four pumps and adding a fifth pump at the Buck Creek Lift Station in east Marion County. A private developer also will install a parallel interceptor at 10th and Post Road to address a bottleneck in that area. The seventh project involves construction of a Castleton Relief Sewer, which was designed in the 1990s but never built.

A description, budget and timeline for each project is shown below:

	SSD Control Measure[1]	Asset ID	Current Capacity-Related SSD Location of Event[2]	Control Measure Description	Estimated Cost	Critical Milestones[3]
1	Elimination of Engineered SSO 124	LS 405	6514 CREEKSIDE LN	Lift station replacement with gravity sewers, lift station upgrades, inflow and infiltration reduction.	□4,240,000	Bid Year □2006 Achievement of Full Operation □2008
2	Elimination of Engineered SSO 105	LS 403	7002 FALL CREEK RD	Lift station replacement with gravity sewers, lift station upgrades, inflow and infiltration reduction.	□1,870,000	Bid Year □2006 Achievement of Full Operation □2008
3	Elimination of Engineered SSO 113	LS 115	8440 WOODBURN DR	Extension of force main and lift station upgrade.	□1,900,000	Bid Year □2006 Achievement of Full Operation □2008
4	Sanitary Basin 41 Improvements	410414	8421 ROYAL MEADOW	Sewer rehabilitation, inflow and infiltration reduction.	□900,000	Bid Year □2007 Achievement of Full Operation □2009
5	Sanitary Basin 41 Lift Station Upgrades	410441	926 W RALSTON RD	Lift station upgrades.	□2,090,000	Bid Year □2007 Achievement of Full Operation □2009
6	East Marion County Regional Interceptor Improvements	460002	10802 E TROY AVE	Local interceptor improvements, lift station upgrades, inflow and infiltration reduction.	□19,400,000	Bid Year □2008 Achievement of Full Operation □2015
7	Castleton Relief Sewer	130049	7601 BROOKVIEW LN	Relief Interceptor adjacent to the existing Castleton Interceptor alignment.	□20,000,000	Bid Year □2010 Achievement of Full Operation □2013
				Total Cost	**$50,400,000**	

Mr. Garrard said all seven projects were already planned by the city. The consent decree moved up the timing on some of them.

Ms. Spalding said EPA was surprised that Indianapolis has done a good job with SSOs compared to many communities. "They had the expectation that we would be in a lot worse shape than we are and were pleasantly surprised. That is a credit to all the work that has been done," she said. Mr. Ray noted that Cincinnati and St. Louis have sanitary sewer backups with almost every rainfall.

Dr. Roper asked whether the 75 mgd pump station installed at the Southport plant last fall had provided relief to SSOs. Mr. Ray said the city hasn't had any overflows since the work was completed. United Water is also using operational changes (such as keeping the wet well level low) to reduce overflows.

Mr. Van Frank asked whether there would be supplemental environmental projects included in the consent decree. Ms. Spalding said the decree would require $3.5 million to be spent on septic tank elimination projects -- $2 million to offset part of the federal penalty and $1.5 million to offset the state penalty. Mr. Ray pointed out that the SEP requirements do not allow the city to obtain low-interest loans or state/federal grants on those projects, so they will be financed by local dollars only.

Mr. Van Frank asked when the public hearing would be held. Ms. Perras said the city was planning to hold the hearing in the evening in the Public Assembly Room of the City-County Building. Mr. Van Frank discouraged the city from holding the hearing in a building that would require going through a security screening because it would discourage people from attending. Kevin Strunk also encouraged the city to avoid downtown for the hearing.

Remarks by New DPW Director and Discussion

Kumar Menon said he was taking some time to get to know the department since his appointment earlier this year. He thanked Mr. Garrard for staying in the job to finish negotiations with EPA. He also thanked the committee for its commitment to helping the city with these issues.

Mr. Menon said his background is in education, the environment and economics. He used to teach economics at IU, IUPUI, and Indiana Wesleyan. He also has run a business.

As DPW's Deputy Director for Public Policy and Planning, he studied the department and its partnerships with other organizations. He also has knowledge of the operations side of DPW, where he used to run the solid waste division. "Engineering is a group that I hadn't worked with very much," he said. "I really look forward to working with this advisory committee. As long as you would like me to attend these meetings, I would love to attend."

Mr. Garrard noted that the city needs to address what the group's function should be and how the group wants to stay informed and involved during the plan's implementation.

Mr. Van Frank said the city has a good model in the AWT advisory committee, which is a small group that has functioned very well for 12 years.

Mr. Garrard said there may be a small group that is interested in the technical details that would meet more frequently, and another group that would meet less frequently to review the big picture of plan implementation. The city will be required to report progress to EPA every six months. Perhaps the larger committee could meet every six months to review the progress report.

Ms. Spalding pointed out that as the plan goes forward there will be a continued need to do public outreach. This group has been a good barometer and advisor on neighborhood issues and the rate increase. She also pointed out that many members of the CSTAC represent organizations. She encouraged committee members to share their involvement and thoughts on the plan with their respective organizations and businesses.

Mr. Strunk pointed out that several committee members have not attended meetings recently. He suggested having a wrap-up meeting on the plan that would include a nice event for committee members who have been involved. He also suggested reaching out to those individuals to encourage more involvement.

Mr. Garrard suggested holding a meeting and reception in the evening for the committee. The goal of the event would be to help committee members understand what is happening and what they should be seeing as things go forward, and also to have some sort of a thank you.

Update on Capital Projects and Committee Questions

Mr. Ray gave a brief update on the city's Capital Improvement Plan. He pointed out that the rate increase passed last fall will be sufficient to fund projects through 2008. Another rate increase will be necessary by 2009 to fund projects in that year and beyond.

Mr. Van Frank asked whether the city would include sediment removal and wetlands work on the Boulevard Dam Removal project. Mr. Ray said the city was working with DNR, IDEM and the U.S. Army Corps of Engineers to determine the best way to address the sediments behind the dam and wetlands issues.

Mr. Ray also gave an update on the new sanitary standards, which developed over the past two years and passed on July 12 by the Board of Public Works. The standards are what developers must follow in designing and construction sanitary sewers. The city will conduct outreach to the developers over the next few months and they will go into effect in November 2006.

Mr. Strunk asked if the city had seen a letter to the editor complaining about a DPW sewer project cutting into a wooded area in Rocky Ripple. Kevin Hardie said he believed the letter appeared in NUVO. Mr. Strunk said the woods are highly valued by the community and are along the canal path. Margie Smith-Simmons said she hadn't seen the letter from the city's press clipping service, but thanked the committee for letting the city know about the issue.

The meeting was adjourned at 12:45 p.m.

City of
Indianapolis
Bart Peterson, Mayor

City of Indianapolis
Combined Sewer Overflow Long-Term Control Planning
Summary of Public Education Sessions

CROWE CHIZEK

Prepared by
Crowe Chizek and Perras & Associates
July 2000

Introduction

Indianapolis is among some 1,000 cities nationwide and 106 communities in Indiana with combined sewers that overflow into rivers and streams during rain storms or snow melt. In Indianapolis, these overflows send raw sewage, human waste, toilet paper, disease-causing bacteria, viruses, and other pollutants directly into our waterways, causing these streams to exceed water quality standards for dissolved oxygen and bacteria. State and federal regulations require the City of Indianapolis to develop a long-term control plan for controlling these sewage overflows and meeting water quality standards.

Public participation is an important part of the long-term planning process for controlling combined sewer overflows (CSOs). Through public participation, the City of Indianapolis plans to educate citizens on the problem and the city's options, and to seek their feedback on such key issues as level of control, cost, and priority areas. The planning process includes:

1. The release of a comprehensive report on the city's options for controlling combined sewer overflows
2. The formation of a Combined Sewer Overflow Advisory Committee
3. The creation of a special website and telephone hotline for accessing information on the sewage overflow issue
4. A series of public education meetings throughout the community
5. A series of public input sessions to get citizen feedback on key issues and options
6. Development of a draft long-term control plan
7. A public hearing on the draft long-term control plan
8. Development of a final long-term control plan for submission to the Indiana Department of Environmental Management and U.S. Environmental Protection Agency

This document summarizes public participation activities conducted during July 2000, culminating in the public education sessions noted in step 4 above. It describes the city's activities and summarizes citizen questions and comments received during the first phase of the CSO public participation process.

Initial Announcement

On July 11, Mayor Bart Peterson held a press conference along Pleasant Run on the city's east side to release a study outlining options to clean up the city's rivers, creeks and streams. The mayor also announced plans to form a Combined Sewer Overflow Advisory Committee. He urged citizens to help evaluate the alternatives during a series of public meetings and forums. "At the dawn of the 21st Century, it is simply unacceptable for this city to continue releasing sewage into our waterways at such an alarming rate," the mayor said in a press release. "The federal government is pushing cities to fix the problem, and I agree that action in Indianapolis is long overdue." The study represented seven years of research conducted by the city Departments of Public Works and Capital Asset Management and a team of private consultants. In a press release, the mayor announced a schedule for upcoming education meetings, public input sessions, and advisory committee meetings. The press conference was covered by all local news media outlets, including the Indianapolis Star; television stations WRTV, WISH, WTHR, and WXIN; radio station WIBC; and other news organizations. Press clippings associated with this announcement and other CSO-related activities are attached to this document.

Advisory Committee

On July 24, Mayor Peterson named an advisory panel to help gather public input on the sewage overflow problem. The committee represents neighborhoods, business leaders, engineers and other community leaders. The purpose of the committee is to:

1. Review the consultants' report on the city's options for controlling combined sewer overflows and improving water quality in Indianapolis;
2. Review opinions and feedback received from Marion County residents during a three-month public participation process; and
3. Advise the mayor on how the city should proceed in developing a long-term control plan for combined sewer overflows.

Committee members are Merri Anderson, Marion County Alliance of Neighborhood Associations; Leon Bates, Mapleton-Fall Creek Neighborhood Association; Bob Bowen, CEO, Bowen Engineering; Thomas Cobb, attorney and utility law judge, Indiana Utility Regulatory Commission; Rachel Cooper, president, Southeast Community Organization; Dennis Charles, accountant, John J. Madden & Co.; Daniel Fugate, chairman, Westside Cooperative Organization; Stu Grauel, Indianapolis Power & Light; Bruce Jacobs, president, Near Eastside Community Organization; Gary Koss, president, Laborers International Union, Local 120; Don Murray, facilities management, Eli Lilly & Co.; John S. Myrland, president, Indianapolis Chamber of Commerce; Mark Sneathen, project engineer, RQAW Corp.; and Kevin Strunk, president/geologist, Wabash Resources & Consulting.

Advisory committee meetings have been scheduled on July 24, August 2, August 28, September 14 October 12, and November 15.

Information Repositories

The city used three methods to give citizens easy access to information on the combined sewer overflow issue: public libraries, a website, and a dedicated telephone hotline. Copies of the city's study were placed in all 25 Indianapolis-Marion County Public Library branches, along with a schedule of public meetings. In addition, the city created a special website (www.indygov.org/dpw/cso) for accessing information on sewer overflows. The website includes: a downloadable copy of the city's CSO study in PDF format, a downloadable copy of a 16-page CSO Decision-making Guide (a condensed version of the study), public meeting dates and times, related links to the U.S. Environmental Protection Agency and Indiana Department of Environmental Management, and a feedback form for citizen comments and questions. Finally, the telephone hotline (706-2622) includes recorded messages with the dates, times and locations of upcoming public meetings, as well as how to obtain written materials on the sewage overflow issue. Citizens also can leave recorded comments or questions on the hotline.

Public Education Sessions

From July 24-31, the Departments of Capital Asset Management and Public Works hosted six public education meetings throughout Marion County to explain the options outlined in the consultants' report and to answer citizens' questions. Meeting sites were selected to ensure that most Marion County residents were within a 15- or 20-minute drive of at least one meeting location.

Meetings were advertised in two press releases from the mayor's office, on government cable Channel 16's calendar of events, as well in a mailing to 600 neighborhood associations, environmental groups, organizations, and elected officials, including state legislators and township assessors and trustees. Mailings also were sent to officials in the excluded cities of Lawrence, Beech Grove and Greenwood, who receive sewage treatment services from the City of Indianapolis. The city also included CSO information in quarterly sewer bill inserts sent to 240,000 residents during July and August. The inserts included a reference to the website and telephone number, where a schedule of meetings was available. Meetings were well-publicized in The Indianapolis Star, local television and radio newscasts, and smaller neighborhood newspapers. DCAM and DPW officials also gave CSO presentations to the city's Board of Asset Management and Public Works, City-County Council committees on public works and capital asset management, the Indianapolis Chamber of Commerce, and other organizations.

In all, 164 people attended at least one of the education sessions. A session-by-session breakdown is shown below:

Date	Time	Location	Attendees
July 24	2:30-4:30 p.m.	Near Northside (2450 N. Meridian St.)	54
July 25	7-9 p.m.	Northwest (5665 Lafayette Road)	26
July 26	7-9 p.m.	Southwest (5401 W. Washington St.	23
July 27	7-9 p.m.	Southeast (6500 Southeastern Ave.)	20
July 29	9-11 a.m.	Downtown (200 E. Washington St.)	13
July 31	7-9 p.m.	Northeast (7701 Allisonville Road)	28

A 16-page booklet summarizing the key issues and options was prepared to guide citizens through the CSO education sessions. Both English and Spanish versions of the booklets were available. (A copy is attached to this report.) The education sessions also included a 70-minute Powerpoint and video presentation by Dr. B.J. Bischoff of Crowe Chizek, a nationally known public policy facilitator and trainer, and Jodi Perras of Perras & Associates, an Indianapolis environmental communications and policy consultant. A copy of the Powerpoint presentation is attached to this report. The presentation covered the following general topics:

1. What are combined sewer overflows?
2. Where are Indianapolis' sewer overflow points?
3. What happens to the waterways when our sewers overflow?
4. Why were our sewers built this way?
5. What other sources of pollution affect our waterways?
6. Indianapolis is not alone: almost 1,000 U.S. cities have CSOs
7. What is being done to fix the problem?
8. What are Indianapolis' goals for fighting sewage overflows?
9. Strategies for CSO control: Capture and storage of more combined sewage in the current sewer system
10. Strategies for CSO control: Expanding wastewater treatment plants
11. Strategies for CSO control: Building new storage tunnels or tanks to capture wastewater volume
12. Other water quality improvement options: Converting septic systems to sewers
13. Other water quality improvement options: Industrial pretreatment
14. Other water quality improvement options: Infiltration/inflow reduction
15. Other water quality improvement options: Stormwater management
16. Other water quality improvement options: Streambank restoration
17. Other water quality improvement options: Pollution prevention
18. Key Issue: How much sewage control should Indianapolis choose?
19. Three possible overflow targets: 12-, 7- or 4-storms/year
20. The benefits of the three possible targets
21. The costs of the three possible targets
22. How costs will affect monthly sewer bills during the first five years of a 20-year project
23. Key Issue: What sensitive areas along our streams deserve priority attention?
24. Oxygen problems along White River and possible options (artificial waterfall or fountains)
25. Oxygen and low flow problems along Fall Creek and possible options (reclamation facility, dam removal, dam modifications, or a fountain)
26. Schedule of upcoming public input sessions and how to obtain more information

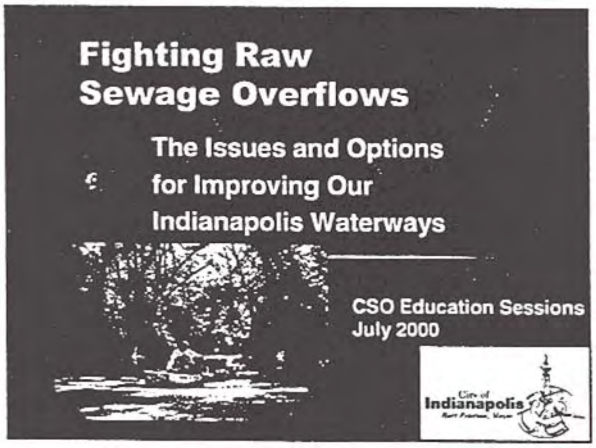
Following the presentation, participants were asked to write their questions on index cards and any comments on a comment sheet. Questions then were answered by DPW or DCAM staff, if possible. All citizen questions and comments were saved, and were to be posted on the CSO website with the city's answers. A list of citizen questions and comments received to date is attached to this report, along with the city's responses. This list was compiled during the public education sessions as well as through the website and telephone hotline. It will be available in print during the public input sessions.

The questions and comments from citizens covered many issues, including cost/financing, using existing sewers for storage, sewer system maintenance and repair, storage tunnels and tanks, treatment plants, stormwater pollution, septic systems, industrial discharges, dam removal/modifications, sewer infiltration/inflow, planning, flood/drainage problems, bacteria, sewer bills, and the proposed Fall Creek reclamation facility.

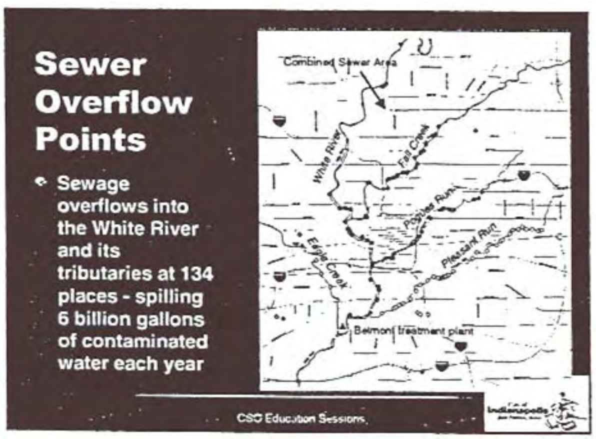
In order to reach even more citizens, the city-owned cable television station, WCTY-TV (Channel 16) taped the July 25 CSO education meeting. WCTY reaches 250,000 households in Marion County. Channel 16 rebroadcast the education session on the following dates and times: July 27 (7 p.m.), July 28 (3 a.m., 11 a.m., 9:30 p.m.), July 29 (8 a.m., 6:30 p.m.), July 30 (5 a.m., 3:30 p.m.), July 31 (2 a.m., 12:30 p.m., 11 p.m.); August 1 (9:30 a.m.); and August 2 (1:30 a.m.). In addition, the session was rebroadcast on WCTY's sister station, Channel 28, on the following dates and times: August 1 and 3 (2 a.m., 8 a.m., 2 p.m. and 8 p.m.) and August 5, 9 and 11 (4 a.m., 10 a.m., 4 p.m., 10 p.m.).

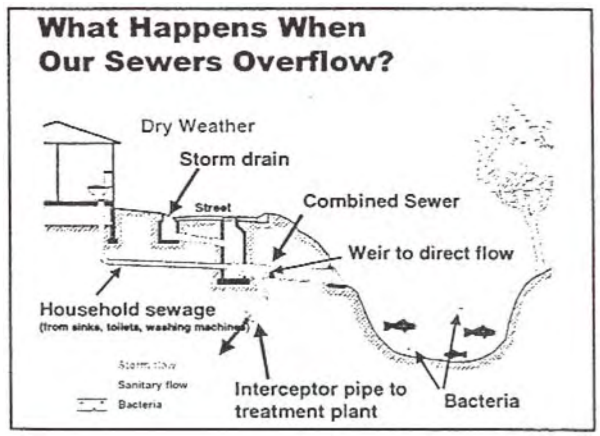
Next Steps

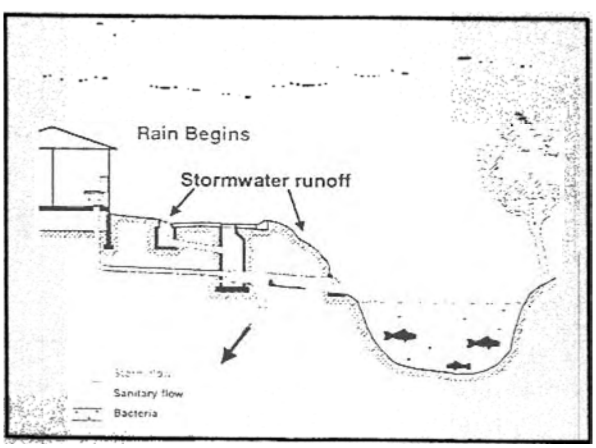
The city will host a series of facilitated public input sessions in August, at five locations where the education sessions were held. These sessions will open with a brief presentation on the city's goals and possible options, followed by small, facilitated group discussions on several key questions and issues. After receiving this input from citizens, the city will prepare a draft long-term control plan and release it for public review and comment. Following an official public hearing, the city will finalize its plan and submit it to the Indiana Department of Environmental Management and U.S. Environmental Protection Agency for their review and approval. Target dates for the draft plan, hearing, and final plan have not been set.

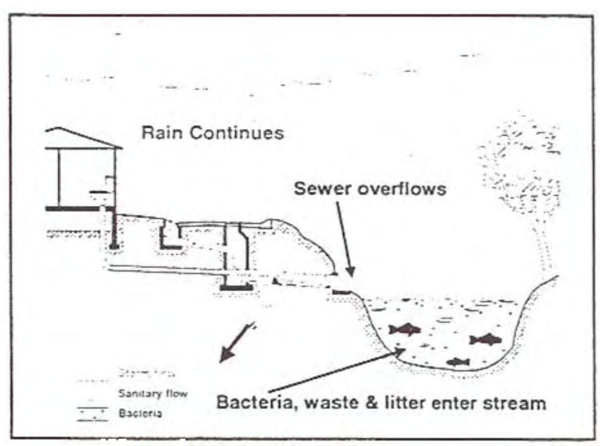

Fighting Raw
Sewage Overflows
The Issues and Options
for Improving Our
Indianapolis Waterways
CSO Education Sessions
July 2000
City of Indianapolis

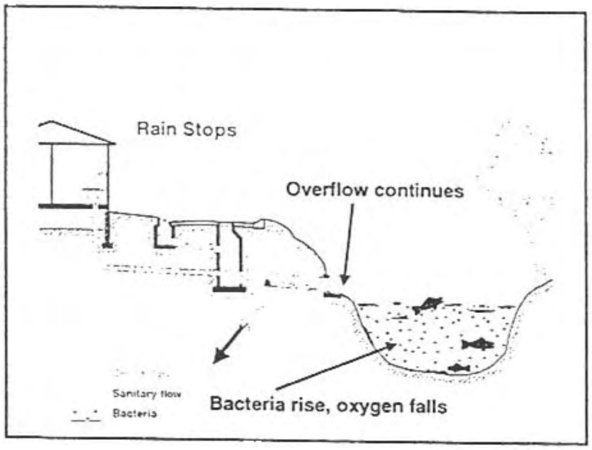

What Are Combined
Sewer Overflows (CSOs)?
In older parts of the city, sewers carry both sewage and stormwater away from buildings and streets (making them combined)
When the weather is dry, these combined sewers carry sewage to the city's treatment plants
When it rains or snow melts, these sewers can be overloaded, and overflow

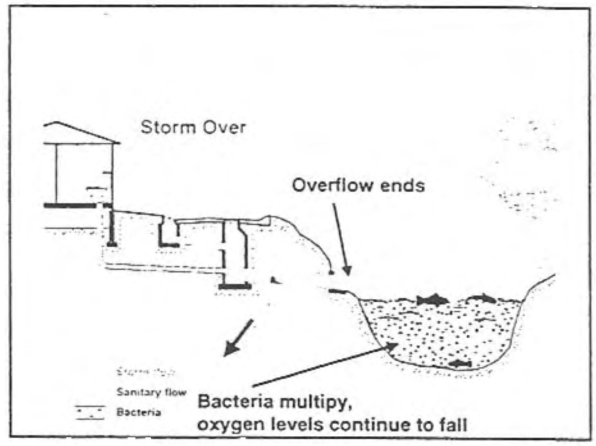

Sewer
Overflow
Points
Sewage overflows into the White River and its tributaries at 134 places - spilling 6 billion gallons of contaminated water each year
Combined Sewer Area
White River
Fall Creek
Pogues Run
Pleasant Run
Eagle Creek
Belmont treatment plant
CSO Education Sessions


What Happens When
Our Sewers Overflow?
Dry Weather
Storm drain
Street
Combined Sewer
Weir to direct flow
Household sewage
(from sinks, toilets, washing machines)
Sanitary flow
Bacteria
Interceptor pipe to
treatment plant
Bacteria

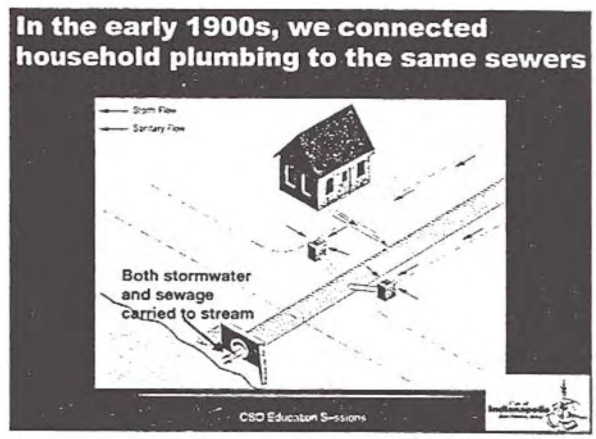

Rain Begins
Stormwater runoff
Sanitary flow
Bacteria

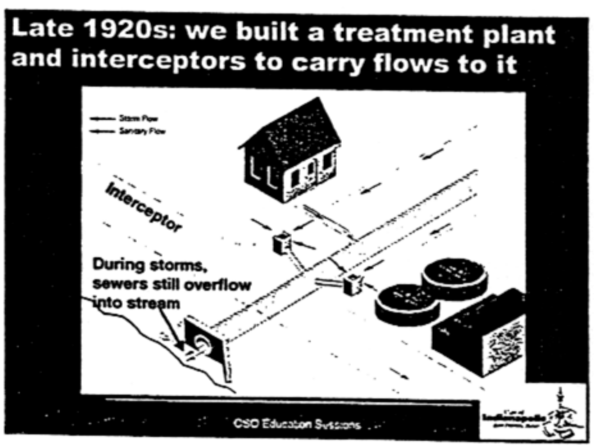

Rain Continues
Sewer overflows
Sanitary flow
Bacteria
Bacteria, waste & litter enter stream


Rain Stops
Overflow continues
Sanitary flow
Bacteria
Bacteria rise, oxygen falls


Storm Over
Overflow ends
Sanitary flow
Bacteria
Bacteria multipy,
oxygen levels continue to fall


Why? Our first sewers were built in the late 1800s, before indoor plumbing
Storm Flow
Stormwater carried to stream
CSO Education Sessions


In the early 1900s, we connected household plumbing to the same sewers
Storm Flow
Sanitary Flow
Both stormwater and sewage carried to stream
CSO Education Sessions


Late 1920s: we built a treatment plant and interceptors to carry flows to it
Storm Flow
Sanitary Flow
Interceptor
During storms, sewers still overflow into stream
CSO Education Sessions


Many Sources of Pollution Affect the Quality of Our Waterways
Agriculture fertilizers and pesticides
Storm water runoff in urban areas
Poorly functioning septic systems
Livestock/Pets
Erosion
Combined sewer overflows (CSOs)
Industrial discharges
CSO Education Sessions

We Must Develop A Watershed-Based Strategy to Meet Indiana's Water Quality Goals

Fighting Sewage Overflows Is Just the First Step

Indianapolis Is Not Alone: Almost 1,000 U.S. Cities With CSOs

What is being done?

Report released July 11, 2000, outlining city's options based on 7 years of study and activities

Gather public input on control alternatives
- Public education sessions (July)
- Public input sessions (August)
- Mayor's CSO advisory committee
- City-County Council

Develop draft long-term control plan

Public hearing on draft plan

Submit long-term control plan to IDEM and EPA

Indianapolis' Goals for Fighting Sewage Overflows

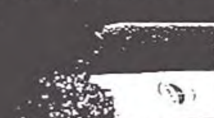
- Improve neighborhood quality of life by eliminating solids and floatables in our streams
- Capture the first flush of stormwater entering the sewer system. The first flush contains solids that have accumulated in the pipes since the previous storm.
- Increase oxygen levels to protect fish
- Decrease bacteria levels to protect people

Improve Neighborhood Quality of Life

- Improve sights and smells when it rains
- Eliminate solids and floatables caused by sewage overflows
- Solids and floatables include human waste, toilet tissue, floating trash, and other solids that are flushed down toilets or washed from streets into sewers

Capture the "First Flush"

- The first rainwater or snow melt (first flush) entering the combined sewer during wet weather contains sewage solids that have accumulated since the previous storm
- The first flush carries the highest concentration of pollution
- Capturing and treating the "first flush" can significantly improve our streams



Increase Oxygen Levels

- Create an environment to support healthy fish, insects, and plant communities in our streams
- Meet or exceed water quality standards for oxygen in our streams

CSO Education Sessions

Decrease Bacteria Levels

- Reduce the amount of time that CSOs cause waterways to exceed water quality standards for bacteria
- Sewage overflows are not the only source of bacteria in our waterways
- However, controlling sewage overflows is the first step toward making our waterways safer for human contact

CSO Education Sessions

There Are 3 Strategies We Can Take to Directly Address Sewage Overflows

1. Capture and store more sewage in the current sewer system where capacity exists during wet weather (but without causing sewer backups)
2. Expand wastewater treatment plants to reduce heavy overflows and treat more wastewater during wet weather
3. Build new storage facilities to capture additional wastewater

CSO Education Sessions

Other Things We Can Do To Improve Water Quality:

- Replace septic systems
- Improve industrial pretreatment
- Reduce infiltration and inflow
- Improve stormwater management
- Restore streambanks to more natural state
- Prevent pollution through street cleaning, water conservation, etc.

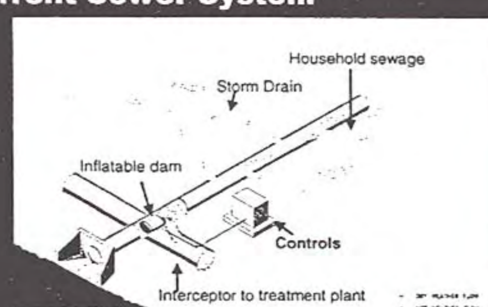
CSO Education Sessions

Strategy #1: Capture and Store More Combined Sewage in the Current Sewer System

- Many of the large pipes in the current sewer system do not fill completely during a storm
- Could use inflatable dams or mechanical gates to hold back flows, using electronic sensors to monitor rainfall and sewage levels in pipes
- High-tech, computerized system releases sewage when pipes get too full, preventing sewer backups

CSO Education Sessions

Capture and Storage in Current Sewer System



CSO Education Sessions

Strategy #2: Expand Wastewater Treatment Plants

Southport treatment plant

- During wet weather, some of heaviest pollution to White River comes from outfalls at or near Belmont treatment plant
- New permit will require the city to better control/eliminate these overflows during wet weather - which means increasing treatment and storage capacity at Belmont and Southport plants

CSO Education Sessions

Largest sewage overflows come from outfalls near Belmont Wastewater Treatment Plant

Largest Sewage Overflow Points
(*Outfalls close to or associated with Belmont AWT)

Outfall Number	Waterbody	Est. Annual Overflow Volume (million gallons per year)
P.E. Bypass (007)*	White River	2,200
CSO 118*	White River	402-554
CSO 039	White River	200-271
CSO 008*	White River	270-369
CSO 115	Pleasant Run	311-430
CSO 051	Fall Creek	212-295
CSO 063	Fall Creek	162-225
CSO 117*	White River	155-210
CSO 034A	Pleasant Run	108-148
CSO 061	Fall Creek	184-258

CSO Education Sessions

Belmont Advanced Wastewater Treatment Plant

CSO Education Sessions

Possible Plant Improvements:

- Phase I: Double secondary treatment capacity at Belmont from 150 to 300 million gallons/day; increase primary treatment capacity at Southport
- Phase II: Increase primary treatment capacity at Belmont by 150-300 million gallons/day, allowing the plant to treat 450-600 million gallons/day during wet weather

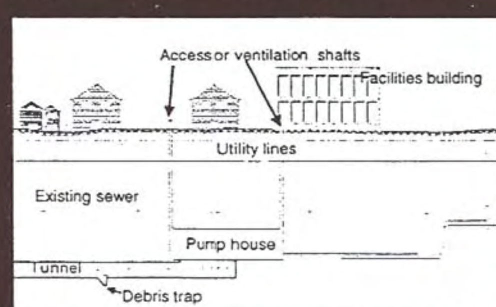
CSO Education Sessions

Strategy #3: Build New Storage Facilities to Capture More Wastewater Volumes

- Underground tunnels
- Storage tanks
- Store sewage during storms, releasing it after storm to treatment plant
- Would capture first flush
- Larger storage captures more overflow, but increases the construction costs

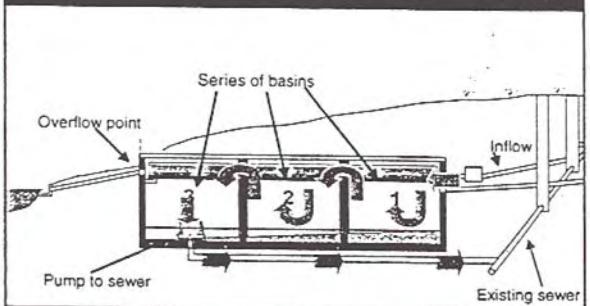
CSO Education Sessions

Diagram of an Underground Tunnel



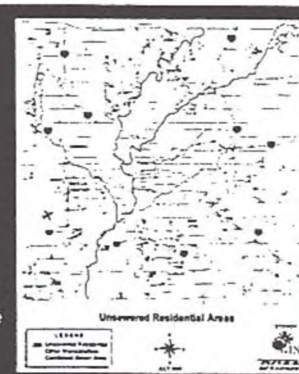
CSO Education Sessions

Diagram of an Underground Tank



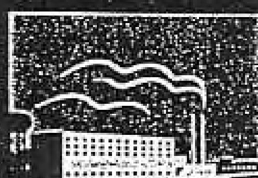
Converting Septic Systems to Sewers

- Indianapolis has 18,000 homes served by septic systems. Many are failing.
- Replacing septic systems would reduce bacteria in streams, especially during dry weather



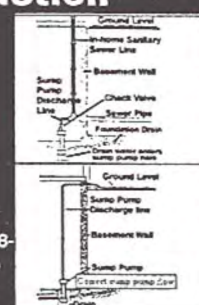
Industrial Pretreatment

- Industries discharge treated wastewater into sewers
- Requiring additional treatment or controls could reduce pollution or volume of wastewater in sewer system



Infiltration/Inflow Reduction

- Reduce groundwater & rainwater entering sanitary sewers
- Creates additional carrying capacity to transport sewage
- 8-10 illegally connected sump pumps can fill an 8-inch sanitary sewer designed to serve 200 homes



Illegal sump pump connection

Proper sump pump flow

Stormwater Management

- Retention ponds, wetlands, buffer strips and other practices can reduce pollutants in stormwater before it enters the sewer system

Wetland

Streambank Restoration

- Rebuild streambanks to create tree canopies and restore wildlife habitat
- Especially beneficial along smaller streams

Pollution Prevention

- Street cleaning, water conservation, solid and hazardous waste collection and other practices can reduce or eliminate pollution before it enters the sewers and our streams

Key Issue: How Much Sewage Control Should Indianapolis Choose?

How much storage will we build along each stream?

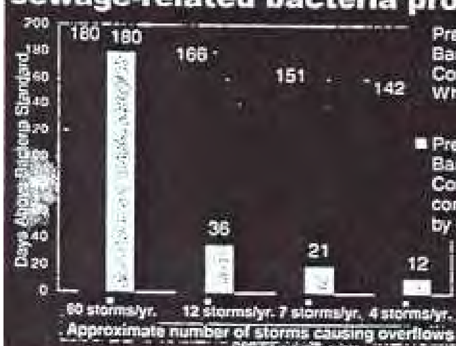
What Are the Options and What Can We Afford?

- About 60 times per year, we have storms large enough to cause sewage overflows. These overflows can last up to three days after a storm, depending on the storm's severity.
- The more we reduce overflows, the more it will cost
- Decision will be based on public input and federal/state environmental requirements
- Three possible targets for reducing overflows: 12 storms/year, 7 storms/year, or 4 storms/year

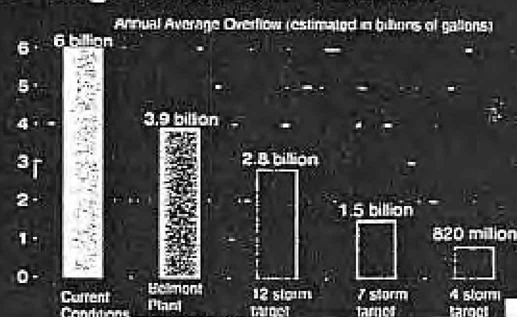
Possible Overflow Targets

Approx. # of storms causing overflows	Eliminates solids & floatables	Captures first flush	Meets or exceeds oxygen standard	System-wide volume capture
12 storms/ year	Yes	Yes	Meets	85% (EPA guideline)
7 storms/ year	Yes	Yes	Exceeds	92%
4 storms/ year	Yes	Yes	Exceeds	96%

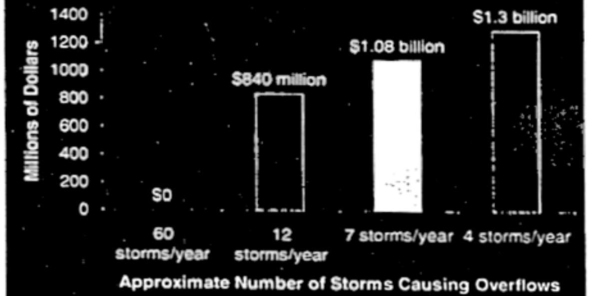
How the options would reduce sewage-related bacteria problems



How the options would reduce sewage overflow volume



How much will these options cost?



How Will This Affect Monthly Sewer Bills?

- Current monthly average bill: $10.91
- To cover costs during the next five years, the project will require an initial $1.94 per month sewer bill increase in 2001.
- This helps provide $184 million to pay for treatment plant expansion and design and engineering work for any CSO control alternatives we select.
- Other sewer rate increases will be required later to pay for the construction projects

How Much Will Construction Costs Add to Sewer Bills?

Final costs will be based on:

- Level of CSO control we choose (how much storage we have to build)
- State and federal regulatory approval of city's plans
- Funding sources - loans and grants
- Financing methods and repayment schedule
- Changes in technology that might reduce costs

Key Issue: Sensitive Areas

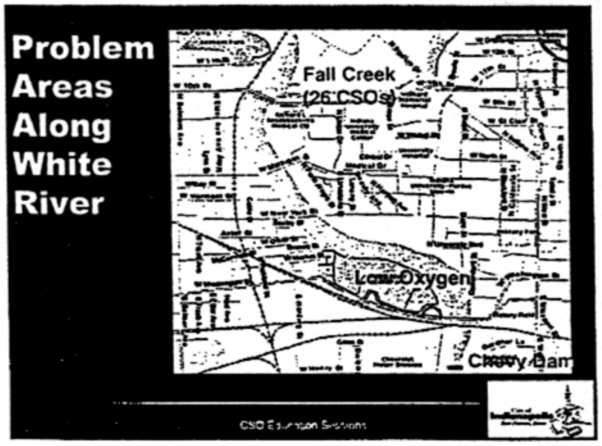
Our highest priority along each waterway could go to controlling CSOs in *sensitive* areas:

- Nature preserves
- City parks
- Greenways
- Boat launches
- Fishing areas
- Places where children play / wade in the water

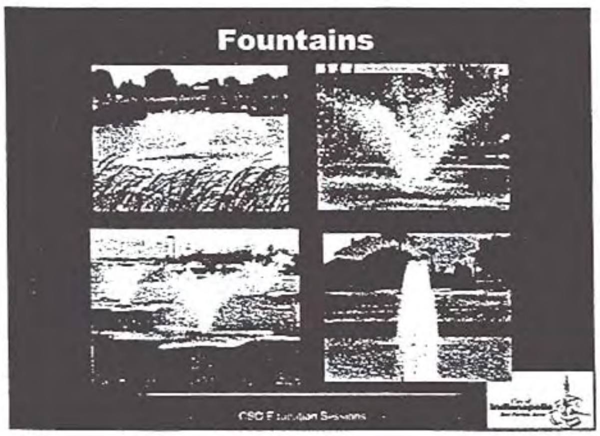
What sensitive areas along our streams deserve priority attention?

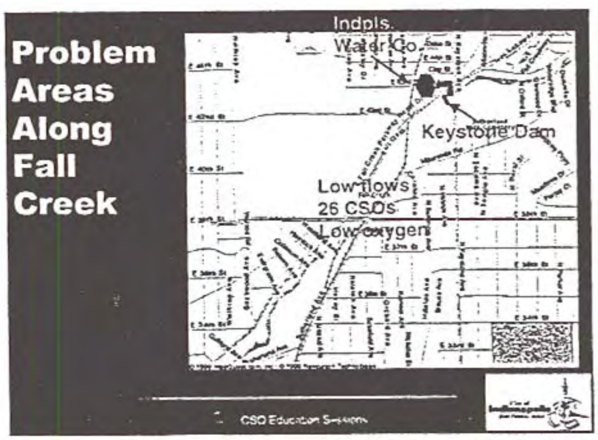
Special Options Being Considered Along Fall Creek & White River

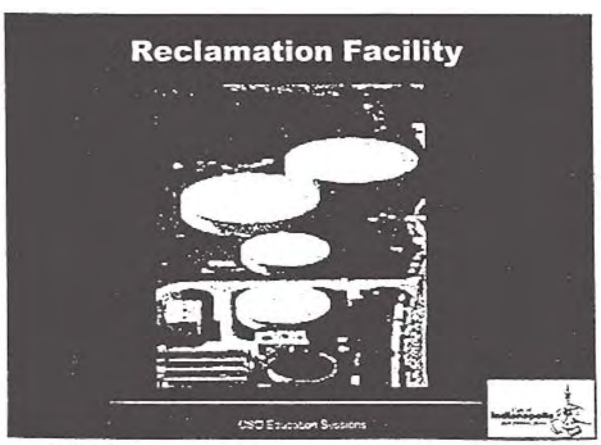
- Artificial waterfalls
- Fountains
- Reclamation facility (Fall Creek only)
- Dam removal or modifications

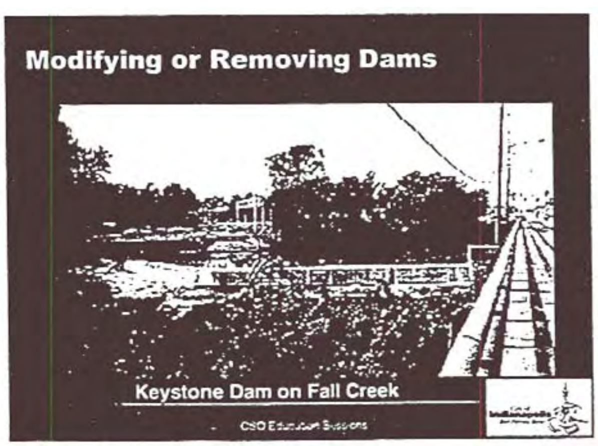

Problem Areas Along White River
Fall Creek (26 CSOs)
Low Oxygen
Chevy Dam
CSO Education Sessions


Artificial Waterfall (Aeration Facility)
Chicago Sidestream Aeration Project
CSO Education Sessions


Fountains
CSO Education Sessions


Problem Areas Along Fall Creek
Indpls. Water Co.
Keystone Dam
Low flows
26 CSOs
Low oxygen
CSO Education Sessions


Reclamation Facility
CSO Education Sessions


Modifying or Removing Dams
Keystone Dam on Fall Creek
CSO Education Sessions

We Need Your Input to Select Affordable Options to Improve Our Waterways!

- Read the full report at www.indygov.org or visit your local library
- Attend a Public Input session to evaluate these alternatives:

  August 17 - Allisonville Christian Church, 7-9:30 p.m.
  August 19 - City County Building, 9-11:30 a.m.
  August 21 - Pike Township Government Center, 7-9:30 p.m.
  August 22 - Southeastern Church of Christ, 7-9:30 p.m.
  August 23 - Wayne Township Trustees Office, 7-9:30 p.m.

- Post comments on website, by mail, or by calling 706-2622

CSO Education Supports

FOR IMMEDIATE RELEASE
Tuesday, July 11, 2000

CONTACT:
Steve Campbell, [317] 327-3622
and www.IndyGov.org/CSO

City of
Indianapolis
Bart Peterson, Mayor

Mayor Begins Process to Fight Sewage Dumping, Urges Citizen Involvement

INDIANAPOLIS – Mayor Bart Peterson today called for solutions to the city's century-old problem of raw sewage overflows into public waterways, and released a study outlining options to clean up the city's rivers, creeks and streams. He also urged citizens to help evaluate the alternatives through an upcoming series of public meetings and forums.

"At the dawn of the 21st Century, it is simply unacceptable for this city to continue releasing sewage into our waterways at such an alarming rate," the Mayor said. "The federal government is pushing cities to fix the problem, and I agree that action in Indianapolis is long overdue."

"Our challenge will be to choose environmentally effective options that the city can afford over the next 20 years or so," he added. "But it's time to start fixing the problem today, so it won't cost us billions more in the future."

More than 100 years ago, the City of Indianapolis built a "combined" sewer system that is still used today. It carries sewage, storm water and industrial waste away from homes, streets and factories in the same set of pipes. To avoid backups into homes, the system sends waste directly into Indianapolis waterways.

During dry weather, sewage is carried through the city's sewer system to two treatment plants, which adequately handle the job of storing and filtering sewage. However, when as little as a quarter-inch of rain falls or snow melts, the extra water overloads the sewers, dumping raw sewage, human waste, toilet paper, disease-causing bacteria, such as *E. coli*, viruses, industrial waste, oil, grease and other pollutants directly into the city's rivers, streams and creeks.

This causes combined sewer overflows (CSOs), which pose serious health and environmental risks to residents.

"If it rains today, tomorrow or the next day, it's almost guaranteed that raw sewage will be dumped into rivers and streams near homes, schools, parks and businesses," the Mayor said. "In order to be a world-class city, we can no longer ignore this problem."

Under the federal Clean Water Act, the U.S. Environmental Protection Agency and the Indiana Department of Environmental Management require cities to publicly evaluate a range of control options and to develop and submit a long-term control plan based on the most cost-effective alternatives for meeting clean water goals.

The report released today represents seven years of research conducted by the city Departments of Public Works and Capital Asset Management. It details three major engineering options to reduce raw sewage overflows:

(more)

Mayor's Press
2542 City County Building
200 East Washington Street
Indianapolis, Indiana 46204
[317] 327 3690
[fax] 327 3686
[TDD] 327 5186
indygov.org

(1) Technologies to store more wastewater in the existing sewer system for later treatment,
(2) Building new storage capacity, either above or underground, and
(3) Increasing treatment capacity at the city's two wastewater treatment plants.

Other options could include accelerating the replacement of septic systems with sewers and better storm water management.

The report describes various alternatives under each option and provides estimated costs for design, construction, and operation and maintenance over the next 20 years. In all likelihood, the city will need some combination of options to meet state and federal requirements.

Under the most cost-effective scenario, the project would cost approximately $840 million, spread over 20 years.

It is difficult to predict exactly how it would affect monthly sewer bills, the Mayor said, because final costs depend on such factors as the specific technologies chosen, the construction schedule and the financing method, including interest rates and loan terms. In addition, emerging technologies might be used in the future to more efficiently and quickly address the problem.

The city will also aggressively pursue federal and state assistance to help fund these solutions and cushion the effect on ratepayers, the Mayor said.

However, the city controller has estimated that during the next five years, the project would require a one-time $1.94 sewer bill increase in 2001. This covers the treatment plant upgrades and design and engineering work necessary for whatever control alternatives are chosen.

Currently, Indianapolis average sewer rates – $10.91 per 7,000 gallons – are significantly lower than current rates in surrounding communities such as:

- Carmel, $19.78
- Greenwood, $21.48
- Greenfield, $23.63
- Brownsburg, $27.65
- Cincinnati, $25.33
- Columbus, OH, $24.29
- St. Louis, $17.61
- Louisville, $19.95
- South Bend, $17.98
- Evansville, $29.23
- Fort Wayne, $15.41.

Since many of these cities are also dealing with the same sewage overflow issues, their rates will likely rise as well. Indianapolis sewer bills are still expected to be lower than or comparable to their rates, even with a rate increase.

Mayor Peterson also announced a series of public meetings designed to both educate citizens and involve them in decision-making. He also appointed an Advisory Committee, which will help gather public input and advise the Mayor as the city prepares its long-term control plan.

"This is a very challenging issue for our community, and that's why I urge all citizens to get involved and make their ideas known," he added. "We have to face this problem head on, but we also have to be fair to ratepayers."

The first set of public meetings, planned for this month, will help citizens learn more about the federal requirements and scientific and financial issues dealing with sewage overflows. The second set of meetings will give citizens a formal opportunity to submit ideas that could be incorporated into the long-term control plan. A final official hearing is also in the works.

For more information, citizens can call the CSO Hotline at (317) 706-2622 or logon to www.IndyGov.org/CSO.

Education Meetings

Tues., July 25	**7-9 p.m.**	Pike Township Government Center 5665 Lafayette Rd. (293-1842)
Wed., July 26	**7-9 p.m.**	Wayne Township Trustee's Office, Community Room 5401 W. Washington St. (241-4191)
Thur., July 27	**7-9 p.m.**	Southeastern Church of Christ 6500 Southeastern Ave. (352-9296)
Sat., July 29	**9-11 a.m.**	City County Building, Public Assembly Room 200 E. Washington St.
Mon., July 31	**7-9 p.m.**	Allisonville Christian Church 7701 Allisonville Rd. (849-3957)

Public Input Sessions

Thur., August 17	**7-9:30 p.m.**	Allisonville Christian Church
Sat., August 19	**9-11:30 a.m.**	City County Building, Public Assembly Room
Mon., August 21	**7-9:30 p.m.**	Pike Township Government Center
Tues., August 22	**7-9:30 p.m.**	Southeastern Church of Christ
Wed., August 23	**7-9:30 p.m.**	Wayne Township Trustee's Office, Community Room

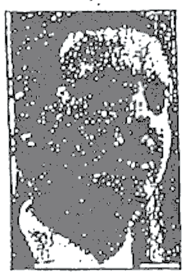
Advisory Board Meetings

Mon., July 24	**2:30-4:30 p.m.**	Indpls.-Marion Co. Library Services Center, Room 226B 2450 N. Meridian St. (269-5215)
Wed., August 2	**2:30-4:30 p.m.**	City County Building, Room 260
Mon., August 28	**2:30-4:30 p.m.**	City County Building, Room 224
Thur., Sept. 14	**2:30-4:30 p.m.**	City County Building, Room 224
Thur., Oct. 12	**2:30-4:30 p.m.**	City County Building, Room 224
Wed., Nov. 15	**2:30-4:30 p.m.**	City County Building, Room 107

Public Hearing – TBA

See IMPUSION Page 2

Mayor unveils 20-year plan to clean up city's sewer overflows



Mayor Bart Peterson said his plan to fix outdated sewers would cost $840 million to $1.3 billion over the next two decades.

By John Strauss
STAFF WRITER

With a polluted neighborhood stream as his backdrop, Mayor Bart Peterson on Tuesday announced the start of a long-term plan to plug the city's overflowing sewers.

But the mayor's 20-year time frame to fix the sewers isn't sitting well with some local residents and environmental specialists.

"I think it's too long. I think over the next 10 years this problem should be handled," said Rachael Cooper, president of the South East Community Organization. "We in the neighborhoods have worked with this for years."

Peterson said residents would see a sewer rate increase of less than $2 a month in the next five years. Beyond that, he said, it was impossible to say how much ratepayers would have to contribute.

"This is the 21st century, and yet still today we dispose of raw sewage, untreated, directly into our streams and rivers across Marion County," Peterson said at a news conference along Pleasant Run southeast of Downtown.

"It is a health risk where we live and where we play. It is an environmental risk. It is abuse and mistreatment of one of our most important environmental assets ... and it is smelly and disgusting."

The mayor released a study that had been in development under the previous administration. Three proposals are listed.

While the final remedy hasn't been selected, the cost has been determined. Peterson said the city will spend $184 million over the next five years and a total of $840 million to $1.3 billion in the next two decades.

Estimates from the previous city administration last year said stopping the sewer overflows likely would cost $8 billion — which Peterson, in the midst of the campaign for mayor, said was absurdly high.

The first, five-year phase of the

See SEWER Page 5

3 options for ending sewage overflows

A group of engineering consulting firms identified three options for stopping sewage overflows into White River and other local streams. The final plan could include elements from each of the alternatives:

- Improve the city's two wastewater treatment plants to increase their capacity, or the gallons treated daily.
- Maximize the capacity of the sewer system so it can hold back water during rains instead of overflowing into streams.
- Construct storage areas near the streams that are being polluted so contaminated water can be stored temporarily until the system is able to handle it.

Whatever option is chosen will include a high-tech "real time" computerized method for controlling sewage flow. That will allow officials to monitor rainfall in different areas of the county and temporarily hold back the flow of sewage through underground pipes.

Committee seeks solutions to sewer overflows

■ Mayor selects community and business leaders to gather input from residents affected by problem.

By Kristina Buchthal
STAFF WRITER

Combine water, soap, sand, dirt, rocks, wrappers, toilet paper and a handful of gravy-making dog kibble.

What do you get?

A simulation of the raw sewage that flows into Indianapolis' rivers and streams more than 60 times a year.

At least that's how the mayor's staff sees it. They'll be doing that demonstration and holding informational lectures around the city this week to educate Indianapolis residents about the combined sewer-overflow problem. The first meeting will be tonight in Pike Township.

The education sessions are one part of Mayor Bart Peterson's plan to find a solution to the city's widespread waterway pollution.

Every time the city gets significant rainfall, its century-old network of combined storm and sanitary sewers overflows. Rainwater mixed with tons of untreated sewage pours into Fall Creek, Pleasant Run, Pogues Run, Eagle Creek and White River.

On Monday, Peterson appointed 14 community and business representatives to serve on the Combined Sewer Overflow Advisory Committee. The group will review options for restructuring the city's sewer system.

At the committee's first meeting Monday, Peterson ... pledge to stop the pollution.

"It's disgusting, it smells and it diminishes the quality of life in this city," he said. "This is a health hazard."

Earlier this month, Peterson estimated that repairs would cost the city between $840 million and $1.3 billion. That translates to about $2 more on residents' monthly sewer bills.

The committee also will hold meetings in mid-August to hear from Indianapolis residents how overflows affect them and which areas should be cleaned first.

"We need to go to people and ask where are the places where children are playing, where people are fishing? We want to clean those up first," said B.J. Bischoff, a Peterson consultant who led the meeting Monday. "There's no map with

Learn more about the problem and offer input

Public educational meetings on combined sewer-overflow problems will be held:

■ Today, 7 p.m. to 9 p.m., Pike Township Government Center, 5665 Lafayette Road.

■ Wednesday, 7 p.m. to 9 p.m., Wayne Township Trustee's Office, Community Room, 5401 W. Washington St.

■ Thursday, 7 p.m. to 9 p.m., Southeastern Church of Christ, 6500 Southeastern Ave.

■ Saturday, 9 a.m. to 11 a.m., City County Building, Public Assembly Room, 200 E. Washington St.

■ Monday, 7 p.m. to 9 p.m., Allisonville Christian Church, 7701 Allisonville Road.

The Combined Sewer Overflow Advisory Committee will hold public input sessions:

■ Thursday, Aug. 17, 7 p.m. to 9:30 p.m., Allisonville Christian Church.

■ Saturday, Aug. 19, 9 a.m. to 11:30 a.m., City County Building, Public Assembly Room.

■ Monday, Aug. 21, 7 p.m. to 9:30 p.m., Pike Township Government Center.

■ Tuesday, Aug. 22, 7 p.m. to 9:30 p.m., Southeastern Church of Christ.

■ Wednesday, Aug. 23, 7 p.m. to 9:30 p.m., Wayne Township Trustee's Office, Community Room.

Mayor to stress lower cost of stopping sewer overflows

■ Solutions shouldn't push sewer bills near levels suggested by GOP last year, Peterson says.

By John Strauss
STAFF WRITER

White River, fouled by Indianapolis sewer overflows dozens of times per year, can be cleaned up at far less cost than earlier estimates indicate, city officials will promise today.

Mayor Bart Peterson's administration will announce the results of a seven-year study of the overflows and a schedule of public meetings to discuss a new state permit for the Indianapolis wastewater treatment plants.

And from the first meeting later this summer, officials will stress that the cost of cleaning up White River will be far less than the $150-a-month sewer bills mentioned in last year's mayor's race.

"That was absurd then, and I think when people see the information that we are going to be discussing, they'll see what an exaggeration that was," Peterson said Monday.

Indianapolis has storm drains in some areas that flow into its sanitary sewer system. During even light rains, the extra water causes the system to overflow, dumping an estimated 5 billion gallons of contaminated water annually into White River, Eagle Creek, Fall Creek, Pleasant Run and Pogues Run.

The city has spent millions of dollars to reduce the combined-sewer overflows, as they're known. And the problem became an issue in the mayor's race last year when Peterson and other Democrats said the Republican-controlled city administration was inflating the cost for political advantage.

File Photo

Behind: Other cities face similar problems, but Indianapolis lags in finding a solution, Mayor Bart Peterson said.

At that time, the city estimated the new state restrictions would require a staggering $8 billion in improvements, which would push average sewer bills to $150 from $10.

The Indiana Department of Environmental Management said the cost would be nowhere near that high. But some Republicans suggested the agency, under the administration of Democratic Gov. Frank O'Bannon, was pressuring the city to create political advantage for Peterson.

Today's announcement will include a range of possible long-term solutions, with price tags starting at around $1 billion, phased in over a period of years. The last permit for its two treatment plants on the Southwestside expired 10 years ago, and the plants have been operating under temporary extensions since then.

The mayor's pending announcement led Republicans on the City-County Council to delay action on a resolution asking Peterson to share the details of any agreement he might reach with federal and state regulators before it is signed.

While the GOP-controlled council is nervous about the big price tag, members decided to give the mayor time to make his case rather than pass the resolution on the eve of his expected news conference.

But recent actions by the U.S. Environmental Protection Agency have Councilwoman Beulah Coughenour, the Republican chairwoman of the council's Public Works Committee, worried that the price could be far more than the mayor is projecting.

The EPA has filed two information requests with the city of the sort that is often followed by expensive federal mandates, she said. One of the requests could make the city liable for fines for past sewage overflows, she said.

"The federal government is not out to bankrupt the city of Indianapolis," Peterson said. "They are insistent that we deal with this problem, and they are losing patience with the city."

Other cities face similar overflow problems, the mayor said, but Indianapolis is behind others in finding ways to reduce the flow.

However, Peterson said he was not interested in criticizing the work done under Mayor Stephen Goldsmith, who served two terms and was in office during most of the time the city was without new wastewater treatment permits.

"We want to fix the problem, not fix the blame," Peterson said. "We want to move forward, not focus too much on what went on in the past."

Staff writer Doug Sword contributed to this report.

Awarding of MSA contract put on h

EDITORIALS

"Let the people know the facts and the country will be saved."
ABRAHAM LINCOLN

Peterson's CSO plan

"We are very pleased with the generous response of the Indianapolis community."

The goal of the campaign wa to collect needed items, educat residents about need and raise awareness that the need exists even during summer.

Road work

Stretch of Lafayette down to 1 lane today

One northbound lane of Lafayette Road for 400 feet north of 30th Street will be closed unt 10 p.m. today while Indianapolis Water Co. repairs a broken main.

Sewer system meetin will inform, gather in

Staff Report

Public educational meetings combined sewer overflow probl and public input meetings are of Mayor Bart Peterson's pla address the city's widesp waterway pollution.

City officials will talk about sewage problem, and commu and business representatives review options.

The educational meetings wil

■ Today, 7 p.m. to 9 p.m., Wa Township trustee's office, Com nity Room, 5401 W. Washington

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■ Saturday, 9 a.m. to 11 a City-County Building, Public sembly Room, 200 E. Washin St.

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■ Wednesday, Aug. 23, 7 p.m 9:30 p.m., Wayne Town trustee's office, Community Roo

MONDAY, JULY 17, 2000

ASANT
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Page B8

SPORTS
DREAMS OF OLYMPIC TRACK GLORY BEGIN, FADE
Marion Jones (left) jumps on team; Joyner-Kersee fails. Page C1.

NATION
GENERAL MILLS TO EAT
Food giant will grow in $10.5 b

THE INDIANAPOLIS STA

EDITION

"Where the Spirit of the Lord is, there is Liberty" II Cor. 3:17

Indiana is flush with septic woes

■ As much as 70 percent of systems are considered failing, inadequate; E. coli risks worry health officials.

By David Rohn
STAFF WRITER

Spending a billion dollars or more to fix Indianapolis' sewer problems won't end the pollution of local rivers and streams.

Because sewers are only half the issue.

Deteriorating septic systems are causing equally serious problems in Marion County and throughout the state.

In some counties, up to 70 percent of all septic systems are considered inadequate and failing.

One county health official said communities in her rural community have been "just sitting in sewage" because of failing septic systems.

Nearly a third of Hoosier families are served by the state's 800,000 septic systems. Among cities of like size, Indianapolis, with about 18,000 houses on septic systems, is second only to Jacksonville, Fla.

A task force that studied the issue in Marion County urged that all septic systems in the county be eliminated. But hooking everyone up to sanitary sewers would cost about $300 million.

Compare that to the city's annual sewer budget of $5 million, Lt. Peg Warnack of the city's Department of Capital Asset Management do the math.

"At that rate," Warnack said, "it would take 60 years."

See SEPTIC Page 4

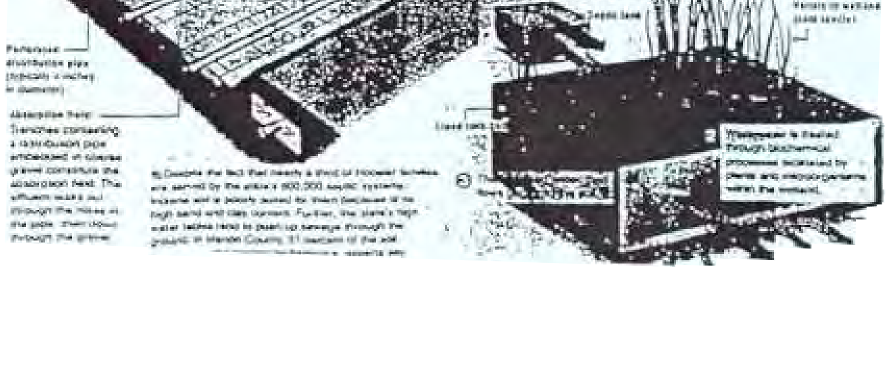
■ Wetlands: Firm builds purification pits. Page A4.

Staff Photo / Karen Dubay

Land down under: Dan Parker of Meredith Septic installs an infiltrator system, which contains no gravel, in a back yard in Marion County, while John Chapman digs with a tractor.

How a septic tank system operates

In a typical system, wastewater flows from the household sewer into an underground septic tank. There the waste components separate, the heavier solids (sludge) settling to the bottom, the grease and fatty solids (scum) floating to the top, and the more liquid portion (effluent) flowing through an outlet to the soil absorption field.



■ Despite the fact that nearly a third of Hoosier families are served by the state's 800,000 septic systems, Indiana soil is poorly suited for them because of its high sand and clay content. Further, the state's high water tables tend to push up sewage through the ground. In Marion County, 51 percent of the soil ...

Continued from Page 1

And yet, it's a lot cheaper than fixing the sewers.

Glenn Pratt, a former state and federal environmental regulator who served on that septic task force, said it makes little sense to spend more than $1 billion to fix city sewer overflow problems while largely ignoring its failing septic systems that could be fixed for a fraction of that cost.

"Compared to how many people get ill from combined sewers," Pratt said, ". . . a lot more people get ill from septic system problems."

He added that while the volume of effluent from sewer overflows is vastly greater, there is much more human contact with sewage from failing septic systems.

That poses many health hazards. Bacteria can be tracked into homes. Wells can be contaminated. Disease-carrying insects can breed in ditches badly polluted with sewage from failed septic systems.

It is a problem that is only getting worse, Pratt said, as septic systems age and reach the end of their life expectancy.

Despite the large number of septic systems, health officials say Indiana is poorly suited for them. A 1980 Purdue University study rated 80 percent of the soil in Indiana unsuitable for conventional septic systems.

The soil has too much sand or clay, for one thing. In southern Indiana, problems are exacerbated by limestone deposits and reclaimed coal mines.

And everywhere, water tables are high. That means during heavy rains, sewage in failed septic leach fields can be pushed up through the ground.

According to the Natural Resource Conservation Service, the ratings for septic systems varies from 100 percent in Delaware and Tipton counties to 60 percent in St. Joseph County.

In Marion County, more than 97 percent of the soil has severe limitations.

"In almost any county you care to look at, you will find a problem," said Howard Cundiff, director of consumer protection for the Indiana State Department of Health.

A properly built and maintained system can operate a long time, said Mark Waltermann, team leader of septic systems and wells for the Marion County Health Department.

But many systems were poorly built because the people installing them weren't trained or licensed, he said. Or they are old — built before indoor plumbing, washing machines, dishwashers and multiple bathrooms.

Many older systems consist of little more than 55-gallon drums discharging waste into ditches.

Few require certification

Alan Dunn, manager of the residential sewage disposal program for the Indiana State Department of Health, said that only 25 Indiana counties require certification.

One is Spencer County, where Rita Stallings, a former substitute teacher, has been the environmental health specialist for about three years.

Years ago, she said, anyone with a backhoe could install a septic system. Now installers must attend classes and pass an annual exam to be certified.

"Septic problems are almost the norm for our county, as is true of most counties in Indiana," Stallings said.

Problems caused by most septic failures involve E. coli bacteria, which can contaminate wells or be E. coli causes stomach problems similar to food poisoning, but many adults are so accustomed to living with stomach problems that they don't even bother to look for the cause, Stallings said.

Another health problem caused by septic system failures is oxygen deficiency, or blue baby syndrome, said Jane Frankenberger, an assistant professor of agriculture and biological engineering at Purdue University. It is caused by nitrates leaching into groundwater from failed septic systems.

She added that it can be difficult to tell if E.coli is coming from animals or humans.

Her project at Lakes Shafer and Freeman involves DNA testing to determine if the E.coli in ditches and streams leading into the lakes is caused by human sewage problems or animal waste.

Cost always is an issue when it comes to replacing septic systems. But the public's health should be more important.

"We want sewers everywhere," Waltermann said. "We would love it if this entire county were connected to sanitary sewers."

A costly fix

But many can't afford it.

The typical homeowner's share of bringing new sewers to a neighborhood can be $5,000 to $15,000. Hooking up to that system can cost another $500 to $1,500. And then there's the average monthly bill of $12.50, said John Burns, environmental health specialist for the Marion County Health and Hospital Corp.

Using the Barrett Law, the cost can be spread out over 10 years at a 7 percent interest rate.

But that's still too much for many homeowners, especially elderly ones on fixed incomes, Burns said. Those homeowners also have long-term fix.

Former Mayor Stephen Goldsmith once proposed eliminating septic systems in Marion County by 2004.

When he left office, the new target date was 2044.

Many septic systems are failing in Crooked Creek on the Northwestside, said Kerry Manders, executive director of the Crooked Creek Community Council Inc. But people often are told they can't connect to the current sewer system because it lacks capacity.

Manders, who also is a member of the legislative Environmental Quality Service Council, has proposed giving people twice as long to pay for connecting to sewers and allowing cities to use money from the Wastewater Revolving Loan Fund to build sewer interceptors in areas that need them.

A couple of years ago, the city came up with a master plan to set priorities for bringing new sewers to about 163 areas, said Warnick, Barrett Law coordinator for the city's Department of Capital Asset Management.

Those priorities are based on the degree of health risk, the level of support from affected property owners and the availability of existing sewer lines.

If there are health problems, homeowners can be forced to connect to sewers whether they want to or not, Warnick said.

Otherwise, sewers can be put in if more than half of the homeowners want them.

The Peterson Plan — Mayor Bart Peterson's campaign platform — pledged to address the septic system issue.

"These potential health risks require the city to closely examine the need and desire for city sewers in these areas," it stated.

But no major new money has been committed by Peterson's administration. Further, the city faces another major waste treatment expense as it is: upgrading its antiquated sewers to meet state and federal requirements.

Some cities, such as Vallejo, Calif., have passed bond issues to quickly eliminate septic systems, Pratt said.

"Since these septic systems never should have been appro[ved] and never been installed in the [first] place," he said, "we as a city h[ave] an obligation to help solve [the] problem, instead of leaving pe[ople] with this huge payment they n[ever] should have been stuck with."

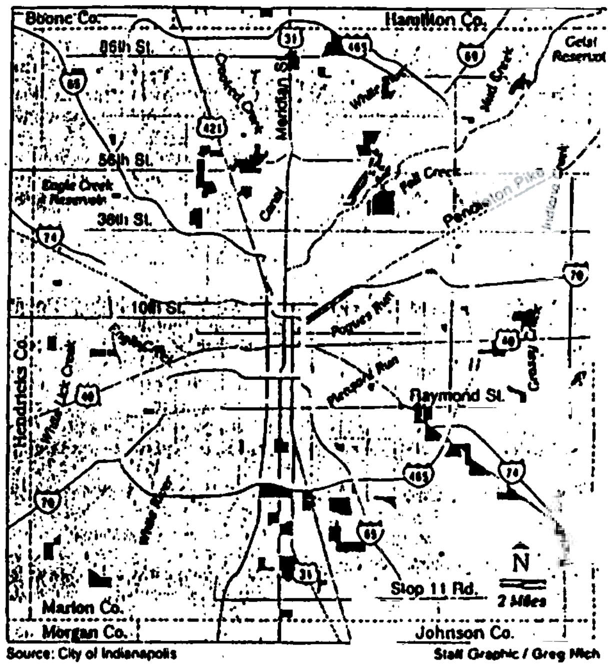
Indianapolis officials have loo[ked] at how 30 other cities got peopl[e to] hook up to sewers.

"Right now," Warnick said, [we] haven't found a better way to d[o it]. We're still looking."

System failure

Aging septic systems in Marion County pose health risks, but the cost to repair and replace them is high.

Project areas: High priority; Medium priority; Low priority



Source: City of Indianapolis

Staff Graphic / Greg Nich

Ignoring the combination sewer down College Ave.

I've heard that Mayor Bart Peterson is going to be making massive overhauls of the severely antiquated and environmentally unsound sewer system in order to avoid more overflow and contamination of White River.

I'm wondering when he is going to address the problems of overflow and contamination of the homes in the proximity of the massive combination sewer that runs down the middle of College Avenue north of 54th Street.

I just received a settlement check for $1,100 for loss of property and am waiting for the bill for cleanup from the last backup of sewage into my basement. This is about the seventh incident in the 17 years I've owned this home.

Don't talk to me about backup or overflow valves. They don't work. Those who have them say they get stuck in the open position. In addition, I would have to dig up my neighbor's driveway and lawn to get to my sewer connection to do this.

I should not have to do such a thing. It should be up to the city to bring its sewer system up to Environmental Protection Agency standards.

SANDRA MARSHALL
Indianapolis

6500 SOUTHEASTERN AVE
CHURCH OF CHRIST
7-9

FT residents will help pay for cleaning up the City's streams

Public meetings scheduled to discuss plan to meet EPA requirements

The Departments of Capital Asset Management (DCAM) and Public Works (DPW) of the City of Indianapolis are hosting a series of public information meetings at various sites throughout Marion County to provide residents and property owners with an opportunity to learn about raw sewage overflows. Sewage is carried through the city's sewer system to two treatment plants, which adequately store and filter sewage during dry weather. However, when as little as a quarter-inch of rain falls or snow melts, the extra water overloads the sewers, dumping raw sewage, human waste, toilet paper, disease-causing bacteria, viruses, industrial waste, oil, grease, and other pollutants directly into the City's streams and rivers.

The federal Environmental Protection Agency, through an order administered by the Indiana Department of Environmental Management, has required that Indianapolis, along with other cities across the country, act to eliminate this infrastructure and public health problem. Decisions that must be made regarding the methods and costs to fight raw sewage overflows will impact all of the residents and taxpayers in Marion County.

The City has scheduled a series of meetings to provide information to the public. By attending one of these educational meetings, residents will have an opportunity to learn about a report the City has prepared on how the City plans to correct this environmental hazard and improve our waterways and what the cost to sewer users and taxpayers will be. A copy of the report can be viewed and/or downloaded from the City's web site at IndyGov.org/cso. Copies are also available for publio viewing at all Indianapolis-Marion County Public Library branches.

Below are listed the meetings closest to Franklin Township. Another series of meetings will be held in August so members of the community can provide feedback and comments regarding the report.

PUBLIC MEETINGS FOR COMBINED SEWER OFERFLOWS

Monday, July 24th	2:30-4:30 p.m.	Library Services Center	2450 N. Meridian
Thursday, July 27th	7:00-9:00 p.m.	Southeastern Church of Christ	6500 Southeastern Avenue
Saturday, July 29th	9:00-11:00 a.m.	City County Building Public Assembly Room	200 E. Washington Street

Chamber Facts

July 24-28, 2000

www.indychamber.com • 317-464-2200

INDIANAPOLIS CHAMBER OF COMMERCE

Chamber News

INITA's Second Annual Workforce Conference

TechFORCE Indiana – "Increasing the Bandwidth" is INITA's second annual workforce conference. INITA, along with main sponsor Indianapolis Chamber of Commerce, is hosting this workforce conference on Monday, August 7 at the Ritz Charles, 12156 North Meridian Street, Carmel. Cost is $75 for members and $125 for non-members; attendees can register online at www.inita.org.

This year's conference features nationally-known speakers, best practices from local companies, and opportunities to interact with representatives from Indiana's colleges and universities. The conference highlights successful recruiting programs, discusses strategies for winning the battle for IT talent, and provides tools and materials to help attendees maneuver through the recruiting maze for both college and experienced hires.

There are four breakout sessions scheduled, with each session highlighting a speaker and best practices of INITA members. Sessions will run twice and will tackle relationship-building, recruiting tactics, keeping and retraining existing employees and the challenges and benefits of internships. Refer to INITA's Web site at www.inita.org for complete schedule and registration information.

Space is limited, so register today at www.inita.org!

Save the Date!

HOBNOB *An Election Showcase*

Where can you meet Indy's candidates for the upcoming elections and hear their views on issues concerning you, register to vote, network with numerous informed business and political professionals, enjoy good food and drinks, and basically have a great time?

At the **HobNob--An Election Showcase**, Indianapolis' largest political event of the year. Join **Paul I. Cripe, Inc.** and the **Indianapolis Chamber of Commerce** at the **Union Station Grand Hall and Conference Center** on **Monday, October 5 from 5 p.m. to 8 p.m.**

HobNob 1999 was the biggest non-partisan political event of the year in Indy, and this year's event promises to be even bigger! Don't miss your chance to be part of the excitement.

Invitations will be sent to your business in September. Tickets are $10, so encourage your employees to be a part of Indianapolis' politcal system, vote and attend HobNob 2000!

If you'd like more information on this upcoming event, contact Sandy

Combined Sewer Overflow Issues are High Priority

Raw sewage... it's flowing into our public waterways at an alarming rate. It's there by way of the Indianapolis sewer system. Our combined sewer system is over 100 years old and is currently unable to handle the job of storing and filtering sewage during any wet weather event. When rainfall or snow melts off as little as a quarter-inch, the system overflows, and loads rivers, streams and creeks with human waste, industrial waste and other pollutants. This pollution process is known as a combined sewer overflow (CSO) and has long been an issue followed by the Indianapolis Chamber.

At least three alternatives have been proposed in the city's new plan for tackling the sewer dilemma. Another alternative: an approximate 17.8% sewer-bill increase per household. At present, Indianapolis is paying HALF of what Greenwood, Anderson and Brownsburg residents are paying, and nearly one third of what Evansville residents pay

Your Chamber Wants to Know: *How comfortable are you with increases in sewer bill rates?* (Check one and fax back to 464-2217)

__I'm comfortable with a $0-$2.00 raise in sewer rates.

__I'm comfortable with a $2.00-$5.00 raise in sewer rates.

__I'm comfortable with a $6.00-$10.00

The Southside Times

M

July 27, 2000 • Serving the Greater Southside since 1928 • Vol. 73, No. 33

in brief...

Sewer rehab meeting tonight

A series of public meetings on Indianapolis's century-old problem of raw sewage overflows will start tonight on the Southside.

The first set of meetings will help citizens learn more about federal requirements and scientific and financial issues dealing with sewage overflows

A second set of meetings in August will give citizens a formal opportunity to give feedback that could be incorporated into a long-term control plan. A final official hearing is also in the works.

The committee will meet at Southeastern Church of Christ, 6500 Southeastern Ave., today, 7-9 p.m.

For more information, citizens can call the CSO Hotline at 706-2622 or log on to www.IndyGov.org/CSO.

PETERSON UNVEILS

Sewer Plan

Mayor Bart Peterson unveiled a plan to clean the city's overflowing sewers. A group of engineering consultants have identified three options for ending sewer overflows, including increasing the capacity of wastewater treatment plants, making the sewer system's capacity larger and constructing storage areas to hold waste until it can be treated. A fourth option — asking city residents to "hold it" every other day of the week — is also being considered. Under this plan, residents with even-numbered addresses would "hold it" on Mondays, Wednesdays and Fridays; odd-numbers would "hold it" on Tuesdays, Thursdays and Saturdays. Sundays would be optional. Citizens could "hold it" as a kind of community service in the "can do" tradition of Hoosier civic-mindedness, but would be free to "let it go" should the call of nature become an imperative.

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Combined Sewer Overflow Long-Term Control Plannin
Summary of Public Input Sessions

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CSO Advisory Committee Report
September 6, 2000
By Crowe Chizek and Perras & Associates

Fighting Raw Sewage Overflows in Indianapolis
Summary of Public Input Sessions

Introduction

The city of Indianapolis hosted five facilitated public input sessions during August 2000 to collect citizen feedback on the issues and options identified for fighting raw sewage overflows. These meetings followed a series of six public education sessions in July that explained the issues associated with developing a long-term control plan for sewage overflows. The public input meetings were held in the following locations:

Date	Time	Location	Attendees
Aug. 17	7-9:30 p.m.	Northeast (7701 Allisonville Road)	13
Aug. 19	9-11:30 a.m.	Downtown (200 E. Washington St.)	13
Aug. 21	7-9:30 p.m.	Northwest (5665 Lafayette Road)	27
Aug. 22	7-9:30 p.m.	Southeast (6500 Southeastern Ave.)	10
Aug. 23	7-9:30 p.m.	Southwest (5401 W. Washington St.)	25

These meetings were publicized during the public education meetings in July, and in a mailing to 600 neighborhood associations, elected officials, environmental groups and other organizations. Meetings also were publicized on government cable Channel 16's calendar of events and in a press release to local news media, who helped notify citizens of the time and location of the sessions.

Meeting Agenda

Following welcoming remarks and introductions, B.J. Bischoff of Crowe Chizek and Jodi Perras of Perras & Associates presented a 15-minute overview of the sewage overflow process and issues. Using a Powerpoint slide presentation, Ms. Perras briefly summarized material presented during the July public education meetings:

- Sewage overflow volume, frequency, location, and environmental and health impacts.
- Indianapolis' goals for fighting sewage overflows: eliminating solids and floatables, capturing the first flush, increasing oxygen levels, decreasing bacteria levels.
- Three strategies for directly addressing sewage overflows: capture in the current sewer system, treatment plant expansion, new storage facilities.
- Other things we can do to improve water quality: replace septic systems, improve industrial pretreatment, reduce infiltration and inflow, improve stormwater management, restore streambanks to a more natural state, and prevention pollution through street cleaning, water conservation, etc.
- Increased costs to sewer users during the first five years of a 20-year project; comparison to current sewer rates in other cities.

Following these opening presentations, the meetings used brief presentations followed by facilitated small group discussions to seek citizen input on several key questions:

1. What sensitive areas along our streams deserve priority attention?
2. What level of control do we want for White River and its tributaries?
3. What other options do we want to consider to improve water quality?
4. What are neighborhood concerns along each waterway?
5. How can we build community support to clean our waterways?

What sensitive areas along our streams deserve priority attention?

State and federal policy requires municipalities to give highest priority to controlling overflows to receiving waters considered sensitive. As part of developing a long-term control plan, cities are required to identify all sensitive water bodies and the CSO outfalls that discharge to them. Under federal policy, sensitive areas include Outstanding National or State Resource Waters, waters with threatened or endangered species or critical habitat, beaches or other primary contact recreation waters, and public drinking water intakes or their designated protection areas.

Indianapolis' CSOs do not discharge into sensitive areas that fall under the federal definition. However, the city wanted citizen input on the types of areas they consider sensitive or deserving of priority attention. Their input would then be used to help the city prioritize its construction schedule.

To gather this input, Ms. Bischoff asked participants to gather in groups of three. Using Post-it Notes, these small groups identified the types of areas they consider to be "sensitive" along city waterways. Ms. Bischoff prompted them with examples, such as places where children wade and play, fishing holes, or parks. Ms. Bischoff then placed the Post-it Notes, each one containing a different type of sensitive area, on large flip charts on the wall. Similar ideas were grouped together as one type of sensitive area. Participants then used eight stick-on stars to "vote" for the most important sensitive areas. Participants could place 1-8 stars on whichever sensitive area(s) they believe are most important. Participants also were allowed to vote for no priority areas.

Below are results of the sensitive area voting during the five public input sessions. The top seven priorities are shown for each meeting location. The number in parentheses shows the percent of the total votes cast at that location for each option. Each participant could cast up to eight votes, dividing their votes however they liked among the options.

Table 1. High Priority Sensitive Areas Identified by Citizens

Northeast	Northwest	Southeast	Southwest	Downtown
Any areas that have evidence of children playing (18%)	Fixing most obvious water quality impacts (16%)	Where children play (29%)	Creeks, drainage ditches in neighbor-hoods (State Ditch) (12%)	Parks & public areas (18%)
Most severely impacted streams (16%)	Parks/Greenways (16%)	Parks (23%)	Septic systems (11%)	Wading areas for kids (15%)
No priority (15%)	Where kids play/playgrounds (14%)	Combined sewers (17%)	Neighborhood without sewers (11%)	Raw sewage in yard (15%)
Drinking water supply (10%)	Crooked Creek (11%)	Schools (13%)	School (8%)	Residential areas (10%)
Low income areas with no access to other swimming options (8%)	Septic tanks (11%)	Recreation areas (8%)	Infiltration by sanitary sewers (7%)	Schools/areas near schools (10%)
Heaviest volume and frequency (7%)	Neighborhoods/residential areas (9%)	Septic Systems (6%)	West Indianapolis -- lots of industry here (7%)	Substandard septic systems (10%)
Heavy septic failures (7%)	Fishing areas (6%)	Fishing holes (4%)	Eagle Creek (7%)	Eroding stream banks/remove blockage on streambanks (8%)
Fishing holes (7%)	Fall Creek (4%)		Dog Pound sanitation system (7%)	Clogged storm drains (5%)

Participants then were asked to identify specific sensitive areas on maps. City staff recorded these areas on the maps, based on citizen comments.

What level of control do we want for White River and its tributaries?

Ms. Perras described the three level-of-control options outlined by the city's engineering consultants. These options would reduce the frequency of overflows from the current 60 storms per year to 12, 7 or 4 storms per year. She described the benefits of each option, including each one's ability to eliminate solids and floatables, capture the first flush, increase oxygen levels, reduce bacteria levels, capture combined sewage volume, and reduce the total volume of overflows. She also presented total estimated construction costs for each option: $840 million for the 12-storm option, $1.08 billion for the 7-storm option, $1.3 billion for the 4-storm option. Participants did not have estimates for how each of these options would affect their monthly sewer bills.

Ms. Perras then noted that some members of the city's Wet Weather Technical Advisory Committee had suggested the city place a greater level of control on the smaller, neighborhood streams than on direct outfalls to the White River. She noted that the smaller streams, such as Pleasant Run, Pogues Run and Fall Creek, run through residential areas and are more accessible to people who live along them. During a storm, the predominant flow in these smaller streams comes from CSO outfalls. Also, work on the tributaries will improve White River because all of the smaller streams flow into White River. Because it is a larger stream, the river also can assimilate a greater number of overflows. Participants were given maps showing the total construction costs of each overflow target along each stream, along with the associated capture rate. Participants were asked to form small groups with facilitators to answer two questions:

> What are the benefits and drawbacks of having a greater level of control on the tributaries than on White River?
> What level of control should we set as a community goal?

Results of each meeting location are summarized below:

Northeast: Participants felt that greater control on the tributaries would help neighborhoods and have greater impact on citizens, while having a positive impact on the White River. Some participants noted the high costs of controlling overflows to the White River and suggested that more spent on direct outfalls to the White River would leave less money for replacing septic systems with sewers. However, other participants were concerned about impacts on Morgan County and other communities downstream of Indianapolis, as well as concerns about people who fish along the White River. Some participants wanted to see options for greater control, including zero overflows and 1-3 overflows per year. Participants felt they might prefer those options, but didn't have enough information to evaluate them. Participant preferences are shown in Table 2.

Table 2. Northeast Level of Control Preferences

	12-storm	7-storm	4-storm
White River	2	1	7
Fall Creek	0	2	7
Pleasant Run	0	1	8
Pogues Run	0	1	8

Northwest: Participants broke up into four small groups. Because each group used a different voting method, votes could not be tabulated for all groups together. The first group chose the 4-storm target for all streams. The second group placed greater priority on the smaller streams and agreed on a 7-storm target for White River and a 4-storm target for all its tributaries. The third group included two people who wanted the 4-storm target on all streams, and one person who wanted a 12-12-7-7 option (12-storm target on White River and Fall Creek and a 7-storm target on Pogues Run and Pleasant Run). The fourth group was split, with three favoring the 4-4-4-4 option, two favoring a target less than 4 on each stream, and one favoring a 7-4-7-7 option (7-storm target on White River, 4-storm target on Fall Creek, and 7-storm target on Pleasant Run and Pogues Run).

Southeast: Participants identified neighborhood benefits, water quality improvements and cost savings as reasons for placing a greater level of control on the tributaries than on White River. However, they also noted that it wouldn't help White River State Park and might draw more new development to the upper White River. Voting on the level-of-control options for each waterway is shown in Table 3.

Table 3. Southeast Level of Control Preferences			
	12-storm	7-storm	4-storm
White River	2		4
Fall Creek		3	3
Pogues Run	1		5
Pleasant Run		2	4

Southwest: Several participants declined to choose a level-of-control target because they felt they did not have enough information on the monthly cost to their sewer bills. The remaining participants divided into two main groups. The first group agreed on a 1-2 storm target for the tributaries. For White River, two people wanted the 4-storm target and a third wanted a 1-2 storm target. The second group selected a 7-storm target for the White River but was split between the 7-, 4- and less-than-4-storm targets for the other streams. Voting results for participants who expressed an opinion at this location are summarized in the following table:

Table 4. Southwest Level of Control Preferences				
	12-storm	7-storm	4-storm	< 4-storm
White River	0	3	3	1
Fall Creek	0	1	2	4
Pleasant Run	0	1	1	4
Pogues Run	0	1	1	4
Eagle Creek	0	1	2	4

Downtown: Participants considered three options. The first was a 12-storm target for White River and a 4-storm target for the tributaries. Participants felt this option provided additional cost savings and improved water quality in the neighborhoods. The second option was the 4-storm target for all streams. Participants felt this option provided maximum water quality improvement and an investment in the future. However, participants were concerned about the high cost and potential economic impact on industry. A third option was a 7-storm target for White River and Fall Creek, and a 4-storm target for Pogues Run and Pleasant Run. Participants felt this option provided some cost savings, but presented long-range concerns about impacts on the waterways. Voting tabulations of individual preferences were not kept during this session. The general consensus of the group supported the first option: a 12-storm target for White River and 4-storm target for the tributaries.

Summary: Based on the information available, most participants chose the 4-storm target for controlling sewage overflows in Indianapolis waterways. A number of participants wanted to place a greater priority on the tributaries than on the White River. Citizens who were most concerned about costs saw greater benefit in placing less control on White River outfalls than on the tributaries. These participants were willing to choose a 12-storm or 7-storm target for White River. Some participants also chose a lower level of control for Fall Creek, due to the higher costs associated with capturing combined sewage along that waterway. Some citizens wanted to see even greater controls beyond the 4-storm target, preferring a 2-, 1- or 0-overflow option if the costs were reasonable. However, no construction cost estimates were available for these options. Participants also expressed concern that they did not know how the different options would affect their sewer bills.

What other options do we want to consider for improving water quality?

Ms. Perras discussed other options the city might consider as part of a long-term plan to improve water quality in Indianapolis. She provided background information on each option and asked participants to provide their opinions on the importance of each one:

Converting septic systems to sewers: Indianapolis has 18,000 homes on septic systems, including many that are failing. The1905 Indiana Barrett Law calls for the city and property owner to share the construction costs for converting septic systems to sewers. Property owners can be required to pay up to 10 percent of the average fair market value of homes in their neighborhood. This can place a high burden on residents with a low income or fixed income. Under historic funding levels, it will take 60 years to replace all septic systems with sewers. Should the city accelerate its program? What about the burden on homeowners?

- **Stormwater management:** By improving stormwater management, the city could reduce pollution impacts from stormwater runoff and reduce neighborhood flooding problems. In 1998, the state issued a new stormwater permit for Indianapolis. The permit required the city to develop a stormwater management plan and to look at revisions to the city's stormwater ordinance. The plan has not yet been implemented because there is no funding appropriated for it. Should the city implement the stormwater plan in conjunction with its CSO plan? What priority should this project have?

Industrial Pretreatment: Industries also discharge into the combined sewer system under pretreatment permits issued and enforced by the city. The city is considering new requirements on industry to decrease, divert or hold flows during a storm; eliminate clear water flows; reduce flows; or remove more pollutants from their wastewater before discharge.

- **Infiltration/Inflow reduction:** The city could increase its enforcement and investigation of clean water entering the sanitary sewers through infiltration and inflow.

  Streambank restoration: By restoring streambanks to a more natural state, the city could improve water quality and habitat, especially along smaller streams. Restoration programs could be implemented in partnership with landowners or through volunteer activities by youth groups or community groups.

- **Pollution prevention:** The city could expand or modify current programs for street cleaning, solid waste collection and recycling, illegal dumping, bulk refuse disposal, hazardous waste collection, or water conservation.

Participants randomly broke themselves into groups to look at three major categories:

1. Converting septic systems to sewers

2. Stormwater management

3. Others, including industrial pretreatment, infiltration/inflow reduction, streambank restoration, and pollution prevention.

Each option was posted on a separate flipchart located in different corners of the room. A facilitator stood by each chart to record participant comments. After 3-5 minutes, participants scattered to a different topic area, until each participant had an opportunity to comment at each area. Following their comments, participants were asked to vote for their most preferred options or comments. Again, each participant had eight stars to distribute in any fashion he or she wished. The comments receiving at least 5 percent of the total votes cast at each location are summarized below in Table 5.

Table 5. Citizen Concerns About Other Options to Improve Indianapolis Waterways

Northeast	Northwest	Southeast	Southwest	Downtown
Septics: Don't require mandatory connections (17% of total votes cast)	Septics: Cost share septic conversion with the city paying 75% (city pays for sewer – homeowner pays for connection) (12%)	Tax credit for good land use (or penalty for not) (21%)	Septics: Total conversion to sewers with 75% paid by city (16%)	No more new septic systems (15%)
Septics: Extend sewers so we can eliminate septics – within 5 years (15%)				
Stormwater: No current incentive for reducing runoff in combined sewer area (8%)	Infiltration/Inflow: Repair of existing storm/sanitary (Belmont Interceptor) line (8%)	Streambank restoration (21%)	Septics: Convert all septics immediately – sewer fees will generate funding (8%)	Take additional dollars from sewer bill and put into fund to subsidize septic conversion (10%)
Infiltration/Inflow: enforcement of roof drains and sump pumps (8%)	Do septics and CSOs at same time (7%)	Other: Inmates to clean streambanks of trash regularly (13%)	Septics: Health Dept. needs to identify priority neighborhoods (8%)	Pollution prevention: Illegal dumping (10%)
Giver higher priority to eliminating septics (6%)	Stormwater: Stormwater utility (7%)	Septics: Lower interest rate – change Barrett Law (10%)	Other: [Fix CSOs along] Belmont interceptor (8%)	Stormwater: land use planning (8%)
Don't like burden Barrett Law places on individuals (6%)	Stormwater: Enlarge Belmont Interceptor capacity (6%)	Septics are inherently unsound, they need to go – 60 years is too long! (10%)	Stormwater: Rule 5 enforcement: control soil erosion during construction, bigger fines (7%)	Stream bank restoration: less erosion (8%)
Want more enforcement of existing stormwater rules (6 %)	Streambank: Quit destroying wetlands/restore wetlands (6%)	City or state should reduce economic impact to residents who are forced to connect to the sewer (5%)	Septics: Require those who have sewer available to hook on (6%)	
Streambank restoration and wetlands along tributaries (6%)		Stormwater: Slow flow down – more interception – new construction (5%)	Stormwater: Better drainage in neighborhoods (5%)	Recycling: free or low cost/home pickup (8%)
Industrial pretreatment: discharges during rain events should meet water quality, BOD standards; Non-contact H2O (6%)			Other: Build Fall Creek treatment (5%)	

What are neighborhood concerns along each waterway?

Ms. Bischoff described the city's desire to identify citizen concerns before and during construction along each waterway. The city was seeking input in three areas:

1. During construction: Neighborhood impacts of concern: street or lane closures vs. tree loss? Noise? Dust? Guidelines for contractors who do the work? Little disruption over a long period of time vs. a lot of disruption over a short period of time?
2. End results: Fall Creek reclamation facility? Waterfall or fountain near White River State Park? Modifying Keystone Dam? Removing Boulevard Dam on Fall Creek? Tunnels vs. underground storage tanks for storage? Ms. Perras described the major construction projects that are planned or being considered along each waterway. Participants reviewed maps showing the general locations of construction projects that would be required to control sewage overflows.
3. Communication: How can the city best communicate with citizens in the neighborhoods before and during construction projects?

Each of the three issues were posted on a separate flipchart around the room, with a facilitator at each chart. Participants scattered to the flipcharts in small groups, rotating to a different flipchart after 3-5 minutes until each participant had an opportunity to provide comments in each topic area. Comments recorded at each location are summarized below:

Table 6. Citizen Concerns During Construction

	Northeast	Northwest	Southeast	Southwest	Downtown
Neighborhood disruption/ timeframe for projects	▪ Prefer work done A.S.A.P. to prevent long-term disruptions. ▪ Do all infrastructure work at same time. ▪ Keep access to neighborhoods open.	▪ Soften/minimize neighborhood impact. ▪ Short construction times. ▪ Even-handed treatment of all neighborhoods.	▪ OK with a lot of disruption for a short term. ▪ Remember aesthetics. ▪ Least amount of disruption possible.	▪ Get it over with. ▪ Repave, resod after project. ▪ Do as much at night as possible. ▪ Leave it in same shape as it started out. ▪ Minimize noise. ▪ People/neighborhoods are #1. ▪ Workers must clean up after themselves.	▪ Do it right the first time, regardless of inconvenience. ▪ Prefer little disruption over longer period of time.
Impacts on streets, trees, greenways	▪ Work in the right-of-way instead of greenspace. ▪ Restore working area after construction.	▪ Avoid removing trees. ▪ Replace trees, with like kind. ▪ Coordinate street closings. ▪ Control erosion and sinking of ground at new structures.	▪ Take NO trees. (If absolutely necessary, must plant lots of others.)	▪ Think about alternative traffic routes. ▪ Speedway project was a good model – keep street open – spaced it out. ▪ Look at types of trees you are working with.	▪ Do construction in greenway only if it can be re-vegetated. ▪ Prefer traffic disruption over cutting trees.

Table 7. Citizen Concerns about the End Results of Construction Projects

	Northeast	Northwest	Southeast	Southwest	Downtown
Aeration options	▪ Some preferred fountains; others preferred waterfall	▪ Fountains better, simple, cheaper. ▪ Make sure waterfall is safe for children.	▪ Waterfalls are more natural, nice to look at. Fountains possibly expensive? ▪ Look at cost factors and choose most cost-effective.	▪ Waterfalls and fountains on White River – favorable.	▪ Fountains much more aesthetic. ▪ Waterfalls better. ▪ Fountain impact on boaters?
Storage options	▪ Tank better than tunnel because concerned about polluting water supply; ▪ San Francisco tanks done well; ▪ No tank in my neighborhood; ▪ Mines good	▪ Mine leakage is a concern. ▪ Above ground seems easier to monitor.		▪ Big tunnels – not a good idea. ▪ Storage tanks – not a good idea. ▪ Real-time control – number 1.	▪ Tunnels preferable. ▪ Whatever is most cost-effective.
Reclamation facility along Fall Creek	▪ Fall Creek reclamation facility good	▪ YES!! ▪ Fall Creek needs to look nice.	▪ Should be one of the first priorities.	▪ High priority.	▪ Blend into neighborhood (no smell, quiet) ▪ No tree removal/close streets if needed. ▪ Call it a wastewater treatment plant.
Dam Options	▪ Agree with removing Blvd. Dam	▪ Fish & migration concerns re dams; water depth could be hazardous		▪ Support recreation (canal)	▪ Good idea to remove dams.
Other		▪ Keep river accessible.			

Other Issues, Concerns and Questions

At times during the public input sessions, participants would provide a comment, question or concern that didn't fit within the discussion, or for which the answer was not known. Participants were asked to write these comments on Post-it Notes and place them on a large flipchart set aside for these issues. Comments received at each site are organized by location and category below:

Northeast

Cost and Financial Issues

- White River at wastewater treatment plant – 12 is best benefit for money
- Other cities pay $30/mo. For their sewer bills. Indy is at about $11/mo. Indy must fix its problem – legally and morally.
- Use knee of the curve figure.
- Does money for Barrett Law projects compete with dollars for CSO controls?

Environmental Issues and Other Concerns

- Storm-water run-off doesn't need treatment. The amount of antifreeze, oil, etc will be handled naturally by flooding down rivers and streams. This is a fact…not just an opinion.
- We shouldn't do anything to negatively impact Morgan County.
- If we "fix" tributaries how much does this help White River?
- Don't allow out of county connection.
- Stop allowing new connections (except septic system).

Process

- Why is public asked to give input only on your "Pre-Selected" options? We need to totally separate storm from sanitary waste.
- EPA requires the zero option and 1-3 overflows/yr. This should be included in these discussions.

Northwest

Cost & Financial Issues

- Everyone I know is willing to pay more than $2/month right now! Get a head start for later projects.
- The statement that the engineering community cannot handle more than $190 Million (in first five years) is NOT correct. Let us look at real numbers.
- City needs to pick up 80% of septic tank connection costs
- Location, Location, Location: The important point is to control 100% of small storms and ALL the tributaries. Is there bonding capacity in the 10 – 13 year time frame?

- Fix the septic problem at the same time as CSO's. We don't need to wait 60 years! But, city should share costs. I don't have children in school but I pay to support schools.

Environmental Issues and Other Concerns

- We can do much more now. Let us move on it!
- Do it now! Do it fast! Up to our ability to manage the process
- Need to look at ammonia, heavy metals, etc.
- What about the small streams?
- Part of the minimum effort needs to be on pollution prevention on industrial "holding" pretreatment
- Infiltration control is long ago a Federal requirement: not an option
- Draft proposal does not meet minimum Federal requirements
- The proposals don't meet water quality standards
- Very important to work on a watershed level – not just at the city level
- City needs to make more effort to inform neighborhood of projects well in advance of beginning construction
- Educate the public in regard to the fact that we are all human beings with the same basic human physical needs. We ALL need clean water. No one is exempt! Everyone is affected!
- Trees!! City has lots of tree removal programs but no planting programs. Maintaining City canopy in these projects is important

Fall Creek Concerns

- Another treatment plant on Fall Creek.
- Give high priority to Fall Creek Retention Facility as one of first projects.
- Fall Creek should require less withdrawals under low flow so higher natural flow.
- Why not increase flow on Fall Creek by limiting water withdraw?
- Review withdrawal of water by IWC on Fall Creek, Eagle Creek and White River and implement conservation early in season. Don't wait for low flows.

Southeast

Cost and Financial Issues

- Affordable options for fixed income residents
- Tax abatement for business – too much

Environmental Issues and Other Concerns

- Recycling, pollution prevention – no additional cost
- Town of Southport old sewer – CSO?
- What about the Belmont North interceptor? We live on Springwood trail and have sewage back up on our own street every major storm. Some of the sewage is sacked up and removed, but we still have solid waste left on the street and yards. Children and adults and pets walk on this street and the overflow that goes into the creek affects our children who play there.

Southwest

Cost/Financial Issues

- We need to be told what this means to us financially per house.
- Can't make informed decision not knowing monthly cost.
- Realistically estimate total costs and go for more dollars up front.
- Do it right the first time – no artificial low rates.
- Tax, Tax: 52% of your tax go to school
- Plans need estimated sewer bill to make real decisions.
- Take tax from school tax – sewer tax.
- Impact fees or all new development to pay for increased capacity.
- To finance this project take the 6% tax off of fast food and entertainment. Start out years ago at 1% to pay for MSA. All of a sudden MSA is no longer – instead it was increased to 6%.

Environmental Issues and Other Concerns

- Find/use Speedway system capacity.
- Factories getting permits to pollute.
- IWC release more H2O to Fall Creek for adequate flow.
- Do comprehensive watershed management.
- Extend a new sewer for combined sewer to alleviate problem with Crooked Creek and Belmont interceptor.
- Have neighborhood's inspections to make homeowners and rental residents clean up their own properties – also property owners who rent out – then they move to more exclusive neighborhoods.
- Yes, clean up smaller streams first and require people to keep it clean. That's only common respect. Why not grills on sewer to keep out bottles, cans, paper plates etc. ? The sewers stink bad around W. Washington at West of Belmont.
- The Railroad overpass at Rockville Road and West Washington street floods bad at every hard rain and it's impossible going West on Washington Street. This has always done this for my 50 years being nearby.
- How does this affect Ben Davis Conservancy residents who are charged on value of property no matter how many people in house? The value is grossly inflated as the area becomes very blighted with rentals, junk yard, auto sales and service etc @ 480 South Somerset avenue 1st block south of 3600 West Washington street.
- Enact delayed "Adopt-a-stream" project, street and gutter clean-ups
- The only viable alternative to work toward is sewer separation, despite the city's viewpoint. This would eliminate the problem of overloaded treatment plants to a large extent. This might lead to less need for sewer plant expansion – a cost savings possibly. There is no guarantee that EPA would not make requirements for clean water more stringent. Also, growth may make CSO plans inadequate. The idea of using mines for storage is impossible to imagine. Sealing them to prevent leaks, seismic activity, pumping, etc. All present monumental problems The idea of inflatable dams and automatic gate valves present strategy problems for planners and engineers.

Downtown

Environmental Issues and Other Concerns

- Will city issue more permits for septic?
- Stormwater utility?
- Why build greenways next to polluted waters?
- What is IDEM Phase II Stormwater?

Process

- Citizen participation is vital. This process (today) proves that ordinary citizens can be part of decision-making and problem-solving.
- The previous administration tried to convince taxpayers that the problem was too expensive to fix. Scare tactics were used rather than education. Please continue this effort over the life of the project.

City of Indianapolis
Bart Peterson, Mayor

Fighting Raw Sewage Overflows: Public Input Sessions
August 2000
Agenda

1. **Welcome, introductions, overview of session, and data gathering process**
   - Purpose: To help the city make decisions on neighborhood priorities that are both environmentally effective and affordable

2. **Overview of the problem, the city's 4 goals and the 3 strategies *(Decision Guide pp. 3-6)***

3. **What sensitive areas along our streams deserve priority attention? *(Guide p. 11)***
   - Criteria for prioritizing construction projects over the next 20 years could include protecting human health, protecting the environment, and treating all neighborhoods in a fair and equitable manner

4. **What level of control do we want for White River and its tributaries? *(Guide pp. 10-11)***
   - What are the benefits and drawbacks of having a greater level of control on the tributaries than on White River?
   - What level of control should we set as a community goal?

5. **What other options do we want to consider to improve water quality? *(Guide p. 7)***
   - Converting septic system to sewers
   - Stormwater management
   - Others including industrial pretreatment, infiltration/inflow reduction, streambank restoration, and pollution prevention

6. **What are neighborhood concerns along each waterway? *(Guide pp. 12-13)***
   - *During construction*: Neighborhood impacts of concern—street or lane closures, tree loss, noise, dust? Guidelines for contractors who do the work? Little disruption over a long period of time vs. a lot of disruption over a short period of time?
   - *End results*: Fall Creek reclamation facility? Waterfall or fountain near White River State Park? Modifying Keystone Dam? Removing Boulevard Dam on Fall Creek? Tunnels vs. tanks for storage?
   - *Communication*: How can the city best communicate with citizens in the neighborhoods before and during construction projects?

7. **How can we build community support to clean our waterways?**
   - Creative funding ideas; public education; communicating our progress

8. **Conclusion/Next steps**
   - Mayor's CSO Advisory Committee will discuss citizen recommendations
   - Stay involved--public hearing in the fall; watch the website and government TV channel; call the phone line

Indianapolis CSO Public Input Sessions, August 2000

Facilitator Agenda

*Timing and activities are designed for small group breakout sessions; methodology will be revised on-site if insufficient number of participants prohibits small group interaction

- **Red words refer to specific small-group facilitation instructions**

***** **Refers to activity in which participants "vote" with 8 stars**

- **Blue words identify small group facilitated discussion topics**

Materials and supplies: 2-4 flipcharts and stands, markers, masking tape, 3"x5" post-it pads, sheets of stick-on stars, stick-on wearable name tags, laptop computer, computer projection unit, videotape player, sign-in sheets, pens, large charts and easels, agendas, CSO Issues Booklets, Q and A document, color maps identifying options for each waterway

Sign-in Table Staff: Be sure to identify any individuals who are on the CSO Advisory Committee, City Officials, or any elected officials who should be introduced. Write these names on an index card and give to the DPW official who is officiating the welcome for the session.

1. **Welcome, introductions, overview of session, data gathering process (10 min.)**

City representative welcomes attendees and stresses the importance of this issue and process

City rep. introduces any Advisory Board and City-Council members present, staff and facilitators who will be assisting, and Jodi and B.J.

- B.J. explains the format of the session, reviews the participant agenda and hand-out materials (CSO Issues Booklet, Q and A document that appears on the website, color maps identifying options for each waterway)

  B.J. explains the process that the city has been using to involve Indianapolis citizens in the CSO decision-making process
  - Purpose of this session is to help the city make decisions on priorities in the neighborhoods
  - Important to select options that are both environmentally effective and affordable
  - These public input sessions are one way of gathering citizen feedback—other forms of feedback include web site and phone hot line comments, and CSO Advisory Committee

2. **Overview of the problem, the city's 4 goals, and the 3 strategies (15 min.)**

- *Decision Guide pp. 3-6*

- Jodi and B.J. present a brief overview of the CSO problem, using the highlights from the PowerPoint presentation, video clips, and large charts

3. What sensitive areas along our streams deserve priority attention? (25 min.)

Guide p. 11

- B.J. asks participants to gather in groups of 3; using post-its, small groups will identify the types of areas they consider to be "sensitive" along our waterways—B.J. will prompt them by giving a few examples including places where we know children wade and play, fishing holes, public parks. B.J. suggests the following criteria:
  - Citizen input is critical because the city needs to schedule many construction projects over the next 20 years and citizen feedback will help us decide where to start the work
  - Some criteria to consider: protecting human health; protecting the environment; treating all neighborhoods in a fair and equitable manner

********B.J. and Jodi will place post-its on flipchart sheets around the room (grouping similar ideas)—each participant may use one strip of their stick-on stars (8 stars) to "vote" for the most important sensitive areas—participants should place 0-8 stars on whichever sensitive area(s) they believe are most important

- B.J. asks participants to form 4 groups—one in each corner of the room—with one facilitator per group

  Using large maps of the waterways taped to the wall (provided), facilitators will ask participants to identify specific sensitive areas (based on previous ranking results) on specific waterways; facilitators draw these sensitive areas on their maps

- Facilitators will present one or two highlights from their group's discussion to entire group, facilitated by Jodi and B.J.

4. What level of control do we want for White River and its tributaries? (30 min.)

Guide pp. 10-11

Jodi explains level of control issues for White River and its tributaries; she describes the size and composition of each waterway and the pros and cons of each capture level for each tributary

B.J. tells the group that we'd like them to provide their feedback on the following:
- What are the benefits and drawbacks of having a greater level of control on the tributaries than on White River?
- What level of control should we set as a community goal?

Participants randomly break into 4 groups—one facilitator per group—in the 4 corners of the room—each group will focus its discussion on the two questions mentioned above

Facilitators conduct a discussion of (1) the pros and cons of having a greater level of control on the tributaries than the White River and (2) recommended level of control (12, 7, or 4 storms/year) for each waterway and record participant comments on flipcharts; working toward consensus, facilitators summarize their group's opinions

Facilitators present report of their group's results to the entire group, facilitated by B.J. and Jodi

5. What other options do we want to consider to improve water quality? (25 min.)

- *Guide p. 7*

Jodi and B.J. present a brief overview of supplementary non-CSO options that can be implemented to clean our waterways

B.J. says that we're looking for public input in three major categories:
1. Converting septic systems to sewers
2. Stormwater management
3. Others, including industrial pre-treatment, infiltration/inflow reduction, streambank restoration, and pollution prevention

Each of these three options (Septic, Stormwater, and Others) are posted on a separate flipchart sheet around the room (a facilitator and/or staff person with expertise in that option stands by each one)—participants randomly walk over to a non-CSO issue that most interests them and express their opinion regarding that issue—facilitator/staff person records their comments—participants scatter to a different group after 5 minutes, as requested by B.J.—repeat this process for 3 rounds

- Prompt questions could include the following:
    - Septic: Should the city accelerate the city's Barrett Law program? How can we make septic system conversions less burdensome for homeowners?
    - Stormwater: Should we resolve some long-standing stormwater and street flooding problems as part of this project?

********After the facilitators/staff have captured the participants' comments on each non-CSO option, participants use a strip of 8 stars and "vote" (using 0-8 stars per option) for their most preferred option(s)

6. What are neighborhood concerns along each waterway? (30 min.)

Guide pp. 12-13

B.J. explains that we need to identify citizen concerns as the city becomes involved in construction projects that will improve the quality of our waterways. She says we're looking for input in three areas:

1. *During construction*: Neighborhood impacts of concern—street or lane closures, tree loss, noise, dust? Guidelines for contractors who do the work? Little disruption over a long period of time vs. a lot of disruption over a short period of time?

2. *End results*: Fall Creek reclamation facility? Waterfall or fountain near White River State Park? Modifying Keystone Dam? Removing Boulevard Dam on Fall Creek? Tunnels vs. tanks for storage?

3. *Communication*: How can the city best communicate with citizens in the neighborhoods before and during construction projects?

- Jodi explains some of the details of the *end results* construction projects

- Each of these three options (During construction, End results, and Communication) are posted on a separate flipchart sheet around the room (a facilitator and/or staff person stands by each one)—participants randomly walk over to one of the topics of concern that most interests them and express their opinion regarding that issue—facilitator/staff person records their comments—participants scatter to a different group after 5 minutes, as requested by B.J.—repeat this process for 3 rounds

  Facilitators present their small group reports to entire group, facilitated by Jodi and B.J.

7. How can we build community support to clean our waterways? (10 min.)

B.J. and Jodi facilitate a large group brainstorming session on: (1) Creative ideas for funding the initiatives discussed during the session; (2) public education that's needed on the CSO issue; and (3) how to communicate progress as it's made.

8. Conclusion/Next steps (5 min.)

- City representative thanks participants for their comments

  City representative tells participants about the next steps, including that the mayor's CSO Advisory Committee will discuss citizen recommendations/encourages citizens to stay involved in this process and return for the public hearing later in the fall—watch the website, channel 16, call the phone line, etc.

Fighting Raw Sewage Overflows

Citizen Recommendations for Improving Our Indianapolis Waterways

CSO Public Input Sessions
August 2000

City of Indianapolis

What Is Being Done?

Report released July 11, 2000, outlining city's options based on 7 years of study and activities

Gather public input on control alternatives
- Public education sessions (July)
- Public input sessions (August)
- Mayor's CSO advisory committee
- City-County Council

Develop draft long-term control plan

Public hearing on draft plan

Submit long-term control plan to IDEM and EPA

CSO Public Input Sessions

Sewer Overflow Points

- Sewage overflows into the White River and its tributaries at 134 places - spilling 6 billion gallons of contaminated water each year

CSO Public Input Sessions

Indianapolis' Goals for Fighting Sewage Overflows

- Improve neighborhood quality of life by eliminating solids and floatables in our streams
- Capture the first flush of stormwater entering the sewer system. The first flush contains solids that have accumulated in the pipes since the previous storm.
- Increase oxygen levels to protect fish
- Decrease bacteria levels to protect people

CSO Public Input Sessions

There Are 3 Strategies We Can Take to Directly Address Sewage Overflows

1. Capture and store more sewage in the current sewer system where capacity exists during wet weather (but without causing sewer backups)
2. Expand wastewater treatment plants to reduce heavy overflows and treat more wastewater during wet weather
3. Build new storage facilities to capture additional wastewater

CSO Public Input Sessions

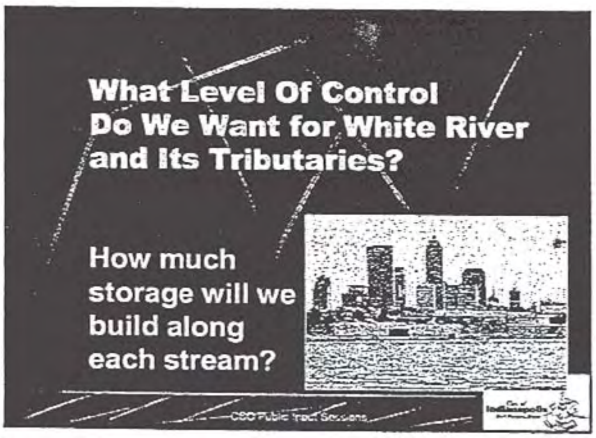
Other Things We Can Do To Improve Water Quality:

- Replace septic systems
- Improve industrial pretreatment
- Reduce infiltration and inflow
- Improve stormwater management
- Restore streambanks to more natural state
- Prevent pollution through street cleaning, water conservation, etc.

CSO Public Input Sessions

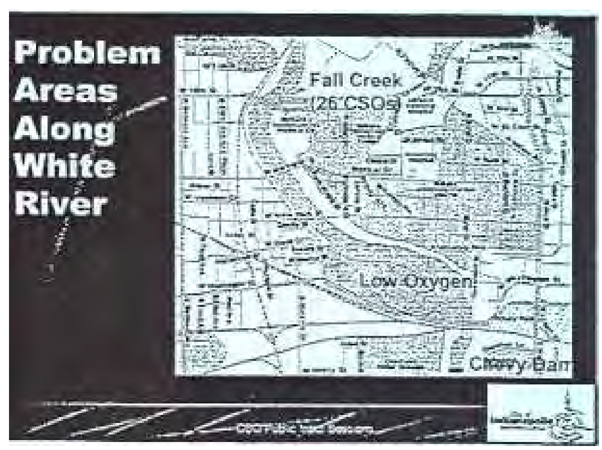

How Will This Affect Monthly Sewer Bills?
Current monthly average bill: $10.91
To cover costs during the next five years, the project will require an initial $1.94 per month sewer bill increase in 2001.
This helps provide $184 million to pay for treatment plant expansion and design and engineering work for any CSO control alternatives we select.
Other sewer rate increases will be required later to pay for the construction projects


What Sensitive Areas Along Our Streams Deserve Priority Attention?

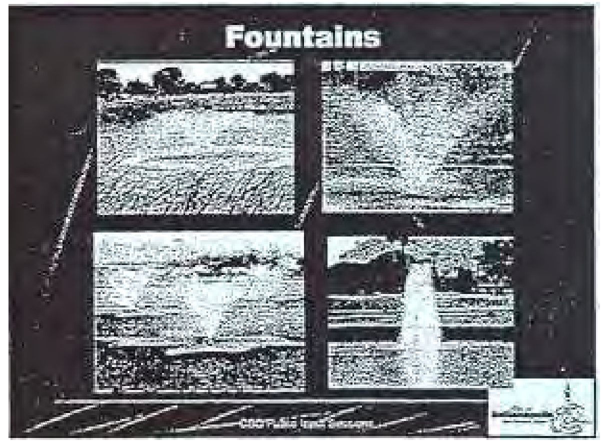

What Level Of Control Do We Want for White River and Its Tributaries?
How much storage will we build along each stream?

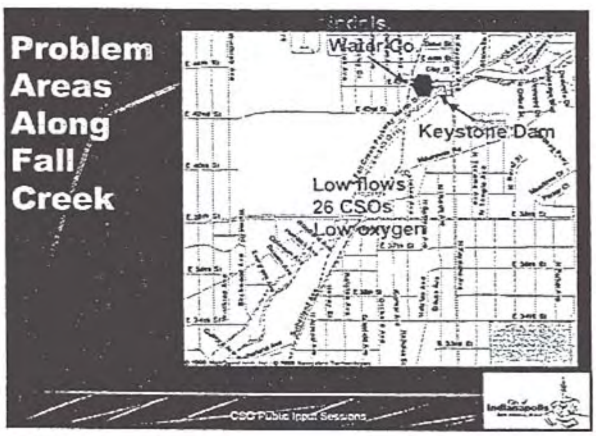

What Other Options Do We Want To Consider To Improve Water Quality
Converting septic systems to sewers
Stormwater Management
Industrial Pretreatment
Infiltration/Inflow reduction
Streambank Restoration
Pollution Prevention

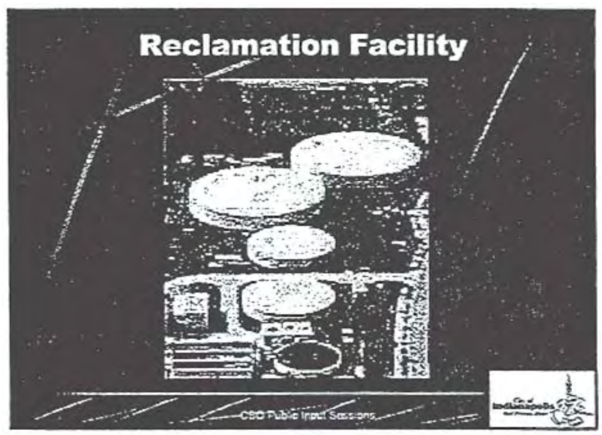

What Are Neighborhood Concerns Along Each Waterway?
During construction
End results
Communication

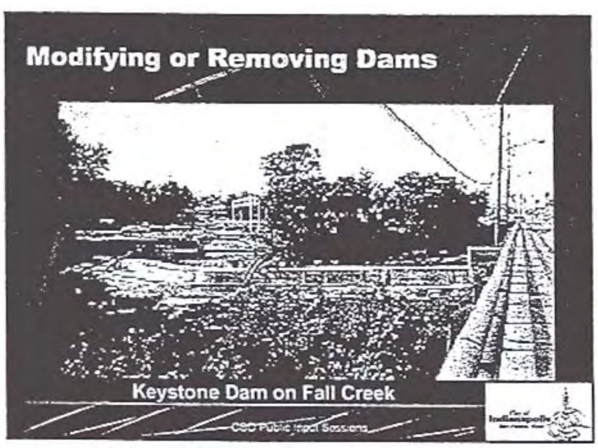

Problem Areas Along White River
Fall Creek (26 CSOs)
Low Oxygen
Chevy Dam


Artificial Waterfall
(Aeration Facility)
Chicago Sidestream Aeration Project
CSO Public Input Sessions

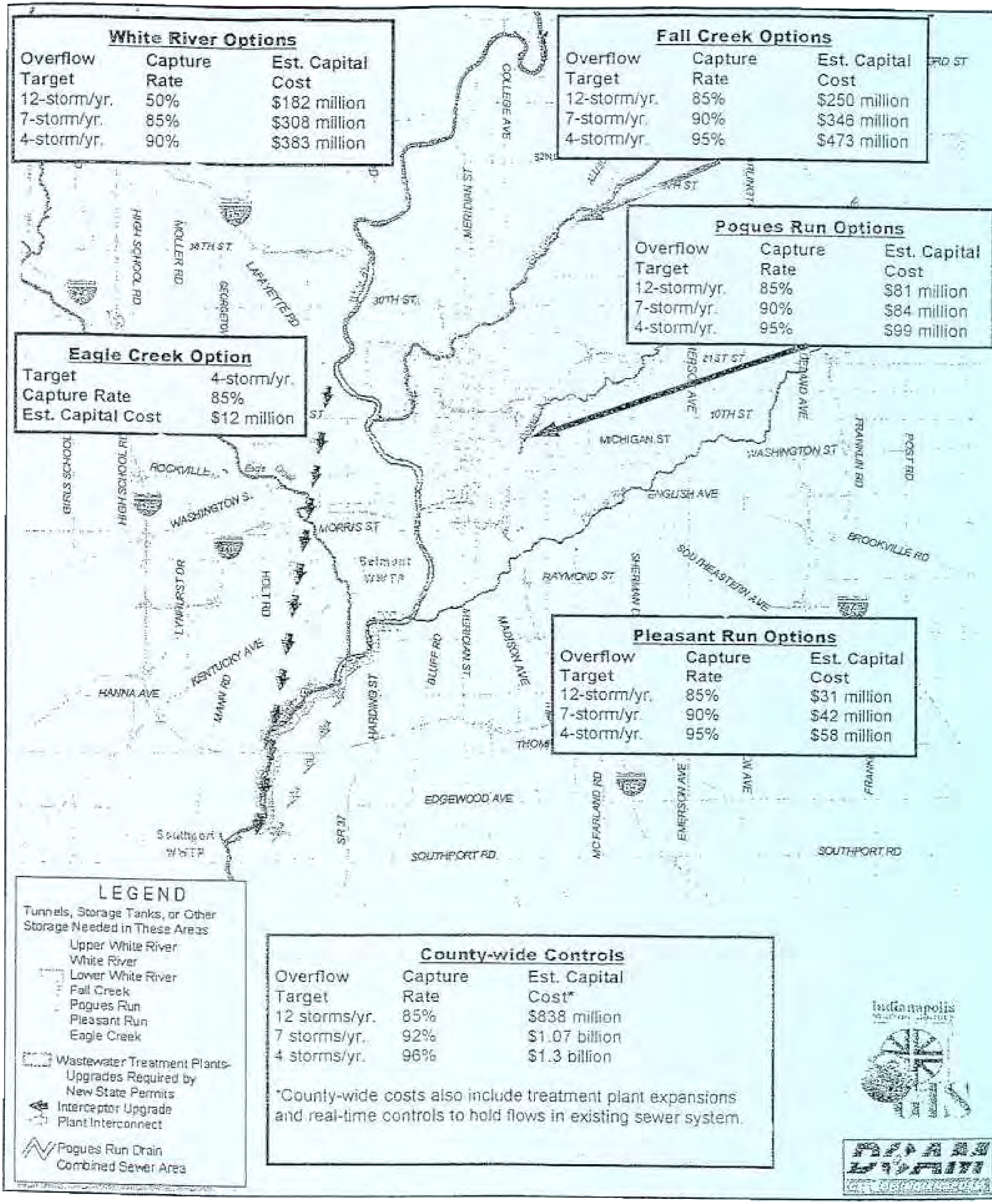

Fountains
CSO Public Input Sessions


Problem
Areas
Along
Fall
Creek
Water Co
Keystone Dam
Low flows
26 CSOs
Low oxygen
CSO Public Input Sessions


Reclamation Facility
CSO Public Input Sessions


Modifying or Removing Dams
Keystone Dam on Fall Creek
CSO Public Input Sessions


How Can We Build Community
Support To Clean Our Waterways
Creative funding ideas
Public education
Communicating our progress
CSO Public Input Sessions



White River Options

Overflow Target	Capture Rate	Est. Capital Cost
12-storm/yr.	50%	$182 million
7-storm/yr.	85%	$308 million
4-storm/yr.	90%	$383 million

Fall Creek Options

Overflow Target	Capture Rate	Est. Capital Cost
12-storm/yr.	85%	$250 million
7-storm/yr.	90%	$346 million
4-storm/yr.	95%	$473 million

Pogues Run Options

Overflow Target	Capture Rate	Est. Capital Cost
12-storm/yr.	85%	$81 million
7-storm/yr.	90%	$84 million
4-storm/yr.	95%	$99 million

Eagle Creek Option

Target	4-storm/yr.
Capture Rate	85%
Est. Capital Cost	$12 million

Pleasant Run Options

Overflow Target	Capture Rate	Est. Capital Cost
12-storm/yr.	85%	$31 million
7-storm/yr.	90%	$42 million
4-storm/yr.	95%	$58 million

County-wide Controls

Overflow Target	Capture Rate	Est. Capital Cost*
12 storms/yr.	85%	$838 million
7 storms/yr.	92%	$1.07 billion
4 storms/yr.	96%	$1.3 billion

*County-wide costs also include treatment plant expansions and real-time controls to hold flows in existing sewer system.

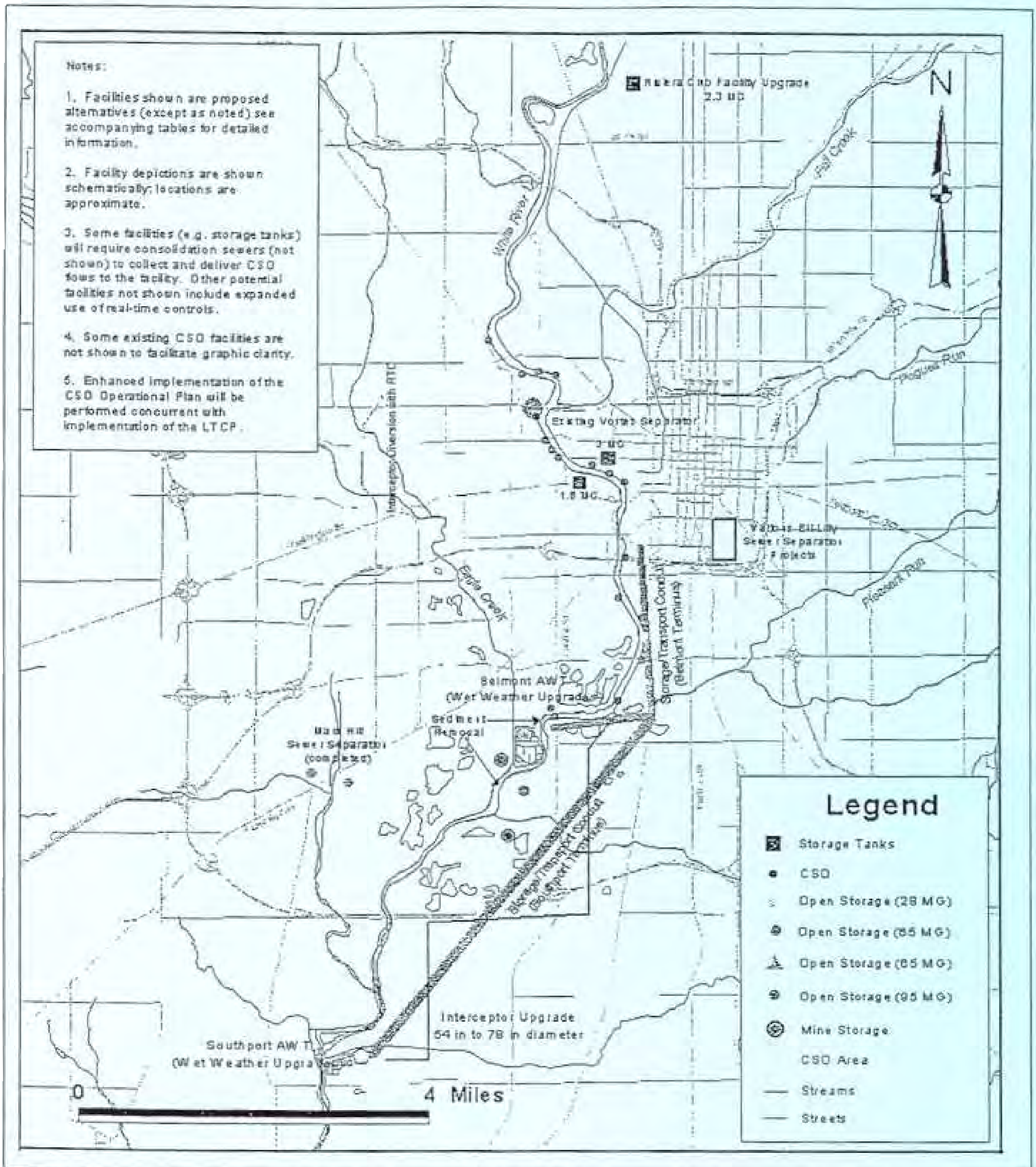


Figure 4-16
Alternative CSO Control Facilities – White River

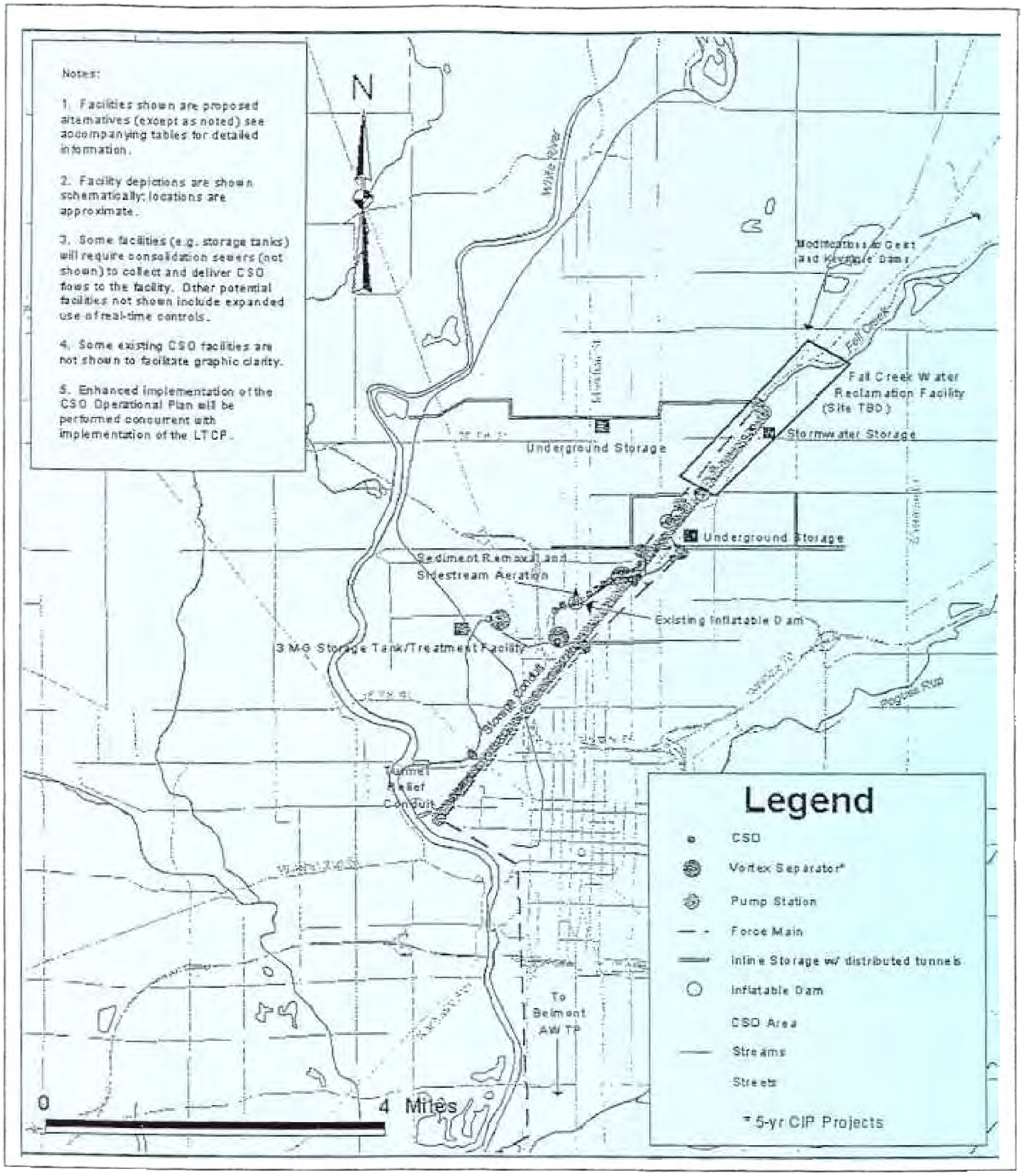


Figure 4-17
Alternative CSO Control Facilities Fall Creek

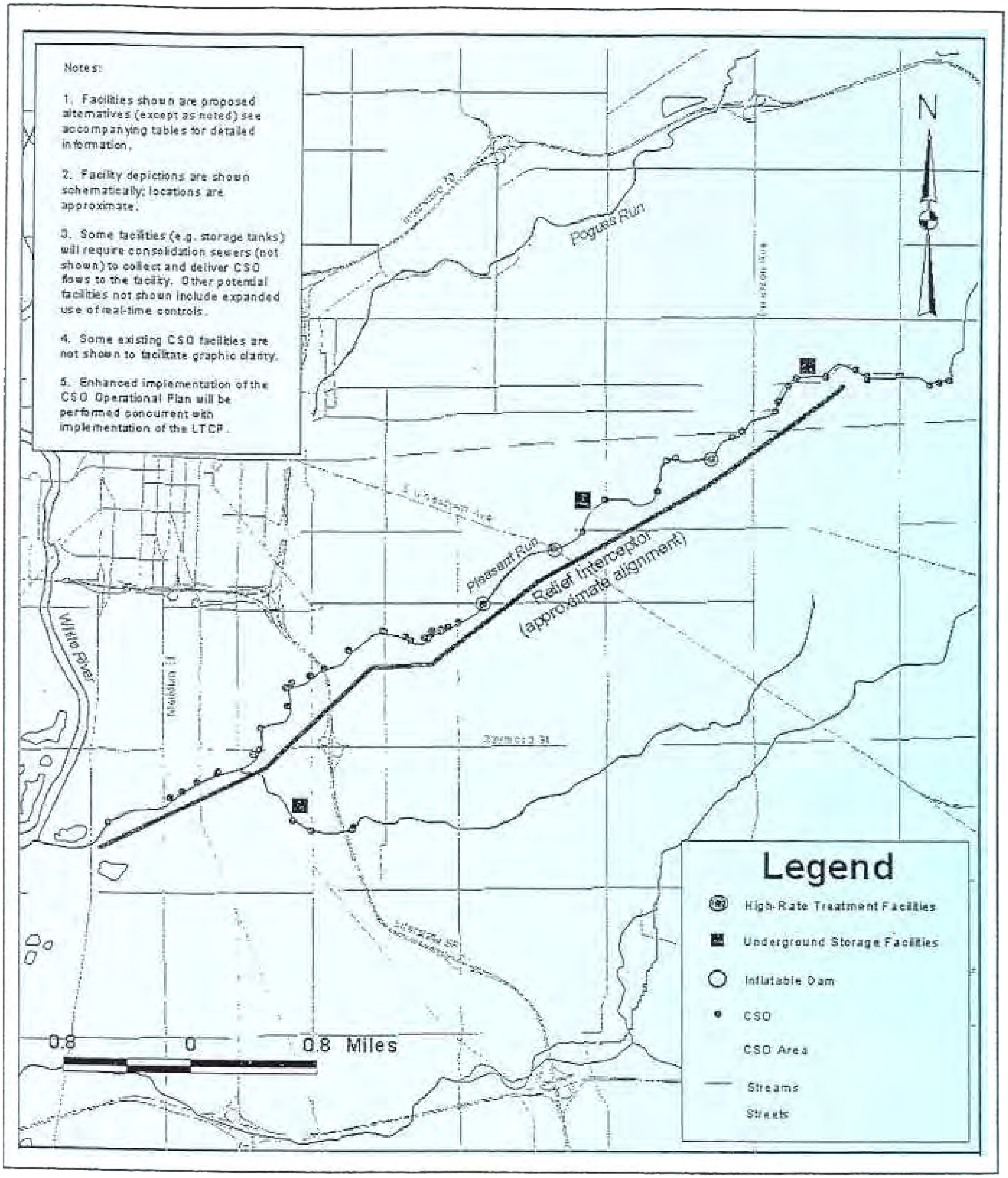


Figure 4-18
Alternative CSO Control Facilities – Pleasant Run

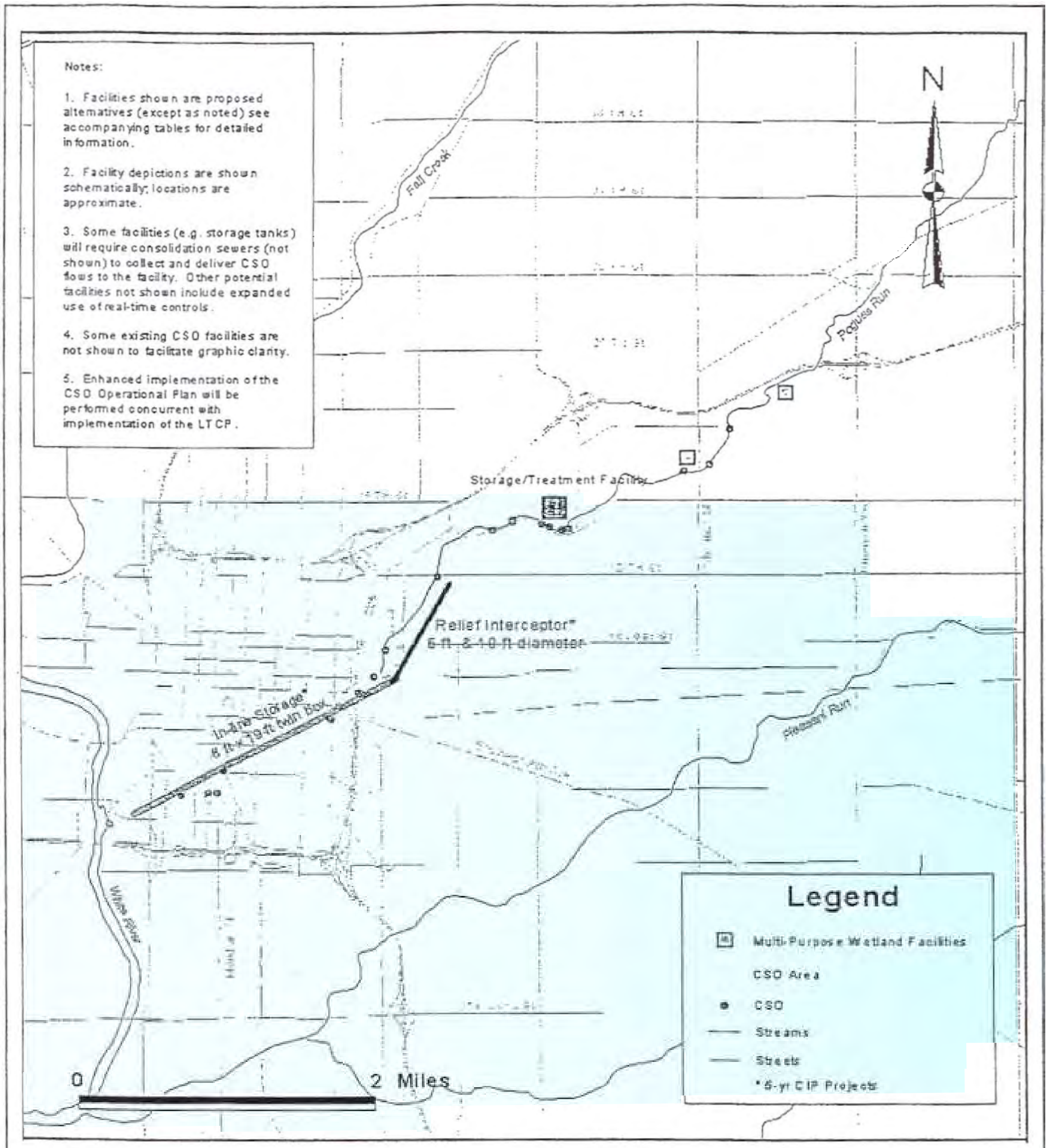


Figure 4-19
Alternative CSO Control Facilities – Pogues Run

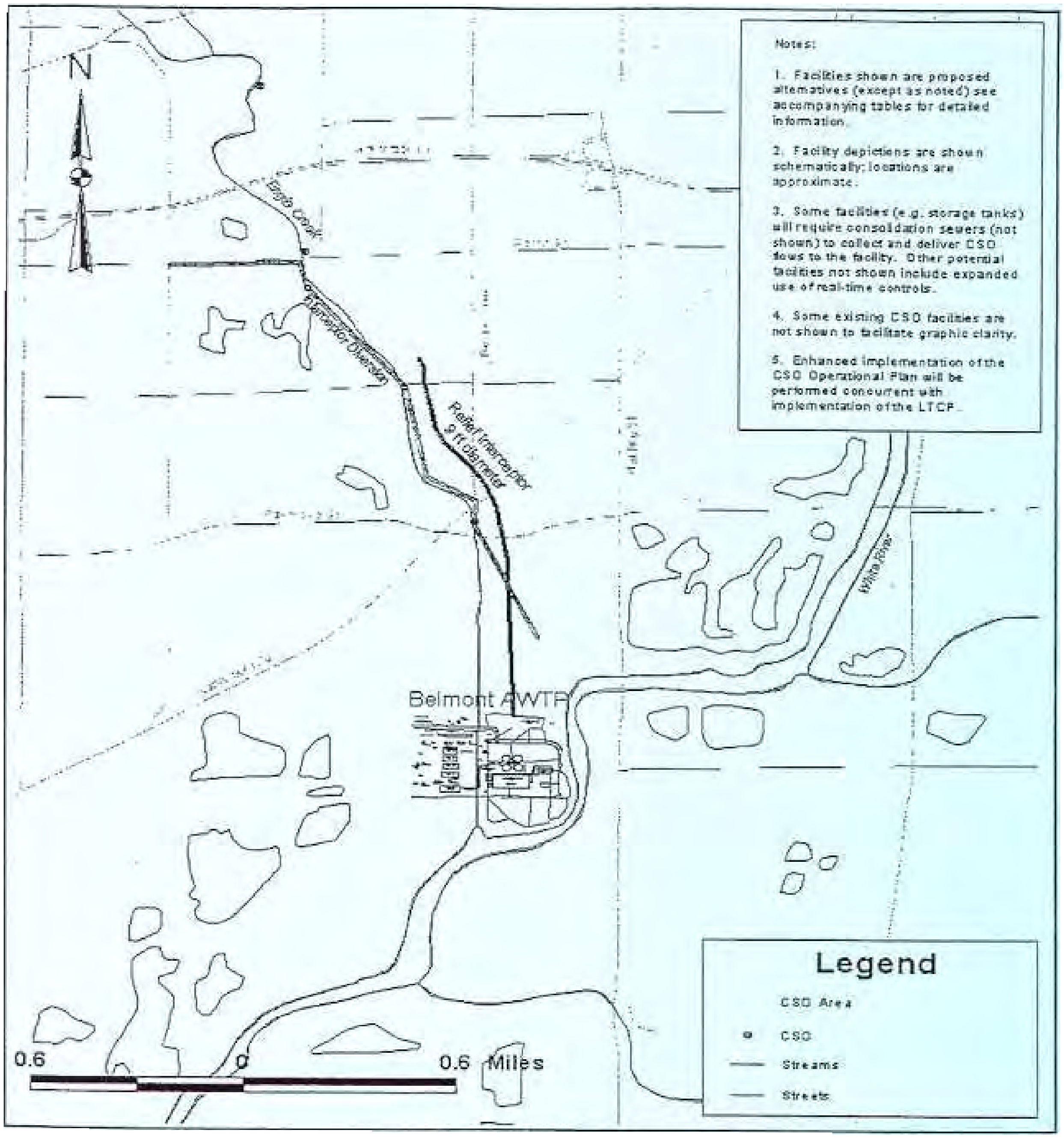


Figure 4-20
Alternative CSO Control Facilities – Eagle Creek

Fighting Raw Sewage Overflows Public Input Sessions

Thursday Augu: t 17 2000
7 00 p m to 9:30 p m

Al onvill Christian Ch ch

What sensitive areas along our streams deserve priority attention?

Below is a list that our participants determined after their discussion to be the highest priority areas that needed attention. Then our 13 participants selected the area they felt needed priority attention. The numbers listed after each area indicates how many votes the participants gave that particular area. **(Each participant could cast up to 8 votes).**

- Any areas that have evidence of children playing - (13)
- Most severely impacted streams – (12)
- No priority – (11)
- Drinking water supply – (7)
- Low income areas with no access to other swimming options – (6)
- Heaviest volume and frequency – (5)
- Heavy septic failures – (5)
- Fishing holes – (5)
- Picnic areas – (4)
- Wildlife habitats – (2)
- Existing and future greenway areas impacted by CSOs – (2)
- Swimming holes – (1)
- Trails
- Recreation areas

Participants then were asked to identify specific sensitive areas on maps. City staff recorded these areas on the maps, based on citizen comments

What level of control do we want for White River and its tributaries?

- *What are the benefits and drawbacks of having a greater level of control on the tributaries than on White River?*

WHITE RIVER

PRO	CON
- Downstream from Morgan county (Morgan etc.) - Helping fishermen	- High Cost - More spent on White River leaves less money for septic areas

TRIBUTARIES

PRO	CON
- More direct "people" impact - Neighborhoods - More cost effective dollar - Has a positive impact on White River	

- *What level of control should we set as a community goal?*

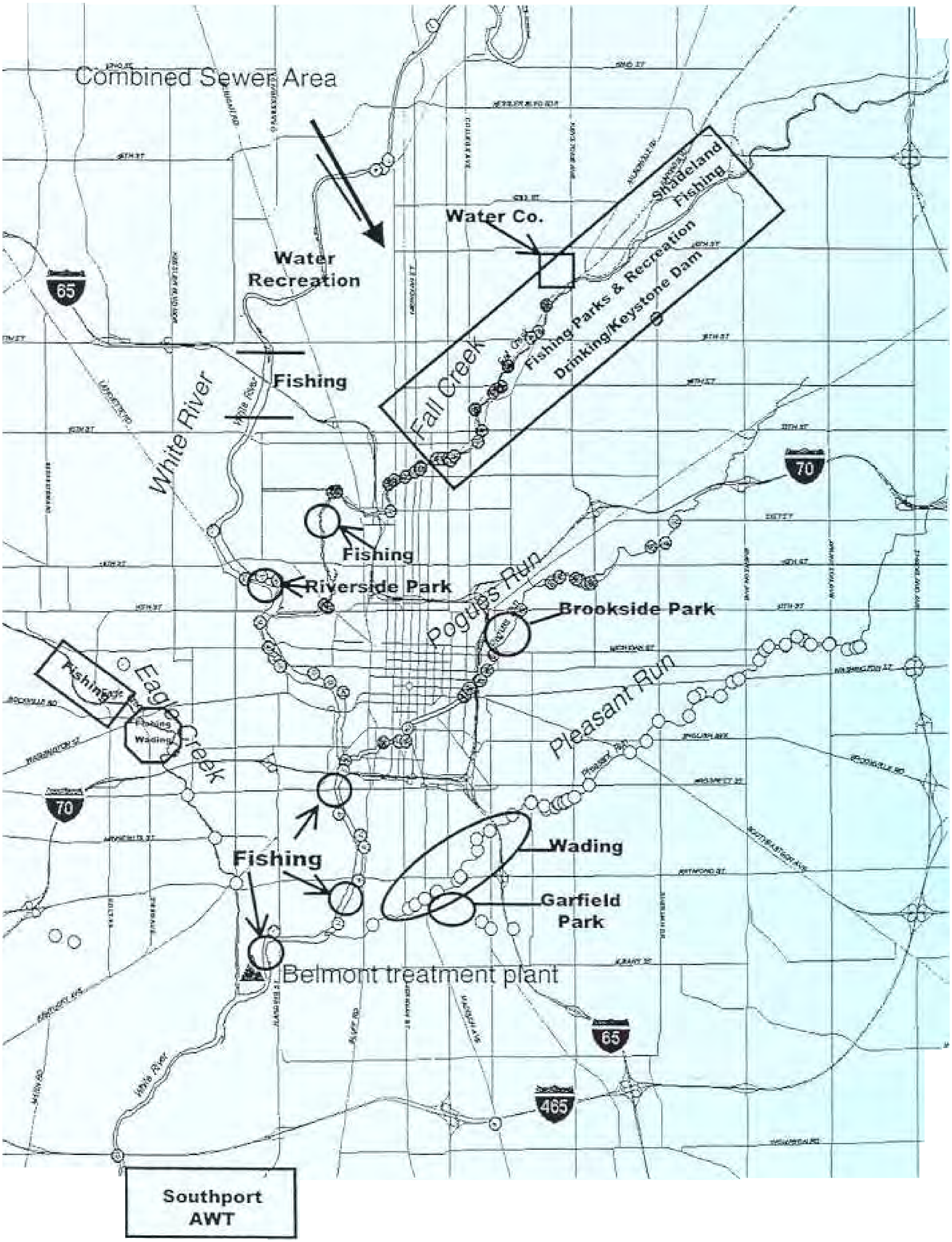
The group discussed goals and the level of controls they felt should be assigned to waterways affected by CSO's:

White River	**Pleasant Run**	**Eagle Creek**
Pogues Run	**Fall Creek**	

Participants felt that greater control on the tributaries would help neighborhoods and have greater impact on citizens, while having a positive impact on the White River. Some participants noted the high costs of controlling overflows to the White River and suggested that more spent on direct outfalls to the White River would leave less money for replacing septic systems with sewers. However, other participants were concerned about impacts on Morgan County and other communities downstream of Indianapolis, as well as concerns about people who fish along the White River. Some participants wanted to see options for greater control, including zero overflows and 1-3 overflows per year. Participants felt they might prefer those options, but didn't have enough information to evaluate them. Participant preferences are shown in the table below.

Northeast Level of Control Preferences			
	12-storm	7-storm	4-storm
White River	2	1	7
Fall Creek	0	2	7
Pleasant Run	0	1	8
Pogues Run	0	1	8

Sensitive Areas Identified - Northeast



What other options do we want to consider to improve water quality?

Below are the comments from participants regarding other options for improving water quality. Once the participants came up with the comments they then prioritized them by placing on 0 - 8 stars next to the comments about which they felt most strong by.

Please note that each of our 13 participants had 8 votes total to cast among three areas (Converting Septic System to Sewers, Stormwater Management, and Others)

- *Converting Septic system to sewers – Total votes cast: 44*
    - Don't require mandatory connections – (12)
    - Extend sewers so we can eliminate septics – within 5 years – (11)
    - Give higher priority to eliminating septics – (4)
    - Don't like the burden Barrett Law places on individuals – (4)
    - Don't dump septics into combined sewers – (3)
    - Eliminating CSO's on White River – (3)
    - Focus on riverside communications – (2)
    - Eliminate "straight pipe" runs from septics directly to waterway (or close) – (1)
- *Stormwater Management – Total votes cast: 14*
    - No current incentive for reducing run off in combined sewer area – (6)
    - Want more enforcement of existing stormwater rules – (4)
    - Urban infill should include stormwater management improvements – (3)
    - Glendale Mall should have stormwater management improvements – (1)
    - Areas developed prior to '68 should be evaluated; this compounds CSO issue
- *Others including industrial pretreatment, infiltration/inflow reduction, streambank restoration, and pollution prevention – Total votes cast: 14*
    - Infiltration/Inflow – (6)
        - Enforcement of roof drains and sump pumps
    - Industrial Pretreatment – (4)
        - Discharges during rain event (meet wq, o & g, BOD standards – during all times)
        - Non-contact H2O
    - Tribs – Streambank restoration, and wetlands – (4)
    - Pollution Prevention

What are neighborhood concerns along each waterway?

During Construction

Neighborhood impacts of concern – street or lane closures, tree loss, noise, dust? Guidelines for contractors who do the work? Little disruption over a long period of time vs. a lot of disruption over a short period of time?

- Big disruption for a short time vs. long term work disruption
- Work in right of way vs. greenspace
- Get done a.s.a.p. to prevent long term disruptions
- Restoration of working area
- Keep access to neighborhoods open
- Project preplanning – do all infrastructure work at the same time
    - No repeat/unnecessary work
    - No duplication of work

End Results

Fall Creek reclamation facility? Waterfall or fountain near White River State Park? Modifying Keystone Dam? Removing Boulevard Dam on Fall Creek? Tunnels vs. tanks for storage?

- Fountains are excellent
    - Work/Less maintenance
    - Better than waterfall
        - Disagree, likes look of waterfall in river
- Tank better than tunnel because concerned about polluting our water supply
- No tank in my neighborhood
- In San Francisco low profile, no odor, well done (surface tanks)
- Mines good
- Fall Creek reclamation facility good – more flow less pollution
- Remove Blvd. Dam – good!!!!

Communication

How can the city best communicate with citizens in the neighborhoods before and during construction projects?

- Public/Neighborhood Forums
- Door hangers in advance of construction
- City contact person/phone/web site withvideo of project
- Neighborhood associations help get information out
- Email updates from city
- Media coverage
- Mass mailings

How can we build community support to clean our waterways?

- Creative funding ideas; public education; communicating our progress
  - Greater communication with newspapers (all media)
  - Presentation to neighborhood associations
  - High School convocations – presentations
  - Schools adopt stream segments
  - Visit city's website

Issues, Concerns and Questions

- White River at wastewater treatment plant – 12 is best benefit for money
- Other cities pay $30/monthly for their sewer bills. Indy is at about $11/monthly Indy must fix its problem – LEGALLY & MORALLY
- Why is public asked to give input only on your "pre-selected" options? We need to totally separate storm from sanitary waste
- We shouldn't do anything to negatively impact Morgan County
- Storm-water run-off doesn't need treatment. The amount of antifreeze, oil, etc. will be handled naturally by flooding down rivers and streams. This is a fact…not just an opinion
- Use knee of the curve figure
- If we "fix" tributaries how much does this help White River
- Don't allow out-of-county connection
- Stop allowing new connections (except septic system)
- EPA requires the zero option an 1-3 overflows/year This should be included in these discussions
- Does money for Barrett Law projects compete with dollars for CSO controls?

Fighting Raw Sewage Overflows Public Input Sessions

Saturday August 19, 2000
9:00 a.m. to 11:30 a.m.

City County Building

What sensitive areas along our streams deserve priority attention?

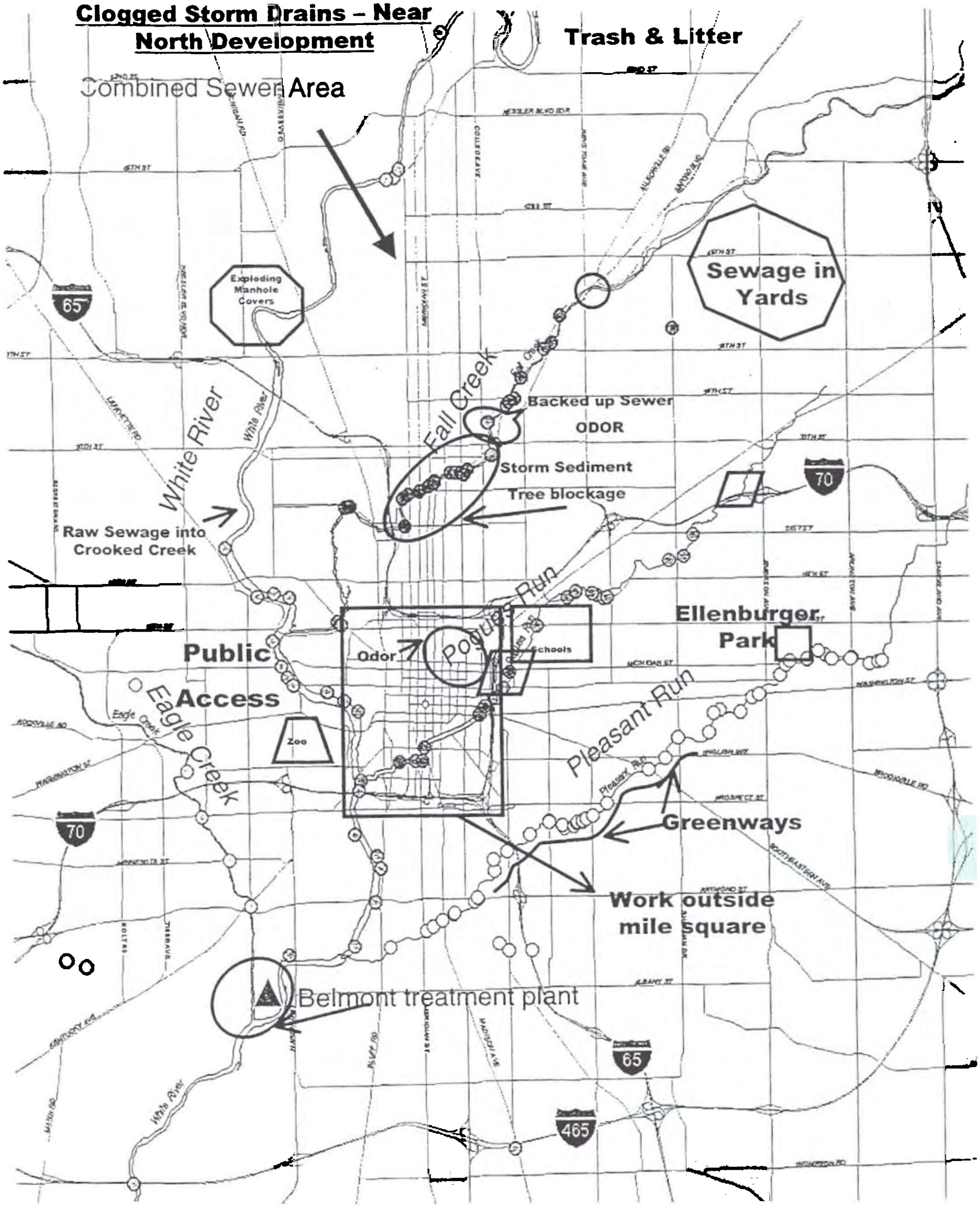
- Criteria for prioritizing construction projects over the next 20 years could include protecting the environment, and treating all neighborhoods in a fair and equitable manner.

Below is a list that our participants determined after their discussion to be the highest priority areas that needed attention. Then our 13 participants selected the area they felt needed priority attention. The numbers listed after each area indicates how many votes the participants out of the group gave that particular area. **(Each participant could cast up to 8 votes).**

- Parks & Public areas - (11)
- Wading areas for kids – (9)
- Raw sewage in yard – (9)
- Residential areas – (6)
- Schools -areas near schools - (6)
- Substandard septic systems – (6)
- Eroding stream banks – Remove blockage on streambanks – (5)
- Clogged storm drains – (3)
- Exploding manhole covers – raw sewage – (3)
- Sewage backup in basement – (2)
- Odor producing areas – (2)

Participants then were asked to identify specific sensitive areas on maps. City staff recorded these areas on the maps, based on citizen comments.

Sensitive Areas Identified - Downtown



What level of control do we want for White River and its tributaries?

- *What are the benefits and drawbacks of having a greater level of control on the tributaries than on White River?*

PRO	CON
- Clean neighborhood	- Disruption
- Immediate result	- Cost (short & long term)
- Learning curve (Learn from mistakes)	

- *What level of control should we set as a community goal?*

A discussion with the group on the setting of goals and the level of controls they felt should be assigned to the below listed bodies of water:

White River	**Pleasant Run**	**Eagle Creek**
Pogues Run	**Fall Creek**	

Participants considered three options. The first was a 12-storm target for White River and a 4-storm target for the tributaries. Participants felt this option provided additional cost savings and improved water quality in the neighborhoods. The second option was the 4-storm target for all streams. Participants felt this option provided maximum water quality improvement and an investment in the future. However, participants were concerned about the high cost and potential economic impact on industry. A third option was a 7-storm target for White River and Fall Creek, and a 4-storm target for Pogues Run and Pleasant Run. Participants felt this option provided some cost savings, but presented long-range concerns about impacts on the waterways. Voting tabulations of individual preferences were not kept during this session. The general consensus of the group supported the first option: a 12-storm target for White River and 4-storm target for the tributaries.

What other options do we want to consider to improve water quality?

Below are the comments from participants regarding other options for improving water quality. Once the participants came up with the comments they then prioritized them by placing on 0 - 8 stars next to the comments about which they felt most strong by.

Please note that each of our 13 participants had 8 votes total to cast among three areas (Converting Septic System to Sewers, Stormwater Management, and Others)

- *Converting Septic system to sewers – Total votes cast:19*

Below are the options that our participants came up with regarding the *converting of septic system to sewers*. Once the participants came up with the options then they prioritized the options by placing stars next to each option. From our 13 participants a total of 19 votes were cast with the results of those votes being listed below.

- No more new septic systems – (7)
  - Poor soils
- Take additional dollars from sewer bill and put into fund to subsidize septic conversion – (5)
- Improve Drainage – (3)
- Drinking water wells – (2)
- Federal Grants? State Grants? – (1)
- Fairness to previous Barrett project area – (1)

- *Stormwater Management – Total votes cast: 10*

- Land use planning – (4)
- Incorporate vegetation in new project – (3)
- Tree plantings in beautification efforts would also help reduce storm water – (2)
- Safety concerns regarding retention ponds in sub-divisions – (1)
- Prioritize local drainage issues
- Protect existing wetlands
- Incentive for both residential and commercial to address storm water
- Better maintenance for existing storm water system
- Safety concerns regarding retention ponds in sub-divisions

- *Others including industrial pretreatment, infiltration/inflow reduction, streambank restoration, and pollution prevention – Total votes cast: 19*

    - Illegal dumping – (5)
    - Stream bank restoration – less erosion – (4)
    - Recycling – Free or low cost – home pickup – (4)
    - Better land planning – (2)
    - Industrial Pretreatment – (2)
        - Extra cost = "Jobs"
    - Pollution Prevention – (1)
        - Tox-away day – drop (3rd site)
    - Clear excess brush – (1)
    - Public access projects

What are neighborhood concerns along each waterway?

<u>**During Construction**</u>

Neighborhood impacts of concern – street or lane closures, tree loss, noise, dust? Guidelines for contractors who do the work? Little disruption over a long period of time vs. a lot of disruption over a short period of time?

- Do it the best possible way the first time regardless of the inconvenience
- Little disruption over longer period of time
- Get it over with A.S.A.P.
- Only put new facilities in a greenway if it can be re-vegetated if not possible create under existing roads etc.
- Prefer traffic disruption over cutting trees
- More communication to neighborhoods
    - TV
    - Paper
    - Meetings
    - City web-site for updates

End Results

Fall Creek reclamation facility? Waterfall or fountain near White River State Park? Modifying Keystone Dam? Removing Boulevard Dam on Fall Creek? Tunnels vs. tanks for storage?

Fall Creek Water Reclamation

- Blend into neighborhood
- Invisible/no smell/quiet
- No tree removal – close streets if needed
- Call it a wastewater treatment plant – Don't try to spin it!

Waterfalls/Fountains

- Fountains much more aesthetic – Design competiton
- Waterfalls better
- Fountain impact to boaters

Dam Modification/Removal

- Good idea to remove dams

Tunnels/Tanks

- Tunnels preferable
- Whatever is most cost-effective

Communication

How can the city best communicate with citizens in the neighborhoods before and during construction projects?

- Printed material – watershed based
- Local meetings – neighborhood association – how affected
- Channel 16 – (Cable)?
- Newspaper – local and neighborhood
- Hotline
- Website
- Door hangers

How can we build community support to clean our waterways?

- Do updates via neighborhood papers
- Mail updates
- Website/Hotline
- Powerful social marketing campaign across several media sources to build spirit
- Pressure on major media to cover this issue
- Explain reclamation facility call it what it is
- Avoid using acronyms – don't call it floatables
- Stress long range of this: I hope it's done right
- Emphasize building this for future generations
- What are the consequences of not doing; benefits of expenditures – what do you get for your dollar
- Try to be very clear about what this will cost individuals – put into context

Issues, Concerns and Questions

- Will city issue more permits for septic?
- Stormwater utility?
- Why build greenways next to polluted waters?
- What is IDEM Phase II Stormwater?
- Citizen participation is vital. This process (today) proves that ordinary citizens can be part of decision-making and problem solving
- The previous administration tried to convince taxpayers that the problem was too expensive to fix. Scare tactics were used rather than education. Please continue this effort over the life of the project

Fighting Raw Sewage Overflows Public Input Sessions

Monday, August 21, 2000
7:00 p.m. to 10:00 p.m.

Pike Township Government Center

What sensitive areas along our streams deserve priority attention?

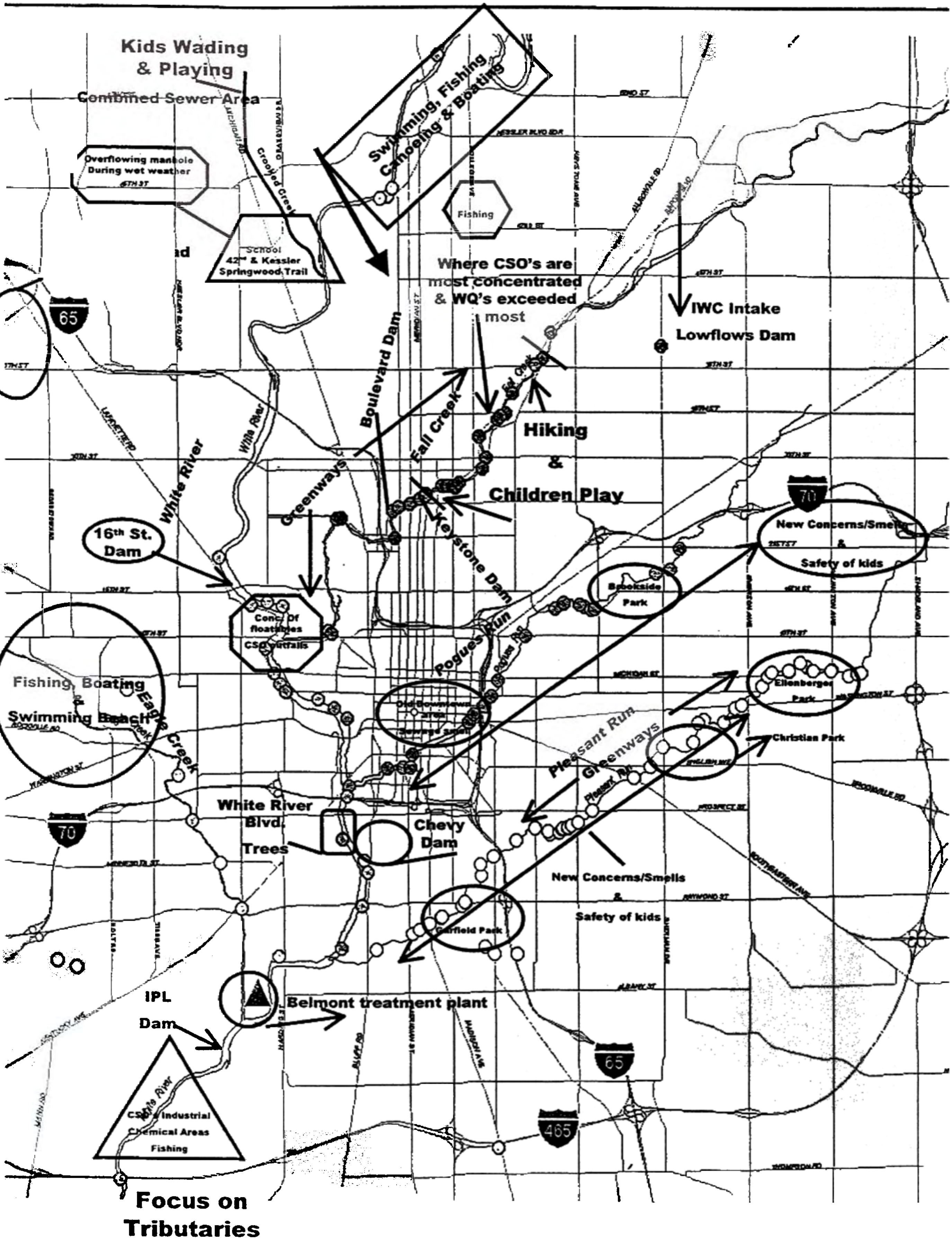
- Criteria for prioritizing construction projects over the next 20 years could include protecting the environment, and treating all neighborhoods in a fair and equitable manner.

Below is a list that our participants determined after their discussion to be the highest priority areas that needed attention. Then our 27 participants selected the area they felt needed priority attention. The numbers listed after each area indicates how many votes the participants gave that particular area. **(Each participant could cast up to 8 votes).**

- Abatement of most obvious water quality Impact – (32)
- Parks/Greenways – (32)
- Where kids play – playgrounds – (27)
- Crooked Creek - (22)
- Septic tanks – (21)
- Neighborhoods/residential areas – (17)
- Fishing areas – (11)
- Fall Creek – (8)
- Wetlands – (7)
- Area of major siltation (where smaller streams flow into White River) – (7)
- Boating areas – (5)
- Schools/areas near Schools – (4)
- Industrial areas – (3)
- Swimming – (1)
- No sensitive areas – (1)
- Soccer field

Participants then were asked to identify specific sensitive areas on maps. City staff recorded these areas on the maps, based on citizen comments.

Sensitive Areas Identified – Northwest



What level of control do we want for White River and its tributaries?

- *What are the benefits and drawbacks of having a greater level of control on the tributaries than on White River?*

- *What level of control should we set as a community goal?*

A discussion with the group on the setting of goals and the level of controls they felt should be assigned to the below listed bodies of water:

White River	**Pleasant Run**	**Eagle Creek**
Pogues Run	**Fall Creek**	

Participants broke up into four small groups. Because each group used a different voting method, votes could not be tabulated for all groups together. The first group chose the 4-storm target for all streams. The second group placed greater priority on the smaller streams and agreed on a 7-storm target for White River and a 4-storm target for all its tributaries. The third group included two people who wanted the 4-storm target on all streams, and one person who wanted a 12-12-7-7 option (12-storm target on White River and Fall Creek and a 7-storm target on Pogues Run and Pleasant Run). The fourth group was split, with three favoring the 4-4-4-4 option, two favoring a target less than 4 on each stream, and one favoring a 7-4-7-7 option (7-storm target on White River, 4-storm target on Fall Creek, and 7-storm target on Pleasant Run and Pogues Run).

What other options do we want to consider to improve water quality?

Below are the comments from participants regarding other options for improving water quality. Once the participants came up with the comments they then prioritized them by placing on 0 - 8 stars next to the comments about which they felt most strong by.

Please note that each of our 27 participants had 8 votes total to cast among the 3 areas (Converting Septic System to Sewers, Stormwater Management, and Others)

- *Converting Septic system to sewers – Total votes cast: 52*
  - Cost share septic conversion with the city (75% city) (city pays for sewer-homeowner pays for connection – (17)
  - Do septics and CSOs at same time – (10)
  - Provide better stormwater drainage in septic areas – (7)
  - Prioritize based on health risk – (5)
  - Do it now! Priority over CSOs– (5)
  - Innovative financing (bond issue) to support conversion – (5)
  - Put teeth in board of health regulations on failed septics – (3)
- *Stormwater Management – Total votes cast: 35*
  - Stormwater utility – (10)
  - Enlarge Belmont Interc. capacity – (9)
  - No more flood plain development – (5)
  - Stormwater best management practices added to ordinance – (4)
  - 42 Forest Manor – Sherman needs ditch – (2)
  - Keep rain water on own property – (2)
  - Septic storm improvements – (1)
  - Pet curbing program – (1)
  - Education program re: lawn care – (1)
  - Address urban runoff Indy & US
  - Need better drainage standards for new development

- *Others including industrial pretreatment, infiltration/inflow reduction, streambank restoration, ad pollution prevention – Total votes cast: 58*

Streambank

- Quit destroying wetlands/restore wetlands – (9)
- DPW/DCAM – Quit clearing streams and ditches on drainage improvement project – (7)
- Buy adjacent lots to rivers & streams to prevent development – not much public area to be restored – (7)
- Plant more trees and plants – (1)
- School programs (plant trees) etc. – direct to doing more benefit like on stream banks – (1)
- Civic Leagues get involved – (1)

Pollution Prevention

- Stop the dumping – main thoroughfare – (5)
- Schools education – teach the kids – (4)
- Hazardous pickup – How to get rid of that – (1)
  - Publication
  - Easier access
  - Open
  - Rotating/schedule
- Septic tank – (1)
- Keep contamination out of storm sewers
  - More for flow off bridges to streams
- Discount rain leaders
- Better street cleaning

Industrial Pretreatment

- Focus on process water or highly impacted waste streams - (3)
- Phased in discharge holding - (2)
- Tax credits for parameter and sp. NH_3 RCRA metals reduction – (1)

Infiltration/Inflow

- Repair of existing storm/sanitary (Belmont Interceptor) line – (11)
- Discount rain gutters – (2)
- Sump pumps

Other

- Controlling timing of discharge (ie: voluntary pre-planning storm event hold – residential and industrial) – (1)
- Encourage out of city watershed management
- Encourage gray water use – (1)
- Composting toilets

What are neighborhood concerns along each waterway?

<u>During Construction</u>

Neighborhood impacts of concern – street or lane closures, tree loss, noise, dust? Guidelines for contractors who do the work? Little disruption over a long period of time vs. a lot of disruption over a short period of time?

- Avoid removing trees!
- Replace trees, with kind
- Coordination on street closing
- Short construction times
- Erosion and sinking of ground at new structures
- Soft impact on neighborhoods
- Evan handed treatment of all neighborhoods
- Schedule construction to minimize impacts

<u>End Results</u>

Fall Creek reclamation facility? Waterfall or fountain near White River State Park? Modifying Keystone Dam? Removing Boulevard Dam on Fall Creek? Tunnels vs. tanks for storage?

- Mine leakage is a concern
- Keep river accessible
- Fountains & waterfall
- Fountains better, simple, cheaper
- Waterfall safe for children
- Dam: water depth could be hazardous
- Above ground seems easier to monitor
- Fall Creek waste treatment plant – YES!!
- Fall Creek needs to look nice
- Fish & igration concerns re: Dams

Communication

How can the city best communicate with citizens in the neighborhoods before and during construction projects?

- Advanced information being sent out
- Meeting with neighborhood early – before construction
  - Have information
  - Website information
  - Live cameras on overflows
- Fax to: neighborhood newsletter
  - Old mayor did – haven't had one with new mayor
- Public schools – teachers – fieldtrips - Health Dep. signs come down – huge constituency – But water quality has not changed – really no progress
- When overflows are and where:
  - People need to know
  - Constant information about how bad this is…
  - News with weather reports – TV
  - Graphic – Representation and photos
  - Like wind-chill factor or no zone action
- Direct mail
- Door to Door Flyers
- Current updates
- Detailed article about what is going on
- Hire "PIO" to only do CSOs – Dedicated people – People to manage it

How can we build community support to clean our waterways?

- Live cameras on the overflows
- Equate costs with voluntary costs like cable / 6 pack of beer etc.
- Do it once and do it right
- Make it a total watershed approach
- Equate costs to ethics of eliminating CSOs
- Use media / weather to increase awareness of CSOs
- Connection with 2 local stations who do weather
- City get word out on groups activities who are working to improve conditions
- Promote greenways – see conditions
- Web Cams – do live feeds of CSOs
- Establish neighborhood watches for CSOs overflows – adopt outfalls
- Get mainstream media for Saturday's tour
- Publicize success/improvements
- Collusion Partner with Media
- Adopt a CSO

- Develop a cultural reason (not legal reason) for support
- World class city & third world sewer system
- Enlist the tourism industry
- Use the signs on the bus system – moveable signs – recognizable symbol
- Mascot/ICON/Slogan – Don't do it in the water!
- Go to Herron and get students to develop logo/mascot
- Elementary school art contest

Issues, Concerns and Questions

- Another treatment plant on fall creek
- Timing & amount
- What about the small streams
- Need to look at ammonia, heavy metals, etc.
- Part of the minimum effort needs to be on pollution prevention on industrial "holding" pretreatment
- Infiltration control is long ago a federal requirement: not an option
- City needs to pick up 80% of septic tank connection costs
- Location, Location, Location: The important point is to control 100% of small storms and ALL the tributaries. Is there bonding capacity in the 10 – 13 year time frame?
- Do we need to have a higher STD to put in sewers?
- We can do much more now. Let us move on it!
- The statement that the engineering community cannot handle more than $/month of $190 Mill is NOT correct. Let us look at real numbers.
- Give high priority to Fall Creek Reclamation Facility as one of first projects
- Fall Creek should require less withdrawals under low flow so higher natural flow
- Why not increase flow on Fall Creek by limiting water withdraw?
- Everyone I know is willing to pay more than $2/mo. Right Now! Get a head start for later projects
- Draft proposal does not meet minimum federal requirements
- Review withdrawal of water by IWC on Fall Creek, Eagle Creek and White River and implement conservation early in season. Don't wait for low flows
- Dams which can release most water before a certain storm - get maximum to treatment plants when they can handle the most
- Do it now! Do it fast! Up to our ability to manage the process
- The proposals don't meet water quality standards
- Very important to work on a watershed level – not just at the city level
- Trees!! City has lots of tree removal programs but no planting programs. Maintaining City canopy in these projects is important
- City needs to make more effort to inform neighborhood of projects well in advance of beginning construction

- Educate the public in regard to the fact that we are all human beings with the same basic human physical needs. We all need clean water. No one is exempt! everyone is affected!
- Fix the septic problem at the same time as CSOs. We don't need to wait 60 years! but, city should share costs. I don't have children in school but I pay to support schools.

Sensitive Areas Identified - Southeast

What level of control do we want for White River and its tributaries?

- *What are the benefits and drawbacks of having a greater level of control on the tributaries than on White River?*

PRO	CON
Downstream – send cleaner water downstream	Won't help White River State Park
Natural environment treatment	More new development upper White River
More people in contact with small streams	More construction disruption
Least cost impact	
Doesn't try to anticipate future regulatory requirements	
Greatest water quality benefit	

- *What level of control should we set as a community goal?*

A discussion with the group on the setting of goals and the level of controls they felt should be assigned to the below listed bodies of water:

White River
Pogues Run
Pleasant Run
Fall Creek
Eagle Creek

Participants identified neighborhood benefits, water quality improvements and cost savings as reasons for placing a greater level of control on the tributaries than on White River. However, they also noted that it wouldn't help White River State Park and might draw more new development to the upper White River. Voting on the level-of-control options for each waterway is shown in the table below.

Southeast Level of Control Preferences			
	12-storm	7-storm	4-storm
White River	2		4
Fall Creek		3	3
Pogues Run	1		5
Pleasant Run		2	4

What other options do we want to consider to improve water quality?

Below are the comments from participants regarding other options for improving water quality. Once the participants came up with the comments they then prioritized them by placing on 0 - 8 stars next to the comments about which they felt most strong by.

Please note that each of our 10 participants had 8 votes total to cast among the 3 areas (Converting Septic System to Sewers, Stormwater Management, and Others)

- *Converting Septic system to sewers – Total votes cast:11*
    - Lower interest rate – Change Barrett Law – (4)
    - Septics are inherently unsound, they need to go – 60 years is too long! – (4)
    - Economic impact to residents who are forced to connect to the sewer – City or State should help – (2)
    - People who own the septic should be responsible – (1)
    - Loans to help out property owners
    - City needs to ind a way to help property owners pay the cost
- *Stormwater Management – Total votes cast: 5*
    - Slow flow down – more interception – New construction – (2)
    - Undersized Regulators – (1)
    - Street sweeping – year 2000 – (1)
    - Street cleaning year 1960 - 1970 – (1)
    - Clean storm sewers more often
- *Others including industrial pretreatment, infiltration/inflow reduction, streambank restoration, and pollution prevention – Total votes cast: 23*
    - Tax credit for good land use (or penalty for not) – (8)
    - Streambank restoration – (8)
    - Corrections people to clean banks of trash regularly – (5)
    - Proper installation of sewers – (1)
    - Zebra mussels and cattails – (1)

What are neighborhood concerns along each waterway?

<u>During Construction</u>

Neighborhood impacts of concern – street or lane closures, tree loss, noise, dust? Guidelines for contractors who do the work? Little disruption over a long period of time vs. a lot of disruption over a short period of time?

- Take NO trees (if absolutely necessary, must plant lots of others)
- OK with a lot of disruption for a short term
- Remember aesthetics
- Least amount of disruption possible

<u>End Results</u>

Fall Creek reclamation facility? Waterfall or fountain near White River State Park? Modifying Keystone Dam? Removing Boulevard Dam on Fall Creek? Tunnels vs. tanks for storage?

Waterfalls

- More natural
- Limited # of places to locate
- Nice to look at

Fountains

- Possibly expensive

*Look at cost factors for the above two whatever is most cost effective

Dam Modifications

Fall Creek Reclamation Plant

- Should be one of the 1st priorities

Tunnels/Tanks

<u>Communication</u>

How can the city best communicate with citizens in the neighborhoods before and during construction projects?

- Local newspapers – spotlight – Northside
- Indianapolis Star
- Radio
- Community meetings – neighborhood specific
- Hotline – for questions or issues
- Speakers Bureau
- TV stations – prime time
- Lead time – 30 – 60 days notice
- Research Neighborhood
- Newsletter - faxes

How can we build community support to clean our waterways?

- Increasing citizen support
- Media coverage – prime time – barrage 30 – 60 days
- Local topics - newspaper
- Grade school educate the kids
- Field trips for kids
- Churches
- Scouts
- Youth Groups
- Early and late newscasts 5:00 & 11:00 p.m.
- Education re: recycling/conservation
- PSA at better times
- Little things you can do

Issues, Concerns and Questions

- Recycling pollution prevention – no additional cost
- Affordable options for fixed income residents
- Tax abatement for business – too much
- Town of Southport old sewer – CSO?
- What about the Belmont North interceptor? We live on Springwood trail and have sewage back up on our own street every major storm. Some of the sewage is sacked up and removed, but we still have solid waste left on the street and yards. Children and adults and pets walk on this street and the overflow that goes into the creek affect our children who play there.

Fighting Raw Sewage Overflows Public Input Sessions

Wednesday, August 23, 2000
7:00 p.m. to 9:30 p.m.

Wayne Township Trustees Office

What sensitive areas along our streams deserve priority attention?

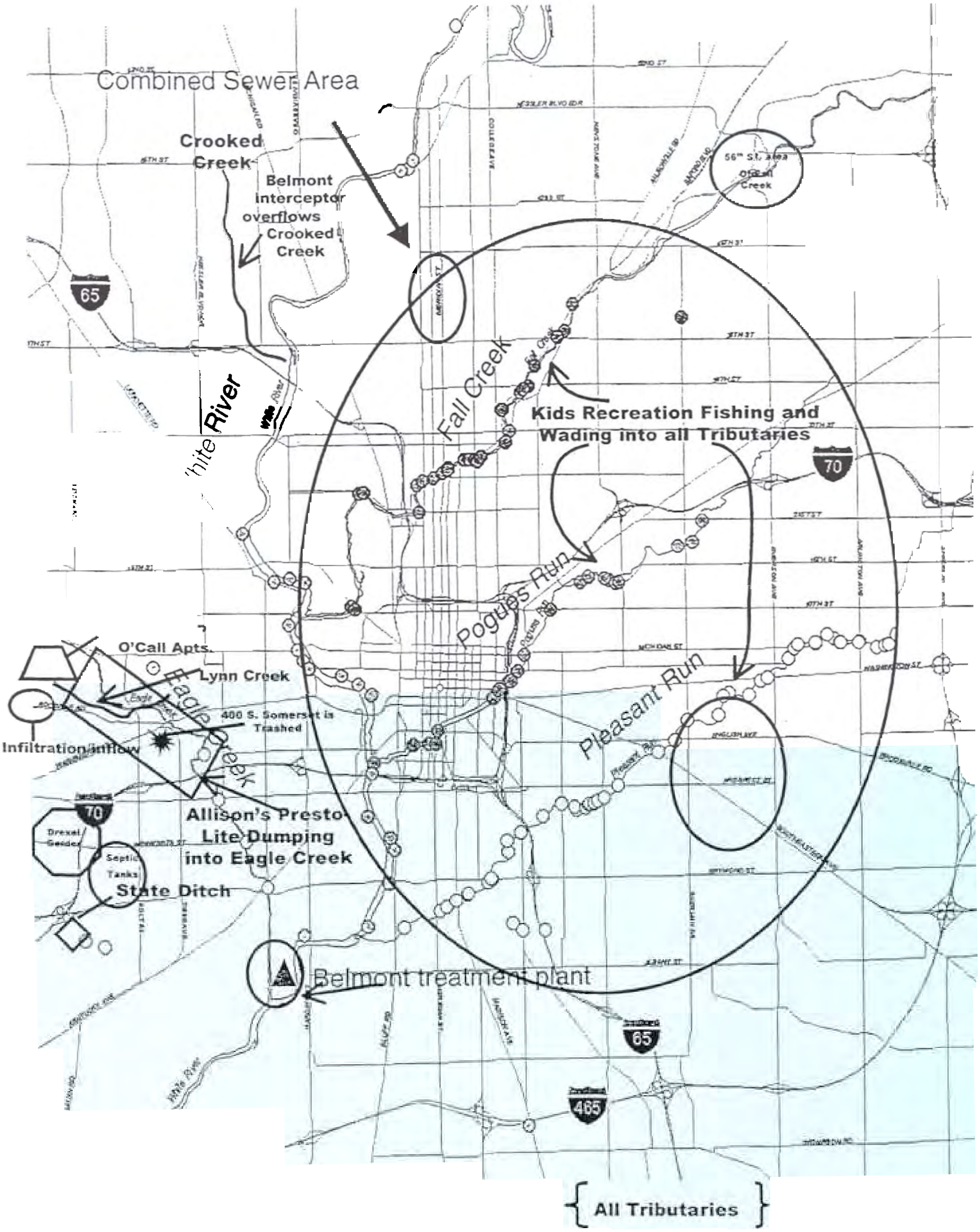
- Criteria for prioritizing construction projects over the next 20 years could include protecting the environment, and treating all neighborhoods in a fair and equitable manner.

Below is a list that our participants determined after their discussion to be the highest priority areas that needed attention. Then our 25 participants selected the area they felt needed priority attention. The numbers listed after each area indicates how many votes the participants out of the group gave that particular area. **(Each participant could cast up to 8 votes).**

- Creeks, State Ditch drainage ditches in neighborhoods - (17)
- Septic Systems – (17)
- Neighborhood without sewers – (16)
- School – (12)
- West Indianapolis lots of industry here – (11)
- Eagle Creek – (11)
- Infiltration of sanitary sewers – (11)
- Dog Pound Sanitation Systems – (10)
- Clean up neighborhoods should start at home early on and in the streets & parks – (7)
- Tributary merge points – (6)
- School Play areas – (5)
- Parks/playgrounds – (3)
- Places of public congregation – (2)
- Create cascades along areas of low oxygen levels – (2)
- Use existing system to store soakers – (2)
- CSO outfall circulation structures for improve treatement – (2)
- Do repair of 4 largest overflows – (2)
- Need total watershed and total source control, not just CSO's – (1)
- Bridges – (1)
- Need to include septic tanks and city pay 75% cost – (1)
- Need to address ammonia and other industrial materials
- Infiltration and Inflow control was required years ago. Do it now!

Participants then were asked to identify specific sensitive areas on maps. City staff recorded these areas on the maps, based on citizen comments

Sensitive Areas Identified – Southwest



What level of control do we want for White River and its tributaries?

- *What are the benefits and drawbacks of having a greater level of control on the tributaries than on White River?*

- *What level of control should we set as a community goal?*

The group discussed goals and the level of controls they felt should be assigned to waterways affected by CSOs:

White River	**Pleasant Run**	**Eagle Creek**
Pogues Run	**Fall Creek**	

Several participants declined to choose a level-of-control target because they felt they did not have enough information on the monthly cost to their sewer bills. The remaining participants divided into two main groups. The first group agreed on a 1-2 storm target for the tributaries. For White River, two people wanted the 4-storm target and a third wanted a 1-2 storm target. The second group selected a 7-storm target for the White River but was split between the 7-, 4- and less-than-4-storm targets for the other streams. Voting results for participants who expressed an opinion at this location are summarized in the table below:

Southwest Level of Control Preferences				
	12-storm	7-storm	4-storm	< 4-storm
White River	0	3	3	1
Fall Creek	0	1	2	4
Pleasant Run	0	1	1	4
Pogues Run	0	1	1	4
Eagle Creek	0	1	2	4

What other options do we want to consider to improve water quality?

Below are the comments from participants regarding other options for improving water quality. Once the participants came up with the comments they then prioritized them by placing on 0 - 8 stars next to the comments about which they felt most strong by.

Please note that each of our 25 participants had 8 votes total to cast among three areas (Converting Septic System to Sewers, Stormwater Management, and Others)

- *Converting Septic system to sewers – Total votes casd: 85*
    - Total conversion to sewers with 75% paid by city – (21)
    - Convert all septics immediately – sewer fees will generate funding – (10)
    - Health Department needs to identify priority neighborhoods – (10)
    - Require those who have sewer available to hook on – (8)
    - Look at alternative sewer systems – (3)
    - Citizens should know what they are going to pay before requiring conversion – (2)
    - Elect leadership who will support conversion– (2)
    - Bond issue to help pay – (2)

- *Stormwater Management – Total votes cast: 20*
    - Rule 5 enforcement – (9)
        - Control soil erosion during construction
        - Bigger fines
    - Better drainage in neighborhoods – (7)
    - More neighborhood street cleaning
    - Quit building in flood plain – (2)
    - More vegetation and fish – (1)
    - No crooked contractors – (1)
    - More retention ponds
    - Enact stormwater ordinance
    - More rules and regulations
    - More comprehensive approach
    - Huge areas of pavement need better drainage
    - Current rule not address current building practices

- *Others including industrial pretreatment, infiltration/inflow reduction, streambank restoration, ad pollution prevention – Total votes cast: 23*

    - Extend CSO to Belmont interceptor – (10)
    - Build Fall Creek Treatment – (6)
    - Streambank restoration – (2)
    - High fines for polluters (include city dumps, pound and individuals – (2)
    - More street sweeping – (1)
    - Industrial pretreatment– (1)
    - Higher responsibility to industry, polluters (no exceptions) – (1)
    - Also city cost sharing on industrial pretreatment
    - Direct dumping from machine shops
    - Enforce no parking for street cleaning

What are neighborhood concerns along each waterway?

<u>**During Construction**</u>

Neighborhood impacts of concern – street or lane closures, tree loss, noise, dust? Guidelines for contractors who do the work? Little disruption over a long period of time vs. a lot of disruption over a short period of time?

- Get it over with
- Repave, resod after project done
- Do as much at night as possible
- Leave it in at least the same shape as it started out
- Minimize noise
- Tree removal
- People and neighborhoods are # 1
- Workers mus clean up after themselves
- Think about alternative traffic routes
    - Communication and planning
- Get it over with
- Speedway project was a good model – kept street open – spaced it out
- Look at types of trees you are working with

End Results

Fall Creek reclamation facility? Waterfall or fountain near White River State Park? Modifying Keystone Dam? Removing Boulevard Dam on Fall Creek? Tunnels vs. tanks for storage?

- Reclamation facilities – high priority
- Water falls and fountains on White River - favorable
- Dam removal / modification – support recreation (canal)
- Big tunnels – not a good idea
- Storage tanks – not a good idea
- Real time control – number 1

Communication

How can the city best communicate with citizens in the neighborhoods before and during construction projects?

Before

- Work with homeowners' association
- Churches
- Meetings
- School flyers
- Community newspapers
- Door tags in areas
- Mailings - separate
- Know risks first
- Who do people call with problems?
- People first

After

- Updates
- Allow room for time delays
- Traffic control i.e.: flagmen
- Keep dust down
- People first
- Direct mail

How can we build community support to clean our waterways?

- Workshops on channel 20 to take feedback and show ideas (visually)
- Neighborhood papers
- Churches to support
- Personalize for our children
- Relate to human health issues
- Personalize: "Our Problem"
- Communicate to the public how their voices are going to be heard
- Relate to dollars so people understand
- Cable TV or other / Internet / Web Page
- Suggestion boxes in libraries
- Other tax funds (city restaurant lottery) should go to this project
- Sell city assets (golf courses) to fund CSOs
- High level dialogue between city, state and federal agencies
- Don't let comments, plans etc. to get aside – use what we get
- Higher level of major media coverage/support
- Community presentations
- During this boom time in the economy – leave legacy for our children
- If we can support sports, etc., we can support clean water
- Support our claim of a world class city
- What about our other aquifers

Issues, Concerns and Questions

- We need to be told what this means to us financially per house
- IWC release more water to Fall Creek for adequate flow
- Find/use Speedway system capacity
- Factories getting permits to pollute
- Can't make informed decision not knowing monthly cost
- Do comprehensive watershed management 1 piece is not
- Realistically est. total costs and go for more dollars up front
- Do it right the first time – no artificial low rates
- Now too much Fox schedule – Tax, Tax 52% of your tax go to school
- Plans needest/sewer bill to make real decisions
- Extend a new sewer for combined sewer to alleviate problem with Crooked Creek and Belmont interceptor
- Take tax from school tax – sewer tax
- Have neighborhood's inspections to make homeowners and rental residents clean up their own properties – also property owners who rent out – then they move to more exclusive neighborhoods
- Impact fees or all new development to pay for increased capacity

- Yes, clean up smaller streams first and require people to keep it clean. That only common respect. Why not grills on sewer to keep out bottles, cans, paper plates etc. The sewers stink bad around W. Washington at West of Belmont
- The Railroad overpass at Rockville Road and West Washington street floods bad at every hard rain and it's impossible going west on Washington Street. This has always done this for my 50 years being nearby
- Consider alternative collection methods for unsewered areas, grinder vacuum, etc.
- How does this affect Ben Davis Conservancy residents who are charged on value of property no matter how many people in house? The value is grossly inflated as the area becomes very blighted with rentals, junk yard, auto sales and service etc. @ 480 South Somerset avenue 1st block south of 3600 West Washington street
- Enact delayed "Adopt -a- stream" project, street and gutter clean-ups
- To finance this project take the 6% tax off of fast food and entertainment. Start out years ago at 1% to pay for MSA. All of a sudden MSA is no longer – instead it was increased to 6%

* Note from participant: The only viable alternative to work toward is sewer separation despite the city's viewpoint. This would eliminate the problem of overloaded treatment plants to a large extent. This might lead to less need for sewer plant expansion – a cost savings possibly. There is no guarantee that the EPA would not make requirements for clean water more stringent. Also, growth may make CSO plans inadequate. The idea of using mines for storage is impossible to imagine. Sealing them to prevent leaks, seismic activity, pumping, etc. All present monumental problems. The idea of inflatable dams and automatic gate valves present strategy problems for planners and engineers.

Marion County

Input sought on proposal to cut sewer overflows

■ City officials have scheduled another set of meetings to get comments on long-term plan.

Staff Report

City officials have set a second series of meetings on decreasing the risks of pollution from raw sewage overflows into various waterways.

The Indianapolis departments of Capital Asset Management and Public Works held meetings last month about overflows. The sessions this week and next week are designed to gather citizen comment on a long-term plan to meet state and federal standards for reducing spills. Such spills may result when as little as a quarter-inch of rain or snow meltoff runs into the sewers and causes overflows of raw sewage.

The meeting schedule is:

■ Thursday 7 p.m. to 9:30 p.m., Allisonville Christian Church, 7701 Allisonville Road.

■ Saturday, 9 a.m. to 11:30 a.m., City-County Building, second floor public assembly room. Use the Market Street entrance.

■ Aug. 21, 7 p.m. to 9:30 p.m., Pike Township Government Center, 5665 Lafayette Road.

■ Aug. 22, 7 p.m. to 9:30 p.m., Southeastern Church of Christ, 6500 Southeastern Ave.

■ Aug. 23, 7 p.m. to 9:30 p.m., Wayne Township trustee's community room, 5401 W. Washington St.

A report written after the previous meetings may be viewed at all branches of the Indianapolis-Marion County Public Library. It also can be downloaded from the city's Web site, located at indygov.org/cso.

Activist is glad embarrassing sewage getting bad publicity

Ruth Holladay

Hypodermic needles, empty wine bottles, a dilapidated pet-carrying case and other garbage line the water's edge of Fall Creek, near humble little Watkins Park on the Near Westside.

That's the savory stuff. Get closer to the brownish water, dip into it with a bucket, as Tom Neltner does, and you come up with the dregs: foul black sludge, a panty liner, condoms, and similar items that are euphemistically called "floatables." Then there are the "sinkables," but you get the picture.

And no, it is not a pretty one, this intimate view of Indianapolis near 23rd and Dr. Martin Luther King Jr. Street, near a park where children play, just a couple miles north of our sparkling Downtown.

Yet it is this image of the city that made its way into *The Economist* this month. The article in the international magazine focused on our 100-year-old combined sewer overflow system, or CSO, in which raw sewage is dumped into the city's waterways during rainstorms, and on Neltner's visual and visceral efforts to bring attention to the problem.

"I firmly believe the public has a right to know," says Neltner, who Saturday donned latex gloves, fought his way through the brush that hides the pollution from the street on Fall Creek and filled a Ball jar with the creek's toxic brew. He then took it to a Marion County neighborhood association meeting, one of a series being held by the city to address CSOs.

Neltner's point? "This is not just about bacteria as a number," he says, referring to the city's plan to reduce the overflows from 60 a year to 12, seven or four, depending on how much money is spent. "It's about bacterial parasites and floatables and other things that we absolutely must keep kids away from."

Kids is Neltner's key word: kids is the word that needs to be on more environmental activists' lips, although Neltner is doing a pretty good job himself of making noise on their behalf.

The creator of the nonprofit Improving Kids' Environment, Neltner is probably best known for filing a complaint last fall with the EPA, charging that Indianapolis practices environmental racism. It sounds like a fiery allegation, but Neltner is a low-key guy: a 40-year-old attorney, former state employee and father of two boys in the Indianapolis Public Schools.

Still, he's not low-key about documenting what too many refuse to see: kids' bikes parked near a CSO at 10th and Harshman, near a middle school. Childish scrawl in sewers. Toys alongside the needles and bottles near Fall Creek, just feet from a sign obscured by dense growth: POSSIBLE SEWAGE POLLUTION. CONTACT WITH WATER MAY BE HAZARDOUS, as if kids could even see or read the words.

Then, he says, there's this game kids play: sewer chicken. When it starts to rain, they flock to the CSOs to see how long they can remain there until the flooding — and the garbage — push them out.

All this is grim. What is encouraging is — let's count our blessings — Neltner is getting national attention.

And then again, there's the local angle. Clarke Kahlo is the passionate head of Protect Our Rivers Now. He happened to see the piece in *The Economist* the same day he received his Indy Parks newsletter, which — lo and behold — just happened to be filled with good news about a musical event at Watkins Park and how many kids would attend it. The irony was not lost on Kahlo — happy talk at the local level, while national attention reveals the truth.

is not only still running, but seemingly fitter than ever.

Economic output rose by an annualised 5.2% (rather than slowing sharply as had been expected), and—more striking—worker productivity outside agriculture surged by an annualised 5.3%, according to preliminary figures released by the Labour Department on August 8th. Between April and June, America's workers produced 5.1% more stuff per hour than they did a year ago. That is the biggest annual productivity gain in almost 17 years.

As a result of this stellar growth in productivity, unit-labour costs (that is, the cost of workers' compensation per unit of output) fell by an annualised 0.1% in second quarter. Compared with a year ago, they fell by 0.4%, even though hourly pay rose by 4.7%. Soaring productivity is, for now, more than making up for healthy pay rises (a relief no doubt for those weary economists in Cape Cod and the Hamptons).

The immediate result of these productivity figures was to boost Wall Street's confidence that short-term interest rates are unlikely to rise when the Federal Reserve's policymaking committee next meets on August 22nd. That confidence was also boosted by scant signs of inflationary pressure in the second-quarter GDP figures, evidence from the employment figures that the labour market is not getting any tighter and a few further signals that demand may be slowing.

Few, however, expect this rate of productivity acceleration to be sustained. Quarterly productivity figures are often volatile (remember that non-agricultural productivity grew by only 1.9% at an annual rate in the first three months of the year). Moreover, some of this productivity growth is undoubtedly cyclical, the result of higher-than-expected output growth. When the economy grows unexpectedly fast, firms work their employees harder to keep up.

But there is also little doubt that a substantial portion of the higher productivity growth is due to structural improvements in America's economy. Continued high rates of investment spending by businesses are one factor behind the accelerating productivity. Compared with a year earlier, real business fixed investment has risen from about 10% in 1999 to 15.3% in the second quarter of 2000. Economists at Goldman Sachs, for instance, estimate that this factor alone has pushed up the productivity growth rate by about 0.2 percentage points.

Other potential sources of productivity growth are improvements in the quality of the labour force and pure gains in efficiency that come from innovation and technological progress. Evaluating these factors and, more important, ascertaining whether the structural changes are occurring throughout the economy or are concentrated heavily in the high-tech sector is the subject of furious debate among economists; a debate that these latest figures will fuel. Meanwhile, whatever the underlying explanation, continued acceleration in productivity makes that bunny run and run.

An unSafir future?

NEW YORK

"THE greatest police commissioner in the history of the city" is how Rudolph Giuliani sees him. But New York's mayor was almost alone in praising Howard Safir when he announced that he would quit as top cop on August 18th for a job in the private sector—and it was Mr Giuliani who appointed him in 1996. More typical was the comment by the Reverend Al Sharpton, organiser of numerous protests against New York's police force: "He presided over some of the worst, most graphic police brutality cases in memory. His leaving will not cause any regret at all in our community."

On balance, the mayor was closer to the truth. Three killings by the police of unarmed men, all from ethnic minorities, and the torture in a police cell of another, are often held against Mr Safir. In fact, he condemned unreservedly the cops convicted of torture (those involved in the killings have been exonerated) and boasted of firing more misbehaving officers than any of his predecessors. Contrary to the impression created by his critics, killings and shootings by the city's police have fallen sharply in recent years.


A smile at last

What Mr Safir should chiefly be remembered for is the 30-year low in crime on his watch. The transformation of New York into one of the safest big cities in the world was undoubtedly begun by Mr Safir's more charismatic predecessor as police commissioner, William Bratton. But Mr Safir's management techniques were a decisive help, particularly his use of the Compstat computer database (a Bratton innovation) to cope with crime hot-spots, and his readiness to sort out inefficient precincts.

Mr Safir's main weakness was public relations. A dour appearance and prickly manner did him and his force no favours. And morale suffered. The city's policemen have increasingly vented their ire against Mr Safir, even though the main source of their frustration is the mounting public criticism of their work.

Joseph Dunne, currently New York's top-ranking uniformed policeman, and Bernard Kerik, commissioner of the city's Department of Correction, are the likeliest candidates to succeed him. But whoever gets the job may not last much beyond the mayoral election in November 2001. This will make it hard for the next man to restore the force's battered morale.

This leaves a disturbing thought. Mr Safir may be quitting at the low point of the crime cycle. A demoralised NYPD, the strong prospect of a Democrat mayor who would be less supportive than Mr Giuliani, and a soon-to-be rising number of people in the prime law-breaking age group: will New York after Safir be unsafer?

Sewage

Coming to a cellar near you

WATKINS PARK, with its meandering stream and its thicket of greenery, is as bucolic as downtown Indianapolis gets. But look a little closer—or inhale a little deeper—and reality intrudes. "My God, look at that crap!" shouts Tom Neltner. As an activist environmentalist, he knows whereof he speaks, and there it is: raw sewage, as well as condoms, clearly visible in the stream. "Floatables" is the official euphemism for them. "Sinkables"? Don't ask.

The mess is not just unsightly; unwary trespassers can pick up E. Coli, or contract shigellosis and hepatitis, by dabbling in the babbling brook. But warning signs have clearly been ignored. Hanging from a nearby tree is a bobber connected to a fishing line.

This rustic scene comes courtesy of Indianapolis's "combined sewer overflow" (or CSO) system, which was designed nearly a century ago to carry both sewage and storm water through one set of pipes. Indianapolis's pipes have now become so over-filled and under-mended that they regularly carry sewage where it is not supposed to go—to Watkins Park or, worse, into people's cellars.

Indianapolis is not the only city grappling with CSO problems. In the 1970s and 1980s, some places used federal grants to convert their old systems, but about 1,000 American cities, predominantly in the mid-west and the north-west, still have them. Indiana, where environmental law-enforcement is often on the lax side, accounts for about 10% of the communities that still use CSOs.

The idea did not lack logic, in the beginning. The men who built them designed CSOs to fail once or twice a year, during unusually big storms—an acceptable risk, they decided, when compared with the substantial added cost of building separate flow systems. Now, however, some districts of Indianapolis get 85 overflows annually, or 1.8m gallons of diluted crud a year. Sometimes, rainstorms that dump a mere fraction of an inch set off an overflow.

CSOs serve about 10% of the 400-square-mile city of Indianapolis, predominantly the downtown area and some older districts. Wherever they exist, housing values go down, no matter how quaint the architecture or convenient the location. Brenda Truedell-Bell, a community leader in the Mapleton-Fall Creek district, blames the local incidence of childhood asthma on sulphur from backed-up sewage.

In many ways, the problem is easy to explain. Rapid population growth and heavy property development during the 20th century meant that more and more homes were hooked up to the CSO system, pushing pipes far past their original capacity. Other factors contributed, including the (pretty universal) preference for low taxes over big investment in things you can't see, such as sewers.

Could another factor—racism—have been involved? Critics charge that the Republicans who generally control Unigov, the region's unusual government combing city and county, have been more sympathetic to affluent suburbanites than to inner-city blacks. Mr Neltner's pressure group—Improving Kids' Environment, or IKE—filed a complaint last October with the federal Environmental Protection Agency (EPA). IKE contends that CSO neighbourhoods with large numbers of blacks get more serious overflows than CSO districts that are mostly white. This, IKE contends, is because, Indianapolis officials have tried to patch up the system in the white areas first, even though the problems were less severe.

Welcome to Indianapolis

The EPA is still looking at the issue; if it agrees with IKE, the agency may require the city to fix the problem properly. Mr Neltner, for his part, would like to see an end to new suburban connections to the old sewer system and a programme th: notifies residents when overflows are hap pening (in case they are not yet aware th: sewage is streaming down the street). He als wants a long-term plan to fix the system.

The obvious way to do so would be t separate Indianapolis's storm pipes from it sewers. Most experts say that the cost an the physical disruption would make this im practicable. But even less-costly remedies- such as building new storage facilities an control mechanisms that would work tc gether to make peak flows more manage able—would still be pricey, though exactl how much is the theme of spirited argu ments between Republicans and the Demc cratic mayor (the first Democrat to hold th: post in a generation). Republicans say th: CSO improvements would cost families $15 more in sewer charges every month.

Although that seems a clear exaggera tion, the new mayor's director of publi works admits they would be "very expen sive to implement". Meanwhile, if you ar planning to visit Indianapolis this autumn get your jabs and pack your galoshes.

A bird on the bumper

NEW ORLEANS

IN LOUISIANA, as in the rest of the United States, much of the sloganeering in the abortion wars is by bumper-sticker. On the roads around New Orleans, stickers proclaiming "We vote pro-choice" duel with ones suggesting to the driver behind: "Ya mama was pro-life, dawlin'."

Last year, though, the state legislature voted to give abortion opponents another outlet: a special licence plate that bears the motto "Choose life" and a picture of a pelican, the Louisiana state bird, holding a baby in a blanket hanging from its beak. The state-issued plate would cost $28.50 a year more than a regular licence plate, and most of the proceeds would go either to anti-abortion counselling organisations or to groups that help poor women meet the costs of having their babies. Advocates of abortion rights paid little attention to the bill at the time; now they are trying to stop them.

So to court they have gone. William Rittenberg, a New Orleans lawyer, has filed a suit to block the "Choose life" plates. A hearing is set for August 23rd, and the state has halted plans to distribute the plates at least until then.

The idea of using licence plates to raise money for alternatives to abortion first surfaced in Florida, where the governor, Jeb Bush, is firmly in the "Choose life" camp. The law that he signed is still tied up in litigation, but anti-abortion activists in other states have not been deterred. Louisiana has gone furthest, not because it is especially devout (Cajun Catholicism makes lots of allowances for temptation), but because the state makes it easy to get speciality plates approved. You can support almost any cause on your vehicle in Louisiana, from child safety to the Louisiana black bear.

But black bears pale in comparison with abortion, and getting the "Choose life" plate past federal court scrutiny may be a more delicate matter. The law passed last year sets up a committee to recommend recipients for the money, and it includes representatives of various groups that are aligned with the evangelical Christian community. Mr Rittenberg maintains that this gives religious groups too much authority over taxpayer money.

He also says a free-speech issue is involved, because choose-choice Louisianians don't have a special licence plate. That's because you haven't asked for one, retort pro-life activists. Maybe we will, abortion-rights advocates suggest. If the plates squeak through, Louisiana may be on the brink of full-scale motorised war.

Big biz to bear brunt of sewer fix

Companies fear high cost of mayor's overflow plan

By Scott Olson
IBJ Reporter

Clarian Health Partners Inc. uses a lot of water during a year's time. Enough that it wishes it could pour cold water on Mayor Bart Peterson's plan to remedy the city's sewer problems.

In 1999, its network of Methodist Hospital, Indiana University Hospital and Riley Hospital for Children registered more than 369 million gallons, an unimaginable amount for the typical residential user.

Clarian's combined water and sewer bill, which topped $400,000 last year, could be about $100,000 more per year if the city wins approval for an 18-percent sewer bill rate hike to help fund improvements to its antiquated sewer system.

Ron Bounin, Clarian's manager of facilities, finds it hard to support the proposal.

"At that rate, every gallon of water will have to be accounted for," Bounin said. "[The sewer problem] does need attention, there's no question about that. We just don't feel the large users are the ones that should have to carry the burden."

SEWER

Continued from page 3

Clarian already installed lift stations and separate sewer lines at its three facilities to increase efficiency, Bounin said. Now, it may need to spend more money on water meters to monitor use. Currently, its usage is tracked using a formula.

Because it has not yet received any formal notification of a rate hike from the city, Bounin said, Clarian has not taken any formal stance. If given the opportunity, however, Clarian will participate in talks with the city.

The problem is the city's combined sewer system, which carries sewage, storm water and industrial waste away from homes, streets and factories using the same set of pipes. When as little as a quarter of an inch of rain falls, or the same amount of snow melts, the system fills beyond capacity and waste is sent directly into city waterways, such as White River and Eagle Creek.

Under the city's proposal to battle its combined sewer overflow problem and to curb the amount of raw sewage that enters area waterways, ratepayers would pay an extra $1.94 for every 7,000 gallons of water used.

Despite the extra expense, many business leaders support the mayor's plan.

"Obviously, [the increase] is going to have an impact," said Christopher Swatts, public policy manager for the Indianapolis Chamber of Commerce. "We'd like to see other funding options to offset the cost to the user and taxpayer, but when you have to correct these things there will be a price tag."

The new rate would go into effect in 2001 and would be capped at that amount for at least five years.

The mayor's announcement earlier this month recommended adding more capacity to the sewer system to reduce overflows or building new storage and treatment capacity at the city's two wastewater treatment plants.

Before taking the plan public, the mayor and his staff met with city business leaders to gauge support for a rate increase.

"Businesses are saying they want to grow in the community," said Steve Campbell, spokesman for the Mayor's Office. "But if we're using 19th-century techniques to solve a 21st-century problem, it doesn't say much for the city."

Indianapolis Power & Light Co.'s Stout plant is less than a mile downstream from the city's southwest-side Belmont Advanced Wastewater Treatment Plant on the White River. Dead fish, which sometimes can be found floating in the power plant's dam, are the result of large sewage discharges, said Terry Hogan, IPL's manager for environmental affairs.

The plant draws a lot of water from the river to cool the process of generating steam for electricity. When the water is drawn, screens are used to filter out garbage. Most of the water is returned to the river.

"Anything that floats, you'll find it in the White River," Hogan said, noting IPL collects the garbage and ships it to a landfill.

As a large sewer user, IPL will be affected by the rate increase but it will

"The devil's always in the details, but we agree with the mayor that it's time to look at the situation and do the prudent things to address the issue," he said.

Large industrial waste users need special permits requiring them to pretreat the water that will be discharged into the city's sewer system, although waste products from residences, things like toilet paper and hygiene products, are the larger problem, the mayor said in announcing his plan.

Still, many businesses don't have a problem anteing up the extra money, said Vince Griffin, director of environmental and energy policy at the Indiana Chamber of Commerce.

"The preponderance of comments that I've heard from business and industry is, 'We agree we need to eliminate these combined sewer overflows,'" Griffin said. "The problem wasn't created in a few years, and it won't go away in a few years."

The Indiana Manufacturers Association has remained neutral on the mayor's proposals. The association focuses the majority of its attention on state and federal issues, association President Pat Kiely said.

A mayoral-appointed advisory board first met July 24 and will gather six times until Nov. 15. Public input sessions will be held five times, Aug. 17-23.

The Indiana Department of Environmental Management issued a storm water permit in 1998 requiring the city to address overflow issues. Under the permit, the city must have new policies and mechanisms for managing sewer

Sewer session doesn't answer a key question

■ Citizens wonder how much their bills will go up, but city isn't sure as it ponders repair options.

By David Rohn
STAFF WRITER

A dozen residents who asked this week about fixing the city's sewage-tainted water system complained they couldn't get an answer to a billion-dollar question: How much more will they pay in their monthly bills?

Indianapolis officials are bound to hear the same complaint in this round of public meetings on proposals to fix the city's antiquated sewers.

"We're in the process of working on those figures," said Greta Hawvermale, director of the Department of Public Works. "As soon as we have those available, we will share that information."

Hawvermale said Friday the city can move ahead in its planning without knowing exact consumer costs.

But public comment may be hard to come by. Only a dozen people showed up at an evening meeting this week at the Allisonville Christian Church near Castleton. More than two hours later, only seven people remained.

"I went there with expectations of being able to give some public input," said Steve Siebert, a retired plumber. "But once I was there, I felt like they only had three options. It was a kind of railroading in that respect."

Siebert said he was frustrated by the lack of another option — building separate sanitary and storm-water systems that wouldn't produce any overflows.

City officials are pitching three options to reduce overflows of raw sewage into White River and its tributaries.

Polluting overflows happen about 60 times a year.

But with costs come choices. Residents are being asked how much they're willing to pay to dramatically cut pollution.

An $840 million plan, for example, would reduce those bacteria-riddled overflows to 12 times a year. A $1.1 billion plan would cut it to seven. And the most expensive, $1.3 billion option would drop it to four.

"The city has preordained some things as not being affordable without explaining why."
Tom Neltner, Improving Kids Environment

Sandra Ralston, an environmental engineer who attended the meeting, said Friday that she felt rates were left out of the discussion. Ralston said reducing the number of overflows to four a year was probably unrealistic.

"With the amount of money that would cost, there is a certain point where you don't get anywhere near a dollar's worth of benefit for every dollar you spend," she said.

The city's only mention of sewer bills came from Jody Perras, a consultant hired by the city to run the meetings.

Before the city picks one of the three options, it faces an upfront expense of $184 million for consulting studies and to expand the city's wastewater treatment plants. That expense alone would increase the $10.91 average monthly sewer bill by an additional $1.94.

"Beyond that, I can only say that the other increases are going to be much more reasonable," Perras said of the speculation about exorbitant increases.

Residents said it is difficult to pick among planning options without knowing how each one would affect their sewer bills.

"It's like going in a store and being allowed to buy only generic brands or the house brand. We're not getting the brand-name products, and we don't know the cost of things," said Tom Neltner, director of Improving Kids Environment, an environmental group dealing with children's health issues.

"I think the city has preordained some things as not being affordable without explaining why."

City officials said Friday that these meetings are only part of the continuing public input process. Residents can comment on a web site: www.indygov.org/dpw/cso/feed_back.htm

The city has to give its final plan to state and federal regulators by January 2001.

Upcoming public meetings:

■ Today — 9 a.m., City-County Building, Public Assembly Room, 200 E. Washington Street.

■ Monday — 7 p.m., Pike Township Government Center, 5665 Lafayette Road.

■ Tuesday — 7 p.m., Southeastern Church of Christ, 6500 Southeastern Avenue.

■ Wednesday — 7 p.m., Wayne Township trustee's office, 5401 W. Washington Street.

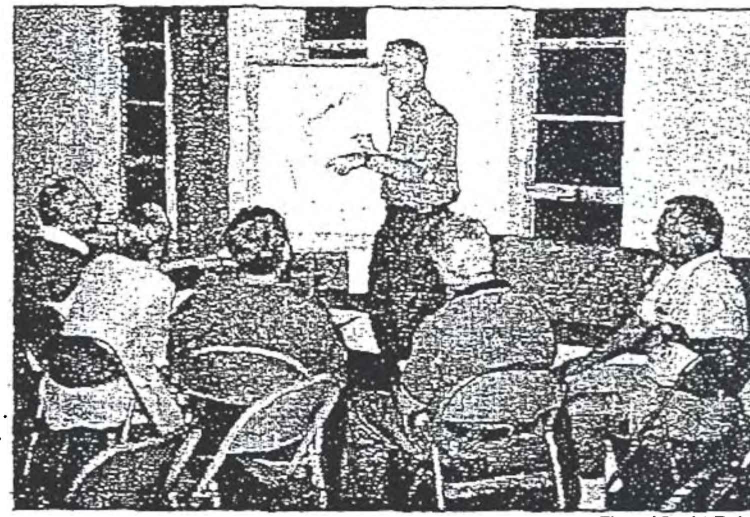


Photo / David Rohn

Small group: John Burkhardt, a Department of Public Works employee, discusses options to fix city sewers with citizens.

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Editorial

Full speed ahead on sewer cleanup plan

Now that city government is finished hearing public input on options for preventing the flow of raw sewage into White River and its tributaries, we hope Mayor Peterson and his advisers act boldly to devise a final plan, move it quickly through the public hearing process, and begin to implement it as soon as possible.

The combined sewer overflow problem is one that deserves immediate attention and significant financial resources. There should be no mistaking that this is a problem that touches everyone, not just those who ignore the posted warning signs and risk illness by coming into contact with the filthy water.

The Economist magazine recently ran a story on the city's combined sewer overflows. It acknowledged that other cities have the same problem, but the international magazine focused on our city and cast a broad spotlight on one of our biggest failings. Now the whole world knows Indianapolis is a city where used condoms and human waste can be found floating in our waterways. At a time when quality-of-life issues are gaining ground on economics as a factor in business decisions, the message *The Economist* sends couldn't be worse.

Back at home, there's little disagreement that the combined sewer system that serves the old city should be fixed. Heavy rains overwhelm the system, which carries both sewage and storm water. The overflow causes the system's untreated contents to spill out into White River, Fall Creek, Pogues Run and Pleasant Run at any one of 134 sewage overflow outfalls. The heavy capacity also overwhelms the city's water treatment plants, which spill the excess into White River. It's estimated that 6 billion gallons of rainwater mixed with raw sewage spill into our waterways every year.

The CSO problem is decades old, but it took the federal Clean Water Act, which requires a plan to control the overflows, to move the city off the dime in seeking a solution.

The proposal the city administration has on the table offers three basic levels of remediation. Through expanding the city's wastewater treatment plants, enhancing the capacity of the sewer system or both, the city could reduce the number of CSO incidents from 60 a year to 12, seven or four depending upon how much money is spent to fix the problem.

For the first five years of the program, $1.94 would be tacked on to the average monthly residential sewer bill. For businesses, the cost would be higher but would remain in the context of local sewer charges that are dramatically lower than most cities'. Indianapolis' average monthly sewer bill is $10.91 per 7,000 gallons used. Carmel sewer users pay $19.78 per 7,000 gallons. In Cincinnati, the charge is $25.33. In Evansville, it's almost $30.

The point is, there's plenty of room for an increase to pay for clean water that eliminates a health hazard, provides new recreational opportunities, and prevents us from being singled out as backward when it comes to environmental issues.

The final opportunity for public input on the options the city is considering was Aug. 23. Mayor Peterson's CSO Advisory Committee is to receive a report on the public comments in September, after which a long-term control plan will be drafted, opened to public comment and finalized. By most accounts, the public input sessions were lightly attended. They shouldn't be used to provide any political cover for those who are now entrusted with putting together the finished product.

Environmentalists are generally happy the city is finally moving on this issue. And, unlike other issues of this nature, the clean-and-green crowd isn't at war with the cost-conscious business community. The Indianapolis Chamber of Commerce was an early advocate of solving the CSO problem. And most businesses interviewed by *IBJ* for a recent story said they were more than willing to pay their share if it meant solving the problem.

Now all we need is the political will to get the job done. We hope the Peterson administration recommends bold steps to solve the problem. Only drastic measures will help dilute the negative impact of years of neglect of our waterways.

Fighting Raw Sewage Overflows
Public Participation Process
Comments and Questions Submitted via the CSO Website and Information Phone line
August 5 - September 5, 2000

Website Messages

Q. Why has the city not addressed the overflow before now? I know that this problem has been discussed and worked on for more than 20 years. During a period of the late 70s, while I was working for a local environmental Engineering Co., I spent almost an entire summer in the sewer system photographing the overflow diversions to be submitted in a large comprehensive report to the city and the EPA. So in the twenty years since that report why have no overflows been corrected?

C. First, let me commend the Peterson Administration for tackling this problem head-on. The Goldsmith Administration stalled and then tried to create hysteria in an effort to avoid the problem.

I have read the booklet "Fighting Raw Sewage Overflows" and conclude that the city should make the maximum effort to eliminate CSOs, i.e. meet the 4 storm overflows per year standard. It is only fair that those of us who do not live along the polluted streams help pay for the damage we do when our sewage overflows into those streams.

I have analyzed the economic information given in the booklet, which also seems to justify the maximum level of control. If I understand the figures properly, it will cost $840 million to clean up the first 3.2 billion gallons of sewage (i.e. meet the 12 storm per year benchmark), an average of about 26 cents per gallon. Meeting the 4-storm benchmark will cost an extra $460 million to control a further 1.98 billion gallons, an average of about 23 cents per gallon. If it is worth the costs to meet the first benchmark, then it is clearly worth it to go farther at even lower marginal costs. The booklet indicates that benefits will continue to increase as more sewage is treated. It is also clear that Indianapolis sewer bills could double or triple and not be out of line with what other Hoosiers pay.

I realize that completely clean water ("fishable and swimmable") is not attainable without further actions, such as eliminating old septic systems. Therefore, I suggest that you plan to do this as quickly as possible. Once again, it is not fair for some people to avoid the costs of treating their sewage while others suffer from the effects.

All of the above should be accomplished on an accelerated timetable, preferably over the next 5-10 years. This problem has been ignored or avoided for too long and needs prompt attention.

Thank you for your efforts to solve Marion County's water quality problems.

C. I am a designer by training. I also have an abiding interest in the environment and Indianapolis' long-term prosperity. As a designer, I often face problems needing creative solutions on a short tether of time, money or both. One of the strategies I use is called "Changing the Rules." In the context of Indianapolis' sewer problem this doesn't mean throwing out the environmental laws. On the contrary, I'm sure any serious solution takes the environment to heart.

Instead, what I have in mind is a means to bring different types of creativity to the table. Based on the CSO report, the idea of "control" is the overriding theme. There is a growing movement afoot in industry and other disciplines to get to pollution related problems before they become problems of control. They are usually placed under the general heading of pollution prevention or clean technology. These same principles are applicable to the combined sewer overflow problem.

The principle centerpiece of what I have in mind is a design competition to study strategies to control Indy's sewer difficulties through changes in policy, incentives and construction practices. The word control would not appear in the brief.

I suggest multidisciplinary teams to look at ways to prevent, percolate and/or collect storm runoff before it ever reaches the sewer in the first place across the whole system. It's also possible to have different levels of sophistication. Perhaps a science fair project for schools, an engineering project for Purdue and IUPUI, a policy challenge for planners and an integrated strategy challenge for design professionals in general.

If a competition is engaged, the prize should not be trivial. The integrated submission should include information about strategies, policy, cost, time frame and details. If the main prize were 7 figures plus the design commission, I believe that would get and hold people's attention in a heartbeat. This is a bunch of money, but if solutions can be generated that halve the cost or more, the investment is peanuts compared to the savings.

Now, I apologize for the quick tour of many ideas. From what I understand of serious design competitions, skilled consultants give these things clarity and flesh. It's a bunch of work just to prepare and launch the idea alone.

I wish you the best and clarity of mind as you struggle with this challenge.

C. I have some pictures of a "first flush" overflow from back in 1995. The overflow was after a long dry-spell and therefore the pictures are pretty dramatic. They were taken at Pogues Run and Sherman drive. Please let me know if you would like me to e-mail a copy of them to you.

C. I would like some info about any plans to extend the sewer systems to homes now on septic systems in Marion County or about any public assistance

Q. I am sure we are not the first community to be faced with this problem. What are other municipalities doing? How much would it cost to develop two systems - one for sewage treatment and one for runoff?

Q. I am very angry that the city of Indianapolis is now initiating a public relations campaign to prepare us for exorbitant sewer and water bills because the city has chosen during the last two administrations to place sports stadiums, malls, and large grants to large corporations first before citizens. This city has forgotten that we form cities and governments to help the citizens to provide for the common needs of sewers, street, garbage pickup etc. Cities are NOT formed to promote big business. I think that we have to see a change in direction in our city's priorities. The give away must stop. Do not continue a pr campaign full of platitudes asking the citizens of this city to cough up more money while all the time continuing to allow access and favoritism to business. You are here for the real live breathing citizens of this city. Do not forget it.

C. I won't be able to attend the public input sessions, but I am wondering why the information sessions did not present information on the cost of our first choice, which is to build new storm drainage systems area by area and disconnect the storm sewers from the existing sanitary sewers. However large, we need to hear the costs and why the consultants ruled that out.

C. Regarding the list of questions & comments distributed at the Input Sessions, there is an error on p. 7. The first item under "Treatment Plants" implies that the city's receipt of Federal funds came with a requirement to evaluate regionalization outside the county. This is not correct. The initial Plan of Study, the approved Facilities Plan and all subsequent planning and construction grants and grant amendments that I have reviewed are based on a planning area approved by the Indiana State Board of Health and the EPA. That planning area is Marion County. Period. For the city to be serving areas outside the county with those Federally- and state-funded facilities is, technically at least, a violation of the various grant agreements. As explained in the initial submittals by the city to the ISBH and EPA, the reserve capacity that has been built in the interceptors and at the treatment plants was for the purpose of serving the septic system areas of the county and any future growth within the county. November 1977 Correspondence from the ISBH to the city made it clear that regionalization was to be considered "within Marion County."

C. After reviewing the city's proposal to get sewage out of the water I feel that the solutions are not acceptable. 20 years is too long, there are no plans to take our residents off septic, and we are compounding the problem by taking sewage from other counties. Thanks.

C/Q. I just found out about this information with the flyer in my water bill. I would have liked to attend a public input session but cannot this week and I didn't know about the previous ones.
I do not see my issue with this addressed in this report. I have never been able to get the city to do anything about it. When there is a deluge of rain, my basement backs up with raw sewage. I am not the only homeowner with this problem. The plumbers say they get the same calls from other homeowners who are the first houses connected along the line that comes down from Carmel on the north. It is a major health problem for us, and expensive for the clean up every time it happens. The plumbing companies say it can only be solved by changing the sewer system. Why does no one want to talk about this?!!

Q. Will there be further public sessions? If not why? I would like to participate in the future.

C. It is irresponsible for the City to proceed with any sewage overflow abatement program without knowing how much the "solution" will cost citizens. I live in an old home in an historic neighborhood and face the prospects of rising property taxes as a result of reassessment, 20-40% increases in natural gas prices this winter, and now sewer user fee hikes of unknown but substantial amounts. It is impossible for people who live in my area to absorb these costs and continue making improvements to our aging homes and neighborhood. No responsible public policy maker, particularly anyone accountable to an annual budget process, can in good conscience undertake infrastructure projects that will run into the hundreds of millions of dollars without knowing AND PUBLICIZING the financial impact they will have on citizens. Proceeding with infrastructure plans based on speculation about the cost to homeowners and businesses is absolutely unacceptable and betrays the public trust.

Phone Messages

C. This man watched the presentation on cable channel 16 and feels that city is going about this all wrong. You don't charge the customers extra money to fix a failing sewer system that should have been replaced twenty years ago. Than to plan on taking twenty years to fix it is unacceptable. They need to talk to the people in San Francisco and do what they did. San Francisco replaced their entire sewer system and water treatment plant in five years. They didn't charge the people extra money on their bills, they passed a bond issue to supply the money for the repair. Get a clue. Indy is too behind the times.

C. He attended the meeting on 7/24/00, and twenty years is too long to take to clean up the sewage problems. He thinks they are being too conservative on the cost. He feels they need to devise a plan where those who can afford to pay more are charged more. He can afford to pay more is willing to pay more. And those who can't afford to pay that much can be charged a lower rate.

C. She is very upset about the sewage running through the drinking water lines on the Southside. There is a 90-foot well near her home. Maybe the city needs to look into the wells to furnish the city's drinking water.

C. If we are accepting sewage from outside sources - we shouldn't be. We can't handle the load we've got. He does appreciate the good work and thought going into this. Feels they do need to be a bit bolder, having more pride about this issue to get it resolved faster.

C. She is very upset because the sewage water backs up in her neighborhood all the time and when she calls they always give her the excuse that they can't find her location on their maps. She has even had her son call, and they give him the same excuse. They refuse to acknowledge the sewer systems in her neighborhood exist. In the meantime water continues to back up in her basement on a consistent basis.

C. A citizen called who has observed hazardous dumping from sewer trucks, labeled as such, off of Pleasant Run Parkway, just west of Emerson, off Washington Street, behind the apartments complexes. The grass is worn the tire tracks are visible. Trucks pull up, dump their hoses into the water there on a regular basis. Try policing this area between the hours of 5 am and 7 am. The citizen also says there is a building just west of Arlington, off of Massachusetts where they dump into the storm drains.

The following are my comments on the city's report: *Improving Our Streams in the City of Indianapolis* (The Report)

The Report is a good start on describing the Combined Sewer Overflow (CSO) problem in Indianapolis and is discussing some of the potential solutions to this long term public health and environmental problem. The lack of a new NPDES permit significantly complicates the problem of developing a Long Term Control Plan as does the sec 308 requests the EPA has recently filed. I have the following comments:

1.4.4. The Stream Reach Characterization and Evaluation Report (SRCER) is deficient in many aspects. It is based on the mistaken assumption that the city would not have to meet current Water Quality Standards (WQS). There are problems with the modeling used that have not been resolved. Some of these may be resolved as part of the city's compliance with the sec 308 orders issued by EPA. I have previously commented on the SRCER. The statement that the city has implemented the CSO Operational plan is incorrect. Many things mentioned in the plan have never been done and some have been revised.

1.5.4. Fig. 1-2 is inaccurate and does not properly reflect the correct of doing a knee-of – the curve analysis. It also shows a secondary contact recreation protection level. This classification does not exist.

1.5.5. While it is correct to say that communities can use either the presumptive or demonstration approach this does not apply to Indianapolis. In the sec. 308 letter the EPA states it expects the city to use the demonstration approach.

2.3.3.2. Doesn't fig 2-3 show model data rather than actual data? If it is actual data on what date were the data collected or are the data the mean of data collected over a period of time? There were questions raised by the Wet Weather TAG about the assumptions made in the bacteriological model that were never answered. There is a risk of both over estimating or under estimating bacteriological conditions in the streams.

2.6.2. This paragraph does not accurately describe conditions in the river. The Bacteriological Study showed that only 38% of the grab samples exceeded the WQS at 96 St.

4.2. The city should meet or exceed WQS for bacteria not just reduce the amount of time WQS are exceeded.

4.3. What does "second, Indianapolis may develop additional objectives for receiving stream conditions and uses" mean?

4.5.3. The significance of the septic tanks to the water quality problem needs to be resolved. At present there is little actual data on the effect of failed septic tanks on water quality in streams in the city.

4.5.5. At present street cleaning is grossly inadequate.

4.6.2 The demonstration approach must be considered per EPA CSO Policy and the sec. 308 letter.

Fig 4-7, 4-8. If modeling is used some statistical evaluation must be included. The lines shown on the charts do not accurately reflect the actual conditions. These lines are actually bands of some width.

4.7.3 Real-time control combined with inline storage is probably the most cost-effective way to reduce CSOs. I believe The Report may be underestimating the full potential of use of this approach and for the benefits achieved.

4.7.4. I/I reduction must be incorporated into the LTCP. I/I is significant at the Southport Plant.

4.8.1. The cost estimates in the CDM, April 1997 report need to be reevaluated in light of existing construction costs and technology available. Storage technologies need to be incorporated into and made a part of real-time control approaches.

Page 4-56. Increasing the height of the dams on Fall Creek is discussed. Increasing the base flow of Fall Creek is not mentioned. While the Indianapolis Water Company (IWC) thinks it owns the water in Fall Creek, it does not. A study is needed on the effect of increasing the base flow in the creek to determine if that would produce significant improvement in water quality. In the long run it may be cheaper to increase the flow in the creek, even if IWC received reimbursement, than to implement some of the control projects being proposed.

5.6. The EPA CSO Policy suggests that the cost of between one and four overflows be considered. There also appears to be no recognition of the fact that the demonstration approach must be considered (sec 308 letter from EPA). Additional control and economic analysis will have to be done as part of the LTCP development. On Page 5-7 the statement is made that the citizens can decide what level of bacterial control they desire. This is not correct. Indianapolis will have to meet current WQS.

7.1. The LTCP should be designed to achieve meeting current WQS for bacteria and not just significantly reducing the amount of time the WQS for bacteria are exceeded.

The amount the city can afford to spend in solving the CSO problem is based on EPA guidance and not on what the administration thinks it can spend. While only a $2.00 per month increase in sewer rates sounds good, it is doubtful that this is anywhere near what the city will ultimately have to spend to solve this long-standing problem. It would be better to be more up-front about the total costs.

Greta,

Thanks for the copy of the report. I like the approach of using a report rather than a LTCP at this stage in the program. It provides a good opportunity to make corrections to the LTCP early on.

I have not read through the document thoroughly but have looked for the key issues. I have serious concerns with the Quandt, CDM and G & H report. They are as described below.

1. The project approach described in Section 1.5 misconstrues the EPA
Guidance document. Since section 1.5.2 sets the goals for the entire program, it is a significant issue. I checked with Section 4.2 and it basically restates the goals from section 1.5. The fourth goal about significantly reducing the amount of time that CSOs cause the waterways to exceed WQS for bacteria is inconsistent with EPA guidance. The goal of the LTCP is to ensure that the CSOs do not contribute to a violation of the WQS. EPA is extremely clear on that point. The guidance allows the City to lower the goal but there is a rigorous process that the guidance requires to be followed - a cost-performance analysis and a use attainability analysis. But lowering the goal without going through this process, the report essentially bypasses the key steps in the LTCP process.

2. Section 1.5.4 again misconstrues the EPA guidance. The ability to pay
does not affect the selection of the solution - it only affects the implementation schedule. See Section 4.4 of the EPA Guidance for an explanation. In essence, seven factors allow the community to take more time to implement the solution. It is wrong to state that the "cost-benefit analysis takes into account . . . . the community's ability to pay." Also,

the seven criteria are significantly less stringent that the criteria would apply if a showing of "social and economic hardship" is pursued as part of a use attainability analysis.

3. Figure 1.2 misstates the statutory definition and EPA Guidance definition
of the knee-of-the-curve. It is definitely not the equation provided.

4. Section 1.5.5 misconstrues the EPA guidance. The four criteria provided
are not conditions that must be met to use the demonstration approach. It is just the opposite. They are conditions that must be met when the demonstration approach is used. They got cause and effect backwards. The test provided in the EPA guidance is whether the data and models provide "a clear picture of the level of CSO controls necessary to protect WQS." The presumption approach is to be used when "data and modeling of wet weather events often do not give a clear picture of the level of CSO controls necessary to protect WQS." This might be the case for Pogues Run and Pleasant Run but is not true for Fall Creek and White River. The City has done extensive modeling and has more than enough data to give a clear picture - and, therefore, the City must use to the demonstration approach. Just because that clear picture makes it evident that the level of controls is more stringent than the 4 overflows per year is an unacceptable reason to reject the demonstration approach.

5. Section 1.5.5 also misses a key condition in EPA's guidance when it comes
to the use of the presumptive approach. On page 3-8 of the guidance, EPA states that "[u]se of the presumption approach does not release municipalities from the overall requirement that WQS be attained. If the data collected during the system characterization suggest that use of the presumption approach cannot be reasonably expected to result in attainment of WQS, the municipality should be required to use the demonstration approach instead. Furthermore, if implementation of the presumption approach does not result in attainment of WQS, additional controls beyond those already implemented might be required." This issue is critical.

6. The alternatives proposed would not pass muster under the EPA guidance.
The best level of control considered is 4 overflows per year. But EPA makes it clear that tighter controls must be considered. How else can a knee-of-the-curve be developed? On page 3-55 of the EPA guidance, EPA gives two approaches. Both approaches require consideration of at least a 1-year storm. Also check Appendix D of the permit writers guide to reviewing LTCPs to reinforce that point.

The issues raised are similar but somewhat different to the ones found in the draft LTCP developed by CDM and G&H for Ft. Wayne. The engineering and modeling analysis is excellent but the framework is flawed.

I would be glad to sit down and work through the issues with you, Mona or the consultants. Just let me know when.

Also, please forward to Mona, I do not have her email address. I got a bounce when I tried it last week.

Thanks for the opportunity

REDUCING SEWAGE OVERFLOWS: YOUR INPUT NEEDED

- Are you interested in reducing raw sewage overflows into our streams?
- How much are you willing to pay to solve this 100-year-old problem?
- Are smaller streams a higher priority than the White River?

The Indianapolis Department of Public Works and its Clean Stream Team will present information on three options for reducing sewage overflows. Meetings will be held in neighborhoods most affected by raw sewage overflows.

PUBLIC MEETING SCHEDULE

Thursday, October 14	Garfield Park Multipurpose Room	2450 S. Shelby St.	7:00 PM
Tuesday, October 19	Julia Carson Government Center, Rm A	300 E. Fall Creek Parkway, N. Drive	7:00 PM
Thursday, October 21	Christamore House Auditorium	502 N. Tremont	6:00 PM
Monday, October 25	Brookside Park Auditorium	3500 Brookside Parkway S. Drive	7:00 PM
Tuesday, October 26	Riviera Club	5640 N. Illinois Street	7:00 PM

If you can't attend one of these meetings, you can go to indycleanstreams.org from October 14-30 to learn about the options and provide your input.

www.indycleanstreams.org
317.327.8720

City of Indianapolis
DPW
Department of Public Works

INDIANAPOLIS
CLEAN STREAM TEAM

CITY OF INDIANAPOLIS

Clean Stream Program

REDUCING SEWAGE OVERFLOWS: YOUR INPUT NEEDED

City Seeks to Reduce Sewer Overflows and Improve Neighborhoods

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The final plan will be subject to the approval of the U.S. Environmental Protection Agency and the Indiana Department of Environmental Management.

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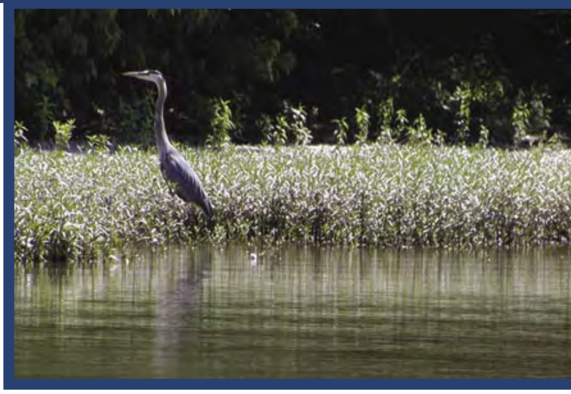
City of Indianapolis DPW Department of Public Works

INDIANAPOLIS CLEAN STREAM TEAM

CITY OF INDIANAPOLIS

Clean Stream Program

REDUCING SEWAGE OVERFLOWS: YOUR INPUT NEEDED



- **Are you interested in reducing raw sewage overflows into our streams?**
- **How much are you willing to pay to solve this 100-year-old problem?**
- **Are smaller streams a higher priority than the White River?**

The City of Indianapolis is finalizing a plan to reduce raw sewage overflows into our rivers and streams, and we need your input. Five public meetings are scheduled to get citizen feedback on plans to overhaul the city's sewer infastructure to reduce raw sewage overflows.

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City of Indianapolis DPW Department of Public Works

INDIANAPOLIS CLEAN STREAM TEAM

Stream Line

City of Indianapolis / Department of Public Works / Clean Stream Program

Fall 2004

Inside This Issue

Statement Of Purpose

The Indianapolis Clean Stream Team is overseeing many projects to keep raw sewage out of our waterways and improve the quality of life in our neighborhoods. Stream Line is published quarterly to keep you informed about the city's progress in reducing raw sewage overflows and restoring the health of our streams.

Contact Info

Send letters to:

Indianapolis Clean Stream Team
Attn: Jodi Perras
151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel: 317-327-8720
Fax: 317-327-8699
Email: jperras@indygov.org

INDIANAPOLIS CLEAN STREAM TEAM

Sewer Overflow Hotline: 327-1643

REDUCING SEWAGE OVERFLOWS: YOUR INPUT NEEDED

Greetings,

The City of Indianapolis is finalizing a plan to reduce raw sewage overflows into our rivers and streams, and we need your input.

In 2001, we proposed a plan to add capacity to our 100-year-old sewer system. Since then, we have been negotiating with regulatory agencies while also implementing many short-term projects to clean our streams. In the coming months, we hope to finalize a long-term plan and gain state and federal approval to move ahead with more projects.

You can participate in developing the plan by:

- Reviewing the information in this newsletter and returning the response card, by October 30
- Attending one of our public meetings (see the schedule below), or
- Visiting our Web site at *www.indycleanstreams.org* between October 14-30.

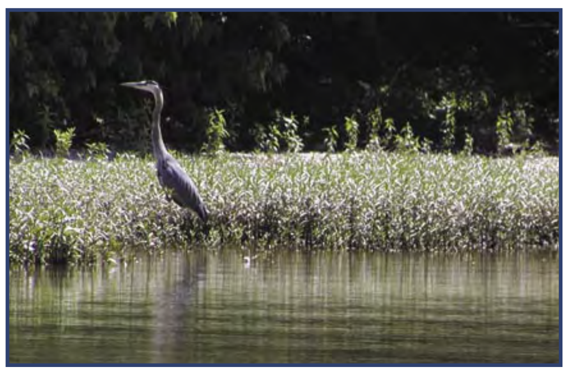
As you may know, this is not the only financial challenge facing our community. Recently, I proposed "Indianapolis Works," a plan to simplify and streamline local government and tax structures in Indianapolis and Marion County to make our community even more competitive with other cities and even more attractive to families, homeowners, businesses, and entrepreneurs.

Reducing the hazards, smells and sight of raw sewage in our neighborhoods is another challenge we must face to avoid costly fines and remain a vital, growing community.

Thank you for taking time to learn about these issues. Your opinion matters to me.

Sincerely,

Bart Peterson



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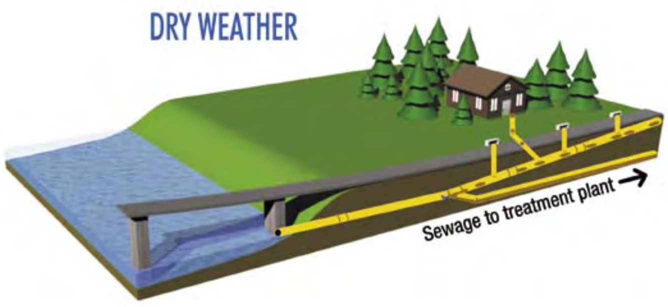
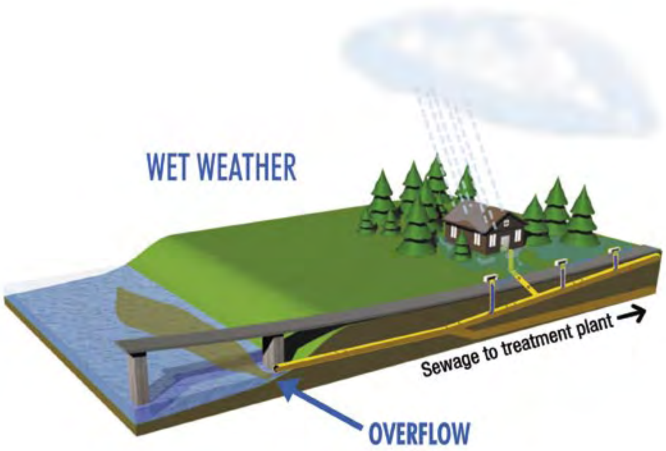
Find us on the web at: www.indycleanstreams.org

WHY DO OUR SEWERS OVERFLOW WHEN IT RAINS?

More than 100 years ago, Indianapolis built a storm sewer system to carry rainwater and melting snow away from homes, businesses and streets. When indoor plumbing came later, homeowners and business owners hooked their sewage lines to these storm sewers, combining stormwater and raw sewage into one pipe. This was common practice in many U.S. cities, especially in the Northeast and Midwest.

During dry weather, a combined sewer system works much like a separate sewer—carrying all sewage to the treatment plant for treatment. However, when it rains or snow melts, the sewer can be overloaded with incoming stormwater. When this happens, the sewers are designed to flow over internal dams in the underground pipe system and into nearby streams and rivers. Without these overflows, sewage would back up into basements and streets. Today, when building new sewer systems, we build separate sewers for stormwater and sewage.



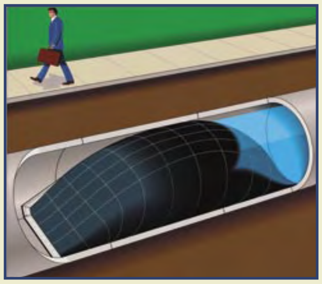


PROJECTS ALREADY UNDERWAY

Many projects have already begun to repair old sewer lines, build new storage tanks and expand treatment plants. Together, these “early action projects” will remove more than 2 billion gallons of overflows from our waterways each year.

At the same time, the City of Indianapolis has been working with the U.S. Environmental Protection Agency and the state to develop a long-term control plan that will provide a roadmap for future sewer repair and solutions to Indianapolis’ raw sewage overflow problems.

Some of the early action projects include:



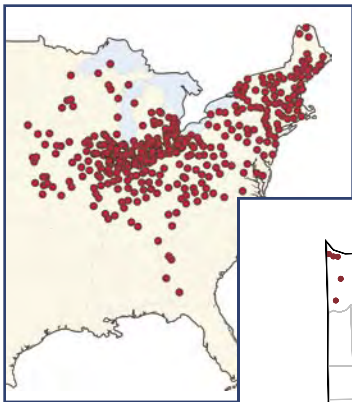
Inflatable Dams

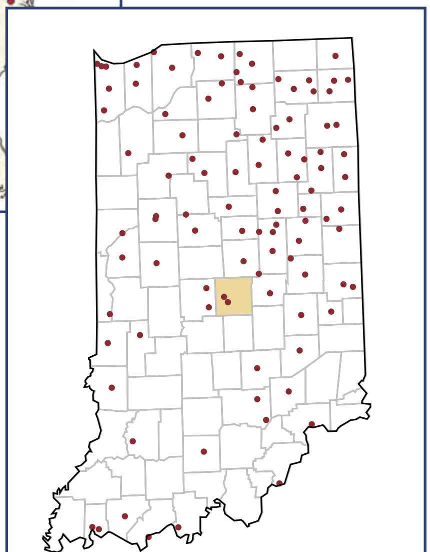
Inflatable dams have been constructed to keep millions of gallons of sewage out of Pleasant Run near Ellenberger Park and Howe Middle School and Pogues Run at Brookside Park.

When stormwater enters the sewers, the dams will inflate to block the overflow pipe and direct the wastewater to the city’s treatment plants. After the storm, when the flows in the sewer recede, the dam will deflate. Inflatable dams help save money by using existing sewer lines to contain and reduce raw sewage overflows.

Electronic sensors upstream and downstream of the dam will send data to a centralized computer, which will activate the dam as needed. These projects are part of a $5.6 million effort to install automated sewage control technologies in locations throughout the city.

HOW BIG IS THIS PROBLEM?

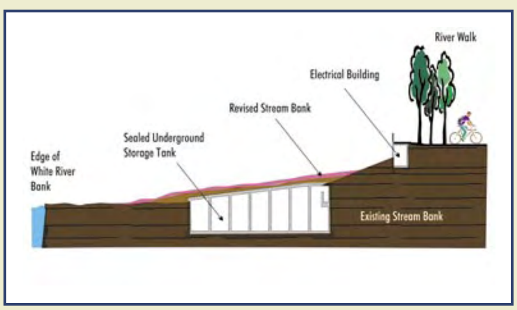




Indiana Raw Sewage Overflow Communities

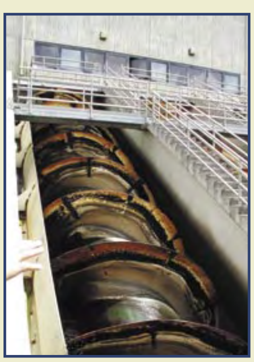
Many cities with combined sewer systems have problems with raw sewage overflows when it rains. These overflows contain not only stormwater, but also untreated human and industrial waste, toxic materials and debris. Combined sewer systems serve roughly 772 communities containing about 40 million people, according to the U.S. Environmental Protection Agency. Most communities with combined sewer systems are located in the Northeast and Great Lakes regions and in the Pacific Northwest. Indiana has 105 communities with combined sewers.

Raw sewage in our streams is a health hazard, smells and looks disgusting, hurts our environment and harms the quality of life in our neighborhoods. Sewage overflows are a major cause of pollution in White River, Fall Creek, Pleasant Run, Pogues Run and Eagle Creek. Raw sewage steals oxygen from the water, making it difficult for fish to breathe and sometimes causing fish kills. High bacteria levels make streams unsafe for children to wade or play in the water. Raw sewage in our streams also prevents us from becoming a world-class city that can attract new businesses, jobs and residents.



White River East Bank Storage Tank

A 3-million gallon underground storage tank was installed this year along the White River near the Indiana University-Purdue University Indianapolis campus. The tank will capture and store a combination of raw sewage and stormwater that would otherwise overflow into the river during storms. It will hold the wastewater until flows in the sewer system subside. The tank will control one of the largest sources of raw sewage overflow in the city.



BEFORE

AFTER

Improvements at the Treatment Plants

Early action projects and other improvements at the city's two wastewater treatment plants will reduce plant overflows by millions of gallons each year. Some sewage overflows currently go directly into the White River and Little Buck Creek.

The wet weather upgrades at the Belmont Advanced Wastewater Treatment Plant include two double-lined flow equalization basins and two concrete storage tanks that also provide first-stage treatment. At the Southport Advanced Wastewater Treatment Plant, the city is building a new pump station, new 48-inch force mains to convey flows, and a double-lined equalization basin for storage and later treatment.

In the next few years, the city also will install new wet weather treatment facilities at Belmont and a new pipeline between the plants so Southport can treat more flows when Belmont is overloaded by wet weather.

OVERVIEW OF OPTIONS

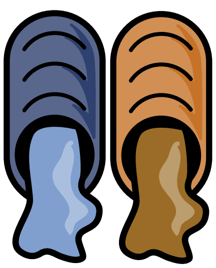
The city has evaluated a number of technologies and options to further reduce sewage overflows to our streams. The final options are:

PLAN 1: STORAGE AND CONVEYANCE

Plan 1 would involve a single deep tunnel, underground storage tanks and new sewers to capture raw sewage that would otherwise overflow into our streams. The tunnels and tanks would store the sewage underground until after a storm, when the captured sewage would be pumped to the city's treatment plants. The treatment plants also would be expanded. Total costs range from $1.44 billion to $3.02 billion, depending on the size of the facilities.

PLAN 2: STORAGE AND REMOTE TREATMENT

Plan 2 would involve three deep tunnels, as well as underground storage tanks and new sewers to capture raw sewage that would otherwise overflow into our streams. It also would include remote treatment facilities at the downstream end of Pogues Run and Fall Creek tunnels. These treatment facilities would treat wet-weather flows that exceed the tunnels' capacity. The city's central treatment plants also would be expanded. Total costs range from $1.55 billion to $3.03 billion, depending on the size of the facilities.



PLAN 3: TOTAL SEWER SEPARATION

Plan 3 would involve completely separating combined sewers in all areas to eliminate raw sewage overflows. Existing combined sewers would be converted to either a separate sanitary sewer or a separate storm sewer. New sewers would need to be installed in all neighborhoods, and all homes and businesses would be re-connected to the separated sewers. The city's treatment plants would not be expanded under this plan. Total sewer separation is the most costly option, estimated at $6.2 billion.

OTHER WATERSHED IMPROVEMENTS

A watershed is an area of land that drains into a river or stream. The city is looking at all the sources of pollution in its watersheds to identify the best plan for improving water quality. Under all three plans, the city also would implement the following programs:

- Building sewers for neighborhoods now served by septic systems
- Implementing projects to reduce flooding and improve stormwater drainage
- Restoring streambanks and removing polluted sediments from streams
- Disconnecting downspouts, sump pumps and other illicit connections that take up sewer capacity

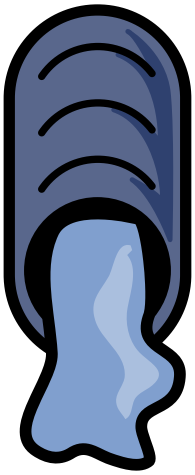
If Plan 1 or 2 are chosen, these additional improvements would be added:

- Adding water to tributaries to improve stream flow and wildlife habitat
- Improving oxygen levels in streams by adding aeration on Fall Creek and White River, removing Boulevard Dam on Fall Creek and modifying Stout Dam on White River

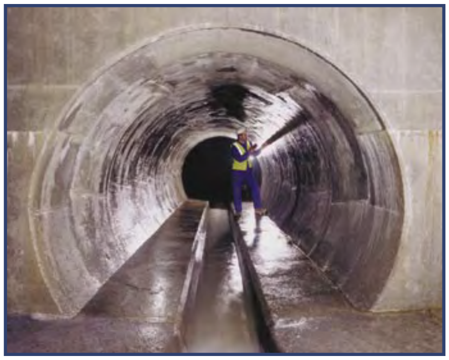
The cost of these additional programs is estimated at $64.72 million(included in cost estimates above).

PLAN 1: STORAGE AND CONVEYANCE

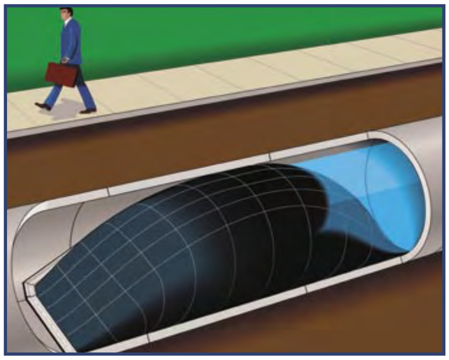
The key features of Plan 1 are:



- A single central tunnel system along Fall Creek and White River, to store and carry sewage to the city's wastewater treatment plants. The tunnel would be built several hundred feet below the ground surface with tunnel boring machines. Tunnels can provide a large storage volume with very little disturbance to the ground surface, making them a preferred option in urban areas. Sewage storage tunnels have been built in Chicago, Milwaukee, Toledo and other cities.
- New, larger sewers along Pogues Run, Pleasant Run, Bean Creek and parts of Fall Creek and White River to capture overflows and carry them to the central tunnel system. Most sewers would be installed by digging open trenches, with limited sections installed by small-scale tunneling.
- A new sewer along Eagle Creek to carry wet weather flows to the Belmont Advanced Wastewater Treatment Plant.
- An underground storage tank near Spades Park to capture and store overflows from upper Pogues Run. The stored sewage would be pumped to the city's treatment plants after a storm. The storage tank would be self-cleaning.
- Upgrading an existing storage/treatment facility at Riviera Club to capture, store and treat overflows from upper White River.
- An underground storage tank now under construction on the White River near the campus of Indiana University-Purdue University at Indianapolis. Stored sewage would be pumped to the treatment plants after a storm, and the tank would have an automatic self-cleaning system.
- Inflatable dams and pinch valves at key points in the sewer system. These devices help save money by using existing sewer lines to contain and reduce raw sewage overflows. Eventually, electronic sensors would send data to a centralized computer, allowing remote and real-time control of flows within the sewer system.
- Local sewer separation projects to eliminate isolated overflows on State Ditch, Lick Creek and the upstream ends of Fall Creek, Pogues Run and Bean Creek.
- Improvements to both Belmont and Southport Advanced Wastewater Treatment Plants to increase their ability to store and treat peak flows during wet weather. Improvements would include a new sewer pipe connecting the two plants.
- Watershed improvements described on page 4.



Storage tunnel

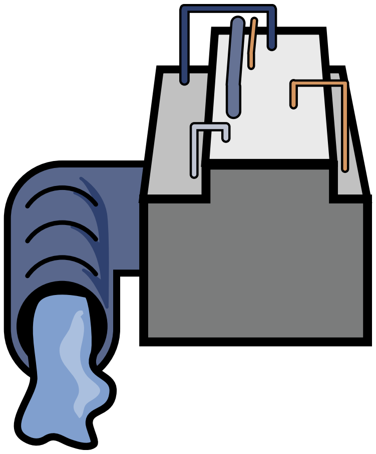


Inflatable dam

Plan 1 costs

The key factor in determining cost is facility size. The larger you build a tunnel, storage tank, or other facility, the more it will capture and the more it will cost. The city's options under Plan 1 could increase sewage capture from today's 63 percent annual average to 90, 93, 95, 97 or 99 percent. Design, construction and 20 years of operating costs for Plan 1 range from $1.443 billion for 90 percent capture to $3.026 billion for 99 percent capture.

PLAN 2: STORAGE AND REMOTE TREATMENT



Plan 2 is similar to Plan 1 in many respects. The key differences are three separate tunnels and the use of high-rate treatment facilities along Fall Creek and Pogues Run to treat sewage captured by deep tunnels, rather than send it to the city's existing treatment plants.

The key features of Plan 2 are:

- Two separate deep tunnel systems and treatment facilities – one for Fall Creek and one for Pogues Run. The treatment facilities would be located at the downstream end of both waterways, where they converge with the White River. These facilities would use the latest technologies to treat sewage stored in the tunnels, discharging treated flows into the streams after disinfection with ultraviolet lights. These treatment units would be relatively small and could start up quickly to treat storm flows. However, they would not be as effective as the city's advanced wastewater treatment plants in removing pollutants, and they would require more maintenance than a storage tank or tunnel.
- A third separate tunnel system for White River watershed with a pumping facility to direct stored sewage to the city's central treatment plants.
- New sewers for isolated outfalls along Fall Creek, Pogues Run and White River to carry wet weather flows into each tunnel system.

Remote treatment unit

The remaining features of Plan 2 are identical to Plan 1:

- New, larger sewers along Eagle Creek, Pleasant Run and Bean Creek.
- An underground storage tank for upper Pogues Run near Spades Park.
- Upgrading an existing storage/treatment facility for upper White River at Riviera Club.
- An underground storage tank now under construction on the White River near the IUPUI campus.
- Inflatable dams and pinch valves at key points in the sewer system.
- Local sewer separation projects to eliminate isolated overflows on State Ditch, Lick Creek and the upstream ends of Fall Creek, Pogues Run and Bean Creek.
- Improvements to both Belmont and Southport Advanced Wastewater Treatment Plants, including a new sewer pipe connecting the two plants.
- Watershed improvements described on page 4.

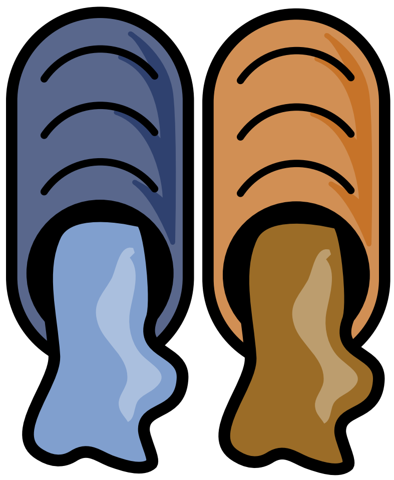
Remote treatment

Plan 2 costs

As with Plan 1, the key factor in determining cost is facility size. Building and operating the remote treatment facilities makes Plan 2 somewhat more expensive than Plan 1. Design, construction and 20 years of operating costs for Plan 2 range from $1.545 billion for 90 percent capture to $3.032 billion for 99 percent capture.

PLAN 3: TOTAL SEWER SEPARATION

Plan 3 includes total separation of existing combined sewers in all watersheds to eliminate all combined sewer outfalls. Total sewer separation is the most costly option and would also be the most disruptive to neighborhoods during construction, especially downtown and in Center Township. Sewer separation would lead to increased pollution from urban stormwater, a significant source of water quality problems in Marion County.



The key features of Plan 3 are:

- Total sewer separation in all watersheds, including Fall Creek, Pogues Run, Pleasant Run, Eagle Creek, State Ditch and White River. The existing combined sewers would be converted to either a separate sanitary sewer or a separate storm sewer.
- Stormwater flows would be conveyed to ponds, sand filters or other stormwater management practices, prior to discharge into streams. These technologies would help reduce (but not eliminate) the many pollutants found in urban stormwater, such as sediments, organic matter, metals, oils, and trash.
- Improvements to the Belmont and Southport treatment facilities would not be needed, nor would the new pipe connecting the two plants.
- Watershed improvements described on page 4.

Plan 3 costs

The cost of sewer separation was estimated based upon the total acreage that would need to be separated. With 35,405 acres draining into the combined sewer area, the city estimates the total cost of sewer separation at $6.201 billion.

Sewer separation under construction

Sewer separation under construction

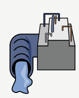
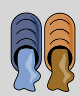
NEIGHBORHOOD IMPACTS

Like any construction project, all the plans will affect our neighborhoods. Some will have greater impact during construction, while others might have more of an effect during long-term operation. The Mayor's Raw Sewage Overflow Advisory Committee and the Wet Weather Technical Advisory Committee—made up of neighborhood representatives, health officials, environmental advocates and technical representatives—evaluated how the three plans would impact neighborhoods.

Here's a sample of some of the questions committee members asked when they considered how the plans would affect neighborhoods:

- **NOISE:** How much and when will noise occur during construction? How much noise will be present in the long-term, from pumps and blowers, etc.?
- **ODOR:** Are odors expected to be increased during the long-term operation?
- **SAFETY AND SECURITY:** Are there public safety issues associated with the alternative, such as use of chemicals for treatment, creation of mosquito or fly habitat? Are there security issues, such as potential for vandalism, terrorism, sabotage, etc.?
- **SITING CONCERNS:** How close are facilities to homes, parks and schools? How difficult would it be to site these facilities?
- **AESTHETICS:** How long will the facilities have a visual impact on the existing landscape? Can the alternative be seen from a home or public gathering place, such as a park?
- **TRUCK TRAFFIC DURING OPERATION:** How frequently will trucks travel through a neighborhood for regular operation and maintenance activities?
- **NEIGHBORHOOD DISRUPTION DURING CONSTRUCTION:** How much disruption will be caused to streets, sidewalks, parks, yards, etc. during construction? How long will the disruption last?

Committee members and city staff reviewed these questions and then ranked the proposed plans 1^{st}, 2^{nd} or 3^{rd}, based on their judgment. They concluded that Plan 1 is the best option for neighborhood issues, followed by Plan 3, and Plan 2. The final results are in the graphic below.

	 PLAN 1	 PLAN 2	 PLAN 3
NOISE	1st	3rd	1st
ODOR	2nd	3rd	1st
SAFETY AND SECURITY	1st	3rd	1st
SITING CONCERNS	1st	2nd	2nd
AESTHETICS	1st	3rd	2nd
TRUCK TRAFFIC DURING OPERATION	1st	3rd	2nd
NEIGHBORHOOD DISRUPTION DURING CONSTRUCTION	1st	2nd	3rd
THE COMMITTEE'S OVERALL RANKING OF NEIGHBORHOOD ISSUES	1st	3rd	2nd

***Please answer Question 1 on the Clean Stream Decision-Making Card.**

IMPACT ON SEWER RATES

One key factor in selecting a plan is determining its impact on ratepayers. Our sewer rates, which are among the lowest in the nation, will need to rise in order to pay for these projects. However, the city will work hard to keep construction costs down and obtain state and federal grants to reduce the burden on our ratepayers.

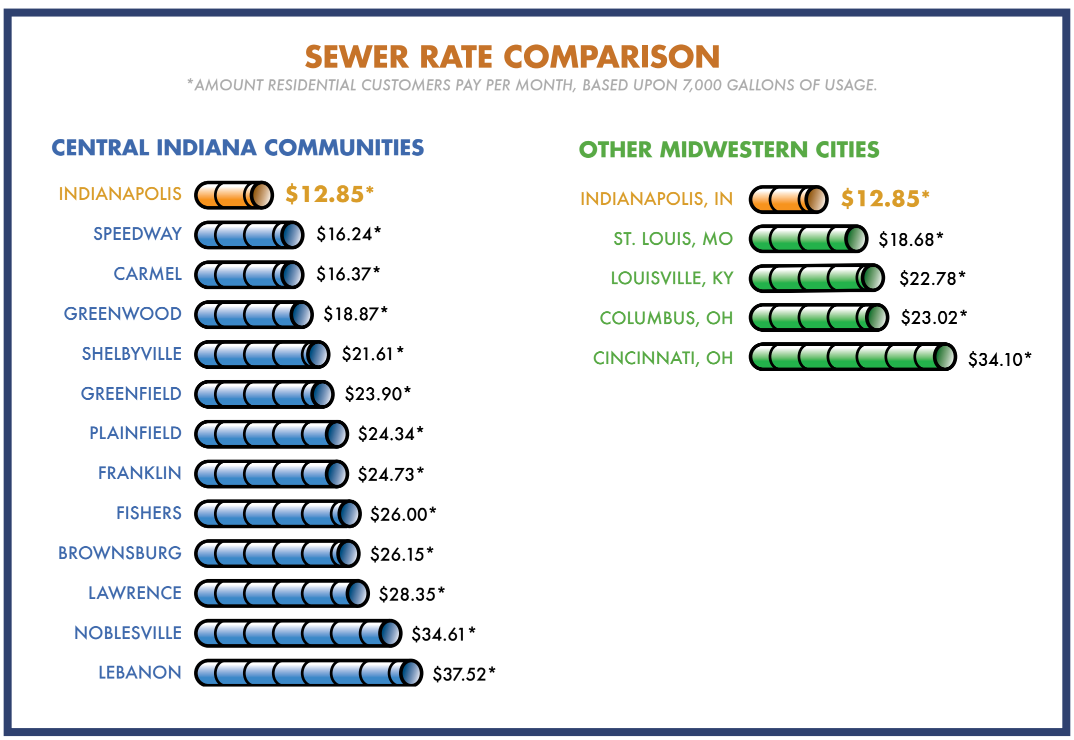
The city is concerned in particular about rate impacts on Center Township, where the city's most disadvantaged residents live. Forty-three percent of households in Center Township are considered "low income," as defined by the federal government – that is, they have less than 50 percent of the area median family income. For Marion County as a whole, 25 percent of households fit that description.

While long-term sewer rates are difficult to predict, the city has estimated the additional monthly cost to ratepayers for sewage overflow control at the end of 20 years. Rates will rise gradually during that time to provide funding necessary to repay bonds and loans used to finance the projects, as well as operate and maintain the new facilities.

Estimated impact on rates for the different options are shown in the comparison table on page 10. These rates only represent increases associated with controlling combined sewer overflows. Other rate increases will likely be needed to keep our sanitary sewers and treatment plants in good condition.

HOW DO OUR RATES COMPARE WITH OTHER CITIES?

Indianapolis sewer rates are low in comparison to other cities of our size and other cities in Indiana. Indianapolis residential customers pay $12.85 per month, based upon 7,000 gallons of usage. According to a rate survey conducted by the accounting firm Crowe Chizek in 2004, comparable rates in other cities for the same usage were:



MAKING THE COMPARISON

How do we decide what plan is best? In addition to looking at neighborhood issues, we can compare the plans based upon how well they reduce overflows, protect human health, protect wildlife, or manage costs. A side-by-side comparison of the various options is presented in the table below.

	REDUCING OVERFLOWS			PROTECTING HUMAN HEALTH		IMPROVING WILDLIFE HEALTH	MANAGING COSTS		
	AVERAGE % OF FLOW CAPTURED AND TREATED ANNUALLY	AVERAGE # OF UNTREATED OVERFLOWS PER YEAR	ADDITIONAL GALLONS OF SEWAGE CAPTURED/TREATED PER YEAR	DAYS WATERWAYS ARE SAFE FOR SWIMMING (<235 *E. COLI* COLONIES/100 ml)	DAYS WATERWAYS HAVE VERY HIGH BACTERIA LEVELS (> 10,000)	AQUATIC AND WILDLIFE BENEFITS	TOTAL COST (CONSTRUCTION + OPERATIONS FOR 20 YEARS)	TOTAL COST PER GALLON OF OVERFLOW CAPTURED	AVERAGE HOMEOWNER'S MONTHLY SEWER RATES (AT END OF 20 YEARS)*
CURRENT CONDITIONS	63%	60	-	187 days	52 days	3RD	$0	-	$12.85
PLAN 1	90%	12	6.33 billion	230 days	12 days	1ST	$1.44 billion	22.8 cents	$44.00
	93%	6	6.86 billion	230 days	6 days		$1.61 billion	23.5 cents	$47.00
	95%	4	7.12 billion	230 days	4 days		$1.73 billion	24.3 cents	$49.00
	97%	2	7.46 billion	230 days	2 days		$2.21 billion	29.6 cents	$58.00
	99%	0.5	7.73 billion	231 days	0.5 days		$3.03 billion	39.2 cents	$73.00
PLAN 2	90%	12	6.35 billion	230 days	12 days	2ND	$1.55 billion	24.4 cents	$46.00
	94%	6	6.93 billion	230 days	6 days		$1.72 billion	24.8 cents	$49.00
	95%	4	7.16 billion	230 days	4 days		$1.86 billion	26.0 cents	$51.00
	98%	2	7.49 billion	230 days	2 days		$2.23 billion	29.8 cents	$58.00
	99%	0.5	7.73 billion	231 days	0.5 days		$3.03 billion	39.2 cents	$73.00
PLAN 3	100%	0	7.87 billion	228 days	0 days	2ND	$6.2 billion	78.8 cents	$132.00

***Monthly sewer rate estimates include today's rates plus the amount needed to fund sewage overflow projects. Other rate increases will likely be needed in future years to keep the rest of our system in good condition.**

Reducing Overflows: Currently, sewers overflow about 60 times per year, spilling 7.87 billion gallons of untreated sewage into our waterways. The table shows how each plan will reduce the number of overflows each year and how many gallons will still overflow. After the plan is implemented, overflows would only happen during the biggest storms, or in back-to-back smaller storms. We will be capturing a greater percentage of sewage, up from 63 percent today to 90 percent or more under the various options.

Protecting Human Health: Will our waterways be safe for swimming? That goal is not achievable at all times. However, we will improve the number of days our waterways meet the state's swimming standards from 187 per year today to around 230 per year in the future. We will also reduce the number of days our streams have very high *E. coli* bacteria levels (greater than 10,000 colonies in a 100 milliliter sample). A city ordinance prohibits swimming in these streams. Even though water quality will improve under the city's plans, you should protect yourself and your family by staying out of urban waterways.

Improving Wildlife Health: Wildlife are already returning to city streams due to the investments the city has made in recent years. Each option will lead to additional improvements. Plan 1 ranks first for improving wildlife health. Plans 2 and 3 provide about equal benefits.

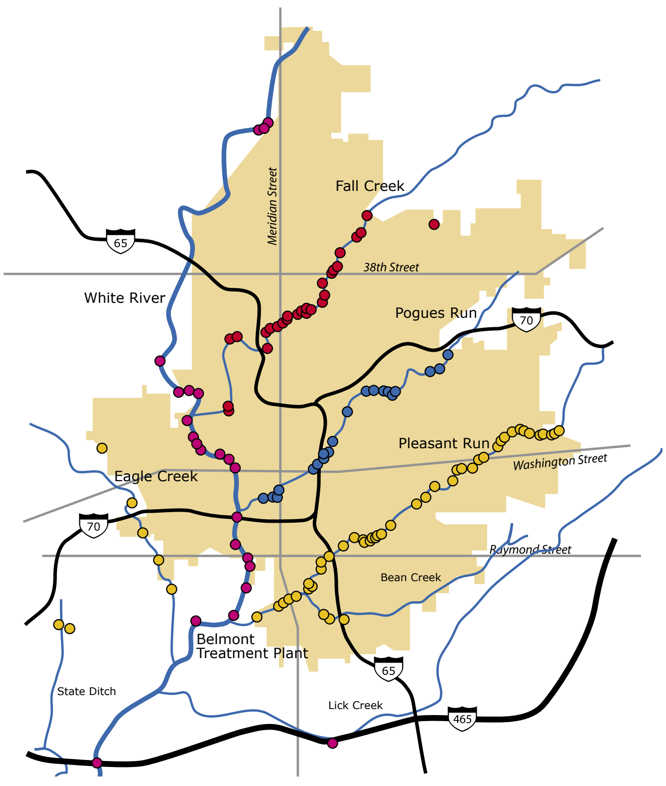
Managing Costs: The chart compares the plans based upon total cost, cost per gallon captured, and the impact on monthly sewer rates. Total costs include the cost of design, construction and operation over 20 years. The cost-per-gallon column shows that costs are similar for 90, 93 and 95 percent capture, but get more expensive when you have to build facilities big enough to capture the biggest storms. The monthly sewer rate is estimated based upon funds and financing needed for sewer overflow projects only.

***Please answer Question 2 on the Clean Stream Decision-Making Card.**

PRIORITY AREAS

The city has conducted surveys to determine how people use our streams. These surveys show that our streams and greenways are used for a variety of activities, with the most popular being walking, jogging, bicycling, and playing by the streambank. Less frequent activities include fishing, wading and swimming.

Recreational activities are reported both along smaller, neighborhood streams, and the White River. However, there are no swimming beaches along waterways affected by sewage. The city has concluded that while each waterway is important to people who live along and use it, no one waterway or area is more important than another to the entire city.



Location of sewage overflows in Indianapolis

ARE SMALLER STREAMS A HIGHER PRIORITY?

In implementing the plan, the city could spend more resources and place higher standards on some streams than others. What is your preference?

- *All streams should be treated the same.* The city should have the same goal for reducing overflows on all streams.
- *Smaller streams should be a higher priority than White River.* Smaller, neighborhood streams should be a higher priority because water quality impacts are more severe there. Also, reducing overflows on these streams will improve White River, because the smaller streams flow into White River.
- *Some small streams should receive higher protection than other small streams.* You may prefer a higher control on Fall Creek vs. Pleasant Run or Eagle Creek vs. Pogues Run. If so, please explain your reasoning.
- *Some streams may receive a higher level of control because it is cost-effective to do so.*

HOW MUCH CONTROL MAY BE REQUIRED?

Because sewer overflow costs and impacts vary in each community, regulatory agencies may require more or less control in different communities or on different waterways. Some U.S. waterways have been allowed an average of 6 overflows per year, others 4, and others 2 or fewer. During negotiations, the U.S. Environmental Protection Agency has suggested we should evaluate additional levels of control, including different levels of control on the White River and the smaller streams. An example would be that we achieve an average of 3 overflows per year for White River, Pleasant Run and Eagle Creek, and 2 per year for Fall Creek and Pogues Run.

Here is how this particular option would compare with the options shown on page 10.

AVERAGE % OF FLOW CAPTURED AND TREATED ANNUALLY	AVERAGE # OF UNTREATED OVERFLOWS PER YEAR	ADDITIONAL GALLONS OF SEWAGE CAPTURED /TREATED PER YEAR	DAYS WATERWAYS ARE SAFE FOR SWIMMING (<235 E. COLI COLONIES/100 ML)	DAYS WATERWAYS HAVE VERY HIGH BACTERIA LEVELS (> 10,000 COLONIES/100 ML)	AQUATIC AND WILDLIFE BENEFITS	TOTAL COST (CONSTRUCTION + OPERATIONS FOR 20 YEARS)	TOTAL COST PER GALLON OF OVERFLOW CAPTURED	AVERAGE HOMEOWNER'S MONTHLY SEWER RATES (AT END OF 20 YEARS)
96%	3 OR 2	7.37 billion	230 days	3 OR 2 days	1ST	$2.05 BILLION	27.8 CENTS	$53-54

The city hasn't selected a level of control because we need your input first. What are your thoughts?

***Please answer Questions 3, 4 and 5 on the Clean Stream Decision-Making Card.**

WHAT YOU CAN DO

It took decades for our streams to get into this condition, and it will take years of hard work and investment to improve them. In the meantime, there are measures you can take to help protect the environment and yourself and your family.

PROTECT THE ENVIRONMENT

- Disconnect downspouts and sump pumps connected to sewers. This will prevent clear water from using up our sewers' capacity.
- Don't send fats, oils or grease down the drain. They cause sewer blockages and backups.
- Properly dispose of motor oil, antifreeze, battery acid and household chemicals. Call 327-4TOX to learn how.
- Clear gutters and storm sewer drains of leaves and debris.
- Reduce water use in your home and business.
- Clean up after your pets. Their waste contaminates our waterways.

PROTECT YOURSELF AND YOUR FAMILY

- Pay attention to warning signs posted by the Indianapolis Department of Public Works and the Marion County Health Department.
- Call the Sewer Overflow Hotline at 327-1643 to receive notification of sewage overflows.
- Sign up for sewage overflow e-mail alerts at www.indycleanstreams.org.

THE PROCESS

The City of Indianapolis has been working for years on its long-term control plan for the Indianapolis sewer system. The plan must be submitted to the U.S Environmental Protection Agency and the Indiana Department of Environmental Management. The following is a tentative schedule:

SCHEDULE

• **Oct. 14-26**	**Public meetings**
• **November**	**Determine preferred plan**
• **December - January**	**Produce draft of long-term control report**
• **February**	**30-day public comment period**
• **Mid-February**	**Hold public hearing**
• **March**	**Incorporate changes from public comments**
• **Late March**	**Produce final report**
• **April**	**Send to EPA and IDEM for review and approval**

INSIDE: YOUR CHANCE TO COMMENT ON OPTIONS FOR CONTROLLING SEWAGE OVERFLOWS.

made with recycled paper

CLEAN STREAM DECISION-MAKING CARD

1. Neighborhood Impacts: Please rank the following items 1-7 in importance to you as they pertain to sewer repairs (use No. 1 to indicate your first priority):

______ Noise in long-term operation
______ Odor during long-term operation
______ Security issues, such as possibilities of vandalism and sabotage
______ Siting issues, such as proximity of facilities to homes, parks and schools
______ Aesthetics: How facilities and improvements look in the neighborhoods
______ Truck traffic during long-term operation
______ Neighborhood disruption during construction

2. Environmental Benefits and Cost Impacts: Please rank the following items 1-6 in importance to you:

______ Reducing the number of gallons that overflow each year
______ Reducing the number of times that sewers overflow each year
______ Making waterways safer for people who use them
______ Making waterways healthier for fish and other wildlife
______ Keeping the cost per gallon reasonable and cost-effective (i.e., don't spend beyond the point of diminishing returns)
______ Keeping sewer rates affordable for most families and businesses

City of **Indianapolis**
Bart Peterson, Mayor

INDIANAPOLIS
CLEAN STREAM TEAM

3. While long-term sewer rates are very difficult to predict, the city has estimated the impact on sewer rates from overflow control projects. At the end of 20 years, how much would you be willing to pay to clean our waterways?

______ $44 - $46 per month (90 percent capture)
______ $47 - $49 per month (93 percent capture)
______ $49 - $51 per month (95 percent capture)
______ $58 per month (97 percent capture)
______ $73 per month (99 percent capture)
______ $132 per month (100 percent capture)
______ Other ______________________________

4. In implementing the plan, the city could spend more resources and place higher standards on some streams than others. What is your opinion (check one)?

______ All streams should be treated the same
______ Smaller streams should be a higher priority than the White River
______ Some small streams should receive higher protection than other small streams. If so, which ones? ______________________________
______ Some streams should receive a higher level of control because it is cost-effective to do so.

5. Now that you've considered neighborhood issues, environmental benefits and cost impacts, which plan do you prefer?

______ Plan 1: Storage/conveyance
______ Plan 2: Storage/conveyance with remote treatment facilities
______ Plan 3: Total sewer separation

6. Please check you Annual Household Income: Less the $50,000 ______
$50,000 - $100,000 ______
More than $100,000 ______

7. (Optional) If you'd like to receive updates on the issue, please provide your Email address: ______________________________

MAKE SURE YOUR OPINION IS COUNTED.
MAIL THIS CARD BY OCTOBER 30TH.

Place
Stamp
Here

INDIANAPOLIS
CLEAN STREAM TEAM

Indianapolis Clean Stream Team
151 North Delaware Street
Suite 900
Indianapolis, IN 46204

Attendance Record

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Date: October 14, 2004

Time: 7 p.m.

Location: Garfield Park Multipurpose Room

Workshop: Raw Sewage Overflow Public Meeting

	Name	Telephone	Email
1.	Mark Burgess	581-9585	burgessma@cdm.com
2.	Mike Haskin	865-3621	mhaskin@greeley-hansen.com
3.	Julie Haskin	865-3621	
4.	Pegg Warnick	327.8314	pwarnick@indygov.org
5.	Tricia Banta	327-4805	tbanta@indygov.org
6.	TOM WOODY	788-0612	
7.	Tom Brown	639-7017	tom.brown@unitedwater.com
8.	Lewis Warren	357-9853	
9.	MICHAEL ROGERS	784-2958	mikerogerscciwa@aol.com
10.	Mark Downey	888-1177	mdowney@contactcei.com
11.	Jerry Cosby	788-4554	spotlight@indyweb.net
12.	[illegible]	783-1274	
13.	Anna Chase	357-4539	chase@tcon.net
14.	Dan Chase	357-4539	" " " "
15.	JOHN KIEL	887-9342	jkiel@comcast.net
16.	SRINI VALLABHANENI	581-9585	VALLABHANENIS@CDM.COM
17.	LORI WEISS	496 8498	
18.	LORI McLaughlin	357-2144	tmclaughlin@indy.rr.com

Confidential intraoffice memorandum for discussion and deliberative purposes

	Name	Telephone	Email
18.	Scott Wallace	317-238-0080	
19.	Jo Coleman		jorcoleman@sbcglobal.net
20.	MARK WALLBOM	317 293-0278	mark.wallbom@millerpipeline.com
21.	Dennis Clark	328-8876	indyclark1@netdirect.net
22.	Scott Girman	298-9255	caritagir@aol.com
23.	Brandon Miles	635-3013	
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Attendance Record

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Date: October 19, 2004

Time: 7 p.m.

Location: Julia Carson Government Center, Room A

Workshop: Raw Sewage Overflow Public Meeting

	Name	Telephone	Email
1.	Felix McDaniel	317-926-2978	X
2.	Jamie + Amanda Rickard	927-9342	X
3.	John Kyple	251-8169	jkyple@hnth.com
4.	Rick Erhardt	594-3720	rerhardt@pirnie.com
5.	Tricia Banta	327-4805	tbanta@indygov.org
6.	Linda Minder	923-2934	
7.	Al Polin	926-7794	
8.	Leon Bates		
9.	Jennifer McGlone		
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	Name	Telephone	Email
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Attendance Record

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Date: October 21, 2004

Time: 6 p.m.

Location: Christamore House Auditorium

Workshop: Raw Sewage Overflow Public Meeting

	Name	Telephone	Email
1.	Mike Massarone	317 633-4120	mmassarone@dlz.com
2.	Dick Weigel	317-347-3663	dweigel@hwcengineering.com
3.	Richard A. Condre	227-7165	rcondre@cmtengr.com
4.	Art Umble	574-293-2572	ajumble@juno.com
5.	Ron Sanders	327-8415	RSanders@IndyGov.org
6.	Glenn Pratt	253-7061	pratt@netdirect.net
7.	Merri Anderson	2419647	anderson@mcoanindy.org
8.	Janice McHenry	298-5285	jfmchenry@iquest.com
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Attendance Record

INDIANAPOLIS CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Date: October 25

Time: 7 p.m.

Location: Brookside Park Auditorium

Workshop: Raw Sewage Overflow Public Meeting

	Name	Telephone	Email
1.	OTTIS GUFFEY	631-7825	
2.	IVA GUFFEY	631-7825	
3.	Alivine Williams *Joyce VANDEMAN	784-1623	
*4.	Barb Schwarenberg	638-9166	
5.	Marge Kuroitt	638-3706	
6.	Delma Matthew	357-9976	
7.	Vola Brummitt	726-0248	
8.	Patrick Kaefler	312 353-6268	
9.	Jim Ku	317-636-4682	
10.	DENVER DUTTON	317 251 5061	
11.	MAE DUTTON	317 251 9061	
12.	Ferry Anderson	(317) 638-6484	
13.	Nofee Miles	636-4075	
14.	KATHY SINER	266-9453	ksiner@iupui.edu
15.	Phyllis Zimmerman	357-6392	
16.	STEVE WICKWANGER	357-6312	Swickwanger@yahoo.com
17.	DON ZESSIN	639-2089	

	Name	Telephone	Email
18.	John + Judy Coe	356-1327	jcoen9lfl@prodigy.net
19.	Josh Bowling	264-8288	jbowlin1@indygov.org
20.	David Mohler	823-3150	dmohler@contactcei.com
21.	Leon Bates		
22.	Ken Moran		
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Date: October 25

Time: 7 p.m.

Location: Brookside Park Auditorium

Workshop: Raw Sewage Overflow Public Meeting

	Name	Telephone	Email
1.	Tim George	780-7250	TGeorge e RWA.com
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5.	FRANK WATSON	2669345	FRANK@WOVENHAND.ORG
6.	Barbara Black	638-1572	
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Attendance Record

INDIANAPOLIS CLEAN STREAM TEAM
151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Date: October 26, 2004

Time: 7 p.m.

Location: Riviera Club

Workshop: Raw Sewage Overflow Public Meeting

	Name	Telephone	Email
1.	Karl Tanner	255-2578	Tanner005@SBCGLOBAL.NET
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8.	Helen Carroll	255-5148	hcarroll@mibor.net
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10.	Ruth P. Hayes	253-9191	8565 No. Penn. St. 46240
11.	Audrey Smith	257-6432	
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	Name	Telephone	Email
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28.	Gary Moody		GARYX@COPPER.NET
29.	MARK Smith	833-1001	
RR septic? → 30.	Daniel Axler	233-7126	daxler@onemain.com
31.	Ruth Ann Ingraham	253-3863	
32.	Karen Frank	2573323	
33.	Pat Spence	722-0429	pspence@hnttb.com
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Attendance Record

INDIANAPOLIS CLEAN STREAM TEAM
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Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Date: October 26, 2004

Time: 7 p.m.

Location: Riviera Club

Workshop: Raw Sewage Overflow Public Meeting

	Name	Telephone	Email
1.	Dona Wenderitch	298-4937	
2.	MICHAEL ARNOLT	926.2766	
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4.	Howard Creveling	283-4514	
5.	Brett Barber	658-6309	
6.	CORNELL BURRIS	568-1384	CORNELLBURRIS@AOL.COM
7.	Bloom, Ruth + Mel	259-7694	
8.	Floyd Essink	253-3136	
9.	Hannah Essink	253-3136	
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13.	TODD RUTLEDGE	710-5586	
14.	Annette Namias	259-7188	snamias@iupui.edu
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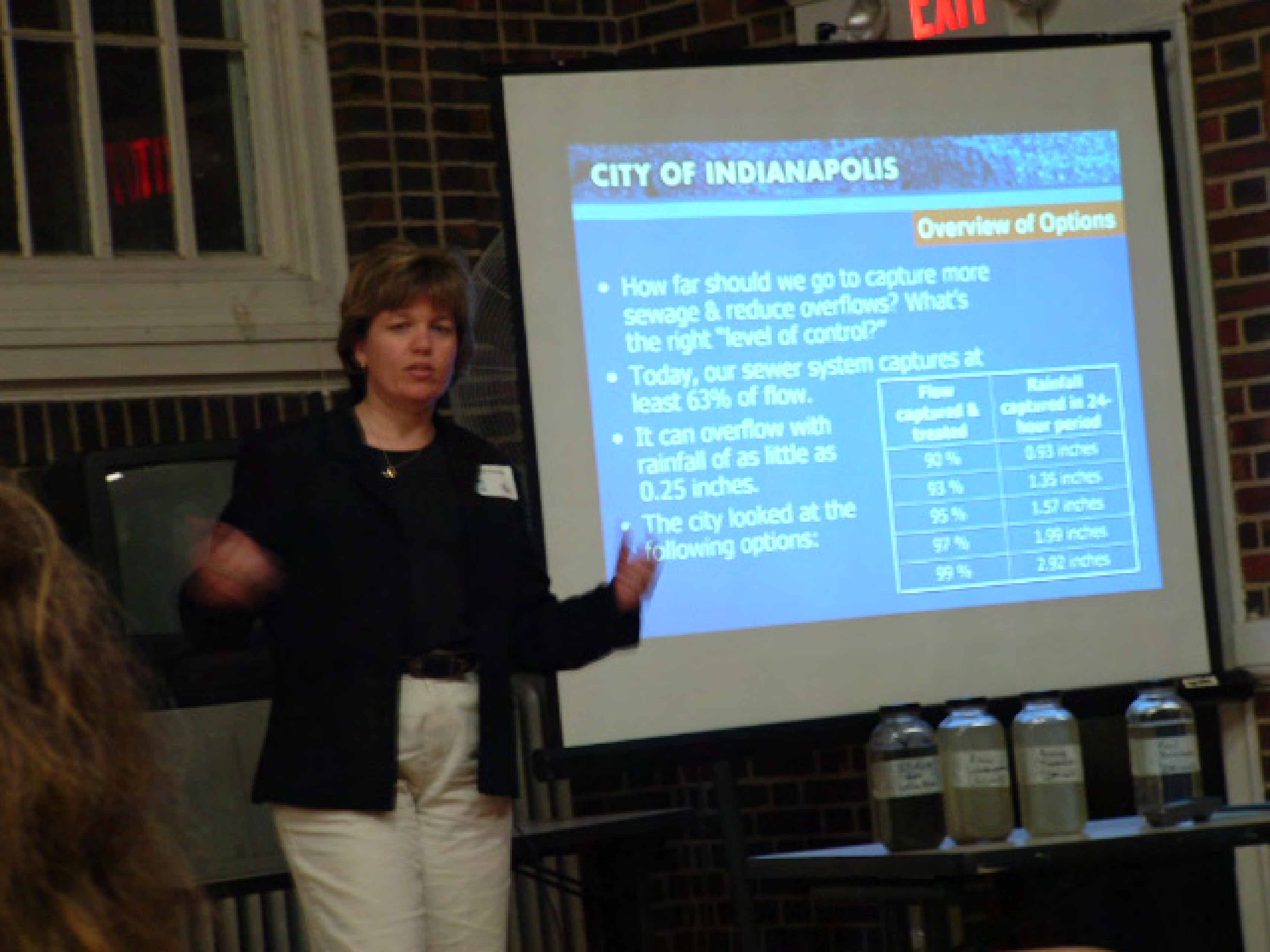
17.	CHRIS RAUH	251-0466	[illegible]@[illegible].com


EXIT
CITY OF INDIANAPOLIS
Overview of Options
How far should we go to capture more sewage & reduce overflows? What's the right "level of control?"
Today, our sewer system captures at least 63% of flow.
It can overflow with rainfall of as little as 0.25 inches.
The city looked at the following options:
Flow captured & treated
Rainfall captured in 24-hour period
90 % 0.93 inches
93 % 1.35 inches
95 % 1.57 inches
97 % 1.99 inches
99 % 2.92 inches

Memorandum

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Date: 10/15/04

To: Jodi Perras

From: Amanda Craft

Subject: Questions from Pleasant Run Watershed Meeting 10/14/04

EPA /IDEM Regulatory Issues

- Where do we stand on the EPA permits?

Answer: IDEM issued the city new National Pollution Discharge Elimination System (NPDES) permits for the Belmont and Southport Advanced Wastewater Treatment facilities on December 1, 2001. Portions of those permits have been appealed but the city is moving forward to meet the permit requirements.

- Aren't there deadlines associated with those permits—early action projects that were to be completed on a schedule?

Answer: No. Schedules for projects will be contained in the final Long-Term Control Plan. The city's current permits only require preparation of the plan, not implementation of raw sewage control projects.

- Have IDEM and EPA told you where they want the numbers to come in regard to dollars and capture amounts?

Answer: During negotiations with EPA and IDEM, the regulatory agencies have suggested that we evaluate approximately 96% capture on the White River, Pleasant Run, and Eagle Creek and 98% capture on Fall Creek and Pogues Run. This plan would cost approximately $2.05 billion if implemented over a 20-year timeframe. They are interested in public input on this level of control.

Raw Sewage Overflows

- What is the extent of the sewer overflows—where are they?

Answer: The city's combined sewer area is mostly located within the old city limits. The city's combined sewer system has 132 overflow locations located mostly along White River, Fall Creek, Pogues Run, Pleasant Run, and Eagle Creek.

- How long does an overflow last—a week, a day?

Answer: Typically, sewer overflows last for 1 to 2 days after a storm. The exact time an overflow lasts depends upon the amount, intensity, and duration of the rainfall, as well as whether or not rain has fallen recently and soils are already wet.

- Does each overflow point overflow every time?

Answer: No. Because rain does not fall evenly across the city, it is possible that some outfalls may be overflowing while others are not during a storm event.

- Are you making the assumption that rainfall will be the same across the county when calculating overflows?

Answer: Yes. While we recognize that rainfall does not fall uniformly across the county most of the time, our planning assumes that it does in order to establish a worst case scenario for controlling overflows..

Early Action Projects/Completed Projects

- How much of the early action projects are complete?

  Answer: Projects already built by the city are reducing overflows by as much as 5 million gallons with every rainfall. In May 2004, the U.S. Environmental Protection Agency and Indiana Department of Environmental Management approved the city's request to continue ongoing projects and move forward with additional projects worth more than $475 million. When fully completed, these projects will:

  - *Reduce overflows at the city's two advanced wastewater treatment plants by more than 2 billion gallons per year, on average.*
  - *Reduce overflows in our neighborhoods by another 2 billion gallons per year, on average.*
  - *Cut average annual raw sewage overflow volumes nearly in half from levels when Mayor Peterson took office in 2000.*

- What is the purpose of the storage basin at I-70 and Emerson?

Answer: This basin provides flood protection for properties along Pogues Run and helps reduce sewage overflows. During rainstorms, excess water that could flood basements or streets is directed toward this basin for temporary storage until after the rain is over.

- Does the storage basin at I-70 and Emerson hold sewage overflows?

Answer: No. The basin is upstream of all Pogues Run sewage overflow points.

Technology/Plan Development

- Does a tunnel serve as a storage tank? Isn't that a really expensive option?

Answer: Yes, in essence a tunnel acts as an underground storage tank. Tunnels are typically a more cost-effective type of storage solution when employed in urban areas such as Indianapolis. Above ground storage tanks are not feasible control solutions due to the large overflow volume that must be controlled, the lack of available land to construction large above ground tanks, disruptions to neighborhoods, aesthetic and odor issues, etc.

- What effects will the plans have on the scouring of the sewer system? Will you be able to maintain flow so the solids don't build up in the sewers?

Answer: The proposed plans will not impact the quantity of flow carried by existing interceptors, so scouring and solids buildup will remain the same. The new facilities will capture overflows form existing sewers and route the flow to new collection sewers, which will send flows into the storage tunnel.

- How would you increase flow to streams?

Answer: The city is looking at several options to increase base flow in local streams. One option is modification of existing dam structures along Fall Creek and White River. Another option might be pumping highly treated water from the Belmont Advanced Wastewater Treatment facility and distributing it to Pleasant Run, Pogues Run, and Fall Creek. Another option would involve working with the water company to reduce water withdrawals on Fall Creek. While the city has not made a decision at this time, providing additional base flow to local streams is an important step in improving water quality.

- Can the plants handle the increased flow from increased capture?

Yes, they will. The city is adding treatment capacity to both the Belmont and Southport treatment plants to handle the increased flow. Currently, both plants have enough capacity to provide a primary level of treatment of flows. New facilities will provide additional secondary (biological) treatment capacity.

- Do you have to stop treating the stormwater in Plan 3 or could you also capture and treat it?

Answer: Storm water captured under Plan 3 (total sewer separation) would be directed to local streams. This flow would receive some level of treatment through the use of best management practices. However, storm water flows would not receive treatment at the city's Advanced Wastewater Treatment facilities.

- Will there be multiple pipes running into the tunnel(s) under Plans 1 and 2?

Answer: Yes. Plans 1 and 2 incorporate collection sewers that will carry captured flows to the storage tunnel.

- Is the city currently using pinch valves?

Answer: Yes. The city has two pinch valve installations, one at 10th Street and White River and one at Morris and Meikel Street. These valves are used to redirect flow from a full interceptor sewer to nearby interceptors that are not full.

- Does upstream mean incline and downstream mean decline?

Answer: Typically, yes. Water flows in our streams from higher elevations to lower elevations in the county.

- Are you thinking about the future and expansion? What about growth?

Answer: Yes. Our long-term plan accounts for additional growth within Marion County over the next 20 years.

- How long will these projects take?

Answer: The city is considering a 20-year implementation schedule for constructing all of the projects. The project schedule must be negotiated and agreed upon with state and federal regulatory agencies.

Costs/Rates

- Are the costs based on receiving no help from the government in the form of grants?

Answer: Yes. All costs assume that ratepayers will bear the full burden of paying for required improvements. We will be pursuing federal grants through our representatives in Congress.

- Is there a guess about how much grant money we may receive?

Answer: No. Currently there are no federal or state grants available to help pay for overflow controls. Some communities have received assistance from the federal government through line-item appropriations in Congress. The city is aggressively lobbying our federal and state lawmakers for help so we can keep sewer rates affordable for our ratepayers.

- Is there a minimum sewer charge for residents?

Answer: Yes. City Ordinance establishes a minimum monthly charge to non-industrial customers of $6.40.

- Do sewer rates represent the average countywide?

Answer: Yes. Sewer rates are the average amount a homeowner would pay each month for 7,000 gallons of usage.

- How will the rates of surrounding communities be affected?

Answer: The city provides wastewater treatment services for Beech Grove, Greenwood, Lawrence and a few other communities through legal agreements. As each of these agreements are scheduled for renewal, the city will negotiate with them to help cover these costs.

- Do these costs also represent getting rid of septic systems in the county?

Answer: The costs shown only represent the city's portion of accelerating the septic conversion program from 60 years to 20 years. These costs include planning, engineering, and construction inspection. Costs associated with constructing new sewer facilities will still be borne by individual homeowners and are not included in our cost estimates.

- How will the rates go up over time?

Answer: Rates will increase gradually over time. Actual rate increases will be dependent on the overall plan selected, implementation schedule, and availability of grants and low interest loans from the federal and/or state government. For example, rates would increase approximately 7% per year over 20 years for a $1.7 billion control plan. Other rate increases will be necessary to fund additional infrastructure projects within the same 20-year period.

- Will there be assistance for lower-income families?

Answer: Unfortunately state law requires that sewer rates be applied evenly across all ratepayers regardless of one's ability to pay. The city is very concerned about the effects that the plan will have on all ratepayers, especially those with low or fixed incomes. We will continue to seek ways in which to reduce the overall cost of the final plan so that it remains affordable to all residents.

- How much of the current projects are figured into the cost?

Answer: The cost of the city's early action projects is included in the overall cost estimates.

- Is there a provision to charge the worst offenders under any of the plans?

Answer: No. Stormwater, the primary "offender," overwhelms the system -- causing overflows 45 to 80 times a year. We all need to share the burden of paying for this to ensure waterways are improved for those who come after us.

Septic Systems

- Will neighborhoods with septic systems have sanitary/separate sewers under these plans?

Answer: Yes. When septic systems are converted, separate sewers are installed for sanitary flow and storm water.

- Do these costs also represent getting rid of septic systems in the county?

Answer: The costs shown only represent the city's portion of accelerating the septic conversion program from 60 years to 20 years. These costs include planning, engineering, and construction inspection. Costs associated with constructing new sewer facilities will still be born by individual homeowners and are not included in our cost estimates.

Inflow and Infiltration /Illegal Connections

- How would you correct an illegally connected sump pump?

Answer: Sump pumps should be drained into the yard instead of the sanitary sewer system.

- Won't creating more urban run-off (disconnecting illegal connections) make the problem worse?

Answer: No. Disconnecting illegal connections will reduce the amount of clear water that is entering existing sewer systems. This clear water takes up valuable capacity during storms, which in turns leads to increased overflows. In addition, storm water from roof drains or ground water from sump pumps could actually be cleaner after flowing across grassy areas that help remove harmful pollutants.

- Are you going to fix the inflow and infiltration problems upstream?

Answer: The city actively seeks out and addresses the problem of clear water inflow and infiltration in the upstream, separate sewer areas.

- If you live on a creek bank, will disconnecting your sump pump wash out the creek bank?

Answer: Not if the disconnection is done properly. There are several methods that can be used to help ensure that disconnected roof drains and/or sump pumps do not have a negative impact on surrounding stream banks.

Miscellaneous

- How much digging will there be along Bean Creek?

Answer: There will be some digging along Bean Creek and other waterways in order to complete the city's proposed plan. However, the city will employ numerous construction methods to help minimize the impacts on the creek (erosion controls, microtunneling, etc).

- Is this doable?

Answer: Yes. This is a challenge the city can and must address. The alternative would be to send millions of dollars in fines to Washington and the state's coffers. We'd rather spend our money here fixing our water quality problems.

Memorandum

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Date: 10/20/04

To: Jodi Perras

From: Deana Haworth

Subject: Questions from Fall Creek Watershed Meeting 10/19/04

EPA /IDEM Regulatory Issues

- Can the remote treatment plants be permitted?
- *Answer: The city believes that the necessary permits could be obtained from IDEM to construct and operate the remote treatment plants.*
- What is the regulatory requirement on capture?
- *Answer: Because sewer overflow costs and impacts vary in each community, regulatory agencies may require more or less control in different communities or on different waterways. Some U.S. waterways have been allowed an average of 6 overflows per year, others 4, and others 2 or fewer. These numbers are averages, and may vary depending on rainfall during a particular year. During negotiations, the U.S. Environmental Protection Agency has suggested we should evaluate additional levels of control, including different levels of control on the White River and the smaller streams. An example would be that we achieve an average of 3 overflows per year for White River, Pleasant Run and Eagle Creek, and 2 per year for Fall Creek and Pogues Run. This was not necessarily a final position on EPA's part. They are interested in public input on this level of control.*
- As you are negotiating with IDEM and EPA, is there any guarantee that EPA and IDEM will accept our chosen plan?
- *Answer: The city's negotiations with EPA and IDEM continue to move forward in a positive manner. We plan to continue these negotiations in order to obtain agreement from both regulatory agencies on the final plan prior to submitting it to them.*
- Why wouldn't we just focus our efforts on watersheds we control? It sounds like IDEM and EPA are making Indianapolis responsible for the quality of streams that

start far above us. Do we assume that all of the communities above us will be responsible for meeting the same standards we are?

- *Answer: The city is responsible for the impact of our sewer overflows on streams within Marion County and downstream of us. The state is responsible for enforcing these requirements on other communities upstream of Indianapolis. Those communities will also be required to do their part.*

Choosing an Option

- Are we choosing an option we want for our watershed or for the entire city?
- *Answer: The various plans presented are for the entire city. While different types of control measures may be used in individual watersheds, the overall plan addresses combined sewer overflows citywide.*
- When you are asking us to rank the neighborhood impacts, I might rank siting concerns higher if I knew a facility would be built right next to my house. How do we make these decisions? I would probably be OK with some noise, but not with a constant screeching. How do I indicate that?
- *Answer: When rating neighborhood impacts, we want to know which impacts cause you the most concern. While the noise, odor, etc. may vary for a particular option, we are most interested in which of these impacts, in a general sense, is the most offensive to you and which are the least.*

Raw Sewage Overflows

- You talk about removing 4 billion gallons of sewage in a year. What is that in comparison to?
- *Answer: The city's combined sewer system currently discharges an average of 7.87 billion gallons of raw sewage into local streams on an annual basis. We predict that the early action projects underway throughout the city, once complete, will reduce that average by 4 billion gallons each year. That includes 2 billion gallons at the treatment plants and 2 billion gallons in our neighborhoods.*

Costs/Rates

- If we have a lot of pressing issues facing the city like fire pensions, a new stadium for the Colts, etc. and we know we will never swim in the White River, can't we just say forget it? Is all this really worth it?
- *Answer: Federal and state law and regulations require the city to address this problem. Ignoring the problem would lead regulatory agencies to levy large fines against the city. We feel that our money should be spent on projects here to correct the problem rather than sending fines to Washington. Our goal is to prevent sewage overflows in all but the largest storms, since people aren't swimming or wading during these large rainstorms. Correcting the raw sewage overflow problem is necessary to protect human health, foster economic development, and improve quality of life. If Indianapolis is to remain a world-class city, we must do the right thing and fix this age-old problem.*

Miscellaneous

- I've heard that Fall Creek starts in Anderson. Is that true? Do we get a compilation of items and pollution from Anderson to Indianapolis? Where does the major portion of the pollution come from?
- *Answer: Yes, the upper reaches of Fall Creek start near Anderson. Pollution does enter Fall Creek at many different locations upstream of Indianapolis. Our water quality is impacted by a combination of upstream pollutants plus the pollutants entering the creek within Marion County. These pollutants come from sources such as raw sewage overflows, storm water runoff, etc. The single biggest source of bacteria entering Fall Creek comes from our raw sewage overflows.*

Memorandum

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Date: 10/22/04

To: Jodi Perras

From: Deana Haworth

Subject: Questions from Eagle Creek Watershed Meeting 10/21/04

EPA /IDEM Regulatory Issues

- How much of this can we get done? Isn't this an uphill bureaucratic fight? No matter what plan we come up with, EPA and IDEM will make us come back again.
- *ANSWER: We can and must reduce raw sewage flowing into our streams. Besides being a federal and state regulatory requirement, cleaning up our waterways is the right thing to do. Once implemented, the long-term control plan will improve the water quality in our local streams, reduce the potential for people being exposed to raw sewage, improve wildlife habitats, and help Indianapolis remain a world-class city.*
- Since the federal criteria talks about six overflows per year, can we have six overflows per year and use the rest for septic conversion?
- *ANSWER: The U.S. Environmental Protection Agency's Combined Sewer Overflow Policy (April 19, 1994) states that a program that allows "no more than an average of four overflow events per year" is presumed to provide an adequate level of control to meet the water quality based requirements of the Clean Water Act. While the guidance also states that "the permitting authority may allow up to two additional overflow events per year," EPA typically considers four overflows per year to be the minimum overflow frequency for long-term control plans throughout the United States.*

Choosing an Option

- There is a concern on a major storage area being in the wellhead protection area due to the potential for fracture and contamination. How is that concern being addressed?

- *ANSWER: The Department of Public Works and Indianapolis Water will be working together to address this important issue and to ensure that storage facilities do not impact our drinking water supply.*
- When you list noise and security, are those during construction? There would be minimal noise during operation, I assume.
- *ANSWER: Noise and security can be both construction and operation issues depending upon the plan selected. For example, remote treatment facilities constructed as part of Plan 2 would have potential noise and security issues after construction is completed.*
- You are using the term swimmable. If that is the case, then wildlife can't live in the streams since in order to be swimmable, you have to add chlorine to the water and you would kill the wildlife there.
- *ANSWER: "Swimmable" is a term used by EPA and IDEM for swimming beaches in natural waterways, not swimming pools. The term swimmable does not mean we would have to add chlorine to local receiving streams in order to meet the regulatory definition. However, it is one standard against which we can measure improvements in water quality.*

Raw Sewage Overflows

- How will septic issues be addressed under these plans? Will the city take up more of the costs associated with the septic conversion projects?
- *ANSWER: The plans presented include provisions for acceleration of the city's septic conversion program. This accelerates the original 60-year completion schedule to 20 years. Septic conversion costs in our plans include the city's costs for planning, engineering, and construction inspection. Costs associated with constructing new sewer facilities will still be borne by individual homeowners. However, the city has taken steps in recent years to make payments easier and to ensure that no one will lose their home as a result of new sewers in their neighborhood.*

Costs/Rates

- Are there federal grants available that can help Indianapolis deal with these costs? Can we bring some money back from Washington?

- *ANSWER: There is a low interest loan program, but currently there are no federal or state grants available to help pay for overflow controls. Some communities have received assistance from the federal government through line-item appropriations in Congress. The city is aggressively lobbying our federal and state lawmakers for help so we can keep sewer rates affordable for our ratepayers.*
- What happens to the rates at the end of 20 years?
- *ANSWER: Rate increases will help the city pay for money that it must borrow in order to pay for the construction projects. The payback period of these loans is unknown at this time, but will most likely extend beyond the 20-year implementation period. Once all loans have been repaid, city decision-makers at that time will need to decide whether sewer rates can or should be adjusted.*
- We have a lot of people who are on fixed incomes as well as families and businesses that can't afford this. How will people afford these increases?
- *ANSWER: Unfortunately, state law requires that sewer rates be applied evenly across all ratepayers regardless of one's ability to pay. The city is very concerned about the effects that the plan will have on all ratepayers, especially those with low or fixed incomes. We will continue to seek ways in which to reduce the overall cost of the plan so that it remains affordable to our residents.*
- How many people in the city know this is happening?
- *ANSWER: The city publicized these meetings through press releases, advertisements in neighborhood newspapers, flyers in more than 250 locations, mailings, and emails. However, we cannot control what the local news media decide to print or broadcast. We are working with them to continue to publicize this issue.*
- Since we pay for water and sewer jointly, has any thought been given to making funds or incentives available to those who install low water usage toilets and conserve water in other ways? Or education programs to educate people on how to bring their water bill down?
- *ANSWER: The city continues to look for innovative ideas to solve this problem and help ensure that water and sewer rates remain affordable. We welcome public input on this critical issue.*

Memorandum

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Date: 11/4/04

To: Deana Haworth

From: Jodi Perras

Subject: Questions from Pogues Run Watershed Meeting 10/25/04

Choosing an Option

- Where will the storage tank at Spades Park be located?

  ANSWER: A final location for the underground storage tank has not been determined. The city is considering locations in Spades Park and some vacant land nearby.

- Are there plans to put in a walkway and bike trail along Pogues Run as part of this project? Will other improvements be made as part of these projects? Can we structure the work so other things (putting bathrooms in parks, bank restoration, etc.) can be done at the same time?

  ANSWER: While we cannot promise at this time that specific neighborhood improvements will be made, the city will meet with neighborhood residents during the design phase of each project to look at local concerns and needs.

- Why are we proposing sewer separation in areas where the problem is not the worst?

  ANSWER: The Plan 1 and Plan 2 options propose sewer separation to eliminate overflows in isolated locations. Our goal is to use sewer separation to eliminate overflows in upstream locations and along isolated small streams such as State Ditch and Lick Creek, where only one or two overflow points exist. Sewer separation is less attractive and not cost-effective in areas where there are multiple overflow locations and many acres of sewers that would have to be separated.

Raw Sewage Overflows

- How will the chosen plan impact neighborhoods with flooding and sewage backups?

  ANSWER: During facility planning and design, the city will meet with neighborhood *residents to identify flooding and sewage backup problems and determine whether or not they can be addressed through these projects.*

- What is the purpose of the containment pond in Brookside Park? Am I correct in understanding that when overflows come into the containment pond we are putting sewage in the pond? If so, when water drains out, what happens to that sewage and how long does it take for it to decompose?
  ANSWER: The containment pond in Brookside Park is a flood control basin built to capture flooding from very large storm events. The basin would hold floodwaters that overflow from Pogues Run. This water would be contaminated by urban runoff and sewage, and would drain back into Pogues Run as floodwaters recede. Without the flood control basin these contaminated waters would flood people's homes and streets and cause significant property damage and health risks, particularly in the Cottage Homes neighborhood.

Water Quality

- Does treated water released into the White River meet drinking water standards or swimming standards when it leaves the treatment plants?
  ANSWER: The treated water discharged from the city's treatment plants receives three levels of treatment. Although it does not meet drinking water standards, it is disinfected during the recreational season to meet swimming standards.
- Can we use dry wells to hold stormwater on people's property and recharge aquifers?
  ANSWER: Where roof drains and gutters are illegally connected to the sewer system, the city requires that property owners disconnect those illegal connections and direct the stormwater into their yard. This will eliminate or delay clear water flowing into city sewers. In locations where the stormwater causes ponding in your yard, a dry well may help improve drainage. Widespread implementation of dry wells in private yards to address the sewer overflow problem would be very difficult in a city of our size. It also may cause pollution of groundwater used for drinking water.
- Can we address stormwater drainage through dredging to make the streams deeper?

ANSWER: Historically, communities used dredging and improved channel configurations to improve stormwater drainage. Today, however, we know that dredging and channelization can have very negative impacts on downstream flooding and in-stream aquatic life. Regulations now prohibit most dredging/channelization projects for stormwater drainage.

Technology

- Are there any other inflatable dams or other types of dams along Pogues Run between Brookside Park and the White River?
  ANSWER: Currently, there is one inflatable dam in the sewer system along Pogues Run, in Brookside Park. This rubber dam helps reduce sewage overflows from a large pipe that overflows into Brookside Park. Elsewhere in the city, three inflatable dams are located along Fall Creek near 32nd Street, 34th Street, and Capitol Avenue and two are located on Pleasant Run near Ellenberger Park and Howe Middle School.
- Have we looked at pumping treated water into our tributaries?
  ANSWER: One option being considered to increase flow in Pogues Run, Pleasant Run and Fall Creek would involve pumping highly treated water from the Belmont Advanced Wastewater Treatment Plant. However, additional analysis and public involvement is needed before this option is pursued.
- With the remote treatment option, would this be an actual plant that makes noise?
  ANSWER: If the city were to select Plan 2, the remote treatment plants would be small plants that operate only during and after wet weather. They would occupy about an acre of land and would treat stormwater and sewage captured in the underground tunnel. These facilities could cause some noise during operation, such as from pumps and truck traffic.
- Would these plants be designed not to smell? What are the contingencies?
  ANSWER: All facilities would be designed to eliminate or minimize any smells. However, the city would include contingency plans to address any strong odors that may result from building one of these facilities.

- Is removing contaminated sediment from the streams and rivers a definite part of the plan?
  ANSWER: No matter what plan is chosen, the city will need to clean up contaminated sediments from some areas of our streams.
- What is the projected lifetime of the solution and the facilities suggested in these plans?
  ANSWER: Service life varies depending on type of facility. For the proposed plans the following assumptions have been used:
  - *50 years for tunnels and underground piping*
  - *40 years for buildings and other permanent structures*
  - *10-20 years for tanks, pumps, electrical and other equipment*

Memorandum

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
Fax (317) 327-8699

Date: 11/5/04

To: Deana Haworth

From: Jodi Perras

Subject: Questions from Riviera Club Watershed Meeting 10/26/04

EPA /IDEM Regulatory Issues

- Is it true that these three options were originally formulated in 1991? If there has been a 10-year lapse, maybe the information needs to be updated?
  ANSWER: The city first began to study this problem in 1991. Necessary information has been updated in recent years to develop the three plan options.
- You have a wastewater problem and a stormwater problem. The EPA could come down in a few years and say that you can't have any overflows. What will we do then?
  ANSWER: We have designed the options so they can be built upon later to address new regulatory requirements. We also will be seeking a revision to water quality standards during the largest storm events when overflows cannot be controlled.

Choosing an Option

- With plan 3 there was a mention of adding ponds and the pretreatment of stormwater. When you are taking into account wildlife health, were you considering habitat that would be created by these ponds?
  ANSWER: We considered the additional habitat for wildlife, but the increased stormwater load caused by sewer separation is expected to have a more negative impact on habitat in the streams compared to the other two options.
- Are there optimal options for different parts of the city and have those been identified?
  ANSWER: Plan 1 and Plan 2 include a specific plan for each watershed,

based on the characteristics of that watershed and the most cost-effective solution. For example, a deep storage tunnel is proposed for Fall Creek due to the high volumes of overflows, while new relief sewers are more cost-effective for Pleasant Run and Eagle Creek because overflow volumes are smaller. Sewer separation is proposed in some neighborhoods to eliminate isolated overflow locations.

- You mention implementing flood control projects, what about preserving our flood plains and floodways from development?
  ANSWER: This program focuses on how we can reduce sewage overflows into our streams. Your question about development in flood plains is important, but not directly related to this issue.

Rate Increases

- Is some of the money collected for sewers being use for fire and police pension fund? Why is this money being diverted when we need work on the sewers?
  ANSWER: The city's 2005 budget took out a one-time loan of $10 million from the Sanitary District to enable the continuation of essential police and fire services. This was required to balance the city's budget in trying times. The city is committed to repay the loan in eighteen months.

- Did you assume that the users or residents will pay for the entire cost?
  ANSWER: The rate projections provided assume the worst-case scenario: that all revenues will be raised from local sewer rates. However, the city will aggressively pursue federal and state funding to reduce the costs to ratepayers.

- My experience with user fees is that they don't increase with inflation. Has anyone looked at inflation?
  ANSWER: The projected rates at the end of 20 years include the cost of increases due to *inflation over time.*

- When would we start these projects and when would we start to see rate increases?
  ANSWER: Projects are already underway and will continue for 15-20 years. The first rate increase took place in 2001 to fund the initial projects. We expect another increase to be required in 2005.
- Will the cost recovery to do this be distributed over the combined sewer area or is it over the entire county?
  ANSWER: The costs of improving our sewage collection system and treatment plants are shared by all sewer system users.

Raw Sewage Overflows

- Is the overflow just outside the Riviera Club the northernmost one on White River?
  ANSWER: Yes. There are three overflow locations in that area, and all will be addressed through the improvement of the existing storage facility at the Riviera Club.
- I live in Meridian Kessler area. When can I expect something to happen to address sewage overflows and basement backups in my neighborhood?
  ANSWER: The storage facility project near the Riviera Club is currently scheduled for completion in early 2010. This facility is intended to store CSO flow and reduce raw sewage overflows in the area near Meridian and Kessler. In most residential areas, the best method for reducing basement backups is disconnecting downspouts and sump pumps that are connected to the sewers. The city will be launching a Correct Connect program to address this problem in the near future.
- When you look at runoff from streets in comparison to disconnecting downspouts, are you working with the planning department to lessen the kind of development that will increase the pollution on storm drains?
  ANSWER: In recent years, the Department of Public Works implemented new stormwater design standards that require developers to include basic stormwater treatment when they disturb greater than one-half acre of land.

These standards address both stormwater flow and water quality from development projects.

Septic Systems

- What impact do the old septic systems have on this problem?
  ANSWER: Failing septic systems cause significant water quality problems in Marion County. Indianapolis has one of the highest concentrations of homes served by septic systems of any large city in the country. In many cases these septic systems are failing or have failed, causing health hazards in neighborhood ditches and streams. A septic conversion program is underway to take 18,000 families off septic systems in the next 20 years.
- Is the city considering using another approach than the Barrett Law to disconnect from septics? For the areas where a main is not available, what will happen?
  ANSWER: The city currently uses the state's Barrett Law to apportion the cost for septic conversion projects. The city pays the cost of design, land acquisition and inspection, while the property owners pay for the construction costs and the cost of connecting to the new sewer. There have been discussions in the City-County Council about changing this system. For now, we are assuming that the Barrett Law system will remain.

  In situations where mains are not near a septic area a raw sewage pumping station and force main can be constructed to pump collected sewage over the distance necessary to reach an existing gravity sewer main. This can be accomplished economically over a distance of several miles.

Downspout Disconnection

- You mention disconnecting downspouts as one of the things we can do to reduce raw sewage overflows. If we do this, isn't this water going to end up in the sewer system and will this cause flooding in the streets or above ground?
  ANSWER: The primary benefit of disconnecting downspouts is that the ground will soak up a significant amount of the clear water. At some point the ground will become saturated and the remaining clear water will migrate to the street, but the total amount of clear water will be

significantly less than when the downspouts are directly connected to the combined sewer.

Technology

- With all the digging and construction that has to go on, is it possible to lay pipes in waterways to take care of some of the overflows? It seems like it would be less disruptive.

  ANSWER: Laying pipelines in the waterways is possible, although it is not practical and has multiple drawbacks, such as:
  - *The pipes required for this project are anticipated to range from 6 feet to 12 feet in diameter, making installation in the stream very costly and disruptive to the watercourse.*
  - *Future access for maintenance activities like inspection and cleaning would be difficult, costly and impractical.*
  - *Over time, scouring by the flow in the stream could remove the cover over the top of the pipe and lead to catastrophic failures, which are difficult and expensive to repair*
  - *As the pipe ages there is a greater likelihood of leakage into the line*

Stream Line
City of Indianapolis / Department of Public Works / Clean Stream Program
Winter 2005 | Issue 5

Inside This Issue

Statement Of Purpose

The Indianapolis Clean Stream Team is overseeing many projects to keep raw sewage out of our waterways and improve the quality of life in our neighborhoods. Stream Line is published quarterly to keep you informed about the city's progress in reducing raw sewage overflows and restoring the health of our streams.

Contact Info

Send letters to:
Indianapolis Clean Stream Team
Attn: Jodi Perras
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Suite 900
Indianapolis, IN 46204

Tel: 317-327-8720
Fax: 317-327-8699
Email: jperras@indygov.org

INDIANAPOLIS CLEAN STREAM TEAM

Sewer Overflow Hotline: 327-1643

CITIZENS WEIGH IN ON SEWAGE CONTROL OPTIONS

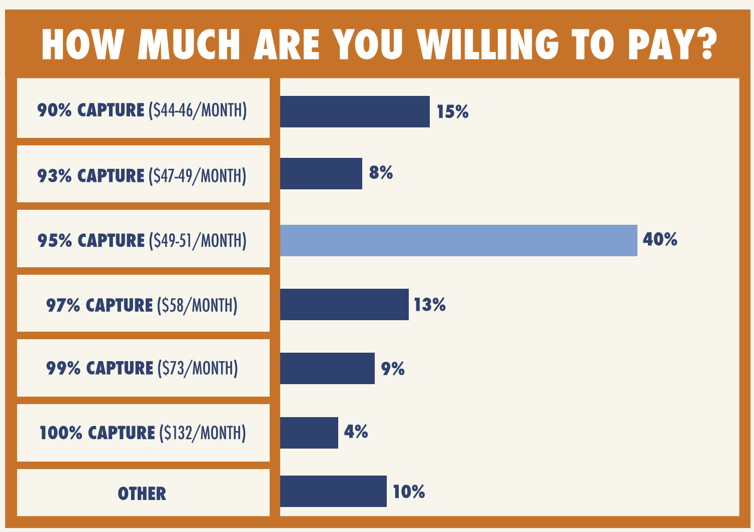
Most popular choice is mid-range option of 95 percent capture

During a series of public meetings in October, the Department of Public Works sought public input on the city's options for reducing raw sewage overflows. The city received 153 responses through public meetings, mail and its Web site.

"We want to thank the citizens for their input, as well as their time and effort, in helping us develop the most effective long-term control plan for reducing raw sewage overflows in our city," said DPW Director Jim Garrard. Partial results are summarized below. For more detailed information and full survey results, visit our Web site at www.indycleanstreams.org.

Cost and Level of Control

The city estimated the impact of overflow control projects on residential sewer rates and asked residents how much they would be willing to pay at the end of 20 years for cleaner waterways. The top vote-getter, with 40 percent of all votes, was 95 percent systemwide capture (costing the average homeowner $49-51 per month at the end of 20 years). Other results are shown below.



Monthly sewer rates are the average homeowner's estimated rate at the end of 20 years. They include today's rate plus the amount needed to fund sewage overflow reduction projects. Other rate increases will likely be needed for other sewage collection and treatment needs.

Priority Areas

In implementing the plan, the city could spend more resources and place higher standards on some streams than others. When asked about this, the largest number of residents (38 percent) wanted to treat all streams the same. Twenty-seven percent wanted to give smaller streams a higher priority than White River and 22 percent would give some streams higher controls if it is cost-effective to do so.

Preferred Plan

Participants were asked to indicate which systemwide plan they prefer. Fifty-nine percent of participants preferred Plan 1 (Storage/Conveyance), 26 percent chose Plan 2 (Storage/Conveyance with Remote Treatment Facilities), and 15 percent chose Plan 3 (Total Sewer Separation).

Negotiations are continuing with state and federal agencies to finalize a plan.

From the Director...

James Garrard
Director of Public Works

Happy New Year to all! In this issue of Stream Line, we are highlighting recent city activities to reduce sewage overflows and improve water quality.

These include:

• Public input on our alternatives for reducing sewer overflows. Since October, city staff and the Clean Stream Team have been talking to groups all over town about our options and getting input on some important policy questions. The results will guide our long-term plan.

• The opening of the 3-million-gallon East Bank Storage Tank, which is reducing millions of gallons of sewage overflows from one of the worst overflow locations along the White River.

• The 2005 debut of our "Correct Connect" program which will educate, encourage and require property owners to disconnect incorrect or illegal sump pump and downspout connections to our sewers.

• A campaign to raise $103,000 from the community to endow an environmental scholarship for a deserving Indianapolis Public School student who participates in Purdue University's Science Bound program.

Our most important goal this year, however, is completing our long-term control plan for improving water quality and gaining federal and state approval of the plan. Watch our Web site at www.indycleanstreams.org for updates on our progress, a draft plan and opportunities for further public comment.

Thank you for your interest in our waterways!

BRIEFS

USGS Releases Biological Study

The U.S. Geological Survey recently released a biological assessment of White River and other streams in the Indianapolis area. Funded by DPW's Office of Environmental Services, the study provides an assessment of stream health in the White River and select tributaries from 1999-2001. The report describes the abundance and diversity of fish and their food sources at 12 sampling locations. Results are compared to previous studies conducted intermittently from 1981 to 1996.

The study found 74 species and 3 hybrids of fish in the White River and its tributaries in the study area. Carps and minnows were the largest group of fish identified, consisting of more than half of all fish collected. The most numerous species was the central stoneroller, which accounted for almost 25 percent of the fish identified.

Results of the study were affected by the December 1999 discharge of toxic chemicals into the White River at Anderson, Indiana. The discharge killed an estimated 117 tons of fish from Anderson to south of Indianapolis. Biologists began restocking various reaches of the river from April 2000 to November 2001. The direct and indirect effect of the toxic discharge on bottom-dwelling larva, snails and other fish food sources was not clear, USGS reported.

The report is available on the USGS Web site at http://water.usgs.gov/pubs/wri/wri034331.

Company Supports Teacher Training

ADS Environmental Services sponsored a recent Team WET Schools curriculum training hosted by John Marshall Middle School. WET stands for Water Education for Teachers, a water-related curriculum correlated to Indiana state standards. ADS supported the purchase of 10 urban water test kits for participating schools. These kits allow teachers and students to assess the conditions of their drinking water or a local creek. ADS also provided lunch for the participating teachers and trainers. The Clean Stream Team thanks ADS for its support of our educational programs.

New Underground Tank Reduces Overflows to White River

Donohue & Associates Vice President Stephen Brinegar (left), Deputy Mayor Carolyn Coleman, DPW Director James Garrard and Donohue & Associates Vice President Jim Miller celebrated the opening of the East Bank Storage Tank. Donohue & Associates were the project designers.

Raw sewage overflows into the White River near downtown reduced dramatically with the October opening of the East Bank Storage Tank.

The 3-million-gallon, underground tank lies adjacent the campus of Indiana University-Purdue University at Indianapolis and along White River State Park. From July to December 2001, 29 overflows were reported at this location. With the tank in place, just five would have occurred during that period.

"From the day he took office, Mayor Peterson has made it a priority to solve this problem," Deputy Mayor Carolyn Coleman said at the October 12 ribbon-cutting ceremony. "This project is a prime example of what we are doing to reduce overflows and become a world-class city."

The $5.8 million project is included in the city's long-term plan to reduce sewage overflows and restore Indianapolis streams. The tank captures and stores a combination of raw sewage and stormwater that would otherwise overflow into the river during rainfall or snowmelt.

The East Bank Storage Tank holds wastewater until flows in the sewer system subside; then the sewage is pumped back into the existing sewer for transport to the Belmont Advanced Wastewater Treatment Plant. Flushing gates clean out the storage tank after each use.

The underground tank blends into the stream bank and is not noticeable to people enjoying White River State Park. The project was designed by Donohue & Associates, Inc. and inspected by Malcolm-Pirnie, Inc. The construction was managed by Thieneman Construction, Inc.

SCIENCE Bound

Science Bound students Emma Carmichael (left) and Tasha Ricks teamed on a robotics project at the Women in Engineering Summer camp.

Scholarship Campaign Launched

The Indianapolis Clean Stream Team has launched a fund-raising campaign to endow an environmental scholarship at Purdue University for a deserving Indianapolis Public Schools student.

The scholarship will be granted through the Purdue-IPS Science Bound program, which makes higher education a reality for low-income students who might not otherwise go to college.

Science Bound was the brainchild of Purdue President Martin Jischke and Purdue alum Bob Bowen of Bowen Engineering.

Students who complete the Science Bound requirements will receive a full-tuition scholarship to study a science-related field at Purdue. Program requirements include maintaining a required GPA, participating in after-school programming, and attending summer programs and weekend trips to Purdue.

Today, there are more than 150 students between 8th and 10th grade in Science Bound.

"When today's 10th graders graduate, one of them will be rewarded with a Clean Stream Team scholarship to attend Purdue," said DPW director Jim Garrard. "We are excited about the opportunity to draw new talent into the environmental science and engineering field."

The Clean Stream Team plans to raise $103,000 during the next three years to establish an endowment. Various levels of tax-deductible giving are available. If you are interested in making a donation, contact Jodi Perras at 327-8720 for more information.

DO YOU HAVE A CORRECT CONNECT?

The Department of Public Works is launching a new "Correct Connect" program to support its goal of reducing sewage overflows into our rivers and streams.

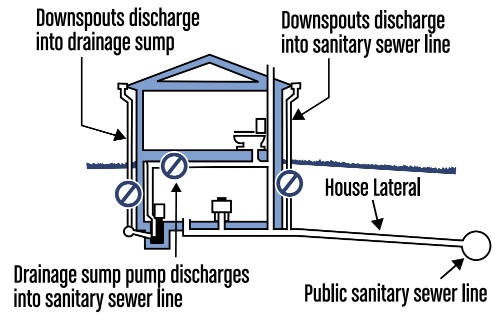
Many homes in Marion County have sump pumps or downspouts illegally or incorrectly connected to the sewer system. If your downspout or sump pump is directly connected to the sewer, it is taking up space needed to carry sewage to our treatment plants.

"The goal of Correct Connect is to reduce rainwater flowing into our sewers," said DPW Director Jim Garrard. "This 'clear water' can contribute to sewage overflows into our streams and – even worse – sewage backups into people's basements."

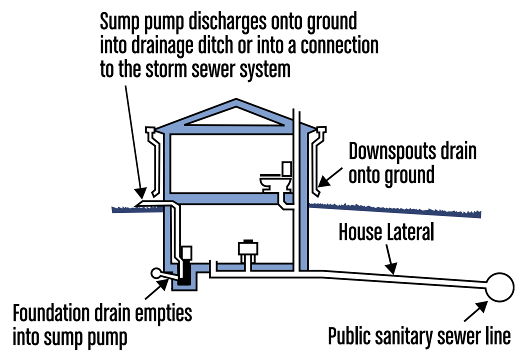
"In a neighborhood of 200 homes it only takes six to eight sump pumps working full time in wet weather to cause a backup in a sanitary sewer – causing problems for an entire neighborhood," said Carlton Ray, DPW's administrator for environmental engineering.

The Correct Connect program will educate residents on how to identify and correct any illegal or incorrect sewer connections. The program will include an instructional video, how-to materials, and assistance from city staff and partner organizations.

For more information on Correct Connect, visit our Web site at www.indycleanstreams.org or call the Mayor's Action Center at 327-4622.



IMPROPER INSTALLATION



PROPER INSTALLATION

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St., Suite 900
Indianapolis, IN 46204

Stream Line

City of Indianapolis / Department of Public Works / Clean Stream Program

made with recycled paper

PLEDGE CARD

The Clean Stream Team is a City of Indianapolis program dedicated to restoring area streams and improving quality of life in our neighborhoods. You can join our team by filling out this pledge.

I, ______________________________, understand the importance of clean rivers and streams in my community, and I promise to complete the following tasks to create a healthier environment and better quality of life for all of us. I will:

- **Disconnect downspouts and sump pumps connected to sewers. I understand this will prevent clean water from using up our sewers' capacity.**
- **Not send fats, oils or grease down the drain. I understand that they cause sewer blockages and backups.**
- **Properly dispose of motor oil, antifreeze, battery acid and household chemicals. (Call 327-4TOX to learn how.)**
- **Look for ways to reduce water use in my home and at work.**
- **Clear gutters and storm sewer drains of leaves and debris.**
- **Clean up after my pets. I understand that their waste contaminates our waterways.**

Signed ______________________________ Date ______________________

For Internal Use Only

Received ______________________ By ______________________
(DATE) (NAME)

Thank you for joining the Clean Stream Team. Please fill out the information below to be added to the team's mailing list.

Name ____

Address ____

City ______________________ State ____________ Zip Code ____________

E-Mail Address ____

WELCOME TO THE TEAM!

Welcome to the Indianapolis Clean Stream Team! We look forward to working with you to restore area streams and improve the quality of life in our neighborhoods. Remember, completing the simple tasks in your pledge can create a healthier environment for all of us.

To learn more, call the Clean Stream Team at (317) 327-8720 or visit us at www.indycleanstreams.org.

INDIANAPOLIS
CLEAN STREAM TEAM

JOIN THE TEAM

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FOR IMMEDIATE RELEASE
Tuesday, October 12, 2004

Contact Information
Jo Lynn Garing, 327-3690
Margie Smith-Simmons, 327-4669

City of
Indianapolis
Bart Peterson, Mayor

East Bank Storage Tank to dramatically decrease sewage overflows into White River

INDIANAPOLIS – Today, Deputy Mayor Carolyn Coleman, Department of Public Works (DPW) Director Jim Garrard and others celebrated the completion and opening of the East Bank Storage Tank, a $5.8 million project, located along the east bank of the White River downtown.

The 3-million-gallon underground storage tank is an "early action project" included in the city's long term plan to reduce sewage overflows and restore Indianapolis rivers and streams. The tank will capture and store a combination of raw sewage and stormwater that would otherwise overflow into the river during rainfall or snowmelt.

The tank will control one of the largest sources of raw sewage overflows in the city. Between July and December 2001, 29 overflows occurred at this location. With the storage tank in place, it is estimated that five overflows would have occurred.

"From the day he took office, Mayor Peterson has made it a priority to solve this problem," said Deputy Mayor Carolyn Coleman. "This project is a prime example of what we are doing to reduce overflows and become a world-class city."

The celebration also offered the opportunity to promote the public watershed meetings scheduled to begin on Thursday, October 14 at 7 p.m. in the Garfield Park Multipurpose Room.

"The watershed meetings will allow DPW to gain public input and feedback on long-term options for reducing sewage overflows into our streams," said Director Jim Garrard. "It is important to reduce overflows so that they only occur during the largest storm events, but we also need to keep rates affordable for families and business. That is why citizen input is vital to finding the right balance in this process."

For a list of meeting locations, dates and proposed rates please visit www.indycleanstreams.org.

-30-

Department of Public Works
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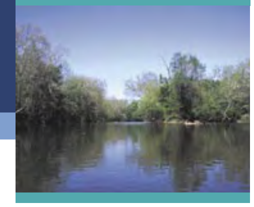
200 East Washington Street
Indianapolis, Indiana 46204
(317) 327-4000
(fax) 327-4954
(TDD) 327-5186
indygov.org

FACT SHEET

CITY OF INDIANAPOLIS

Clean Stream Program

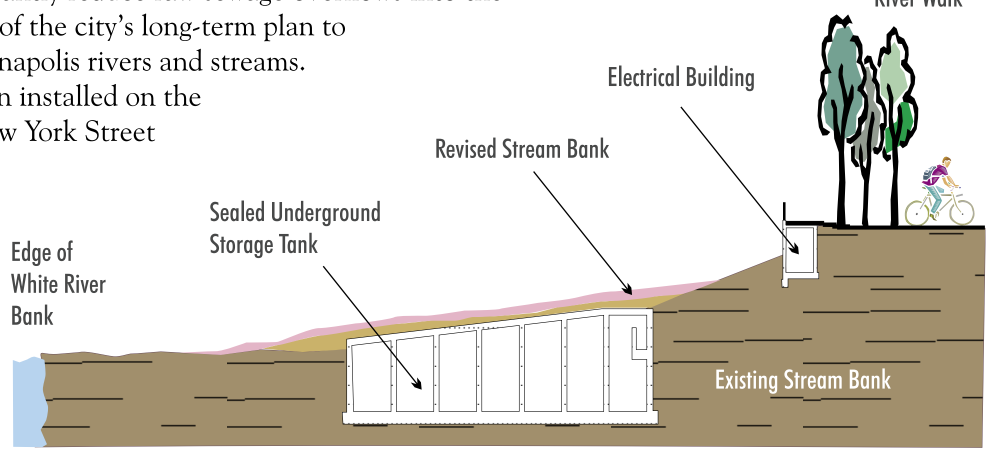


White River

East Bank Storage Tank

The City of Indianapolis Department of Public Works has constructed a 3-million-gallon underground storage tank that will significantly reduce raw sewage overflows into the White River downtown. The tank is part of the city's long-term plan to reduce sewage overflows and restore Indianapolis rivers and streams.

The concrete storage structure has been installed on the east bank of the river, just south of the New York Street bridge and west of the Indiana University-Purdue University at Indianapolis campus. The tank will capture and store a combination of raw sewage and stormwater that would otherwise overflow into the river during rainfall or snowmelt. It will hold the wastewater until flows in the sewer system subside, providing enough capacity to transport the flows to the Belmont Advanced Wastewater Treatment Plant for treatment. The underground tank blends into the stream bank and is not noticeable to people enjoying White River State Park.



Conceptual Illustration - Not to Scale

The tank will control one of the largest sources of raw sewage overflow in the city. Between July and December 2001, overflows occurred 29 times at this location. With the storage tank in place, five overflows would have occurred.

Project Budget:	$5.89 million, including planning, design, construction, and inspection.
Design Firm:	Donohue & Associates, Inc.
Inspection Firm:	Malcolm-Pirnie, Inc.
Contractor:	Thieneman Construction, Inc.
Completion Date:	Fall 2004
Project Benefits:	• Improved White River water quality • Fewer raw sewage overflows • Healthier and safer waters flowing through downtown • Removal of unhealthy and unsightly debris
Special Features:	Flushing gates that clean out the storage tank after each use. This flushed water will then be sent for treatment at the wastewater treatment plant.

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

Clean Streams, Healthy Neighborhoods
Frequently Asked Questions

The Need

Q. What do we need to do to improve our sewer and stormwater system?

A. Indianapolis has sewer infrastructure needs that are county-wide. For the sanitary sewer system and sewer overflow projects, we need approximately $400 million in capital revenue over the next three years. The stormwater increase will provide another $35 million for new capital projects. Our capital needs include:

- The next three years of the city's federally mandated long-term plan to control raw sewage overflows;
- Expansion, maintenance and upgrades for our two sewage treatment plants;
- Rehabilitation of aging sewers and lift stations;
- Additional sewer capacity in the most rapidly developing areas of the city;
- Extending sanitary sewers into neighborhoods now served by septic systems; and
- Addressing drainage and flood control needs throughout the county.

Q. Why do we have raw sewage spilling into our streams?

A. Indianapolis' sewer system is antiquated and can no longer handle the amount of sewage and rainwater that flows through it. During dry weather, sewage flows safely through the sewers to our wastewater treatment plants. However, as little as a quarter-inch of rain causes raw sewage to overflow into our streams. The sewers were built this way 80-100 years ago before there were wastewater treatment plants. This was common practice in many U.S. cities, especially in the Northeast and Midwest.

Q. Why were our sewers built this way?

A. More than 100 years ago, Indianapolis built a sewer system to carry rainwater and melting snow away from homes, businesses and streets. This was standard practice at the time. When indoor plumbing came later, homeowners and business owners hooked their sewage lines to the storm sewers, combining stormwater and sewage in one pipe. During dry weather, the combined sewers carry sewage to the city's treatment plants. However, when it rains or snow melts, the sewers can be overloaded with incoming stormwater. When this happens, the sewers are designed to overflow into nearby streams and rivers. If they didn't have this escape valve, raw sewage would back up into people's basements and streets. Today, we build separate sewers for stormwater and sewage.

Q. What are the harmful effects of raw sewage overflows?

A. Raw sewage in our streams is a health hazard, smells and looks disgusting, hurts our environment and harms the quality of life in our neighborhoods. Sewage overflows are a major cause of pollution in White River, Fall Creek, Pleasant Run, Pogues Run and Eagle Creek.

Q. How can we reduce raw sewage overflows to our streams?

A. The city has a long-term plan to reduce sewer overflows over the next 20 years. It will:

- Protect public health and improve the quality of life in many neighborhoods now suffering from the sight and stench of raw sewage
- Reduce overflow frequency from 45-80 storms per year to 0-10 storms – actual overflows will depend on the weather each year
- Make streams safer for fish, reduce odors and capture toilet paper, sanitary waste and other unsightly materials found in overflowing sewers
- Minimize impacts on neighborhoods and businesses by locating most overflow storage facilities deep underground

Q. When will you start to fix this problem?

A. We have already begun. The City of Indianapolis has already spent more than $200 million to keep raw sewage out of our waterways, especially near parks, schools and neighborhood streams. Already, we've reduced annual overflows by more than 145 million gallons.

The Cost

Q. How much will my sewer rates increase?

A. We are proposing a sanitary sewer rate increase phased in over the next three years. The average homeowner using 5,400 gallons per month will see his monthly bill increase from $9.59 today to $12.38 in 2006, $15.17 in 2007 and $17.96 in 2008. New or increased fees also are proposed on new developments and new connections to the sewer system. In addition, a $1.00 per month increase to the $1.25 stormwater utility fee has been proposed. If approved, the stormwater fee will appear on Spring property tax bills and the sewer fee will appear on water/sewer bills in January 2006.

Q. Will these be the last rate increases needed to pay for the city's plan?

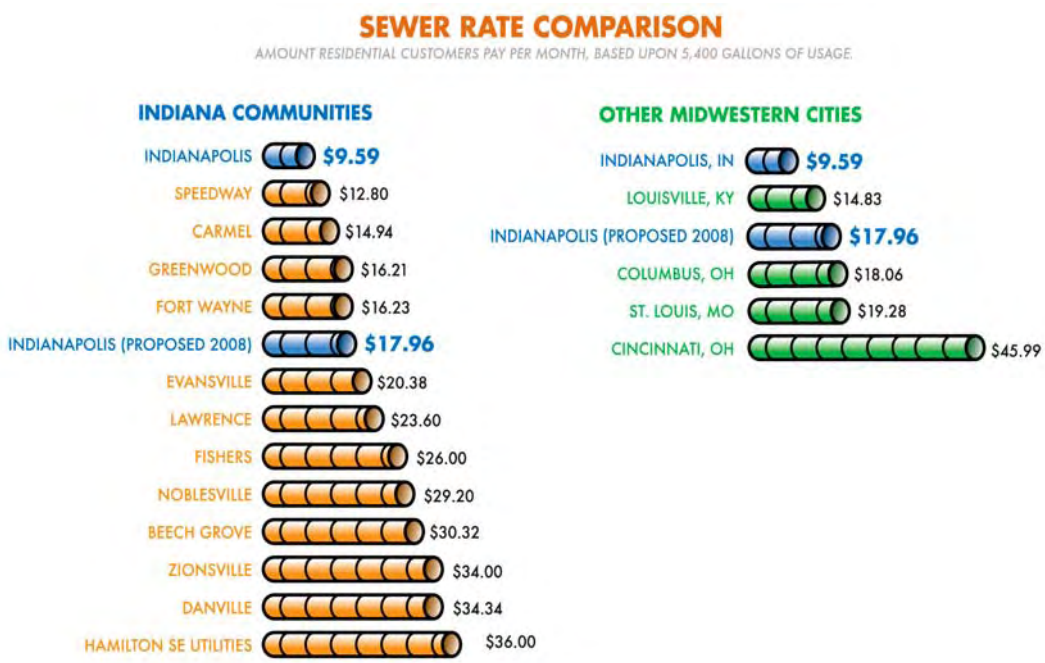
A. No. Regular sewer rate increases will be required every year for the next 20 years to finance the projects required by the state and federal governments.

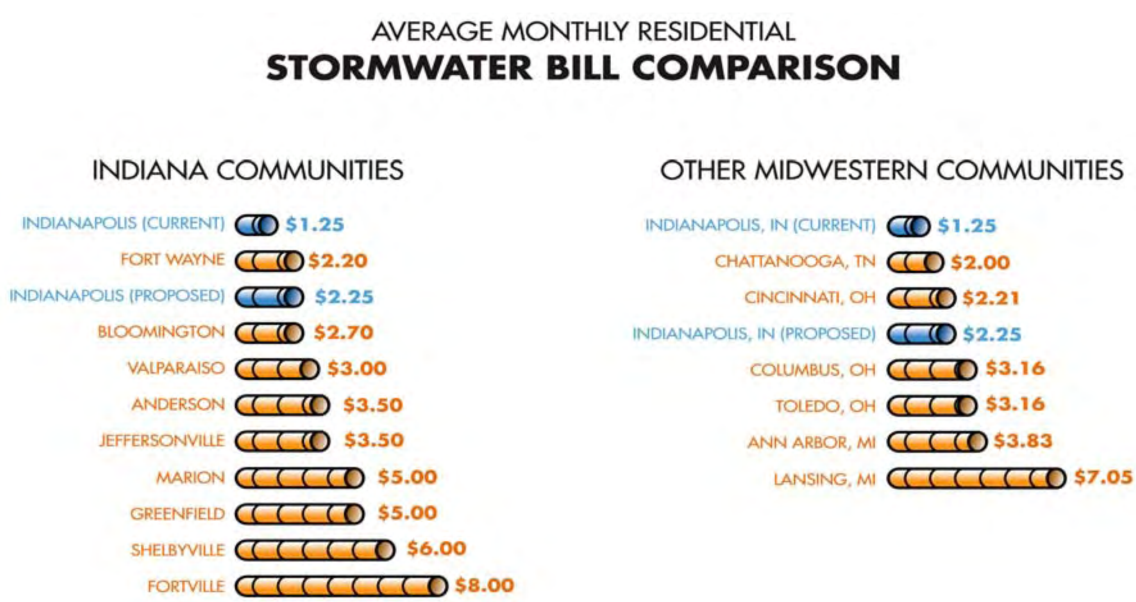
Q. How much will sewer rates cost at the end of the 20-year plan?

A. Long-term sewer rates are very difficult to predict because of rapidly changing regulatory requirements and higher-than-average inflation in the construction industry. Current projections show residential sanitary sewer rates in 2025 will be around $55-60 per month, based upon 2005 dollars.

Q. How do Indianapolis sewer rates compare to other cities' rates?

A. Indianapolis sewer rates are low in comparison to other cities of our size and other cities in Indiana. Indianapolis residential customers pay $9.59 per month, based upon the average home using 5,400 gallons. Stormwater utility fees now equal $1.25 per month for residential properties. According to a rate survey conducted in 2005, comparable rates in other cities were higher than Indianapolis' rates. See the charts below.





Q. Can the city afford this plan given our current budget shortfalls?

A. Funding for sewers and stormwater comes out of dedicated funds that are separate from the general fund, which is suffering the budget shortfalls. Most of these projects are required by the federal government, and they are also the right thing to do. We can no longer stick our head in the sand and ignore the fact that raw sewage spills into our streams with nearly every rainfall. We also can't ignore our many drainage problems or the failing septic systems that contaminate backyards and neighborhood ditches.

Q. How can people living on a fixed income afford these costs on top of other rising prices?

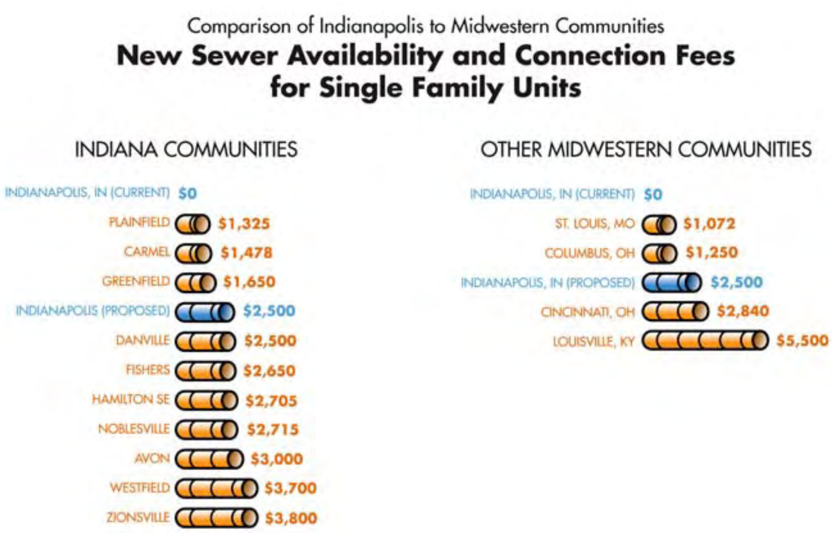
A. We are very concerned about the impact of these improvements on the elderly and low-income and all of our residents. That's why we have negotiated a 20-year schedule and plan to phase in rate increases only as we need them to pay for projects.

Q. What are the proposed new sewer connection fees and what are they for?

A. If approved, a new $2,500 sewer connection fee will be charged per equivalent dwelling unit (EDU). Multi-family housing will pay $2,500 per unit; industrial and commercial connections would pay a proportional amount based upon meter size. This fee will require new connections and new developments to help pay into the sewer system that has been built by others before them.

Q. I am a first-time home buyer. Will the proposed sewer connection fees make new houses in Indianapolis less affordable?

A. These one-time fees are comparable to similar fees paid in surrounding communities, so they shouldn't significantly affect the competitiveness or affordability of Marion County housing. It is only fair that new connections and new developments help pay into the sewer system that has been built by others before them. Here is a comparison of Indianapolis connection fees with other nearby communities in Central Indiana and with similar cities surrounding states.



CITY OF INDIANAPOLIS

Clean Stream Program

FACT SHEET

The Benefits

Q. What benefits will we receive for our dollars?

A. Because of these funds, the city will have cleaner streams and healthier neighborhoods. These funds will help many neighborhoods suffering from the sights and smells of raw sewage in their streams or flood control and drainage problems that threaten life and property. Some 18,000 properties now on septic systems will have access to city sewers without having to pay the cost of sewer construction.

Q. Will the long-term solution completely eliminate all raw sewage overflows?

A. No. At the end of 20 years, overflows will be reduced dramatically from today's 45-80 storms each year down to 0-10 storms. Actual frequency will depend on the weather, but only the largest storms will still cause some overflows. Also, overflows will occur when streams are flowing fast and people are not likely to be exposed to raw sewage. The city's goal is to develop an affordable plan that will focus dollars on projects that will do the most to improve water quality and protect public health.

Q. Will the stormwater utility increase eliminate flooding in Frog Hollow, Ravenswood and all other neighborhoods?

A. No. The stormwater utility will help improve drainage and flood control in many areas, but it is not possible to eliminate all neighborhood flooding. The city will continue to invest in maintenance improvements in the Frog Hollow and Ravenswood neighborhoods, but their location in the flood plain of the White River makes future flooding an inevitable way of life for those residents.

Q. I don't fish or swim in the White River and don't live in the inner city. How does this rate increase benefit me?

A. The proposed rate increases will fund projects throughout Marion County, not just in the inner city. In addition to our long-term plan to reduce sewer overflows, we must extend sanitary sewers to neighborhoods now on septic systems, improve drainage and flood control, upgrade our treatment plants and provide more capacity in our separate sewer system outside the old city limits. Although the sewers are sometimes "out-of-sight, out-of-mind," they are just as important to our city's future as our roads, bridges and highways.

Q. Why are we trying to make the White River swimmable? No one swims in the river and smaller streams aren't deep enough for swimming. Parents should keep their kids out of these streams.

A. Our goal is not to make the White River and other streams swimmable 100 percent of the time. There are a few large storms that will still cause overflows even after the new facilities are built. Our plan is the most cost-effective way to meet federal requirements and at the same time protect public health. We agree that urban streams are not safe for swimming, and the city has educational programs to warn children and adults to the dangers of water that might be contaminated by sewage and urban stormwater.

Q. Why didn't we do more of this work years ago?

A. In the 1980s and 1990s, the city short-changed its sewer infrastructure and treatment plant needs. As a result, we are paying the price today. Mayor Peterson is the first mayor to make real investments in reducing sewer overflows and improving water quality. These investments are not only required by the federal Clean Water Act, they are the right thing to do to take our sewer system into the 21st century.

Q. How will these projects benefit local businesses?

A. The city will work hard to ensure that locally owned and operated businesses will participate in the work, thus keeping dollars in Indianapolis and Central Indiana as much as possible. When local businesses benefit, other local companies that serve those businesses and their employees also will benefit. This plan will allow our city to continue to grow and attract new business opportunities.

Q. Will these rate increases hurt our competitiveness as a city?

A. Even with these rate increases, the city's sewer rates will still be among the most affordable in the region and the nation. U.S. Census housing statistics released in July showed that Marion County's housing boom from 2000-2004 has led the entire state of Indiana. Nearly 21,000 units were constructed during this time, a growth rate of 5.4 percent. Communities surrounding Indianapolis also are growing, signaling that our region is an attractive destination.

Other Questions

Q. What is happening with other cities on the White River who have sewage overflows?

A. Indiana has 105 communities with raw sewage overflows, including several on the White River. The Indiana Department of Environmental Management is responsible for ensuring that these communities are addressing the problem just as Indianapolis is doing.

Q. How can I help improve water quality?

A. We need you to join us in solving the problem of raw sewage in our streams. Everyone has a role: individual citizens, government, non-profit organizations, businesses, industry, and community groups. You can help by:

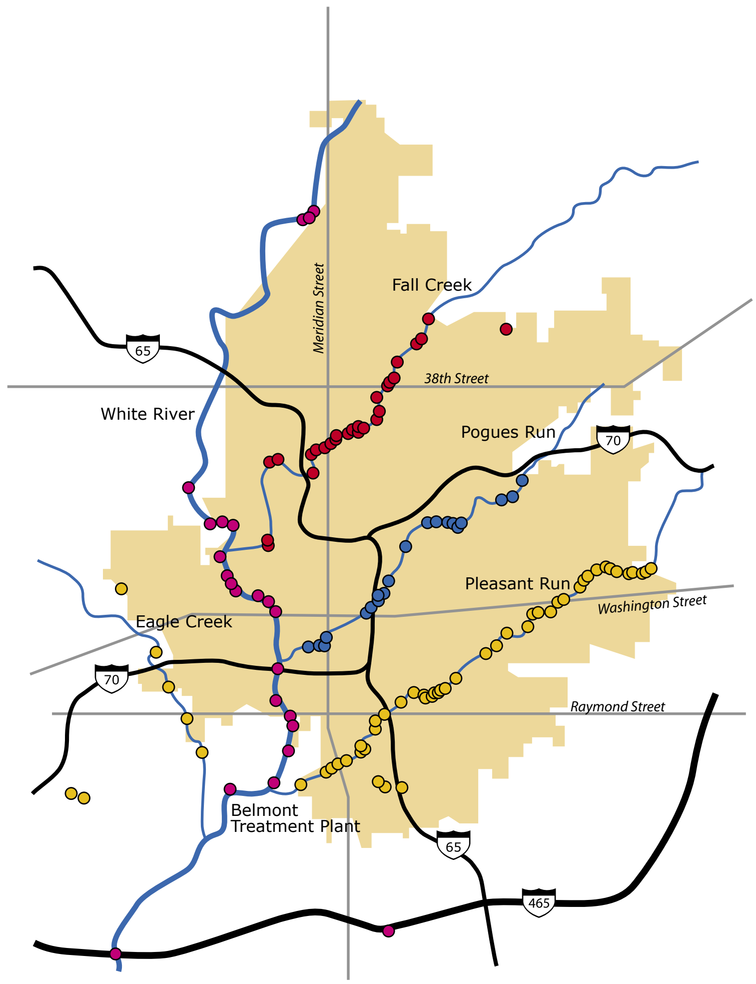
- Disconnecting your downspouts and sump pumps if they are connected to the sewer system. The city's Correct Connect program can show you how to disconnect. Learn more at www.indycleanstreams.org.
- Reducing water use, especially during rainy weather.
- Coming to a public meeting to learn more about what is being done. Sign up at indycleanstreams.org to be notified of upcoming meetings through e-mail.
- Inviting Clean Stream Team representatives to make a presentation to your civic association or neighborhood group.
- Learning how you can reduce water use in your homes and businesses, and help keep pollution out of the storm drains.

Raw Sewage Overflow Locations in Marion County

Raw sewage overflows 60 times in a typical year in portions of White River, Fall Creek, Pleasant Run, Pogues Run, Eagle Creek and other waterways. Six billion gallons of contaminated water goes into White River and its tributaries each year.

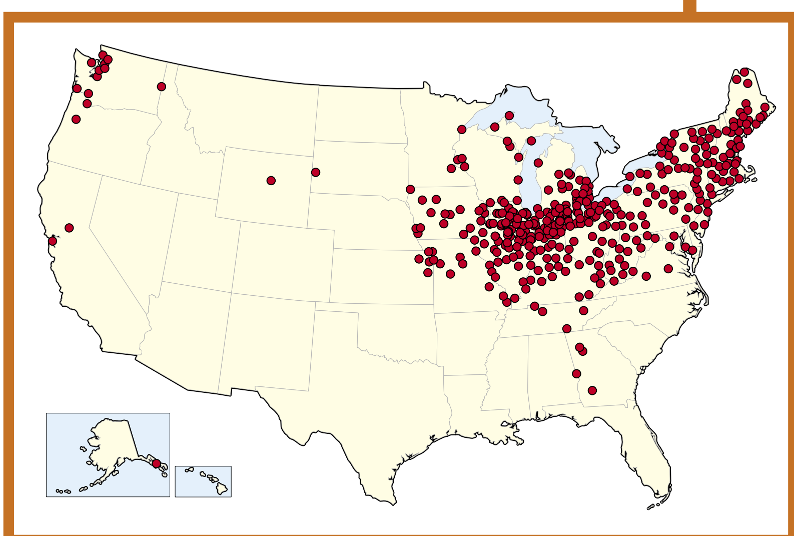
The affected areas include:

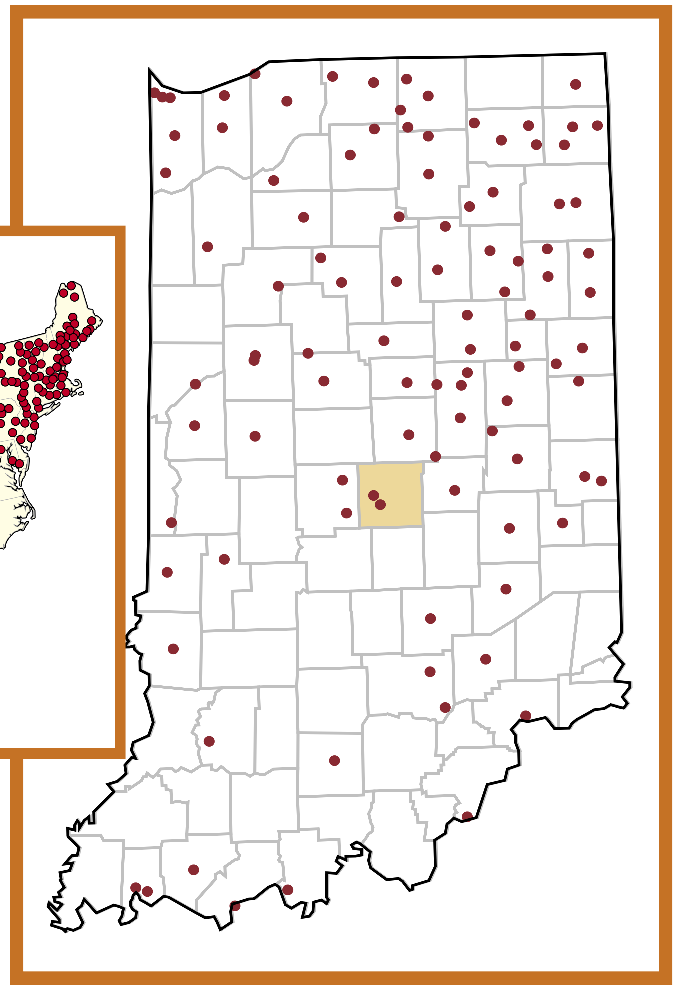
- White River downstream from 56th Street
- Fall Creek downstream from Keystone Avenue
- Eagle Creek downstream from Michigan Street on Little Eagle Creek
- Pogues Run downstream from 21st Street
- Pleasant Run downstream from Kitley Avenue
- State Ditch downstream from Southern Avenue
- Lick Creek downstream from Madison Avenue
- Bean Creek downstream from I-65



Combined Sewer Systems Nationwide

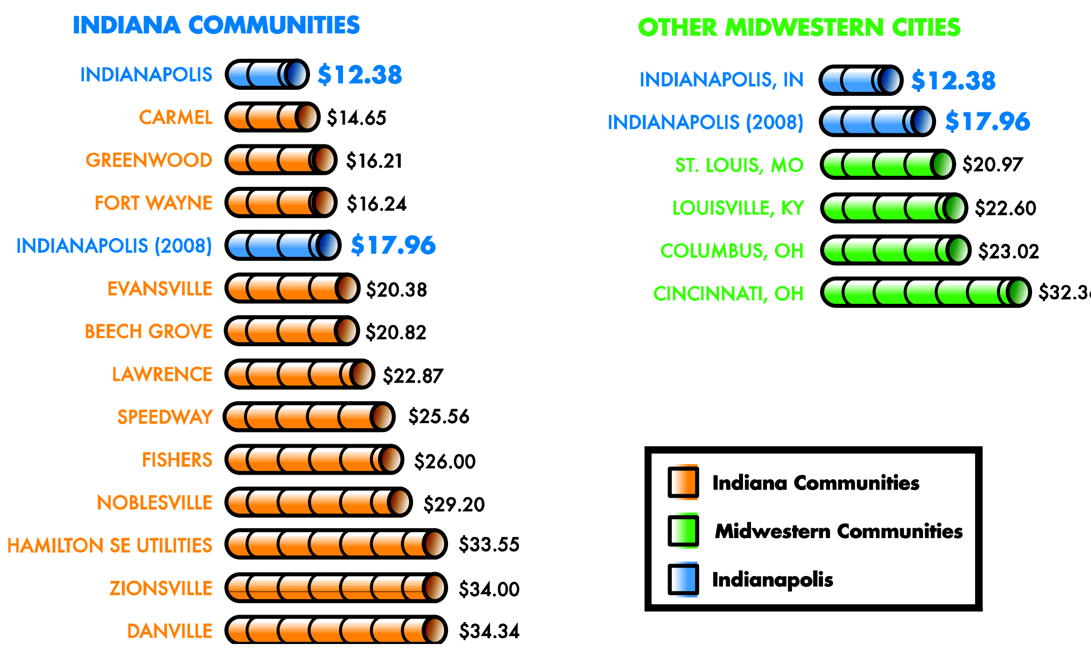
Combined sewer systems carry both stormwater and raw sewage in the same pipes. Many cities with combined sewer systems have problems with raw sewage overflows when it rains. These overflows contain not only stormwater, but also untreated human and industrial waste, toxic materials and debris. Combined sewer systems serve roughly 772 communities containing about 40 million people, according to the U.S. Environmental Protection Agency. Most communities with combined sewer systems are located in the Northeast and Great Lakes regions and in the Pacific Northwest. Indiana has 105 communities with combined sewers.





SEWER RATE COMPARISON

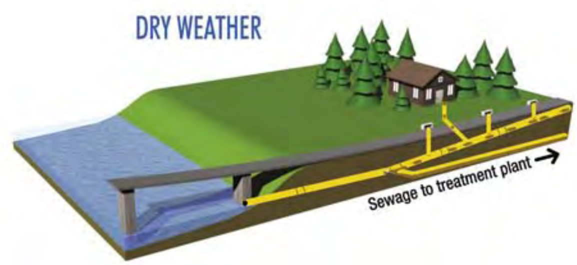
AMOUNT RESIDENTIAL CUSTOMERS PAY PER MONTH, AS OF MARCH 1, 2006
BASED UPON 5,400 GALLONS OF USAGE.



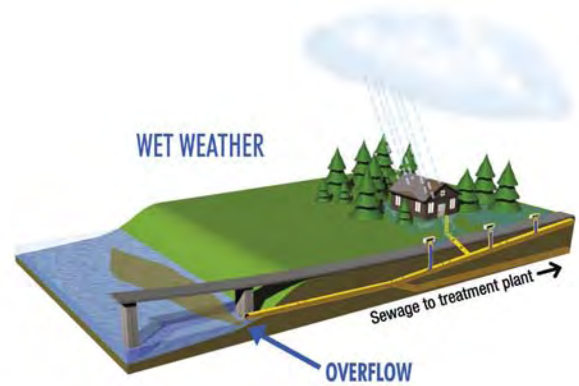
Why Do Our Sewers Overflow When It Rains?

More than 100 years ago, Indianapolis built a storm sewer system to carry rainwater and melting snow away from homes, businesses and streets. When indoor plumbing came later, homeowners and business owners hooked their sewage lines to these storm sewers, combining storm water and raw sewage into one pipe. This was common practice in many U.S. cities, especially in the Northeast and Midwest.

During dry weather, a combined sewer system works much like a separate sewer-carrying all sewage to the treatment plant for treatment.



However, when it rains or snow melts, the sewers can be overloaded with incoming storm water. When this happens, the sewers are designed to flow over internal dams in the underground pipe system and into nearby streams and rivers. If they didn't have this release valve, raw sewage would back up into people's basements and streets. Today, when building new sewer systems, we build separate sewers for storm water and sewage.



Raw sewage in our streams is a health hazard, smells and looks disgusting, hurts our environment and harms the quality of life in our neighborhoods. Sewage overflows are a major cause of pollution in White River, Fall Creek, Pleasant Run, Pogues Run and Eagle Creek. Raw sewage steals oxygen from the water, making it difficult for fish to breathe and sometimes causing fish kills. High bacteria levels make streams unsafe for children to wade or play in the water. Raw sewage in our streams also prevents us from becoming a world-class city that can attract new businesses, jobs and residents.

What You Can Do

We need you to join us in solving the problem of raw sewage in our streams. One of the best ways to do this is to get involved in developing the city's long-term control plan and help city leaders choose which capital improvement projects are best for Indianapolis.

Look up our Web site, www.indycleanstreams.org, for the latest information on public meetings and other ways to get involved. It took decades for our streams to get into this condition, and it will take years of hard work and investment to improve them. In the meantime, there are measures you can take to help protect the environment and yourself and your family.

Protect the Environment

- Disconnect downspouts and sump pumps connected to sewers. This will prevent clear water from using up our sewers' capacity.
- Don't send fats, oils or grease down the drain. They cause sewer blockages and backups.
- Properly dispose of motor oil, antifreeze, battery acid and household chemicals. Call 327-4TOX to learn how.
- Clear gutters and storm sewer drains of leaves and debris.
- Reduce water use in your home and business.
- Clean up after your pets. Their waste contaminates our waterways.

Simple actions like these can add up to a healthier environment and better quality of life for us all.

Protect Yourself and Your Family

- Pay attention to warning signs posted by the Indianapolis Department of Public Works and the Marion County Health Department.
- Call the Sewer Overflow Hotline at 327-1643 to receive notification of sewage overflows.
- Sign up for sewage overflow e-mail alerts at www.indycleanstreams.org.

Clean Stream Team Honorary Membership
Nomination Form

Honorary membership in the Indianapolis Clean Stream Team may be awarded for the following achievements or activities:

1. **Environmental Leadership:** Given to an individual or organization who has demonstrated a long-standing commitment to protecting, restoring or caring for Marion County rivers and streams. This category honors individuals and groups who have worked as advocates or volunteers on clean water issues for many years.
2. **Voluntary Stewardship:** Given to an individual or organization in recognition of a voluntary, one-time or sustained project that demonstrates outstanding stewardship of Marion County waterways.
3. **Partnership with the City:** Given to individuals or organizations who have worked in partnership with the city on water quality issues or projects.

Any Clean Stream Team staff person or member of the public may submit a nomination for honorary membership using this nomination form. An internal review committee will review the nominations and make recommendations for awards to the DPW director.

Person or organization being nominated:

Name	Title
Employer or Organization	
Phone	E-mail

Category (pick one after reading the descriptions above):
1. ☐ Environmental Leadership
2. ☐ Voluntary Stewardship
3. ☐ Partnership with the City

In 300 words or less, please explain why this individual or organization should receive this award:

Person making nomination:

Name	Title
Employer or Organization	
Phone	E-mail

For internal use only

Received ____________________ by ____________________________
date name


36″
28″
8″
City of Indianapolis
Department of Public Works
INDIANAPOLIS
CLEAN STREAM TEAM
Another
Clean Stream Project
City of
Indianapolis
Bart Peterson, Mayor
Raw sewage spilling into our streams is a serious problem. The City of Indianapolis' Clean Stream Team is working to upgrade our out-of-date sewer system to reduce these overflows. More than 50 projects like this one are already underway to keep raw sewage out of our waterways and improve the quality of life in our neighborhoods.
East Bank Storage Tank
This project creates an underground storage tank to capture sewage overflows. During rainfall events, the tank will hold up to three million gallons of untreated sewage and stormwater that would otherwise flow into White River. When waters recede in the sewer system, the wastewater will be directed to the city's treatment plants.
Benefits:
• Improved White River water quality
• Fewer raw sewage overflows
• Healthier and safer waters flowing through downtown
Design firm: Donohue & Associates
Supervising Engineer: Malcolm-Pirnie
Contractor: Thieneman Construction
Budget: $5.8 million
Completion by: Fall 2004
For more information contact: 327-4MAC or visit our website at www.indygov.org/dpw/cso. Refer to project number CS-24-105.
In the event of an emergency call: 557-6340 (Thieneman Construction).

Scale:
1″ = 8″

Raw sewage spilling into our streams is a serious problem. The City of Indianapolis' **Clean Stream Team** is working to upgrade our out-of-date sewer system to **reduce these overflows.** Many projects are underway or in planning to keep raw sewage out of our waterways and improve the quality of life in our neighborhoods.

Pogues Run Sewage Overflow Reduction

This project represents Phase II of the city's Pogues Run Initiative, a three-phase program to improve water quality in this neighborhood stream. This project will reduce sewage overflows from four locations near several Indianapolis Public Schools, including Arsenal Tech High School, Harshman Middle School, Horizon Alternative Middle School and School 74. Overflows will be reduced from their current average of 22-38 in a typical year to 4 overflows per year or less. The overflows will be redirected to an underground tunnel where people won't come in contact with the water. Once completed, this project will greatly improve Pogues Run water quality and help protect children from sewage overflows.

Benefits:

- Reduces the frequency and volume of raw sewage overflows to Pogues Run
- Improves water quality near neighborhoods and schools
- Pedestrian bridge and channel improvements to Pogues Run

Design firm:	Clark Dietz, Inc.
Contractor:	Walsh Construction Company Super Excavators, Inc. Insituform Technologies, USA, Inc.
Inspection Firm:	Christopher B. Burke Engineering, Ltd.
Budget:	$19.2 million
Completion by:	August 2006

☞ *For more information, contact: 327-4MAC (4622) or visit our Web site at www.indycleanstreams.org.*

In the event of an emergency, call 327-4622. *Refer to Project CS-31-002.*

FACT SHEET

CITY OF INDIANAPOLIS

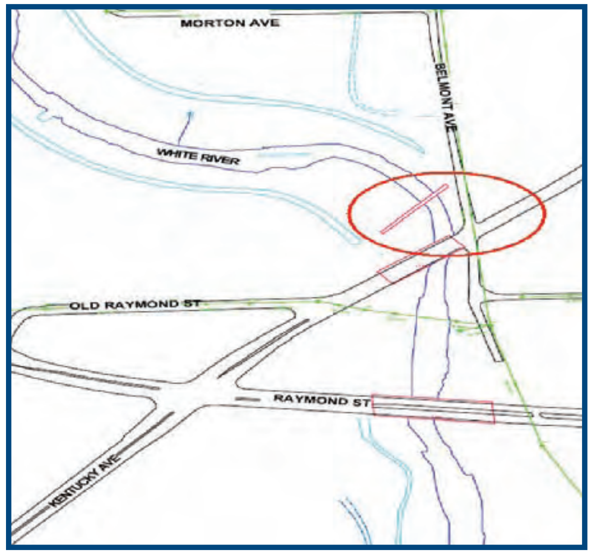
Clean Stream Program

Additional Barrel for Harding/White River Siphon

The City of Indianapolis Department of Public Works is working to reduce overflows to the White River and other area waterways.

This project involved construction of an additional 36-inch inverted siphon barrel under White River to increase the carrying capacity of the existing combined sewer main artery, called an “interceptor.” A siphon is a U-shaped, underground pipe that can transport wastewater under the river on its path to the treatment plants. The siphon uses atmospheric pressure to push wastewater against the forces of gravity, moving it under the river and back up to a higher level.

This project helps to eliminate the bottleneck in the interceptor and reduce overflows near Harding Street and Waterway Boulevard.

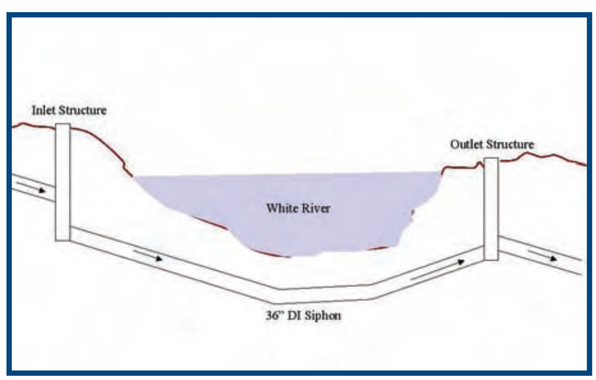


PROJECT BENEFITS:

- Eliminate bottlenecks in a main sewer artery and reduce raw sewage overflows to the White River near Harding Street and Waterway Boulevard.

For more information visit our Web site at www.indycleanstreams.org

Project Cost:	$1.35 million
Design Engineer:	United Consulting Engineers, Inc.
Contractor:	Eagle Valley, Inc.
Inspection Firm:	United Consulting Engineers, Inc.
Completion Date:	December 2003
Status:	In Service



INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

FACT SHEET

CITY OF INDIANAPOLIS

Clean Stream Program

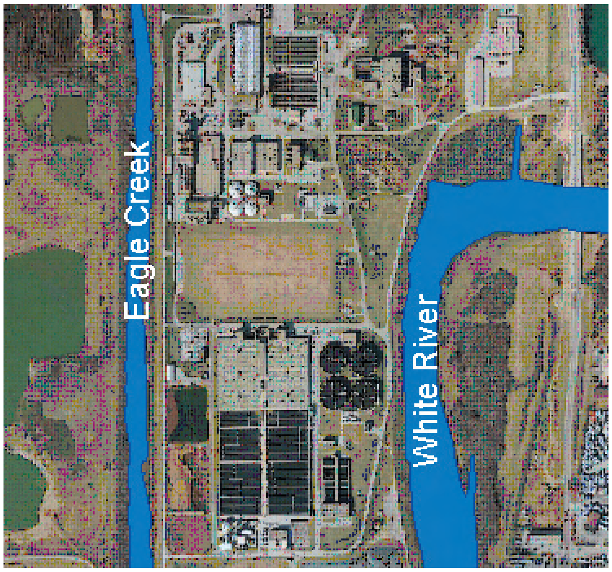
Belmont Wet Weather Chlorination/ Dechlorination Facilities

The City of Indianapolis Department of Public Works is working to reduce millions of gallons of sewage overflows at the Belmont Advanced Wastewater Treatment Plant. Overflows at the plant cause 2.2 billion gallons of partially treated wastewater to enter the White River each year.

This project will ensure that wet-weather flows at the Belmont AWT plant are disinfected prior to discharge to the White River. This will ensure that the plant meets permit limits set by the state and federal governments.

The project includes rehabilitating an existing abandoned chlorine contact tank and installing new chlorination and dechlorination chemical feed equipment.

This is a companion project to the trickling filter/solids contact project at Belmont, which will provide secondary treatment to wet-weather flows at the plant.



ANTICIPATED PROJECT BENEFITS:

- Increase wet weather treatment flow capability at the Belmont Advanced Wastewater Treatment Plant.
- Improve stream water quality and protect public health.
- Reduce bacteria and pathogen levels in the White River after storm events.

For more information visit our Web site at www.indycleanstreams.org

Project Cost:	$18.3 million
Completion Date:	March 2010
Status:	In Planning

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

CITY OF INDIANAPOLIS

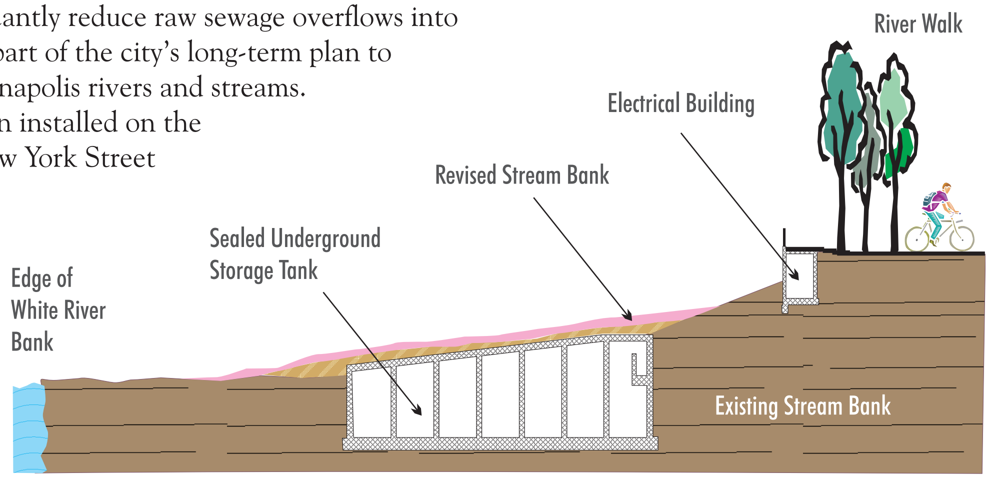
Clean Stream Program

FACT SHEET

White River
East Bank Storage Tank

The City of Indianapolis Department of Public Works has constructed a 3-million-gallon underground storage tank that will significantly reduce raw sewage overflows into the White River downtown. The tank is part of the city's long-term plan to reduce sewage overflows and restore Indianapolis rivers and streams.

The concrete storage structure has been installed on the east bank of the river, just south of the New York Street bridge and west of the Indiana University-Purdue University at Indianapolis campus. The tank captures and stores a combination of raw sewage and stormwater that would otherwise overflow into the river during rainfall or snowmelt. It holds the wastewater until flows in the sewer system subside, providing enough capacity to transport the flows to the Belmont Advanced Wastewater Treatment Plant for treatment. The underground tank blends into the stream bank and is not noticeable to people enjoying White River State Park.



Conceptual Illustration - Not to Scale

For more information visit our Web site at www.indycleanstreams.org

The tank controls one of the largest sources of raw sewage overflow in the city. Between July and December 2001, overflows occurred 29 times at this location. With the storage tank in place, five overflows would have occurred.

Project Budget: $5.89 million, including planning, design, construction, and inspection.

Design Firm: Donohue & Associates, Inc.

Inspection Firm: Malcolm-Pirnie, Inc.

Contractor: Thieneman Construction, Inc.

Completion Date: Fall 2004

Project Benefits:
- Improved White River water quality
- Fewer raw sewage overflows
- Healthier and safer waters flowing through downtown
- Removal of unhealthy and unsightly debris

Special Features: Flushing gates that clean out the storage tank after each use. This flushed water will then be sent for treatment at the wastewater treatment plant.

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW Department of Public Works

FACT SHEET

CITY OF INDIANAPOLIS

Clean Stream Program

Elimination of Overflow 275 on Lower White River

The City of Indianapolis Department of Public Works is working to reduce millions of gallons of sewage overflows to White River, Fall Creek and other neighborhood streams.

The White River runs through the center of Indianapolis and is an important community asset, with many city parks located along its banks.

This project is intended to separate all of the combined sewers and eliminate combined sewer overflow number 275 at White River near Thompson Road. This outfall point is isolated from other sewer overflow locations, making it an ideal candidate for sewer separation. Separate sewers exist throughout most of the area with combined sewers scattered within six small portions of the system. Detaching the storm collection pipes, which feed into the sanitary sewer and installing new pipes to transport stormwater runoff into existing storm conveyance facilities will eliminate the combined sewers. This will eliminate outfall point 275.

Many other projects planned, begun or already completed will improve water quality throughout the White River watershed.

ANTICIPATED PROJECT BENEFITS:

- Eliminate one of the city's overflow points
- Reduce clean water infiltration and inflow to sewer system.
- Improve stream water quality.
- Improve stream bank aesthetics by removing an outfall structure.

For more information visit our Web site at www.indycleanstreams.org

Design Engineer:	Hanson Engineers
Project Cost:	$1.4 million
Expected Completion Date:	May 2007
Status:	In Design

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

CITY OF INDIANAPOLIS

Clean Stream Program

FACT SHEET

Fall Creek Inflatable Dams to Reduce Sewer Overflows

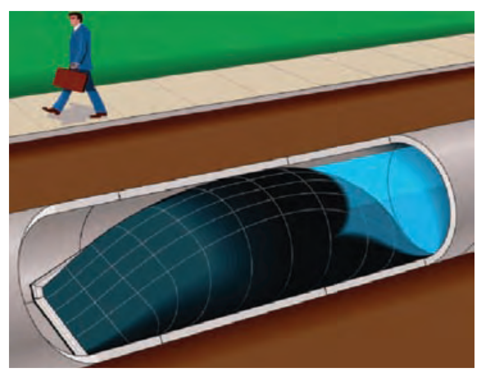
The City of Indianapolis Department of Public Works is working to keep millions of gallons of raw sewage out of Fall Creek and other area waterways.

Inflatable rubber dams have been placed within the sewer system at three locations near 32nd and 34th streets to prevent thousands of gallons of raw sewage and polluted stormwater from spilling into Fall Creek with each rainfall. Together, these inflatable dams are preventing 30 million gallons of raw sewage overflows into Fall Creek every year.

When stormwater enters the sewers, the dam inflates to block the overflow pipe and direct the wastewater to the city's treatment plants. After the storm, when the flows in the sewer system recede, the dam deflates. Inflatable dams help save money by using existing sewer lines to contain and reduce raw sewage overflows.

Electronic sensors upstream and downstream of the dam send data to a centralized computer, which activate the dam as needed.

The red dots show where inflatable dams have been inserted to reduce sewer overflows into Fall Creek.



PROJECT BENEFITS:

- Reduce overflows to Fall Creek at 32nd and 34th street
- Improve stream water quality
- Reduce solids and floatables in the Fall Creek Basin
- Reduce odor

Project Cost:	$3.3 million
Design Engineer:	Howard Needles Tammen & Bergendorff
Contractor:	Bowen Engineering
Inspection Firm:	American Consulting Engineers, Inc.
Completion Date:	November 2003
Status:	In Service

For more information visit our Web site at www.indycleanstreams.org

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

FACT SHEET

CITY OF INDIANAPOLIS

Clean Stream Program

Treatment Plant Improvements Reduce Bypasses During Wet Weather Events

The City of Indianapolis Department of Public Works has completed a $28 million project that will prevent millions of gallons of raw sewage from flowing into White River and Little Buck Creek.

Improvements at the Belmont and Southport Advanced Wastewater Treatment Plants included construction of flow equalization basins and a new raw sewage pumping station. The basins and the pumping station will reduce the frequency and volume of raw sewage overflows into the White River and Little Buck Creek by temporarily storing the flows during wet weather until the plants have the capacity to treat the flows.

The $15.3 million wet-weather upgrades at the Belmont AWT plant include two earthen-walled, double-lined flow equalization basins and two combination concrete storage tanks / primary clarifiers. Combined, these facilities will store up to 38 million gallons of wastewater.

The $12.8 million Southport upgrade aims to reduce combined sewage overflows to Little Buck Creek and the White River. The wet weather improvements at the Southport AWT plant include a new 75 million gallon/day raw sewage pump station, new 48-inch force mains to convey flows, and an earthen-walled double-lined equalization basin for storage and later treatment. The Southport basin has the capacity to store up to 25 million gallons of wastewater.

On average, Indianapolis has 45 to 80 storms causing raw sewage overflows per year. The project was completed on budget and months ahead of schedule.

This project is part of the city's long-term control plan to combat the century-old problem of raw sewage overflows into our local waterways.

Belmont flow equalization basin

ANTICIPATED PROJECT BENEFITS:

- Reduce frequency and volume of raw sewage overflows into White River and Little Buck Creek.

For more information visit our Web site at www.indycleanstreams.org

Design Engineer:	HNTB Corporation
Contractor:	Bowen Engineering
Inspection Firm:	Greeley and Hansen
Project Cost:	$28 million
Completion Date:	August 2005

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

CITY OF INDIANAPOLIS

Clean Stream Program

FACT SHEET

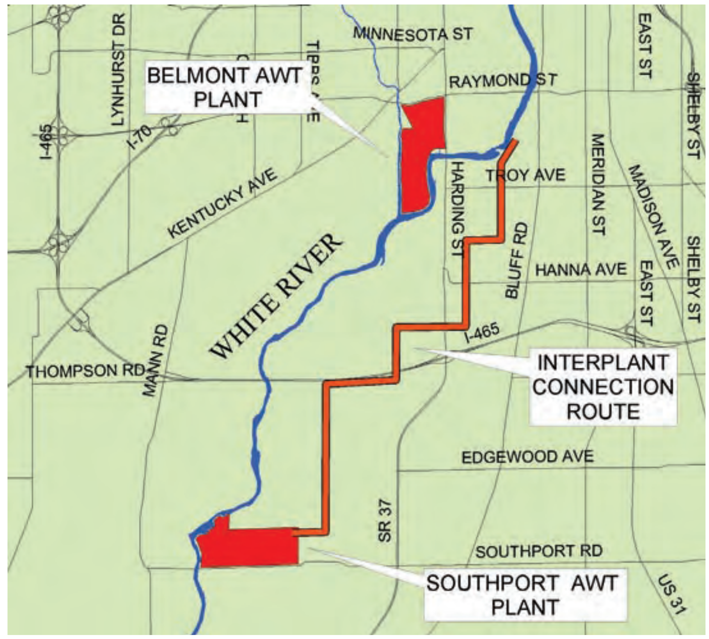
Interplant Connection Facility Plan

The City of Indianapolis Department of Public Works is working to reduce raw sewage overflows to the White River, Fall Creek and other neighborhood streams. This project evaluated alternatives for construction of a new sewer between the Belmont and Southport advanced wastewater treatment (AWT) plants. This plan also investigated approaches to convey all or part of the captured combined sewage to the Southport AWT facility for treatment. The facility planning also developed and evaluated various concepts for expanding the Southport facility to provide effective treatment of the captured combined sewage. Expansion alternatives for the Belmont AWT facility were evaluated previously during the preparation of the 2001 long-term control plan and subsequent pilot studies at the facility.

The interplant connection consists of a 144-inch diameter interceptor sewer that would originate just west of the Southern Avenue and Bluff Road intersection (near CSO 117) and terminate near the headworks of the Southport plant. Initially, the interceptor would store and convey overflows captured from CSO 117. After the deep tunnel is constructed, the new interceptor would convey overflows captured in the tunnel. The project will improve the city's ability to transport sewage to the Southport AWT plant at higher levels of flow.

ANTICIPATED PROJECT BENEFITS:

- Increase capability to treat collected sewage by sending flows to the Southport AWT plant when capacity is available.
- Reduce bypass flows at Belmont AWT facility.
- Optimize treatment plant capacities.
- Reduce raw sewage overflow volumes and occurrences.
- Improve water quality and protect public health.



For more information visit our Web site at www.indycleanstreams.org

Project Cost:	$440,000 (Facility Plan)
Design Engineer:	MWH America, Inc. (Indianapolis Clean Stream Team)
Completion Date:	April 2004 (Study)
Status:	Study Completed

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

FACT SHEET

CITY OF INDIANAPOLIS

Clean Stream Program

Pogues Run Sewage Overflow Reduction

The Indianapolis Department of Public Works will reduce sewage overflows near four local schools through a sewer and tunneling project under construction on the city's eastside.

Pogues Run was selected for the city's first tunneling project because of its proximity to Arsenal Tech High School, Harshman Middle School, Horizon Alternative Middle School and Theodore Potter Elementary School.

Focusing on the lower portion of Pogues Run between 10th and New York streets, the project will rehabilitate old brick sewers, dig a new tunnel to capture sewer overflows and redirect those overflows into an existing downtown tunnel—away from the schools. See map and detailed project description on back.

Overflows in the area should be reduced from an average of 22-38 storms in a typical year to four overflows or less, based on average rainfall statistics. Fewer overflows will occur in dry years; wet years may cause more than four.

All three phases of the project are scheduled to be complete by August 2006.

For more information visit our Web site at www.indycleanstreams.org

Project Budget: $19.2 million

Design Firm: Clark Dietz, Inc. and Brierly Associates

Inspection Firm: Christopher B. Burke Engineering Ltd.

Contractors: Walsh Construction Company, Super Excavators Inc., and Insituform Technologies, USA, Inc.

Expected Completion Date: August 2006

Project Benefits:

- Reduces the frequency and volume of raw sewage overflows to Pogues Run
- Improves water quality near neighborhoods and schools
- Pedestrian bridge and channel improvements to Pogues Run

Special Features: A new tunnel will capture the overflows and relocate them into a downtown tunnel, away from schools

Walsh Construction crew members pour concrete to create a wastewater collection structure under East Michigan Street near Pogues Run, as part of Phase 1. Eventually, three sewer pipes will converge into the underground box, which will direct overflows into an underground tunnel and away from area schools and neighborhoods.

Super Excavators will use tunnel boring equipment like this to dig the tunnel for Phase 2.

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

Pogues Run Sewage Overflow Reduction (continued)

The Pogues Run project will be completed in three phases

PHASE 1

The project started in early 2005 when workers began digging under Michigan Street near the Interstate 65-North ramp to build a sewage collection box and a connecting sewer from Michigan Street up to 10th Street to capture sewer overflows.

PHASE 2

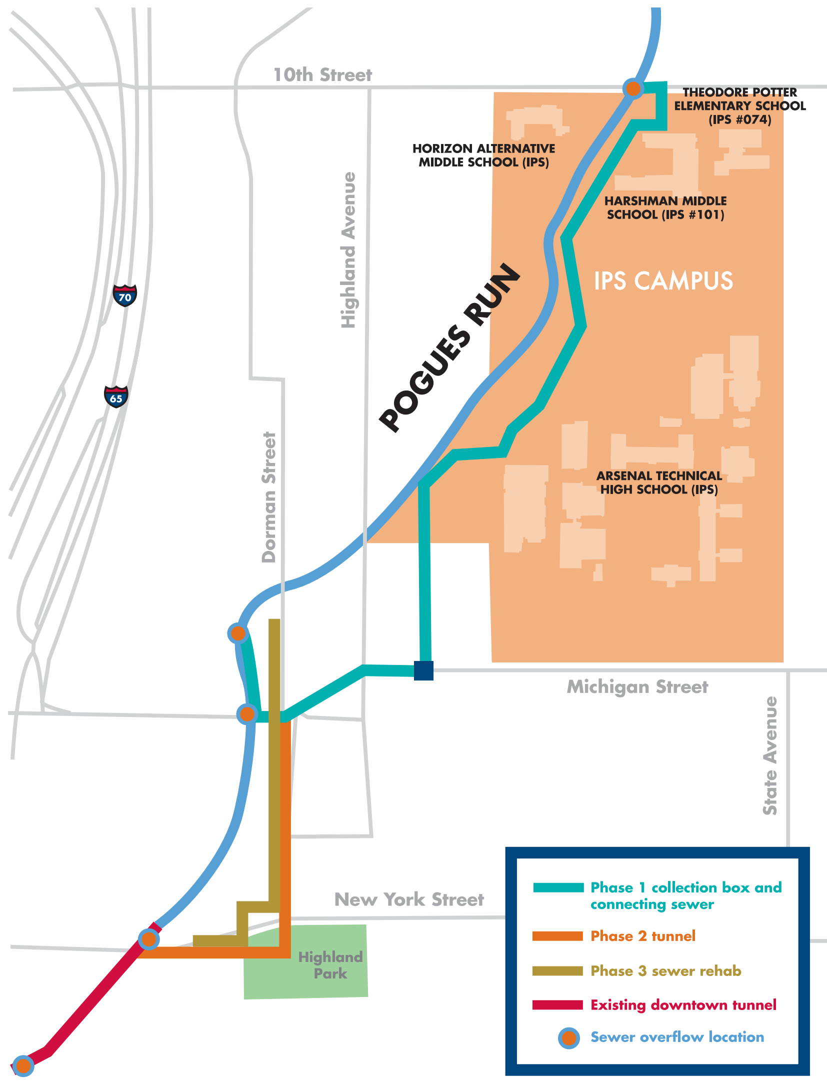
The second phase, initiated in March 2005, involves digging a tunnel connecting the new Michigan Street collection structure to the existing downtown tunnel. State-of-the art tunneling equipment will be launched from Highland Park, located at New York and Dorman streets.

PHASE 3

Phase three will include rehabilitation of brick sewers along Dorman and New York streets. All three phases are scheduled to be complete in 2006. Another key part of this $19.2 million construction project includes the replacement of the old Dorman Street pedestrian bridge and the widening of Pogues Run. These changes will bring the Cottage Home neighborhood out of the 100-year flood zone and allow residents to discontinue their flood insurance.

FUTURE

This project reduces overflows in the lower reach of Pogues Run. Additional improvements will be made later to reduce overflows in the upper portions of Pogues Run under the city's long-term control plan.



This 3-phase project will capture sewer overflows and relocate them to an underground tunnel and away from area schools.

CITY OF INDIANAPOLIS

Clean Stream Program

FACT SHEET

Odor Control

The odor control device near 34th & Sutherland helps control smells that occasionally surface as wastewater moves through the neighborhood to the Belmont Advanced Wastewater Treatment Plant on the southside. The Indianapolis Department of Public Works has made a substantial investment in the facility to ensure that odors are less frequent and not offensive to the surrounding neighborhood.

The odor control device works in tandem with a concrete junction chamber that sits beside it. The junction chamber receives wastewater from northeastside neighborhoods through a large pipeline, known as a force main. Odors can escape when sewage drops from the force main into the Fall Creek interceptor sewer, which carries wastewater to the treatment plant.

Instead of escaping into the neighborhood, air from the force main is now forced into the odor control device. The air then moves through a filtering process that involves wood chips soaked in ferrous chloride. The filters are designed to remove a variety of odors associated with sewage and wastewater, allowing cleaner air to be diffused back into the environment.

The city takes numerous other steps to ensure the odor control device works effectively. Each day, the city adds water and chemical solutions upstream of the site to help increase flows and eliminate odors. Monitoring equipment on the odor control device itself tracks the proper operation of the facility.

Both the odor control device and the junction chamber sit next to a newly opened portion of the Monon Trail that attracts a number of outdoor enthusiasts, including runners, walkers and bicyclists.

The odor control device (above) helps remove a variety of odors associated with wastewater and sewage. It sits next to a junction chamber that receives wastewater from northeastside neighborhoods.

For more information visit our Web site at www.indycleanstreams.org

Project Cost:	$135,000, including landscaping
Design Firms:	Donohue & Associates, Inc. Shrewsberry & Associates, LLC
Completion Date:	2003
Contractor:	Bowen Engineering Corp.
Inspection Firm:	American Consulting, Inc.
Project Benefits:	Improved air quality for neighborhood residents
Special Features:	The odor control device utilizes a chemical filtering system that removes a number of odors associated with sewage and wastewater.

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

Ozonation at Belmont to Benefit White River

Aquatic life should soon benefit from higher oxygen levels in the White River downstream of the city's advanced wastewater treatment plants, as the city returns to high purity oxygen treatment and ozonation for disinfection.

Following filtration, ozone will again be passed through the treated effluent as the final step before discharge. City engineers working to restore ozonation say ozone is superior at removing viruses and is effective against waterborne disease organisms harmful to humans. As a benefit, ozone's chief by-product is oxygen, which, when added to the river, benefits aquatic life.

"Ozone provides several advantages" said Jim Parks, a senior project engineer with the city's Department of Public Works. "Of disinfectants we could use, we believe this is best overall for the river."

Indianapolis was the first large U.S. city to ozonate wastewater in the 1980s. Ozonation was effective, but due to costs and maintenance issues, it was abandoned after 1994. Disinfection switched to chlorine bleach. Parks noted ozonation is commonly used for drinking water. Technology improvements make ozonation more reliable and cost effective with less maintenance.

ANTICIPATED PROJECT BENEFITS:

- Increase the wet weather flow capacity at the Belmont treatment plant.
- Upgrade of ozonation treatment flow rate for dry weather flows.
- Increase oxygen production capability.
- Improve pollutant removal efficiency in the wastewater treatment facility.
- Improve plant effluent quality
- Improve stream water quality and protect the public health.

For more information visit our Web site at www.indycleanstreams.org

Contractor:	Ozonia North America (Equipment)
Project Cost:	$515,000 (Design) $22.5 million (Construction)
Completion Date:	May 2004 (Design)
Status:	Ready for Contract Award

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

FACT SHEET

CITY OF INDIANAPOLIS

Clean Stream Program

Pilot Study for Wet Weather Flows at Belmont Treatment Plant

The City of Indianapolis Department of Public Works is working to reduce millions of gallons of sewage overflows at the Belmont Advanced Wastewater Treatment Plant. Overflows at the Belmont plant cause 2.2 billion gallons of partially treated wastewater to enter the White River each year.

The city conducted extensive pilot testing at the Belmont AWT plant in 2003 to evaluate several chemical clarification methods for removing suspended solids from the effluent of the existing trickling filter bio-roughing system (BRS). The goal of the bio-roughing solids clarification concept was to provide the equivalent of secondary biological treatment of wet-weather primary effluent bypasses using the existing bio-roughing system for soluble biological oxygen demand removal and new clarification equipment for suspended solids removal.

The results from the pilot program showed that chemically assisted clarification technologies were able to consistently achieve effluent total suspended solids concentrations below 45 mg/L when applied to the trickling filter bio-roughing effluent. However, chemical requirements and associated sludge generation rates were relatively high. Conventional clarification of the BRS effluent without some form of chemical or biological coagulation of the suspended solids was shown to be unreliable.

BOD_5 removal estimates based on piloted TSS removals suggested that traditional monthly secondary standards for BOD_5 (i.e., 30 mg/L monthly average limits) could not reliably be achieved by chemically assisted clarification methods. This is because chemically assisted clarification has essentially no effect on reducing the relatively high Belmont soluble BOD concentration. Therefore, the city concluded that the wet-weather treatment process at the Belmont plant must be more aggressive in terms of removing soluble BOD_5.

Accordingly, the study concluded that the preferred wet-weather treatment option would involve a trickling filter/solids contact (TF/SC) process. The TF/SC process would require new solids clarifiers following the bio-roughing towers, supplemented with biological contact and reaeration tanks. In other words, the existing bio-roughing process would be upgraded to a TF/SC process, a well-established and highly economical secondary treatment method.

ANTICIPATED PROJECT BENEFITS:

- Increase wet weather treatment capacity.
- Meet instream water quality requirements at lower costs to ratepayers.
- Reduce raw sewage overflow volume and frequency of overflows.
- Reduce Belmont Treatment Plant overflows and bypasses.
- Evaluate the effectiveness of new technologies before funds are spent on construction.

For more information visit our Web site at www.indycleanstreams.org

Design Engineer:	Shrewsberry & Associates
Project Cost:	$807,000 (Study)
Completion Date:	May 2004
Status:	Waiting for permit approval from state and federal authorities to begin construction.

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

CITY OF INDIANAPOLIS

Clean Stream Program

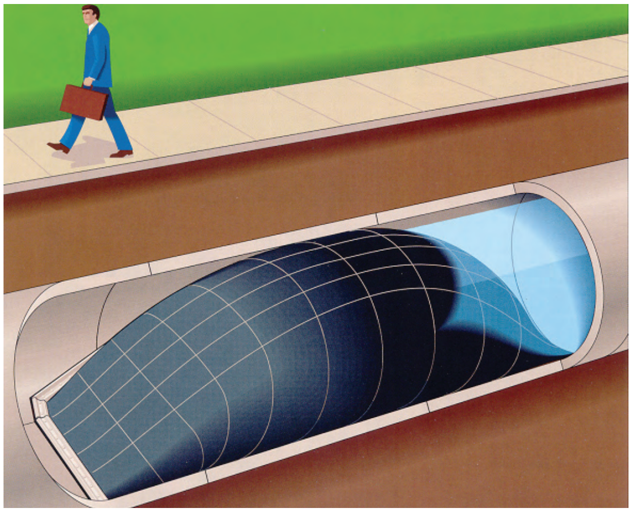
FACT SHEET

Pleasant Run Inflatable Dam (Ellenberger Park)

The City of Indianapolis Department of Public Works has completed a project that keeps millions of gallons of raw sewage out of Pleasant Run near Pleasant Run Parkway, East Drive at Michigan Street.

The inflatable rubber dam placed within the sewer system prevents up to 350,000 gallons of raw sewage and polluted stormwater from spilling into Pleasant Run with each rainfall. Currently about 28 million gallons overflow each year from this location.

When stormwater enters the sewers, the dam inflates to block the overflow pipe and direct the wastewater to the city's treatment plants. After the storm, when the flows in the sewer system recede, the dam deflates. Inflatable dams like this one help save money by using existing sewer lines to contain and reduce raw sewage overflows. Electronic sensors upstream and downstream of the dam send data to a centralized computer, which activates the dam as needed.



This project also helps to reduce the amount of raw sewage flowing through Ellenberger Park after a rainfall. It is part of a $5.6 million effort to install automated sewage control technologies in locations throughout the city. More work will be required in the future to further reduce overflows along Pleasant Run.

For more information visit our Web site at www.indycleanstreams.org

Design Engineer:	Triad Engineering, Inc.
Contractor:	Bowen Engineering Corp.
Inspection Firm:	M.D. Wessler & Associates, Inc.
Project Cost:	$711,000
Completion Date:	September 2003
Project Benefits:	• Prevents up to 350,000 gallons of raw sewage with each rainfall. • Improves the water quality in Pleasant Run.
Special Features:	Electronic sensors upstream and downstream of the dam send data to a centralized computer, and activates the dam as needed.

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

DPW

CITY OF INDIANAPOLIS

Clean Stream Program

FACT SHEET

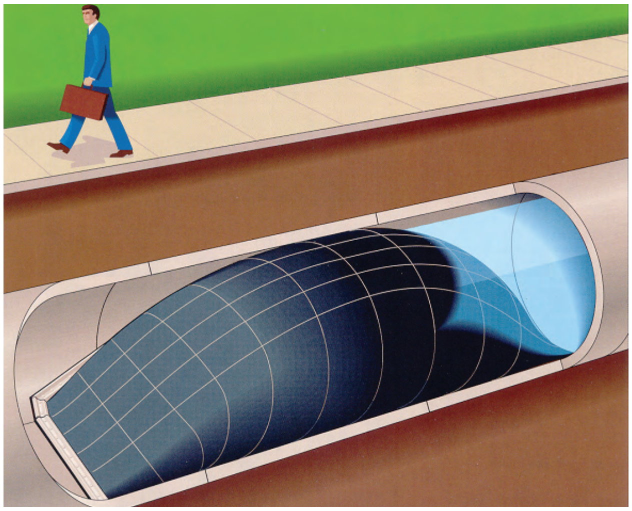
Pleasant Run Inflatable Dam (Howe Middle School)

The City of Indianapolis Department of Public Works has completed a project to keep millions of gallons of raw sewage out of Pleasant Run near Howe Middle School.

An inflatable rubber dam within the sewer system to prevent up to 30,000 gallons of raw sewage and polluted stormwater from spilling into Pleasant Run with each rainfall. Currently about 15 million gallons overflow each year from this location.

When stormwater enters the sewers, the dam inflates to block the overflow pipe and direct the wastewater to the city's treatment plants. After the storm, when the flows in the sewer system recede, the dam deflates. Inflatable dams like this one help save money by using existing sewer lines to contain and reduce raw sewage overflows. Electronic sensors upstream and downstream of the dam will send data to a centralized computer, which will activate the dam as needed.

This project also helps to reduce raw sewage flowing through Christian Park and Garfield Park after a rainfall. It is part of a $5.6 million effort to install automated sewage control technologies in locations throughout the city.



Design Engineer:	Triad Engineering, Inc.
Contractor:	Bowen Engineering Corp.
Inspection Firm:	M.D. Wessler & Associates, Inc.
Project Cost:	$649,900
Completion Date:	September 2003
Project Benefits:	• Prevents up to 30,000 gallons of raw sewage with each rainfall. • Improves the water quality in Pleasant Run.
Special Features:	Electronic sensors upstream and downstream of the dam will send data to a centralized computer, which will activate the dam as needed.

For more information visit our Web site at www.indycleanstreams.org

INDIANAPOLIS CLEAN STREAM TEAM

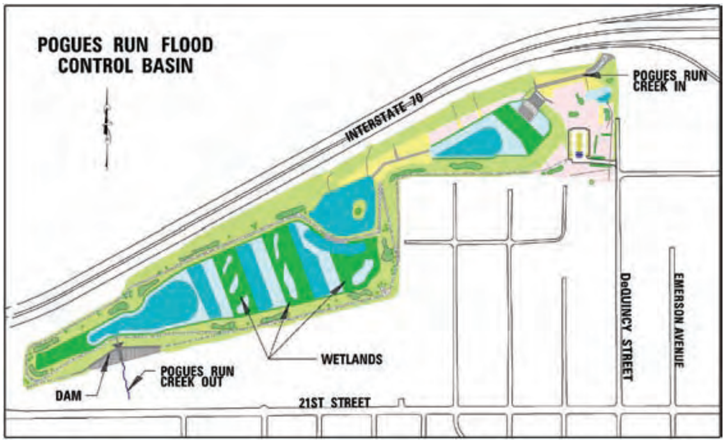
City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

Pogues Run I-70/Emerson Avenue Wetlands

The City of Indianapolis Department of Public Works is working to reduce neighborhood flooding along Pogues Run and other area waterways. This project's primary purpose was to reduce historic flooding in many neighborhoods along Pogues Run. Combined with other projects, it also gives the city more options for reducing sewer overflows elsewhere on Pogues Run.

The project involved construction of open detention ponds, wetlands, and energy dissipation along Pogues Run upstream of the combined sewer area. The wetlands store stormwater that would otherwise flood many neighborhoods downstream during a heavy rain. The wetlands are located just south of Interstate 70 near the Emerson Avenue exit on the city's Eastside.



PROJECT BENEFITS:

- The completed project has significantly reduced long-term historical flooding in the urban Pogues run watershed by detaining stormwater and discharging to Pogues Run after the storm has subsided.
- The wetland facility is reducing stormwater pollution in the watershed.
- The reduction of stormwater discharged to Pogues Run allows the city to convert one of the barrels in the downstream Pogues Run tunnel into a storage facility for sewer overflows, thus reducing raw sewage overflows in lower Pogues Run.

Design Engineer:	Christopher B. Burke Engineering, Ltd.
Contractor:	Gradex, Inc.
Inspection Firm:	Christopher B. Burke Engineering, Ltd. VS Engineering, Inc.
Project Cost:	$17.3 million
Completion Date:	January 2003
Status:	In-Service

For more information visit our Web site at www.indycleanstreams.org

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

FACT SHEET

CITY OF INDIANAPOLIS

Clean Stream Program

Primary Clarifiers at Belmont Advanced Wastewater Treatment Plant

The City of Indianapolis Department of Public Works is working to reduce millions of gallons of sewage overflows at the Belmont Advanced Wastewater Treatment Plant. Overflows at the plant cause 2.2 billion gallons of untreated wastewater to enter the White River each year.

This project converted existing pre-aeration tanks at the plant to primary clarifiers. This project provides increased primary treatment capacity by 30 million gallons per day and helps alleviate wet-weather overflows to the White River.

ANTICIPATED PROJECT BENEFITS:

- Provide 30 MGD additional primary treatment capacity at the Belmont AWT Plant.
- Reduce Belmont AWT Plant overflows and bypasses.
- Improve stream water quality and protect public health by reduction of overflow volumes.

For more information visit our Web site at www.indycleanstreams.org

Design Engineer:	Howard Needles Tammen & Bergendorff
Contractor:	Bowen Engineering
Inspector Firm:	Howard Needles Tammen & Bergendorff
Project Cost:	$3.49 million
Completion Date:	March 1999
Status:	In Service

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

CITY OF INDIANAPOLIS

Clean Stream Program

FACT SHEET

Beautiful, clean streams and rivers add to the quality of life in our city. The White River and neighborhood streams are resources that residents and visitors enjoy for fishing, boating and other recreation. Birds, fish, turtles and a variety of other wildlife make their homes in and along these waterways.

INDIANAPOLIS
CLEAN STREAM TEAM

The Problem

Indianapolis streams are polluted. Although many factors contribute to pollution in our waterways, a major source is raw sewage overflow from the city's out-of-date sewer system. When it was built many years ago, the sewer system was considered beneficial because it carried both sewage and stormwater away from homes, businesses and streets, as was common practice throughout the United States. Today, as in many cities around the country, Indianapolis' sewer system can no longer handle the amount of sewage and rainwater that flows through it.

As little as a quarter-inch of rain causes raw sewage, toilet paper, and sanitary items to flow into our streams and waterways. Raw sewage overflows occur about 60 times a year in portions of White River, Fall Creek, Pleasant Run, Pogues Run, Eagle Creek and other waterways. About 6 billion gallons of contaminated water goes into these streams each year.

Raw sewage flowing into streams is a health hazard, smells and looks disgusting, hurts our environment and harms the quality of life in our neighborhoods. In many neighborhoods, overflows cause offensive odors in parks, greenways and homes. Raw sewage in our streams prevents us from becoming a world-class city that can attract new businesses, jobs and residents.

The Solutions

RAW SEWAGE OVERFLOW CONTROL PROGRAM

The City of Indianapolis worked with technical experts and the public to develop a long-term plan that includes new sewers, storage tanks, deep storage tunnels and other measures to reduce pollution in area streams. When approved, this plan will represent the single largest investment in water quality in the city's history.

SEPTIC CONVERSION PROGRAM

While the raw sewage overflow program addresses a big part of the problem, efforts are also underway to take care of other contributing factors. For example, Indianapolis has one of the highest concentrations of homes served by on-lot sewage treatment systems of any large city in the country. In many cases these septic systems are failing or have failed, causing health hazards in neighborhood ditches and streams. A septic conversion program is underway to take 18,000 families off septic systems in the next 20 years.

DRAINAGE/FLOOD CONTROL PROGRAM

Stormwater control also plays a major role in helping to improve our waterways. When it rains or snow melts, water runs off driveways, parking lots, sidewalks and roofs into the stormwater drainage system. The City-County Council established a user fee in 2001 to fund drainage, flood control and water quality improvements. Numerous projects to control stormwater and improve neighborhood flooding problems are already underway.

City of
Indianapolis
Bart Peterson, Mayor

Our Investment

Improving water quality requires an investment in our future. Mayor Bart Peterson has already invested more than $50 million to modernize the city's wastewater treatment plant and improve the sewage collection system. By 2006, we will spend $184 million on early projects to address this problem. Although the city's total cost won't be known until the final long-term plan is approved by state and federal agencies, we will have to invest at least $1 billion to implement the work contained in the plan. As work proceeds, the city's focus will be on directing dollars toward solutions, not fines and legal fees.

The city's goal is to create an affordable plan that will greatly improve water quality and protect people's health. However, we can't afford to expand the sewer system to capture every large storm. This means there will still be some overflows into our streams during the heaviest rainfalls.

What's Next?

The city is working closely with the public and state and federal regulatory agencies to develop the long-term plan. Once approval is obtained, implementation of the plan can begin. However, the city is not waiting to take action. More than 50 "early action projects" are already underway to reduce raw sewage overflows in streams that flow through our neighborhoods and near parks and schools.

Join the Clean Stream Team

We need you to join us in solving the problem of raw sewage in our streams. Everyone has a role – individual citizens, government, non-profit organizations, businesses, industry, and community groups.

Everyone can adopt environmentally friendly practices:

- Clear gutters and storm sewer drains of leaves and debris.
- Properly dispose of motor oil, antifreeze, battery acid and household chemicals. Call 327- 4TOX to learn how.
- Disconnect downspouts and sump pumps connected to sewers.
- Reduce water use in your homes and businesses.
- Compost leaves, branches and grass clippings.

For those interested in getting more involved, come to a public meeting and learn more about what is being done and let us make a presentation to your civic association or neighborhood group.

To learn more about the Indianapolis Clean Stream Program, visit www.indycleanstreams.org.

To receive notification of sewer overflows, call the Sewer Overflow Hotline at 327-1643 or sign up for email alerts at www.indycleanstreams.org.

For other citizen issues and concerns, please call the Mayor's Action Center at 327-4MAC (327-4622).

Photos of White River and blue heron provided by Stephen Sellers.

CITY OF INDIANAPOLIS

Clean Stream Program

FACT SHEET

Pump Bypass to Reduce Overflows at Belmont Treatment Plant

The City of Indianapolis Department of Public Works is working to reduce millions of gallons of sewage overflows at the Belmont Advanced Wastewater Treatment Plant. Overflows at the Belmont plant cause 2.2 billion gallons of untreated wastewater to enter the White River each year.

This project provides additional treatment capacity at the Belmont plant by diverting more flow to the city's Southport Advanced Wastewater Treatment Plant. The Southport plant often has capacity during wet weather when Belmont is overloaded. The project gets more flow to Southport by increasing the pumping rate through a diversion structure to 30 MGD from 17 MGD.

PROJECT BENEFITS:

- Provide for an additional 13 MGD treatment by utilizing the available treatment capacity at Southport AWT Plant.
- Reduce raw sewage overflow volumes and frequency.
- Improve water quality and protect public health.

For more information visit our Web site at www.indycleanstreams.org

Project Cost:	$1.3 million
Completion Date:	October 1997
Status:	In-Service

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

FACT SHEET

CITY OF INDIANAPOLIS

Clean Stream Program

SCADA System Phase 1

The City of Indianapolis Department of Public Works recently completed a study for a Supervisory Control and Data Acquisition (SCADA) system. This system will help improve the operation of the sewer system and reduce sewage overflows.

This study recommends that the city construct a SCADA system that uses a wireless broadband communication system incorporating the countywide microwave structure of the Metropolitan Emergency Communications Agency (MECA). A SCADA system consists of three primary elements: remote site equipment, a communication network, and control facility.

SCADA systems collect information from numerous remote sites on either a real-time or periodic basis so that system managers can be aware of system status, identify current operating needs, manage equipment maintenance, and take action to minimize or avert operational upsets. Effective use of SCADA will optimize the use of a wastewater conveyance system while saving operation and maintenance costs.

The proposed SCADA system is intended to provide the capabilities and performance necessary for it to become the cornerstone management tool for the city's wastewater collection system. This system will replace the city's existing wastewater conveyance alarm system. The proposed SCADA system will provide for monitoring and control of wastewater sites located throughout the Marion County area. The city currently owns a large number of wastewater sites that either control wastewater flow or provide information important in managing that flow. Implementation of the raw sewage overflow long-term control plan will add a significant number of new facilities.

ANTICIPATED PROJECT BENEFITS:

- Improved data reporting from remote lift stations will make operation and maintenance more efficient and will allow for faster diagnosis of lift station problems.

For more information visit our Web site at www.indycleanstreams.org

Design Engineer:	Donohue & Associates
Project Cost:	$3 million
Completion Date:	August 2005 (Design)
Status:	Design Completed

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

CITY OF INDIANAPOLIS

Clean Stream Program

FACT SHEET

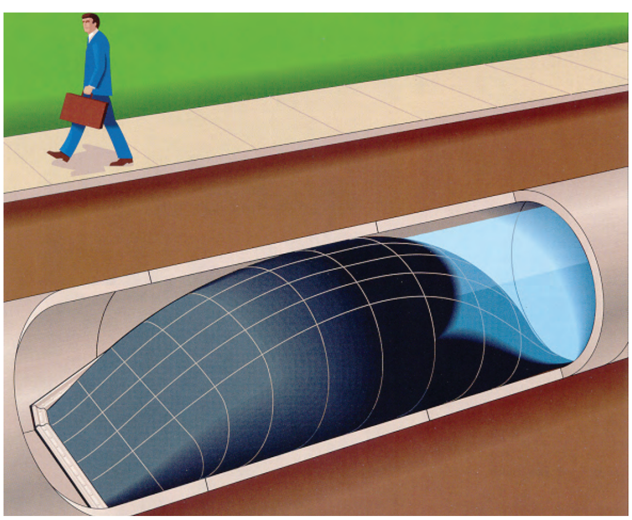
White River Inflatable Dam (West Street)

The City of Indianapolis Department of Public Works has completed a project to keep millions of gallons of raw sewage out of White River near West Street at White River Parkway, East Drive.

The inflatable rubber dam within the sewer system prevents more than 120,000 gallons of raw sewage and polluted stormwater from spilling into White River with each rainfall. Currently about 178 million gallons overflow each year from this location.

When stormwater enters the sewers, the dam inflates to block the overflow pipe and direct the wastewater to the city's treatment plants. After the storm, when the flows in the sewer system recede, the dam deflates. Inflatable dams like this one help save money by using existing sewer lines to contain and reduce raw sewage overflows. Electronic sensors upstream and downstream of the dam send data to a centralized computer, which will activate the dam as needed.

This project is part of a $5.6 million effort to install automated sewage control technologies in locations throughout the city. More work will be required in the future to further reduce overflows along White River.



For more information visit our Web site at www.indycleanstreams.org

Design Engineer:	Triad Engineering, Inc.
Contractor:	Bowen Engineering Corp.
Inspection Firm:	M.D. Wessler & Associates, Inc.
Project Cost:	$1.1 million
Completion Date:	September 2003
Project Benefits:	• Prevents up to 120,000 gallons of raw sewage with each rainfall. • Improves the water quality in White River.
Special Features:	Electronic sensors upstream and downstream of the dam will send data to a centralized computer, which will activate the dam as needed.

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

CITY OF INDIANAPOLIS

Clean Stream Program

FACT SHEET

White River Pinch Valve System (10th Street)

The City of Indianapolis Department of Public Works has completed a project to keep millions of gallons of raw sewage out of White River near 10th street.

The pinch valve system was within the sewers to hold back raw sewage and polluted stormwater from spilling into White River with each rainfall. The pinch valve system diverts rainwater and sewage when sewage pipelines south of the site are at or above capacity. When necessary, the valve closes, allowing flow to be stored upstream. After a storm, when the flows in the sewer system recede, the pinch valve opens and release the stored water.

Electronic sensors upstream and downstream of the valve send data to a centralized computer, which will activating the valve as needed.

The White River pinch valve system is part of a $5.6 million effort to install automated sewage control technologies in locations throughout the city. More work will be required in the future to further reduce overflows along White River.

This project won a 2004 Technical Innovation Award from the American Water Works Association.

For more information visit our website at www.indycleanstreams.org

The pinch valve system diverts flows from sewers that overflow during a storm to sewers that aren't full.

Design Engineer:	Triad Engineering, Inc.
Contractor:	Bowen Engineering Corp.
Inspection Firm:	M.D. Wessler & Associates, Inc.
Project Cost:	$1,206,950
Completion Date:	September 2003
Project Benefits:	Improves the water quality in White River.
Special Features:	Electronic sensors upstream and downstream of the pinch valve will send data to a centralized computer, which will activate the valve as needed.

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

CITY OF INDIANAPOLIS

Clean Stream Program

FACT SHEET

White River/Fall Creek Tunnel Evaluation Study

The City of Indianapolis Department of Public Works is working to reduce sewage overflows to neighborhood streams. The city has completed a preliminary study for a deep underground tunnel that will store millions of gallons of sewage that now flows into White River, Fall Creek and other streams during some wet weather events.

The study represents the city's first look at important issues such as groundwater protection, tunnel length and route, and geology – especially in the bedrock where the tunnel will be built.

Underground solutions are becoming more common in cities because there is little or no room above ground for the facilities we need to build.Following the results of the geotechnical exploration program and considering other factors, the tunnel is expected to be dug approximately 200-250 feet below ground with a tunnel boring machine.

Tunneling minimizes disruption to neighborhoods, but some construction will be required on the surface. The city will need one or two staging areas at ground level to dig a vertical shaft and launch the machine, and another staging area for a retrieval shaft to remove the machine. New sewers and approximately 21 drop shafts will be dug to connect overflow pipes to the tunnel.

The study placed an emphasis on protecting the groundwater supply because parts of the tunnel will run adjacent to city wellfields. The city will ensure wellfield protection through groundwater monitoring, advanced tunnel construction practices, sealing the tunnel with grout and concrete, and limiting the tunnel's fill level and storage time during operation.

The preliminary study suggests the tunnel will be 7.5 to 10.5 miles long and 26-35 feet in diameter. Three different tunnel routes were studied, as shown in Figure 1. The final route will be selected after doing test borings, other studies, and communication with the public.

A typical rock tunnel boring machine is shown in the photo.

The final draft of the Fall Creek Evaluation Study is completed. Based on the initial recommendations, the geotechnical investigation work for the tunnel is currently underway. This work includes ten borings, approximately 350 feet below ground. The final study report and geotechnical was completed in September 2005.

ANTICIPATED PROJECT BENEFITS:

- Meet overflow control and water quality goals of the city's long-term plan.
- Capture raw sewage overflows from Fall Creek, Pogues Run, Pleasant Run and White river and provide storage of captured flows during and after rainfall.
- Improve stream water quality and protect public health.

For more information visit our Web site at www.indycleanstreams.org

Study Consultant: GEC, Inc. and Black & Veatch Corporation

Project Cost: $2.5 million (Study)

Total Project Cost: $600 million

Expected Completion Date: September 2005 (Study)

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis Bart Peterson, Mayor

City of Indianapolis DPW

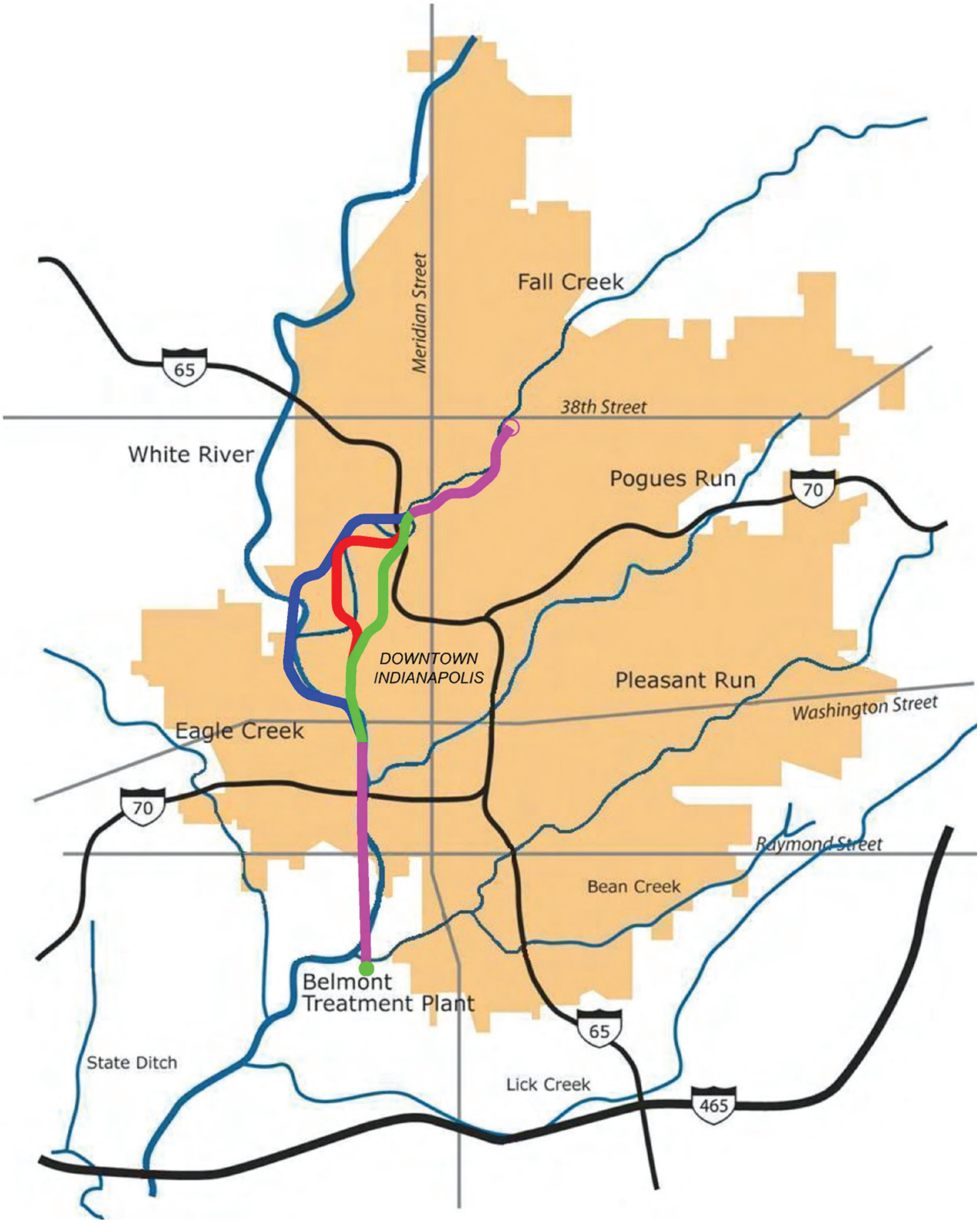


Figure 1 *The above map shows the three different tunnel routes considered in the White River/Fall Creek Tunnel Evaluation Study.*

FACT SHEET

CITY OF INDIANAPOLIS

Clean Stream Program

White River Pinch Valve System (McCarty & Meikel Streets)

The City of Indianapolis Department of Public Works has completed a project to keep millions of gallons of raw sewage out of White River near McCarty and Meikel streets.

The pinch valve system within the sewer holds back raw sewage and polluted stormwater from spilling into White River with each rainfall. The pinch valve system diverts rainwater and sewage when sewage pipelines south of the site are at or above capacity. When necessary, the valve closes, allowing flow to be stored upstream. After a storm, when the flows in the sewer system recede, the pinch valve opens and release the stored water.

Electronic sensors upstream and downstream of the valve send data to a centralized computer, which activates the valve as needed.

This project is part of a $5.6 million effort to install automated sewage control technologies in locations throughout the city. More work will be required in the future to further reduce overflows along White River.

This project won a 2004 Technical Innovation Award from the American Water Works Association.

For more information visit our Web site at www.indycleanstreams.org

The pinch valve system diverts flows from sewers that overflow during a storm to sewers that aren't full.

Design Engineer:	Triad Engineering, Inc.
Contractor:	Bowen Engineering Corp.
Inspection Firm:	M.D. Wessler & Associates, Inc.
Project Cost:	$1.37 million
Completion Date:	September 2003
Project Benefits:	Improves the water quality in White River.
Special Features:	Electronic sensors upstream and downstream of the pinch valve will send data to a centralized computer, which will activate the valve as needed.

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW

Stream Line

City of Indianapolis / Department of Public Works / Clean Stream Program

FALL 2003 | ISSUE 1

Inside This Issue

Statement Of Purpose

The Indianapolis Clean Stream Team is overseeing more than 50 projects to keep raw sewage out of our waterways and improve the quality of life in our neighborhoods. Stream Line is published quarterly to keep you informed about the city's progress in reducing raw sewage overflows and restoring the health of our streams.

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INDIANAPOLIS CLEAN STREAM TEAM

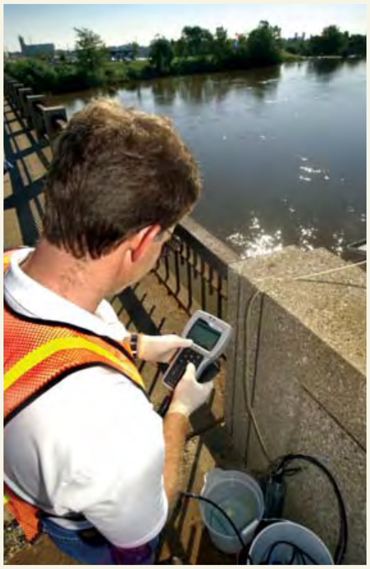
LABOR DAY FLOOD HIGHLIGHTS SEWER NEEDS

DPW crews work overtime to respond to rising waters

No combined storm and sanitary sewer system could have handled Labor Day's record rainfall, but the Sept. 1 deluge did raise public awareness of the shortcomings of the city's century-old system.

Newspaper, television and radio accounts of the flood included news of raw sewage overflows and the need for people to stay away from contaminated floodwaters.

"The storms that saturated Indianapolis on September 1 only underscored the need to upgrade our sanitary and storm sewer systems," said Barbara Lawrence, director of the Department of Public Works. "Raw sewage spilling into our streams is a decades-old problem that we're now taking action to resolve."



DPW's Mark Richards collects data from a water-quality monitor on the 16th Street bridge over the White River following the flood.

Photo by Charlie Nye, courtesy of The Indianapolis Star

Several days of rain, including a record-breaking 7.2 inches on Labor Day, tested the mettle of DPW employees, who also have battled record snowfall and a tornado in the past year. Lawrence praised the work of the department's employees who interrupted their three-day holiday weekend to post street closing signs, staff hotlines, and monitor the condition of levees and bridges.

"Our city's system of storm drains, levees and sewers is comparable to many other urban communities," Lawrence said. "Although there's work to be done to upgrade our system, I am proud of the things we were able to accomplish during the flooding."

Each of the city's levees held back the rising waters as they were designed. A $12.5 million flood basin completed on Pogues Run last year prevented more than 200 million gallons of water from flooding parts of the eastside and downtown.

In the days following the storm, DPW crews worked 12- to 16-hour shifts to pump

(see "Flooding" page 4)

Project Will Help Clean Up Brookside Park

Thousands of gallons of raw sewage will be captured and kept out of Pogues Run in Brookside Park by early next year. Mayor Bart Peterson joined other community and civic leaders in June to break ground on an inflatable dam that will significantly reduce raw sewage overflows in the park.

The inflatable dam is similar to a large balloon. When excess runoff comes into the pipe, the dam will expand to contain it. When flow in the sewer system recedes, the wastewater is directed to the city's treatment plants.

The dam has been installed inside one of Brookside Park's largest sewage outfalls. Nestled inside a 90-inch pipe, the dam can hold up to 500,000 gallons of raw sewage and debris that would otherwise flow untreated into the stream with each rainfall.

(see "Brookside" page 3)

From the Director...

Barbara Lawrence
Director of Public Works

Welcome to the first edition of Stream Line! This quarterly newsletter is designed to keep you informed of the city's progress in reducing raw sewage overflows and restoring the health of neighborhood streams and the White River.

Raw sewage spilling into our streams is a serious problem that we have begun to address. As in many cities around the country, Indianapolis' antiquated sewers can no longer handle the sewage and rainwater that flow through them. Raw sewage in our streams is a health hazard, smells and looks disgusting, hurts our environment and harms our economy and the quality of life in our neighborhoods.

The Department of Public Works is working with state and federal regulatory agencies on a plan to reduce these overflows. This plan, worth $1 billion, will represent the single largest investment in clean water in the city's history.

But even as we negotiate with regulatory agencies, DPW is moving forward on more than 50 projects to start cleaning our streams and protecting public health. These projects are managed by the Indianapolis Clean Stream Team, a group of city staff and consultants working together to reduce raw sewage overflows.

I hope you use Stream Line to stay informed and involved in the important work of the Clean Stream Team. I encourage you to give us feedback on what you read in these pages. We look forward to hearing from you.

City Tests Wet Weather Treatment Technologies

Ana Johnston adjusts controls on one of the wet-weather treatment units being pilot-tested at the Belmont treatment plant.

During wet weather, the city faces a significant challenge in handling flows reaching the Belmont Advanced Wastewater Treatment Plant.

Since May 2003, engineers and operators have been testing wet weather treatment technologies in side-by-side trials to confirm their effectiveness in reducing sewage overflows from the plant under varying conditions. The technologies are especially designed to quickly treat high-rate flows and pollutants.

"These technologies have the potential to save the city hundreds of millions of dollars over conventional treatment while meeting water quality goals," said Carlton Ray, DPW Administrator for Environmental Engineering. Results of the studies will be available next spring.

Shotcrete Used to Restore Sewers

The city is giving new life to 100-year-old brick and reinforced concrete pipe sewers under Michigan Street by using shotcrete, a spray-on concrete mixture.

The shotcrete is sprayed onto the existing pipe wall after the pipe has been cleaned and steel mesh or bars have been added as reinforcement. After the shotcrete dries and cures, the rehabilitated sewer is stronger than the original sewer.

Shotcrete is less expensive than building a new sewer, and much less disruptive to the streets above. "By applying shotcrete, we can extend the life of these sewers by at least 50 years," said Mike Hill, the city's project manager.

Shotcrete can add life to older sewers at less cost and less disruption than building new sewers.

Plants to Receive Electrical Upgrade

Both the Belmont and Southport wastewater treatment plants are receiving plant-wide electrical upgrades and repairs under a $5 million project expected to start construction before year's end.

The project will replace aging electrical switchgear, transformers, motor control centers and electrical enclosures that keep the plants running and improving water quality. "This project will improve the reliability of the electrical systems at both treatment plants," said Tricia Banta, the city's project manager.

Team WET Schools Coming to Indianapolis

As part of the Clean Stream Team's education initiative, three Indianapolis middle schools have agreed to participate in an exciting water education program, Team WET Schools. Harshman, John Marshall and McFarland middle schools will be the first Team WET Schools in the Midwest.

Developed by the Council for Environmental Education in Houston, the program will work with teachers to incorporate urban water education into science, social studies, history and other subjects. The activities promote learning about a range of water issues, from ecology and pollution prevention to wastewater treatment and water stewardship. During the 2003-4 school year, each school will also launch a student-driven stewardship project. For more information, contact the Clean Stream Team at 327-8720.

Brookside (continued from page 1)

Mayor Bart Peterson, (left), City-County Councillor John Bainbridge, NESCO President Josh Bowling, and DPW Director Barbara Lawrence helped break ground earlier this year for an inflatable dam along Pogues Run. The dam will greatly reduce raw sewage overflows in Brookside Park.

"This project means better water quality for those who live on the eastside," Mayor Peterson said. "It's simply unacceptable to have raw sewage overflows in a community park that draws parents and children."

Inflatable dams provide "in-line" storage that helps save money by using existing sewer lines to contain and reduce raw sewage overflows. Other projects will be required in the future to reduce overflows even further along Pogues Run.

"Pogues Run flows through the near eastside through three of our parks and through our high school," said Josh Bowling, President of the Near Eastside Community Organization. "We're very excited this project is underway and we'll be excited when it gets finished."

As the installation of the dam concludes, workers are busy completing final construction. The area will be landscaped in early spring.

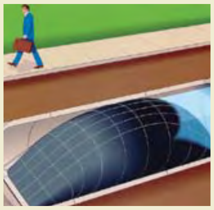
The Department of Public Works has worked on six similar projects elsewhere in the community. Together, these projects will prevent up to 5 million gallons of raw sewage overflows every time it rains.

The Brookside Park project complements other activities underway to clean up Pogues Run. Three other sewage overflow points upstream of the park already have been eliminated or greatly reduced.

"Each of these projects fits into the mayor's goal of creating a world-class city," said DPW Director Barbara A. Lawrence. "One way we accomplish that goal is by taking care of our neighborhoods and environment, and eliminating these disgusting overflows in our streams."

Other In-line Storage Projects

Inflatable dams, pinch valves and other mechanisms prevent sewage overflows by holding flows inside existing pipes until the storm subsides. In addition to the Brookside Park inflatable dam, the city has other in-line storage projects completed or underway in the following locations:



- Pleasant Run at Ellenberger Park
- Pleasant Run near Howe Middle School
- White River at West Street
- White River at 10th Street
- McCarty & Meilke streets near White River
- Fall Creek between 32nd and 34th streets, as well as at Illinois Street (four dams)

Flooding (continued from page 1)

water from streets, clean storm drains, remove debris and hand out sandbags, along with other emergency activities.

Crews brought in equipment from Chicago to pump water from Fall Creek Parkway south of 38th Street, reopening the waterlogged street to morning commuters on September 3.

The onslaught of water overburdened the city's sewer system, causing more than 350 million gallons of raw sewage and stormwater to overflow into area waterways. However, the city's two wastewater treatment plants – Belmont and Southport – worked at full capacity for several days, successfully treating more than 500 million gallons of raw sewage and stormwater per day.

"Our systems performed remarkably well given the conditions we faced," added Mario Mazza, Administrator of Water Management Services. "We saw no failures in our wastewater lift stations, our levees, or our treatment plants."

DPW crews also removed eight tons of trees over a two-day period from an area near 10th Street and Pogues Run. The engineering division felt the trees might cause structural damage to a bridge at the site.

Reminded of the damage rising floodwaters can cause, the city is moving forward with dozens of projects to reduce raw sewage overflows and control stormwater. Even with those projects in place, however, the Labor Day storm would have overwhelmed the system.

"No city can afford to prevent damage from a storm of that size, and that's not our goal," Lawrence said. "However, we are moving forward to make sure our infrastructure is better prepared to manage the more frequent, non-historical storms today and in the future. At the Department of Public Works, meeting that goal is both our daily challenge and our long-term commitment."

The Labor Day rainfall caused flooding at many homes and businesses, such as this location at Fall Creek Parkway and Emerson Way.

National Guardsmen assisted city staff by creating hundreds of sandbags that were made available to home and business owners to hold back rainwater.

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St., Suite 900
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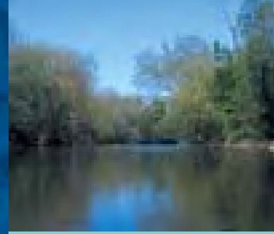

Inside This Issue

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INDIANAPOLIS CLEAN STREAM TEAM

Sewer Overflow Hotline: 327-1643

STREAM IMPROVEMENTS BENEFIT PLEASANT RUN

Inflatable dam will help reduce overflows

A project underway near Howe Middle School will keep millions of gallons of raw sewage out of an eastside stream.

An inflatable rubber dam within the sewer system will prevent thousands of gallons of raw sewage and polluted stormwater from spilling into Pleasant Run with each rainfall. Currently, about 17 million gallons overflow each year from this location.

As in many cities around the country, Indianapolis' sewer system is antiquated and can no longer handle the amount of sewage and rainwater that flows through it. As little as a quarter inch of rain can cause raw sewage to spill into portions of Pleasant Run, White River, Fall Creek, Pogues Run and other area waterways.

Consultants from Triad Engineering Inc. prepare to enter the sewer system near Howe Middle School to verify conditions prior to completing design work on an inflatable dam. They are (left to right) Zig Resiak, John Zant and Rob Suttero.

"Raw sewage in our streams is a health hazard, smells and looks disgusting, hurts our environment and harms the quality of life in our neighborhoods," said Barbara A. Lawrence, Director of the Department of Public Works (DPW).

The inflatable dam, similar to a large balloon, is being placed inside the sewer to trap contaminated water that would otherwise overflow into Pleasant Run.

When storm runoff enters the sewers, the dam will inflate to block the overflow pipe and direct the wastewater to the city's treatment plants. After the storm, when the flows in the sewer system recede, the dam will deflate.

Inflatable dams help save money by using existing sewer lines to contain and reduce raw sewage overflows. Electronic sensors will activate the dam as needed and will eventually send data to a centralized computer, allowing remote and real-time control of flows within the sewer.

"This system allows us to actively control the amount of wastewater going into any part

(see "Pleasant Run" page 4)

Mayor Bart Peterson presents a Team WET Schools certificate to John Marshall Middle School Principal Jamyce Banks.

Teachers Bring Water Lessons into Classroom

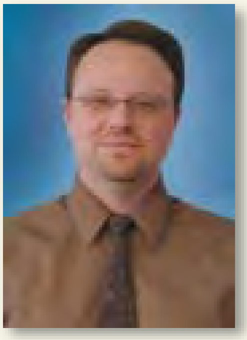
Teachers at three Indianapolis Public Schools campuses have learned how to conduct an urban waterway checkup and how to mix up a recipe for clean water – lessons they are taking to their classrooms through the Team WET schools program. WET stands for Water Education for Teachers.

Teachers at John Marshall, Harshman and McFarland middle schools were trained at the beginning of the 2003-04 school year to bring urban water issues into all kinds of classroom activities.

The urban waterway checkup taught educators about the different environments through which an urban stream travels, and the effects

(see "Teachers" page 4)

New Director Takes the Helm at DPW



James Garrard

The Department of Public Works (DPW) welcomed James Garrard as its new director in January. Garrard, who previously served as administrator of the city's Animal Care and Control Division, started his new position January 12.

Garrard takes over for Barbara Lawrence, who was appointed city controller by Mayor Bart Peterson and will now manage the city's budget and finances. Ms. Lawrence had served as DPW director since January 2002.

Garrard will manage a 595-person department that builds and maintains the city's sewer, wastewater treatment and stormwater systems. DPW employees also maintain city streets, levees and traffic systems; handle trash collection and disposal; and inspect air, land and water for environmental health and safety.

Under Garrard's leadership, DPW will continue to work with state and federal regulatory agencies on a plan to reduce raw sewage overflows into our streams and waterways. The plan, worth at least $1 billion, will represent the single largest investment in clean water in the city's history.

Garrard also will oversee progress on numerous projects that are underway to start cleaning our streams and protecting public health.

Garrard is credited with a turnaround in the city's Animal Care and Control Division. During his tenure, the division dramatically increased outreach and education efforts and worked with volunteer groups and local media to raise awareness of the shelter and animal-related issues. A 38-year-old attorney, Garrard previously served as special counsel in the Office of Corporation Counsel.

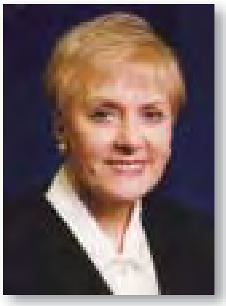
"I am excited about working with the many constituents DPW serves to continue to advance our city as a safe and clean place for everyone," said Garrard.

Ms. Lawrence earned high marks for her management of DPW and will stay involved in helping the department finance water quality improvement projects. In recognition of her leadership, she was named an honorary member of the Clean Stream Team in December.

"I am proud to have headed a department with such a committed and hard-working group of employees," said Lawrence. "We faced several unusual natural events during my administration such as last year's Labor Day flooding, but the DPW staff always met the challenges and performed admirably."

Organizations, Councilwoman Honored for Environmental Leadership

The Indianapolis Department of Public Works honored three organizations and a retiring City-County councilwoman in 2003 for their leadership on water quality issues.



Beulah Coughenour

Former City-County Councillor Beulah Coughenour received honorary membership in the Indianapolis Clean Stream Team on Dec. 3. Among many accomplishments during her 28 years on the council, she spearheaded creation of a stormwater utility to establish dedicated funding for drainage and flood control projects in Marion County. She did not seek re-election in 2003.

On Oct. 9, the department presented Eli Lilly and Company, the Rotary Club of Indianapolis, and the Center for Earth and Environmental Science at Indiana University-Purdue University at Indianapolis (IUPUI) honorary team membership. Together, they have created an environmental restoration project that planted six acres of trees along the White River just west of the IUPUI campus.

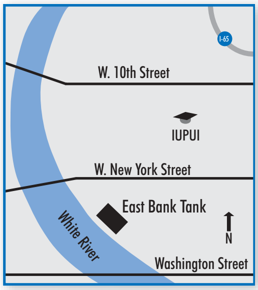
"All along we've known improving water quality would be a team effort," said Department of Public Works Director Barbara A. Lawrence. "City government cannot do it alone. These awards recognize and encourage voluntary community efforts to protect and restore our streams."

If you know someone deserving of the Clean Stream Team award, visit www.indycleanstreams.org to submit a nomination form.

Three community partners were recognized for their work in restoring eight acres along the White River. Pictured (left to right) are honorees Todd Lugar, Rotary Club of Indianapolis; John Wilkins, Eli Lilly and Company; Barbara Lawrence, DPW director; and honoree Dr. Lenore Tedesco, IUPUI.

Tank Project Benefits White River

Along the east bank of White River near downtown, the Department of Public Works is building a 3-million-gallon underground storage tank that will significantly reduce raw sewage overflows. The concrete tank is being built just south of the New York Street bridge and west of the Indiana University-Purdue University at Indianapolis campus.



Map Not To Scale

Tank benefits

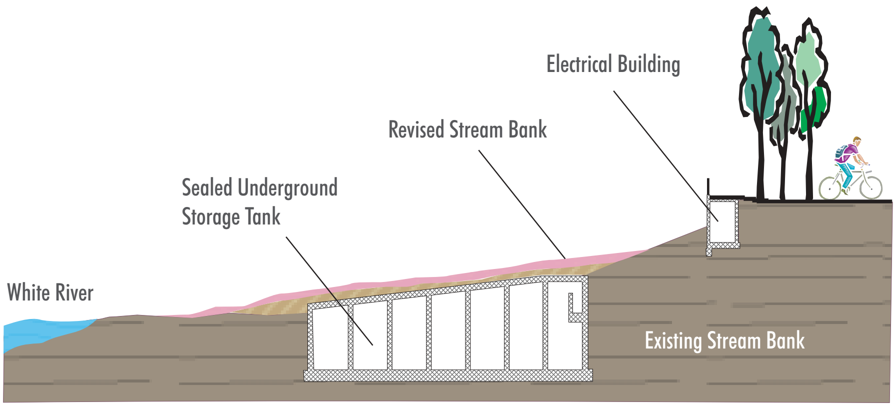
The tank will reduce one of the city's largest sources of raw sewage overflow, known as CSO 039. Between July and December 2001, overflows occurred 29 times at this location. With the storage tank in place, five overflows would have occurred.

Construction details

Donohue & Associates, Inc., designed the $5.84 million tank so it can be expanded later to control even more overflows, if necessary. Thieneman Construction, Inc., is managing the construction project, which is expected to be complete by Spring 2005. Inspection services are being performed by Malcolm-Pirnie, Inc.

What to expect

When complete, landscaping will conceal the tank and its control structures so visitors to White River State Park will notice only that water quality has improved – and not the unseen technology making it all possible.

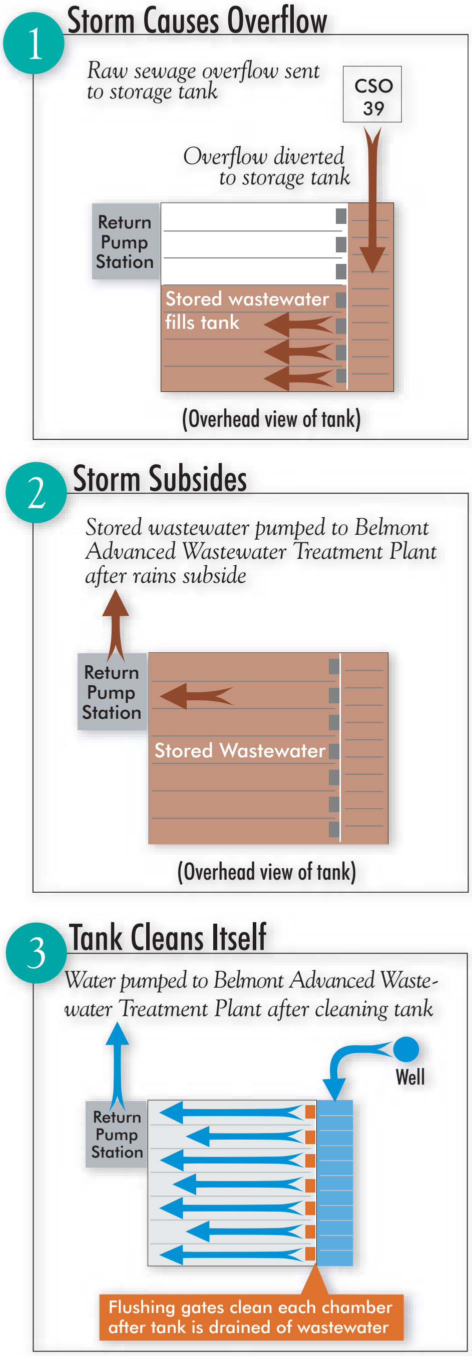


Conceptual Illustration - Not to Scale

How the tank will work

When rains fall, a combination of raw sewage and stormwater that would otherwise overflow into the river will instead flow into the storage tank and its series of parallel chambers. As one chamber fills up, the sewage-stormwater mixture will flow into and fill up the next chamber, and so on, until all the chambers are full. When rains subside, the tank will pump the stored wastewater back into the sewer system for treatment at the Belmont Advanced Wastewater Treatment Plant.

When the wastewater has drained away, flushing gates will release water to clean out each chamber of the storage tank.



Pleasant Run (continued from page 1)

of the sewer system," said Carlton Ray, DPW's Administrator of Environmental Engineering. "We will now be able to maximize the amount of wastewater inside the sewer system and minimize overflows into the streams."

Construction is expected to be complete by early spring.

The $500,000 project near Washington and Emerson streets also will help reduce raw sewage flowing through Christian Park and Garfield Park after a rainfall. It is part of a $5.6 million effort to install automated sewage control technologies in locations throughout the city, including:

1) Pleasant Run at Ellenberger Park
2) Pogues Run at Brookside Park
3) White River at 10th Street
4) McCarty and Meikel streets near the White River
5) West Street near the White River.

The city completed four other similar projects last year along Fall Creek.

Teachers (continued from page 1)

Mayor Bart Peterson, Indianapolis Public Schools Board Vice President Dr. Mary Busch (second from right), and John Marshall Principal Jamyce Banks (far left) are joined by students at the September 29 designation ceremony.

various land uses have on water quality. While mixing a recipe for clean water, teachers learned how to make non-toxic, alternative cleaners and to test them against traditional cleaners. Teachers also explored water-related sayings from different cultures to study literal and figurative uses of language and what you can learn about cultures from their sayings.

"I gained plenty of ideas for my classroom," one teacher said following the training.

Another was pleased "that all the activities are being aligned with state standards so that I can use WET in the City in my standards-based classroom." The teachers participating in the program teach in a variety of disciplines, including science, language arts, special education and mathematics.

Mayor Bart Peterson kicked off the Indianapolis Team WET Schools program on September 29, 2003, when he designated John Marshall Middle School as the first Indianapolis Team WET School. The Indianapolis Clean Stream Team and Department of Public Works sponsor the Team WET Schools program. Volunteers from DPW and the team will provide expertise in local water issues to the teachers throughout the school year.

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INDIANAPOLIS CLEAN STREAM TEAM

Sewer Overflow Hotline: 327-1643

IMPROVEMENTS UNDERWAY AT TREATMENT PLANTS

New basins will reduce bypasses during wet weather events

Although it will take up to 20 years to fully implement the city's plan for controlling raw sewage overflows into area streams, several "early action projects" are already underway to clean our waterways. Some of these projects involve improvements at the city's wastewater treatment plants.

Flow Equalization Basins

Flow equalization basins and a new pumping station will reduce bypasses and overflows at both the Belmont and Southport Advanced Wastewater Treatment (AWT) plants.

Belmont, the older of the two plants, receives the vast majority of the city's wet weather flows. The Belmont basins will reduce the frequency and volume of bypasses to the White River by temporarily storing flows during wet weather, until the plant has capacity to treat the flows.

The $15.3 million wet weather upgrades at the Belmont AWT plant include two earthen-walled, double-lined flow equalization basins and two combination concrete storage tanks / primary clarifiers. Combined together, these facilities will store up to 38 million gallons of wastewater.

(see "Improvements" page 3)

E-mail, Telephone Hotline Provide Overflow Warnings

When it comes to protecting Indianapolis residents from raw sewage overflows, projects to clean up waterways go hand-in-hand with public education on the hazards of urban waterways.

That's why the City of Indianapolis has taken the lead in informing residents about raw sewage overflows from the city's antiquated sewer system.

In 2002, Indianapolis became the first Indiana community to issue alerts when sewage overflows were predicted due to rain or snow forecasts. Hundreds of citizens now access these alerts through e-mail or the city's telephone hotline.

Both methods warn citizens when overflows are expected and educate them about the hazards of sewage in our streams.

(see "Notification" page 4)

Health and Safety Tips

To protect your health, take the following protective actions when recreating along city streams:

- Avoid contact with urban streams, especially during and three days after rain.
- Alter recreational activities to ones that do not contact urban waterways. For example, try walking or biking along a stream rather than swimming, wading or water skiing.
- Always wash your hands after contacting water in urban streams, especially before eating.
- Use a waterless hand sanitizer at outings that occur near urban streams.

As we look forward to completing a plan to significantly reduce the number of raw sewage overflows into Indianapolis waterways, I want to extend a personal invitation to you to participate in the process. While work to reduce these disgusting overflows is already underway, we still need your input and involvement.

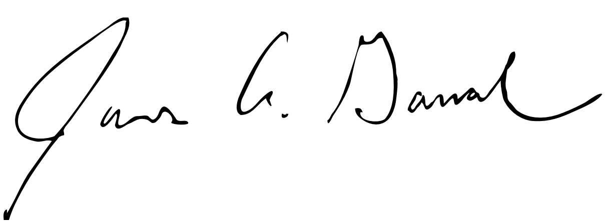
In June, the city will begin hosting meetings to give you a look at cleanup alternatives for each of the five sewage-impacted watersheds: Fall Creek, Pogues Run, Pleasant Run, White River, and Eagle Creek. And while we welcome your input at any stage of the process, this will be your first formal opportunity to review specific alternatives for restoring waterways in your part of Indianapolis.

Later this fall, we anticipate a month-long public comment period on the revised long-term control plan, which we must submit to state and federal regulators. There will be a formal public hearing during this time, as well.

Your comments and suggestions are welcomed at any point during the next few months as the city finalizes its plan. Visit our Web site at www.indycleanstreams.org for more information. You can ask a question, make a comment, or request a speaker for your next neighborhood meeting. As we proceed to finalize our plans, we'll use the Web to publicize upcoming meetings and to address your comments or questions.

We want to make sure you have the best possible understanding of options for reducing the number of raw sewage overflows, how much they might cost, and the benefits they will ultimately achieve. We've said it all along and continue saying it today: we cannot do this alone. A program of this magnitude requires careful planning, due diligence, and of course, upholding our commitment and responsibility to giving you ample opportunity to participate in the process.

Thank you for your time and, just as importantly, your input.

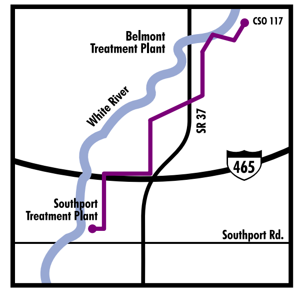


PIPELINE SHOULD STEM OVERFLOWS

You don't often hear the words "diamond in the rough" used to describe wastewater treatment facilities. But that's how the Southport Advanced Wastewater Treatment Plant is being billed for its potential role in reducing sewage overflows into the White River.

Heavy rainfalls often overwhelm the Belmont Advanced Wastewater Treatment Plant, which receives most of its flow from the city's combined storm and sanitary sewer system.

A new connection to the Southport plant should bring significant relief to Belmont.



Southport currently receives most of its flow from the separate sewer areas, which aren't as affected by wet weather. As a result, when Belmont is overwhelmed, Southport often has excess capacity that the city cannot use.

The Belmont-to-Southport Interplant Connection will create a 7-mile pipeline between the two facilities. The pipeline will carry as much as 150 million gallons of wastewater per day to Southport. Southport peak treatment capacity also will be expanded from 150 to 375 million gallons per day.

"This project has been needed for a long time and it's good to know that it's moving forward," said John Morgan, a project manager with the Department of Public Works. "The connection's main purpose will be to balance flows between the two plants during peak periods."

Ozonation Will Benefit Fish

Aquatic life should soon benefit from higher oxygen levels in the White River as the city returns to high purity oxygen treatment and ozonation for disinfection at its advanced wastewater treatment plants.

Ozone will replace chlorine as the city's disinfection method, in the final step before treated effluent is discharged to the river. City engineers say ozone is superior at removing viruses and is effective against harmful waterborne organisms. In addition, ozone's chief by-product is oxygen, which when added to the river will benefit fish and other aquatic life.

Indianapolis was the first large U.S. city to ozonate wastewater in the 1980s. Ozonation was effective, but due to costs and maintenance issues, it was abandoned after 1994. Technology improvements have recently made ozonation more reliable and cost effective with less maintenance. It is estimated that the $18-20 million oxygen and ozonation systems will be operating in 2006.

IMPROVEMENTS (continued from page 1)

The $12.8 million Southport upgrade aims to reduce combined sewage overflows to Little Buck Creek and the White River. The wet weather improvements at the Southport AWT plant include a new 75 million gallon/day raw sewage pump station, new 48-inch force mains to convey flows, and an earthen-walled double-lined equalization basin for storage and later treatment.

The two-plant project was designed by HNTB Corporation of Indianapolis and is being constructed by Bowen Engineering Corporation, which began work in January. The project is scheduled for completion in June 2006.

"This project will greatly help manage current flows reaching the city's AWT plants that now cause bypasses or overflows," said Jim Parks, Senior Project Engineer for DPW's Engineering Division. "It will improve water quality by capturing between 1.5 and 2.5 billion gallons of combined sewage for later treatment that otherwise would have added pollution to the river."

Bio-Roughing System Clarification (BRSC) Pilot Study

While those short-term improvements are underway, the city has been studying long-term wet weather treatment options at Belmont. A Bio-Roughing System Clarification (BRSC) Pilot Study was conducted over a 6-month period to field test intermediate clarification using conventional and enhanced high rate technologies.

With a quick startup time and relatively small footprint, these technologies have the operational flexibility to treat peak wet weather flows at the Belmont plant.

Belmont's secondary treatment capacity can be doubled by uncoupling the two-stage nitrification process and inserting intermediate clarifiers between the bio-roughing towers and the oxygen nitrification system (see diagram). During wet weather, flows entering the plant could take two different routes – with each providing biological treatment and disinfection before discharge to the White River.

The pilot study by Shrewsberry & Associates, with subconsultants Bernardin Lochmueller & Associates, Inc. and Greeley and Hansen LLP, was finalized earlier this year. Construction could be underway by 2007, with an estimated cost of nearly $56 million.

Steps of Wastewater Treatment

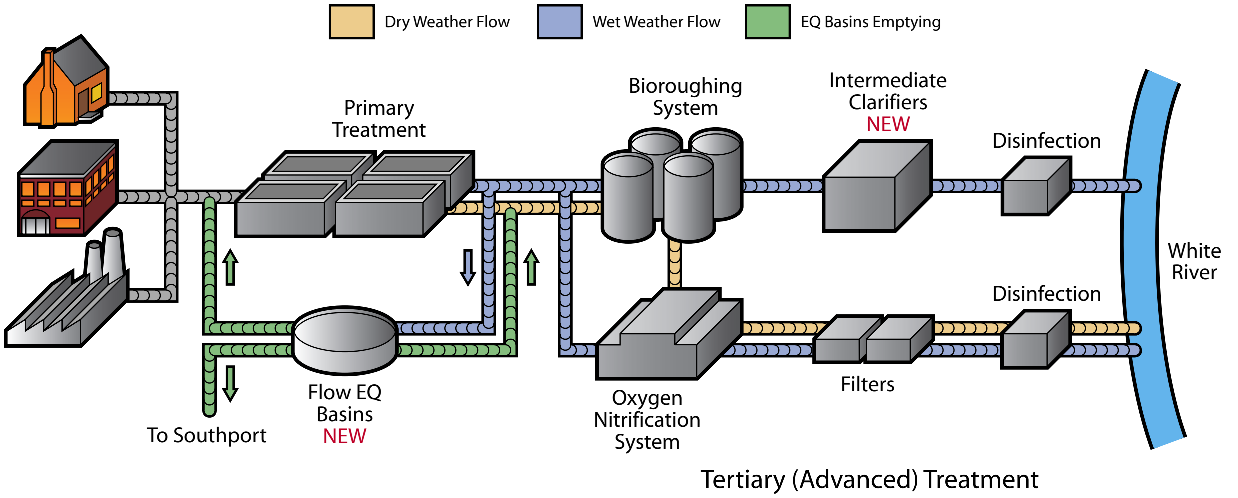
Wastewater sources: wastewater enters the plant from many sources, including homes, businesses and industry

Primary treatment: trash, grit and solids are removed from the wastewater

Secondary treatment: waste and other organic matter is consumed by bacteria and other organisms in the bioroughing and oxygen nitrification systems.

Tertiary (advanced) treatment: filters remove additional pollutants to create a high-quality effluent.

Disinfection: kills any harmful organisms before discharge to the White River.



The diagram above illustrates how the Belmont Advanced Wastewater Treatment Plant will manage both wet-weather and dry-weather flows in the coming years. During dry weather, flows follow the gold-colored path, moving from primary treatment to secondary treatment (bioroughing/oxygen nitrification systems), then to tertiary treatment (filters), followed by disinfection. During wet weather, flows follow the blue-colored path, moving from primary treatment to secondary treatment (bioroughing), then to tertiary treatment (oxygen nitrification system/filters), followed by disinfection. The new intermediate clarifiers will enable the city to "uncouple" the bioroughing and oxygen nitrification systems during peak wet weather flows — sending some flows through ONS, filtration and disinfection, and then on to advanced treatment and disinfection, and the remaining wet-weather flows through the bioroughing system, new clarifiers, and disinfection. In addition, the new flow equalization basins will help capture and store peak flows for later treatment. The green path illustrates three different options for emptying the flow EQ basins after a wet weather period.

NOTIFICATION (continued from page 1)

"Our goal is to keep people out of streams, particularly when it's most unhealthy to be there, which is shortly after a rainfall," said Victoria Cluck, Strategic Planning Administrator for the Indianapolis Department of Public Works. "We see the notification program as a proactive way for people to protect themselves and their families."

A state rule required 105 Indiana communities to establish similar notification programs this year. The Indianapolis program offers warnings in two ways:

E-mail: Citizens can sign up for e-mail notification at www.indycleanstreams.org by clicking on "Public Notification Program." The e-mails are sent to about 300 people when weather forecasts indicate a strong chance that storms might cause an overflow.

Telephone Hotline: By calling (317) 327-1643, citizens can access current information about raw sewage overflows in area streams. During and three days after a storm, the hotline plays a recorded warning to stay away from waterways where sewage overflow signs are posted.

DPW and the Marion County Health Department have posted signs near sewage outfalls, parks, and public access points to warn residents that sewage can pollute waterways during wet weather. The city also notifies residents of the program through a water bill insert and mailings to community organizations, schools and day care centers.

Starting this year, the city-owned cable station, Channel 16 (WCTY-TV), will be running sewage overflow warnings, as well.

"The number of people signed up for the public notification program continues to grow," added Cluck. "We believe this is a simple yet important program that everyone can utilize to reduce their risk when around urban streams."

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St., Suite 900
Indianapolis, IN 46204

Stream Line
City of Indianapolis / Department of Public Works / Clean Stream Program

Stream Line

City of Indianapolis / Department of Public Works / Clean Stream Program

Fall 2004

Inside This Issue

Statement Of Purpose

The Indianapolis Clean Stream Team is overseeing many projects to keep raw sewage out of our waterways and improve the quality of life in our neighborhoods. Stream Line is published quarterly to keep you informed about the city's progress in reducing raw sewage overflows and restoring the health of our streams.

Contact Info

Send letters to:

Indianapolis Clean Stream Team
Attn: Jodi Perras
151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel: 317-327-8720
Fax: 317-327-8699
Email: jperras@indygov.org

INDIANAPOLIS CLEAN STREAM TEAM

Sewer Overflow Hotline: 327-1643

REDUCING SEWAGE OVERFLOWS: YOUR INPUT NEEDED

Greetings,

The City of Indianapolis is finalizing a plan to reduce raw sewage overflows into our rivers and streams, and we need your input.

In 2001, we proposed a plan to add capacity to our 100-year-old sewer system. Since then, we have been negotiating with regulatory agencies while also implementing many short-term projects to clean our streams. In the coming months, we hope to finalize a long-term plan and gain state and federal approval to move ahead with more projects.

You can participate in developing the plan by:

- Reviewing the information in this newsletter and returning the response card, by October 30
- Attending one of our public meetings (see the schedule below), or
- Visiting our Web site at *www.indycleanstreams.org* between October 14-30.

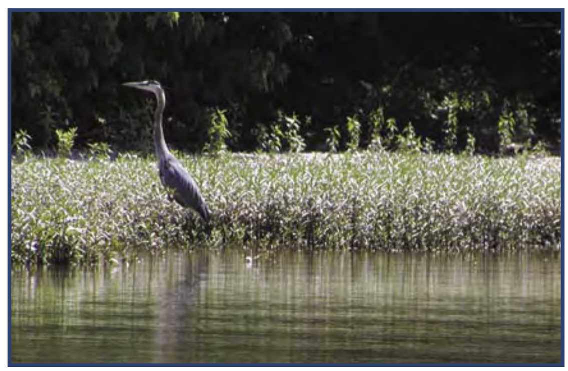
As you may know, this is not the only financial challenge facing our community. Recently, I proposed "Indianapolis Works," a plan to simplify and streamline local government and tax structures in Indianapolis and Marion County to make our community even more competitive with other cities and even more attractive to families, homeowners, businesses, and entrepreneurs.

Reducing the hazards, smells and sight of raw sewage in our neighborhoods is another challenge we must face to avoid costly fines and remain a vital, growing community.

Thank you for taking time to learn about these issues. Your opinion matters to me.

Sincerely,

Bart Peterson



PUBLIC MEETING SCHEDULE

Thursday, October 14	Garfield Park Multipurpose Room	2450 S. Shelby St.	7:00 PM
Tuesday, October 19	Julia Carson Government Center, Rm A	300 E. Fall Creek Parkway, N. Drive	7:00 PM
Thursday, October 21	Christamore House Auditorium	502 N. Tremont	6:00 PM
Monday, October 25	Brookside Park Auditorium	3500 Brookside Parkway S. Drive	7:00 PM
Tuesday, October 26	Riviera Club	5640 N. Illinois Street	7:00 PM

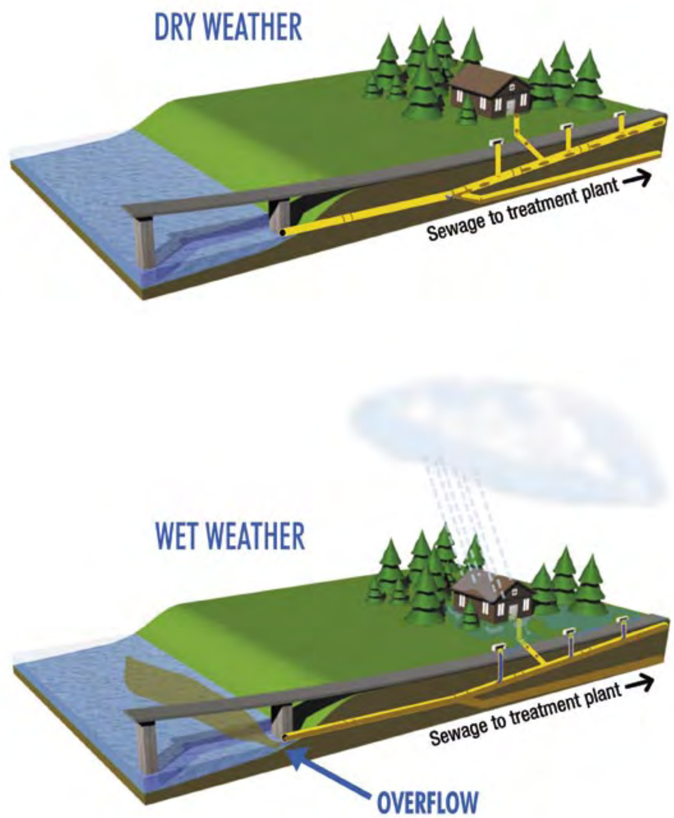
The City of Indianapolis will host five public meetings to provide more information on the options. These meetings give the public an opportunity to provide feedback before the city decides on the long-term plan. The final plan will be subject to the approval of the U.S. Environmental Protection Agency and the Indiana Department of Environmental Management.

Find us on the web at: www.indycleanstreams.org

WHY DO OUR SEWERS OVERFLOW WHEN IT RAINS?

More than 100 years ago, Indianapolis built a storm sewer system to carry rainwater and melting snow away from homes, businesses and streets. When indoor plumbing came later, homeowners and business owners hooked their sewage lines to these storm sewers, combining stormwater and raw sewage into one pipe. This was common practice in many U.S. cities, especially in the Northeast and Midwest.

During dry weather, a combined sewer system works much like a separate sewer—carrying all sewage to the treatment plant for treatment. However, when it rains or snow melts, the sewer can be overloaded with incoming stormwater. When this happens, the sewers are designed to flow over internal dams in the underground pipe system and into nearby streams and rivers. Without these overflows, sewage would back up into basements and streets. Today, when building new sewer systems, we build separate sewers for stormwater and sewage.

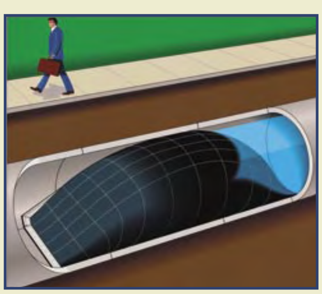


PROJECTS ALREADY UNDERWAY

Many projects have already begun to repair old sewer lines, build new storage tanks and expand treatment plants. Together, these "early action projects" will remove more than 2 billion gallons of overflows from our waterways each year.

At the same time, the City of Indianapolis has been working with the U.S. Environmental Protection Agency and the state to develop a long-term control plan that will provide a roadmap for future sewer repair and solutions to Indianapolis' raw sewage overflow problems.

Some of the early action projects include:



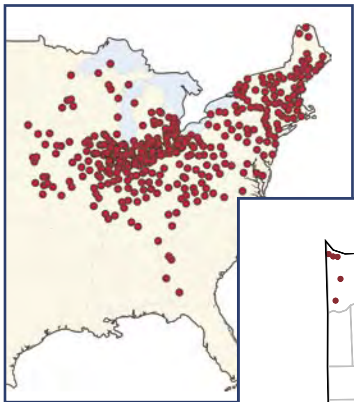
Inflatable Dams

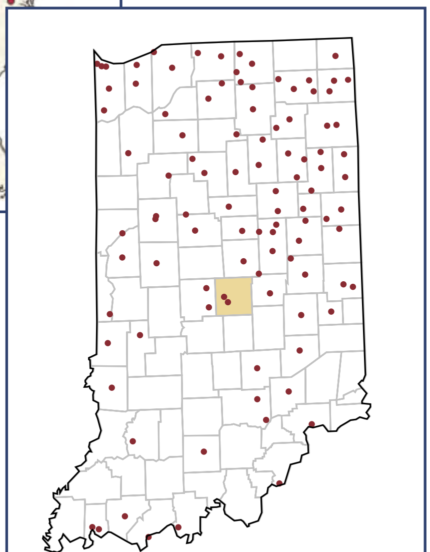
Inflatable dams have been constructed to keep millions of gallons of sewage out of Pleasant Run near Ellenberger Park and Howe Middle School and Pogues Run at Brookside Park.

When stormwater enters the sewers, the dams will inflate to block the overflow pipe and direct the wastewater to the city's treatment plants. After the storm, when the flows in the sewer recede, the dam will deflate. Inflatable dams help save money by using existing sewer lines to contain and reduce raw sewage overflows.

Electronic sensors upstream and downstream of the dam will send data to a centralized computer, which will activate the dam as needed. These projects are part of a $5.6 million effort to install automated sewage control technologies in locations throughout the city.

HOW BIG IS THIS PROBLEM?

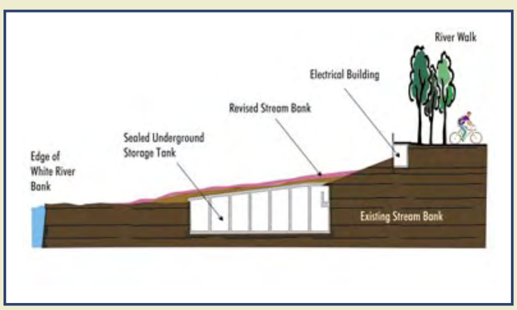




Indiana Raw Sewage Overflow Communities

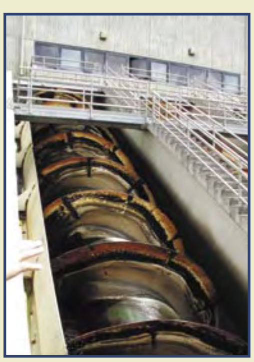
Many cities with combined sewer systems have problems with raw sewage overflows when it rains. These overflows contain not only stormwater, but also untreated human and industrial waste, toxic materials and debris. Combined sewer systems serve roughly 772 communities containing about 40 million people, according to the U.S. Environmental Protection Agency. Most communities with combined sewer systems are located in the Northeast and Great Lakes regions and in the Pacific Northwest. Indiana has 105 communities with combined sewers.

Raw sewage in our streams is a health hazard, smells and looks disgusting, hurts our environment and harms the quality of life in our neighborhoods. Sewage overflows are a major cause of pollution in White River, Fall Creek, Pleasant Run, Pogues Run and Eagle Creek. Raw sewage steals oxygen from the water, making it difficult for fish to breathe and sometimes causing fish kills. High bacteria levels make streams unsafe for children to wade or play in the water. Raw sewage in our streams also prevents us from becoming a world-class city that can attract new businesses, jobs and residents.



White River East Bank Storage Tank

A 3-million gallon underground storage tank was installed this year along the White River near the Indiana University-Purdue University Indianapolis campus. The tank will capture and store a combination of raw sewage and stormwater that would otherwise overflow into the river during storms. It will hold the wastewater until flows in the sewer system subside. The tank will control one of the largest sources of raw sewage overflow in the city.



BEFORE

AFTER

Improvements at the Treatment Plants

Early action projects and other improvements at the city's two wastewater treatment plants will reduce plant overflows by millions of gallons each year. Some sewage overflows currently go directly into the White River and Little Buck Creek.

The wet weather upgrades at the Belmont Advanced Wastewater Treatment Plant include two double-lined flow equalization basins and two concrete storage tanks that also provide first-stage treatment. At the Southport Advanced Wastewater Treatment Plant, the city is building a new pump station, new 48-inch force mains to convey flows, and a double-lined equalization basin for storage and later treatment.

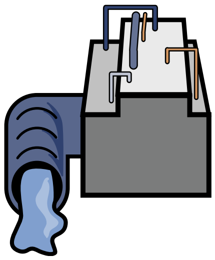
In the next few years, the city also will install new wet weather treatment facilities at Belmont and a new pipeline between the plants so Southport can treat more flows when Belmont is overloaded by wet weather.

OVERVIEW OF OPTIONS

The city has evaluated a number of technologies and options to further reduce sewage overflows to our streams. The final options are:

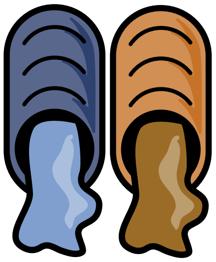
PLAN 1: STORAGE AND CONVEYANCE

Plan 1 would involve a single deep tunnel, underground storage tanks and new sewers to capture raw sewage that would otherwise overflow into our streams. The tunnels and tanks would store the sewage underground until after a storm, when the captured sewage would be pumped to the city's treatment plants. The treatment plants also would be expanded. Total costs range from $1.44 billion to $3.02 billion, depending on the size of the facilities.



PLAN 2: STORAGE AND REMOTE TREATMENT

Plan 2 would involve three deep tunnels, as well as underground storage tanks and new sewers to capture raw sewage that would otherwise overflow into our streams. It also would include remote treatment facilities at the downstream end of Pogues Run and Fall Creek tunnels. These treatment facilities would treat wet-weather flows that exceed the tunnels' capacity. The city's central treatment plants also would be expanded. Total costs range from $1.55 billion to $3.03 billion, depending on the size of the facilities.



PLAN 3: TOTAL SEWER SEPARATION

Plan 3 would involve completely separating combined sewers in all areas to eliminate raw sewage overflows. Existing combined sewers would be converted to either a separate sanitary sewer or a separate storm sewer. New sewers would need to be installed in all neighborhoods, and all homes and businesses would be re-connected to the separated sewers. The city's treatment plants would not be expanded under this plan. Total sewer separation is the most costly option, estimated at $6.2 billion.

OTHER WATERSHED IMPROVEMENTS

A watershed is an area of land that drains into a river or stream. The city is looking at all the sources of pollution in its watersheds to identify the best plan for improving water quality. Under all three plans, the city also would implement the following programs:

- Building sewers for neighborhoods now served by septic systems
- Implementing projects to reduce flooding and improve stormwater drainage
- Restoring streambanks and removing polluted sediments from streams
- Disconnecting downspouts, sump pumps and other illicit connections that take up sewer capacity

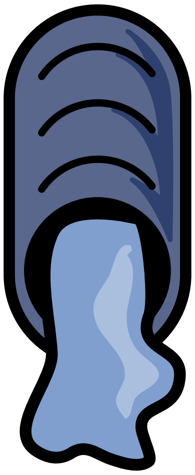
If Plan 1 or 2 are chosen, these additional improvements would be added:

- Adding water to tributaries to improve stream flow and wildlife habitat
- Improving oxygen levels in streams by adding aeration on Fall Creek and White River, removing Boulevard Dam on Fall Creek and modifying Stout Dam on White River

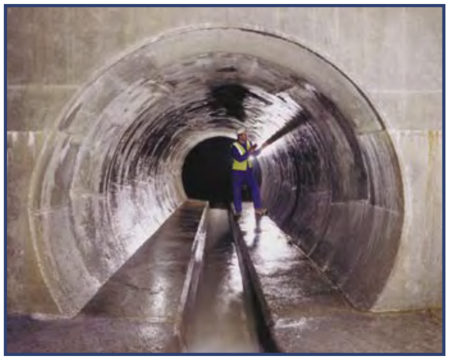
The cost of these additional programs is estimated at $64.72 million(included in cost estimates above).

PLAN 1: STORAGE AND CONVEYANCE

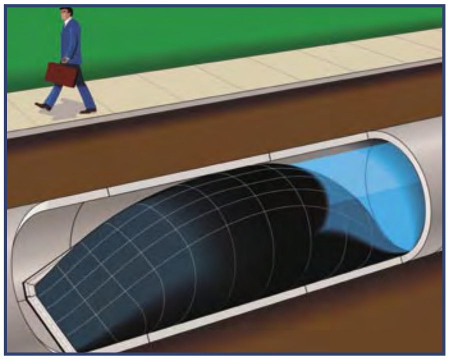
The key features of Plan 1 are:



- A single central tunnel system along Fall Creek and White River, to store and carry sewage to the city's wastewater treatment plants. The tunnel would be built several hundred feet below the ground surface with tunnel boring machines. Tunnels can provide a large storage volume with very little disturbance to the ground surface, making them a preferred option in urban areas. Sewage storage tunnels have been built in Chicago, Milwaukee, Toledo and other cities.
- New, larger sewers along Pogues Run, Pleasant Run, Bean Creek and parts of Fall Creek and White River to capture overflows and carry them to the central tunnel system. Most sewers would be installed by digging open trenches, with limited sections installed by small-scale tunneling.
- A new sewer along Eagle Creek to carry wet weather flows to the Belmont Advanced Wastewater Treatment Plant.
- An underground storage tank near Spades Park to capture and store overflows from upper Pogues Run. The stored sewage would be pumped to the city's treatment plants after a storm. The storage tank would be self-cleaning.
- Upgrading an existing storage/treatment facility at Riviera Club to capture, store and treat overflows from upper White River.
- An underground storage tank now under construction on the White River near the campus of Indiana University-Purdue University at Indianapolis. Stored sewage would be pumped to the treatment plants after a storm, and the tank would have an automatic self-cleaning system.
- Inflatable dams and pinch valves at key points in the sewer system. These devices help save money by using existing sewer lines to contain and reduce raw sewage overflows. Eventually, electronic sensors would send data to a centralized computer, allowing remote and real-time control of flows within the sewer system.
- Local sewer separation projects to eliminate isolated overflows on State Ditch, Lick Creek and the upstream ends of Fall Creek, Pogues Run and Bean Creek.
- Improvements to both Belmont and Southport Advanced Wastewater Treatment Plants to increase their ability to store and treat peak flows during wet weather. Improvements would include a new sewer pipe connecting the two plants.
- Watershed improvements described on page 4.



Storage tunnel

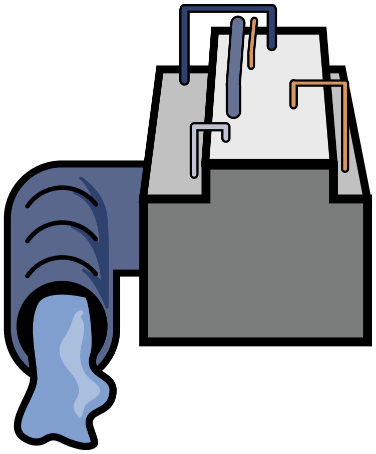


Inflatable dam

Plan 1 costs

The key factor in determining cost is facility size. The larger you build a tunnel, storage tank, or other facility, the more it will capture and the more it will cost. The city's options under Plan 1 could increase sewage capture from today's 63 percent annual average to 90, 93, 95, 97 or 99 percent. Design, construction and 20 years of operating costs for Plan 1 range from $1.443 billion for 90 percent capture to $3.026 billion for 99 percent capture.

PLAN 2: STORAGE AND REMOTE TREATMENT



Plan 2 is similar to Plan 1 in many respects. The key differences are three separate tunnels and the use of high-rate treatment facilities along Fall Creek and Pogues Run to treat sewage captured by deep tunnels, rather than send it to the city's existing treatment plants.

The key features of Plan 2 are:

- Two separate deep tunnel systems and treatment facilities – one for Fall Creek and one for Pogues Run. The treatment facilities would be located at the downstream end of both waterways, where they converge with the White River. These facilities would use the latest technologies to treat sewage stored in the tunnels, discharging treated flows into the streams after disinfection with ultraviolet lights. These treatment units would be relatively small and could start up quickly to treat storm flows. However, they would not be as effective as the city's advanced wastewater treatment plants in removing pollutants, and they would require more maintenance than a storage tank or tunnel.
- A third separate tunnel system for White River watershed with a pumping facility to direct stored sewage to the city's central treatment plants.
- New sewers for isolated outfalls along Fall Creek, Pogues Run and White River to carry wet weather flows into each tunnel system.

The remaining features of Plan 2 are identical to Plan 1:

- New, larger sewers along Eagle Creek, Pleasant Run and Bean Creek.
- An underground storage tank for upper Pogues Run near Spades Park.
- Upgrading an existing storage/treatment facility for upper White River at Riviera Club.
- An underground storage tank now under construction on the White River near the IUPUI campus.
- Inflatable dams and pinch valves at key points in the sewer system.
- Local sewer separation projects to eliminate isolated overflows on State Ditch, Lick Creek and the upstream ends of Fall Creek, Pogues Run and Bean Creek.
- Improvements to both Belmont and Southport Advanced Wastewater Treatment Plants, including a new sewer pipe connecting the two plants.
- Watershed improvements described on page 4.

Remote treatment unit

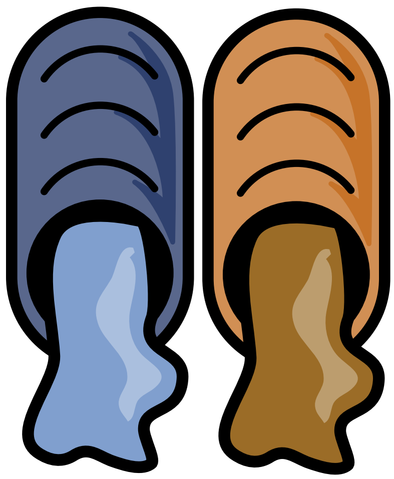
Remote treatment

Plan 2 costs

As with Plan 1, the key factor in determining cost is facility size. Building and operating the remote treatment facilities makes Plan 2 somewhat more expensive than Plan 1. Design, construction and 20 years of operating costs for Plan 2 range from $1.545 billion for 90 percent capture to $3.032 billion for 99 percent capture.

PLAN 3: TOTAL SEWER SEPARATION

Plan 3 includes total separation of existing combined sewers in all watersheds to eliminate all combined sewer outfalls. Total sewer separation is the most costly option and would also be the most disruptive to neighborhoods during construction, especially downtown and in Center Township. Sewer separation would lead to increased pollution from urban stormwater, a significant source of water quality problems in Marion County.



The key features of Plan 3 are:

- Total sewer separation in all watersheds, including Fall Creek, Pogues Run, Pleasant Run, Eagle Creek, State Ditch and White River. The existing combined sewers would be converted to either a separate sanitary sewer or a separate storm sewer.
- Stormwater flows would be conveyed to ponds, sand filters or other stormwater management practices, prior to discharge into streams. These technologies would help reduce (but not eliminate) the many pollutants found in urban stormwater, such as sediments, organic matter, metals, oils, and trash.
- Improvements to the Belmont and Southport treatment facilities would not be needed, nor would the new pipe connecting the two plants.
- Watershed improvements described on page 4.

Plan 3 costs

The cost of sewer separation was estimated based upon the total acreage that would need to be separated. With 35,405 acres draining into the combined sewer area, the city estimates the total cost of sewer separation at $6.201 billion.

Sewer separation under construction

Sewer separation under construction

NEIGHBORHOOD IMPACTS

Like any construction project, all the plans will affect our neighborhoods. Some will have greater impact during construction, while others might have more of an effect during long-term operation. The Mayor's Raw Sewage Overflow Advisory Committee and the Wet Weather Technical Advisory Committee—made up of neighborhood representatives, health officials, environmental advocates and technical representatives—evaluated how the three plans would impact neighborhoods.

Here's a sample of some of the questions committee members asked when they considered how the plans would affect neighborhoods:

- **NOISE:** How much and when will noise occur during construction? How much noise will be present in the long-term, from pumps and blowers, etc.?
- **ODOR:** Are odors expected to be increased during the long-term operation?
- **SAFETY AND SECURITY:** Are there public safety issues associated with the alternative, such as use of chemicals for treatment, creation of mosquito or fly habitat? Are there security issues, such as potential for vandalism, terrorism, sabotage, etc.?
- **SITING CONCERNS:** How close are facilities to homes, parks and schools? How difficult would it be to site these facilities?
- **AESTHETICS:** How long will the facilities have a visual impact on the existing landscape? Can the alternative be seen from a home or public gathering place, such as a park?
- **TRUCK TRAFFIC DURING OPERATION:** How frequently will trucks travel through a neighborhood for regular operation and maintenance activities?
- **NEIGHBORHOOD DISRUPTION DURING CONSTRUCTION:** How much disruption will be caused to streets, sidewalks, parks, yards, etc. during construction? How long will the disruption last?

Committee members and city staff reviewed these questions and then ranked the proposed plans 1st, 2nd or 3rd, based on their judgment. They concluded that Plan 1 is the best option for neighborhood issues, followed by Plan 3, and Plan 2. The final results are in the graphic below.

	PLAN 1	PLAN 2	PLAN 3
NOISE	1st	3rd	1st
ODOR	2nd	3rd	1st
SAFETY AND SECURITY	1st	3rd	1st
SITING CONCERNS	1st	2nd	2nd
AESTHETICS	1st	3rd	2nd
TRUCK TRAFFIC DURING OPERATION	1st	3rd	2nd
NEIGHBORHOOD DISRUPTION DURING CONSTRUCTION	1st	2nd	3rd
THE COMMITTEE'S OVERALL RANKING OF NEIGHBORHOOD ISSUES	**1st**	**3rd**	**2nd**

***Please answer Question 1 on the Clean Stream Decision-Making Card.**

IMPACT ON SEWER RATES

One key factor in selecting a plan is determining its impact on ratepayers. Our sewer rates, which are among the lowest in the nation, will need to rise in order to pay for these projects. However, the city will work hard to keep construction costs down and obtain state and federal grants to reduce the burden on our ratepayers.

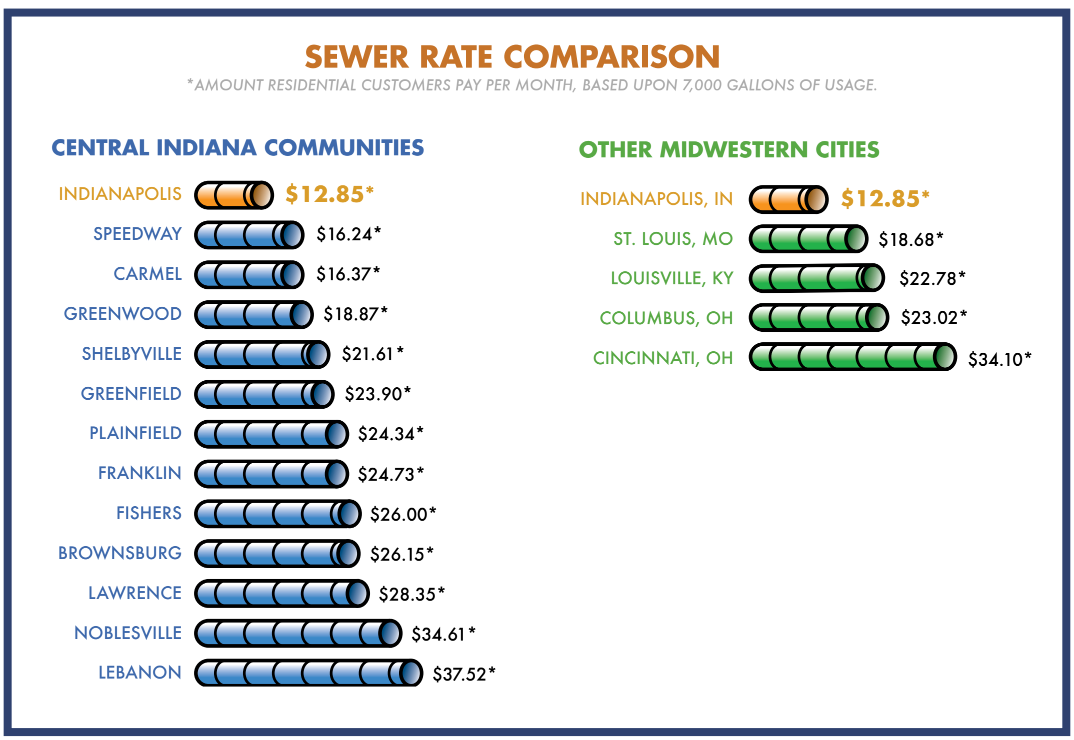
The city is concerned in particular about rate impacts on Center Township, where the city's most disadvantaged residents live. Forty-three percent of households in Center Township are considered "low income," as defined by the federal government – that is, they have less than 50 percent of the area median family income. For Marion County as a whole, 25 percent of households fit that description.

While long-term sewer rates are difficult to predict, the city has estimated the additional monthly cost to ratepayers for sewage overflow control at the end of 20 years. Rates will rise gradually during that time to provide funding necessary to repay bonds and loans used to finance the projects, as well as operate and maintain the new facilities.

Estimated impact on rates for the different options are shown in the comparison table on page 10. These rates only represent increases associated with controlling combined sewer overflows. Other rate increases will likely be needed to keep our sanitary sewers and treatment plants in good condition.

HOW DO OUR RATES COMPARE WITH OTHER CITIES?

Indianapolis sewer rates are low in comparison to other cities of our size and other cities in Indiana. Indianapolis residential customers pay $12.85 per month, based upon 7,000 gallons of usage. According to a rate survey conducted by the accounting firm Crowe Chizek in 2004, comparable rates in other cities for the same usage were:



MAKING THE COMPARISON

How do we decide what plan is best? In addition to looking at neighborhood issues, we can compare the plans based upon how well they reduce overflows, protect human health, protect wildlife, or manage costs. A side-by-side comparison of the various options is presented in the table below.

	REDUCING OVERFLOWS			PROTECTING HUMAN HEALTH		IMPROVING WILDLIFE HEALTH	MANAGING COSTS		
	AVERAGE % OF FLOW CAPTURED AND TREATED ANNUALLY	AVERAGE # OF UNTREATED OVERFLOWS PER YEAR	ADDITIONAL GALLONS OF SEWAGE CAPTURED/TREATED PER YEAR	DAYS WATERWAYS ARE SAFE FOR SWIMMING (<235 *E. COLI* COLONIES/100 ml)	DAYS WATERWAYS HAVE VERY HIGH BACTERIA LEVELS (> 10,000)	AQUATIC AND WILDLIFE BENEFITS	TOTAL COST (CONSTRUCTION + OPERATIONS FOR 20 YEARS)	TOTAL COST PER GALLON OF OVERFLOW CAPTURED	AVERAGE HOMEOWNER'S MONTHLY SEWER RATES (AT END OF 20 YEARS)*
CURRENT CONDITIONS	63%	60	-	187 days	52 days	3RD	$0	-	$12.85
PLAN 1	90%	12	6.33 billion	230 days	12 days	1ST	$1.44 billion	22.8 cents	$44.00
	93%	6	6.86 billion	230 days	6 days		$1.61 billion	23.5 cents	$47.00
	95%	4	7.12 billion	230 days	4 days		$1.73 billion	24.3 cents	$49.00
	97%	2	7.46 billion	230 days	2 days		$2.21 billion	29.6 cents	$58.00
	99%	0.5	7.73 billion	231 days	0.5 days		$3.03 billion	39.2 cents	$73.00
PLAN 2	90%	12	6.35 billion	230 days	12 days	2ND	$1.55 billion	24.4 cents	$46.00
	94%	6	6.93 billion	230 days	6 days		$1.72 billion	24.8 cents	$49.00
	95%	4	7.16 billion	230 days	4 days		$1.86 billion	26.0 cents	$51.00
	98%	2	7.49 billion	230 days	2 days		$2.23 billion	29.8 cents	$58.00
	99%	0.5	7.73 billion	231 days	0.5 days		$3.03 billion	39.2 cents	$73.00
PLAN 3	100%	0	7.87 billion	228 days	0 days	2ND	$6.2 billion	78.8 cents	$132.00

***Monthly sewer rate estimates include today's rates plus the amount needed to fund sewage overflow projects. Other rate increases will likely be needed in future years to keep the rest of our system in good condition.**

Reducing Overflows: Currently, sewers overflow about 60 times per year, spilling 7.87 billion gallons of untreated sewage into our waterways. The table shows how each plan will reduce the number of overflows each year and how many gallons will still overflow. After the plan is implemented, overflows would only happen during the biggest storms, or in back-to-back smaller storms. We will be capturing a greater percentage of sewage, up from 63 percent today to 90 percent or more under the various options.

Protecting Human Health: Will our waterways be safe for swimming? That goal is not achievable at all times. However, we will improve the number of days our waterways meet the state's swimming standards from 187 per year today to around 230 per year in the future. We will also reduce the number of days our streams have very high *E. coli* bacteria levels (greater than 10,000 colonies in a 100 milliliter sample). A city ordinance prohibits swimming in these streams. Even though water quality will improve under the city's plans, you should protect yourself and your family by staying out of urban waterways.

Improving Wildlife Health: Wildlife are already returning to city streams due to the investments the city has made in recent years. Each option will lead to additional improvements. Plan 1 ranks first for improving wildlife health. Plans 2 and 3 provide about equal benefits.

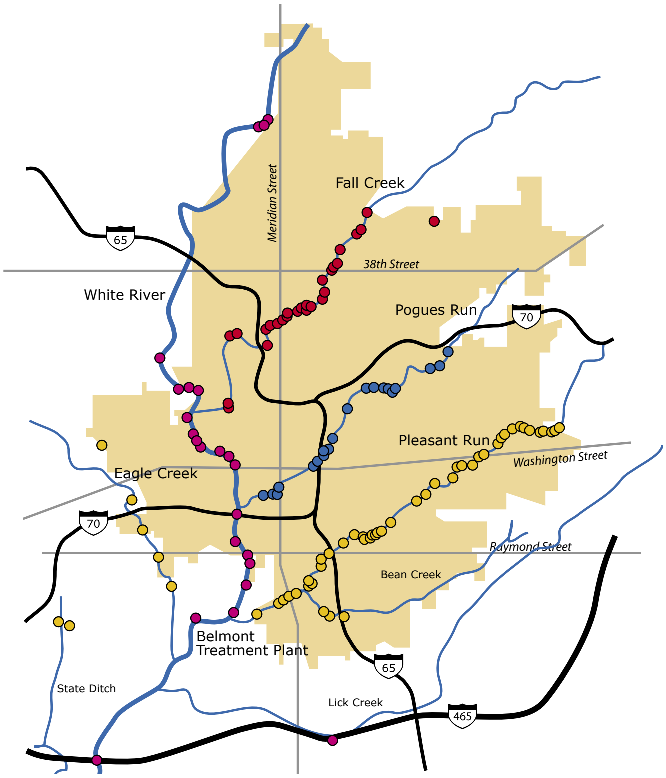
Managing Costs: The chart compares the plans based upon total cost, cost per gallon captured, and the impact on monthly sewer rates. Total costs include the cost of design, construction and operation over 20 years. The cost-per-gallon column shows that costs are similar for 90, 93 and 95 percent capture, but get more expensive when you have to build facilities big enough to capture the biggest storms. The monthly sewer rate is estimated based upon funds and financing needed for sewer overflow projects only.

***Please answer Question 2 on the Clean Stream Decision-Making Card.**

PRIORITY AREAS

The city has conducted surveys to determine how people use our streams. These surveys show that our streams and greenways are used for a variety of activities, with the most popular being walking, jogging, bicycling, and playing by the streambank. Less frequent activities include fishing, wading and swimming.

Recreational activities are reported both along smaller, neighborhood streams, and the White River. However, there are no swimming beaches along waterways affected by sewage. The city has concluded that while each waterway is important to people who live along and use it, no one waterway or area is more important than another to the entire city.



Location of sewage overflows in Indianapolis

ARE SMALLER STREAMS A HIGHER PRIORITY?

In implementing the plan, the city could spend more resources and place higher standards on some streams than others. What is your preference?

- *All streams should be treated the same.* The city should have the same goal for reducing overflows on all streams.
- *Smaller streams should be a higher priority than White River.* Smaller, neighborhood streams should be a higher priority because water quality impacts are more severe there. Also, reducing overflows on these streams will improve White River, because the smaller streams flow into White River.
- *Some small streams should receive higher protection than other small streams.* You may prefer a higher control on Fall Creek vs. Pleasant Run or Eagle Creek vs. Pogues Run. If so, please explain your reasoning.
- *Some streams may receive a higher level of control because it is cost-effective to do so.*

HOW MUCH CONTROL MAY BE REQUIRED?

Because sewer overflow costs and impacts vary in each community, regulatory agencies may require more or less control in different communities or on different waterways. Some U.S. waterways have been allowed an average of 6 overflows per year, others 4, and others 2 or fewer. During negotiations, the U.S. Environmental Protection Agency has suggested we should evaluate additional levels of control, including different levels of control on the White River and the smaller streams. An example would be that we achieve an average of 3 overflows per year for White River, Pleasant Run and Eagle Creek, and 2 per year for Fall Creek and Pogues Run.

Here is how this particular option would compare with the options shown on page 10.

AVERAGE % OF FLOW CAPTURED AND TREATED ANNUALLY	AVERAGE # OF UNTREATED OVERFLOWS PER YEAR	ADDITIONAL GALLONS OF SEWAGE CAPTURED /TREATED PER YEAR	DAYS WATERWAYS ARE SAFE FOR SWIMMING (<235 E. COLI COLONIES/100 ML)	DAYS WATERWAYS HAVE VERY HIGH BACTERIA LEVELS (> 10,000 COLONIES/100 ML)	AQUATIC AND WILDLIFE BENEFITS	TOTAL COST (CONSTRUCTION + OPERATIONS FOR 20 YEARS)	TOTAL COST PER GALLON OF OVERFLOW CAPTURED	AVERAGE HOMEOWNER'S MONTHLY SEWER RATES (AT END OF 20 YEARS)
96%	3 OR 2	7.37 billion	230 days	3 OR 2 days	1ST	$2.05 BILLION	27.8 CENTS	$53-54

The city hasn't selected a level of control because we need your input first. What are your thoughts?

***Please answer Questions 3, 4 and 5 on the Clean Stream Decision-Making Card.**

WHAT YOU CAN DO

It took decades for our streams to get into this condition, and it will take years of hard work and investment to improve them. In the meantime, there are measures you can take to help protect the environment and yourself and your family.

PROTECT THE ENVIRONMENT

- Disconnect downspouts and sump pumps connected to sewers. This will prevent clear water from using up our sewers' capacity.
- Don't send fats, oils or grease down the drain. They cause sewer blockages and backups.
- Properly dispose of motor oil, antifreeze, battery acid and household chemicals. Call 327-4TOX to learn how.
- Clear gutters and storm sewer drains of leaves and debris.
- Reduce water use in your home and business.
- Clean up after your pets. Their waste contaminates our waterways.

PROTECT YOURSELF AND YOUR FAMILY

- Pay attention to warning signs posted by the Indianapolis Department of Public Works and the Marion County Health Department.
- Call the Sewer Overflow Hotline at 327-1643 to receive notification of sewage overflows.
- Sign up for sewage overflow e-mail alerts at www.indycleanstreams.org.

THE PROCESS

The City of Indianapolis has been working for years on its long-term control plan for the Indianapolis sewer system. The plan must be submitted to the U.S Environmental Protection Agency and the Indiana Department of Environmental Management. The following is a tentative schedule:

SCHEDULE

• **Oct. 14-26**	**Public meetings**
• **November**	**Determine preferred plan**
• **December - January**	**Produce draft of long-term control report**
• **February**	**30-day public comment period**
• **Mid-February**	**Hold public hearing**
• **March**	**Incorporate changes from public comments**
• **Late March**	**Produce final report**
• **April**	**Send to EPA and IDEM for review and approval**

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St., Suite 900
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City of Indianapolis / Department of Public Works / Clean Stream Program

INSIDE: YOUR CHANCE TO COMMENT ON OPTIONS FOR CONTROLLING SEWAGE OVERFLOWS.

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Winter 2005 | Issue 5

Inside This Issue

Statement Of Purpose

The Indianapolis Clean Stream Team is overseeing many projects to keep raw sewage out of our waterways and improve the quality of life in our neighborhoods. Stream Line is published quarterly to keep you informed about the city's progress in reducing raw sewage overflows and restoring the health of our streams.

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Tel: 317-327-8720
Fax: 317-327-8699
Email: jperras@indygov.org

INDIANAPOLIS CLEAN STREAM TEAM

Sewer Overflow Hotline: 327-1643

CITIZENS WEIGH IN ON SEWAGE CONTROL OPTIONS

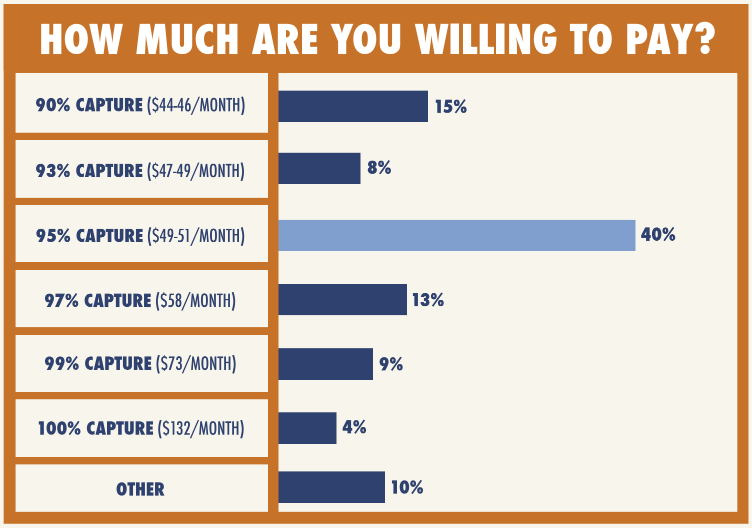
Most popular choice is mid-range option of 95 percent capture

During a series of public meetings in October, the Department of Public Works sought public input on the city's options for reducing raw sewage overflows. The city received 153 responses through public meetings, mail and its Web site.

"We want to thank the citizens for their input, as well as their time and effort, in helping us develop the most effective long-term control plan for reducing raw sewage overflows in our city," said DPW Director Jim Garrard. Partial results are summarized below. For more detailed information and full survey results, visit our Web site at www.indycleanstreams.org.

Cost and Level of Control

The city estimated the impact of overflow control projects on residential sewer rates and asked residents how much they would be willing to pay at the end of 20 years for cleaner waterways. The top vote-getter, with 40 percent of all votes, was 95 percent systemwide capture (costing the average homeowner $49-51 per month at the end of 20 years). Other results are shown below.



Monthly sewer rates are the average homeowner's estimated rate at the end of 20 years. They include today's rate plus the amount needed to fund sewage overflow reduction projects. Other rate increases will likely be needed for other sewage collection and treatment needs.

Priority Areas

In implementing the plan, the city could spend more resources and place higher standards on some streams than others. When asked about this, the largest number of residents (38 percent) wanted to treat all streams the same. Twenty-seven percent wanted to give smaller streams a higher priority than White River and 22 percent would give some streams higher controls if it is cost-effective to do so.

Preferred Plan

Participants were asked to indicate which systemwide plan they prefer. Fifty-nine percent of participants preferred Plan 1 (Storage/Conveyance), 26 percent chose Plan 2 (Storage/Conveyance with Remote Treatment Facilities), and 15 percent chose Plan 3 (Total Sewer Separation). Negotiations are continuing with state and federal agencies to finalize a plan.

Happy New Year to all! In this issue of Stream Line, we are highlighting recent city activities to reduce sewage overflows and improve water quality.

These include:

• Public input on our alternatives for reducing sewer overflows. Since October, city staff and the Clean Stream Team have been talking to groups all over town about our options and getting input on some important policy questions. The results will guide our long-term plan.

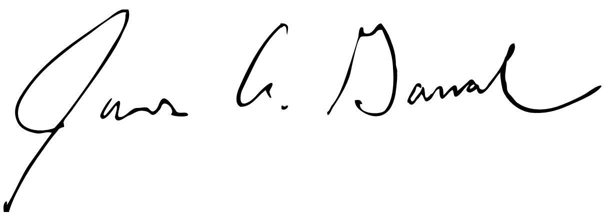
• The opening of the 3-million-gallon East Bank Storage Tank, which is reducing millions of gallons of sewage overflows from one of the worst overflow locations along the White River.

• The 2005 debut of our "Correct Connect" program which will educate, encourage and require property owners to disconnect incorrect or illegal sump pump and downspout connections to our sewers.

• A campaign to raise $103,000 from the community to endow an environmental scholarship for a deserving Indianapolis Public School student who participates in Purdue University's Science Bound program.

Our most important goal this year, however, is completing our long-term control plan for improving water quality and gaining federal and state approval of the plan. Watch our Web site at www.indycleanstreams.org for updates on our progress, a draft plan and opportunities for further public comment.

Thank you for your interest in our waterways!



BRIEFS

USGS Releases Biological Study

The U.S. Geological Survey recently released a biological assessment of White River and other streams in the Indianapolis area. Funded by DPW's Office of Environmental Services, the study provides an assessment of stream health in the White River and select tributaries from 1999-2001. The report describes the abundance and diversity of fish and their food sources at 12 sampling locations. Results are compared to previous studies conducted intermittently from 1981 to 1996.

The study found 74 species and 3 hybrids of fish in the White River and its tributaries in the study area. Carps and minnows were the largest group of fish identified, consisting of more than half of all fish collected. The most numerous species was the central stoneroller, which accounted for almost 25 percent of the fish identified.

Results of the study were affected by the December 1999 discharge of toxic chemicals into the White River at Anderson, Indiana. The discharge killed an estimated 117 tons of fish from Anderson to south of Indianapolis. Biologists began restocking various reaches of the river from April 2000 to November 2001. The direct and indirect effect of the toxic discharge on bottom-dwelling larva, snails and other fish food sources was not clear, USGS reported.

The report is available on the USGS Web site at http://water.usgs.gov/pubs/wri/wri034331.

Company Supports Teacher Training

ADS ENVIRONMENTAL SERVICES®

ADS Environmental Services sponsored a recent Team WET Schools curriculum training hosted by John Marshall Middle School. WET stands for Water Education for Teachers, a water-related curriculum correlated to Indiana state standards. ADS supported the purchase of 10 urban water test kits for participating schools. These kits allow teachers and students to assess the conditions of their drinking water or a local creek. ADS also provided lunch for the participating teachers and trainers. The Clean Stream Team thanks ADS for its support of our educational programs.

New Underground Tank Reduces Overflows to White River

Raw sewage overflows into the White River near downtown reduced dramatically with the October opening of the East Bank Storage Tank.

The 3-million-gallon, underground tank lies adjacent the campus of Indiana University-Purdue University at Indianapolis and along White River State Park. From July to December 2001, 29 overflows were reported at this location. With the tank in place, just five would have occurred during that period.

"From the day he took office, Mayor Peterson has made it a priority to solve this problem," Deputy Mayor Carolyn Coleman said at the October 12 ribbon-cutting ceremony. "This project is a prime example of what we are doing to reduce overflows and become a world-class city."

The $5.8 million project is included in the city's long-term plan to reduce sewage overflows and restore Indianapolis streams. The tank captures and stores a combination of raw sewage and stormwater that would otherwise overflow into the river during rainfall or snowmelt.

Donohue & Associates Vice President Stephen Brinegar (left), Deputy Mayor Carolyn Coleman, DPW Director James Garrard and Donohue & Associates Vice President Jim Miller celebrated the opening of the East Bank Storage Tank. Donohue & Associates were the project designers.

The East Bank Storage Tank holds wastewater until flows in the sewer system subside; then the sewage is pumped back into the existing sewer for transport to the Belmont Advanced Wastewater Treatment Plant. Flushing gates clean out the storage tank after each use.

The underground tank blends into the stream bank and is not noticeable to people enjoying White River State Park. The project was designed by Donohue & Associates, Inc. and inspected by Malcolm-Pirnie, Inc. The construction was managed by Thieneman Construction, Inc.

SCIENCE Bound

Science Bound students Emma Carmichael (left) and Tasha Ricks teamed on a robotics project at the Women in Engineering Summer camp.

Scholarship Campaign Launched

The Indianapolis Clean Stream Team has launched a fund-raising campaign to endow an environmental scholarship at Purdue University for a deserving Indianapolis Public Schools student.

The scholarship will be granted through the Purdue-IPS Science Bound program, which makes higher education a reality for low-income students who might not otherwise go to college.

Science Bound was the brainchild of Purdue President Martin Jischke and Purdue alum Bob Bowen of Bowen Engineering.

Students who complete the Science Bound requirements will receive a full-tuition scholarship to study a science-related field at Purdue. Program requirements include maintaining a required GPA, participating in after-school programming, and attending summer programs and weekend trips to Purdue.

Today, there are more than 150 students between 8th and 10th grade in Science Bound.

"When today's 10th graders graduate, one of them will be rewarded with a Clean Stream Team scholarship to attend Purdue," said DPW director Jim Garrard. "We are excited about the opportunity to draw new talent into the environmental science and engineering field."

The Clean Stream Team plans to raise $103,000 during the next three years to establish an endowment. Various levels of tax-deductible giving are available. If you are interested in making a donation, contact Jodi Perras at 327-8720 for more information.

DO YOU HAVE A CORRECT CONNECT?

The Department of Public Works is launching a new "Correct Connect" program to support its goal of reducing sewage overflows into our rivers and streams.

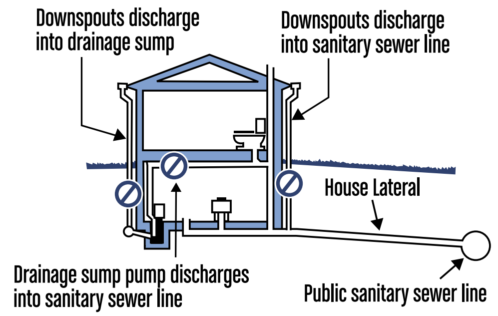
Many homes in Marion County have sump pumps or downspouts illegally or incorrectly connected to the sewer system. If your downspout or sump pump is directly connected to the sewer, it is taking up space needed to carry sewage to our treatment plants.

"The goal of Correct Connect is to reduce rainwater flowing into our sewers," said DPW Director Jim Garrard. "This 'clear water' can contribute to sewage overflows into our streams and – even worse – sewage backups into people's basements."

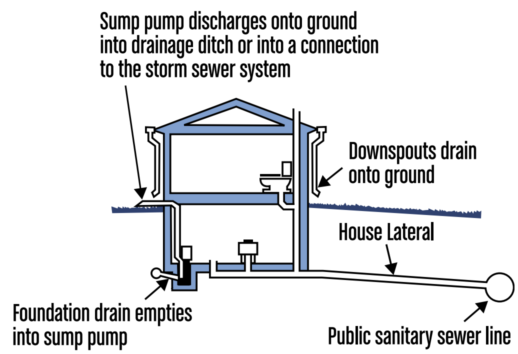
"In a neighborhood of 200 homes it only takes six to eight sump pumps working full time in wet weather to cause a backup in a sanitary sewer – causing problems for an entire neighborhood," said Carlton Ray, DPW's administrator for environmental engineering.

The Correct Connect program will educate residents on how to identify and correct any illegal or incorrect sewer connections. The program will include an instructional video, how-to materials, and assistance from city staff and partner organizations.

For more information on Correct Connect, visit our Web site at www.indycleanstreams.org or call the Mayor's Action Center at 327-4622.



IMPROPER INSTALLATION



PROPER INSTALLATION

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Spring 2005 | Issue 6

Inside This Issue

Statement Of Purpose

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CONSTRUCTION BEGINS TO REDUCE OVERFLOWS TO POGUES RUN

Walsh Construction crew members pour concrete to create a wastewater collection structure under East Michigan Street near Pogues Run. Eventually, three sewer pipes will converge into the underground box, which will direct overflows into an underground tunnel and away from area schools and neighborhoods.

The city will reduce sewage overflows near four local schools through a sewer and tunneling project now under construction on the city's eastside.

Pogues Run was selected for the city's first tunneling project to reduce sewer overflows because of its proximity to Arsenal Tech High School, Harshman Middle School, Horizon Alternative Middle School and Theodore Potter Elementary.

"Citizens have asked us to prioritize improvements near schools, parks and places where children play," said Mona Salem, deputy director for the Department of Public Works (DPW). "This project was put on our priority list to help protect kids in the area."

"It is always a challenge to make students aware of the potential hazards – especially after a flood event," said Steve Young, chief of facilities management for Indianapolis Public Schools. "You wouldn't necessarily know a hazardous situation had been created."

Focusing on the lower portion of Pogues Run between 10th and New York streets, the project will rehabilitate old brick sewers, dig a new tunnel to capture sewer overflows and redirect those overflows into an existing downtown tunnel – and away from the schools.

Overflows in the area are expected to be reduced from an average of 22-38 in a typical year to four overflows or less, based on average rainfall statistics. Dry years will see fewer overflows; wet years may cause more than four. *(see "Construction" page 3)*

DPW Begins 2005 Responding to Rain, Floods

Department of Public Works employees worked around the clock to respond to emergency calls in January, when unusually heavy winter rains caused flooding and sewage overflows throughout the city.

DPW's Flood Command Center distributed more than 10,000 sandbags, erected safety signs and responded to emergency requests. Three DPW township service coordinators were on call 24 hours a day during the storm event to respond to resident concerns.

The National Weather Service reported 6 inches of rain fell on Indianapolis from Jan. 1-6. It rained more during the first week in January than it typically does in January and February combined.

While low-lying areas, such as Ravenswood and Frog Hollow, received the most news media attention, service calls to DPW came from across the city.

"All eight townships reported many incidents of backups, overflows, drainage problems, flooding and other sewer-related issues," said Public Works Director James Garrard. "This wet weather streak

(see "Responding" page 3)

From the Director...

James Garrard
Director of Public Works

Since late last year, DPW has been working with state and federal regulatory agencies to finalize our long-term plan for controlling sewer overflows.

Meanwhile, recent developments in the Indiana General Assembly should lead to more legal certainty for our city and other communities with sewage overflows. Senate Bill 620 has had the support of cities and towns, environmental activists and the business community, because it will help Indiana get more overflow reduction plans approved and implemented.

As we went to print, the bill had passed the House 95-0 and was awaiting the governer's signature. If signed into law, the legislation will still require communities to reduce sewage overflows in a timely manner. It also creates legal tools that lessen the risk of enforcement actions if communities are implementing approved plans as required. This directs local dollars toward projects to solve sewage overflows, and not to unnecessary state and federal fines.

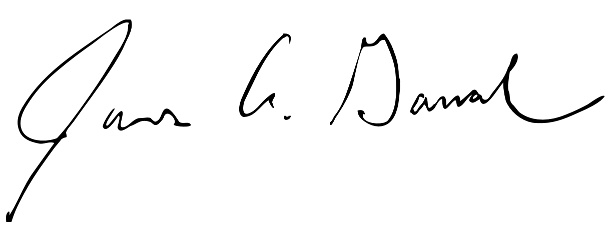
The legislation also creates a new recreational use subcategory in Indiana's water quality standards. This subcategory recognizes that even after a community builds facilities to reduce overflows, some overflows will still occur.

For example, EPA and IDEM have agreed that Indianapolis should build new storage tanks, underground tunnels and larger sewers to store and convey sewage to our central treatment plants. However, we know these facilities cannot capture every storm, making it impossible to make our streams safe for swimming all the time.

For this reason, Indianapolis will ask the state to approve the new recreational use subcategory for those few storms that will cause overflows after our new facilities are in place. Because people are unlikely to be swimming during these large storms, the risk to public health is minimal.

I'd like to thank the legislators, communities and other stakeholders who have worked together on Senate Bill 620 to ensure continued progress in cleaning our waterways.

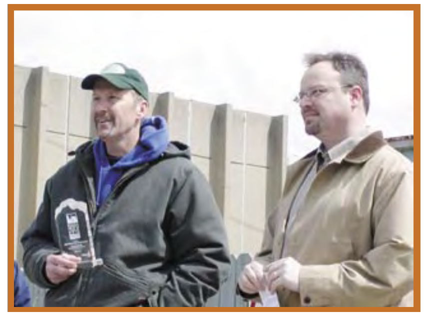
If you have questions about these issues, please contact the Clean Stream Team at 327-8720 or my office at 327-4000.



BRIEFS

White River Organization Recognized

The Friends of the White River became an honorary member of the Clean Stream Team in April for its efforts to preserve and protect the city's primary waterway.



DPW Director James Garrard (right) presents Robb Chitwood, president of Friends of the White River, with the Clean Stream Team Award.

A non-profit organization formed in 1985, FOWR represents the river's recreational users, nearby residents, and all citizens interested in the preservation of the river as a natural resource.

The Friends organize and participate in many river cleanup and educational events each year. Executive Director Kevin Hardie also serves on DPW's Clean Stream Team Advisory Committee.

"This volunteer organization is an invaluable part of our city and vital to the overall efforts of DPW and its Clean Stream Team," said DPW Director James Garrard.

The Clean Stream Team award recognizes businesses, organizations and residents that exhibit extraordinary effort on behalf of our waterways. To nominate someone for this award, visit our Web site at *www.indycleanstreams.org*.

Stream Line Available Via E-mail

The quarterly Stream Line newsletter and other updates from the Indianapolis Clean Stream Team are now available via e-mail.

You can sign up at *www.indycleanstreams.org* to receive an HTML-based version of Stream Line and other e-mail updates on Indianapolis water quality issues. You can also visit the Web site to read past issues of Stream Line.

Be on the lookout for changes at *www.indycleanstreams.org*. We are updating and expanding the site to include more information on the city's stormwater and septic programs, in addition to information about the city's plans to reduce raw sewage overflows into our streams.

Construction (continued from page 1)

"We are pleased that the city is doing what it's doing," Young said. "It certainly will be an improvement over what has existed for a long time."

Another key part of this $19.2 million construction project includes the replacement of the old Dorman Street pedestrian bridge and the widening of Pogues Run. According to Bob Zieles, DPW construction manager, these changes will bring the Cottage Home neighborhood out of the 100-year flood zone and allow residents to discontinue their flood insurance.

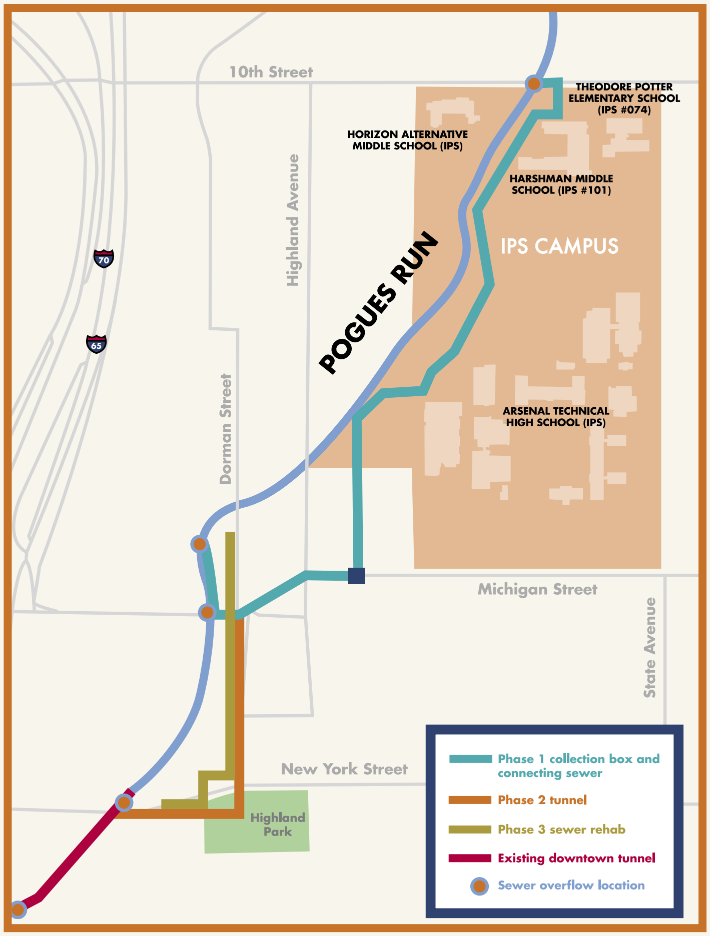
The project started earlier this year when workers began digging under Michigan Street near the Interstate 65-North ramp to build a sewage collection box and a connecting sewer from Michigan Street up to 10th Street to capture sewer overflows. [See map.] This first phase is expected to be complete by the end of 2005.

The second phase, initiated in March, will dig a tunnel connecting the new Michigan Street collection structure to the existing downtown tunnel. State-of-the-art tunneling equipment will be launched from Highland Park, located at New York and Dorman streets.

Phase three will include rehabilitation of brick sewers along Dorman and New York streets. All three phases are scheduled to be complete in August 2006.

Additional improvements will be made later to reduce overflows in the upper portions of Pogues Run under the city's long-term control plan, now under negotiation with state and federal regulators.

The Pogues Run project team includes design firm Clark Dietz, Inc. and Brierly Associates, inspection firm Christopher B. Burke Engineering Ltd. and contractors Walsh Construction Company, Super Excavators Inc., and Insituform Technologies, USA, Inc.



This 3-phase project will capture sewer overflows and relocate them to an underground tunnel and away from area schools.

Responding (continued from page 1)

is just another reminder of the work that remains ahead of us to upgrade our sanitary and storm sewer systems."

DPW's Customer Service center reported nearly three times as many service requests in January 2005 compared with January 2004, as shown in the chart below.

Washington Township was the source of many service calls for sewage overflows, drainage issues, flooding and debris caught in sanitary and storm sewers. Calls made from other townships were mainly about drainage and flooding problems.

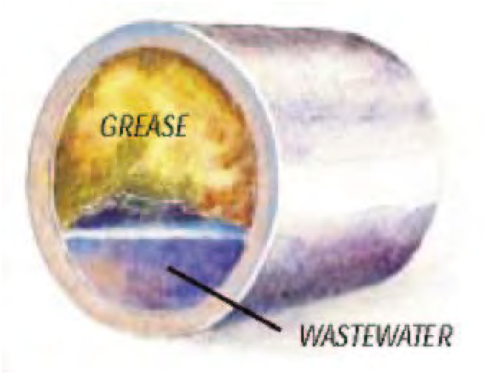
DPW SERVICE REQUESTS COMPARISON - JANUARY 2004 VS. JANUARY 2005

PROBLEM	BACKUP	OVERFLOW	DRAINAGE	FLOODING	SURCHARGED	DEBRIS IN STRUCTURE	DITCH DRAINAGE	TOTALS
2004 JANUARY TOTALS	83	0	141	43	16	23	18	324
2005 JANUARY TOTALS	90	48	244	298	103	81	16	880

FATS, OILS AND GREASE CAN CLOG THE CITY'S SEWERS

What do you do with grease and food scraps left after cooking? If you send them down the drain, you could be contributing to sewage backups and overflows.

"When fats, oils and grease are washed down sinks and floor drains, they can build up over time and eventually create clogs," said John Chavez, administrator for the Department of Public Works, Office of Environmental Services. "These clogs can cause sewer backups and prevent the sewers from safely transporting sewage to our treatment plants."



HOW YOU CAN HELP

Indianapolis businesses and residents can help by taking these simple steps to reduce the amount of fats, oils and grease in our sewers:

- Wipe pots, pans and dishware with a paper towel before washing to reduce grease discharges into the sewer.
- Dispose of food waste through composting or the trash rather than using garbage disposals.
- Never dispose of leftover cooking oil down the drain.

If you own a restaurant or commercial food establishment, make sure you have a grease interceptor and that it is maintained and operated properly.

Grease-clogged sewers must be cleaned more frequently, increasing the city's sewer maintenance costs at a time when the city budget is already strapped for cash. Sewer overflows and backups also can lead to expensive environmental fines and penalties.

Fats, oils and grease are found in food scraps, meat fats, lard, oil, margarine, butter, baking goods, sauces, and dairy products. Under city ordinances, restaurants, bars, hotels, hospitals, schools and other food service establishments are required to install a grease interceptor to prevent grease from flowing into the sewer system. Grease interceptors must be inspected and cleaned periodically to keep them functioning well. When interceptors are not installed and operated correctly, grease blockages will occur. Using enzymes and other grease-fighting agents usually only moves the clog further downstream, Chavez said. For more information please visit our Web site at www.indycleanstreams.org.

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CLEAN STREAM TEAM

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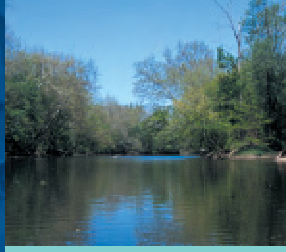

Inside This Issue

Statement Of Purpose

The Indianapolis Clean Stream Team is overseeing many projects to keep raw sewage out of our waterways and improve the quality of life in our neighborhoods. Stream Line is published quarterly to keep you informed about the city's progress in reducing raw sewage overflows and restoring the health of our streams.

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INDIANAPOLIS CLEAN STREAM TEAM

Sewer Overflow Hotline: 327-1643

MAYOR PROPOSES SWEEPING PLAN TO MAKE INDIANAPOLIS NEIGHBORHOODS CLEANER, HEALTHIER

Plan tackles raw sewage overflows, chronic flooding & failing septic tanks

Rates to increase over three years, but will still be lower than most cities across state, country

Mayor Bart Peterson released plans on Oct. 3 to improve the health and quality of life in neighborhoods throughout Marion County by curbing raw sewage overflows in to rivers and streams, address chronic flooding and addressing the thousands of failing septic tanks in homes across the city.

Neighborhoods across the city will see projects and investments in infrastructure that will:

- Continue the city's long-term plan to reduce the century-old problem of raw sewage overflows into White River, Fall Creek and other neighborhood streams;
- Eliminate the onerous Barrett Law process to convert neighborhoods from septic systems to city sewers;
- Bring sewer service to about 18,000 homes in the next 20 years;
- Address high-priority flood control and drainage issues in neighborhoods throughout the county; and
- Keep up with growing neighborhood needs for sewer capacity and sewage treatment.

"Today marks a major investment in the infrastructure of our community that will make drastic improvements in the quality of life for Indianapolis neighborhoods," Mayor Peterson said. "The problems with raw sewage, chronic flooding and failing septic tanks have plagued our community for decades, and today, we're doing something about it."

Since 2000, the city has invested more than $200 million to reduce raw sewage overflows and modernize sewage collection and treatment. These improvements have reduced raw sewage overflows by approximately 145 million gallons per year.

"We are doing something about the problem, but we need to do more," Peterson said. "The state and federal governments have made it very clear that we must address these problems. It's better to spend

(continue "CLEAN STREAMS" on page 3)

CLEAN STREAMS HEALTHY NEIGHBORHOODS PROPOSAL

Proposed Sanitary Rate Increase
Sanitary Sewer Fees: The average homeowner using 5,400 gallons of water per month will see his monthly bill of $9.59 increase to $12.38 in 2006, $15.17 in 2007 and $17.96 in 2008.

Connection Fees: A new $2,500 sewer connection fee will be charged.

Proposed Stormwater Rate Increase
Proposed Increase: The current bill of $1.25/month will rise to $2.25/month per equivalent residential unit.

Proposed Septic Tank Elimination Program
If the City-County Council approves the proposed rate increases, the city will stop using the state's Barrett Law for all new septic conversion projects.

Benefits:
$435 million over the next three years to reduce raw sewage overflows, bring sewer service to neighborhoods on septic systems and improve flood control and drainage.

From the Director...

James Garrard
Director of Public Works

Hurricane Katrina recently reminded the nation of the importance of building and maintaining our sewage and stormwater infrastructure. This has been a major emphasis in Indianapolis since Mayor Peterson took office in 2001.

We know our streams are polluted and our neighborhoods are unhealthy due to raw sewage overflows, failing septic systems and poor flood control and drainage. Raw sewage spills into our waterways nearly every time it rains. Sewage comes from all over the county to contribute to the problem.

The proposed rate increases will not just address raw sewage overflows in the inner city. They will also help Indianapolis:

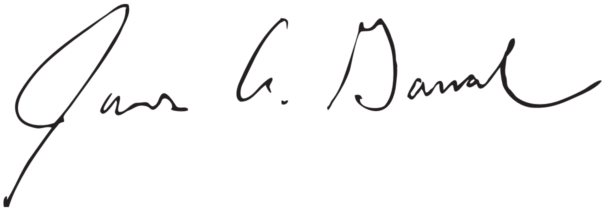
- keep up with growing neighborhoods that need sewer capacity and treatment,
- eliminate failing septic systems, and
- improve flood control and drainage in many neighborhoods.

Our sewer infrastructure needs are well-known and documented by the city and the Indianapolis Chamber of Commerce. The city has already invested $200 million in projects that are reducing overflows by 145 million gallons per year. But we need to do more.

The state and federal governments have made it very clear that we must address these problems or we will face penalties. We believe it's better to keep our money here to solve problems than to pay fines to the state or federal government.

The proposed rate increase will pay for $435 million in sanitary and stormwater projects over the next three years. Additional rate increases will be needed in future years to continue our program for clean streams and healthy neighborhoods.

It's important to remember that with these increases, our rates will still be affordable when compared to other cities' rates. We hope you will take the time to understand this proposal and give us your support.



BRIEFS

Students Earn Clean Stream Team Award

Students at Harshman Middle School visited the Pogues Run project site near their school during the spring semester to learn more about the project.

Students at Harshman Middle School recently received a Clean Stream Team Award for helping educate the community about raw sewage overflows.

The students conducted research, listened to guest speakers from the Clean Stream Team and visited the Pogues Run project site near their school. Compiling all of the information they had learned, the special education class developed a 7-page children's activity book, a PowerPoint presentation, a series of iMovies and a Web site to teach young students and adults alike of the importance of water stewardship.

"With Pogues Run so close to the school, this project allowed the students to make a difference in their community while gaining confidence and practical skills they can use in life," said teacher Laurie Blair, whose class includes 6th, 7th and 8th graders.

DPW Director James Garrard visited the class in May to talk with students about what they learned and to present the Honorary Clean Stream Team Award.

For more information on the class project, please visit the students' Web site at www.bsu.edu/edtec/cilc/blair. The students are looking for assistance in covering the cost of printing their activity book. If you are interested in helping, please contact Deana Haworth at dhaworth@indygov.org.

Honorary Clean Stream Team Award Nominations Accepted

Do you know somebody who is deserving of honorary membership on the Clean Stream Team? The city is accepting nominations for businesses, organizations and residents throughout Marion County who work on behalf of our waterways.

Honorary membership may be awarded for the following achievements or activities:

1. Environmental leadership over an extended time
2. Voluntary stewardship of our waterways through a one-time or sustained project
3. Partnership with the city on water quality issues or projects

Visit www.indycleanstreams.org to make a nomination. An internal review committee will review the nominations and make recommendations for awards to the DPW director.

CLEAN STREAMS *(continued from page1)*

our dollars fixing the problems here than to pay fines to Washington or the state government."

Over the next three years, the plan includes $400 million in sewage overflow and sanitary sewer/treatment projects and $35 million in flood control and drainage improvements. These improvements will be financed by increases in sanitary sewer fees, stormwater utility fees and sewer connection fees paid by property owners and developers who connect for the first time to the sewer system.

Sewer projects. More than 100 years ago, Indianapolis built a "combined" sewer system that is still used today. It carries sewage, storm water and industrial waste away from homes, streets and factories in the same set of pipes. To avoid backups into homes, the system sends waste directly into Indianapolis waterways.

When as little as a quarter-inch of rain falls or snow melts, the extra water overloads the sewers, dumping raw sewage, human waste, toilet paper, disease-causing bacteria, such as E. coli, viruses, industrial waste, oil, grease and other pollutants directly into the city's rivers, streams and creeks.

The new sewer rate will raise the average household user's sewer bill from $9.59 a month for 5,400 gallons of water use to $12.38 a month in 2006, $15.17 in 2007 and $17.96 in 2008. If approved, the first increase would appear on water/sewer bills in January 2006.

Stormwater projects. The Mayor also announced he would support a $1 increase to the current $1.25 per month stormwater utility fee, raising the fee to $2.25 per housing unit. If approved, this fee will appear on residents' property tax bills next spring.

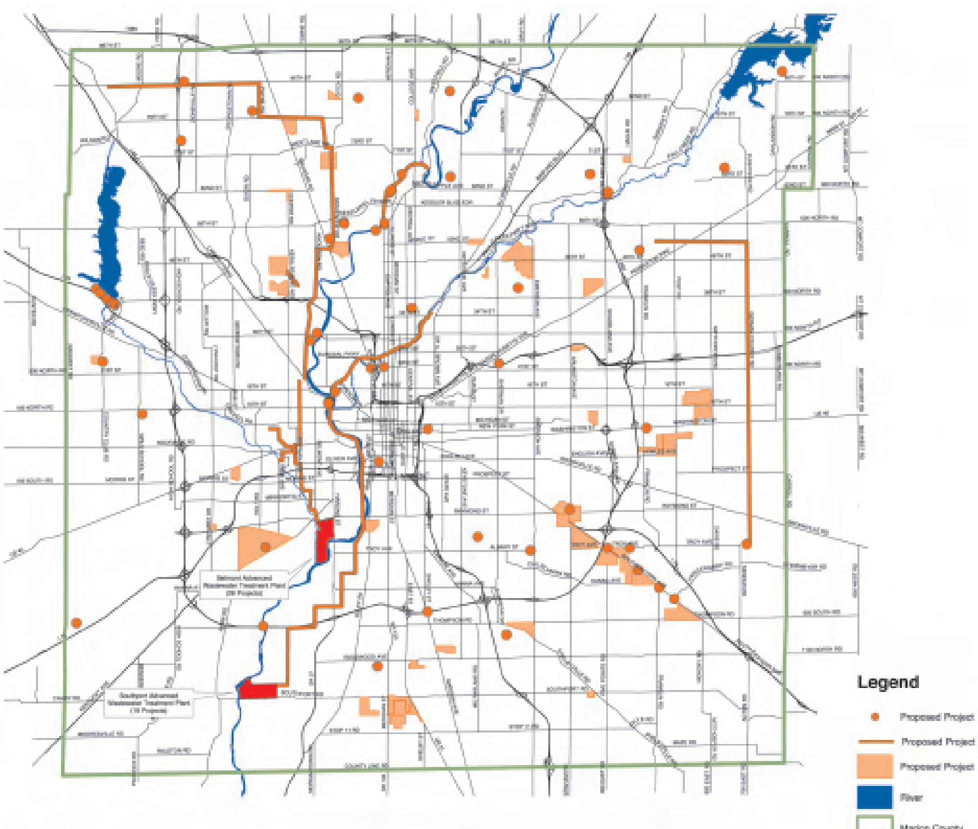
Connecting to city sewers. The city also proposed a new $2,500 sewer connection fee to be charged for a new house or for a house connecting with city sewers. Multi-family housing will pay $2,500 per unit; industrial and commercial connections would pay a proportional amount based upon meter size. This fee will require new connections and new developments to help pay into the sewer system that has been built by others before them.

"Although these connection fees are not pleasant, they are common practice in most other communities, including surrounding communities outside Marion County," said Public Works Director James Garrard. "As our sewer rates rise to comply with regulatory requirements, it is only fair that new connections and new developments help pay into the sewer system that has been built by others before them."

Eliminating septic tanks. If the City-County Council approves the new rates, the city will stop using the state's Barrett Law for all new septic conversion projects. Under the new Septic Tank Elimination Program (STEP), the city will bring sewer service to approximately 18,000 homes in the next 20 years. See page 7 for more details on this proposal.

The Mayor announced the plan outside Harshman Middle School, which sits on Pogues Run, one of many neighborhood streams affected by sewer overflows, neighborhood flooding and failing septic systems.

Sanitary and Stormwater Capital Improvement Projects
(Proposed 2005-2008 Projected Investments)

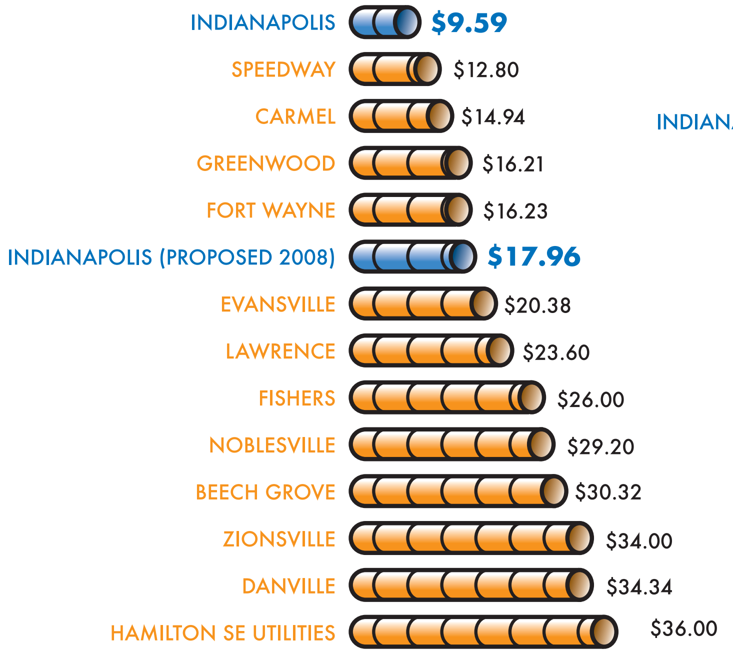


The proposed project list is subject to change based upon changing regulatory requirements, emergencies/natural disasters, available funding, field conditions, and other unanticipated and unavoidable circumstances.

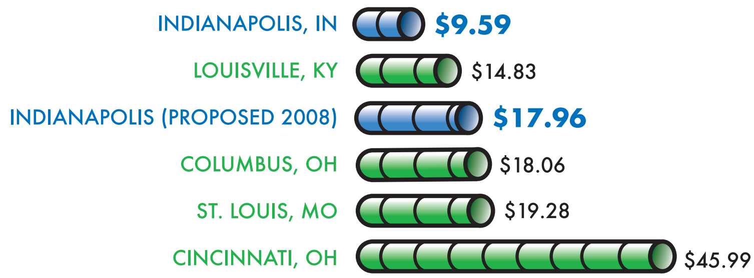
SEWER RATE COMPARISON

AMOUNT RESIDENTIAL CUSTOMERS PAY PER MONTH, BASED UPON 5,400 GALLONS OF USAGE.

INDIANA COMMUNITIES



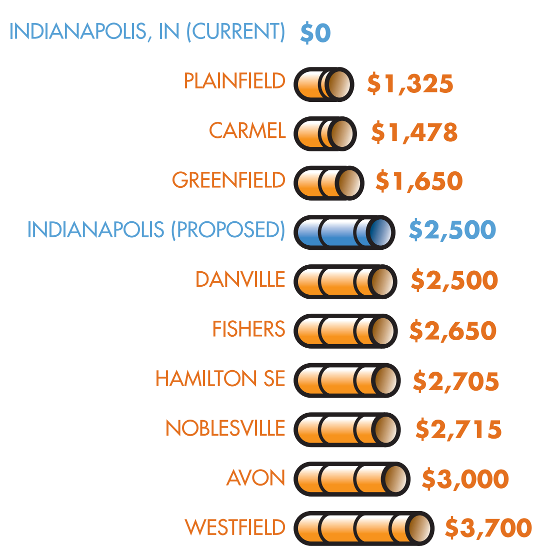
OTHER MIDWESTERN CITIES



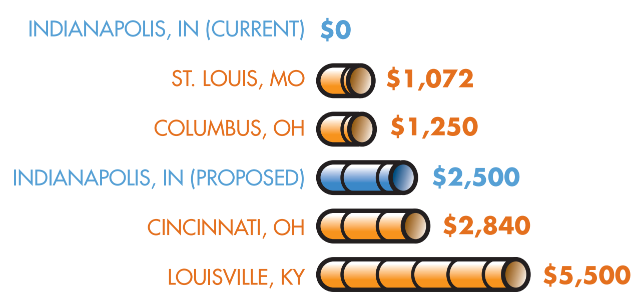
Comparison of Indianapolis to Midwestern Communities

New Sewer Availability and Connection Fees for Single Family Units

INDIANA COMMUNITIES

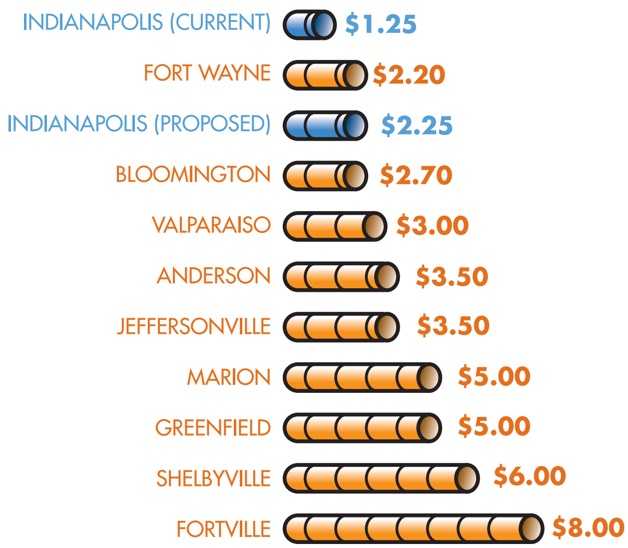


OTHER MIDWESTERN COMMUNITIES

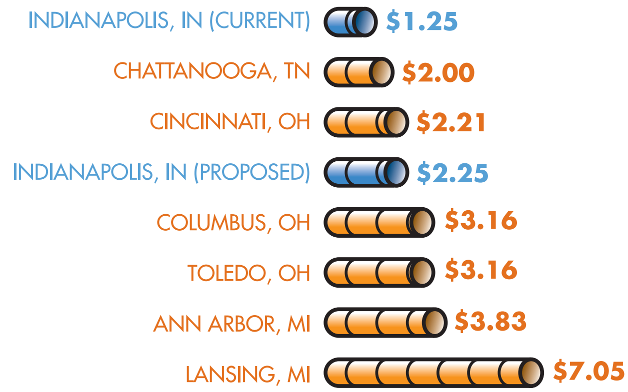


AVERAGE MONTHLY RESIDENTIAL
STORMWATER BILL COMPARISON

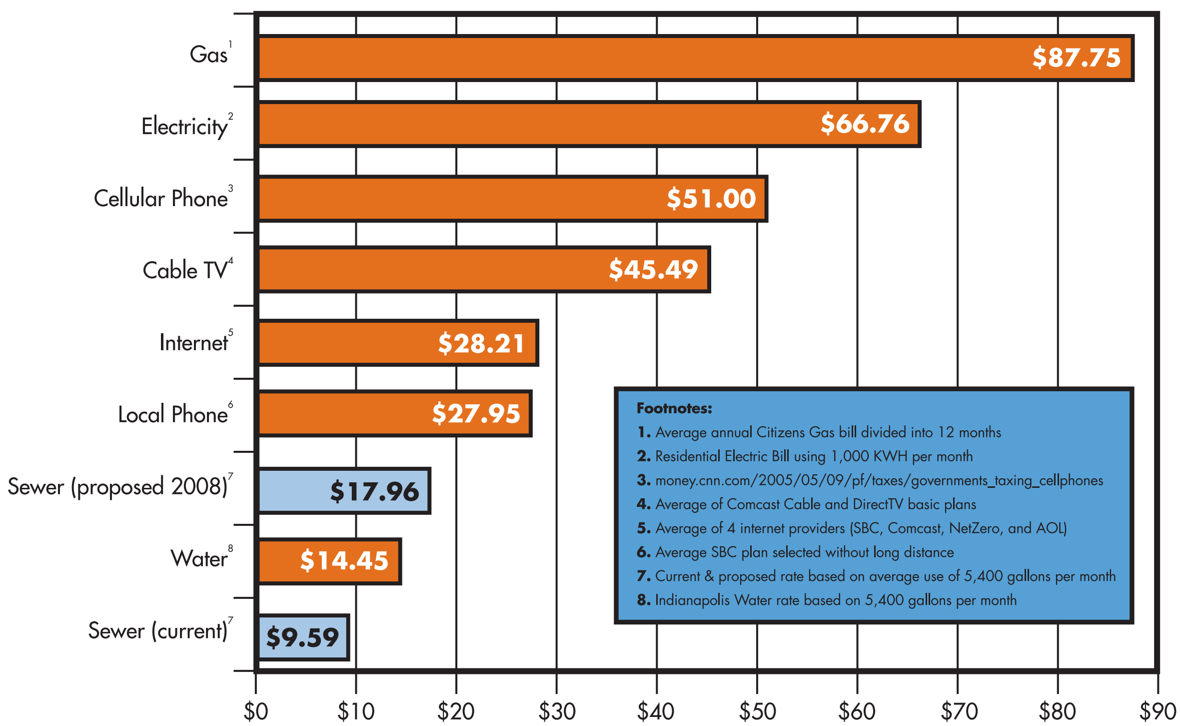
INDIANA COMMUNITIES



OTHER MIDWESTERN COMMUNITIES



Indianapolis Average Residential Sewer Bills vs Other Utilities
(City of Indianapolis, August 2005)



CITY STUDIES PRELIMINARY TUNNEL OPTIONS

Final Route Will Be Chosen After More Analysis And Public Input

The city has completed a preliminary study for a deep underground tunnel that will store millions of gallons of sewage that now flows into White River, Fall Creek and other streams when it rains.

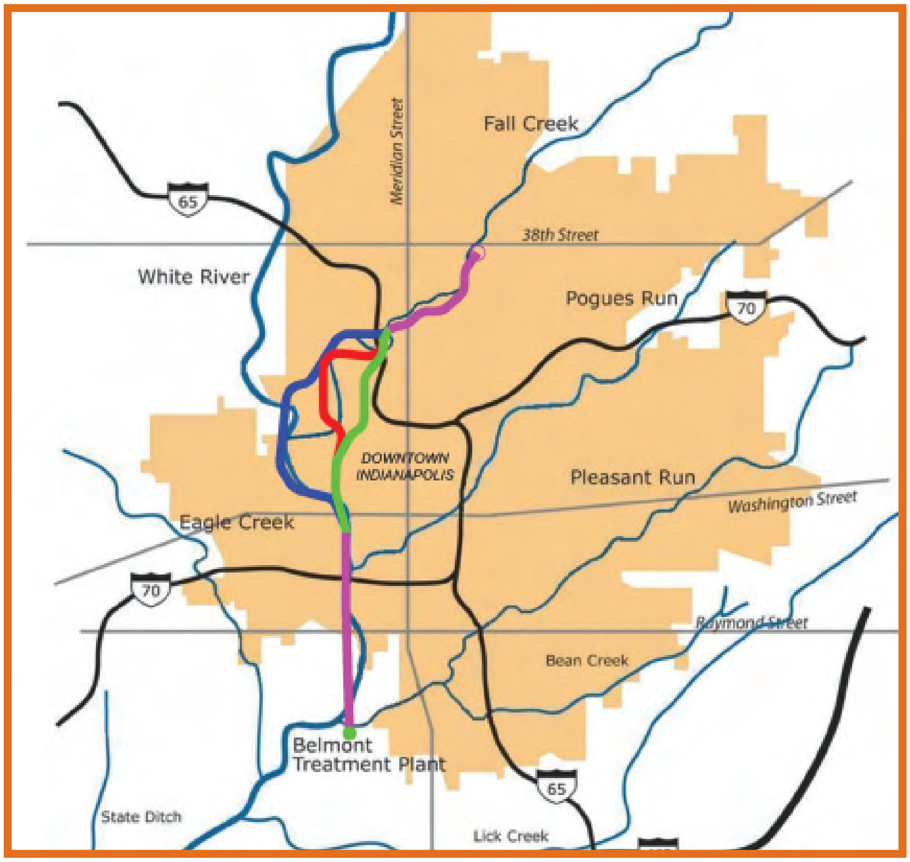
The study represents the city's first look at important issues such as groundwater protection, tunnel length and route, and geology – especially in the bedrock where the tunnel will be built.

The Clean Stream Team Advisory Committee received a briefing on the tunnel study at its May 18 meeting.

"This project is in the preliminary stages," said Carlton Ray, environmental engineering administrator for the Department of Public Works. "There will be a lot more in-depth analysis and engineering to identify the final locations, as well as input from the public. This is a long process and an expensive job."

David Egger of Black & Veatch told the committee that underground solutions are becoming more common in cities because there is little or no room above ground for the facilities we need to build.

"Most cities like Indianapolis are beginning to look more and more at deep tunnels as a solution," Mr. Egger said. "Chicago has been working with tunnels since the late 1970s. Milwaukee has used them as well."



The city's study reviewed three possible routes for the deep tunnel, which would extend along Fall Creek and White River to the Belmont Advanced Wastewater Treatment Plant. The western route, shown in blue, is the preliminary preferred route because of its proximity to existing overflows and its avoidance of downtown and the IUPUI campus.

Following the results of the geotechnical exploration program and considering other factors, the tunnel is expected to be dug approximately 200-250 feet below ground with a tunnel boring machine. A typical rock tunnel boring machine is shown in the photo on this page.

Tunneling minimizes disruption to neighborhoods, but some construction will be required on the surface. The city will need one or two staging areas at ground level to dig a vertical shaft and launch the machine, and another staging area for a retrieval shaft to remove the machine. New sewers and approximately 21 drop shafts will be dug to connect overflow pipes to the tunnel.

The study placed an emphasis on protecting the groundwater supply because parts of the tunnel will run under city wellfields. The city will ensure wellfield protection through groundwater monitoring, advanced tunnel construction practices, sealing the tunnel with grout and concrete, and limiting the tunnel's fill level and storage time during operation, Mr. Egger said.

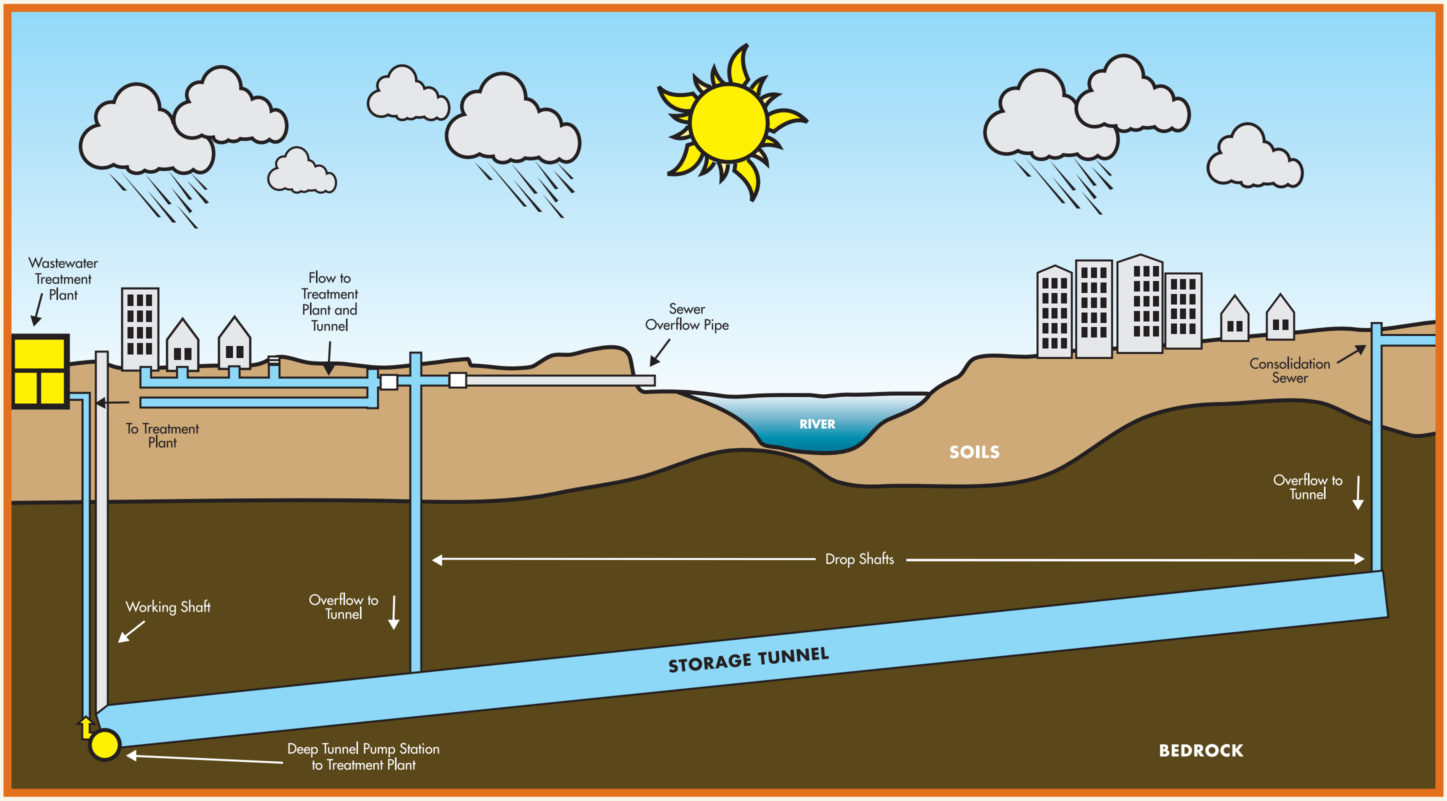
The preliminary study suggests the tunnel will be 7.5 to 10 miles long and 26-35 feet in diameter. Three different tunnel routes were studies, as shown above. The final route will be selected after completing test borings, other studies, and communication with the public, Mr. Egger said.

The Fall Creek/White River Tunnel Evaluation Study was prepared by Black & Veatch and G.E.C. The city and the U.S. Army Corps of Engineers partnered to share the costs of the study.

More information on the study and how a tunnel works is contained in Black & Veatch's presentation, which can be found at www.indycleanstreams.org.

The photo above shows a typical cutter head on a rock tunnel boring machine. The machine will bore through the limestone bedrock more than 200 feet below ground level, cutting a tunnel 7.5 - 10 miles long and 26-35 feet in diameter. Construction is still several years away.

HOW A TUNNEL WORKS



The above diagram shows how a series of drop shafts will connect our existing sewers to the deep tunnel. During a storm when sewers are full, sewage will be sent to the tunnel through the drop shafts. When the storm is over, pumps will pump the stored water to wastewater treatment plants. The tunnel will be used 60-70 times each year, depending on rainfall and snowfall patterns.

SEPTIC TANK ELIMINATION PROGRAM

A STEP Toward Cleaner Streams & Healthier Neighborhoods

SEPTIC TANK ELIMINATION PROGRAM

A **STEP** TOWARD CLEANER STREAMS AND HEALTHIER NEIGHBORHOODS.

Under the Barrett Law, the city may charge property owners for construction of city sewers. Under the new Septic Tank Elimination Program (STEP), the city will pay to bring sewers to neighborhoods with approximately 18,000 homes in the next 20 years. Here's how the new program will work:

Existing Barrett Law Projects: Upon Council approval of the rate increase, property owners owing money for any existing Barrett Law sanitary sewer project will stop paying their assessments. Any outstanding Barrett Law debts will be covered by the city. However, the city will not reimburse property owners for any previous Barrett Law payments made.

New Septic Tank Elimination Projects: For new STEP projects, the city will pay for all sewer construction in the public right-of-way. The property owner will still be responsible for costs on their property (including abandoning the septic tank, installing a lateral to the home, and connecting to the sewer.) This will reduce the average homeowner's payments to the city by 60-70 percent. Actual costs and savings will vary with each property.

The city is exploring options for creating an affordable loan program to help qualified property owners finance the connection costs.

MAYOR CUTS RIBBON ON WET WEATHER UPRGRADES AT TREATMENT PLANT

Indianapolis is one step closer to cleaning up our waterways. The installation of wet-weather storage basins and other improvements at both the Belmont and Southport Advanced Wastewater Treatment Plants were completed on budget and several months ahead of schedule.

Belmont, the older of the two plants, receives most of the city's wet-weather flows. However, Belmont's primary treatment capacity is twice the plant's secondary treatment capacity, resulting in overflows of partially treated wastewater to White River during wet weather.

The Belmont basins will reduce overflows from the primary treatment system by temporarily storing flows during wet weather, until Belmont or Southport have capacity to treat the flows.

The Department of Public Works (DPW) is pleased with the project's progress under construction firm Bowen Engineering Corp.

"Bowen achieved substantial completion of both projects ahead of the city's schedule, which will ensure that the facilities will be ready for the 2006 wet weather season," said Sandra Shafer, senior construction project manager for DPW.

Mayor Bart Peterson held a ribbon cutting ceremony August 22 to celebrate the completion of the storage basins. With the mayor are, from left, Bob Bowen of Bowen Engineering, John Kupke of HNTB, DPW Director James Garrard, Mike Haskin of Greeley & Hansen, DPW project manager Sandra Shafer, and DPW engineer James Parks.

The $15.3 million wet-weather upgrades at Belmont include two earthen-walled, double-lined basins and two new primary clarifiers. Combined together, these facilities will store up to 34 million gallons of wastewater that would otherwise overflow during wet weather. Under the city's long-term plan, additional projects will be needed to add treatment capacity and reduce Belmont overflows even further.

The $12.8 million Southport upgrade aims to reduce sewer overflows to Little Buck Creek and the White River. The Southport improvements include a new 75 million gallon/day raw sewage pump station, new 48-inch force mains to convey flows, and an earthen-walled double-lined 25-million-gallon basin for storage and later treatment.

HNTB Corp. of Indianapolis designed the two-plant project. Greeley and Hansen was the construction engineering firm.

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Inside This Issue

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INDIANAPOLIS CLEAN STREAM TEAM

Sewer Overflow Hotline: 327-1643

CITY MOVING TOWARD CLEANER STREAMS AND HEALTHIER NEIGHBORHOODS

Council's Approval Sets Stage for Sewer System Overhaul

From the Director…

Thank you, Indianapolis!

On behalf of Mayor Bart Peterson, I'd like to thank the community for its strong support of our Clean Streams-Healthy Neighborhoods program.

On Oct. 31, the City-County Council approved Mayor Peterson's $435 million, three-year plan to overhaul the city's sewer system. The plan includes expanding Indianapolis wastewater collection and treatment facilities, reducing flooding and drainage problems, and bringing sewer service to about 4,800 homes now on septic systems.

Mayor Bart Peterson announces the Clean Streams - Healthy Neighborhoods Initiative on Oct. 3 with the support of DPW Director James Garrard, Councillor Lonnell Conley, other community leaders and students from Harshman Middle School.

To fund the improvements, the council voted to increase sewer rates and stormwater fees over the next three years. For an average homeowner in Marion County, monthly sewer bills will rise from $9.59 in 2005 to $17.96 by 2008. Stormwater fees will increase by $1, to $2.25 per month beginning this spring. Also, a sewer connection fee of $2,500 will be assessed on all new-home construction.

Even with the increase, Indianapolis rates remain competitive with cities across the state and country.

The benefits will be seen in neighborhoods across Marion County, as we implement projects that will:

- Continue the city's long-term plan to reduce the century-old problem of raw sewage overflows into White River, Fall Creek and other neighborhood streams;
- Eliminate the onerous Barrett Law process to convert neighborhoods from septic systems to city sewers;
- Address high-priority flood control and drainage issues throughout the county, including necessary repairs to Eagle Creek Dam; and
- Keep up with growing neighborhood needs for sewer capacity and sewage treatment.

In this issue of Stream Line, we are highlighting three projects that will be funded by the new revenue. For a full list of proposed projects, visit www.indycleanstreams.org and click on the "Projects" tab. You can search for projects by township, council district or project type.

The success of the Clean Streams-Healthy Neighborhoods plan would not have been possible without the support of many neighborhood leaders, businesses, civic groups and individuals.

Although sewers in many communities are "out of sight, out of mind," in Indianapolis we see the importance of investing in this buried treasure. Thanks to all of you who made it possible.

THIRTY NEIGHBORHOODS TO GET SEWERS IN NEXT THREE YEARS

City Ending Use of Barrett Law for Sewer Projects

The city's Clean Streams-Healthy Neighborhoods program will bring sewer service to 30 neighborhoods with failing septic systems during the next three years.

"Septic systems have a limited life and eventually fail," Mayor Bart Peterson said. "We will now be able to bring sewer service to homes, eliminate unhealthy conditions and ensure that their sewage gets high-level treatment."

Under the city's Septic Tank Elimination Program (STEP), the Department of Public Works (DPW) will replace failing septic systems with sanitary sewers in approximately 18,000 homes throughout Marion County by 2025. From 2006-2008, about 4,800 homes will be converted to sewers.

Projects planned in 2006 include the Bangor/Delaware neighborhood on the city's south side, which has suffered longstanding health and environmental concerns caused by septic systems.

In 1999, a Marion County Health Department survey found a 38 percent problem or failure rate of septic systems in Bangor/Delaware, including bleed outs, repairs, sewage backups and unsafe levels of *E. coli* bacteria in drainage ditches.

"*E. coli* and other potentially harmful bacteria that seep from failing septic systems are health hazards," said Anne Marie Smrchek, DPW project engineer. "The silt and clay soil in the Bangor/Delaware neighborhood is poor for septic waste absorption."

Resident John Carter, who built his home in Bangor/Delaware in 1963, has to pump his failed septic tank at least once a month.

"We've wanted to be connected to the sewers for so long," said Carter. "We'd be happy staying here forever if it weren't for the septic tank. During the winter and spring, you can smell the sewage in the neighborhood. It is embarrassing."

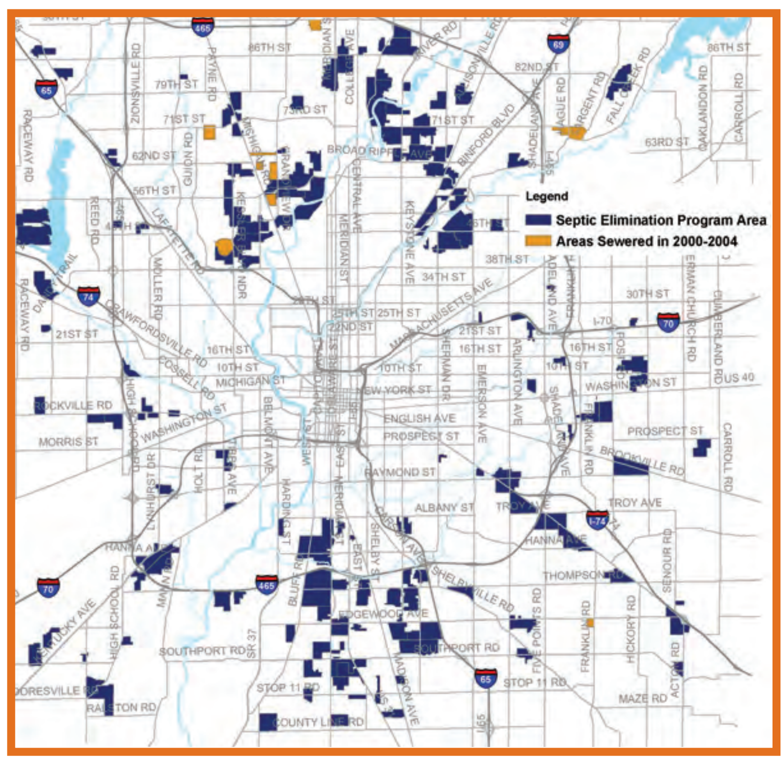
United Consulting Engineers, Inc., is the design engineer for the Bangor/Delaware project. Total project costs are estimated at $11 million.

Under the new STEP program, the city will stop using the state's Barrett Law for all new septic conversion projects. Homeowners still will have to pay private property costs to connect to new sewers, including abandoning the septic tank, installing a lateral to the home, and a $2,500 connection fee. However, the new policy is expected to cut the typical homeowner's total costs from $11,000 to $5,000. Actual costs will vary with each property.

For more information on the STEP program, visit our Web site at www.indycleanstreams.org. To find out when a neighborhood is scheduled to receive sewer service, go to http://imaps.indygov.org/zoning.

STEP
SEPTIC TANK
ELIMINATION PROGRAM

A **STEP** TOWARD CLEANER STREAMS AND HEALTHIER NEIGHBORHOODS.



This map shows neighborhoods with 18,000 homes that have been targeted for sewer service in the next 20 years. Areas shown in orange were sewered in 2000-2004. The remaining neighborhoods will receive sewers by 2025. An additional 12,000 homes on septic systems will need to be addressed as the county grows and sewer service extends into the remaining rural areas.

NORTHWEST SIDE SEWER UPGRADES MOVING FORWARD

The Department of Public Works (DPW) is moving forward with repairs and engineering projects to improve sewer service for fast-growing neighborhoods on the city's northwest side.

The sewer improvements will increase the capacity of the Belmont North Interceptor sewer, which serves Pike Township, western Washington Township and northeastern Wayne Township.

Over the years, the growth of homes and businesses in this area has pushed the capacity of the Belmont North Interceptor near its limits. In addition, many of the aging interceptor lines are in need of repair.

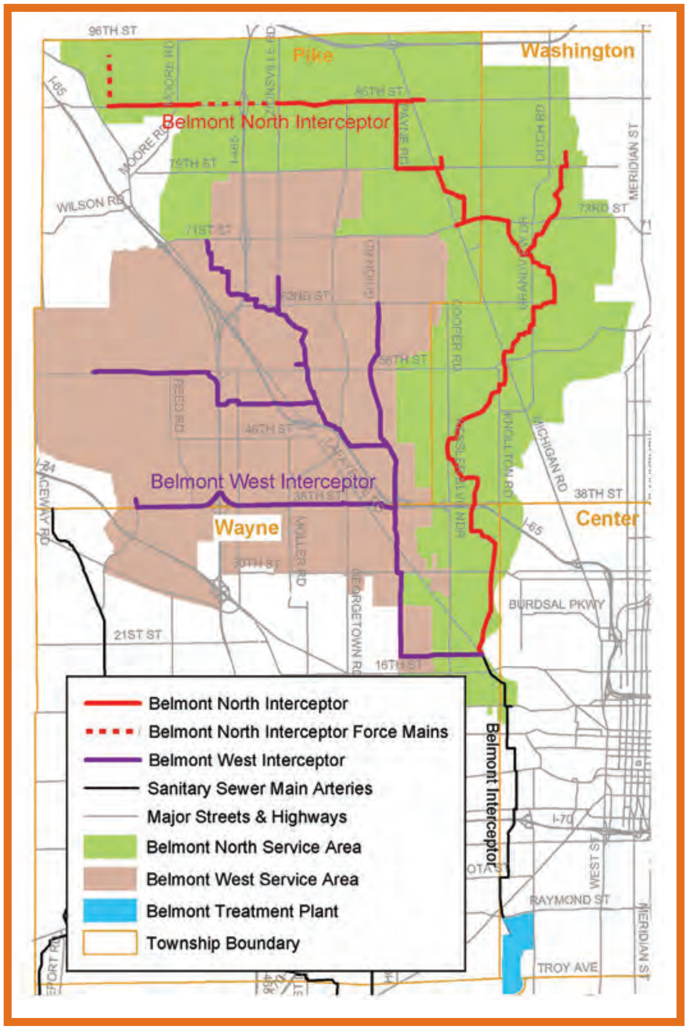
The Belmont North Interceptor sewer begins near the intersection of West 86th Street and Zionsville Road as a 27-inch reinforced concrete pipe sewer and extends east and south to the intersection of 19th Street and Lafayette Road. There it merges with the Belmont West Interceptor to form the Belmont Interceptor, which carries sewage to the Belmont Advanced Wastewater Treatment Plant.

"Interceptors are the main arteries in our sewer system," said DPW Director James Garrard. "These interceptors collect sewage from smaller sewers that serve many homes and businesses. It's important to keep these interceptors in good condition."

The first phase of the Belmont North Interceptor upgrade will repair worn manholes to reduce the infiltration of clear water, said Mike Latos, DPW project engineer. The second phase will construct a parallel sanitary sewer line, which will split the sewage flowing from the northwest side and relieve the flow going into the original line.

"The parallel interceptors will increase the capacity and help convey the sewage south to the Belmont Advanced Wastewater Treatment Plant for treatment," Latos said.

The Belmont North Interceptor is a high priority of the city's Sanitary Sewer Master Plan, which details approximately $370 million in necessary system upgrades over a 15- to 30-year period.



Planning, design, construction and inspection of the Belmont North Interceptor are expected to cost approximately $100 million. HNTB Corp. and American Consulting, Inc., were the engineering firms involved in planning the new interceptor. Design and construction firms will be chosen in the future.

DPW TACKLES SOUTHWEST SIDE STREET AND YARD FLOODING

Rain showers that bring street, yard and basement flooding should be just a memory in a few years for the Mars Hill, Lafayette Heights and Maywood neighborhoods on the city's southwest side.

Upon approval of bond funding, the Department of Public Works (DPW) will embark on several needed stormwater drainage projects in this area of the city, which was built on a mostly flat, low-lying flood plain.

A DPW community survey showed that 72 percent of respondents in these neighborhoods reported their streets had standing water for more than six hours after rainfall. Thirty-nine percent reported the standing water was greater than one foot.

"Standing water is a health and safety hazard," said Bill Bowman, DPW project engineer. "Frozen water on streets causes black ice and pot holes and deteriorates pavement. During warm weather, standing water can become a breeding ground for mosquitoes."

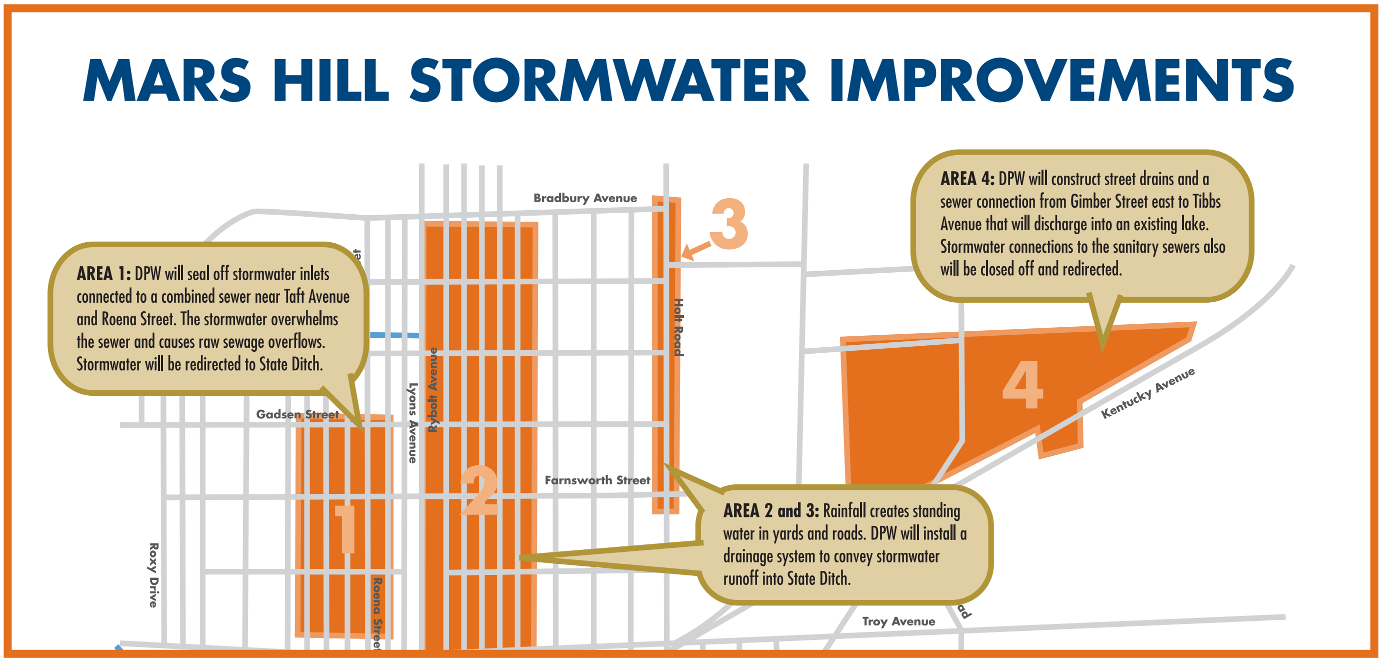
If runoff conditions were improved in this area, stormwater would drain to State Ditch between Hybolt Avenue and Lyons Avenue. However, insufficient drain inlets, roadside ditches filled with gravel, and levees built by residents prevent water from flowing properly to State Ditch, which itself is clogged with debris and occasionally overflows its banks, Bowman said.

(continue "STREET AND YARD FLOODING" on Page 4)

STREET AND YARD FLOODING *(continued from Page 3)*

"The residents are ecstatic that the City-County Council approved the mayor's proposal," Bowman said. "They've been waiting for years for this kind of action."

Expected completion of the stormwater improvement project in the Mars Hill/South Wayne neighborhoods is 2007-2008 at a cost of $3.2 million. RW Armstrong & Associates is the design engineer.



INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St., Suite 900
Indianapolis, IN 46204

Stream Line

City of Indianapolis / Department of Public Works / Clean Stream Program

Stream Line

City of Indianapolis / Department of Public Works / Clean Stream Program

Summer 2006 | Issue 9

Inside This Issue

Statement Of Purpose

The Indianapolis Clean Stream Team is overseeing many projects to keep raw sewage out of our waterways and improve the quality of life in our neighborhoods. Stream Line is published quarterly to keep you informed about the city's progress in reducing raw sewage overflows and restoring the health of our streams.

Contact Info

Send letters to:

Indianapolis Clean Stream Team
Attn: Jodi Perras
151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel: 317-327-8720
Fax: 317-327-8699
Email: jperras@indygov.org

INDIANAPOLIS CLEAN STREAM TEAM

Sewer Overflow Hotline: 327-1643

CITY REACHES AGREEMENT IN PRINCIPLE ON PLAN TO CURB RAW SEWAGE OVERFLOWS

30-Day Public Comment Period Ends August 18

INDIANAPOLIS— The city of Indianapolis has reached a tentative agreement with state and federal agencies on a 20-year plan to greatly reduce raw sewage overflows into Marion County waterways, ensuring continued progress in improving the quality of life in many Indianapolis neighborhoods, Mayor Bart Peterson announced July 19.

Before finalizing the plan, which is a key component of the mayor's Clean Streams-Healthy Neighborhoods program, the city is holding a 30-day public comment period. Once finalized, the plan will be submitted to the Indiana Department of Environmental Management and U.S. Environmental Protection Agency and filed in federal court along with a consent decree.

The $1.8 billion plan represents the largest investment in clean water infrastructure in the city's history. All construction will be completed by Dec. 31, 2025.

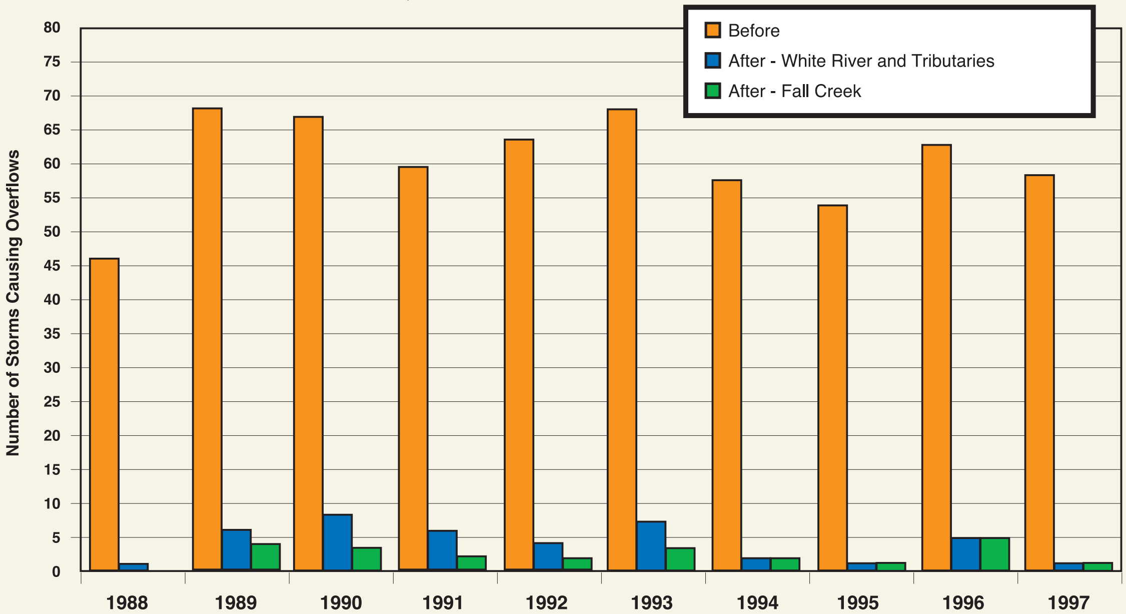
"Since 2000, we have invested more than $200 million and reduced raw sewage overflows by 145 million gallons per year," Mayor Peterson said. "This long-term plan will guarantee ongoing, sustained progress toward cleaner streams and healthier neighborhoods for years to come."

Under the tentative agreement, the city has agreed to invest:

- $1.73 billion by December 2025 to significantly reduce raw sewage overflows from the combined sewer system

See "20-Year Plan," Page 3

PUBLIC HEARING ON THE LONG TERM CONTROL PLAN
August 3, 2006
7 p.m.
University of Indianapolis
1400 E. Hanna Avenue
Good Hall, Room 105



Source: 1950-2003 NetSTORM Simulation. Baseline Conditions and Selected LTCP.

Note: (1) For before conditions, there is an average annual frequency of 60 overflow events per year. The distribution of the 60 events is based on the 54-year precipitation record.
(2) It is estimated that at least one CSO outfall structure would discharge for the listed number of dates each year.

The city's plan will reduce the frequency of overflows from about 60 storms per year to an average of 2 on Fall Creek and 4 on the remaining streams. As shown above, the number of overflow events will vary from year to year, depending on the weather and the severity of storms.

I am pleased to announce the completion of the city's long-term control plan to reduce raw sewage overflows. The $1.8 billion plan will have many benefits to our community, such as:

- Improving the ability of the sewer system and treatment plants to handle rainfall and snowmelt, so sewers would overflow only during large storms
- Capturing 97 percent of wet-weather sewer flows on Fall Creek, reducing the frequency of overflows from about 60 storms per year to 2 storms in a year with average rainfall
- Capturing 95 percent of wet-weather sewer flows on White River and other streams, reducing overflows to 4 storms in an average year
- Improving oxygen levels for fish, reducing E. coli bacteria levels, and reducing or eliminating odors, untreated sewage and trash in neighborhood streams

The city also will be required to invest $50.4 million on specific sanitary sewer improvements by 2015 to eliminate chronic sanitary sewer overflows in the separate, sanitary sewer system.

The plan is one of four components of the mayor's 20-year Clean Streams-Healthy Neighborhoods Program. The other components, though not a part of the federal agreement, are:

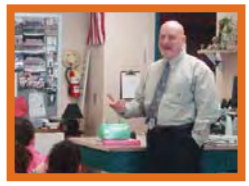
- Bringing sewer service to 18,000 homes in neighborhoods with septic systems
- Expanding and repairing the separate sanitary sewer system to meet growing neighborhood and business needs
- Improving neighborhood drainage and flood protection

Comings and Goings

Many DPW staff deserve credit for the plan's completion. Former DPW Director Jim Garrard helped negotiate the plan's final details while also taking over economic development activities in the mayor's office. Mona Salem, a DPW leader since 2000, left her position as the city's top engineer earlier this year to take a private sector position closer to her family in the Middle East. Our new deputy director of engineering is Carlton Ray, who has helped steer the city's raw sewage overflow program since the 1990s. Thanks to Jim, Mona, Carlton and all the DPW staff and contractors who made the plan's completion possible.

BRIEFS

DPW celebrates National Engineers Week by introducing young people to the profession



DPW Senior Project Manager John Oakley discusses the engineering profession with a group of middle school students.

To highlight National Engineers Week 2006, the Indianapolis Department of Public Works (DPW) kicked off "Connecting Educators to Engineering" to introduce young people to engineering and technical careers.

DPW-Engineering partnered with the Indiana chapter of the American Council of Engineering Cos., sending two-person teams to discuss the engineering profession with Indianapolis middle school students during National Engineers Week, Feb. 20-24.

Professionals who participated in "Connecting Educators to Engineering" also are volunteering for field trip assistance, after-school activities and/or mentoring projects.

"The presenters did a wonderful job of planting seeds for potential career fields for my students," said Joan Jacobs, guidance counselor at Eastwood Middle School in Washington Township.

Clean Stream Team Honored By Friends of White River

The Indianapolis Clean Stream Team recently was recognized for exemplary service to the White River from the Friends of White River. Former DPW Director James Garrard (shown at far right in the photo) accepted the governmental leadership award along with other honorees at the Friends' annual meeting earlier this year.

Dirty Dozen Hunting & Fishing Club Earns Clean Stream Team Award

DPW Public Information Officer Margie Smith-Simmons and her son, Chad Simmons, presented an honorary Clean Stream Team award to Joe King of the Dirty Dozen Hunting & Fishing Club.

Volunteers turned out to pick up garbage and debris around Fall Creek during this year's Fall Creek Clean Up on March 25, which was sponsored by the Dirty Dozen Hunting & Fishing Club. For the organization's sustained commitment to preserving our waterways, the club received an honorary membership to the Clean Stream Team at the seventh annual event. Among the volunteers were IPS students, students from local universities and city employees.

20-Year Plan (continued from page 1)

- $50.4 million by December 2015 to eliminate chronic overflows from seven locations in the separate, sanitary sewer system
- $3.5 million by December 2010 on supplemental environmental projects to eliminate septic systems in the Epler-Meridian and Banta-Southport neighborhoods.

Although not a required component of the agreement, the city also plans an additional $64.3 million in watershed improvement projects, such as streambank restoration and streamflow augmentation, for a total investment of more than $1.8 billion in 2005 dollars.

The 30-day public review and comment period for the plan will end August 18. The plan is available on-line at www.indycleanstreams.org, at all Marion County public library branches, the Department of Public Works office at 604 N. Sherman Drive, and the Indianapolis Clean Stream Team at 151 N. Delaware, Suite 900. Electronic copies of the plan on CD-Rom can be obtained by calling 317-327-8720.

A public hearing on the proposed plan will be held at 7:00 p.m. on August 3 at Good Hall, Room 105, University of Indianapolis, 1400 E. Hanna Avenue. Written comments on the plan should be submitted by August 18 either on-line at the address above or to the Indianapolis Clean Stream Team, 151 N. Delaware St., Suite 900, Indianapolis, IN 46204.

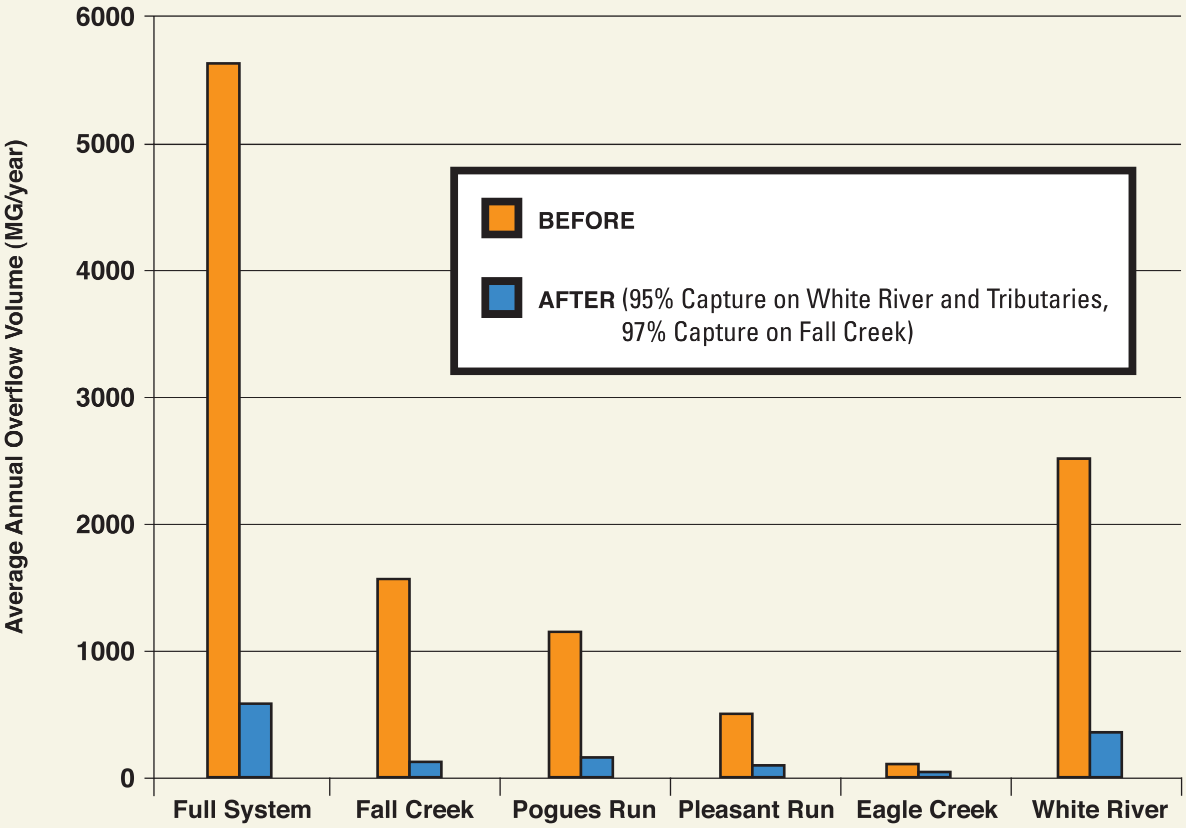
"Our draft plan has been built upon years of public dialogue," DPW Director Kumar Menon said. "We've conducted extensive outreach to neighborhoods, the business community and environmental interest groups – and benefited from the advice of many stakeholders and experts through our Clean Stream Team Advisory Committee. However, we didn't want to finalize the plan without an opportunity for our citizens to provide their comments and input."

The 20-year plan to reduce sewage overflows will include the following major construction projects:

- A 224-million-gallon tunnel located deep underground along Fall Creek and White River. The tunnel will store sewage overflows during rain storms, then pump the sewage to the city's wastewater treatment plants after the storm subsides. Similar sewage storage tunnels have been built in Chicago, Cleveland, Milwaukee, and many other cities.
- New, larger sewers and underground storage tanks along affected waterways to capture overflows and carry them to the central tunnel or treatment plants.
- Improvements and expansion at the Belmont and Southport Advanced Wastewater Treatment Plants to increase their ability to store and treat incoming flows during wet weather.
- A new 12-foot diameter sewer connecting the two treatment plants, enabling the city to better manage and treat flows during wet weather.
- Local sewer separation projects to eliminate isolated raw sewage overflows on White River, State Ditch, Lick Creek and the upstream ends of Fall Creek, Pogues Run and Bean Creek.
- Inflatable dams and pinch valves at key points in the sewer system, enabling the city to better use existing sewer lines to contain and reduce sewage overflows.

The plan will improve the ability of the sewer system and treatment plants to handle rainfall and snowmelt, so sewers overflow only during very large storms when streams are flowing too fast for wading or swimming.

A rate increase approved last year by the City-County Council will fund projects planned in 2006-2008.



Average annual overflow volumes from the city's combined sewer system will be reduced dramatically under the 20-year plan, as shown.

MAYOR PETERSON WINS NATIONAL CLEAN WATER AWARD

Mayor Peterson received his award from NACWA President Donnie Wheeler.

Mayor Bart Peterson was recently honored by the National Association of Clean Water Agencies (NACWA) with a 2006 National Environmental Achievement Public Service Award.

NACWA said Mayor Peterson was being recognized "for being an outspoken advocate for the need to improve the Indianapolis' sewer infrastructure and for aggressively addressing the city's [combined sewer overflow] CSO problem. You are a true champion of wastewater utility issues."

The mayor's achievements since taking office in 2000 include:

- Submitting a long-term control plan in 2001 in advance of permit requirements and investing more than $200 million into CSO-related early action projects.
- Gaining passage of a 17.8 percent sewer rate increase in 2001 and an 87 percent, three-year rate increase for 2006-2008 to fund necessary sewer improvements.
- Implementing the first real-time CSO public notification program in the nation.
- Establishing stormwater construction standards in the combined sewer area, although not required to do so by regulatory agencies.
- Developing a Capacity Management, Operation and Maintenance (CMOM) program in 2000-01 without permit requirement to do so.
- Developing a county-wide Sanitary Sewer Master Plan for large-diameter sewers and conducting Sanitary Sewer Evaluation Studies to identify and address small-diameter sewer needs.
- Creating a new Septic Tank Elimination Program (STEP) that will use city financing to provide proper sewage treatment to 900 homes each year.

"None of these accomplishments would have been possible without the mayor's leadership," said DPW Director Kumar Menon. "While some elected officials find it difficult to put money and attention into underground infrastructure that many will never see, Mayor Peterson has been a leader who recognizes that the city could no longer afford to ignore its waterways and needs for improved sewage treatment."

NACWA represents more than 300 wastewater utilities around the country, including Indianapolis DPW. NACWA members serve the majority of the sewered population in the United States and collectively treat and reclaim more than 18 billion gallons of wastewater daily.

INDIANAPOLIS
CLEAN STREAM TEAM

151 N. Delaware St., Suite 900
Indianapolis, IN 46204

Stream Line

City of Indianapolis / Department of Public Works / Clean Stream Program

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FOR IMMEDIATE RELEASE
Wednesday, July 19, 2006

***CONTACT*:**
Justin Ohlemiller, [317] 327-3622
Margie Smith-Simmons, 327-4669

City of Indianapolis
Bart Peterson, Mayor

City reaches agreement in principle with state, EPA on plan to curb raw sewage overflows

INDIANAPOLIS— The city of Indianapolis has reached a tentative agreement with state and federal agencies on a 20-year plan to greatly reduce raw sewage overflows into Marion County waterways, ensuring continued progress in improving the quality of life in many Indianapolis neighborhoods, Mayor Bart Peterson announced today.

Before finalizing the plan, which is a key component of the mayor's "Clean Streams-Healthy Neighborhoods" program, the city will hold a 30-day public comment period. Once finalized, the plan will be submitted to the Indiana Department of Environmental Management and U.S. Environmental Protection Agency and filed in federal court along with a consent decree.

The $1.8 billion plan represents the largest investment in clean water infrastructure in the city's history. All construction will be completed by December 31, 2025.

"Since 2000, we have invested more than $200 million and reduced raw sewage overflows by 145 million gallons per year," Mayor Peterson said. "This long-term plan will guarantee ongoing, sustained progress toward cleaner streams and healthier neighborhoods for years to come."

Under the tentative agreement, the city has agreed to invest:

- $1.73 billion by December 2025 to significantly reduce raw sewage overflows from the combined sewer system;
- $50.4 million by December 2015 to eliminate chronic overflows from seven locations in the separate, sanitary sewer system; and
- $3.5 million by December 2010 on supplemental environmental projects to eliminate septic systems in the Epler-Meridian and Banta-Southport neighborhoods.

Although not a required component of the agreement, the city also plans an additional $64.3 million in watershed improvement projects, such as streambank restoration and streamflow augmentation, for a total investment of more than $1.8 billion in 2005 dollars.

A public hearing on the proposed plan will be held at 7 p.m. on August 3 at Good Hall, Room 105, University of Indianapolis, 1400 E. Hanna Ave. Written comments on the plan should be submitted by August 18 either on-line at the address above or to the Indianapolis Clean Stream Team, 151 N. Delaware St., Suite 900, Indianapolis, IN 46204.

(more)

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indygov.org

The 30-day public review and comment period for the plan will end August 18. The plan is available on-line at www.indycleanstreams.org, at all Marion County public library branches, the Department of Public Works office at 604 N. Sherman Drive, and the Indianapolis Clean Stream Team at 151 N. Delaware, Suite 900. Electronic copies of the plan on CD-Rom can be obtained by calling 317-327-8720.

"Our draft plan has been built upon years of public dialogue," Public Works Director Kumar Menon said. "We've conducted extensive outreach to neighborhoods, the business community and environmental interest groups – and benefited from the advice of many stakeholders and experts through our Clean Stream Team Advisory Committee. However, we didn't want to finalize the plan without an opportunity for our citizens to provide their comments and input."

This program will affect – and benefit – all residents of Marion County. Raw sewage overflows from outdated sewers are a century-old problem faced by hundreds of cities, especially in the Midwest and Northeast. When it rains or snow melts, stormwater can overload the combined storm-and-sanitary sewers in older neighborhoods.

Historically, in a typical year, nearly 6 billion gallons of untreated sewage overflowed from more than 130 outfall pipes located along the White River, Fall Creek, Pleasant Run, Bean Creek, Pogues Run, Eagle Creek, Lick Creek and State Ditch. Another 2 billion gallons of partially treated sewage overflowed at the city's wastewater treatment plants.

The 20-year plan to reduce sewage overflows includes the following major construction projects:

- A 224-million-gallon tunnel located deep underground along Fall Creek and White River. The tunnel will store sewage overflows during rain storms, then pump the sewage to the city's wastewater treatment plants after the storm subsides.
- New, larger sewers and underground storage tanks along affected waterways to capture overflows and carry them to the central tunnel or treatment plants.
- Improvements and expansion at the Belmont and Southport Advanced Wastewater Treatment Plants to increase their ability to store and treat incoming flows during wet weather.
- A new 12-foot diameter sewer connecting the two treatment plants, enabling the city to better manage and treat flows during wet weather.
- Local sewer separation projects to eliminate isolated raw sewage overflows on White River, State Ditch, Lick Creek and the upstream ends of Fall Creek, Pogues Run and Bean Creek.
- Inflatable dams and pinch valves at key points in the sewer system, enabling the city to better use existing sewer lines to contain and reduce sewage overflows.

The plan will improve the ability of the sewer system and treatment plants to handle rainfall and snowmelt, so sewers overflow only during very large storms when streams are flowing too fast for wading or swimming. The updated sewer system will:

- Capture 97 percent of wet-weather sewer flows on Fall Creek, reducing the frequency of overflows to Fall Creek from about 60 storms per year to two storms in a year with typical rainfall.
- Capture 95 percent of wet-weather sewer flows on White River and other streams, reducing overflows to four storms in a typical year. Actual overflow frequency will depend on weather conditions, with as many as six to 10 overflows occurring in wet years and as few as zero in dry years.

(more)

- Dramatically reduce the amount of sewage overflowing into our streams, improve oxygen levels for fish, reduce *E. coli* bacteria levels and significantly reduce or eliminate odors, untreated sewage and trash in neighborhood streams.

In addition to reducing overflows in the combined sewer area, the city will implement projects to eliminate seven chronic sanitary sewer overflows in the separated sewer system by 2015.

The plan is one of four components of the Mayor's 20-year Clean Streams-Healthy Neighborhoods Program. The other components, though not a part of the federal agreement, are:

- Bringing sewer service to 18,000 homes in neighborhoods with failing or aging septic systems;
- Expanding and rehabilitating the separate sanitary sewer system to meet growing neighborhood and business needs; and
- Improving neighborhood drainage and flood protection.

A rate increase approved last year by the City-County Council will fund projects planned in 2006-2008. During that time, the city will undertake $400 million in sewage overflow, sanitary sewer and water treatment projects and $40 million in flood control and drainage improvements. Additional rate increases will be needed every year or two beginning in 2009 to finance the 20-year plan and meet other Clean Water Act goals.

-30-

CITY OF INDIANAPOLIS

Clean Stream Program

FACT SHEET

INDIANAPOLIS
CLEAN STREAM TEAM

Beautiful, clean streams and rivers add to the quality of life in our city. The White River and neighborhood streams are resources that residents and visitors enjoy for fishing, boating and other recreation. Birds, fish, turtles and a variety of other wildlife make their homes in and along these waterways.

The Problem

The White River and many of our neighborhood streams are polluted by sewer overflows, failing septic systems and urban stormwater runoff.

Raw sewage overflowing into our streams is a health hazard, smells and looks disgusting, hurts the environment and harms the quality of life in our neighborhoods.

Overflows happen because the 100-year-old sewer system in the old city limits was designed to carry both sewage and rainwater. When it rains as little as a quarter-inch, these sewers overflow into nearby streams, including White River, Fall Creek, Eagle Creek, Pleasant Run, Bean Creek and Pogues Run.

Elsewhere in the city, many neighborhoods are still served by aging septic systems that don't function well in Marion County soils. Even outside the old city limits, our separate sewer system is in need of expansion and repair.

The Solutions

The Clean Water Act requires Indianapolis to address these problems, and Mayor Peterson has been moving forward to clean our waterways since he took office. More than $200 million has been invested to reduce sewer overflows and improve our sewer system and treatment plants. Here's what's being done:

RAW SEWAGE OVERFLOW CONTROL PROGRAM

The city now has a long-term plan to capture raw sewage overflows during all but a few large storms each year – when people are not likely to be using the streams.

The plan involves digging a deep tunnel along White River and Fall Creek to capture overflows during a storm. Underground storage tanks and new sewers also will capture raw sewage that would otherwise flow into the streams. The tunnel and underground tanks will store the sewage until after a storm, when it will be sent to the city's sewage plants for treatment. Many "early action" projects are already underway or completed.

SEPARATE SEWERS AND TREATMENT PLANT IMPROVEMENTS

The city also has developed a Sanitary Sewer Master Plan to address sewer needs outside the old city limits. This plan prioritizes projects to address needs in areas that have grown in population and sewer use. We also need additional investments to maintain and upgrade the city's sewage treatment plants, rehabilitate aging sewers and keep sewage pumps and lift stations in working order.

SEPTIC TANK ELIMINATION PROGRAM

To address health hazards in our neighborhoods, the city has been moving forward to convert neighborhoods on septic systems to the sewer system. In the past, the city has used the state's Barrett Law process to require homeowners to share the costs to construct new sewers. This caused hardships for many homeowners, especially low-income residents and the elderly. Under the new Septic Tank Elimination Program (STEP), the city will pay for new sewer construction in these neighborhoods. Homeowners will still have to pay a contractor and connection fees to connect to the new sewers. However, this will cut the direct cost to homeowners while reducing health hazards and improving property values in these neighborhoods.

Our Investment

Through these programs, the city is poised to make the largest investment in clean water infrastructure in its history. Most projects will be financed through the state's low-interest loan fund or by selling municipal bonds. Grants also will be pursued, but unfortunately state and federal governments put most of the burden on local ratepayers to finance these projects.

On October 31, 2005, the City-County Council approved new sanitary sewer rates for 2006-2008. The rates will finance approximately $400 million in sewer improvements, including:

- Reducing raw sewage overflows into our waterways, as required under federal law;
- Expanding and maintaining our two sewage treatment plants;
- Rehabilitating aging sewers and lift stations;
- Adding sewer capacity in rapidly developing areas of the county; and
- Extending sanitary sewers to 4,800 homes now served by septic systems.

For a list of planned projects for 2006-2008, go to www.indycleanstreams.org and click on the "Projects" tab, where you can search by council district, project type, or township.

In future years, rate increases will be needed every year or two to finance more clean water infrastructure projects. Even so, Indianapolis sewer rates are among the lowest in the state and nation. Sewer rates are also low when compared with other utilities, such as phone, electric, gas and cable TV.

In addition, a $1 per month increase in the residential stormwater utility charge has been approved to pay for $35 million in flood control and drainage projects. This charge appears on residential property tax bills.

HOW CAN I GET INVOLVED?

You can help keep our waterways clean and our sewers flowing by adopting environmentally friendly practices:

- Disconnect downspouts and sump pumps connected to the sewer system. Their flow takes up capacity we need to carry sewage.
- Don't send fats, oils and grease down the drain. They can clog our sewers and cause overflows.
- Clear gutters and storm sewer drains of leaves and debris.
- Never dispose motor oil, antifreeze, battery acid and household chemicals down the drain. Properly dispose these materials through the city's ToxDrop program. Call 327-4TOX to learn how.
- Reduce water use in your homes and businesses.
- Sign up to receive e-mail warnings of sewer overflows at www.indycleanstreams.org or call the Sewer Overflow Hotline at 327-1643 before an outing near affected waterways.

You also may want to support the creation of a national trust fund to provide federal dollars that help communities like ours pay for clean water. For more information, go to www.cleanwateramerica.org.

To learn more, visit the Indianapolis Clean Stream Team Web site at www.indycleanstreams.org.

For other issues and concerns, please call the Mayor's Action Center at 327-4MAC or 327-4622.

Photos of White River and blue heron provided by Stephen Sellers.

FACT SHEET

CITY OF INDIANAPOLIS

Clean Stream Program

Raw Sewage Overflow Long-Term Control Plan

THE PROBLEM

- The White River and many of our neighborhood streams are polluted by sewer overflows during rain and snow storms.
- Raw sewage overflowing in our streams is a health hazard, smells and looks disgusting, hurts the environment and harms the quality of life in our neighborhoods.
- Overflows happen because the 100-year-old sewer system in the old city limits was designed to carry both sewage and rainwater. When it rains as little as a quarter-inch, these sewers overflow into nearby streams, including White River, Fall Creek, Eagle Creek, Pleasant Run, Bean Creek and Pogues Run.

THE SOLUTION

The city now has a long-term plan to capture raw sewage overflows during all but a few large storms each year. This plan will protect streams during dry weather and small storms when people are most likely to be using them for recreation.

The plan involves digging a deep tunnel along White River and Fall Creek to capture overflows during a storm. New sewers along Eagle Creek, Pleasant Run, Bean Creek and Pogues Run will capture overflows and direct them to the tunnel and treatment plants.

Underground storage tanks and new sewers also will capture raw sewage that would otherwise flow into the streams. The tunnel and underground tanks will store the sewage until after a storm, when it will be sent to the city's sewage plants for treatment. In some neighborhoods, the city will separate sewers to eliminate overflows.

Many "early action" projects already are underway or completed.

THE COSTS AND BENEFITS

The city's plan will cost $1.8 billion in 2005 dollars and will be implemented over the next 20 years. It will:

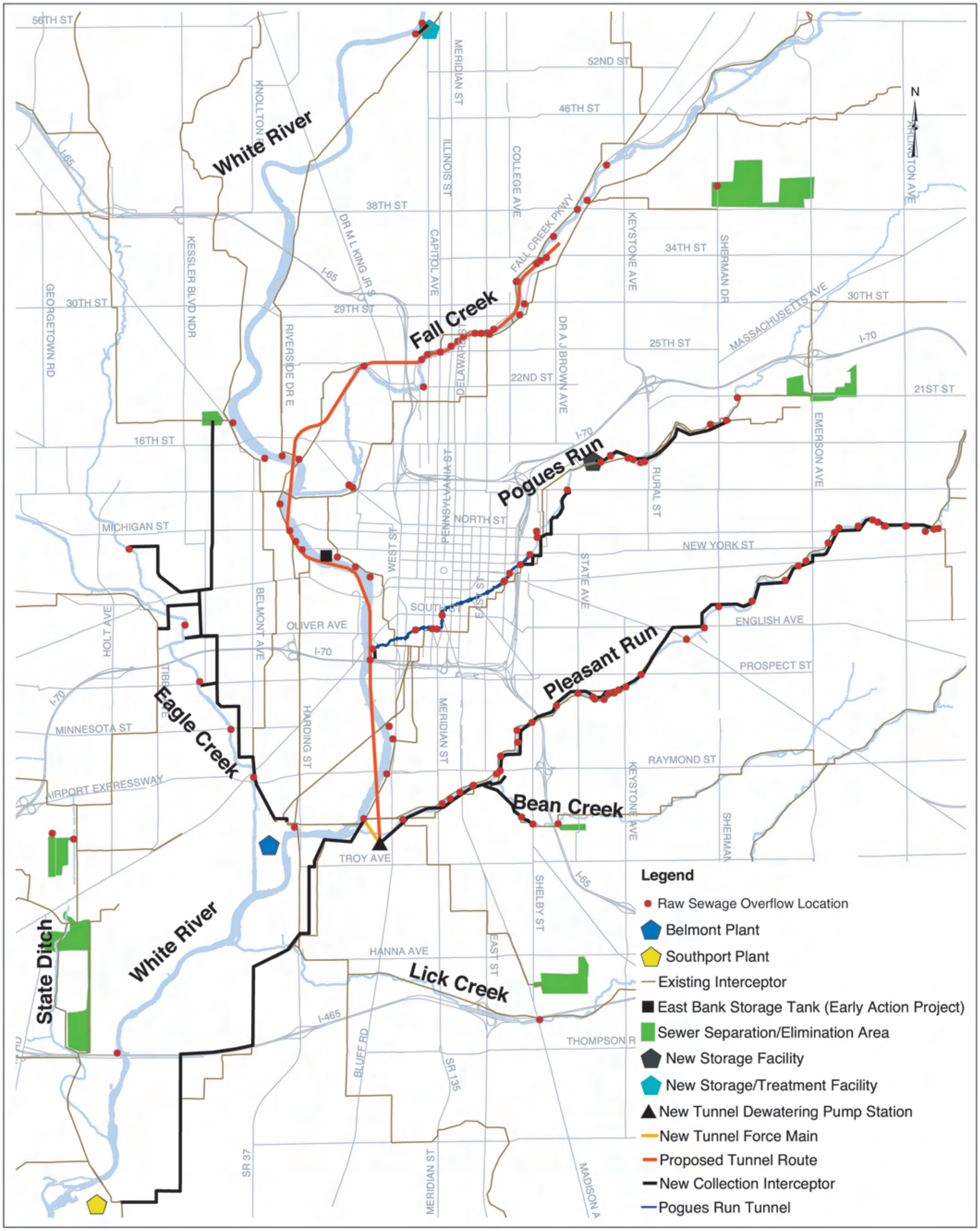
- Reduce sewage in our streams by capturing and treating 97 percent of the stormwater and sewage along Fall Creek and 95 percent along White River and other waterways in a typical year.
- Reduce overflow frequency from 45-80 storms per year to 0-10 storms, depending upon weather conditions. Overflows are expected to occur two storms per year on Fall Creek and four storms per year on White River and other waterways in a typical year.
- Make streams healthier for people and safer for fish
- Reduce odors and capture toilet paper, sanitary items and other unsightly materials found in overflowing sewers
- Minimize impacts on neighborhoods and businesses by locating most overflow storage facilities deep underground

In October 2004, the city sought public input on the final options for reducing raw sewage overflows. The city adopted the recommendations of these residents, as well as its Clean Stream Team Advisory Committee.

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW



This map illustrates the city's plan to reduce raw sewage overflows. The plan involves building new sewer "interceptors," the main arteries of the sewer sysytem. It also will involve underground storage tanks and tunnels, improvements at the treatment plants and sewer separation in remote areas. For more information, visit our Web site at www.indycleanstreams.org.

REVISED: 07-12-06

FACT SHEET

CITY OF INDIANAPOLIS

Clean Stream Program

Reducing Raw Sewage Overflows into White River

THE PROBLEM

The history of Indianapolis is inherently linked to the White River. In 1820, pioneer John McCormick built his cabin at the confluence of the White River and Fall Creek. It was in his cabin that the first county commissioners chose Indianapolis to be the state capital.

In at least the past century, swimming, wading or eating fish from the White River have not been safe recreational activities. Although water quality has improved through better wastewater treatment, studies show the White River continues to suffer from high levels of *E. coli* bacteria, especially during wet weather.

E. coli comes from a number of sources, including:

- Raw sewage overflows from Indianapolis's antiquated combined sewer system.
- Partially treated wet-weather overflows at wastewater treatment plants.
- Urban stormwater runoff contaminated by failing septic systems, illegal connections to storm drains and waste from pets and wildlife.
- Pollution sources upstream of Marion County, including stormwater and agricultural runoff.

THE SOLUTION

Over the next 20 years Indianapolis will implement a long-term plan to reduce sewer overflows, the largest investment in clean water in the city's history. The plans for White River include:

- A deep underground tunnel along Fall Creek and White River that will store and carry sewage to the city's wastewater treatment plants. The tunnel will be built several hundred feet below the ground surface to store overflows during rainfall. After the rainfall has passed, wastewater in the tunnel will be pumped to the wastewater treatment plants for treatment.
- Upgrades to an existing storage/treatment facility at Riviera Club to capture and store overflows from upper White River.
- An underground storage tank completed in 2004 along White River near the campus of Indiana University-Purdue University at Indianapolis. Stored sewage is pumped to the treatment plants after rainfall, and the tank has an automatic self-cleaning system.
- Inflatable dams and pinch valves at key points in the sewer system. These devices help save money by using existing sewer lines to contain and reduce raw sewage overflows. The city has already installed several of these devices.
- Major improvements to Belmont and Southport Advanced Wastewater Treatment Plants to dramatically increase their ability to store and treat incoming flows during wet weather.
- A new sewer pipe connecting the two treatment plants, enabling the city to better manage and treat flows during wet weather.

A map of the White River plan is shown in Figure 1 (over).

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
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DPW

ADDITIONAL WATERSHED IMPROVEMENTS

The city also plans to replace failing septic systems, restore stream banks to more natural conditions, augment water levels during dry weather and improve dissolved oxygen levels through aeration systems, such as fountains.

BENEFITS

The city's goal is to protect people when they are most likely to be using our waterways. Our plan will capture 95 percent of wet-weather sewer flows in a typical year – reducing overflows into White River from 60 storms per year to four, on average.

We will have fewer overflows during dry years and more during wet years. However, even when overflows do occur, swimming and wading won't be safe due to high flows in the river. Citywide, the plan's estimated cost is more than $1.8 billion in 2005 dollars. It will be implemented over 20 years.

Other benefits include:

- Reducing odors and unsightly sanitary waste floating in the river.
- Supporting fish and other aquatic wildlife by improving dissolved oxygen levels.
- Reducing *E. coli* bacteria and other dangerous pathogens.
- Increasing sewer capacity for growing residential and business needs.
- Improving the environment and quality of life in Indianapolis neighborhoods.

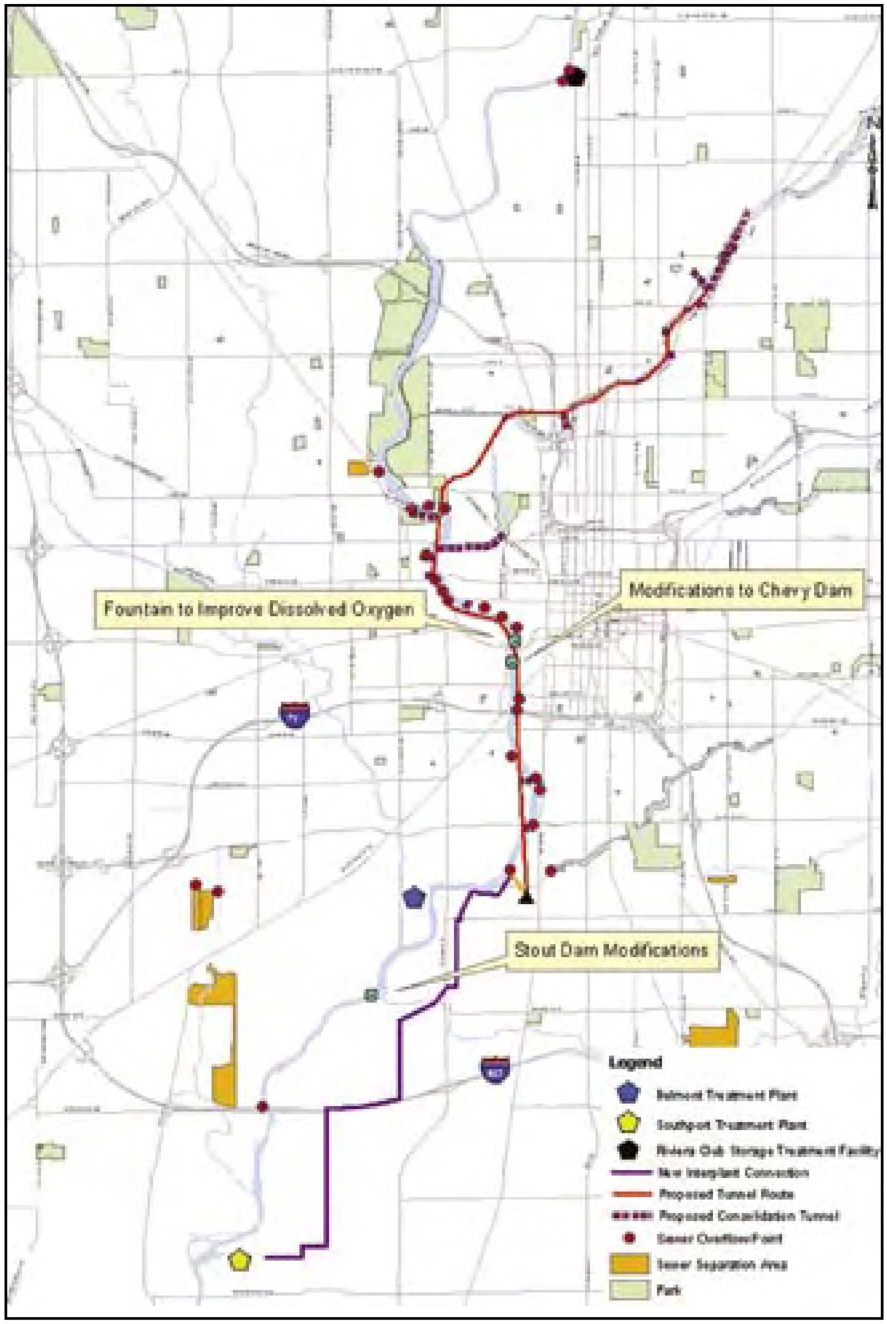

Figure 1

FACT SHEET

CITY OF INDIANAPOLIS

Clean Stream Program

Reducing Raw Sewage Overflows into Fall Creek

THE PROBLEM

Fall Creek begins as a rural stream traveling through Henry, Madison and Hamilton counties. In Hamilton County, Fall Creek flows into Geist Reservoir. South of the reservoir, Fall Creek runs through northeastern Marion County until it meets the White River near 10th Street. Fall Creek flows past the state fairgrounds and several city parks.

For at least a century, raw sewage and other pollution sources have tainted Fall Creek. It is unsafe to swim or wade in the creek due to high levels of *E. coli* bacteria, especially after it rains. Sludge deposits from raw sewage overflows and low stream flows during the summer compound the problem, creating offensive odors and unsightly debris deposited along the creek banks. Low water levels also contribute to low dissolved oxygen levels. Fish need dissolved oxygen to breathe.

Contamination sources include:

- Raw sewage overflows from Indianapolis's antiquated combined sewer system.
- Failing septic systems in upstream areas.
- Urban stormwater runoff contaminated by illegal connections to storm drains and waste from pets and wildlife.

Water samples collected between January 2000 and December 2002 demonstrate that Fall Creek exceeds the Indiana water quality standard for *E. coli* bacteria 27-50 percent of the time, depending on where samples are taken.

THE SOLUTION

Over the next 20 years Indianapolis will implement a long-term plan to reduce raw sewage overflows, the largest investment in clean water in the city's history.

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
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City of Indianapolis DPW

The plans for Fall Creek include:

- Digging a deep underground tunnel along Fall Creek and White River that will store and carry sewage to the city's wastewater treatment plants. The tunnel will be built several hundred feet below the ground surface to store overflows during a storm. After the storm has passed, wastewater in the tunnel will be pumped to the wastewater treatment plants. The Fall Creek tunnel will begin near 34th Street and Sutherland Avenue and will run generally parallel to the creek.
- Building new, larger sewers to capture overflows and carry them to the tunnel.
- Installing inflatable dams and a sluice gate at key points in the sewer system. These devices help save money by using existing sewer lines to contain and reduce raw sewage overflows. Four of these dams have already been installed along Fall Creek.
- Separating sewers in a neighborhood near 38th Street and Sherman Avenue.
- Removing the dam near Dr. Martin Luther King Jr. Street and Fall Creek Parkway to improve water flow within the creek.
- Installing a fountain near the Meridian Street bridge

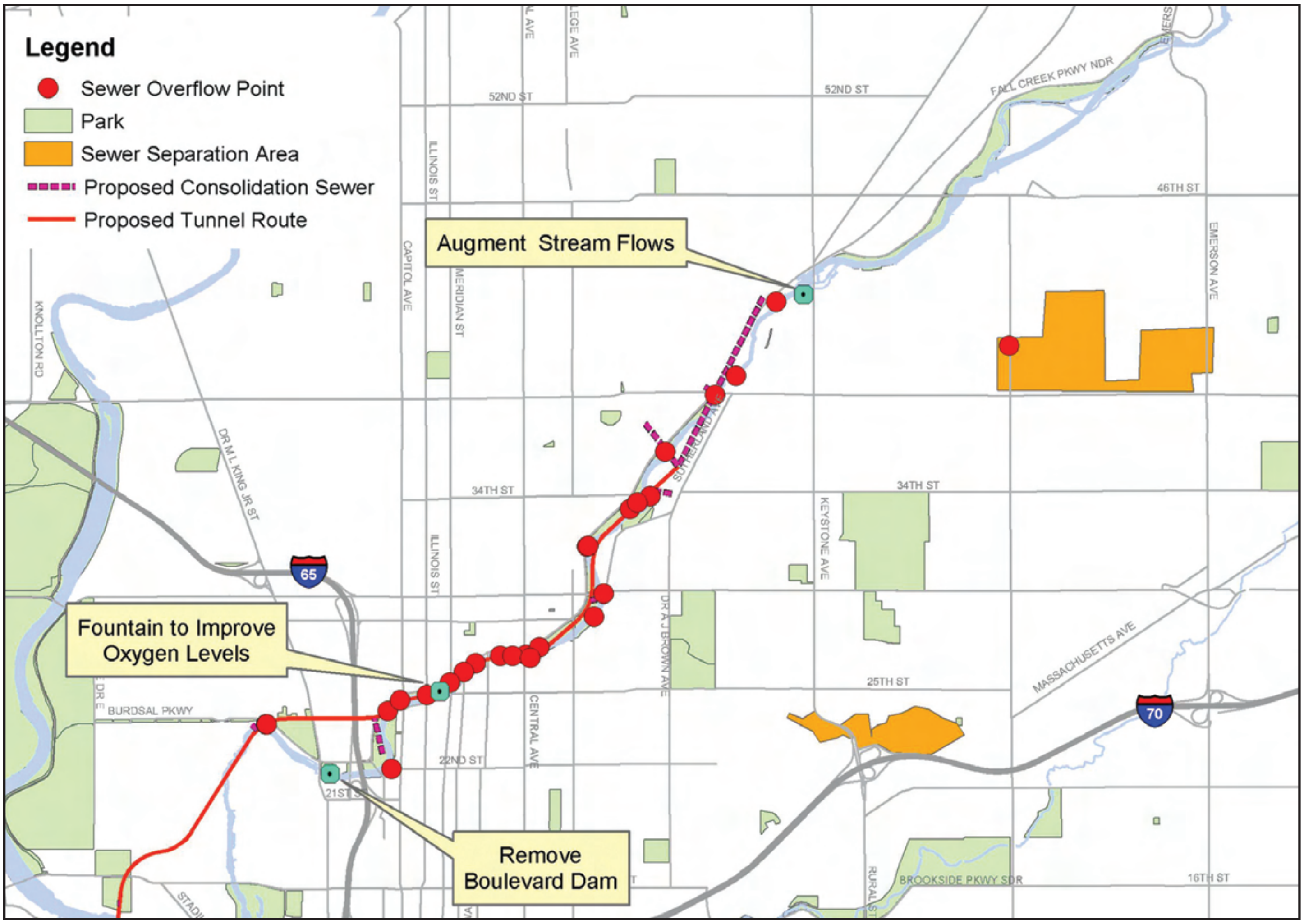

Figure 1

to improve oxygen levels for fish and other aquatic life in the creek during summer months.

- Adding flows to the creek during dry weather.
- Eliminating failing septic systems and restoring stream banks to more natural conditions.

A map of the planned improvements is shown in Figure 1.

BENEFITS

The city's goal is to protect people when they are most likely to be using our waterways. Our plan will capture 97 percent of wet-weather sewer flows in a typical year – reducing overflows into Fall Creek from 60 storms per year to two, on average.

We will have fewer overflows during dry years and more during wet years. However, even when overflows do occur, swimming and wading won't be safe due to high flows in the stream. The plan's estimated cost to address overflows citywide is more than $1.8 billion in 2005 dollars. It will be implemented over 20 years.

Other benefits to Fall Creek include:

- Reducing odors and unsightly sanitary waste floating in the creek.
- Reducing *E. coli* bacteria and other dangerous pathogens.
- Supporting fish and other aquatic life by improving the creek ecology.
- Increasing sewer capacity for growing residential and business needs.
- Improving the environment and quality of life in Indianapolis neighborhoods.

CITY OF INDIANAPOLIS

Clean Stream Program

FACT SHEET

Reducing Raw Sewage Overflows into Eagle Creek

THE PROBLEM

Eagle Creek begins as a rural stream that travels through Hamilton, Boone and Marion counties. In Marion County, Eagle Creek flows into Eagle Creek Reservoir, then flows southeast through Indianapolis and Speedway until it meets with White River near Troy Avenue and Harding Street.

The 1,400-acre reservoir in Eagle Creek Park is a valuable recreational asset with good water quality that is safe for swimming. However, downstream of the reservoir, Eagle Creek is contaminated by high levels of *E. coli* bacteria, which makes the creek unsafe for swimming or wading. Many neighborhoods along the creek lack public swimming pools or safer places to cool off during hot summer months.

Contamination sources include:

- Raw sewage overflows between Michigan Street and Raymond Street from Indianapolis's antiquated combined sewer system.
- Failing septic systems in upstream neighborhoods.
- Urban stormwater runoff contaminated by illegal connections to storm drains and waste from pets and wildlife.

Water samples collected between January 2000 and December 2002 demonstrate that Eagle Creek exceeds the Indiana water quality standard for *E. coli* bacteria 14-59 percent of the time, depending on where samples are taken.

THE SOLUTION

Over the next 20 years Indianapolis will reduce raw sewage overflows by implementing a long-term plan, the largest investment in clean water in the city's history.

The plans for Eagle Creek include:

- Building a new main sewer artery, called a collection interceptor, to capture sewer overflows and carry them to the Belmont Advanced Wastewater Treatment plant.
- Building a new Belmont West Cutoff Interceptor to divert flow from the Belmont North and Belmont West interceptors.
- Improving stream flows during dry weather.
- Eliminating failing septic tanks and restoring stream banks to more natural conditions.

A map of the planned improvements is shown in Figure 1 (over).

BENEFITS

The city's goal is to protect people when they are most likely to be using our waterways. Our plan will capture 95 percent of wet-weather sewer flows in a typical year – reducing overflows on Eagle Creek from 60 storms per year to four in a typical year.

Eagle Creek will have fewer overflows during dry years and more during wet years. However, when overflows do occur,

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis Bart Peterson, Mayor

City of Indianapolis DPW

swimming and wading won't be safe due to high water flows in the stream. The plan's estimated cost to address overflows citywide is more than $1.8 billion in 2005 dollars. It will be implemented over 20 years.

Other benefits include:

- Reducing odors and unsightly sanitary waste floating in the creek.
- Reducing *E. coli* bacteria and other dangerous pathogens.
- Supporting fish and other aquatic life by repairing the creek ecology.
- Increasing sewer capacity for growing residential and business needs.
- Improving the environment and quality of life in Indianapolis neighborhoods.

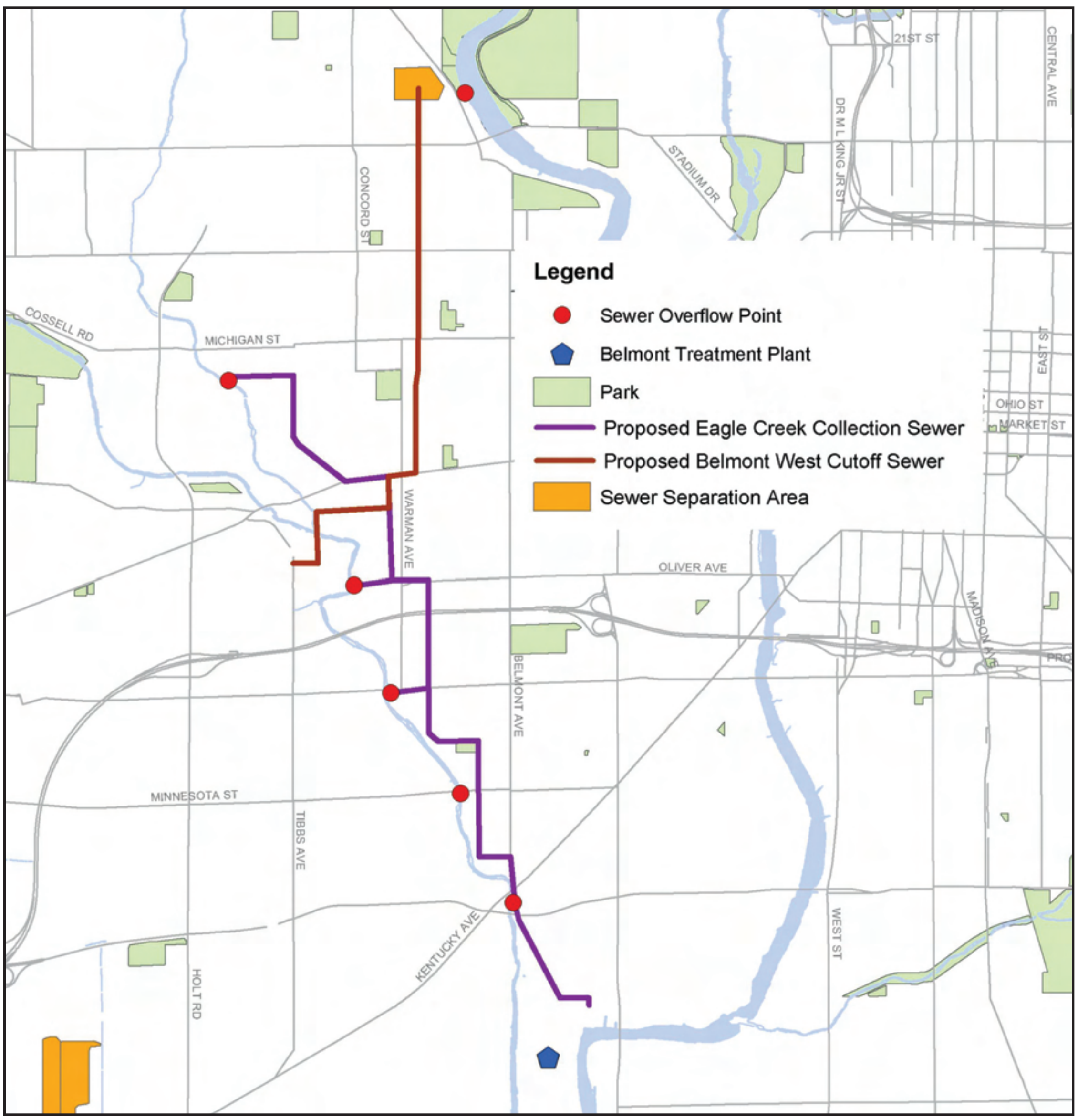

Figure 1

CITY OF INDIANAPOLIS

Clean Stream Program

FACT SHEET

Reducing Raw Sewage Overflows into Pleasant Run and Bean Creek

THE PROBLEM

Pleasant Run and Bean Creek are urban streams on the east and southeast side of Indianapolis. Pleasant Run starts near 30th Street and Shadeland Avenue and flows through Pleasant Run Golf Course and Ellenberger, Christian and Garfield parks. In Garfield Park, Bean Creek also flows into Pleasant Run. Bikers, walkers, runners and skaters use trails along the Pleasant Run Greenway.

About 50 percent of Pleasant Run flows through urban and industrial areas with little or no public access. Pleasant Run enters the White River about a half mile southwest of Holy Cross and St. Joesph Cemeteries near Bluff Road.

Pleasant Run and Bean Creek are contaminated by a number of pollution sources, including:

- Raw sewage overflows from Indianapolis's antiquated combined sewer system.
- Failing septic systems in upstream areas.
- Urban stormwater runoff contaminated by illegal connections to storm drains and waste from pets and wildlife.

Water samples collected between January 2000 and December 2002 demonstrate that Pleasant Run and Bean Creek exceed the Indiana water quality standard for *E. coli* bacteria 59-71 percent of the time.

THE SOLUTION

Over the next 20 years Indianapolis will reduce raw sewage overflows by implementing a long-term plan, the largest investment in clean water in the city's history.

The plans for Pleasant Run include:

- Building new sewer arteries, called collection interceptors, to capture sewer overflows along Pleasant Run and Bean Creek and carry them to a new deep storage tunnel.
- Separating sewers on the upstream end of Bean Creek, eliminating sewage overflows from one location.
- Installing inflatable dams to hold back sewage at Ellenberger Park and Howe Academy Middle School. (This project has been completed.)
- Installing netting in the sewer system to capture toilet paper and other solids and prevent them from overflowing into parts of Garfield Park. (This project has been completed.)
- Improving stream flows during dry weather.
- Eliminating failing septic tanks and restoring stream banks to more natural conditions.

A map of the planned improvements is shown in Figure 1 (over).

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City of Indianapolis
Bart Peterson, Mayor

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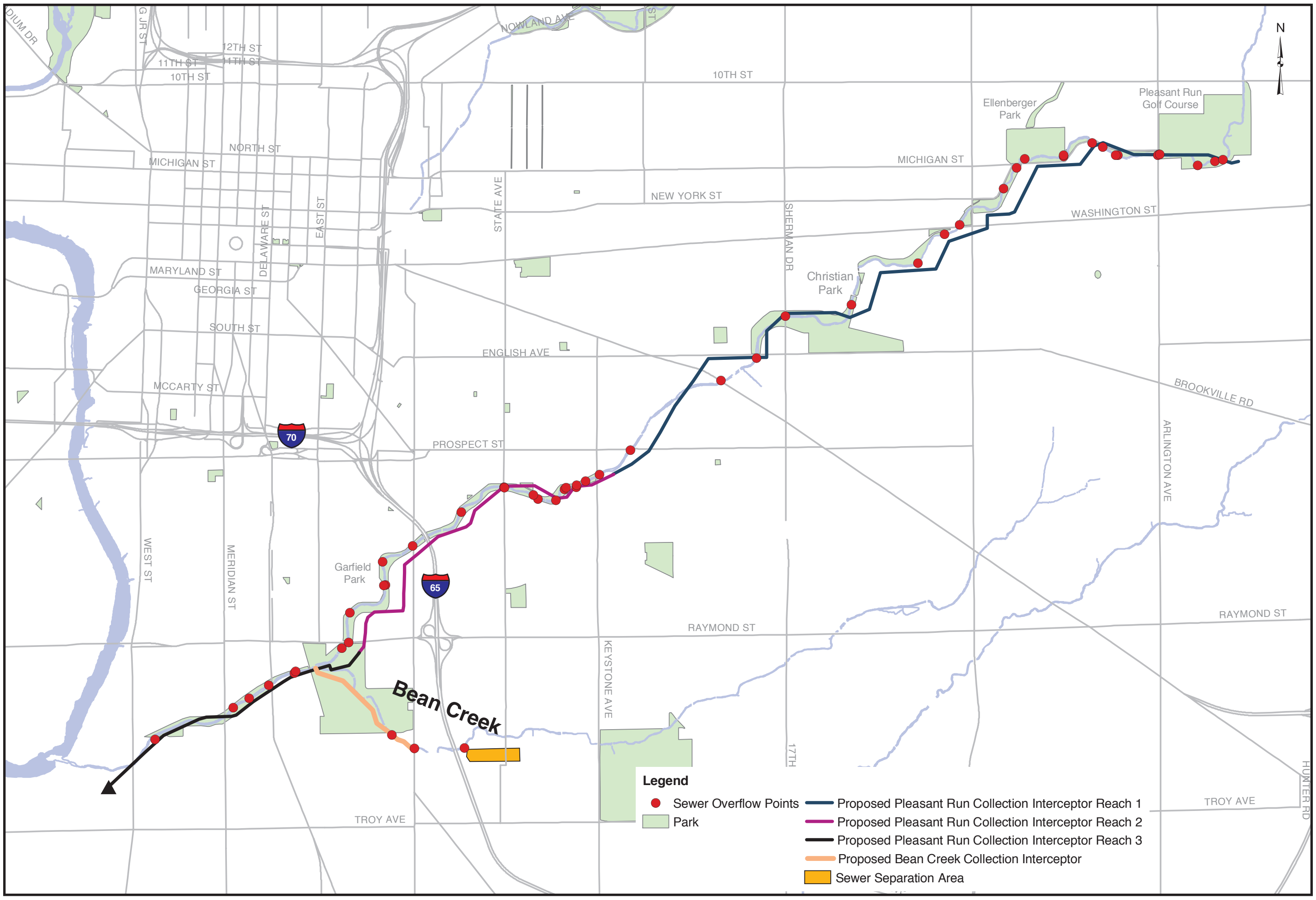


Figure 1

BENEFITS

The city's goal is to protect people when they are most likely to be using our waterways. Our plan will capture 95 percent of wet-weather sewer flows in a typical year – reducing overflows into Pleasant Run and Bean Creek from 60 storms per year to four, on average.

We will have fewer overflows during dry years and more during wet years. However, even when overflows do occur, swimming and wading won't be safe due to high flows in the stream. The plan's estimated cost to address overflows citywide is more than $1.8 billion in 2005 dollars. It will be implemented over 20 years.

Other benefits to Pleasant Run and Bean Creek include:

- Reducing odors and unsightly sanitary waste floating in the creek.
- Reducing *E. coli* bacteria and other dangerous pathogens.
- Supporting fish and other aquatic life by improving the creek ecology.
- Increasing sewer capacity for growing residential and business needs.
- Improving the environment and quality of life in Indianapolis neighborhoods.

FACT SHEET

CITY OF INDIANAPOLIS

Clean Stream Program

Reducing Raw Sewage Overflows into Pogues Run

THE PROBLEM

Pogues Run is an urban stream that runs through the east-side of Indianapolis. In the 1800s the banks of Pogues Run hosted the first Indianapolis settlement.

Today Pogues Run flows through three city parks—Forest Manor, Brookside and Spades—and near four public schools—Theodore Potter Elementary, Horizon Alternative Middle, Harshman Middle and Arsenal Tech High School. The Pogues Run Greenway trail goes through some of the city's oldest neighborhoods, including Woodruff Place and Cottage Home. When it nears downtown at New York Street, Pogues Run enters a two-barrel, concrete tunnel built in 1914-15.

Studies show Pogues Run is contaminated by a number of pollution sources, including:

- Raw sewage overflows from Indianapolis's antiquated combined sewer system.
- Failing septic systems in upstream areas.
- Urban stormwater runoff contaminated by illegal connections to storm drains and waste from pets and wildlife.

Water samples collected between January 2000 and December 2002 demonstrate that Pogues Run exceeds the Indiana water quality standard for *E. coli* bacteria 65-73 percent of the time.

THE SOLUTION

Over the next 20 years Indianapolis will reduce raw sewage overflows by implementing a long-term plan, the largest investment in clean water in the city's history.

The plans for Pogues Run include:

- Rerouting overflows away from the four IPS schools and into the underground Pogues Run Tunnel, which will be retrofitted to transport and store overflows during wet weather.
- Installing an inflatable dam in the sewer to hold back and reduce overflows into Brookside Park. (This project has been completed.)
- Separating sewers near 21st Street and Emerson Avenue to eliminate overflows into Forest Manor Park.
- Building an underground storage tank and treatment facility near Spades Park to store flows from nine outfalls in Forest Manor, Brookside and Spades parks. The facility will temporarily store sewage during a storm, then pump wastewater through existing pipes to the treatment plant after the storm subsides.
- Eliminating failing septic tanks and restoring stream banks to more natural conditions.

A map of the planned improvements is shown in Figure 1 (over).

INDIANAPOLIS CLEAN STREAM TEAM

City of Indianapolis
Bart Peterson, Mayor

DPW

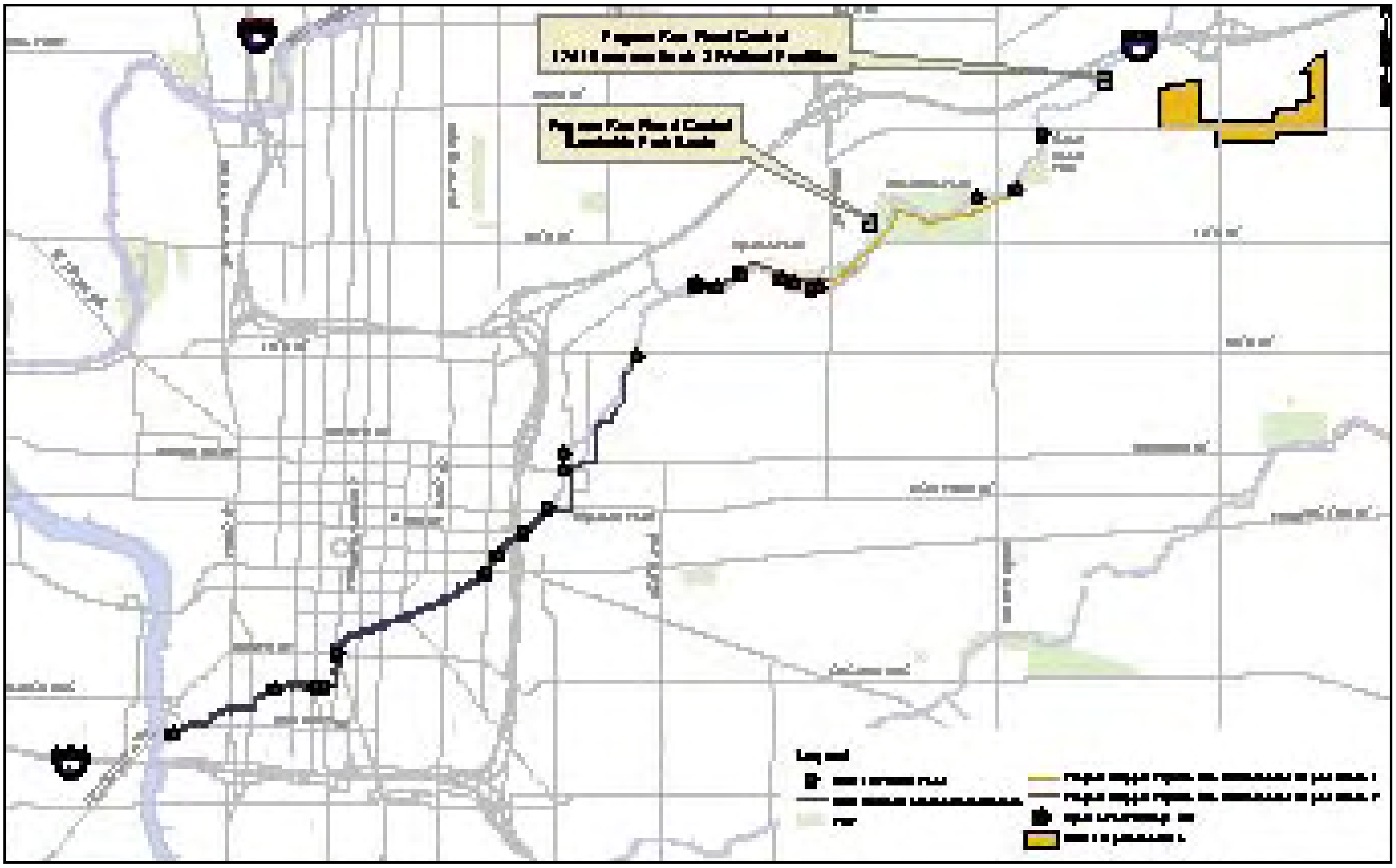


Figure 1

BENEFITS

The city's goal is to protect people when they are most likely to be using our waterways. Our plan will capture 95 percent of wet-weather sewer flows in a typical year – reducing overflows on Pogues Run from 60 storms per year to four, on average.

Pogues Run will have fewer sewer overflows during dry years and more during wet years. However, even when overflows do occur, swimming and wading won't be safe due to high flows in the stream. The plan's estimated cost to address overflows citywide is more than $1.8 billion in 2005 dollars. It will be implemented over 20 years.

Other benefits to Pogues Run include:

- Reducing odors and unsightly sanitary waste floating in the creek.
- Reducing *E. coli* bacteria and other dangerous pathogens.
- Supporting fish and other aquatic life by improving the creek ecology.
- Increasing sewer capacity for growing residential and business needs.
- Improving the environment and quality of life in Indianapolis neighborhoods.

Raw Sewage Overflow Long-term Control Plan
Frequently Asked Questions

The Plan

Q. What is the long-term control plan (LTCP)?
A. The long-term control plan sets out the city's 20-year plan to improve the sewer system and reduce raw sewage overflowing into our streams and neighborhoods. The plan was developed with the involvement of businesses, neighborhood groups and interested citizens – and it has received bipartisan support from the City-County Council. It is based upon years of stream monitoring, treatment analysis and sewer studies. The plan will require more than 100 individual construction projects to bring our sewer system to 21st century standards.

Q. When will the projects be done?
A. The plan will be implemented in four five-year phases, with all projects complete by December 31, 2025. At least 20 years are needed for construction to minimize disturbance to neighborhoods; accurately evaluate the effectiveness of each project; secure rights of way; coordinate technical, manpower and material needs; and manage the financial burden on ratepayers.

Q. How will the plan reduce raw sewage overflows to our streams?
A. The city's plan will protect public health and improve the quality of life in many neighborhoods now suffering from the sight and stench of raw sewage. It will involve building new tunnels, storage tanks, larger sewers and sewage treatment facilities in order to:

- Reduce overflow frequency from 45-80 storms per year to 0-10 storms; actual overflow frequency will depend on how much it rains or snows each year.
- In year with average rainfall, the plan is expected to capture and treat 97 percent of wet-weather flow in the sewers along Fall Creek and 95 percent along White River and other streams. We expect sewer overflows to occur twice in a typical year on Fall Creek and four times in a typical year on other waterways.
- Make streams safer for fish, reduce odors, and capture toilet paper, sanitary waste and other unsightly materials found in overflowing sewers.
- Minimize impacts on neighborhoods and businesses by locating most overflow storage facilities deep underground.

Q. Is this plan required?
A. Yes. Both the federal Clean Water Act and state law require cities with combined sewer systems to develop long-term plans to reduce and control sewage overflows. The plan must be approved by the U.S. Environmental Protection Agency and the Indiana Department of Environmental Management.

Q. What is the difference between the plan released in 2001 and this plan?
A. This plan has been revised, expanded and updated since 2001 to respond to comments and requirements imposed by the U.S. EPA and IDEM. The city's 2001 plan was based upon 85 percent capture of sewage during wet weather and approximately 12 overflow events in an average year at a cost of $1.1 billion. The revised plan will capture 95-97 percent of sewage

during wet weather, resulting in overflows during approximately 2-4 storms in an average year. The revised plan has an estimated cost of $1.8 billion in 2005 dollars.

Q. What options did the city consider when developing the plan?
A. The city considered a wide variety of options, including storing overflows for later treatment, separating the combined sewers and treating overflows where they occur along the streams. For more information on the city's analysis of raw sewage overflow alternatives, visit our web site at www.indycleanstreams.org and click on "The Solutions" tab.

Q. When will you start to fix this problem?
A. We have already begun. The City of Indianapolis has already invested more than $200 million to keep raw sewage out of our waterways, especially near parks, schools and neighborhood streams. Already, we've reduced annual overflows by more than 145 million gallons.

The Need

Q. Why do we have raw sewage spilling into our streams?
A. Indianapolis' sewer system is antiquated and can no longer handle the amount of sewage and rainwater that flows through it. During dry weather, sewage flows safely through the sewers to our wastewater treatment plants. However, as little as a quarter-inch of rain causes raw sewage to overflow into our streams. The sewers were built this way 80-100 years ago before there were wastewater treatment plants. This was common practice in many U.S. cities, especially in the Northeast and Midwest.

Q. Why were our sewers built this way?
A. More than 100 years ago, Indianapolis built a sewer system to carry rainwater and melting snow away from homes, businesses and streets. This was standard practice at the time. When indoor plumbing came later, homeowners and business owners hooked their sewage lines to the storm sewers, combining stormwater and sewage in one pipe. During dry weather, the combined sewers carry sewage to the city's treatment plants. However, when it rains or snow melts, the sewers can be overloaded with incoming stormwater. When this happens, the sewers are designed to overflow into nearby streams and rivers. If they didn't have this escape valve, raw sewage would back up into people's basements and streets. Today, we build separate sewers for stormwater and sewage.

Q. What are the harmful effects of raw sewage overflows?
A. Raw sewage in our streams is a health hazard, smells and looks disgusting, hurts our environment and harms the quality of life in our neighborhoods. Sewage overflows are a major cause of pollution in White River, Fall Creek, Pleasant Run, Pogues Run and Eagle Creek.

Plan Funding

Q. How much does the long-term control plan cost?
A. The cost of construction and operations/maintenance over 20 years is estimated at $1.8 billion in 2005 dollars.

Q. How is the long-term control plan being funded?
A. Most of the money will come from local sewer user fees, although the city will also pursue state and federal assistance where available. A three-year sewer rate increase was approved by the City-County Council in October 2005. This rate increase is paying for the first three years of the

20-year plan, as well as other needed improvements to the sanitary sewer system and converting neighborhoods from septic tanks to sewers.

Q. Will these be the last rate increases needed to pay for the city's plan?
A. No. Regular sewer rate increases will be required every year for the next 20 years to finance the projects required by the state and federal governments.

Q. How much will sewer bills cost at the end of the 20-year plan?
A. Long-term sewer rates are very difficult to predict because of rapidly changing regulatory requirements and higher-than-average inflation in the construction industry. Current projections show residential sanitary sewer rates in 2025 will be around $55-60 per month, based upon 2005 dollars. We expect our rates to remain competitive with other Midwestern cities, who face the same requirements to upgrade their sewer infrastructure.

Q. Is all the money that is being collected going to the plan or is it going to other projects?
A. As mentioned above, sewer user fees support sewage collection and treatment projects all over Marion County. These include projects in the long-term control plan, septic tank elimination projects, treatment plant improvements and sanitary sewer expansion. For a list of projects planned in 2006-08, visit our web site at www.indycleanstreams.org and click on the “Projects” tab.

Q. What assistance is available from the state and federal governments?
A. The state and federal governments offer low-interest loan programs for sewer projects. However, funding for those programs has been reduced in recent years. Federal grants, once widely available through a construction grants program, are now only available through Congressional earmarks on federal spending bills. Many local, state and national organizations are working with Congress to create a federal trust fund for clean water infrastructure, much as we now have federal trust funds for highways and airports. To learn more or show your support, visit www.cleanwateramerica.org.

Plan Benefits

Q. What benefits will the long-term control plan provide?
A. The plan will improve the ability of the sewer system to handle rainfall and snowmelt, so sewers would overflow only during large storms. The plan also will dramatically reduce the amount of sewage overflowing into our streams, improve oxygen levels for fish, reduce *E. coli* bacteria levels, and significantly reduce or eliminate odors, untreated sewage and trash in neighborhood streams.

Q. Will the long-term solution completely eliminate all raw sewage overflows?
A. No. In a year with typical rainfall, we expect sewer overflows to occur twice on Fall Creek and four times on other waterways – compared with 63 storms with today’s sewer system. Actual frequency will depend on the weather, but only the largest storms will still cause some overflows. During these storms, streams are flowing fast and aren’t safe for swimming or wading. The city's goal is to develop an affordable plan that will focus dollars on projects that will do the most to improve water quality and protect public health.

Q. I don't fish or swim in the White River and don't live in the inner city. How does this program benefit me?
A. Under the mayor’s Clean Streams-Healthy Neighborhoods plan, projects are planned throughout Marion County, not just in the inner city. In addition to our long-term plan to reduce

sewer overflows, we must extend sanitary sewers to neighborhoods now on septic systems, improve drainage and flood control, upgrade our treatment plants and provide more capacity in our separate sewer system outside the old city limits. Although the sewers are sometimes "out-of-sight, out-of-mind," they are just as important to our city's future as our roads, bridges and highways.

Q. Why are we trying to make the White River swimmable? No one swims in the river and smaller streams aren't deep enough for swimming.
A. Our goal is not to make the White River and other streams swimmable at all times. Our goal is to try to minimize sewer overflows and stormwater impacts during all but the largest storm events in the typical year. Our plan is the most cost-effective way to meet federal requirements and at the same time protect public health. Urban streams are generally not safe for swimming, and the city has educational programs to warn children and adults to the dangers of urban waters during both dry and wet weather conditions.

Q. How will these projects benefit local businesses?
A. The city will work hard to ensure that locally owned and operated businesses will participate in the work, thus keeping dollars in Indianapolis and Central Indiana as much as possible. When local businesses benefit, other local companies that serve those businesses and their employees also will benefit. This plan will allow our city to continue to grow and attract new business opportunities.

Q. How do we know if the plan is working?
A. The city will monitor the effectiveness of the new facilities and programs after construction to make sure projects are working as designed and to verify that we are capturing overflows as required. The city also will prepare reports to regulatory agencies and the public on the plan's progress.

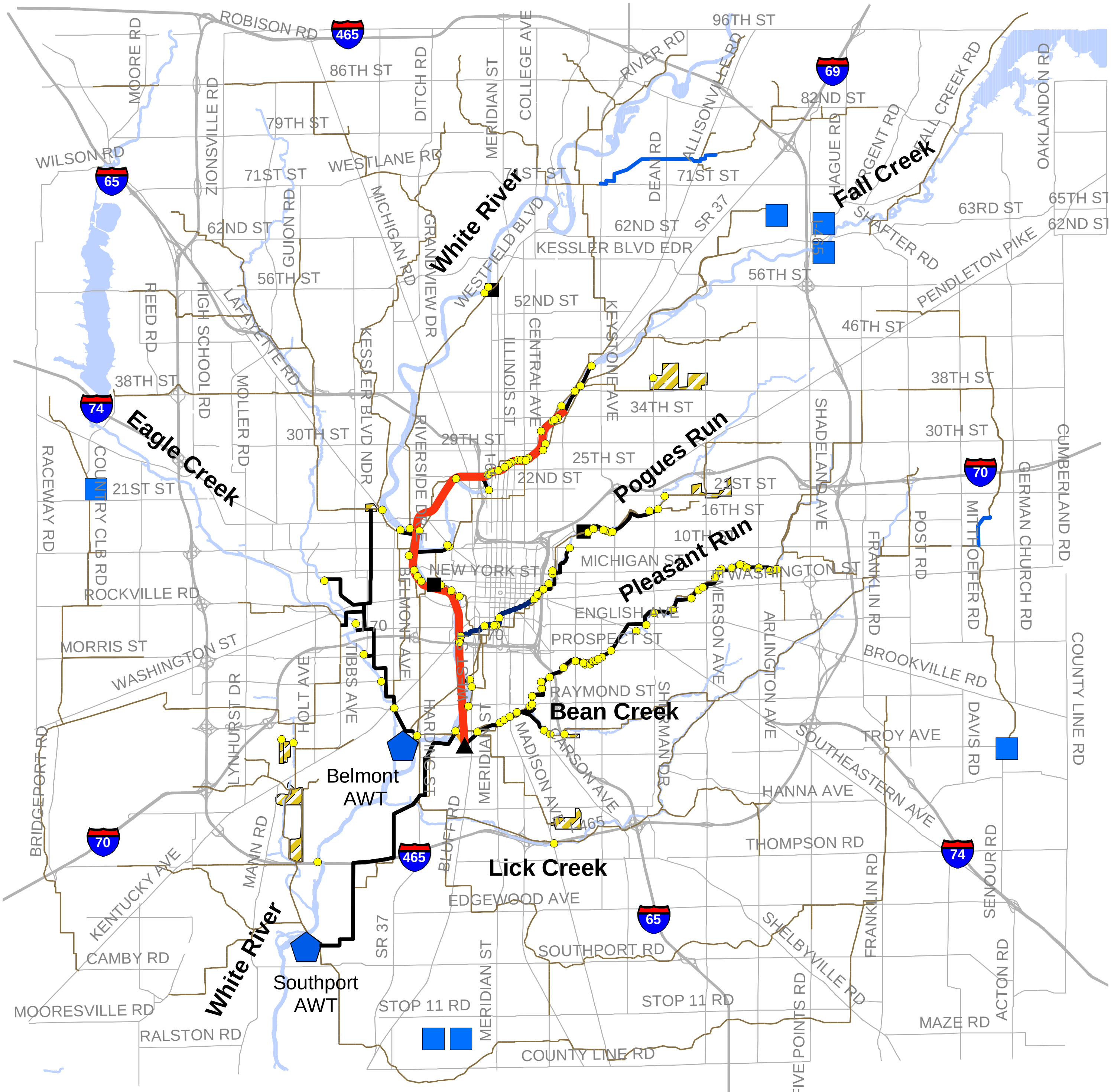
Other Questions

Q. What is happening with other cities on the White River who have sewage overflows?
A. Indiana has 105 communities with raw sewage overflows, including several on the White River. The Indiana Department of Environmental Management is responsible for ensuring that these communities are addressing the problem just as Indianapolis is doing.

Q. How can I help improve water quality?
A. You can help by:

- Disconnecting your downspouts and sump pumps if they are connected to the sewer system. The city's Correct Connect program can show you how to disconnect. Learn more at www.indycleanstreams.org.
- Reducing water use, especially during rainy weather
- Coming to a public meeting to learn more about what is being done. Sign up at www.indycleanstreams.org to be notified of upcoming meetings through e-mail
- Inviting Clean Stream Team representatives to make a presentation to your civic association or neighborhood group
- Learning how you can reduce water use in your homes and businesses, and help keep pollution out of the storm drains

20-Year Required Sewer Improvement Projects



Existing Infrastructure

- Sewer Overflow Point
- Existing Interceptor
- AWT Plant Location

Long Term Control Plan Projects

- Storage Facility
- Sewer Separation/Elimination Area
- Tunnel Dewatering Pump Station
- Tunnel Force Main
- Proposed Tunnel Route
- Collection Interceptor
- Pogues Run Tunnel

Sanitary Sewer Projects

- Lift Station and Rehabilitation Projects
- Interceptor Projects

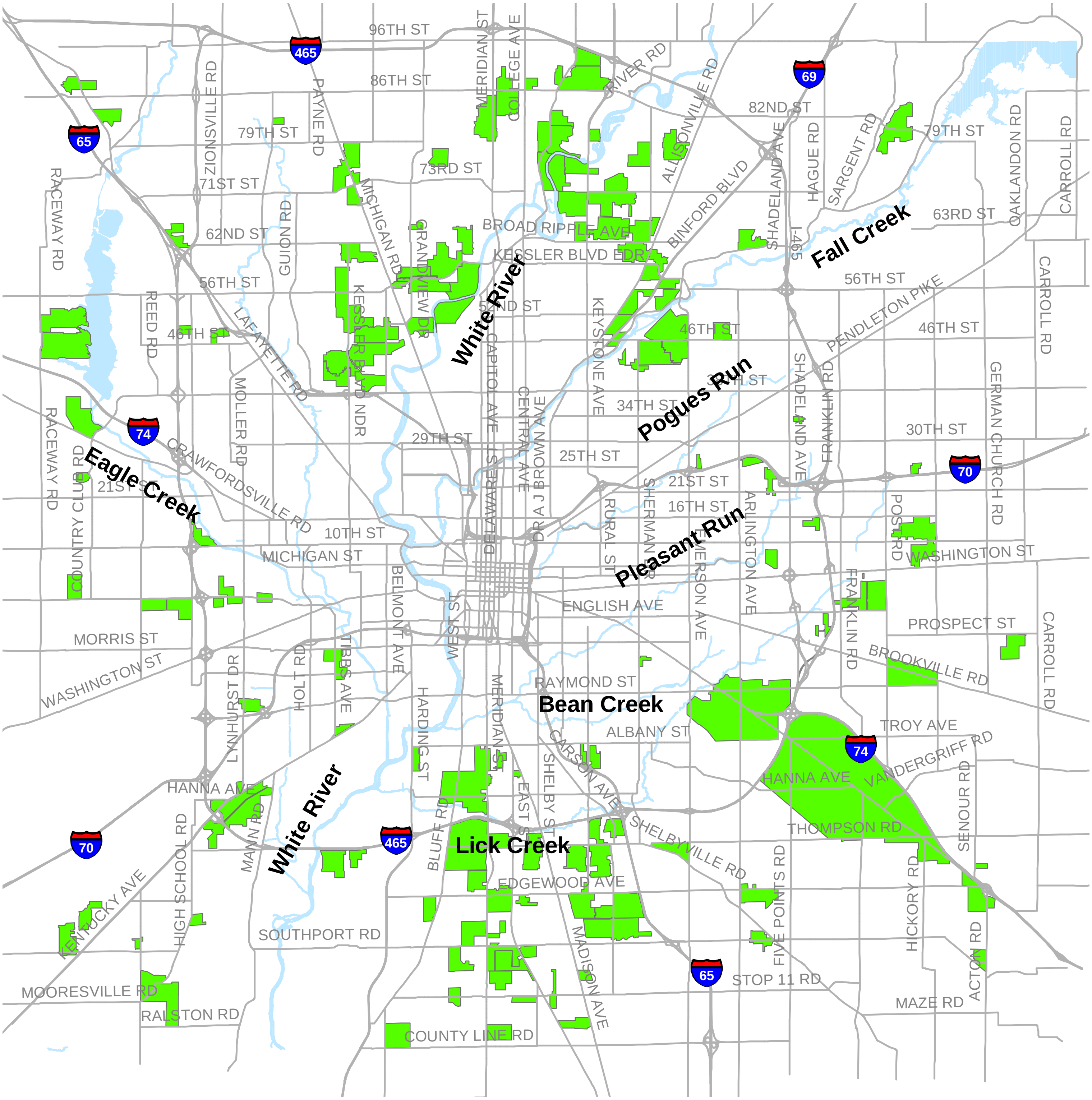
N W E S

City of Indianapolis DPW Department of Public Works

INDIANAPOLIS CLEAN STREAM TEAM

These major projects represent planning-level information and may be subject to refinement during facility planning and design phases.

20-Year Voluntary Plan to Address Failing Septic Systems



Septic Tank Elimination Projects thru 2025

These major projects represent planning-level information and may be subject to change during facility planning and design phases.

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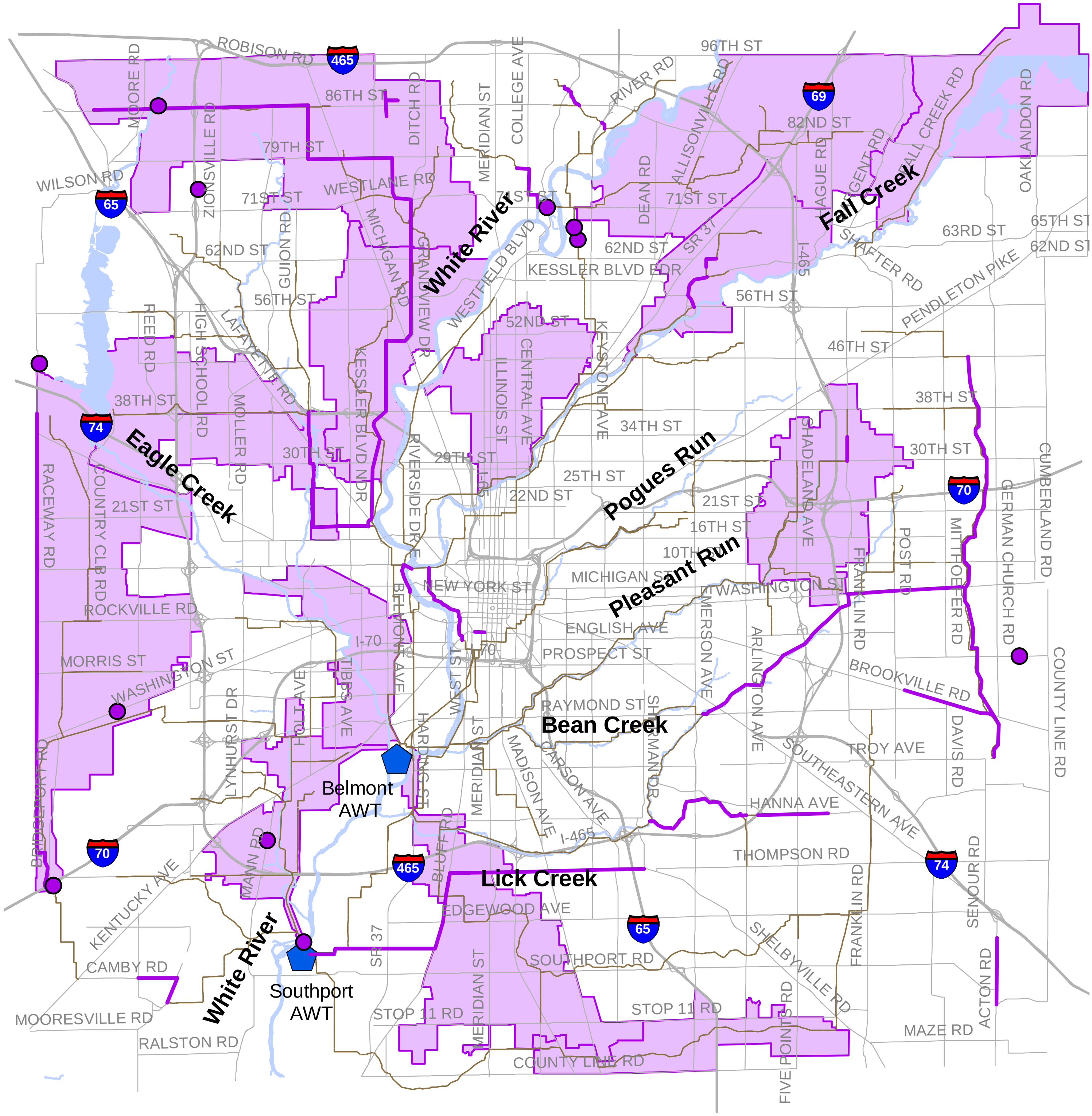
DPW
Department of Public Works

INDIANAPOLIS
CLEAN STREAM TEAM

20-Year Voluntary Sanitary Sewer Improvements



Existing Infrastructure

Existing Interceptor

AWT Plant Location

Sanitary Sewer Projects thru 2025

Sanitary Lift Station and Rehabilitation Projects

Sanitary Interceptor Projects

Sanitary Basin Rehabilitation Projects

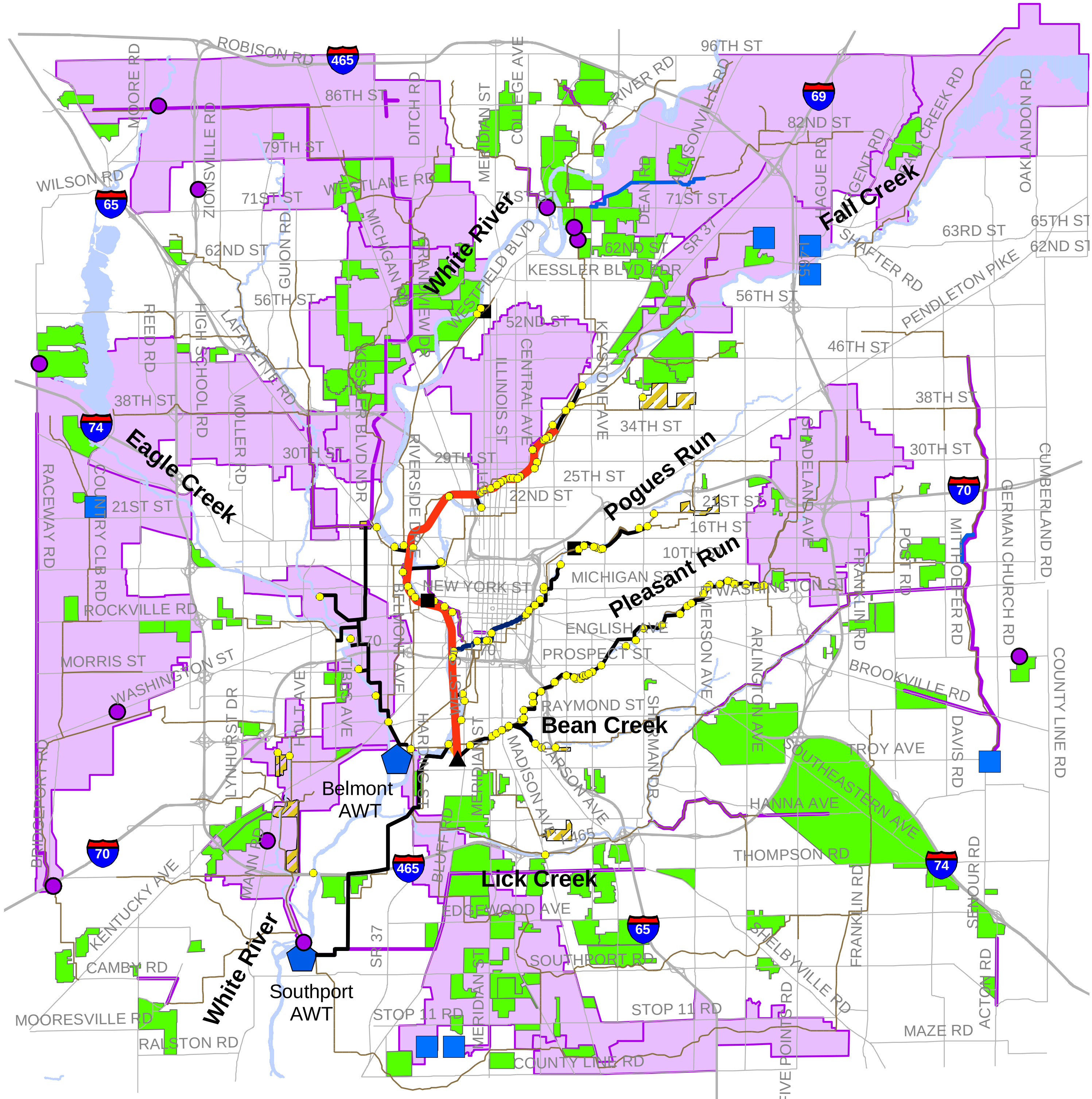
N W E S

These projects represent planning-level information and may be subject to refinement during facility planning and design phases.

City of Indianapolis DPW Department of Public Works

INDIANAPOLIS CLEAN STREAM TEAM

Clean Streams-Healthy Neighborhoods: 20-Year Sewer Improvement Program



Existing Infrastructure
- Sewer Overflow Point
- Existing Interceptor
- AWT Plant Location

Required Projects
- Storage Facility
- Sewer Separation/Elimination Area
- Tunnel Dewatering Pump Station
- Tunnel Force Main
- Proposed Tunnel Route
- Collection Interceptor
- Pogues Run Tunnel
- Lift Station and Rehabilitation Projects
- Interceptor Projects

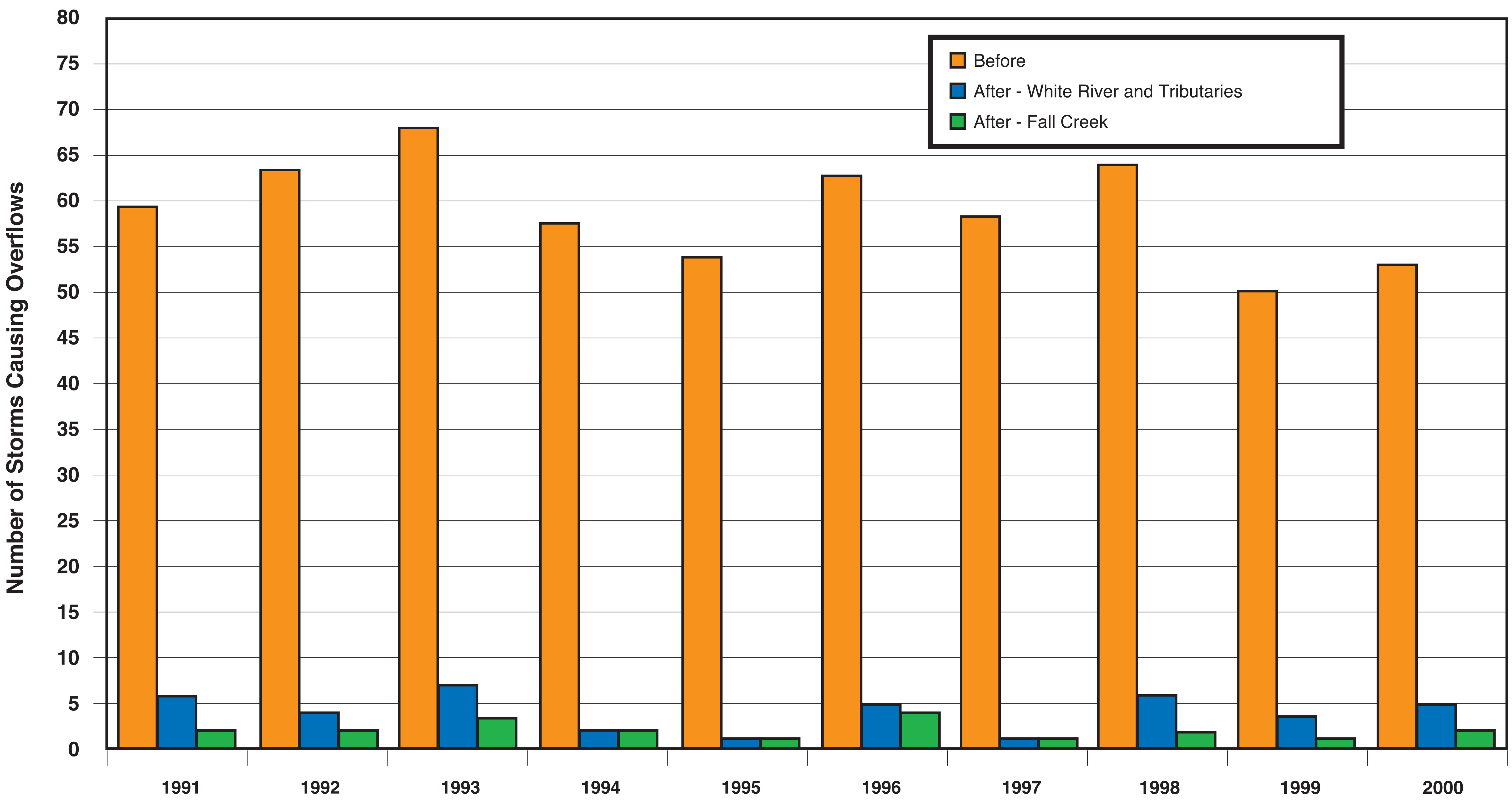
Voluntary Projects
- Lift Station and Rehabilitation Projects
- Interceptor Projects
- Sanitary Basin Rehabilitation Projects
- Septic Tank Elimination Projects

These major projects represent planning-level information and may be subject to refinement during facility planning and design phases.

City of Indianapolis DPW Department of Public Works

INDIANAPOLIS CLEAN STREAM TEAM

OVERFLOW FREQUENCY BEFORE AND AFTER PLAN IS IMPLEMENTED



Source: 1950-2003 NetSTORM Simulation. Baseline Conditions and Selected LTCP.

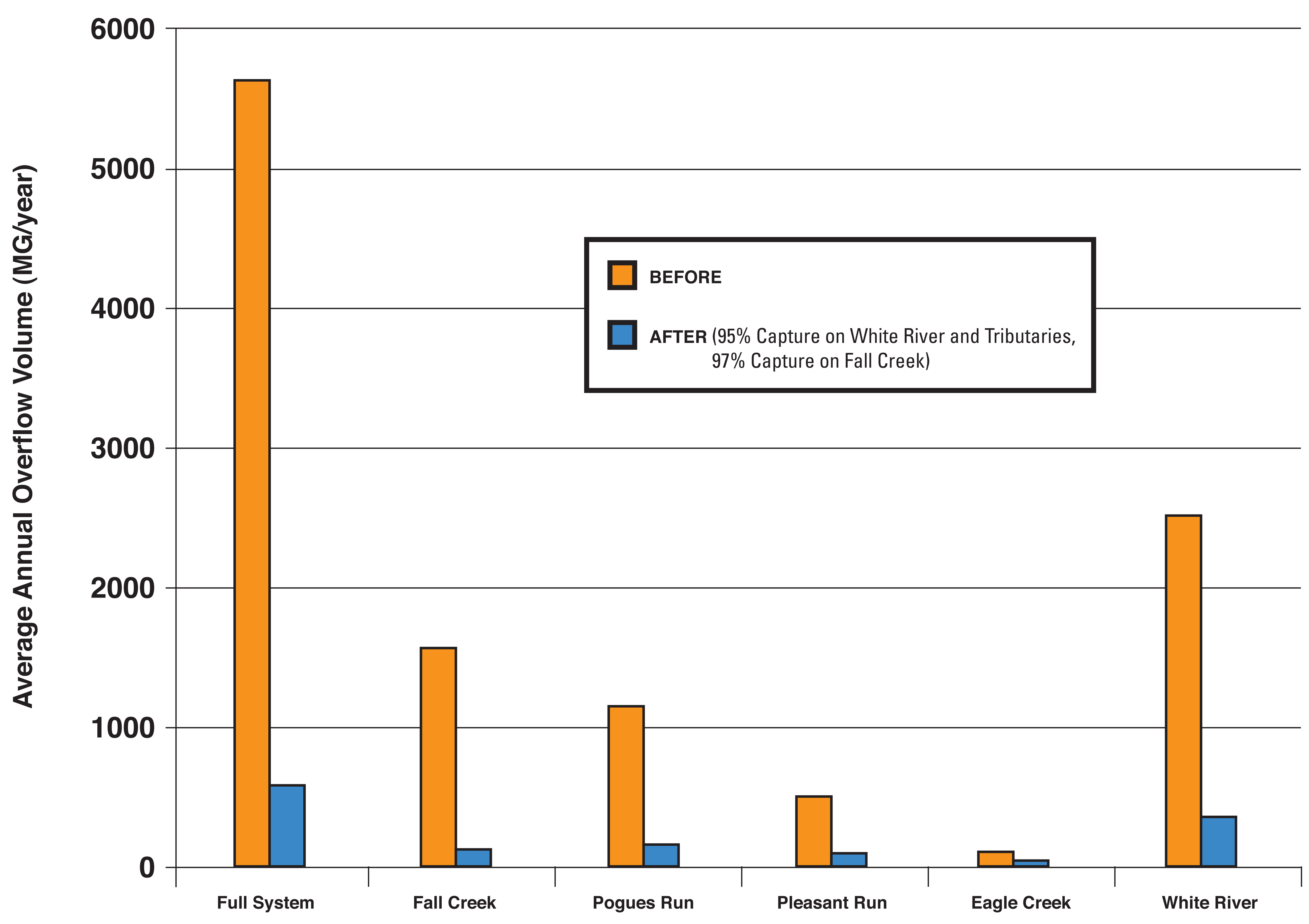
Note: (1) For before conditions, there is an average annual frequency of 60 overflow events per year. The distribution of the 60 events is based on the 54-year precipitation record.
(2) It is estimated that at least one CSO outfall structure would discharge for the listed number of dates each year.

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis DPW Department of Public Works

INDIANAPOLIS CLEAN STREAM TEAM

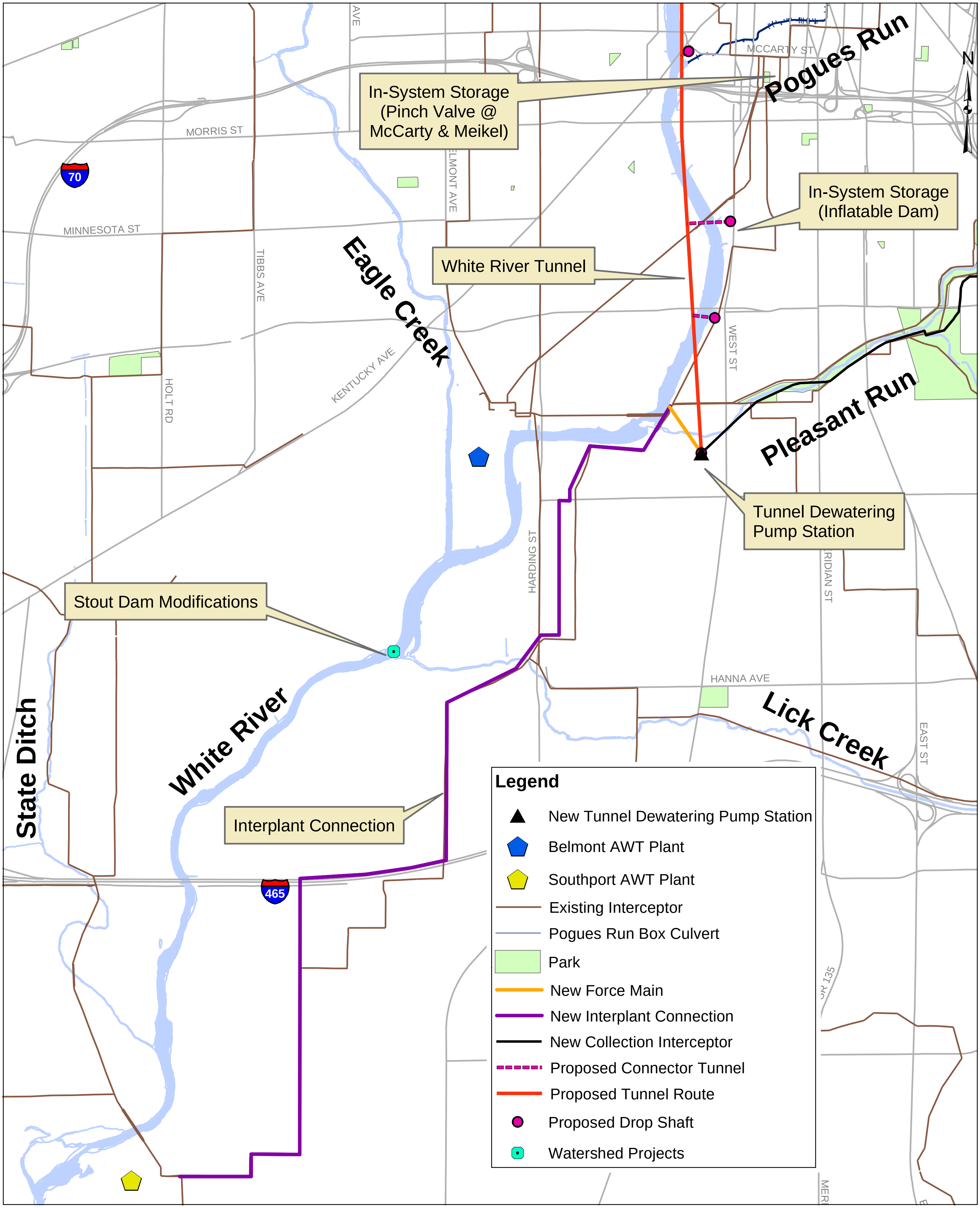
OVERFLOW VOLUME BEFORE AND AFTER PLAN IS IMPLEMENTED



City of Indianapolis
Bart Peterson, Mayor

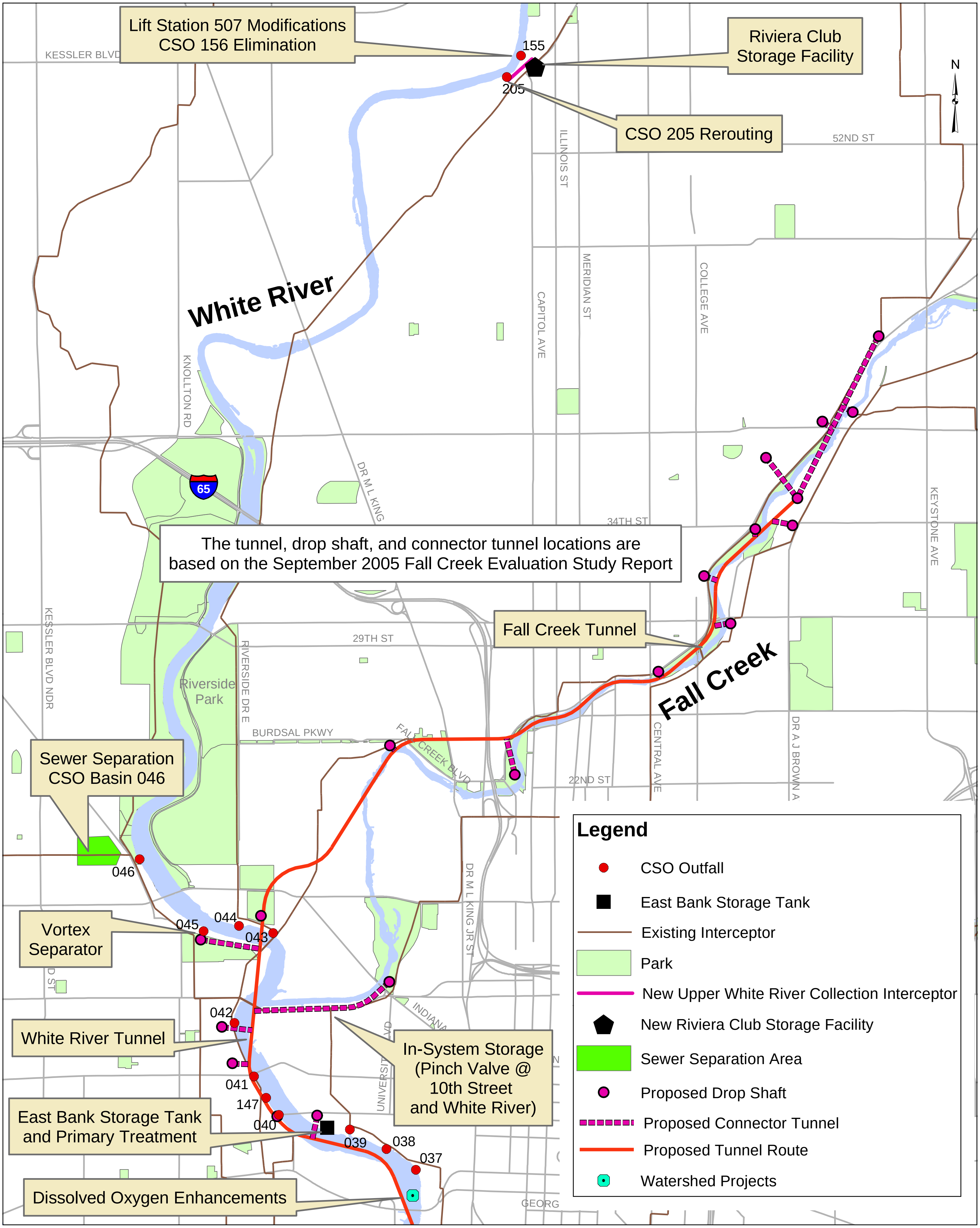
City of Indianapolis DPW Department of Public Works

INDIANAPOLIS CLEAN STREAM TEAM



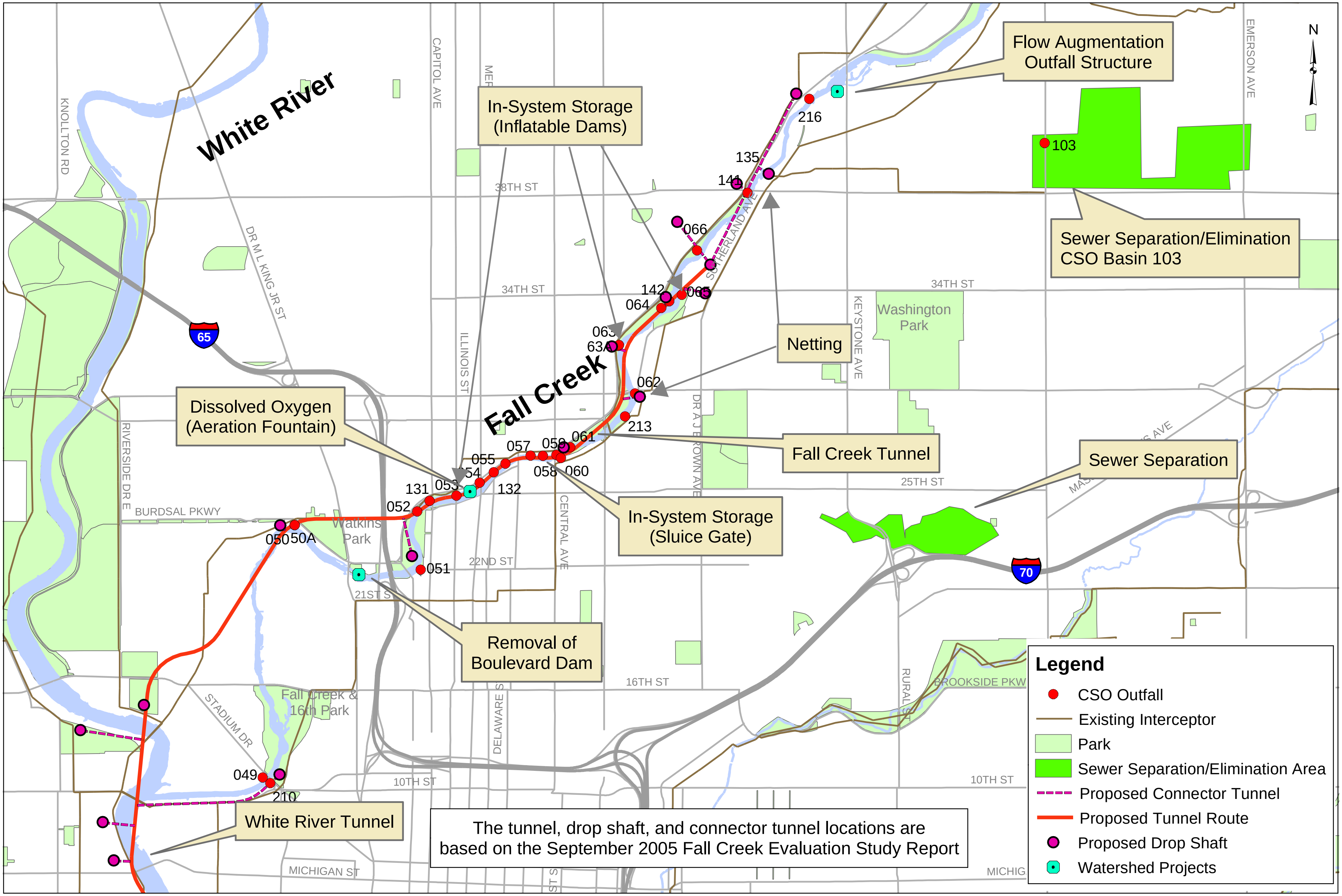
July 2006 Long Term Control Plan
Lower White River Watershed Control Measures

These major projects represent planning-level information and may be subject to refinement during facility planning and design phases



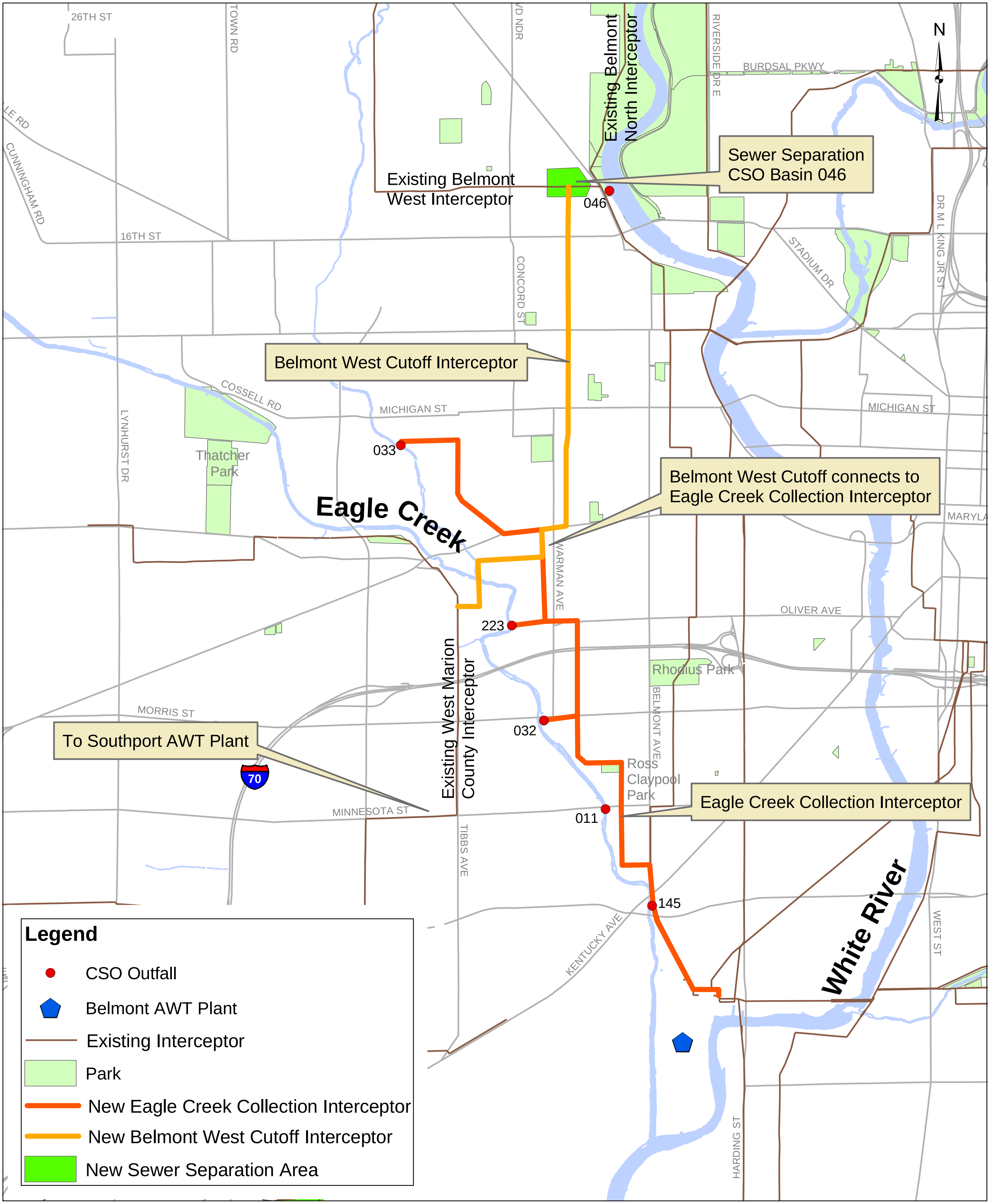
July 2006 Long Term Control Plan: Upper White River Watershed Control Measures

These major projects represent planning-level information and may be subject to refinement during facility planning and design phases



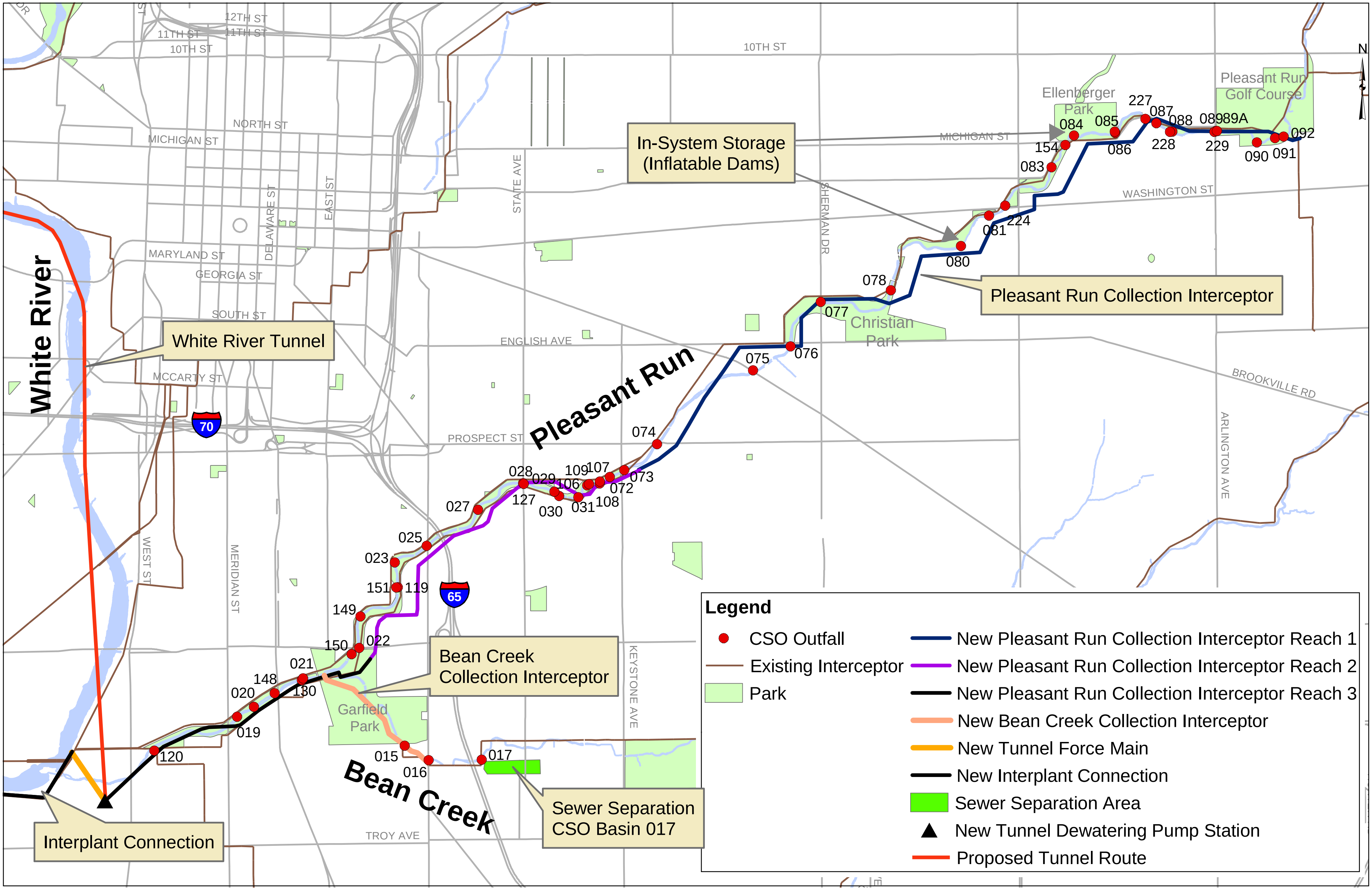
July 2006 Long Term Control Plan
Fall Creek Watershed Control Measures

These major projects represent planning-level information and may be subject to refinement during facility planning and design phases



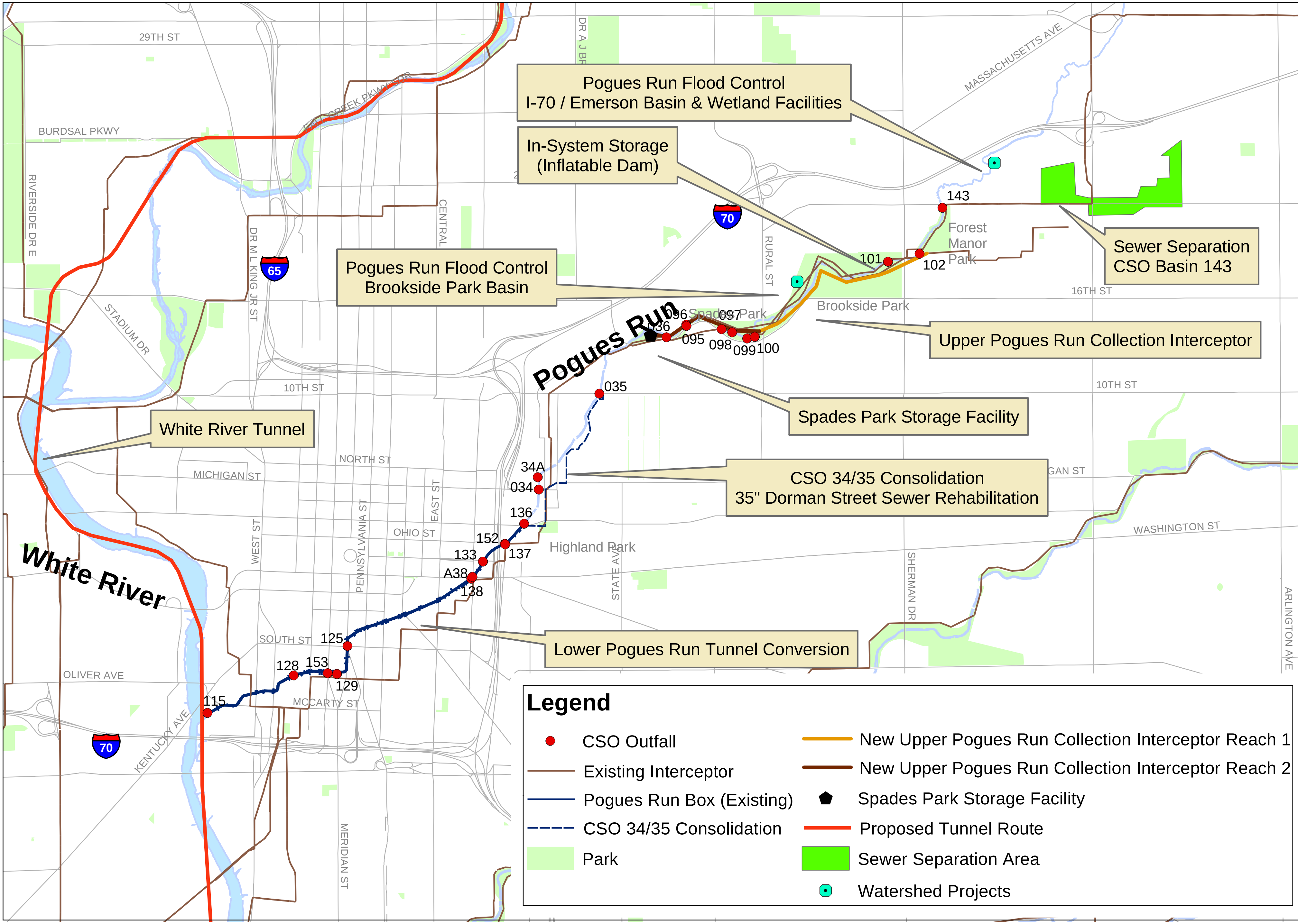
July 2006 Long Term Control Plan
Eagle Creek Watershed Control Measures

These major projects represent planning-level information and may be subject to refinement during facility planning and design phases



July 2006 Long Term Control Plan
Pleasant Run Watershed Control Measures

These major projects represent planning-level information and may be subject to refinement during facility planning and design phases



July 2006 Long Term Control Plan: Pogues Run Watershed Control Measures

These major projects represent planning-level information and may be subject to refinement during facility planning and design phases

City of Indianapolis
Department of Public Works

Raw Sewage Overflow Long Term Control Plan and Water Quality Improvement Report

is available for public review and comment. The document also is available electronically at www.indycleanstreams.org.

You are invited to submit comments on the plan via mail, fax or Web. Verbal comments also will be accepted at a public hearing on Aug. 3, 2006, 7 p.m., at the University of Indianapolis.

SUBMIT COMMENTS ONLINE:
www.indycleanstreams.org

MAIL COMMENTS TO:
City of Indianapolis Long Term Control Plan Comments
c/o Indianapolis Clean Stream Team
151 N. Delaware Street, Suite 900
Indianapolis, IN 46204

FAX COMMENTS TO:
(317) 327-8699

Thank you for your interest in the city's efforts to reduce sewer overflows, improve water quality and improve the quality of life in our neighborhoods.

City of Indianapolis
Bart Peterson, Mayor

City of Indianapolis
DPW
Department of Public Works

INDIANAPOLIS
CLEAN STREAM TEAM

LTCP E-mail Blast

Subject: Special Announcement from the Indianapolis Clean Stream Team

Mayor Announces Release of Raw Sewage Overflow Long Term Control Plan; Public Review and Comment Period Begins Today

Today, Mayor Peterson announced the release of the City of Indianapolis Raw Sewage Overflow Long Term Control Plan and Water Quality Improvement Report for public review and comment. To view the entire document online or to request a CD of the plan, visit www.indycleanstreams.org.

The public is invited to submit comments on the plan via mail, fax or online. Verbal comments also will be accepted at a public hearing on Aug. 3, 2006, 7 p.m., University of Indianapolis, 1400 Hanna Ave., Good Hall, Room 105. The 30-day public review and comment period will end Aug. 18.

SUBMIT COMMENTS ONLINE:
www.indycleanstreams.org

MAIL COMMENTS TO:
City of Indianapolis Long Term Control Plan Comments
c/o Indianapolis Clean Stream Team
151 N. Delaware Street, Suite 900
Indianapolis, IN 46204

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Thank you for your interest in the city's efforts to reduce sewer overflows, improve water quality and improve the quality of life in our neighborhoods.

Please see the news release below for additional information.

[paste news release]

Raw Sewage Overflow Long-Term Control Plan Announcement
July 19, 2006

Form Prescribed by the State Board of Accounts

TO: Court & Commercial RECORD YOUR PUBLIC INFORMATION SOURCE SINCE 1895

General Form No. 99P (Rrev. 2005)

Department of Public Works
(Governmental Unit)

Marion County, Indiana

IBJ CORP.
41 E. Washington St., Suite 200, Indianapolis, Indiana, (317) 636-0200

PUBLISHER'S CLAIM

LINE COUNT - Display Matter (Must not exceed two actual lines, either of which shall total more than four solid lines of type in which the body of the advertisement is set) - number of equivalent lines.

HEAD - number of lines

BODY - number of lines

TAIL - number of lines

TOTAL NUMBER OF LINES IN NOTICE 64

COMPUTATION OF CHARGES

64 lines. 1 columns wide, equals 64 equivalent lines at 0.431 cents per line 27.58

Additional charges for notices containing rule or tabular work (50 percent above amount)

Charge for extra proofs of publication ($1.00 for each proof in excess of two) 0.00

TOTAL AMOUNT OF CLAIM $ 27.58

DATA FOR COMPUTING COST

Width of single column 10 ems | Size of type 6 point | Number of Insertions 1

Pursuant to the provisions of Ch. 15, Acts 1953

I hereby certify that the foregoing account if just and correct, that the amount claimed is legally due, after allowing all credits, and that no part of the same has been paid.

1 OF 1

06-8509

Date July 21,2006

Judith A. Smith

Title: Clerk

PUBLISHER'S AFFIDAVIT

State of Indiana
Marion County ss:

Personally appeared before me, a Notary Public in and said county and state, The undersigned Judith A. Smith, who being duly sworn, says she is a Clerk for the IBJ Corp., publishers of Court & Commercial Record, a daily newspaper of general circulation, printed and published in the English language, in the City of Indianapolis, Indiana, in State and County aforesaid, and that the printed matter attached hereto is a true copy, which is duly published in the said paper for 1 time, the dates of the publication being as follows:

07/21/06

Judith A. Smith

Subscribed and sworn to before me, this 21st day of July 2006

My Commission Expires: February 1, 2008
County of Residence: Johnson

Notary Public

Notice of Public Hearing Indianapolis Department of Public Works.

Notice is hereby given that the Indianapolis Department of Public Works will hold a 30-day comment period on the proposed City of Indianapolis Raw Sewage Overflow Long Term Control Plan and Water Quality Improvement Report. A public hearing will be held on August 3, 2006, at 7:00 PM in Room 105 of Good Hall at the University of Indianapolis, 1400 East Hanna Avenue. The aforementioned plan will help restore Indianapolis neighborhoods that now suffer from the sight and smell of raw sewage nearly every time it rains. At an estimated cost of $1.8 billion in 2005 dollars, the plan represents the largest investment in clean water infrastructure in the city's history. The plan solidifies the city's commitment to the federal and state governments to reduce sewer overflows and meet permit requirements under the Clean Water Act.

The Report is available online at www.indycleanstreams.org. Printed copies of the plan can also be found at all Indianapolis-Marion County Public Library branches, the Department of Public Works at 604 N. Sherman Drive, and the Indianapolis Clean Stream Team at 151 N. Delaware, Suite 900. You may also request an electronic copy on CD-Rom by calling the Indianapolis Clean Stream Team at 317-327-8720.

Public comments on the plan will be accepted until August 18. Written comments may be submitted online at www.indycleanstreams.org or to the Indianapolis Clean Stream Team, 151 N. Delaware St., Suite 900, Indianapolis, IN 46204.

If you have a disability and require an accommodation to attend please call 327-3798.

Please contact the Clean Stream Team at 327-8720 if you have any questions.

MARGIE SMITH-SIMMONS

DEPT OF PUBLIC WORKS

MARION COUNTY, INDIANA

To: INDIANAPOLIS NEWSPAPERS
307 N PENNSYLVANIA ST - PO BOX 145
INDIANAPOLIS, IN 46206-0145

PUBLISHER'S CLAIM

LINE COUNT

Display Matter - (Must not exceed two actual lines, neither of which shall total more than four solid lines of the type in which the body of the advertisement is set). Number of equivalent lines $_____

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Body - Number of lines _____ $_____ $_____

Tail - Number of lines _____ $_____

Total number of lines in notice _____

COMPUTATION OF CHARGES

65.0 lines 1.0 columns wide equals 65.0 equivalent lines at .374 cents per line $ 24.31

Additional charge for notices containing rule and figure work (50 per cent of above amount) $_____

Charges for extra proofs of publication ($1.00 for each proof in excess of two) $ .00 $ .00

TOTAL AMOUNT OF CLAIM $_____

DATA FOR COMPUTING COST $_____

Width of single column 7.83 ems Size of type 5.7 point $_____ $_____

Number of insertions 1.0 $ 24.31

Pursuant to the provisions and penalties of Chapter 155, Acts of 1953,
I hereby certify that the foregoing account is just and correct, that the amount claimed is legally due, after allowing all just credits, and that no part of the same has been paid.

DATE: 07/21/2006

[signature] Clerk
Title

80459-4436590

PUBLISHER'S AFFIDAVIT

State of Indiana SS:
MARION County

Personally appeared before me, a notary public in and for said county and state, the undersigned **Karen Mullins** who, being duly sworn, says that SHE is clerk of the INDIANAPOLIS NEWSPAPERS a DAILY STAR newspaper of general circulation printed and published in the English language in the city of INDIANAPOLIS in state and county aforesaid, and that the printed matter attached hereto is a true copy, which was duly published in said paper for **1** time(s), between the dates of:

07/21/2006 and **07/21/2006**

[signature] Clerk
Title

Subscribed and sworn to before me on **07/21/2006**

[signature] Notary Public

My commission expires:_____

"OFFICIAL SEAL"
Susan Ketchem
Notary Public, State of Indiana
My Commission Exp. 05/06/2011

Notice of Public Hearing
Indianapolis Department of Public Works

Notice is hereby given that the Indianapolis Department of Public Works will hold a 30-day comment period on the proposed City of Indianapolis Raw Sewage Overflow Long Term Control Plan and Water Quality Improvement Report. A public hearing will be held on August 3, 2006, at 7:00 PM in Room 105 of Good Hall at the University of Indianapolis, 1400 East Hanna Avenue. The aforementioned plan will help restore Indianapolis neighborhoods that now suffer from the sight and smell of raw sewage nearly every time it rains. At an estimated cost of $1.8 billion in 2005 dollars, the plan represents the largest investment in clean water infrastructure in the city's history. The plan solidifies the city's commitment to the federal and state governments to reduce sewer overflows and meet permit requirements under the Clean Water Act.

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MARGIE SMITH-SIMMONS
PUBLIC INFORMATION OFFICER DEPARTMENT OF PUBLIC WORKS
(S-7/21-4436590)

For ... TE PRESCRIBED FORMULA

... PICA COLUMN - 94 POINT
... DINTS / 5.7 PT. TYPE - 16.49
... EMS / 250 - .06596 SQUARES
... 6 SQUARES x $5.14 - .339 CENTS PER LINE

RATE PER LINE

PUBLISHED 1 TIME = .339
PUBLISHED 2 TIMES= .509
PUBLISHED 3 TIMES= .679
PUBLISHED 4 TIMES= .848

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

Raw Sewage Overflow
Long Term Control Plan
Public Hearing

Indianapolis Department of Public Works

August 3, 2006

City of Indianapolis

BPW

INDIANAPOLIS CLEAN STREAM TEAM

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

City of Indianapolis · DPW · INDIANAPOLIS CLEAN STREAM TEAM

Agenda

- Welcome & Introductions
- Agenda Review & Ground Rules
- Presentation on City's Plan to Reduce Raw Sewage Overflows
- Questions (10-15 minutes)
- Public Hearing (time limited)
- Adjourn

Clean Streams-Healthy Neighborhoods Program

- **Raw Sewage Overflow Long-Term Control Plan**
- Septic Tank Elimination Program: converting 18,000 homes to sewers by 2025
- Sanitary Sewer Master Plan: addressing current and future needs in sanitary sewer system (eliminating constructed overflows and preventing sewer backups)
- Stormwater Master Plan: addressing neighborhood drainage problems and flood protection needs

Background on Sewer Overflows

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

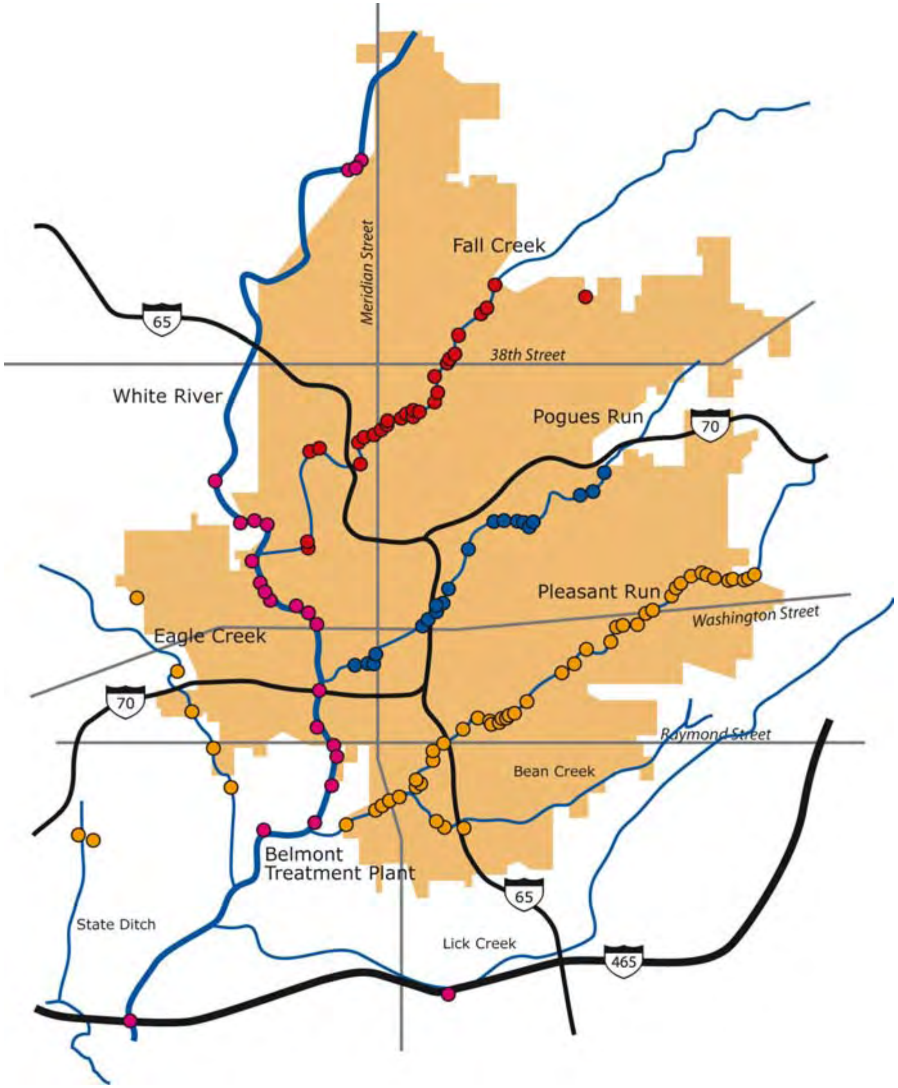
City of Indianapolis

BPW

INDIANAPOLIS CLEAN STREAM TEAM

Where Overflows Occur

- In years past, nearly 6 billion gallons overflowed into our streams, on average
- 45-80 times a year, overflows sent bacteria, pathogens and untreated waste into:
  - White River
  - Fall Creek
  - Pogues Run
  - Pleasant Run/Bean Creek
  - Eagle Creek
  - Lick Creek & State Ditch



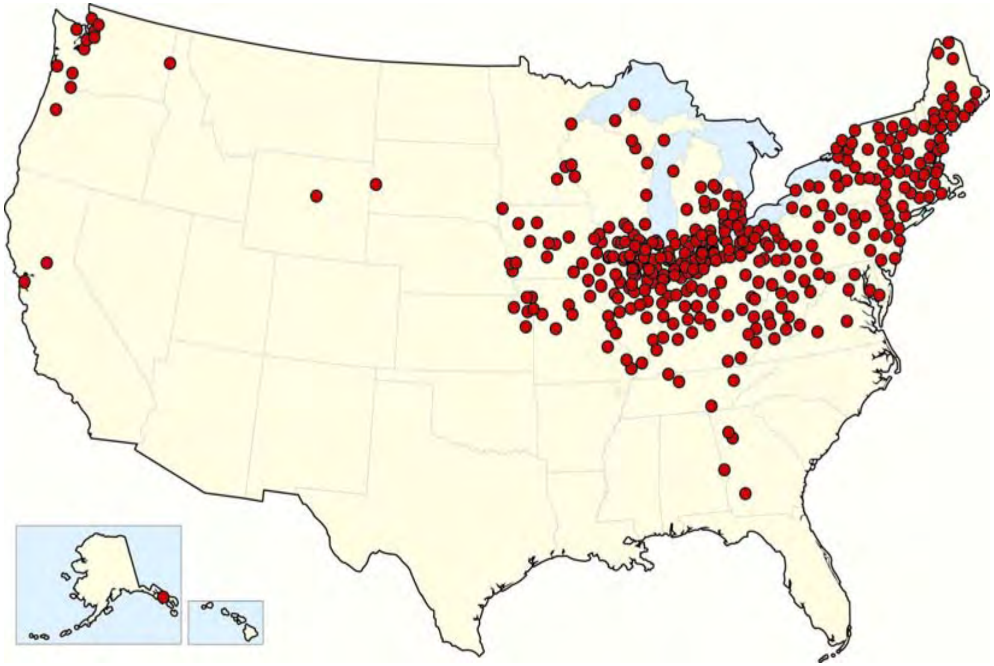
Projects Already Underway

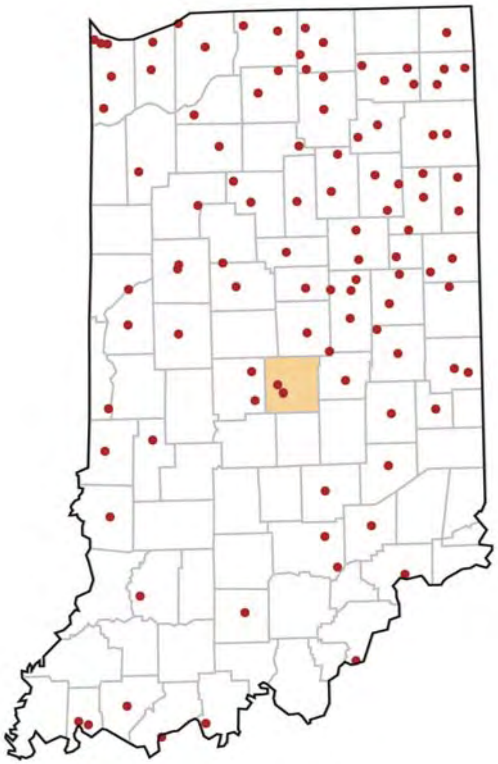
- More than $200 million already invested in sewer system early action projects, reducing overflows by 145 million gallons/year
- Proposed $1.8 billion long-term plan will reduce overflows even more.

We Are Not Alone

A nationwide problem:

- 772 communities in U.S.
- 105 communities in Indiana





Plan Overview

Who's Been Involved?

- Department of Public Works
- Indianapolis Clean Stream Team
- Clean Stream Team Advisory Committee
  - Wet Weather Technical Advisory Committee
  - Mayor's Raw Sewage Overflow Advisory Committee
- Public meetings:
  - 2000: Public education and input sessions on overflow problem
  - 2001: Public comment on first long-term plan
  - 2002: Survey & public meetings on stream uses
  - 2004: Meetings in each watershed to collect input into plan alternatives
  - Speakers are always available to attend community meetings

Long-Term Control Plan Goals

- Dramatically improve water quality by reducing sewer overflows in a cost-effective manner,
- Improve neighborhood quality of life,

- Improve our streams to support fish and other aquatic wildlife, and
- Come into compliance with state and federal Clean Water Act permit requirements.

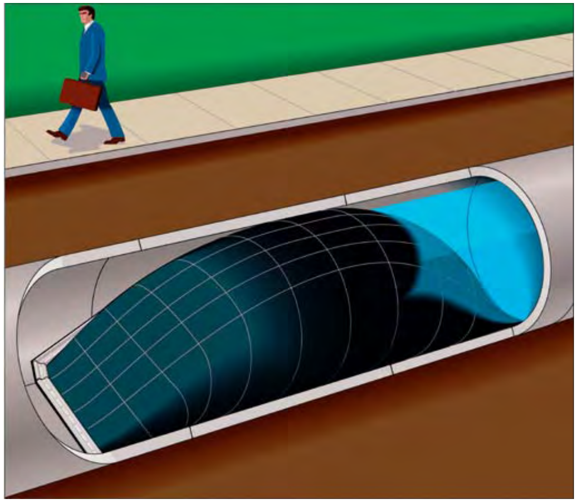
Long-Term Plan Overview

- **Deep Tunnel:** Underground tunnel along Fall Creek and White River to Belmont Advanced Wastewater Treatment Plant
- **Central Treatment:** Expanded capacity at two advanced wastewater treatment plants and new sewer connecting plants

Tunnel construction

Belmont AWTP

Plan Overview (continued)



- **Inflatable dams and pinch valves:** Better utilize existing sewer system.

- **New, larger sewers:** Eagle Creek, Pleasant Run & Bean Creek. Parts of White River, Fall Creek & Pogues Run.

Plan Overview (continued)

- **Storage tanks:** Pogues Run near Spades Park, White River at Riviera Club, and White River at IUPUI (already completed).

- **Sewer separation projects :** On State Ditch, Lick Creek, White River, and upstream ends of Fall Creek, Pogues Run and Bean Creek.

Plan Overview (continued)

- City is also required to invest:
  - $50.4 million by 2015 to eliminate chronic overflows from seven locations in the separate, sanitary sewer system
  - $3.5 million by 2010 on supplemental environmental projects to eliminate septic systems in the Epler-Meridian and Banta-Southport neighborhoods.

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

City of Indianapolis

DPW

INDIANAPOLIS CLEAN STREAM TEAM

Map of Long-Term Control Plan

Cost of construction and operations over 20 years: $1.8 billion in 2005 dollars

Project Schedule

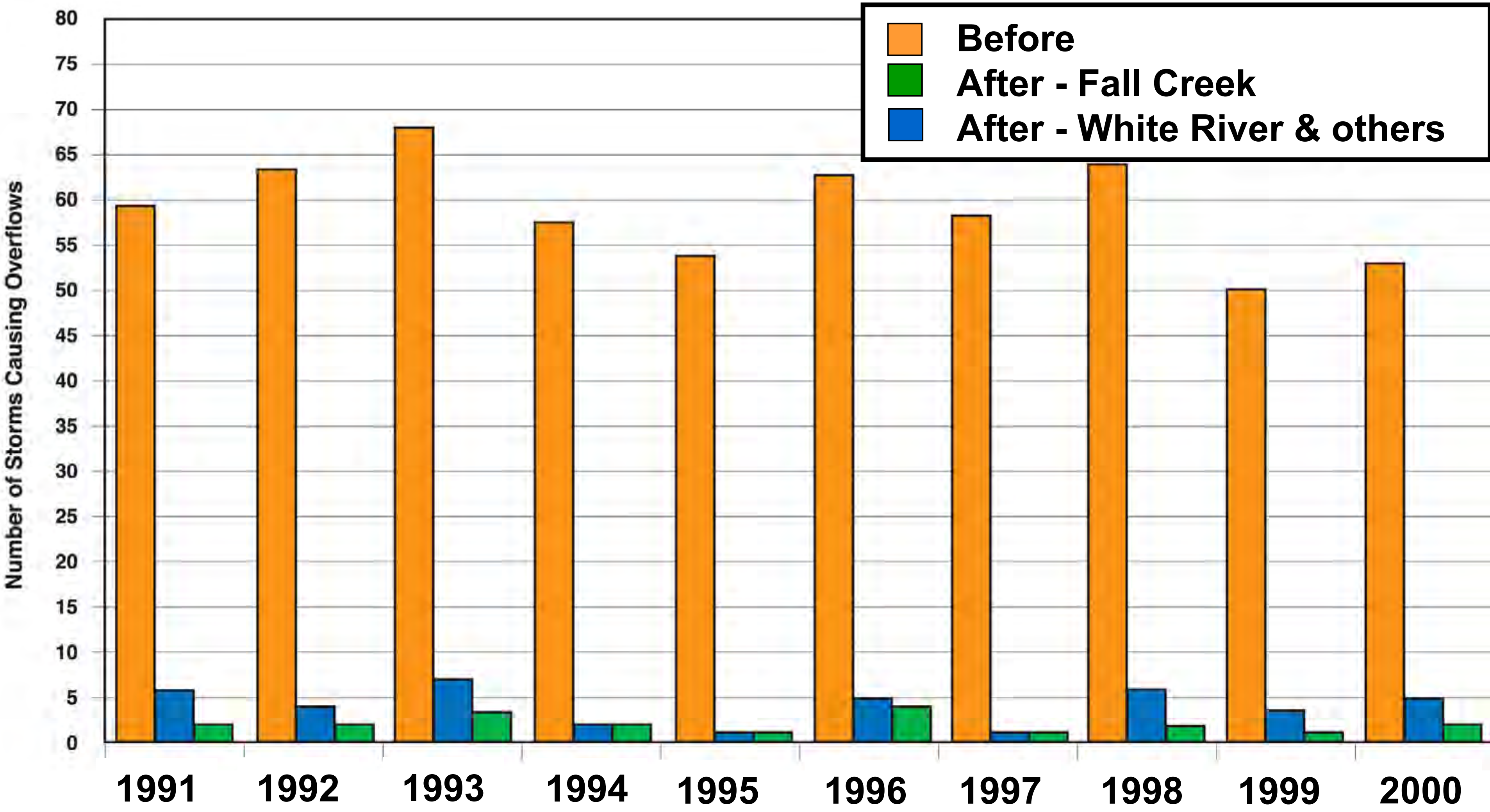
- Implemented in four, five-year phases.
- All projects complete by December 31, 2025.
- At least 20 years are needed to:
  - minimize disturbance to neighborhoods and coordinate with other capital projects
  - accurately evaluate the effectiveness of each project
  - secure rights of way
  - coordinate technical, manpower and material needs
  - manage the financial burden on ratepayers
- By 2025, average residential bill expected to increase to $55-60/month for 5,400 gallons (based on 2005 dollars)

Plan Benefits

Overflow Reduction

- 97 percent capture of wet-weather sewer flows on Fall Creek; 95 percent capture on White River & other waterways
- In a year with “typical” rainfall:
  - 97% capture equals 2 storms per year causing overflows on Fall Creek (>1.99 inches of rain in 24-hour period)
  - 95% capture equals 4 storms per year causing overflows on other waterways (>1.57 inches of rain in 24 hours)
- Actual overflow frequency will depend on weather conditions each year
  - Range of 0-6 per year on Fall Creek and 0-10 on other waterways
- Comparable to what other communities are required to do

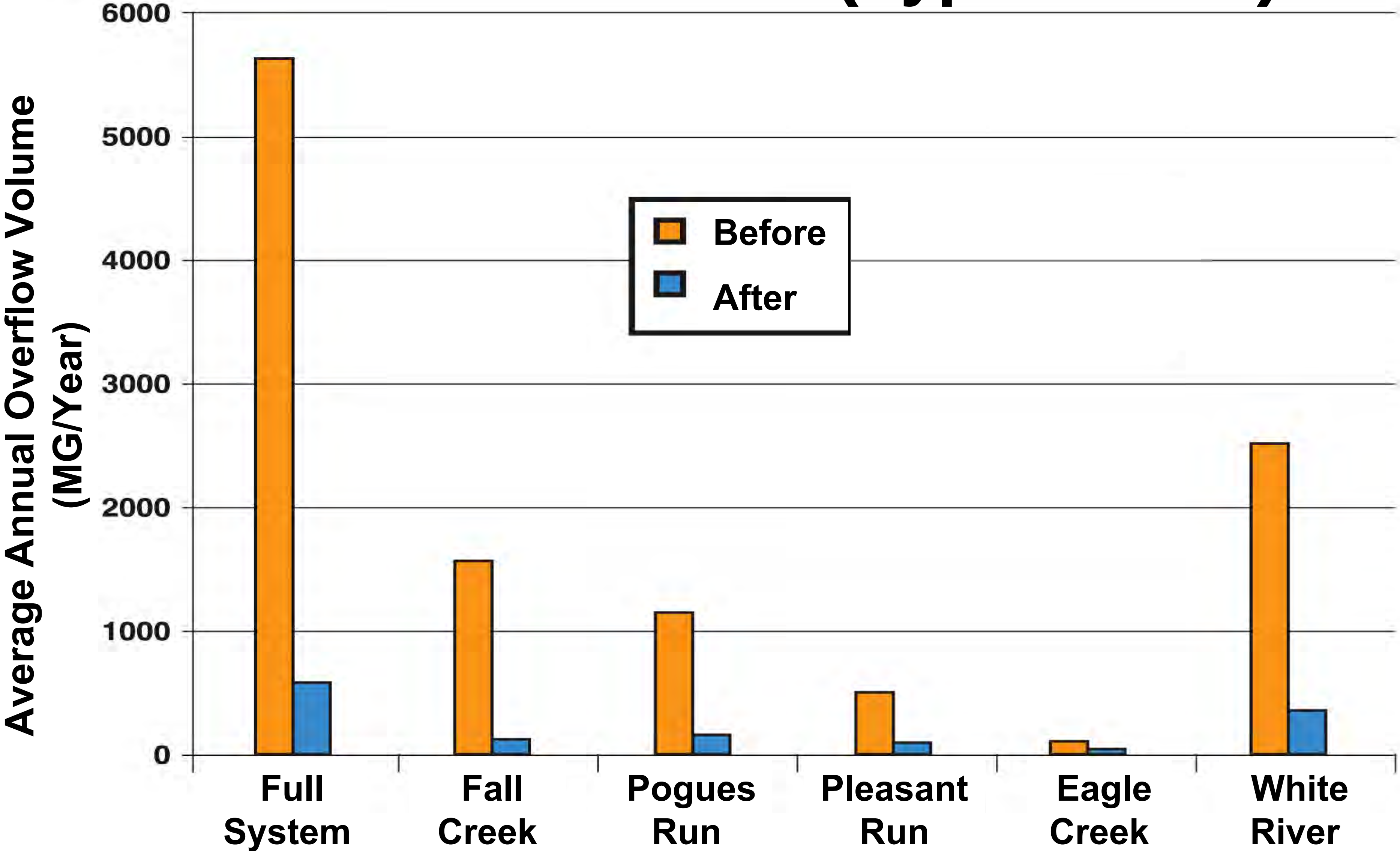
Predicted Overflow Frequency (1991-2000 data)



CLEAN STREAMS
HEALTHY NEIGHBORHOODS

City of Indianapolis
INDIANAPOLIS CLEAN STREAM TEAM

CSO Overflow Volume (Typical Year)



Compliance Monitoring Plan

- Continued monitoring to track the performance of new facilities and in-stream pollution
- Analysis of monitoring data to see if the plan is achieving the desired results
- Continued input from citizens, businesses and community groups about the status of the project
- Milestone reports to EPA, IDEM and the public

Long-Term Benefits

- Sewage overflow volume and overflow frequency reduced dramatically
- Streams protected when people are most likely to use them
- Currently known, chronic sanitary sewer overflows eliminated
- Urban streams enhanced and restored
- Jobs created
- Economic development encouraged along waterways

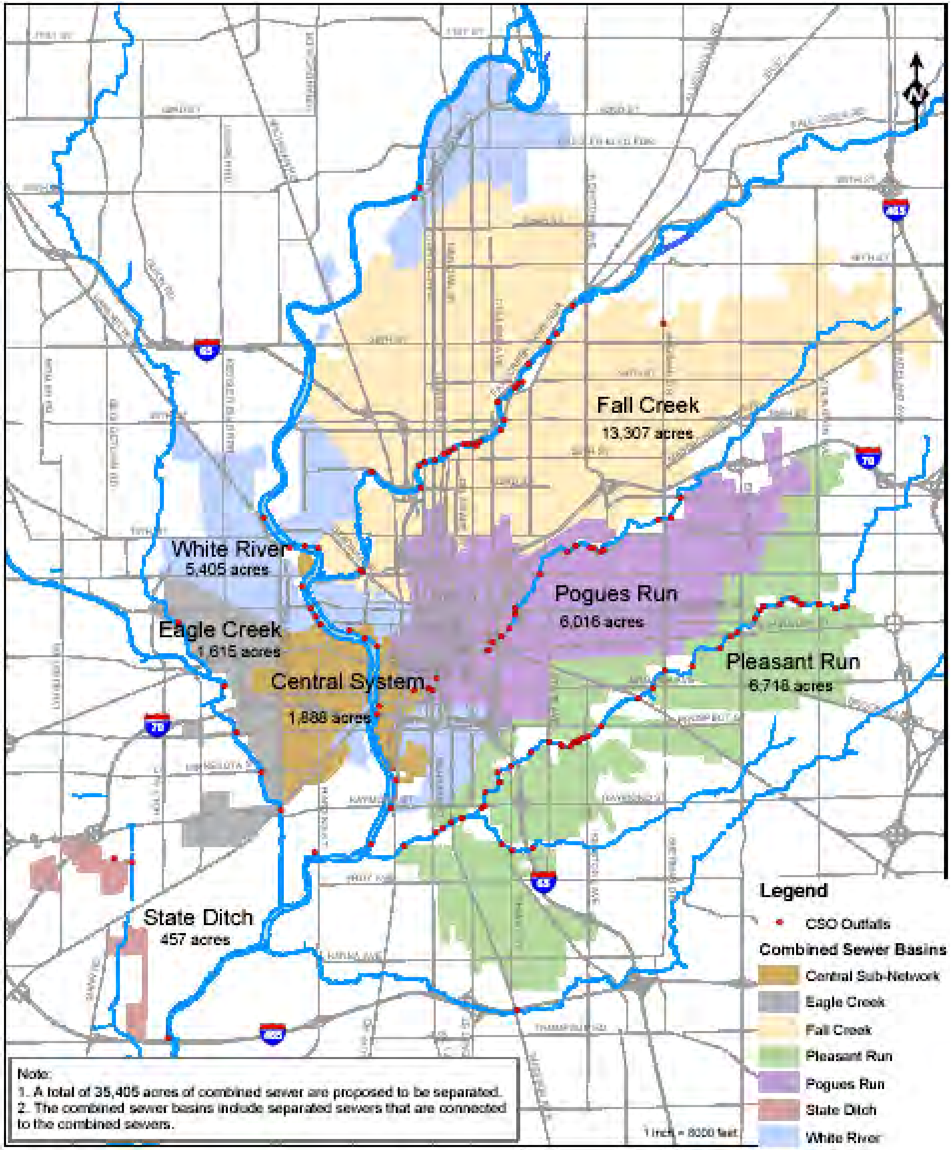
Public Comments

Questions We've Heard So Far

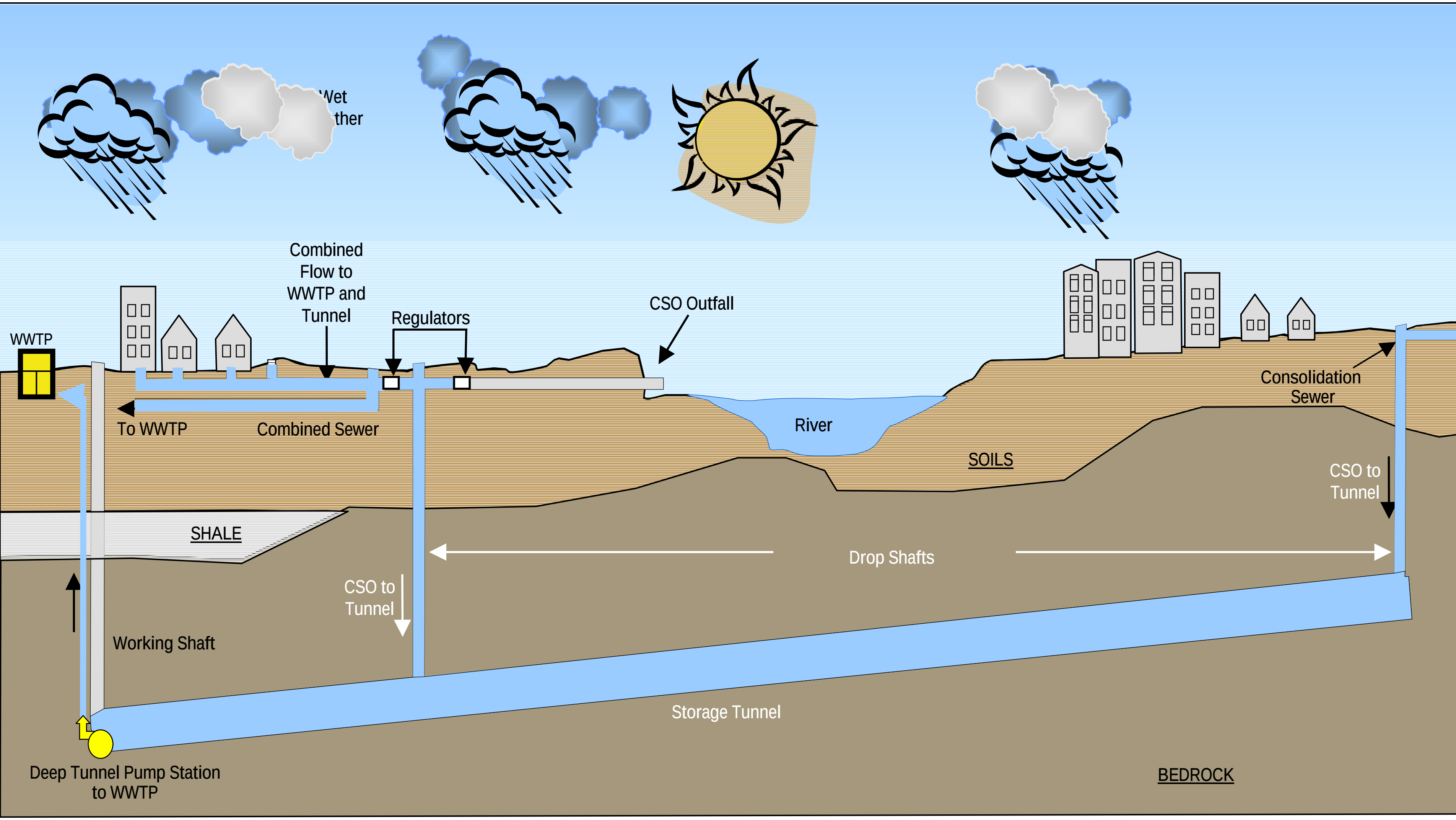
- Why not separate the sewers?
- How will the tunnel work? Won't it contaminate the groundwater?
- I can't afford the projected rates. What about state and federal funding?

Sewer Separation

- 35,405 acres in combined sewer system
- City reviewed complete and partial separation
- Cost to fully separate: $6.2 billion
- Fewer days meeting recreational standards
- More pollution from urban stormwater
- Widespread disruption
- Risk of not meeting future regulatory requirements to treat stormwater

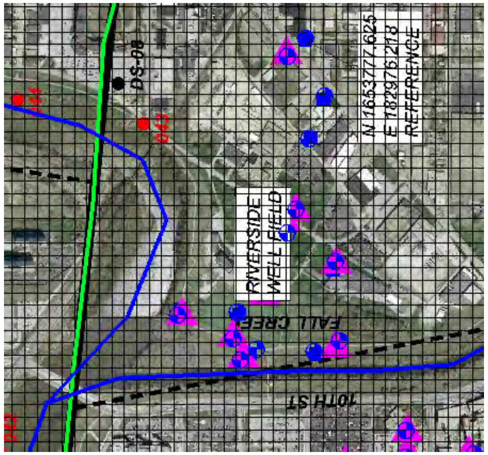


How a Sewage Tunnel Works

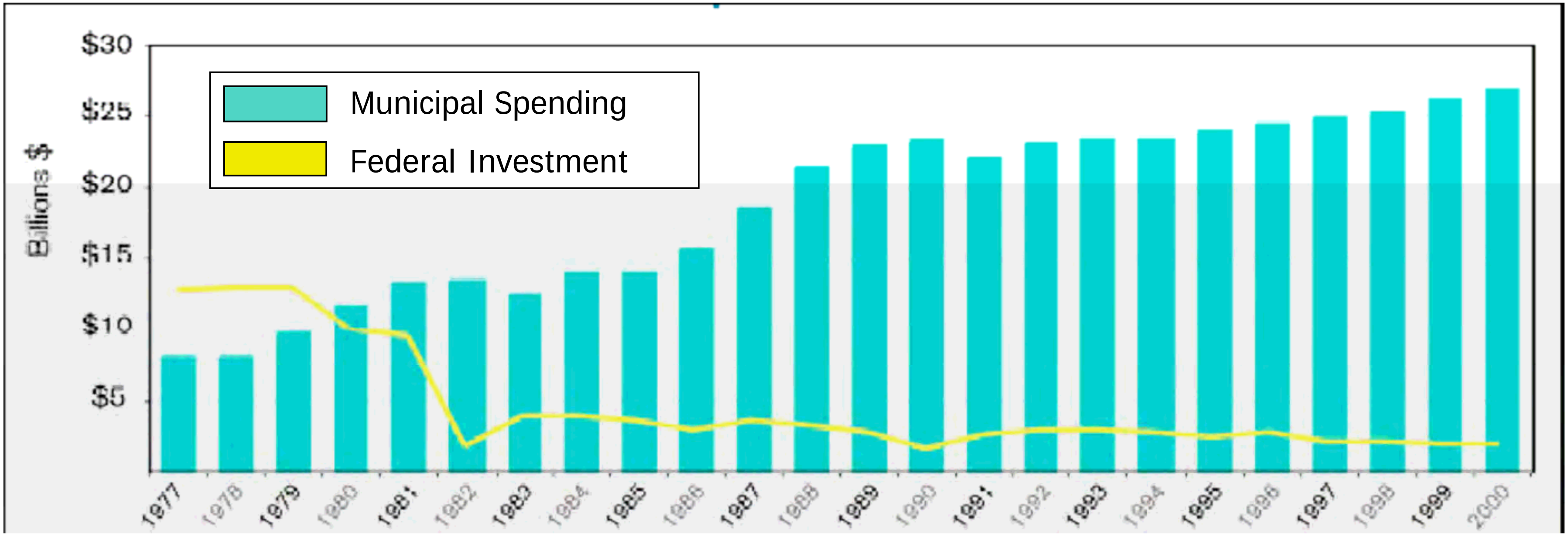


Groundwater Modeling & Monitoring

- Tunnel will be designed and built with groundwater protection methods that prevent contamination
- Model and monitoring will be used to understand the tunnel's impacts on the groundwater/water supply
- "Living Model" will be updated and evaluated:
  - During facility planning and design
  - During construction
  - Post construction
  - Long-term operations & maintenance



Costs & Funding Sources



- The cost of repairing, rehabilitating, and maintaining clean water infrastructure has risen dramatically in the United States while federal funding has been slashed
- EPA, GAO, and WIN report a $300-$500 billion gap between what is being spent and what needs to be spent on our nation’s aging clean water infrastructure

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

City of Indianapolis

DPW

INDIANAPOLIS CLEAN STREAM TEAM

Clean Water Trust Fund Needed

- For information, visit www.cleanwateramerica.org
  - A non-profit advocacy network
  - Working for a federal-state-local financial partnership and creation of a Clean Water Trust Fund that can only be used for clean water priorities
  - Over 140 organizations and 60,000 individual supporters
  - Sign on today to show your support to Congress

Additional Questions?

How to Comment on Plan

- Full plan is available:
  - At www.indycleanstreams.org
  - At all Indianapolis-Marion County Public Libraries
  - At DPW/CST offices (604 N. Sherman & 151 N. Delaware, 9th Floor)
  - On CD-Rom by calling 327-8720
- Written comments accepted until August 18:
  - On-line at Web site above
  - In writing to Indianapolis Clean Stream Team, 151 N. Delaware, Suite 900, Indianapolis, 46204
  - Fax to 317-327-8699

Next Steps

- Review & respond to public comments & finalize plan
- Submit plan to EPA and IDEM for approval
- Continue moving forward with project planning, design and construction, as scheduled
- Report progress to EPA, IDEM, advisory committee and public

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

DPW

# of Speakers: (7)

SPEAKER SCHEDULE
Raw Sewage Overflow
Long Term Control Plan
Public Hearing
Aug. 3, 2006

✓ Sandhya Markand	Greater Indpls. Chamber of Commerce
✓ Rae Schnapp	Hoosier Environmental Council
~~[illegible]~~	
✓ TIM ALTOM / CHAD CERDA	IRVINGTON RESIDENT
✓ John Trypus	Environmental Engineer
✓ LURAE Dabney	Indpls Black Chamber
✓ Mike Logan	
Timothy Aden	

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

ATTENDANCE

Raw Sewage Overflow
Long Term Control Plan
Public Hearing
Aug. 3, 2006

# of attendees: 27

Name (Please Print)	Mailing Address (with Zip Code)	Phone Number/E-mail
Sandhya Markand	111 Monument Circle Suite 1950 Indpls. 46204	464-2243 Smarkand@indylink.com
Jay Thorne	7245 Lomas Dr. Indy 46217	jthorne@dle.com
John Crist	9 South Shamrock Rd. Hartford City 47348	765-348-1020 jcrist@ejiw.com
Rae Schnapp	Hoosier Enviro. Council 1915 W. 18th St. Indpls 46202	rschnapp@hecweb.org
John Trypus	8470 Castle Creek Pkwy, Indianapolis, IN 46250	317-985-2823 ttrypus@ [illegible]
Mark Jacob	151 N. Delaware - Indpls 46204	327-8702 MCJACOB@IndyGov.org
Roger Kelso	151 W Delaware 46204	rkelso@indygov.org
Don Thevenow	3838 N. Rural 46205	221-2266 Dthevenow@hhcorp.org
MARK NYE	CST	574-514-8189
Bob Masbaum	DPW	327-2319

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

ATTENDANCE

Raw Sewage Overflow
Long Term Control Plan
Public Hearing
Aug. 3, 2006

Name (Please Print)	Mailing Address (with Zip Code)	Phone Number/E-mail
Tim Blagsvedt	Parsons Brinckerhoff 300 N Meridian St Su. 990 Indy 46204	317 287-3404 blagsvedt@pbworld.com
Dave Klunzinger	225 E. North St #2400 Indianapolis 46204	
Timothy Aden	2255 Broadway St 46205	Indyhousing1@Yahoo.com
Chris Rauch	645 N Broadway Indy 46220	C3rauch@[illegible]
Carey Hamilton	5765 Rawles Rd Indpls 46220	careyhamilton@yahoo.com
Mike Massonne	CSI	mmassonne@indygov.org
Daniel Hudson	2700 S. Belmont Ave	317 639/7141
Chad M. Cerda	519 N. Lesley Ave 46219	cmcerda@hotmail.com
Tim Altom	321 N. Lesley Av. 46219	354-1383
Tom Brown	United Water, 2700 S. Belmont Ave 46221	639-7000

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

ATTENDANCE

Raw Sewage Overflow
Long Term Control Plan
Public Hearing
Aug. 3, 2006

Name (Please Print)	Mailing Address (with Zip Code)	Phone Number/E-mail
Otha Lawrence Jr.	2340 Highland Pl. Indpls In. 46208	(317) 442-9085
Turae Dabney	3921 N Meridian St, Ste 230 46260	(317) 924-9840

CLEAN STREAMS HEALTHY NEIGHBORHOODS

ATTENDANCE

Raw Sewage Overflow
Long Term Control Plan
Public Hearing
Aug. 3, 2006

Name (Please Print)	Mailing Address (with Zip Code)	Phone Number/E-mail
Tom Wood	1427 E Edwards AV, # 1 Indpls, IN 46227	788-0612
Sean Ballard	261 W. 25th St. Indianapolis, IN 46208	rev_ballard@sbcglobal.net 925-3737
Renee Washington	2450 Boulevard Place, IN 46208	496-1661
[illegible]	1914 S. Gladstone Indpls 46203	431-5751
Bill [illegible]	3930 Redfern Dr Indpls 46237	780-1011

LONG TERM CONTROL PLAN
PUBLIC HEARING

City of
Indianapolis
Bart Peterson, Mayor

QUESTION/COMMENT FORM

TODAY'S DATE: ______________________

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THIS FORM IS PROVIDED FOR YOUR CONVENIENCE TO COMMENT ON THE PROJECT OR PRESENTATION. COMMENTS MAY BE SUBMITTED TODAY, OR MAILED **BY AUGUST 18.**

Indianapolis Clean Stream Team
151 N. Delaware Street, Suite 900, Indianapolis, Indiana 46204
FAX (317) 327-8699

NAME: (PLEASE PRINT)______________________

ADDRESS: ______________________

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PHONE: ______________________

E-MAIL: ______________________

INDIANAPOLIS CLEAN STREAM TEAM

151 N. Delaware St.
Suite 900
Indianapolis, IN 46204

Tel. (317) 327-8720
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City of Indianapolis
DPW
Department of Public Works

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Indianapolis Clean Stream Team
151 N. Delaware Street, Suite 900
Indianapolis, Indiana 46204

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CITY OF INDIANAPOLIS
DEPARTMENT OF PUBLIC WORKS

- - -

PUBLIC HEARING REGARDING

COMBINED SEWER OVERFLOW

LONG-TERM CONTROL PLAN

- - - ORIGINAL

PROCEEDINGS

in the above-captioned matter, before Hearing Officer Jodi Perras, taken before me, Lindy L. Meyer, Jr., a Notary Public in and for the State of Indiana, County of Shelby, at the University of Indianapolis, Good Hall, Room 105, 1400 East Hanna Avenue, Indianapolis, Indiana, on Thursday, August 3, 2006 at 7:04 o'clock p.m.

- - -

William F. Daniels, RPR/CP CM d/b/a
ACCURATE REPORTING OF INDIANA
12922 Brighton Avenue
Carmel, Indiana 46032
(317) 848-0088

APPEARANCES:

ON BEHALF OF THE DEPARTMENT OF PUBLIC WORKS:
Jodi Perras, Hearing Officer
Kumar Menon
Carlton Ray
Imelda Oglesby

SPEAKERS PRESENT:

Tom Woody
Tim Altom
Timothy Aden
Chad Cerda
Mike Logan
Rae Schnapp
Sandhya Markand
John Trypus
Turae Dabney

- - -

7:04 o'clock p.m.
August 3, 2006

- - -

THE HEARING OFFICER: Good evening, everyone. Can you hear me in?

AUDIENCE MEMBER: Yes.

THE HEARING OFFICER: Hi. My name is Jodi Perras. I'm with the Indianapolis Clean Stream Team, and welcome to our public hearing on our proposed long-term plan to control sewer overflows.

I'm going to turn it over here in a second to the Director of the Department of Public Works, but before I do that, if you're hoping or planning to speak tonight at the public hearing portion of the meeting, please sign in at the table out in the hallway, because I'm going to be calling people off that sign-in sheet. If you're just here to listen, that's great. If you want to ask questions, that's a little more informal, but if you want to speak during the public hearing portion, please sign up so we have your name on the record.

I'm going to turn it over to Kumar Menon, who's the Director of the Department of Public Works, newly confirmed this year.

And Kumar, why don't you come on up?

MR. MENON: Thank you, Jodi.

Thank you all for coming out on a beautiful night. It's just a perfect night to be out here.

On July 18th, Mayor Peterson announced that we had reached a tentative agreement with EPA on the long-term control plan. Now, our plan is -- this plan is going to be one of the largest investments in clean water infrastructure in the city's history. We're very proud of this plan. I think it's a good plan. We've had some great people working on it for a long time.

This wasn't designed, you know, in a one-year time span, or even five years. I think it's been going on much longer than that, so a lot of good people have been working on this plan. We really believe that this is one of the best plans that the city can do, one of the most affordable, and one of the most well-thought-out plans that we have.

After the public comment period that's today, we will be finalizing the plan and sending this information back to the U.S. District Court to be file there, and then we will start implementing the plan once it's approved and signed off on. So, this is just the beginning of a few steps before we start implementing the plan, so this input from you is going to be critical in making sure that we get through this process quickly and as fairly as possible.

The Mayor had committed to having public input through this process, and we have had public input for about what, all through the entire process. We had neighborhood groups, we've had neighborhood leaders participating in the process, so this has been an inclusive process, and this is one of those steps, again, to finish up that public input process.

Several people have helped in making

this plan happen. There are some of them that I want to recognize today, and first, with the City of Indianapolis, is Tim Method, our environmental coordinator for the city; and Margie Smith Simmons, who, if you haven't seen her by now, you will in wintertime, because she'll be out there with the snow trucks; Joe Watson.

And then from the Clean Stream Team, we've had several people who have helped us with this process as well. Jodi Perras, of course. She's seen this process through, I think, three different phases: With IDEM, with the city, and now with the Clean Stream Team, so Jodi's input has been critical.

And Mark Jacob, Rosemary Spalding -- are they here? I think -- yes, I see you there, Mark. Thank you -- Roger Kelso, Chris Ranck -- thank you again, guys -- Mark Nye and Mark Massonne, and Jay Thorne. Where's Jay? I saw him there, too.

So, thank you all for making this one of the best plans the City of Indianapolis could have designed. We've had a lot of input from the engineering community, from the environmental community, from the environmental community in making this happen, so we look forward to getting your input today and moving on with this plan as soon as we can.

Thank you again.

THE HEARING OFFICER: Okay. Thank you, Kumar.

A couple of other people I should mention that have been involved as well are members of our Clean Stream Team Advisory Committee. It's a broad-based group that's been advising us, and we have with us Leon Bates here in the front row, and Pam Thevenow in the back row. I guess they're covering both corners of the room tonight. I don't see anybody else yet, but there may be some more coming later.

I'm going to go over the agenda for the meeting real briefly here, and kind of the ground rules for proceeding tonight. I'm going to give a -- try to be brief with a presentation on the city's plan, and there have been documents out in the public for a couple of weeks now, so hopefully a lot of you have had a chance to review those and you may have come here tonight with some questions about it.

I'm going to give a presentation, trying to talk about what the plan will do and anticipate some of the questions or talk about some of the questions we've had, and we'll have a brief period of time for questions. What I want to make sure is that there's enough time for people who have signed up at the public hearing to speak, and if we don't have a lot, then, you know, we'll have more time for questions after that public hearing.

So, we're going to try to manage our time so we can all be home at a decent hour tonight, but I want to make sure everybody has a chance to say their piece as well. And then again, during the public hearing, we're planning to have that time limited, anticipating we might have a lot of people show up, so, again, if the list is very short, we'll have more time for folks to speak, but I'll get to that when we get to the public hearing portion of the meeting.

People will also be around afterward to answer questions that you might have. If you don't get the answer during the meeting, people will be available after the meeting as well.

As Kumar mentioned, this is one piece -- what we're here talking about tonight is one piece of what we call the Mayor's Clean Streams Healthy Neighborhoods Program. The piece we're talking about is highlighted there in blue. It's the raw sewage overflow long-term control plan that's required under the Clean Water Act, it's required by U.S. Environmental Protection Agency and the Indiana Department of Environmental Management.

So, that's the piece we're talking about specifically tonight and getting public comment on, but you should know that there are other things the city is doing to improve its sewer system and improve sewage treatment and storm water management within Marion County.

It's just not part of this long-term plan that we're talking about tonight. So, that includes our septic tank elimination program, which we'll be converting about 18,000 homes to sewers by 2025. That's an important priority for the city to get homes off of septic systems.

A sanitary sewer master plan has been put in place since Mayor Peterson came into office, and that is going to be addressing both current and future needs of the sanitary system, which is our separate sewer system, and I'll talk about the difference between the two in a second.

And then the storm water master plan is, again -- and there's a lot of parts of the county that have flooding and drainage problems, and, of course, we also have to look at flood protection, maintaining Eagle Creek Dam and those kinds of things, so there's a storm water piece, too, and all of those are managed by the Department of Public Works, with the help of the Clean Stream Team, so -- but what we're here to talk about tonight really is that first piece.

I'm going to start with some background on the sewer overflow problem. For those of you who may not have been as familiar with this, we've had lots of meetings on this in the past, but just a quick refresher.

The problem that we have with our sewers is in the older parts of the city -- and I'll show you a map of where that is in a moment -- we have sewers that are designed to take both storm water and sewage from homes and businesses in the same pipe, and the problem that we have is when it rains, those sewers, in many places, get overloaded and can overflow right into our rivers and streams.

Now, they were built this way starting a hundred years ago, before we had indoor plumbing. We -- the city started building its first storm sewers throughout -- you know, if you think back a hundred years ago, we were in horse-and-buggy days and people had outhouses. Well, we started building storm sewers to get -- to get rainwater off of the streets and away from the streets.

So, later on, people had indoor plumbing and they hooked those indoor plumbing pipes to the same storm water pipe, and that all went directly into our waterways. People got wise about not doing that after a while and we built our first treatment plants back in the '20's, I think it was, Carlton, the first -- the Belmont plant was built in --

MR. RAY: Yeah, '25, 1925.

THE HEARING OFFICER: 1925?

And so, we started to move into the age of a little bit more modern sewage treatment, and it's been a continual process of improving our sewer system over time and improving sewage treatment over time, but we're still stuck in the old city with these old combined sewers, and we've done a lot to improve the problem, but this is really going to require a big investment over the next few years.

What you see here in terms of the photos are some of the sites and the visuals that people see in neighborhoods where they have to deal with sewer overflows, trash in the streams, you know, terrible odors, toilet paper hanging from trees, and it's pretty nasty for folks who have to live near that. It's not healthy for anybody who comes in contact with the water, and we're required under the Clean Water Act to do something about it.

This graph -- or this map shows where we have the different overflows, and I'll give you a little orientation here. This is the White River. It's the main river that we have in Marion County, and there are a number of smaller streams that flow into it: Fall Creek, Pogues Run, Pleasant Run -- Bean Creek flows into Pleasant Run -- and then Big and Little Eagle Creek are over here. We also have State Ditch and Lick Creek.

And the orange area on the map represents where we have these -- what we call the combined sewers that I had talked about, and that's kind of zoomed in, so the extent is: This is Meridian Street and 38th Street. The upper area is -- you know, it goes into Broad Ripple and the Meridian Kessler area that we have combined sewers. The lower area goes down to, you know, south of Raymond Street, almost down to 465 in some of these older neighborhoods.

The western portion is, you know, along Eagle Creek, and it -- you know, out on I-70, near where Pleasant Run and Pogues Run cross I-70 is kind of the eastern extent of our combined sewer area. So, it's that whole area, about 55 square miles of Marion County, that have these older sewers.

Now, in the past we've had nearly six billion gallons of sewage that overflows into the streams in a typical year. That means 45 to 80 times a year, depending on how the rain falls, we have these overflows, and the dots represent the overflow locations. There's 132 spots sprinkled throughout the area that these overflows occur.

Now, we haven't just been doing planning and studies all of these years, and we have a lot of projects that are already underway, what we call early action projects, that were going to be part of any long-term plan. EPA and IDEM agreed that these were projects that we needed to do, regardless of what the long-term plan turned out to be.

So, we've already invested more than 200 million dollars in early action projects, early improvements in the sewer system, reducing overflows by a hundred and forty-five million gallons a year, in a typical year.

Our proposed plan will do even more. I mean these photos show just a couple of the projects. The upper photo is of the East Bank Tank that we have along White River near IUPUI in White River State Park, a three-million-gallon tank, and the lower photo shows a project going on right now on Pogues Run to address a couple of overflows in that location, take them away from some IPS campuses, and underground, away from where people can come in contact with them.

It's also important to realize that

we're not alone in this problem. We are one of 770 communities in the country and a hundred plus in Indiana that have this problem. You can see that -- and especially in the Northeast and the Midwest, sewers were kind of built this way as those older cities developed, and then some on the West Coast. So, all of these communities are facing the same kind of requirements that we are and having to deal with this issue.

I'm going to take a few minutes to give an overview of the plan. Hopefully on your way in, you got a copy of the Executive Summary, which kind of goes through the plan and describes a lot of what I'm going to be describing tonight. Also available is the full plan on CD-ROM, so feel free to take that with you as well before you leave tonight.

First, whose been involved in the plan? Kumar mentioned a number of these. The Department of Public Works and its staff have worked, some people for more than ten years, on aspects of studying the sewer system.

The Indianapolis Clean Stream Team was formed in 2002, and that's a team of consultants and city staff that work together, where the consultants who are on the team work as an extension of city staff to plan, develop the plan, and to work to implement the plan and make sure that these projects are done on time and in budget.

The Clean Stream Team Advisory Committee that I mentioned earlier has also been instrumental in the development of the plan, and that is a committee that actually -- we combined two previous committees a couple of years ago to create the Clean Stream Team Advisory Committee. It was -- we had a Technical Advisory Committee and the Mayor's Raw Sewage Overflow Advisory Committee, and we combined them into the Clean Stream Team Committee.

Of course, we've been working with federal and state governments -- that's U.S. Environmental Protection Agency and Indiana Department of Environmental Management -- on these issues over this whole time.

And the public has been very involved, as Kumar mentioned. In 2000 -- you can see the list of times we've been out to the public with elements of this plan, from 2000, when we did our first public education and input sessions, to 2004, when we had meetings in all of the watersheds to look at the different alternatives we were looking at and getting people's input about "How much are you willing to pay to address this issue, and how should we spend our -- best spend our money?" We also have speakers that are always available to attend meetings if anyone were interesting in that.

What are the goals of the plan? Our goals are really to dramatically improve water quality by reducing sewer overflows in a cost-effective manner. It's not to eliminate overflows, because that's not required, but it's to make sure that we're meeting our water quality goals and doing it cost-effectively.

We're also working to improve

neighborhood quality of life. There's a lot of folks who have to live in these neighborhoods, have to live with the sites and smells of overflows, and their quality of life is going to be improved considerably.

We're trying to improve our streams so that fish and aquatic life can thrive there. You know, these are urban streams and there'll be some challenges. We're trying to make sure that they can be restored and brought back to where they -- what they can achieve, and also, of course, to come into compliance with the requirements that we have in our permits.

I'm going to spend a few minutes talking about the major components of the plan, which are described in more detail in the plan itself and in the Executive Summary. A big component is the deep tunnel that we're planning that's going to run along Fall Creek and White River, starting up on Fall Creek near where the State Fairgrounds is. It's going to follow Fall Creek and White River down to our Belmont Treatment Plant.

And there's a map up here -- there's also a map in the Executive Summary -- that shows the intended route of that tunnel. We're still doing studies to make sure that's the right route. It's going to be deep underground, 200, 250 feet underground, to capture overflows, and I'll talk a little bit more in a minute about how that tunnel will work. It's a pretty typical solution that a lot of cities are using to solve these kinds of problems, especially the larger cities around the country.

Central treatment is part of our plan. We have two advanced wastewater treatment plants. They're the biggest and highest quality treatment plants in the state. We're just trying to get more flow to them so that we can provide a high level of treatment to them. Unlike a lot of cities, we're going to be providing biological treatment to these -- to our wet weather flows, and that's a -- we're very proud of that part of our plan.

And we're also building a new sewer

that's going to be connecting the two plants so that we can get more flows, especially the Southport, because often the Belmont plant is overloaded during a rainstorm, and the Southport plant has the capacity, so we want to better manage the flows between the two plants. The pictures here show a typical kind of tunnel construction, and then that's the Belmont plant there on the right.

Another element of our plan is inflatable dams and pinch valves. These are technologies we can use within the existing sewer system so that it can hold more sewage than it currently does, and we've installed ten of those already at various locations. It's helped to better use space, but there's a lot of places where we have large pipes that don't fill up all of the way, then the dams can help. In specific locations where we study and turn -- you know, find that they can work and help us to use our existing pipes better, that's a good cost-saving technology to use.

Pinch valves are much the same way.

The top diagram there shows an inflatable dam. A pinch valve is similar. It just opens and closes using some electronic devices.

Another key element of the plan is new, larger sewers. Along each of these streams we're going to have to build what we call relief sewers so that where our sewers are now overflowing along all of those points that I showed you earlier, instead of overflowing into the waterways, they're going to be overflowing into these new relief sewers.

And the relief sewers will be designed to capture that flow and take it either to the tunnel or directly to the treatment plant for treatment, so we make sure that those flows aren't going into the streams.

Storage tanks are planned in a number of areas where that made sense during our studies. One is already completed. It's that White River Tank that I talked about earlier, and as I said earlier, that's a photo of the White River Storage Tank under construction.

It's a three-million-gallon tank, about

the size of a football field, underground. If you go out there today, you won't even know it's there except for a little utility building that's there, and it's keeping a lot of sewage out of White River. That's one of our worst overflow points was right down on the White River, at White River State Park and IUPUI.

Another one or two tanks are planned along Pogues Run, and we're looking at different locations around the Spades Park area for those. And then we have an existing above-ground facility at the Riviera Club along the White River, and we're going to be upgrading that so that it can store sewage as well.

All of these storage tanks and the tunnel will work temporarily to store sewage. It's not something that we leave it there for weeks. These will be tanks that will store sewage and the tunnel will store sewage during a rainstorm, and then it'll -- when the storm is over and the sewer flows go down, we'll pump those flows out, down to our central treatment plants for treatment.

Sewer separation projects. It didn't turn out that sewer separation across the county was the way to go, and I'll talk about that in a minute, but we are planning localized sewer separation, about a square mile of sewer separation, in a number of neighborhoods, and those are along the streams shown here, State Ditch and Lick Creek, White River.

The upstream ends of Fall Creek, Pogues run and Bean Creek, where it made sense can eliminate overflow, and those on the maps over here and the map up -- well, I think the map over here are shown in the darker green polygons are where we're doing sewer separation projects, so you're welcome after the meeting to take a look at the different watershed maps and see where we're planning sewer separation. The lighter green are parks, so it's the darker green is where we're doing some sewer separation projects.

The other thing that's part of our agreement with EPA and IDEM is a requirement that we invest about 50 million dollars by 2015 to eliminate some chronic overflow problems that we have in the sanitary sewer system, and then three and half million dollars by 2010 on what are called supplemental environmental projects, and those are both septic tank elimination projects in the upper Meridian and down to the Southport neighborhood, so that's part of our requirements with EPA that we do those as well, and if you have questions about that, we can answer those as well.

Here's a map of the plan that I just talked about, and I'll just point out some of the key features. This red line here is the tunnel that we talked about earlier, the Fall Creek and White River tunnel. These dark lines are -- the black lines -- are the new sewers that are going to be built along a number of these waterways.

This is the interplant connect, the new sewer linking those Belmont and Southport plants. We show in green some of the sewer separation and septic tank -- those two septic tank projects that I was talking about a moment ago.

And then the blue squares are the sanitary sewer projects that I just talked about that we need to do, the 50 million dollars in sanitary projects. You can see where those are located as well. And I know that's not easy to see, but the same map that's right here, you're welcome to come up and take a look at it later.

What's the schedule to get all of this done? We're planning to implement this in four- or five-year phases so that everything is done by December of 2025, and some people say, "Why 20 years? Why can't you get that done faster?"

Well, there's more than a hundred different projects that the city's going to have to let through this, and that doesn't even count the other three things that I talked about earlier: Our septic tank elimination program, our sanitary improvements that we have to do, storm water improvements.

So, we're going to be going -- a remarkable increase in the number and dollars that the city's going to be spending on projects, clean water infrastructure projects, in the next 20 years, and we need to manage that over time. We need to minimize the disturbance. We don't want to have all of the work going on all at once. Our people aren't going to be able to get to work or to their soccer games or wherever.

We need to evaluate the effectiveness of each project as it's completed so that if it's going to connect to another project, we can make that connection well and they fit together. A lot of land, rights of way that we're going to have to make sure that the city can secure, and that takes time dealing with property owners on those kinds of issues.

The one advantage of the tunnel, by the way, is that you don't have as much concern about the rights of way, although there are some property rights of people that we'll have to deal with, but you're not going to be taking people's homes, because the tunnel can go under an urban area without disturbing the surface as much as a traditional sewer project would.

We have to coordinate the technical and manpower material needs. There are -- there's a lot of work being done by the city, by the state, by other communities facing this in the next few years, and there's a -- we need to make sure there's capacity in the construction market, in the design market, to get all of this work done in a quality way, so if you try to do too much too fast, you have the risk that you're not going to be doing it well.

And then obviously managing the financial burdens on rate payers by making sure that we can do those rate increases over time, in a gradual way, and not all at once.

Speaking of rates, the Mayor had estimated -- we've estimated that by 2025 the average residential sewer rate will go from where it is today, at about twelve dollars a month for 5400 gallons to fifty-five to sixty dollars a months. That's based on 2005 dollars. So, we're definitely looking at some increases in rates.

Our rates are among the lowest in the country right now, and a number of communities are paying thirty or forty dollars a month now for that level of service, so we're going to try to keep our rates competitive over time as other communities are doing these kinds of projects in the same time frame.

I'll talk about plan benefits here briefly. What is this going to do to reduce our overflows? The plan as designed will be capturing 95 percent of the wet weather sewer flows on Fall Creek and 95 percent on White River and other waterways.

Now, what does that mean? Ninety-five percent capture is sort of an EPA term that we all use. Translated into what you might relate to, 95 percent capture is equivalent -- or 97 percent capture is equivalent to about two storms a year that would cause overflows.

So, again, we're building, you know, a tunnel that's going to be what, 224 million gallons or so underground, and that tunnel is going to hold a lot of water, but there are going to be some storms that are going to be too big and the flows are going to be too big for that tunnel, so there will be on Fall Creek a couple of storms in a typical year, and on the other waterways, four storms in a typical year, that are going to cause some overflows.

What kind of storms are we talking about? With the 97 percent, two overflow kind of control, it's almost -- two inches of rain can fall in a 24-hour period before we have an overflow, so that's a pretty big storm.

Ninety-five percent capture on the other waterways, that's about one -- a little over one and a half, 1.6, inches of rain in 24 hours we're capturing up to that storm. Anything more than that is going to cause an overflow, so that's what we call the level of control or how much -- how we're controlling the overflows.

We're capturing the first part of those storms, which is the dirtiest part, what's called the first flush, that carries the major pollutants that are kind of in the sewers, and it's going to be the end of those storms that will still cause overflows.

Now, the other thing to remember is: We don't control Mother Nature and how the rain falls or how often it falls, so the actual overflow frequency is going to depend on the weather. There will be a range -- and I'll show you in a minute how that might work -- of zero to six per year on Fall Creek, and we predict zero to ten on the other waterways in terms of how often we'll have these kind of -- that big of a storm that will cause overflows, and that's based on 54 years of rainfall records that we've looked at. Now, these numbers are comparable to what other communities have been required to do in their plans and are facing the same kinds of requirements.

A couple of graphs to illustrate what I was just talking about. The first one looks at overflow frequency, and we've taken ten years of rainfall data from 1991 to 2000 and took a look at what's the before -- what would the sewer system -- how often would it overflow before we did any improvements to it, and how often will it overflow in the future if we had the kind of rainfall we had in that year?

So, you can see, just by taking a look at 1992, for example, we had about -- it looks like 63, maybe 64 overflows before. In 1992, we would have had about 64 overflows from our sewer system due to the rainfall in that year. If we had had our plan in place, we would have had four on White River and the other streams, and two on Fall Creek, so that's -- that would be kind of a typical year that we might see.

But you can see there's a range. Some years we're going to have more and some years fewer. Over time, the average ought to come out to two on Fall Creek and four on the other waterways. It's a dramatic improvement over what people are seeing now, and again, it's the end of those storms, not the whole storm, that's causing an overflow.

Overflow volume is also going to be dramatically reduced from what I had said earlier, about six billion gallons a year, under the previous system, or the old system, our baseline conditions. We're going to be dramatically reducing the overflow volume, and this shows the -- for the full system, and then on -- the direct overflows onto each of the waterways, Fall Creek, Pogues Run, Pleasant Run, Eagle Creek, and White River over here on the right, if you can't see those from the back.

How do we know that the plan is doing what we said it would? We're going to have a compliance monitoring program in place before, during and after the plan is implemented, continued monitoring to track the performance of the facilities that we build, make sure they're doing what we said they would do. We're going to analyze the monitoring data by watershed as each watershed is completed, and issue a report on that watershed showing what the plan has accomplished.

We're going to keep working with our advisory committee and our business community and citizens and community groups as we implement the plan, and we'll be issuing milestone reports to EPA, to IDEM and to the public so that people can monitor what's going on. If you're interested in signing up for our Streamline newsletter or being on our mailing list, there's a sign-up in the back, and we can make sure that you get on the list of being distributed those kinds of reports.

Long-term benefits to the community, just to kind of sum up, we're going to be dramatically reducing our overflow volume and frequency, we're going to be dramatically improving the quality of our streams, especially when people are most likely to be using them, during the smaller storms. These large storms are going to have stream flows that aren't going to be safe for recreation anyway, and that's the main concern that we have with these sewer overflows is that people might be exposed to bacteria during the first few days when it's still in the water.

We're going to eliminating those sanitary sewer overflows that I talked about earlier, enhancing urban streams and restoring our stream banks as well. Jobs are going to be created and economic development encouraged along the waterways as these waterways become less of an eyesore and more of an asset to the community.

Public comments. I'm going to talk a little bit about some of the comments we've gotten so far, just to answer some questions we've already gotten, and certainly if you have more questions or you want more explanation, we can do that. These are some of the questions we've already seen: "Why aren't you just separating the sewers?" "How will the tunnel work?" "Won't it contaminate the ground water?" And concerns about the projected rates, and "I can't afford them." "What about state or federal money; what's going on with that?"

First let's talk about sewer separation

briefly. I talked about 55 square miles in the combined system. That's 35,000-plus acres. We did review both complete and partial sewer separation during our analysis of alternatives, and we have materials here tonight. We did some pretty in-depth analysis early on of those various ways to do sewer separation, and it just didn't turn out to be cost effective or environmentally protective.

The big issues are the cost, six billion dollars to fully separate the whole system, you know, leading to rates that people can't even afford to pay. Fewer days actually meeting the recreational standards than we would have under the plan we've proposed, and that's because urban storm water itself carries a lot of pollution. We're going to be treating a lot of that.

There's, as I said, more pollution from urban storm water than if we got it to our treatment plants. And urban -- if you think about clear rainwater falling from the sky, but when it hits in the urban area, it picks up a lot of pollutants.

Widespread disruption to the community by having to tear up nearly -- pretty much every street that's in that colored area. You know, here you can see we've divided up the combined sewer area into different watersheds, and we would have to tear up about every street, put in a new sewer.

Everybody would -- businesses, homes would all have to disconnect from the old sewer, connect to the new sewer. It's a pretty intensive disruptive process that -- most communities aren't going that direction. Those that have have regretted it and gone back to another solution.

Another thing that we're seeing is increasing requirements on urban storm water, if you look at what's happening in California these days. We're going to be looking at storm water requirements in the future that -- this plan will allow us to meet those in the combined area. We're going to have some issues with storm water. We want to make sure that we're thinking ahead about what the storm water requirements might be.

A second issue is: How's the sewage tunnel going to work? And this animation will show how that works. Now, as I mentioned, we have these combined sewers that normally will take sewage to the treatment plants. You can see these are lines going into the sewer to the treatment plant. When it rains, the way it works now, these sewers are overflowing right into the river through this outfall pipe.

With the tunnel in place, instead of overflowing into the river, as the storm water comes into the system and fills up the system, it's going to be instead overflowing into the tunnel, and so the tunnel will be filling up during wet weather, as you can see here.

And then as -- when the weather clears up, the sewers are going to empty and the tunnel can then be pumped out. There will be a deep pump station and it'll be pumped out to -- well, we're planning to pump it into the interplant connect, the new pipe between the two plants, or to the Belmont plant so that it can be treated at one of our two plants.

So, after the rainstorm, the tunnel's pumped out, the tunnel self -- cleans itself, and it's ready for the next storm. So, that's essentially how the tunnel will work. It's not going to be sitting down there permanently. It'll take two or three days for the tunnel to be pumped out and clean itself and be ready for the next storm.

What about ground water? That tunnel's going to be down there. How do we know that it's not going to contaminate our ground water? The tunnel is going to be designed and built so that ground water protection methods are going to prevent any contamination, and there are methods for doing that -- i can go into detail on that if you want -- in terms of putting grout and other systems in as you're constructing the tunnel to prevent -- both prevent ground water from coming in and taking up space in your tunnel, and prevent the tunnel from leaking out.

There's going to -- we're already starting to develop a computer model to look at the ground water impacts that might occur during construction and operation -- and this graphic shows just a little piece of that model -- making sure that we understand how it might impact ground water and the water supply. And it'll be updated and evaluated throughout, from planning, through construction, post-construction and operation of the tunnel so we're always monitoring the wells in that area and making sure that everything is fine.

Other questions that we've gotten is about the cost: "Why do we have to pay for this?" "It's too expensive." "I can't afford it." You know, all of those are very good questions. It's a huge expense. It's the largest investment we've ever made in our clean water infrastructure. We feel it's a worthwhile investment, but at the same time, it's something that's required by the Federal Government and yet the Federal Government isn't providing -- you know, handing over cash so that you can implement this.

This graph shows over time, from the late 1970's until 2000, how federal investment has fallen. The yellow line is the federal in clean water infrastructure, and the blue bars are municipal spending around the country over that same amount of time on an annual basis. Federal investment is falling, it's being slashed. The federal -- there used to be federal grants, and we used those grants to build our Southport Treatment Plant back in the '70's. Now they offer loans. The loan fund itself has been slashed.

So, there's just a declining federal investment, despite the fact there's a gap that -- EPA, the Government Accounting Office, the Water Infrastructure Network have all identified a gap between what is being spent and what ought to be spent on this infrastructure in our country.

So, the City of Indianapolis and a number of other communities and organizations, environmental groups, engineering associations, have banded together to support the creation of a clean water trust fund at the federal level. I just bring this to your attention as something that might help keep our rates down over time.

If you're interested, cleanwateramerica.org is the Web site where you can go, learn about the issue. If you're interested, you can sign on as a supporter, as the City of Indianapolis Department of Public Works has.

Now it's time for additional questions that you might have. This is the question part of the meeting. We're going to have a public hearing in a minute. Again, if you want to speak during the public hearing, please give us -- sign up out there so we can have your names, but first I'll just open it up for general -- any questions about the presentation I just made before we move into the public hearing.

Anybody?

MR. WOODY: Do you.

THE HEARING OFFICER: Could you come up to the microphone, please, just --

MR. WOODY: Oh, yeah.

THE HEARING OFFICER: And also, when you come up, if you could state your name. If it's a name that's difficult to spell for the recorder, just spell it for him.

MR. WOODY: My name's Tom Woody. I live in the neighborhood. I just wondered about two things. When you use the word "well," do you mean publicly owned well or privately owned well? And also, on a night like this, where drains get all stopped up and are plugged up with grass and junk, would it be helpful if they were cleaned by either a private person or a public -- you know, either way?

THE HEARING OFFICER: Thank you. Very good questions. I can answer the second one, which is yes. One of the things we recommend that people do is help keep the storm drains cleared of leaves and other debris. So yes, if people can help do that, private citizens can help do that, that will help our system.

Carlton, do you want to help with the first question about wells?

MR. RAY: Yes.

I'm Carlton Ray, Deputy Director of DPW. We're looking at both public wells as well as private wells throughout the Fall Creek and White River corridors, so both of those well systems will be looked after, and we'll make sure we protect both of those type of wells when we build the tunnel.

THE HEARING OFFICER: Okay. Thank you.

Other questions?

Yes, sir. Could you come up to the microphone, please?

MR. ALTOM: My name is Tim Altom, it's A l t o m, an Irvington resident.

When I saw this in the newspaper, I was trying to figure out if this addressed kind of our concern. I mean we live on a street that has combined sewers --

THE HEARING OFFICER: Uh-huh.

MR. ALTOM: -- and pretty much any time it rains of any sort, a backup in our basement. So, originally I thought that's kind of what this was meant to address, but I don't see where this -- I mean is that meant to address those kind of problems that occur because of combined sewers?

THE HEARING OFFICER: That's another very good question.

MR. RAY: Sure.

THE HEARING OFFICER: Do you want to help with that one, Carlton?

MR. RAY: Yes, we are. We're looking at both the current carrying capacity issues as well as future carrying capacity issues with this plan. We have several different plans that Jodi talked about that -- besides the long-term control plan -- that also will increase carrying capacity within our system, with new sewers that are not associated with the long-term control plan, but will be done in conjunction with the long-term control plan.

And so, we're very cognizant of the people with basement backups. We want to eliminate those. That's our long-term goal. It won't be done overnight, but we'll certainly have projects that we'll be implementing in conjunction with that.

The -- in your neighborhood, we're recently constructing a large -- large tunnel that's diverting flow away from the -- away from Pogues Run that -- and that sewage currently overflows near schools. We want to continue that process of getting sewage away from folks where it potentially is surcharging and getting to the larger sewers and getting down to the treatment plant.

We also have a program called correct connect, we we're reducing the amount of clear water that's getting into the system. It's surprising even today that people have downspouts and sump pumps connected to our sewer system that causes surcharging to occur. An eight-inch sewer line that could transport about 200 homes -- sewage from about 200 homes can surcharge with as little as seven or eight sump pumps connected to that same sanitary sewer.

So, we want to get those sump pumps off the system and downspouts that are illegally connect, and that's another program that we have going on in conjunction with our long-term control plan and building larger sewers.

MR. ALTOM: How would we find out kind of what the plan is? You know, like the --

MR. RAY: Why don't we just answer your -- afterwards -- we've got a couple of folks, a couple of engineers that are going to set up afterwards, and we can talk to them then.

THE HEARING OFFICER: Uh-huh.

MR. ALTOM: All right.

THE HEARING OFFICER: Thank you.

And just for those who didn't catch it, when Carlton says "surcharge," he's talking about backup, so it might be backing up into a basement, it might be backing up into a manhole. It's -- you know, the sewage is supposed to go one direction. Surcharge is when it's slowing down, backing up, and going the wrong way.

MR. RAY: Correct.

THE HEARING OFFICER: Right? So, that's the -- I'm not an engineer, I just translate for them.

Other questions before we move into the public hearing period?

MR. ADEN: Timothy Aden, A d e n. I live in Fall Creek Place. You mentioned large underground storage tanks as big as a football field.

THE HEARING OFFICER: Uh-huh.

MR. ADEN: Is it practical and feasible to develop the land that's on top of those is my first question. The second one is you mentioned biological treatment. I assume that is versus chemical treatment. Can you just talk about the biological and how that works?

THE HEARING OFFICER: Yes.

Do you want to try these two again, Carlton?

MR. RAY: Sure, and then you can translate.

(Laughter.)

MR. RAY: I think first I'll just talk about the underground storage tanks. We construct underground storage tanks in flood plains where normally development would not occur. The picture that we showed up there on the PowerPoint presentation was a new underground storage tank that we constructed just west of the IUPUI track.

That's in the flood plain. You can't see it. You go out there today, it's all underground. It's basically a football field underground in a concrete storage tank. It fills up with sewage during a wet weather event. After that wet weather event, we pump that sewage back in the sewers and we properly treat that at the treatment plant.

That sewage would have gotten away from

us previously in the White River State Park area, so we captured that. But it's in the flood plain, so we don't really allow folks to construct on top of that, on top of that area. We've got several that we're proposing -- or one that we're proposing up in the Spades Park area along Pogues Run, but that will also most likely be constructed in the flood plain. We don't have the final location selected as of yet.

On the biological treatment --

THE HEARING OFFICER: Okay. Carlton?

MR. RAY: Yes.

THE HEARING OFFICER: Sometimes is it possible to put like a soccer field or something like that on it?

MR. RAY: Yes, tennis courts, soccer fields, you know, frisbee fields --

MR. CERDA: Versus --

MR. RAY: -- different things like -- recreational areas.

MR. CERDA: Versus having a

Wal-Mart or something.

THE HEARING OFFICER: Yeah.

MR. RAY: That's correct. So, recreational fields are certainly a great solution for putting on top of this. Or just green areas, you know, good grass.

The other thing is, on the biological treatment at the two treatment plants, a lot of cities have just done -- let me take a step back. At our treatment plant, we have three phases of treatment: Primary, secondary biological treatment, and then tertiary, where we dientrify [phonetic] and break down ammonia.

Lots of cities across the country, when they're addressing this issue, will basically enlarge their primary treatment, will only go after the primary treatment. We did a lot of modeling in trying to understand what the effects that quality would have on our river if we expanded the treatment plants just for primary treatment, and we felt that as a city, just as a city -- it wasn't driven by EPA or IDEM, but the city -- we felt like we needed to do much better than that, we felt like that we needed to go to the secondary, biological, treatment and treat that flow and break down soluble BOD, which is a problem for our streams. It's organic matter that gets into our streams, and we want to get rid of that. A lot of times with biological treatment, that wouldn't be addressed -- in mean in primary treatment, that wouldn't be addressed as fully as what we felt like it should be.

And so, we took that extra step in our plan and we've worked hard on, had a lot of good engineers, lots of scientists work over the last eight years on this issue, where we're going to expand our secondary treatment at both facilities.

And also we've gotten permits. IDEM has worked with us and gotten permits to -- or a permit to work -- to expand our secondary treatment at the Belmont facility, one of the first in the nation. Other cities are looking at this project, and we're very proud of it.

THE HEARING OFFICER: Thanks,

Carlton.

Just a little treatment plan primer -- and I'm going to get way out of my comfort zone here, but primary treatment is basically screening out the trash and the rocks and the debris and then letting it settle in big tanks and then letting the water flow off of that. So, it's kind of an early, you know, very simple getting the worst and the heaviest stuff out.

The secondary treatment is -- one reason it's called biological is it uses little bugs, little -- you know, that are natural in the environment that break down things in the environment, but it's concentrated and enhanced and accelerated, so that in a biological treatment system at a treatment plant, those bugs are working really hard to break down all of the waste that's in the water.

And then it goes to the tertiary, which is a filter system, and as Carlton says, breaks down the ammonia, which a lot of cities don't do tertiary treatment in this country.

And then the final step is disinfection, where you can use either chlorine or ozone gas is what we're --

Ozone gas; is that right?

MR. RAY: Yes.

THE HEARING OFFICER: -- is what we're moving to as a final disinfection to kill the final bacteria. So, that's kind of the process of treatment from primary to disinfection, and we're -- like Carlton said, we're proud of what we're proposing in this. Our wet weather flows are going to be getting some secondary treatment.

Okay. Other questions?

MR. CERDA: My name is Chad Cerda, that's C e r d a, also an Irvington resident. I originally was just a little confused by the sign-up process out front for the presenting part, so you can probably just skip over my name, because really I guess this focuses more on a question.

When you're talking about the overflow process, you had mentioned that the system is going to work on effectively the tail end of the storm, after all of the waterways have filled up, but what we're finding, at least in a few of the blocks in Irvington, is that we're getting hit at the front end of the storm, say, within the first four hours.

In March, as an example, I had 26 inches of water within four hours in my basement, which was, you know, a remarkable feat, considering I'd never seen two inches for the last four years.

So, I don't -- my question's in two parts: What about the front end? And then what happened this year that was so different from the last three or four years, if something's changed within the city's sewer systems or the neighborhood or some -- something that got diverted that is making it a little bit more apparent to us in Irvington?

THE HEARING OFFICER: Okay. Thanks. Maybe I didn't explain clearly enough how the system's going to work. We're not waiting for the waterways to fill up. We are capturing that initial part of the storm. It's that first part of the storm that's now going to be captured in the new, bigger sewers, in the tunnel, in the storage tanks.

So, we're getting the first part the storm, we're capturing it and storing it. It's the end of the storm that -- if it's a big storm. You know, we'll catch a lot of storms. Like those orange bars showed, we're capturing a lot of storms completely, but it's the big storms that are over and inch and a half or two inches, that final part of the storm is going to be causing some overflows into our waterways from these sewers.

So, I think -- it's not -- we're not waiting for the waterways to fill up. What gets into the sewers is going to be captured and treated at the first part of the storms, and in a lot of cases, the whole storm. It's just the big ones that we won't capture all of it.

Does that answer that question?

MR. CERDA: Sort of, yes.

THE HEARING OFFICER: Okay. Now, the second question about is there anything different that's causing more basement backups, I'll have to ask Carlton on that one.

MR. RAY: We don't know of anything that might have changed in your sewer downstream, but we certainly can take a look at it and we can send some crews out and just make sure that we don't have any blockages downstream. Sometimes kids get basketballs, lose different things that get into our sewers that we periodically pull out, which is an amazing number of things that we find in them. So, we televise sewers and then we clean them, and we certainly can take a look at, you know, what's going on downstream at your place.

THE HEARING OFFICER: Okay. Thank you, Carlton.

Other questions before I move into the public hearing portion?

Sir.

MR. LOGAN: Mike Logan, L o g a n. I live on the east side of the interceptor, and it's up to capacity or over capacity right now, and I've noticed that most of the projects on the east side are going to be septic tank projects, which you're going to be putting in east side interceptor, which is overloaded now, then that means more sewage is going to get into my basement, and I was wondering why we couldn't improve the sewers, then put the -- take care of the septic tanks.

And one other thing I've got is storm water getting into Lick Creek. I live approximately a mile and a half from the north end of Lick Creek, and it overflows, and the only thing we've got is an interstate that dumps all of the water into Lick Creek, which makes it overflow.

And the State of Indiana, I had them out to look at the problem, and they said when they added the new lanes -- they've expanded to three lanes out there, and they said that they didn't have to go by Indianapolis codes, where if you pave over half an acre, you're supposed to make a retention system, and we've also had businesses, apartment houses, all kinds of things that don't put retention systems in, and that needs to be addressed badly in Indianapolis. And it seems like nobody's doing anything about it. They're just letting everybody build anything they want.

Those are my comments.

THE HEARING OFFICER: Okay. Thank you, Mr. Logan.

Carlton --

MR. RAY: Sure.

THE HEARING OFFICER: -- do you want to help with that one, too?

MR. RAY: We're very familiar with Mr. Logan, and we've been out to his house several times. We're currently doing some work in the neighborhood. We understand your issue. We plan to do some improvements out there on the -- to the interceptors in your neighborhood.

On the storm water issue, we do have a permitting process. We do have folks taking a look at and reviewing all permits for the improvements that are being made. We do have an engineer that's been hired to review those permits and issue permits based upon the information provided to us, and -- but we understand the issue of Lick Creek. That's a problem for us, and we need to address the problem that's coming off the highway. That's also an issue for us, too, and that's something we're looking into.

Thank you.

THE HEARING OFFICER: Okay. I should mention --

Hold on one second, Rae, because I'm going to start the public hearing, since we're getting comments now instead of just questions.

I should mention that the four components of the Clean Streams Healthy Neighborhoods program that I talked about before, we have maps in the back of the room that show projects that are planned around the county for each of those, so the one that you have up here is the raw sewage overflow long-term plan that I've been talking about, but we also have maps about the septic system, where those neighborhoods are that are going to be getting sewers. That's the one with all of the green blotches on it.

The one with all of the purple blotches on it is the sanitary sewer master plan. That addresses issues outside the combined area, primarily where we have to do fixed rehabbing of the sewers and putting in new sewers to address growth and issues where the sewers don't have enough capacity.

And then do we have a storm map up? No. But the -- I think that map way over there combines -- these two maps here combine all of those three maps together. So, have fun with those later, after the meeting.

I'm going to move into the public hearing portion of the meeting and call people in the order that they --

Huh?

MS. SCHNAPP: I want to get my question in first.

THE HEARING OFFICER: You have a

question? Okay. I'm sorry. Come on up, Rae.

Rae has a question, and then we'll talk about the public hearing. If we have questions at the end, we can move into those, too. Okay.

MS. SCHNAPP: I have a couple of questions. One is whether or not the city has already taken steps to kind of step up enforcement on the illicit connections, the downspout connections and so forth.

And the other question has to do with treatment at the CSO outfalls. I know that kind of earlier in the process we were talking a lot about vortex separators and disinfection at the outfalls, and I didn't know -- I didn't see that as a component in the final plan, and I wonder if it was sort of embedded in there or not, and if not, why?

THE HEARING OFFICER: Okay. Good, good questions. The question about the end-of-pipe treatment I think I can answer.

Carlton, you can elaborate.

And we did look at -- and in fact, installed some screening and vortex separators.

We analyzed in our early analysis of alternatives the idea of putting remote treatment units out in the neighborhoods to treat at the end of the outfall pipes, and that did not prove to be either cost effective or environmentally protective.

Getting flow to our treatment plants, which are, as I said, you know, the biggest and best in the state, in our humble opinion, turned out to be the best solution for us overall, so remote treatment wasn't something that we carried into the final plan. It was something that we looked at earlier, but didn't prove to be part of the final plan.

And your first question was about enforcement of illicit connections?

Do you want to help with that?

MR. RAY: Yes. Also, just to follow up on the treatment plant issue, we discussed this in much degree with IDEM and EPA. Basically on end-of-pipe treatment, it's most likely where we use those high-rate primary treatment units.

We've done pilot testing at the plant, spent about a million dollars of our own money doing pilot testing, and the quality of those were not up to our snuff. We felt like it was better to get the flow to our treatment plant and go through both primary and secondary treatment, the biological treatment, versus just having end of pipe with a high rate of treatment.

The -- on the enforcement, what we're trying to do is do a carrot approach, and then with a stick. We're trying to go with working with folks, let them know that indeed they have problems, they do have a sump pump or downspouts connecting with them. We try to give them a period of time to get them -- get off the system.

If they don't get off the system, we follow up with additional enforcement. But what we'd like to do is, I guess, sugar and then -- use some sugar and try to get folks to understand, but they may -- from their sump pump that's connected to the sanitary sewer may not be causing sewage to back up in their yard, but it could be backing up in Mr. Logan's house.

And so, we don't want that to occur. We want folks to get -- disconnect that. And we explained that, and folks started to understand that potentially it's not causing problems to them, but causing problems to neighbors, and they normally get their sump pumps disconnected.

Okay.

THE HEARING OFFICER: Okay. Thank you.

No further questions? Can I move into the public hearing?

(No response.)

THE HEARING OFFICER: Okay. If people have questions afterward, we can take them where we can break up and you can ask individual folks who are here. There's quite a few folks here who can answer different issues.

My first speaker is Sandhya Markand, who's with the Greater Indianapolis Chamber of

Commerce.

Sandhya, can you state your name and spell it, please?

MS. MARKAND: Yes. Thank you, Jodi and Kumar and DPW staff. My name is Sandhya Markand, S a n d h y a, last name is M a r k a n d. I'm with the Greater Indianapolis Chamber of Commerce. We are a nonprofit member-based organization that represents the business community.

Dating back to 1991, the Indianapolis Chamber of Commerce has been a strong advocate for updating the city's infrastructure system. Within the last five years, we have maintained our support to fix our sewers and clean our waterways by backing the storm water utility rates. The business community realizes the importance of a high-quality infrastructure system in order to increase the growth of economic development within our region.

We understand that the higher investments we make in the upcoming years will better our community as well as the expansion of the business industry. Our members would like to ensure that the rate increase dollars are spent on projects designed to improve our sewers and water. The Indianapolis Chamber is pleased to see the city move forward with these projects and will continue to support this effort.

THE HEARING OFFICER: Thank you very much.

Rae Schnapp, from the Hoosier Environmental Council.

MS. SCHNAPP: Thanks. It's R a e, and the last name is S c h n a p p. Thanks.

I wanted to take a minute just to tell a little story. I think that this is a really important effort, and I want to congratulate the city for moving forward on it in a very serious way. A couple of years ago I had the opportunity to take some visitors from Milwaukee out to look at some aspects of our sewer system. They were interested in that because Milwaukee was sort of re-evaluating their sewer upgrades.

But we went out on a day similar to this one, a very hot day, and we found people along Fall Creek, quite a few people, sitting there with lawn chairs and fishing poles, their feet in the water, you know, really enjoying the stream. And just right while we were there -- and they didn't have their cameras -- the -- there was a cloudburst and it started raining really hard for a very short time.

And then the storm passed and a rainbow came out, and seriously, it was very photogenic, but those people did not move. You know, they stayed there, and I'm thinking that the sewers are probably overflowing and these people may or may not know that, but they're still in the stream.

So, I think that our use of the stream is an important focal point for many members of our community, and I think the process for this plan and its development has been a really solid process.

There are some aspects of it that we would like to see tweaked a little bit. We'd like to see more emphasis on water conservation, and that is something that we have brought up over and over, but it seems somehow distinct from this planning process, whereas we see it more as inherently related, because if we can reduce or water use, we can reduce the flow in the sewer pipes, and possibly even minimizes our infrastructure expenses.

So, we'd like to see more emphasis on water conservation, and we would also like to see more emphasis on infiltration through something like leaching basins or constructed wetlands, biofilters. Of course, the downspout disconnection is an important factor, but what do you do with that downspout water? Well, one thing that a lot of cities have done is construct rain gardens and promote rain gardens. These are very popular in Chicago and Milwaukee.

So, there are ways to use the soil to filter that water and recharge the ground water and slow down the flow of our storm water getting to the streams. I saw in the -- on the CD-ROM I saw some mention of the leaching basins, and there was kind of a dismissal of them because it said there was potential for ground water contamination, but I've seen several EPA publications that say these leaching basins are very effective, and I'd like to ask the city to take another look at that.

Again, those are kind of just tweaking the technical aspects of the plan. I guess our biggest concern is with the use attainability analysis part of the plan, kind of the last chapter, which, to paraphrase, is saying that since the waters have never met the water quality standards for recreation, the recreational use has not existed, and we know a lot of people are out there recreating in the stream, so we would hate to see that recreational use designation removed.

I think I'll stop there.

Thanks.

THE HEARING OFFICER: Thank you for

your comments. We appreciate it.

I next have Tim and Chad. Are you -- you don't need to comment?

MR. ALTOM: No.

THE HEARING OFFICER: Okay. Great. Thank you for coming and your questions, and we'll talk to you afterward.

John Trypus. Where's John? There he is.

MR. TRYPUS: My name is John Trypus, T r y p u s. I'm an environmental engineer.

I just wanted to comment on the Indianapolis long-term control plan in the coon text that I moved to Indianapolis about two years ago and spent over 30 years in Washington, D.C. and have personal involvement in working on their CSO long-term control plan.

In 2004 they implemented and signed a similar consent decree as Indianapolis has started the process, and their overall plan, a two-billion-dollar program, was similar, with a tunnel system, and provided a good benefit for water quality at the best affordable rate, and just in reviewing the Indianapolis one, I think it's also a good plan that's good for the rate payers.

THE HEARING OFFICER: Okay. Thank you, John.

Is it Turae Dabney? Did I pronounce that right?

MS. DABNEY: Yes, you did. My name is Turae Dabney. That's T u r a e, and my last name is Dabney, D a b n e y, and thank you, and I'm here representing the Indianapolis Black Chamber of Commerce. Our organization's mission is to educate, advocate and enhance Greater Indianapolis through black businesses.

And the purpose of my comments today is to look at the economic development side of this project, and very simply, we want to encourage you and the city to comply with the 15 percent MB equal participation in the construction of this project. We are happy about -- and excited -- about the health improvements, but want to encourage, as I said, again, to include -- have more inclusion of the 15 percent MB participation in accordance to the city's ordinance.

THE HEARING OFFICER: Okay. Thank you.

And that is the last person that I had signed up to be a speaker during the public hearing portion. Is there anybody else who would like to speak?

Yes, sir.

MR. ADEN: Timothy Aden, for the record, A d e n.

First of all, I'd like to thank you for moving forward with the project, and also for going over and above what the EPA required. Whenever you go over and above the call of duty, that's a good thing.

I think there are some additional -- or in addition to the practical benefits of reducing the overflows, there are some spin-off benefits. The waterways that would enjoy the greatest improvements or changes are the ones that are the most underutilized today, which is why the project is so important.

Upon substantial completion, the waterways will become areas where people will actually want to congregate, which is different than the way they are now. Because these blighted areas are areas where people don't congregate but where they will, I believe there will be some economic development potential in the waterways.

One potential economic development benefit might be trying to attract water sports. I'm not sure if it's practical or feasible, I'm not sure if our waterways are wide enough or deep enough or configured in the correct way, but if they are and if we could attract a nationally recognized -- preferably nationally televised -- water sporting event, that would be a good feather in our cap as we move forward with this project.

In terms of the increase in tax, I am not an advocate of increased taxes, but I am an advocate of structuring tax increases appropriately, and I believe the structure is appropriate. It's a little bit at a time, which is really good. Having said that, what's a little bit to me might be a lot to someone else, but I do believe that the structure is a good structure.

So, I ask that you all move forward with all deliberate speed, and I look forward to improving these assets.

THE HEARING OFFICER: Okay.

MR. ADEN: Thank you.

THE HEARING OFFICER: Thank you, Mr. Aden.

Anyone else?

(No response.)

THE HEARING OFFICER: Okay. I had all of these rules, but we didn't need to use them because we didn't have that many people sign up.

So, thank you all for coming. I'm going to let you mingle and ask questions informally after the meeting. Just a reminder, the full plan is available easily on CD-ROM as you go out the door if you don't already have it, but people can also access it on the Web site.

There's hard copies at all of the Marion County Libraries and at our offices of the Clean Stream Team and the DPW Sherman Drive office. Anybody who wants a CD can have one by calling the Clean Stream Team office, and the number is there. If -- you're welcome to turn in written comments tonight by filling out the form that was available on the table as you came in, or the Web site.

If you want to expand on your comments and send in written comments, we welcome that. We're actually monitoring those regularly and posting comments we've received and responses on the Web site, so you can go there and look at those comments if you'd like. We're also taking them in writing to the Clean Stream Team address and -- or by fax; okay?

And finally, our next steps are -- we're going to be reviewing and responding to the comments that we've received during this comment period, which ends on August 18th, then we're going to be finalizing the plan and submitting it to both EPA and IDEM for their approval.

We're going to continue moving forward with projects. Carlton is busy every day with planning, designing and construction of projects that are part of this plan as well as all of the other elements that we've talked about tonight. And then we're going to be reporting our progress to the agencies as well as to our advisory committee and to you, so sign up to be on that mailing list if you're interested.

And I think that is it. Thank you all for coming.

(Applause.)

\- - -

Thereupon, the proceedings of August 3, 2006 were concluded at 8:17 o'clock p.m.

\- - -

CERTIFICATE

I, Lindy L. Meyer, Jr., the undersigned Court Reporter and Notary Public residing in the City of Shelbyville, Shelby County, Indiana, do hereby certify that the foregoing is a true and correct transcript of the proceedings taken by me on Thursday, August 3, 2006 in this matter and transcribed by me.

Lindy L. Meyer, Jr.,
Notary Public in and
for the State of Indiana.

My Commission expires October 27, 2008.

CERTIFICATE

I, Lindy L. Meyer, Jr., the undersigned Court Reporter and Notary Public residing in the City of Shelbyville, Shelby County, Indiana, do hereby certify that the foregoing is a true and correct transcript of the proceedings taken by me on Thursday, August 3, 2006 in this matter and transcribed by me.

Lindy L. Meyer Jr.

Lindy L. Meyer, Jr.,
Notary Public in and
for the State of Indiana.

My Commission expires October 27, 2008.

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THE INDIANAPOLIS STAR

A GANNETT NEWSPAPER
★ INDYSTAR.COM ★

"Where the Spirit of the Lord is, there is Liberty" II Cor. 3:17

WEDNESDAY, JULY 19, 2006

CI
★ 5

Ex-worker embezzled $350,000, city claims

Staffer's theft from Indy parks agency went on for 6 years, according to charges

By Tim Evans
tim.evans@indystar.com

A former Indy Parks employee is facing charges that she steered $350,000 in public money to her own bank accounts in one of the metro-area's biggest public embezzlement cases in recent years.

Kenya Miles, who was fired Monday from her $25,000-a-year accounting job, obtained the money by directing bogus credit and debit card refunds to the accounts, according to preliminary charges filed late last week.

The transactions, some of which date to 2000, were discovered after a review of financial records that began July 7, when a bank alerted city officials to possible irregularities in a parks department account. City officials acknowledge that lax oversight contributed to the scope of the theft.

"There was clearly a breakdown in controls," said Kobi Wright, Indianapolis' corporation counsel.

Miles, 34, was arrested Thursday at her home in Hendricks County on a preliminary count of theft. She was processed at the Marion County Jail and released after posting a $7,500 bond.

Formal charges of theft, official misconduct and fraud on a financial institution are expected to be filed before Miles makes an initial court appearance July 26, said Helen Marchal, chief counsel for the

See Embezzled, Page A11

IN TODAY'S STAR

1ST BUSH VETO POSSIBLE TODAY

The Senate voted Tuesday to overturn the president's limits on embryonic stem cell research, setting the stage for President Bush's first veto. Both Indiana senators voted for the bill, which would restore federal funding for research. A3

TSUNAMI DEATHS EXCEED 500

Indonesia pledged to develop a warning system after a giant wave that hit the island of Java on Monday. The disaster, which left at least 275 missing, was triggered by an undersea quake. A10

WEATHER

Low 72 High 92
Party cloudy, light winds.
Full forecast, B6

$0.50

$1.8 BILLION AGREEMENT

Sewer repair coming, but it will cost us

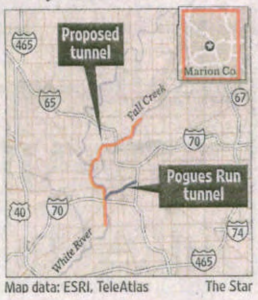
THE DEAL: Indy, EPA agree on plan to sharply cut overflow

THE COST: In 20 years, average sewer bill to be $60

SAM RICHE / The Star

CHECKING: Jeremy R. Morris, the project's construction engineering section head, inspects the completed section of a wastewater tunnel, part of a $1.8 billion overhaul of the city's antiquated sewer system.

FEWER SPILLS, LESS MESS
Indianapolis' $1.8 billion plan will reduce the estimated number of wastewater spills into rivers and streams from 60 a year to roughly six with two new tunnels (shown below). The Pogues Run tunnel is already under construction.



Map data: ESRI, TeleAtlas — The Star

Outdated system allows 7 billion gallons of wastewater into rivers, streams every year

By Tammy Webber
tammy.webber@indystar.com

Indianapolis residents will see their sewage bills go from among the lowest in the nation to about $60 a month over the next 20 years to pay for a huge, $1.8 billion overhaul of the city's antiquated sewer system.

The project, which city officials will announce today, all but settles five years of talks between Indianapolis and the EPA over a rejected $1 billion plan that the federal agency said wouldn't have done enough to protect people's health.

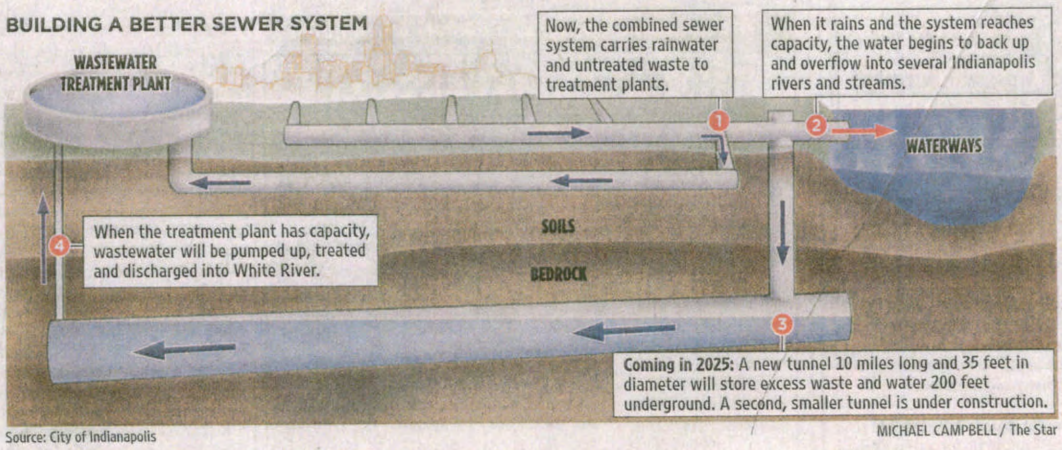
The tougher plan, which the EPA is expected to approve later this year, will increase sewer rates every year or two until 2026. Rates already have increased twice to pay for about $600 million in improvements. The latter of the two came last fall, when the City-County Council approved a series of rate increases under which average residential sewer bills will climb from $12.28 this year to $17.96 by 2008.

But rates will need to increase much more to pay for the largest capital improvement project in Indianapolis' history, including a 10-mile-long tunnel that, among other

> Are you willing to pay higher sewer bills to build the new system? Go to **IndyStar.com/feedback** to share your thoughts.

See Sewer, Page A11

BUILDING A BETTER SEWER SYSTEM



Source: City of Indianapolis — MICHAEL CAMPBELL / The Star

Judg vacati court adjour

Hiatus tha people in b will help att catch up, ju

By Vic Ryck and Will Hig
vic.ryckaert@indy

A Marion Co went on vacation and shut down his for two weeks.

The break in Court Judge Bill Y has drawn criticis leaders, who s progress on hundr was a mistake as entered its worst years.

"The court had for two weeks," sai troller Robert Cl like a retailer clo cember. It's the bu the year."

Just last month freed almost 600 cause of crowding ond highest mass in the past six Marion County Ja near a mandatory cap of 1,135 repea mates wait for th move through the tem.

Young said th was designed to h in his court catch u work and settle a l through plea agre said that in the might help ease the jail.

Judges have th having commissio trates or other ju during an absence

Young oversees

See Vacatio

MIDEAST

KEVORK DJANSEZIAN

LEAVING LEBANO rine helped an Ame and two children T they evacuated the bassy in the capita

EVACUAT PICK UP

As many as 1,000 poised to leave the v nation of Lebanon to evacuation effort tha criticism for its relat compared to efforts

Violence continue Tuesday it is ready f attack against Hezbo ing hopes for a diplo

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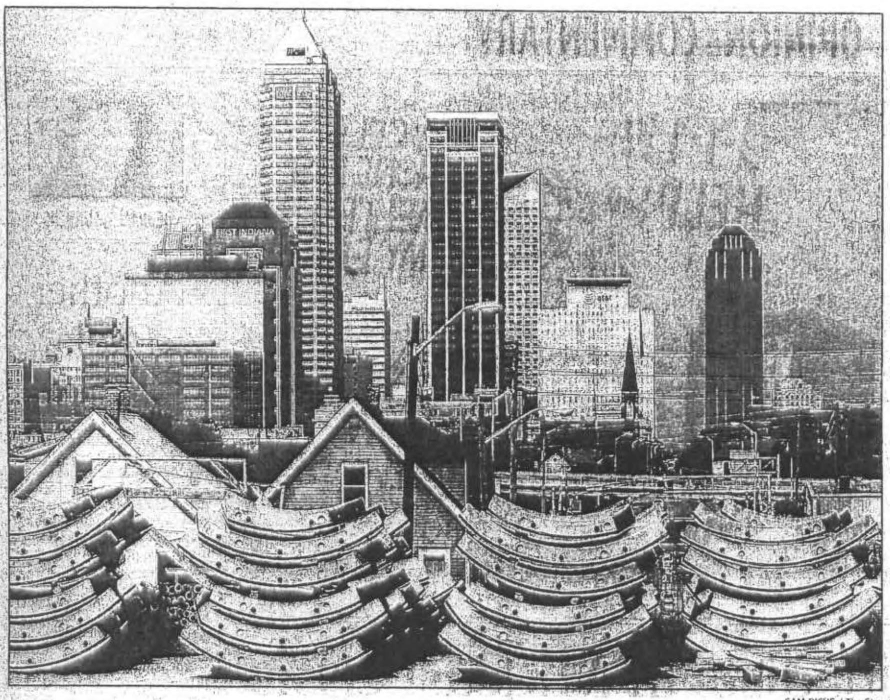


SAM RICHE / The Star

STACKED UP: These concrete wall pieces will be assembled into the 12-foot-diameter wastewater tunnel being built at Pogues Run.

Sewer

◆ City agrees to pay fines to state, federal governments.

From A1

upgrades, are designed to dramatically reduce the number of instances each year that heavy rains or snows overwhelm the system and cause an estimated 7 billion gallons of wastewater to spill into rivers and streams.

The plan is intended to settle a longstanding enforcement action by the U.S. Environmental Protection Agency.

The $1 billion plan in 2001 would have cut overflows from about 60 annually to 12. But the EPA rejected that plan, saying the city could afford to spend more than twice that amount to further reduce the number of spills.

The payoff now will be cleaner waterways that finally could become destinations for recreation and a draw for economic development, officials said.

"There will be incredibly significant water-quality improvements throughout the waterways . . . and they will become much more of an attraction than what's currently perceived as an eyesore," said Carlton Ray, the Department of Public Works' deputy director of engineering.

Now, sewers in some of Indianapolis' oldest and poorest neighborhoods overflow about 60 times a year, often after as little as a quarter-inch of rain.

Sewage and storm water are routed through the same pipes. When they're overwhelmed, wastewater, including raw sewage, pours out of more than 130 outlets — polluting waterways with an unhealthy mix of everything that's flushed down toilets and washed down storm drains.

Under the city's plan, 97 percent of wastewater will be captured along Fall Creek, reducing overflows to an annual average of two; the system will capture 95 percent of overflows on other waterways, reducing overflows to an average of four per year.

For Norman L. Davis, who has lived 49 years in a neighborhood near College and Sutherland avenues, the improvements can't come soon enough. Nobody uses nearby Fall Creek anymore, he said, and it often is the source of stomach-turning stench.

"At night, you can smell it real bad," said Davis, pointing toward an overflow outlet. "I love this neighborhood, but the smells bring down the property values — you know people making $200,000 a year don't want to live around here."

"Sometimes you almost want to throw up," said his neighbor, Virgie Thurman, 68.

The centerpiece of the city's plan is a giant tunnel that will run about 10 miles, from Fall Creek at 38th Street to the Belmont Treatment Plant.

Storm water will be diverted to the 35-foot-diameter tunnel, rather than to rivers or streams, where it will be held until it can be treated. Construction of that tunnel, about 200 feet underground, will begin in 2010 and be completed by 2025.

A new pipe will connect the city's Belmont and Southport treatment plants; now, wastewater often overflows from the Belmont plant when Southport has reached treatment capacity, Ray said. The plants also will be upgraded, and sewers and storage basins will be built throughout the city as part of the project.

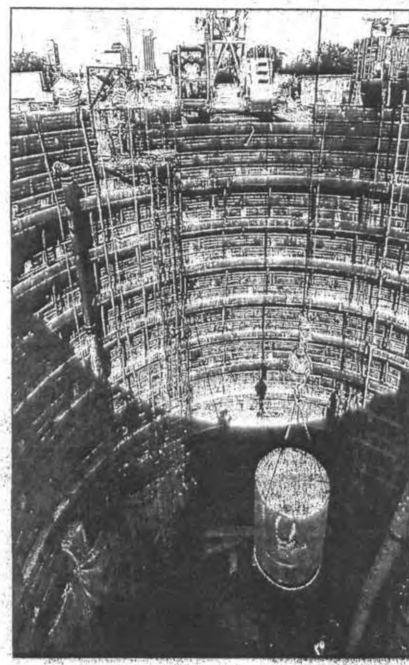
The city also agreed to pay cash fines of $588,900 to the federal government and $58,890 to the state of Indiana. In lieu of larger fines, the city will spend $3.5 million to eliminate septic systems in two neighborhoods. The plan is open for public comment until Aug. 17.

The city already has spent $200 million — part of the $1.8 billion total — to address the problem. Those projects include storage basins and the installation of inflatable dams in sewer pipes. The city has approved another $400 million in related projects.

Neither EPA nor Justice Department officials would comment because the consent agreement was not expected to be final until later this year.

"We think this was the right plan; we've been talking to people for years," said former DPW Director Jim Garrard, recently named Indianapolis' director of economic development. "This is a large quality-of-life issue for folks who live near these tributaries and have to deal with the stench and the debris and all the bad stuff that comes along with (overflows)."

★ Call Star reporter Tammy Webber at (317) 444-6212.



SAM RICHE / The Star

MORE TO COME: The wastewater tunnel under Pogues Run is one of two planned. The second will run about 10 miles, from Fall Creek at 38th Street to the Belmont Treatment Plant.

THE ISSUES

The problem

When it rains or snow melts, the city's 100-year-old combined sewer and rainwater system is quickly overwhelmed, sending untreated sewage and storm water into many of the city's rivers and streams.

The solution

To reduce overflows in all but the biggest storms, the city plans to dig a new deep tunnel along White River and Fall Creek and a smaller tunnel along Pogues Run, build new underground storage tanks and sewers and upgrade its two wastewater treatment plants.

Costs and benefits

Average monthly sewer bills for residential customers are expected to reach $60 by the time the $1.8 billion project is completed in 20 years. Wastewater overflows will be reduced from 60 a year to two a year on Fall Creek and four a year on other waterways, including White River.

Source: City of Indianapolis

WATER WORRIES

In water, E. coli itself is not harmful but is measured because the bacterium's presence signals there probably are other, harmful pathogens that could cause stomach and intestinal ailments. Higher E. coli levels indicate a greater chance a person could get sick. Shown below are the highest five-year averages for E. coli in Indianapolis, based on tests conducted by the city during the recreational season, April through October, from 2001 through 2005.

The standard for E. coli in Indiana waterways is 235 colonies per 100 mL.

Location	Colonies
1. White River at Tibbs Avenue and Banta Road	3,520 colonies
2. Pogues Run at New York Street	2,849 colonies
3. Pogues Run at Emerson Avene	1,502 colonies
4. Bean Creek at Southern Avenue	1,431 colonies
5. Pleasant Run at Meridian Street	1,088 colonies

Note: E. coli is reported as the number of colonies per 100 milliliters of water.

Sources: Indianapolis Office of Environmental Services, U.S. Environmental Protection Agency

MICHAEL CAMPBELL / The Star

WHAT'S NEXT

◆ **A 30-day public comment period** begins today. Copies of the plan are available at the DPW engineering office, 604 N. Sherman Drive; Indianapolis Clean Stream Team office, 151 N. Delaware St., Suite 900; and at all Marion County Public Library branches. It also can be viewed online at www.indycleanstreams .org, or an electronic copy (compact disc) is available by calling (317) 327-8720.

◆ **A public hearing is scheduled** for 7 p.m. Thursday, Aug. 3, in Room 105 at Good Hall, University of Indianapolis, 1400 E. Hanna Ave.

◆ **After the comment period,** the city will submit the final plan to the U.S. Environmental Protection Agency and the Justice Department.

◆ **Once the plan is approved,** the parties will sign a consent agreement. The DOJ will file a complaint in U.S. District Court, along with the consent agreement and plan.

◆ **Another 30-day comment period** will be held on the consent agreement, after which the consent decree must be filed and signed by a judge.

Source: City of Indianapolis

LOW RATES TO EVAPORATE

Right now, Indianapolis' sewer rates are among the cheapest in the Midwest. That could change with the $1.8 billion overhaul.

Indianapolis	$12.38
Danville	$34.34
Zionsville	$34
Cincinnati	$33.71
Hamilton SE Utilities	$33.55
Noblesville	$29.20
Fishers	$26
Speedway	$25.56
Columbus, Ohio	$23.02
Lawrence	$22.87
Louisville, Ky.	$22.60
St. Louis	$20.97
Beech Grove	$20.82
Evansville	$20.38
Fort Wayne	$16.24
Greenwood	$16.21
Carmel	$14.65

Source: Indianapolis Department of Public Works

The Star

Embezzled

◆ Thefts occurred while Indy Parks was cutting back.

From A1

Marion County prosecutor's office.

Marchal said additional charges may be filed after investigators finish reviewing financial records.

The thefts occurred during a period when Indy Parks was forced to cut back on trail cleaning, curtail hours at some swimming pools and delay repairs and construction projects to cope with budget constraints.

Wright, who noted he is unaware of any theft of city funds of this scope during Mayor Bart Peterson's administration, said the credits that Miles processed were presented as refunds to residents who had paid in advance for park services, such as facility rental or program fees.

Inadequate supervision

The biggest public embezzlement in state history involved a former Family and Social Services Administration employee, David Scott, who was sentenced in 1999 to at least four years in prison for stealing more than $700,000.

James Spaulding, a former employee of the Indiana Public Employees' Retirement Fund, was sentenced in May 2004 for his role in the theft of more than $220,000 in retirees' funds.

In the Indy Parks situation, Wright said, city officials acted quickly after learning of the potential problems but acknowledged inadequate supervision of the parks department's $30 million annual budget.

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★ Call Star reporter
(317) 444-6204.

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addressed the underlying probl

Ken Falk, legal director of ACLU of Ind

Vacations

◆ Court has 354 defendants in jail on pending cases.

From A1

felony drug court, one of the county's busiest, with 1,251 pending cases. Defendants in Young's court include accused cocaine dealers, methamphetamine manufacturers and people suspected of serious drug use.

"I've got lawyers with 150 cases apiece who barely have time to look at their cases," said Young, reached in Indianapolis where he was attending a meeting Tuesday. "I'm just seeing if I can make a dent in my caseload by giving the lawyers some breathing room."

He said he expects to be back in his office Friday.

Young's court, records show, has 354 defendants with pending cases sitting in the Marion County Jail. No other criminal court even comes close.

The drug court, records show, has an additional 316 defendants whose cases have been closed sitting in jail, but it's unclear whether those inmates are awaiting sentencing or being held on charges in another court.

"The fact is I need more prosecutors, I need more public defenders," Young said. "You can have a hearing every day, but if the lawyers have done no work on it, we get nowhere."

Marion County Prosecutor Carl Brizzi, who is pushing a plan to ship some inmates out to a state prison to try to free up jail space, questioned Young's decision.

"I wouldn't feel comfortable taking that much time off," he said. "However, rather than casting blame, we need to all work together to do everything we can to move people through the system so there's room in the jail."

Mayor Bart Peterson called the shutdown disturbing, given that the county jail has freed hundreds of inmates in recent weeks.

One of them, a convicted child molester, was later accused of fondling two young girls within days of going free.

"We all have to do our part systemwide to address this very serious issue," said Justin Ohlemiller, Peterson's spokesman. "The news of this court closure is extremely disappointing."

Others working to solve the county's jail problems were slower to criticize

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★ Call Star reporter
at (317) 444-2761.

$1.8 billion upgrade for sewers outlined

Smelly streams hurt property values and are a health risk, Peterson says

By Tammy Webber
tammy.webber@indystar.com

Leon Bates listened happily Wednesday as Mayor Bart Peterson outlined a $1.8 billion plan to fix the city's overflowing sewers, despite nearly 20 years of sewer-rate increases that will be needed to help pay for it.

"This is the first time I've heard any mayor say we truly have a problem and it needs to be fixed and the fix will not be cheap," said Bates, who lives in the Mapleton-Fall Creek neighborhood on the Near Northside, where residents are often besieged by putrid odors caused by sewer overflows.

"Sewer rates have been artificially low for way too long; we've known about this problem for 30 years and didn't do a . . . thing."

Peterson, as expected, announced a tentative agreement with the U.S. Environmental Protection Agency that calls for the city to reduce overflows to an average of two per year on Fall Creek and four per year on White River and other streams. Now, sewers in the oldest parts of the city overflow about 60 times a year or more, inundating waterways annually with 6 billion to 7 billion gallons of wastewater contaminated with raw sewage.

The century-old system was built to carry untreated waste and storm water in the same pipes. But as the city developed and flushed more waste into the system, the volume became too great to handle.

Sewer rates will rise every year or two until at least 2025 — to about $60 a month — to pay for the fix, which includes a 10-mile-long deep tunnel, holding basins and upgrades to the city's two treatment plants.

Now, Indianapolis' average monthly sewer bill is just over $12, among the lowest in the nation. But even with the increases, the rates in 20 years probably still will be lower than in many other cities, Peterson said, adding they will be raised incrementally to allow residents to adjust to the changes.

The plan is subject to a 30-day public comment period, which ends Aug. 18. A public hearing will be at 7 p.m. Aug. 3 at Good Hall, University of Indianapolis, 1400 E. Hanna Ave.

Peterson said the sewer problem has reduced property values and unfairly subjected older neighborhoods to the stench and health risks. He said the decrepit sewers and filthy water also have hurt the city's reputation — and recalled how politicians and others used to joke about the smelly streams.

"It should never have been a joke," Peterson said. "It should have been a source of shame."

The improvements, he said, should go a long way toward making the city's waterways a source of pride, enhance recreational opportunities and help lure development and new residents.

"This is going to make our city easier to sell," Peterson said.

Bates said he's happiest for the families who live near the sewer outlets.

"You know that black and gray matter at the bottom of the river? That's not mud," he said. "This is what some of the kids play in."

★ Call Star reporter Tammy Webber at (317) 444-6212.

THE PRICE OF PROGRESS

Indianapolis residents' sewer bills will rise to pay for a $1.8 billion plan to dramatically reduce sewer overflows into area waterways. Average monthly residential rates will rise from about $12 now to about $60 by 2025. The City-County Council already has approved rate increases through 2008, when the average sewer bill will climb to $17.96 a month.

The city also already has completed or approved $600 million in construction projects as part of the overall plan, including:

- ◆ A 34 million-gallon storage basin at the Belmont Treatment Plant and a 25 million-gallon basin at the Southport Treatment Plant.
- ◆ Diverted overflows from outlets at the Riviera Club on White River into an existing million-gallon underground holding tank. A third overflow point also will be diverted to the tank.
- ◆ A 3 million-gallon storage tank just west of the track at Indianapolis University-Purdue University Indianapolis.
- ◆ Inflatable dams in some large sewers, designed to store wastewater in the pipes but release it before it can back up into basements.
- ◆ Expanding treatment capacity at the Belmont Treatment Plant. Overflows from the plant were one of the largest single sources of pollution to White River.
- ◆ A 12-foot-diameter sewer pipe between the Belmont and Southport plants, allowing wastewater volumes to be equalized.

Source: Indianapolis Department of Public Works

OPINION&COMMENTARY

THE INDIANAPOLIS STAR
A GANNETT NEWSPAPER

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EDITORIALS

No getting around sewer price tag

Our position:

Agreement with the federal government means the city can move ahead on a huge, costly, necessary infrastructure task.

There's nothing sweet about a nearly five-fold increase in sewer bills over 20 years, but a great many folks around here are not likely to cry foul. They know foul.

It is common knowledge, or should be, that Indianapolis is decades late in overhauling a sewage system so undersized and outdated that it spews the contents of toilets into streets and waterways an average of better than once a week. Older, lower-income neighborhoods, a key element of the city's revitalization, bear the brunt.

The Peterson administration has been hard at work on improvements, having invested some $600 million even though the U.S. Environmental Protection Agency rejected the city's original plan for a $1 billion project.

Wednesday, the city and the feds announced a settlement under which a total of $1.8 billion will be spent to enlarge and modernize the system, reducing anticipated overflows to two a year along Fall Creek and four on other waterways.

It's not free. Sewer bills will rise gradually from the current $12.38 to $60 a month by 2026. If it's any comfort, we've been spoiled. Zionsville residents now pay $34 a month, Cincinnatians just under that, users in Columbus, Ohio, a little over $23. All those rates figure to rise over the next 20 years as well. If they do not reach our level, those communities also haven't matched our overflow.

Unfortunately for local residents, federal and state funding help for meeting these federal and state mandates has declined in recent years. To their credit, city officials are not whining. "It's less than it used to be," lamented Deputy Mayor Steve Campbell. "But it's the right thing to do, federal money or not, state money or not. We've been negotiating with EPA for seven years, and we've been moving ahead anyway."

Only by paying now, and paying later, can the city move ahead in the broader sense. Without basic protection of public health, economic growth will always be stunted.

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Associated Press

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$1.8B sewer plan gaining support

Community leaders praise effort to reduce the amount of sewage released into waterways

By Diana Penner
diana.penner@indystar.com

A public hearing Thursday on a proposed $1.8 billion improvement to the city's combined sewer system drew praise from those who attended.

The city's plan features a huge, 10-mile-long tunnel about 200 to 250 feet underground and large storage basins that could temporarily hold overflow water and sewage until it can be pumped into treatment facilities.

Sandhya Markand, with the Greater Indianapolis Chamber of Commerce, praised the plan, and Turae Dabney, with the Indianapolis Black Chamber of Commerce, urged the city to seek minority contractors to do 15 percent of the work.

While Rae Schnapp, with the Hoosier Environmental Council, also praised the process so far, she urged greater emphasis on water conservation to reduce the amount of water getting into the sewers in the first place. She also called for increased use of natural filtration systems such as wetlands and rain gardens to slow the flow of storm water into streams.

The new system is projected to significantly reduce but not completely eliminate overflows of untreated sewage into local waterways.

The problem has been building for much of the past century and would require about two decades of construction work — and incremental sewer rate increases, officials said.

Sewer bills are projected to increase from the average today of about $12 per month to about $60 per month by 2025, but overflows would decrease from an average of 60 times a year now to two annually into Fall Creek and about four a year into White River and its tributaries.

Last month, Mayor Bart Peterson announced the plan and a tentative agreement with the U.S. Environmental Protection Agency. The public comment period continues through Aug. 18.

Indianapolis — like other cities primarily on the East Coast and in the Midwest — has a combined sewer system in the oldest parts of the city. Storm water sewer systems were developed before most residents had indoor plumbing. As homes were built or retrofitted with indoor toilets and bathtubs, residential sewage lines were hooked into existing storm systems.

Now, in heavy rains, the system can back up and dump untreated sewage into White River, Fall Creek and other waterways.

★ Call Star reporter Diana Penner at (317) 444-6249.

TO COMMENT

The public may submit comments on the city's plan to control raw sewage overflows.

Comments can be submitted through Aug. 18 online at www.indycleanstreams.org; by fax to (317) 327-8699; or by mail to City of Indianapolis Long Term Control Plan Comments, c/o Indianapolis Clean Stream Team, 151 N. Delaware St., Suite 900, Indianapolis, IN 46204.

The plan is available online at the Web site listed above and at all Indianapolis-Marion County Public Library branches. It also is available on CD through the Web site or by calling (317) 327-8720.

Water Pollution

Indianapolis to Settle Sewer Violations Through $1.8 Billion Plan to Stop Overflows

The Environmental Protection Agency and the city of Indianapolis reached a tentative agreement to settle water quality violations and reduce sewage overflows into the city's waterways with a plan that calls for a $1.8 billion investment by the city over 20 years, a city Department of Public Works official told BNA July 20.

“We've tentatively reached agreement with EPA and the state regulatory agency. We feel like we have a good plan,” Carlton Ray, deputy director of the department, said.

The city must pay pending fines and make investments in its sewer system by certain deadlines to comply with the agreement. The settlement must still be approved by EPA and the Indiana Department of Environmental Management and filed in the U.S. District Court for the Southern District of Indiana along with a consent decree, Ray said.

Under the proposed settlement, the city would agree to invest:

- $1.73 billion by December 2025 to significantly reduce raw sewage overflows from the combined sewer system;
- $50.4 million by December 2015 to eliminate chronic overflows from seven locations in the separate, sanitary sewer system; and
- $3.5 million by December 2010 on supplemental environmental projects to eliminate septic systems in two neighborhoods.

The city also plans to spend an additional $64.3 million on watershed improvement projects, such as stream bank restoration and stream flow augmentation.

If the settlement is approved, the city will also pay $588,900 to settle violations of the federal Clean Water Act and another $58,890 to resolve state violations.

A public comment period on the plan ends Aug. 18.

Violations Cited.

EPA cited the city for alleged violations related to sewer overflows and flow maximization issues, Ray said.

“We even have some difficulty getting the sewage to the treatment plant,” he said.

Sewer overflows are common in the current system. They happen 60 to 80 times each year and can be triggered by as little as a quarter-inch of rainfall, Ray said.

Under the plan, the city must reduce the number of annual overflow events to four in a typical year, he said.

Among the projects planned to solve those problems is a 224-million-gallon tunnel along two waterways--Fall Creek and White River--that will store sewage overflows during rainstorms and pump the sewage to the city's wastewater treatment plants after the storm subsides, according to a statement from the mayor's office. A 12-foot-diameter sewer connecting the city's two treatment plants will also allow the city to better manage and treat flows during wet weather, the statement said.

The city has been making investments to address the problem.

“Since 2000, the city has spent more than $200 million to reduce raw sewage overflows by 145 million gallons per year,” Mayor Bart Peterson said in announcing the agreement July 19.

Ray said the city and EPA have been negotiating about the sewer overflow issue for five years.

EPA declined to discuss the settlement because it has not been officially approved, Phillipa Cannon, an agency spokeswoman in EPA's Region 5 office in Chicago, said.

EPA Requiring Plans.

Jodi Perras, an environmental consultant with Indiana-based Perras & Associates, told BNA July 19 that the combined sewer overflows can be attributed to an aging infrastructure.

The agreement reflects the 1994 Combined Sewer Overflow guidance that EPA issued in lieu of rules to deal with incessant overflows from collection systems that were built at the turn of the 20th century to deal with stormwater as well as wastewater.

These combined systems are designed to overflow during wet weather, releasing the untreated wastewater into nearby rivers and streams to prevent excess flows from inundating the treatment plant. These overflows cause the receiving waters to become contaminated with pathogens and other pollutants in violation of water quality standards.

The guidance called upon utilities to assess the reasons for combined sewer overflows and to devise plans for minimizing flows. The agreement with Indianapolis, Perras told BNA, reflects the solutions Indianapolis devised to deal with its aging infrastructure.

According to EPA, 772 communities in the United States have combined sewer systems, and Indiana has the most with 104.

The combined sewer overflows guidance was codified into law in 2000. Among other things, it required municipalities to put into place “nine minimum controls.”

These controls require proper maintenance of the sewer system, prohibit overflows in dry weather, establish pollution prevention practices, and require public notification of overflows. The controls are supposed to be implemented while the communities develop plans to eliminate overflows.

In February, a group of 27 advocacy organizations released a letter charging that EPA was failing to enforce clean-water laws in cities with histories of overflows from combined sewer systems (32 DEN A-8, 2/16/06).

By Joyce Hedges and Amena Saiyid

Comments Received on Indianapolis Long-Term Control Plan and City Responses
September 6, 2006

Comment: Will this new sewer fix clean up Pleasant Run Creek? I've lived in Christian Park for 65 years and it hurts my soul to see such a mess in the creek. We used to have frogs, small fish and other critters but no more. I'm more than willing to pay for the cost of the sewer clean up! (S. McCardle, Indianapolis)
Response: Yes, the city's plan will dramatically reduce overflows into Pleasant Run and also Bean Creek, which is a tributary of Pleasant Run. We have posted fact sheets for each watershed on the website to describe how the plan will benefit Pleasant Run and the other waterways.

Comment: I'm so glad this problem is getting attention. It's past due. (S. Shaw, Indianapolis)
Response: Thank you for your comment and support.

Comment: I'm glad to see this plan. It's long overdue, and needs to be moved forward as rapidly as possible. The health of the citizenry and the environment both demand its completion as soon as possible. (W. Gillette, Indianapolis)
Response: Thank you for your comment. The plan will be implemented in four five-year phases, with all projects complete by December 31, 2025. The 20-year schedule is needed to minimize disturbance to neighborhoods; accurately evaluate the effectiveness of each project; secure rights of way; coordinate technical, manpower and material needs; and manage the financial burden on ratepayers. We are implementing projects as expeditiously as we can.

Comment: I believe something should be done with the overflow of sewage, but this is terrible. I am a senior and do not make a lot of money, in fact less than $800 a month. Now you are talking about a $60.00 sewage raise and then you want a water raise in our bill. I ask you how much can a person take, especially when you don't make that much. Since the governor sold our roads and now it will be a toll road, why not take that money and leave the people alone, we can't afford all this. After this is all done then there will be something else Indy will need to do. I don't want to have to sell my home to pay for all these things, I just want to live in peace. Thank you for letting me speak and may I say this God Bless us all, we do need help, but there are other ways. Thank you. (M. Owens, Indianapolis)
Response: Thank you for your comment. We sympathize with your concerns and worked hard to protect ratepayer interests during negotiations with state and federal regulators. It's important to point out that rates will rise gradually over 20 years. However, we have no choice but to do what is required by the U.S. Environmental Protection Agency and the Clean Water Act. We agree that state and federal funding should help pay for these projects. Unfortunately, at this time local ratepayers are being required to bear the burden. Currently, state and federal governments offer low-interest loans for sewer projects. However, funding for those programs has been reduced dramatically in recent years. Federal grants, once widely available through a construction grants program, are now only available through Congressional "earmarks" on federal spending bills. Many local, state and national organizations are working with Congress to create a federal trust fund for clean water infrastructure, much as we now have federal trust funds for highways and airports. To learn more or show your support, visit www.cleanwateramerica.org. The city will pursue any alternative funding options that may become available in order to lessen the burden on ratepayers.

Comment: I live on Rahke Road off of Sumner between Meridian and Bluff. My entire street, which is a cul de sac, consisting of about 50 homes is on septic. Heavy rains, it stinks horrible. Is our street included in the septic plan (1.8 million plan?) If not, when are we going to get sewer systems? We do have city water. Thanks. (M. Wertzberger, Indianpolis)

Response: Your neighborhood is located within the boundaries of the Septic Tank Elimination Project BL-32-001 (Brill and Troy). Construction is scheduled for Spring 2009. The approximate boundaries associated with this project are Troy and Sumner to the North, Mt. Vernon to the West, a portion of I-465 to the South and Brill to the East. Currently, this project is in the planning phase. This link will provide you an overview of the Septic Tank Elimination Program: http://www.indygov.org/eGov/City/DPW/Environment/CleanStream/Solutions/Septic/home.htm

Comment: After criticizing the city for thirty years, and raising the pollution of Pogue's Run at every opportunity possible, and after seeing children swimming in Pogue's Run while the water was up, we have a plan for cleaning up sewer overflows. This is a huge job and the planning process has included time for comment and citizen review. I don't agree with everything that has been done. The use of Brookside Park land as an open overflow area for 100 year floods is something I did not want. Yet I applaud the city even for that move, because it was an improvement on the years of inaction that preceded it. Running a city is a huge job, and running it successfully requires long term planning, citizen input, and compromise. We all must be willing to share some pain, and willing to see some compromise. Mayor Bart Peterson has led a bipartisan effort that has resulted in one of the finest moments that I have seen in my 30-odd years as a resident of Indianapolis. The Mayor and the City-County Council get an A from me and from the Brookside Bunch Neighborhood Association. Thank you so much for all you hard work, and thank all the city officials for the hard work, and sometimes angry citizens, that they had to face in the process of bringing all this to fruition. In closing, I want to say that the increased use of the Mayor's liaisons, such as Katy Brett, who works with our area, made it possible for me to make these comments in a timely manner. This is the communication we need to take us forward into a sustainable new millennium. Thank you all so much! We love our city! (F. Watson, Indianapolis)
Response: Thank you for your comment. The staff at the Indianapolis Department of Public Works and its Clean Stream Team have worked many hours to develop this plan and they appreciate your comments. Thanks also should go to the Clean Stream Team Advisory Committee and the many citizens who have participated in public meetings and dialogue on the plan.

Comment: My friend is a home owner in Marion County. They have a well maintained septic system. How will the new raw sewage overflow system affect their water and sewage rates? Will their rates increase? How much will their rates increase? (G. Wade, Indianapolis)
Response: It would help to know your friend's address in Marion County or the neighborhood where they live. Then we can determine if and when their neighborhood is scheduled to receive sewer service. If they are currently on a septic system, they should not be getting a sewage bill. If their neighborhood is slated to get sewer service, they will pay a connection fee to be hooked into the sewer system, and will pay a monthly sewer bill once they receive sewer service. Current sewer rates are about $12.38 per month for 5,400 gallons. Long-term sewer rates are very difficult to predict because of rapidly changing regulatory requirements and higher-than-average inflation in the construction industry. Current projections show residential sanitary sewer rates in 2025 will be around $55-60 for 5,400 gallons per month, based upon 2005 dollars. We expect our rates to remain competitive with other Midwestern cities, who face the same requirements to upgrade their sewer infrastructure.

Comment: I strongly support the upgrades to the Combined Sewer Overflow upgrades. The expense is well worth it to improve our water ways. (J. Barnd, Indianapolis)
Response: Thank you for your comment and your support.

Comment: I am embarrassed to be a native of Indianapolis, where a sewer plan, proposing multi-millions of dollars, does not COMPLETE the job of clean-up. Absolutely NO spills is the objective

that must underline the extravagant expense being proposed. Please revise you plans accordingly. (B. Ferguson, Indianapolis)
Response: The city's goals for the sewer plan are:

- Reducing sewer overflows when people are most likely to be in the streams,
- Improving our streams to support fish and other aquatic wildlife,
- Improving the quality of life in our neighborhoods by reducing odors and capturing the unsightly materials found in overflowing sewers, and
- Coming into compliance with state and federal Clean Water Act permit requirements.

Eliminating overflows through sewer separation is not required under the Clean Water Act and is not necessary to protect human health or meet these goals. In fact, because urban storm water run-off is contaminated with many pollutants, sewer separation is less environmentally beneficial than capturing a high level of combined sewage and stormwater and conveying it for treatment at the advanced wastewater treatment plants. Overflows will only occur during very large storms when people aren't using the streams for recreation. Also, sewer separation is three times more expensive and would push residential sewer bills over $100 a month, based on 2005 dollars. This expense cannot be justified and would not produce better water quality conditions. During public outreach in October 2004, most residents preferred overflow control at the 95-97 percent capture level.

Comment: More money should be spent getting families off septic systems and it should be done faster than any 20 years. If an accelerated plan can be done for the first 3 years, why not continue that amount being replaced instead of slowing down. What are you waiting for, an epidemic to kill some old people or infants? If that happened I'll bet you can't do it fast enough. (L. Givans, Indianapolis)
Response: We agree that septic systems are a priority. Our plan is designed to address the worst neighborhoods and greatest public health threats first. However, septic tank elimination needs to be considered within the context of the city's many clean water infrastructure needs, including raw sewage overflows, sewer backups into streets and basements, treatment plant repairs, aging sewers needing rehabilitation, and fast-growing areas needing more sewer capacity. All pieces of the puzzle need to fit together. We need to ensure that solving a problem in one neighborhood doesn't just transfer it to another area. Our 20-year schedule to eliminate 18,000 septic systems throughout Marion County is both appropriate and protective of public health.

Comment: We wish to thank the Mayor and the Clean Stream Team for the opportunity to obtain and distribute copies of the Executive Summary and CD Roms that inform our residents of significant improvements to take place in our immediate area along West Fall Creek Parkway between N. Meridian and Dr. Martin Luther King, Jr. Streets. We could not participate at the public hearing, but at our neighborhood meeting that same night we reviewed and acknowledged the importance of this long-term project to the health and future vitality of our community and to the City. We will invite and look forward to a Clean Stream Team presentation to us. (M. Warrington, Highland Vicinity Neighborhood Association, Indianapolis)
Response: Thank you for your comment. We look forward to meeting with your members and other interested neighborhood groups as the sewer improvement program proceeds.

Comment: I am signed up for the Stream Overflow Newsletters and I get weekly emails speaking of sewage overflows. I think that an upgrade to the city's sewage system is a definite plus. I would be willing to pay upwards of $10.00 a month extra to have better water facilities and not have local bodies of water smelling like sewage. It is time that people start wanting to pay for top of the line services instead of crying when there is a problem. Go DPW!! (J. Perry, Indianapolis)
Response: Thank you for your support.

Comment: The sewage reduction plan on deck is a nice start. But that's about it; a good effort at best. If $1.8B cuts overflows by 90% what will it take to never have raw sewage flow into our neighborhood streams? Something has to be done and this is a solid step in the right direction. I want to say I applaud the city for getting this far, but I'm too disappointed it took this long to get a plan on paper (Who knows how many overflows we are away from getting a shovel in the ground. At 60 sewage overflows a year I'm assuming quite a few). As an avid outdoor enthusiast not only in Indy but throughout the midwest, it's hard for me to advise my family and friends to avoid indy waterways. It pains me to see perfect river settings throughout the city while knowing we can't enjoy them because of the potential health risks. 60 spills a year works out to around 1 sewage overflow a week within the city. I guess if our city's best effort is a 90% reduction goal (4-6 spills a year), it is what it is. Hopefully the administration shoots higher than curbing 90% of crime, a 90% cleaner downtown or even getting our stoplights to work 90% of the time. (S. Kraege, Indianapolis)
Response: Our plan is the most cost-effective way to meet federal requirements and at the same time protect public health. Eliminating sewer overflows through sewer separation would cost an estimated $6 billion – costing more than three times more and achieving no more days of recreational use on our waterways. At the end of 20 years, sewer overflows will be reduced dramatically from today's 45-80 storms each year down to 0-10 storms. Overflows will occur only during the largest storms, when streams are flowing fast and people are not likely to be exposed to raw sewage. The city's goal was to develop an affordable plan that would focus dollars on projects that will do the most to improve water quality and protect public health. Also, we have already begun putting projects in the ground. The city has already invested more than $200 million to keep raw sewage out of our waterways, especially near parks, schools and neighborhood streams. Already, we've reduced average annual overflows by more than 145 million gallons.

Comment: Why doesn't the city of Indianapolis utilize the sewer gas (methane gas) to generate electricity. This can be done simply and cost-effectively by using the sewer gas to run diesel engines, which turn electrical generators. By doing this and selling the electricity to the utility company's which are required by federal law to purchase this electricity at their cost. The city of Indianapolis could probably generate enough income to offset the cost of providing electrical power to all Government Buildings, School Buildings, Street Lights and city managed property. Thereby freeing up tax dollars to use in improving the infrastructure. Systems like this are already in use at Southside Landfill where they reclaim the methane gas from the bottom of the landfill and use it to fuel engines that turn generators that provide the electrical power for their operations. Additionally, this same technology is used on pig farms where the methane gas generated from pig waste is captured and used for fuel for diesel engines that turn generators to provide all the electrical power for the farming operation. It seams to me that this would be a much wiser use of the methane gas from the sewer system and from the waste treatment plant than simply burning it off to atmosphere. Thank you for your time. (S. Bryson, Indianapolis)
Response: We appreciate your suggestion to evaluate this approach to help ensure that the operational costs of sewage treatment are minimized and that all alternatives for energy sources are pursued. As you mention, the methane from Southside Landfill is captured and used. The City also generates steam from the incineration of solid waste at the Covanta Energy Facility. These two measures have proven to use resources wisely and the City will continue to explore other options in the future to keep our costs down and to wisely use resources. Indianapolis currently incinerates sewage sludge in a cost-effective and environmentally sound manner. This process, unlike some other cities' approaches, does not generate sufficient methane gas to allow for energy recovery. The city completed a pretty thorough investigation into the economics of sludge disposal as part of a recent Solids Handling Study. Harvesting digester gas ranked very low compared to current procedures.

Comment: I totally agree with this plan. I grew up near Pogues Run and its left bank tributary, Brookside Creek, and know that this plan will enhance Pogues Run (and Pleasant Run, another stream I know well). Thank you. (B. Berchekas, formerly of Indianapolis)
Response: Thank you for your support.

Comment: I believe the failure to include the resolution of septic tanks in the long term control plan is a disgrace. EPA estimates that septic tanks are the 5th leading cause of underground pollution of water. In addition, it is a fact that the septic tanks are contributing to the pollution of our rivers, streams, etc. in Marion County. I urge our City/County governmental officials to include the replacement of septic sewage system with sanitation in the Long Term Control Plan. The citizens of Marion County deserve from Mayor Peterson and our elected officials to keep their promise of Indianapolis as a world-class city. (C. Burris, Indianapolis)
Response: We agree that septic systems are a priority. Our Septic Tank Elimination Program is designed to address the worst neighborhoods and greatest public health threats first. However, septic tank elimination needs to be considered within the context of the city's many clean water infrastructure needs, including raw sewage overflows, sewer backups into streets and basements, treatment plant repairs, aging sewers needing rehabilitation, and fast-growing areas needing more sewer capacity. All pieces of the puzzle need to fit together. We need to ensure that solving a problem in one neighborhood doesn't transfer it to another area. Our 20-year schedule to eliminate 18,000 septic systems throughout Marion County is both appropriate and protective of public health. Furthermore, the city believes there is no legal justification for including the Septic Tank Elimination Program in a federal consent decree.

Comment: In October 1999, the Hoosier Chapter of the Sierra Club joined in a civil rights suit filed with the U.S. Environmental Protection Agency's Office of Civil Rights citing the City's decisions regarding the operation of the City's combined sewer overflows that resulted in a disproportionate impact on minorities along Fall Creek and the White River. In October 2001, EPA accepted the complaint for investigation for potential violations of the Federal Civil Rights Act. In November 2001, we jointly asked EPA to suspend its investigation of the complaint pending ongoing discussions as part of the City's development of a Combined Sewer Overflow Long Term Control Plan (CSO LTCP) consistent with the Clean Water Act. EPA agreed to suspend the investigation and served as a valuable facilitator of some discussions. EPA and the City of Indianapolis recently reached a tentative agreement on a CSO LTCP and will make the 20-year plan enforceable through a consent decree. The plan is contingent on the outcome of a public comment period.

The Hoosier Chapter of the Sierra Club supports the CSO LTCP as written. It is a fair outcome that should eliminate the disproportionate impact on minorities caused by the operation of Indianapolis' combined sewer system and redress the ongoing discharge of sewage into our streams. It is not perfect but, if implemented in its present form, should adequately address the CSO issues.

However, we have serious concerns about the City's ongoing commitment to implement key other portions of the plan. Our concerns center on three areas of the plan that are not presently proposed to be part of the consent decree. The City's refusal to include them in the consent decree makes us question whether the plan will be fully implemented. Without key elements in a consent decree, the next administration may renege on the commitments – choosing only to implement the elements incorporated into the consent decree.

Our major concern is that elements of the plan related to septic tanks are not a part of the consent decree despite the ongoing and the significant impact existing failing septic systems have on human health and pollution in our urban neighborhood streams. As Dr. Caine, Marion County Health and Hospital Director stated at your announcement of the revised Barrett process, "Failing septic systems (in Marion County) are a public health issue." Many of these streams, such as Devon Creek, have bacteria concentrations over ten times that of the CSO impacted waters. The consent decree, or some other mechanism, must include enforceable requirements to assure that future administrations implement septic conversions in a shortened time frame because of their significant human health and water quality impact. A more reasonable and justified time frame would be completion within 6 to 7 years. We have promoted and worked with neighborhood organizations and the city for several years to promote this critical need.

While this may seem like a hypothetical concern, the city's decision to raid the account funded by sewer fees to pay for crime prevention shows how easily the plan can be undermined. This raid is clearly not a one-time event. It has happened in the past to pay for police and fire pensions. The consent decree must contain provisions ensuring the sewer fees are using solely to remedy the sewer problems. Crime prevention is essential but it is not new, and the need is not going away any time soon. The city must raise funds to address that problem too – but not by robbing the fund dedicated to sewers.

Finally, the city has refused to even put in the plan its commitment to the civil rights complainants to notify the public of sewer connection permit applications that may impact downstream sewer capacity. This public notification must be in the plan and in the consent decree. If the consent decree and plan do not address these concerns, we will be raising our concerns again in an objection to the consent decree for public comment. Please contact me at sierra@netdirect.net for any questions or clarifications. Thank you. (S. Zaborowski, Hoosier Chapter Sierra Club, Indianapolis)

Response: Thank you for your comments and your support of the plan as written.

We agree that septic systems are a priority, which is why we included the septic tank commitment in the long-term control plan. Our Septic Tank Elimination Program is designed to address the worst neighborhoods and greatest public health threats first. However, septic tank elimination needs to be considered within the context of the city's many clean water infrastructure needs, including raw sewage overflows, sewer backups into streets and basements, treatment plant repairs, aging sewers needing rehabilitation, and fast-growing areas needing more sewer capacity. All pieces of the puzzle need to fit together. We need to ensure that solving a problem in one neighborhood doesn't transfer it to another area. Our 20-year schedule to eliminate 18,000 septic systems throughout Marion County is both appropriate and protective of public health. Furthermore, the city believes there is no legal justification for including the Septic Tank Elimination Program in a federal consent decree.

Sanitary funds were recently approved to be loaned to Marion County to temporarily cover the cost of leasing 200 additional jail beds to address jail overcrowding and critical public safety needs. This loan, as approved in City-County Special Ordinance No. 5, 2006, must be repaid no later than June 30, 2007. This short-term loan will not affect our ability to deliver sewer improvement projects within the required schedule.

The Department of Public Works has made a commitment to provide information to interested persons on sewer connection applications that may affect downstream sewer capacity. However, it is not necessary to address this or any other city permit matter or ordinance in order to reach agreement with U.S. EPA on a consent decree relative to CSO discharges.

Comment: Congratulations on your diligent efforts to improve the environmental quality of Indianapolis's waterways. The recently approved Long Term Control Plan will benefit the current citizen's as well as future generations. Like many massive public works projects it takes an extended period of time, with input from many interested parties, and a continued focus on the end goal to bring a plan together. You have accomplished this and much more. As public officials you are forced to quantify the economic, technical, and environmental impact of what each project is supposed to do. Through it all, it should not be lost, that creating a better environment for future generations is just the right thing to do.

As an environmental construction professional I know that this planned investment will maintain jobs for existing workers, as well as create new opportunities to enter the industry. Many other areas are drawing construction professionals away from environmental areas, and this sustained, long-term demand for workers will provide a means to keep them employed.

The projected positive impact from this project has been diligently studied. I believe that, as with many other large-scale projects, there will unanticipated positive outcomes. I look forward to finding out what they are.

Thank you for your dedication to this effort to developing a solution to a problem that has been in development for over a hundred years. (David Wrightsman, P.E., Bowen Engineering, Fishers, Ind.)
Response: Thank you for your comments and support.

Comment: Dear Mayor Peterson,

In October 1999, before you were elected, I filed an administrative complaint with U.S. Environmental Protection Agency's Office of Civil Rights on behalf of several organizations citing decisions regarding the operation of the city's combined sewer overflows that resulted in a disproportionate impact on minorities along Fall Creek and White River. In October 2001, EPA accepted the complaint for investigation for potential violations of the Federal Civil Rights Act.

The organizations are Improving Kids' Environment, Hoosier Environmental Council, Hoosier Chapter of Sierra Club, Concerned Clergy of Greater Indianapolis, and the Mapleton Fall Creek Neighborhood Association.

In November 2001, we jointly asked EPA to suspend its investigation of the complaint pending ongoing discussions as part of the City's development of a Combined Sewer Overflow Long Term Control Plan (CSO LTCP) consistent with the Clean Water Act. EPA agreed to suspend the investigation and served as a valuable facilitator of some discussions.

EPA and the City of Indianapolis recently reached a tentative agreement on a CSO LTCP and plan to make the 20-year plan enforceable through a Consent Decree. The plan is contingent on the outcome of a public comment period. EPA will propose the consent decree for comment at a later time.

I rise in support of the CSO LTCP as written. It is a fair outcome that should eliminate the disproportionate impact on minorities caused by the operation of Indianapolis' combined sewer system.

My clients will be submitting comments separately. But I wanted to share my perspective based on their concerns and my experiences. I believe that the CSO LTCP is sufficient to resolve the civil rights concerns we raised. I also believe that the plan – while not eliminating combined sewer overflows – reflects a good plan that balances many competing interests. Assuming the plan is finalized consistent with the draft, I will notify EPA that the complainants will withdraw our civil rights complaint. If it is not, we need to discuss possible changes.

My major concern with the plan is that the whole plan will not be part of the consent decree. Apparently, the elements of the plan related to septic tanks are not a part of the consent decree despite the ongoing and tangible impact these septic tanks have on the pollution in our urban streams. The consent decree should contain the septic tank provisions.

The plan and the consent decree should also contain a requirement that the City implement the promised program to notify the public of sewer connection permit applications that may impact downstream sewer capacity. Tim Method's promise to the complainants and me is helpful but it should be a part of the Plan.

Finally, we just learned that the City is diverting funds raised from sewer fees and dedicated to sewers to address the crime problem. This problem has been ongoing. We recognize that the crime problem has reached a crises stage. We believe that both issues – sewers and crime – are important. Both certainly need to be resolved. But one should not be used to undermine the effectiveness of the other. Nor should the money for sewer improvements be considered a fund that may be dipped into for other city needs, albeit extremely critical ones. The consent decree MUST contain a requirement that sewer fees be used exclusively to implement the CSO LTCP. This practice must stop.

If the consent decree does not address these concerns, we will be raising our concerns again when EPA offers the consent decree for public comment if they are not resolved. Please contact me at 317-442-3973 or neltner@ikecoalition.org for more information. (T. Neltner, Silver Spring, MD)
Response: Thank you for your support of the plan as written.

We agree that septic systems are a priority, which is why we included the septic tank commitment in the long-term control plan. Our Septic Tank Elimination Program is designed to address the worst neighborhoods and greatest public health threats first. However, septic tank elimination needs to be considered within the context of the city's many clean water infrastructure needs, including raw sewage overflows, sewer backups into streets and basements, treatment plant repairs, aging sewers needing rehabilitation, and fast-growing areas needing more sewer capacity. All pieces of the puzzle need to fit together. We need to ensure that solving a problem in one neighborhood doesn't transfer it to another area. Our 20-year schedule to eliminate 18,000 septic systems throughout Marion County is both appropriate and protective of public health. Furthermore, the city believes there is no legal justification for including the Septic Tank Elimination Program in a federal consent decree.

Sanitary funds were recently approved to be loaned to Marion County to temporarily cover the cost of leasing 200 additional jail beds to address jail overcrowding and critical public safety needs. This loan, as approved in City-County Special Ordinance No. 5, 2006, must be repaid no later than June 30, 2007. This short-term loan will not affect our ability to deliver sewer improvement projects within the required schedule.

The Department of Public Works has made a commitment to provide information to interested persons on sewer connection applications that may affect downstream sewer capacity. However, it is not necessary to address this or any other city permit matter or ordinance in order to reach agreement with U.S. EPA on a consent decree relative to CSO discharges.

Comment: At long last, our "CSO – Long Term Control Plan" is here and out for public comment. For the record I personally would like to see even more done by our city to achieve a zero overflow capability; with that said, I realize this may not be a realistic goal.

The current CSO – Long Term Control Plan – DRAFT addresses the needs of the citizens of Indianapolis, the environment, and those who live downstream of Indianapolis. To reach the clean water levels specified by the State of Indiana and the U.S. Environmental Protection Agency ***is NOT going to be cheap or easy***. The cost of the improvements needed to achieve the state and federal guidelines will require the residents of Marion County to pay higher taxes in form of a monthly sewer user fee or "Sewer Bill." Over the next 20 years this monthly fee will triple or quadruple many residents' monthly cost, which I and most other residents are reluctantly willing to pay. The current administration, Clean Stream Team, and DPW staffs are all to be commended for doing a hard dirty job; which has been denied, hidden, ignored, and kept off the agenda for more than 30 years.

Outside the CSO Long Term Control Plan itself, I have some concerns. The sudden spike in the city's murder rate has driven the City of Indianapolis to take drastic action, which I do understand. However, I do not think that so many have labored for so long, and so hard in this effort just to see it turned into a slush fund for other monetary shortfalls. The operation and management of a large metropolitan city is an immense undertaking, which requires the administration to take quick drastic action in order to manage any situation which may arise at any minute: *i.e.* the transfer of sewer funds to cover short term law enforcement needs. However, vigilance must be maintained in these situations, for we are stepping out on to a slippery slope that can lead to a very hard and disappointing landing. If the city fails to live up to the spirit of the consent decree, the resulting damage and ill feelings will leave deep festering wounds that will eventually heal, over a long period of time, and leave scars that will last even longer.

Indianapolis has wasted far too much time avoiding this issue; it is time to move forward. I support the Indianapolis "CSO – Long Term Control Plan." (L. Bates, Indianapolis)
Response: Thank you for your comments and your support of the plan as written. As you noted, sanitary funds were recently approved to be loaned to Marion County to temporarily cover the cost of leasing 200 additional jail beds to address jail overcrowding and critical public safety needs. This loan, as approved in City-County Special Ordinance No. 5, 2006, must be repaid no later than June 30, 2007. This short-term loan will not affect our ability to deliver sewer improvement projects within the required schedule.

Comment: On behalf of Improving Kids' Environment, Inc., I would like to add my support to the City of Indianapolis' Long Term Control Plan and provide the following comments. Improving

Kids' Environment (IKE) is a not-for-profit advocacy organization that works to reduce environmental threats to children's health.

Since its founding in 1999, IKE has been concerned with combined sewer overflows and the health threats that raw sewage pose to children in Indianapolis, especially those living in Center Township where overflows have historically happened more frequently. IKE has worked closely with City personnel, IDEM and USEPA over the years that the long term control plan has been under development. And, IKE's founder and previous Executive Director filed an administrative complaint with the USEPA regarding the impacts that the municipal sewer system was having on minority neighborhoods.

IKE is very pleased to see this final plan and supports its final adoption. The measures contained in it, when implemented, will dramatically reduce the number of overflow events in our community and reduce the public health risk that these events pose. IKE notes the City's stated commitment to addressing failing septic systems over a 20 year period (§ 7.3.9) and shares the concerns expressed by others that this commitment be fully implemented. IKE also agrees that an important part of the plan must be a system for notifying the public, especially those downstream, of proposed additional sewer connections. IKE is concerned that these elements are not at present included in the draft Consent Decree. The public needs assurance that these programs will be implemented as described.

IKE also shares the concerns expressed by several other commenters that funds now planned for this important program not be diverted to pay for other current or future city needs, worthy as they may be.

Finally, IKE urges the City to continue its efforts to make information about progress of implementation of the long term control plan available to the citizens on an ongoing basis. Especially as sewer bills increase, making sure that the public knows that their money is being put to good and proper use is critical.

Thank you for the opportunity to comment on this plan. IKE looks forward to its implementation and improved water quality in Indianapolis. (J. McCabe, Improving Kids' Environment, Indianapolis)

Response: Thank you for your support of the plan as written.

We agree that septic systems are a priority, which is why we included the septic tank commitment in the long-term control plan. Our Septic Tank Elimination Program is designed to address the worst neighborhoods and greatest public health threats first. However, septic tank elimination needs to be considered within the context of the city's many clean water infrastructure needs, including raw sewage overflows, sewer backups into streets and basements, treatment plant repairs, aging sewers needing rehabilitation, and fast-growing areas needing more sewer capacity. All pieces of the puzzle need to fit together. We need to ensure that solving a problem in one neighborhood doesn't transfer it to another area. Our 20-year schedule to eliminate 18,000 septic systems throughout Marion County is both appropriate and protective of public health. Furthermore, the city believes there is no legal justification for including the Septic Tank Elimination Program in a federal consent decree.

Sanitary funds were recently approved to be loaned to Marion County to temporarily cover the cost of leasing 200 additional jail beds to address jail overcrowding and critical public safety needs. This loan, as approved in City-County Special Ordinance No. 5, 2006, must be repaid no later than June 30, 2007. This short-term loan will not affect our ability to deliver sewer improvement projects within the required schedule.

The Department of Public Works has made a commitment to provide information to interested persons on sewer connection applications that may affect downstream sewer capacity. However, it is not necessary to address this or any other city permit matter or ordinance in order to reach agreement with U.S. EPA on a consent decree relative to CSO discharges.

Finally, we do plan to continue to keep the public informed about progress in implementing the long-term control plan. We agree it will be important to demonstrate that funds are being spent wisely and water quality is improving.

Comment: I agree that the overall scope of the projects proposed is important for the City of Indianapolis to do.

I offer the following observations to assure that the intent is stated precisely and the explanations given in a compelling manner.

1. **The specific criteria to determine compliance with the performance commitment are inadequately written.** The critical criteria appear to be stated in footnotes 1 and 6 of Table 7-5 as achievement of both 1) 97% capture Fall Creek and 95% capture for other receiving waters and 2) 2 CSO events for Fall Creek Watershed and 4 CSO events in other waters in a "typical year." That is clear if "typical year" is clearly established. The footnote says it is the period of "1996 to 2000", which is a clearly defined quantity and distribution of precipitation. However it then adds the phrase "(or another subsequently approved five-year simulation period)." That phrase changes the end-point from one that is clearly defined to one that is an undefined moving target depending who "subsequently approves" an alternative precipitation characteristic for whatever reason.

   This could allow future parties responsible for agreement on either side to develop a misunderstanding of the end-point intended resulting in avoidable legal fighting at best and a solution significantly different than what is being agreed to at worst.

   The sentence ends with a second phrase that confuses matters further stating that the simulation of period 1996 to 2000 is to be done "in accordance with Section 8.4." Section 8.4 simply states that CSO post-construction monitoring will be done. That is excellent for future planning and to determine whether construction was appropriate but it has nothing to do with the simulation monitoring for the "typical year" that should be used to determine City compliance with commitments under this Long Term Control Plan.

2. **What is the written technical rationale for how the tunnels, related piping and other structures will not significantly harm ground water supply of City of Indianapolis?** In meetings there have been oral statements about either the unlikelihood of contamination or of steps that will be taken to prevent it. However, given that 50 and 100 years from now it is likely that the ground water aquifers under the City will be of greater value than at present, I would recommend the report record the current understanding of likelihood of significant contamination and anticipated commitment to detect or to prevent.

3. **Expand discussion of options for flow augmentation.**
   Removing CSO overflows to Fall Creek removes pollution as well as flow to Fall Creek. The report mentions in passing the possibility of flow augmentation as an option outside the LTCP obligations in chapter 7. The advisory group discussed other specific options and the importance of have a clear plan to address the question of adequate base flow in Fall Creek. This should be mentioned.

4. **Rephrase title and final sentence of 7.4.3**
   The LTCP is expected to "eliminate violations of 4.0 ml/L dissolved oxygen standard." That certainly is the expectation or, more appropriately given the physical realities of the waterways, the goal.

   That is different than achieving "aquatic life use attainment." "Full" aquatic life use may be impaired in other ways at various points in the waterways being addressed for physical, biological or chemical reasons, including the reason on paper of exceeding specific aquatic criteria for other parameters.

   A more accurate title would be "(E)limination of Low Dissolved Oxygen Impairment of Aquatic Life Use." A more accurate final sentence would be "(T)his is expected to create waterways with enough dissolved oxygen enough of the time to support a vigorous aquatic community." (I eliminated "restore" in my suggestion because that presupposes a pre-existing condition in some particular decade in the past with its particular land use drainage patterns that may or may not have been an aerobic setting. My reading of early settings in downtown Indy, for instance, has that as swamplands and original waterways draining the forested lands here were slow meandering streams.)

5. **Adjust use attainability rationale**
In chapter 9, first sentence, I would not say that complete elimination is “infeasible.” The case is that any feasible solution is unaffordable.

In second paragraph, the UAA is not a federal tool to “address the reality” of “limited periods” in which “urban waters are unsuitable for recreational use.” The UAA is just the justification that any state must use for changing its mind about the designated use that it earlier had agreed was appropriate to aspire to (by memorializing that decision in the state regulation) and which USEPA had agreed to use the power of the Clean Water Act to assist the state to achieve.

It is good to point out that of the many standards that could need to be changed, the City is only requesting the change for recreational use related to bacteria.

As I have said frequently before, until USEPA promulgates a regulation fleshing out the enigmatic “existing use” concept of the 1970’s, given the subsequent development of the strong tools of designated use, of water quality standards, of NPDES permit conditions and, arguably, of antidegradation, the idea of existing use should have to do with substantial government recognition that a water body is being used as a particular desired use. “Existing use”, just like designated use and indeed NPDES permit limits themselves thus far is a low-flow, steady-state concept. It does not fit well with wet weather. Common sense says that if a particular water body is a functioning trout stream, a state cannot redesignate it as a use that precludes it continuing as a functioning trout stream. If it is a bathing area that the community regards as an asset as a bathing beach, the state cannot redesignate it for a use that precludes that. It does not mean that the presence of a bather or of a trout automatically locks the state into a particular designation.

The City’s argument in section 9-3 should not be for the period of time of the specific storm events (9-3 parag 4) but for the entire length of time the state law grants the limited use designation. The local government should not want people to be engaged in recreation downstream of a CSO after an overflow. The government should, for public health reasons including and beyond the CSO issue, attempt to restrict people from recreating in urban run-off waters with pathogens.

9-3 parag 5 bullets one and four are correct. Anyone using these waters for that purpose has been engaging in a generally-regarded undesirable activity. Just because people do intentionally go over Niagra Falls does not meaning going over Niagra Falls should be considered a desirable use of the water.

Bullet points number two and three seem less compelling to me. If you argue that the criteria is whether people “are not known” to be in the water during a large storm event then you open the argument to counterpoints that 1) what if a group of people do become “known” to be in the water during a large storm event, 2) what about the back waters in a large storm event and 3) what about the waters three days after the storm event? To me the simple fact of whether people are known present is irrelevant for “existing use” for recreational use.

Bullet three is not a stand-alone reason. (As such it would have the characteristic circularity of the person pleading for mercy for killing his parents because he is an orphan.) Rather this should be part of bullet one as an explanation of why no own in his or her right mind should have to this point considered the waters a legitimate existing use.

Section 9.4.1 is generally a well-reasoned section regarding urban run-off. In parag 1 I would say “during and after” wet weather events. The core point is that in today’s urban setting, human and animal pathogens go into the drainage waters during storm events and remain after storm water events. Urban waters are “naturally” not places for recreational use unless a particular local government wishes to make a heroic effort to capture, clean, disinfect and return storm waters to the streams.

I did not understand how the second bullet related to the CSO text in the second part of the section. I do not understand the relation between the phrase “existence of combined sewer system” as a reason the waters should be redesignated with the paragraphs that were entirely describing how the absence of CSOs would not solve problem. Both are important points to state and explain but they are not connected this way. (B. Beranek, Indiana Environmental Institute, Inc., Indianapolis)

Response: Thank you for taking time to thoroughly review the plan and for your support of the projects proposed. The following are specific responses to your comments:

1. **The specific criteria to determine compliance with the performance commitment are inadequately written.**

   Response: Footnote 6 to Table 7-5 has been edited as shown below:

   > “[6] CSO Control Measures will be designed to achieve Performance Criteria of 97 percent capture for the Fall Creek watershed and 95 percent capture for other CSO receiving waters, and 2 CSO events for the Fall Creek watershed and 4 CSO events for each of the other CSO receiving waters in a “typical year.” “Typical year” performance, and achievement of Performance Criteria, shall be assessed in accordance with Section 8.4 (Post-Construction Monitoring) using the average annual statistics generated by the collection system model for the representative five-year simulation period of 1996 to 2000 (or another ~~subsequently approved~~ five-year simulation period subsequently proposed by the city and approved by IDEM and U.S. EPA~~). in accordance with Section 8.4 (Post-Construction Monitoring)~~ “

2. **What is the written technical rationale for how the tunnels, related piping and other structures will not significantly harm ground water supply of City of Indianapolis?**

   Response: The following paragraph has been added to Section 7.3.2 to describe the Groundwater Management Plan:

   > “Because groundwater is such an important resource for the City of Indianapolis, the city will take all necessary steps to prevent groundwater contamination during construction and operation of the deep tunnel along Fall Creek and White River. The city's Groundwater Management Plan includes the following components: 1) reviewing available groundwater data to evaluate where groundwater impacts might occur along the preliminary tunnel alignments; 2) developing a calibrated groundwater model to evaluate alternatives for tunnel construction in the bedrock; 3) developing a groundwater risk registry and mitigation controls to be considered during construction and future operation; and 4) reviewing specialized construction techniques to protect groundwater. The plan also includes information on recommended groundwater monitoring both during and after tunnel construction to verify groundwater protection.”

3. **Expand discussion of options for flow augmentation.**

   Response: We agree with the Clean Stream Team Advisory Committee on the importance of returning more base flow to Fall Creek. After initial study, the city's favored approach is construction of an effluent reuse force main to return flows from the Belmont Advanced Wastewater Treatment Plant to Fall Creek, and possibly other waterways. As noted in the LTCP, this will depend upon successful resolution of state and federal permitting issues. We believe the current discussion in the LTCP should remain as-is until further study and facility planning is completed.

4. **Rephrase title and final sentence of 7.4.3**

   Response: The subtitle and final sentence were edited to clarify the city's goal is to eliminate the dissolved oxygen impairment:

   > **"7.4.3 Dissolved Oxygen Standard ~~Aquatic Life Use~~ Attainment**
   >
   > "The selected plan is expected to eliminate violations of the 4.0 mg/L dissolved oxygen standard by achieving 95 percent capture in White River and 97 percent capture on Fall Creek. The city also plans to remove Boulevard Dam in Fall Creek, modify Chevy and Stout dams in White River, and provide aeration, if needed, within White River and Fall Creek to ensure attainment of the dissolved oxygen standard. This is expected to ensure sufficient dissolved oxygen to support a vigorous aquatic community in affected waterways."~~fully restore aquatic life uses in waterways affected by CSOs.~~

5. **Adjust use attainability rationale**

   Response: The first two paragraphs of Section 9 have been edited to read:

   > "~~While complete elimination of combined sewer overflows would be both unaffordable and infeasible, t~~The selected long-term control plan will achieve an extremely high level of CSO control, resulting ~~. Specifically, the LTCP is expected to result~~ in the capture of 95-97 percent of CSO volumes after full program implementation. This is an extraordinary level of control of urban stormwater throughout the CSO area.
   >
   > "Nevertheless, a few residual CSOs will occur during storms that exceed the LTCP design and performance criteria. This will result in limited periods when CSOs would combine with other pollutant sources (and issues, such as stream flow/velocity) to make urban waters unsuitable for recreational use. ~~To address this reality, f~~Federal and state laws provide a process for refining designated uses through a Use Attainability Analysis (UAA). The UAA is an analysis to identify attainable use designations for CSO receiving waters."

   The existing use text you reference in Section 9.3 summarizes the existing use submittal presented to IDEM in 2004, which IDEM has already approved for a 3-month storm. There is no need to change our rationale at this time, and the city believes all four arguments are valid.

   The first sentence in the first paragraph of Section 9.4.1 was edited to read "during and after wet weather events."

   In Section 9.4.1, the city is required to demonstrate that:

> "Human-caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place."

The second bullet in Section 9.4.1 identifies the combined sewer system as a human-caused condition that prevents the attainment of the recreational use. The city's alternatives analysis determined that while the combined sewer system could be "remedied" through sewer separation, this solution would cause more environmental damage than leaving the combined sewer system in place and retrofitting it with the proposed storage and conveyance facilities. Figure 9-1 illustrates this point, showing that full sewer separation would not achieve more days of recreational use, and would in some cases achieve fewer days.

Comment: The long term plans to decrease pollution overflow into Pogues Run are inadequate. There is a long history on the near-eastside of trying to get the city to clean up our creek. While canals have been built, and now money will finally be spent on partial cures, this portion of the city's waterway has still been mostly ignored.

Some near-east neighbors sent in pictures this past year of local children swimming in our creek. Many of those kids cannot even afford the charges at the Brookside pool for summer swimming. While parents warn their kids against the creek, it is sad that they would need to do so. It is sad that the city builds canals while ignoring this natural city creek.

There are pictures of local community activist back in 1978 protesting with signs reading: We're tired of turning the other cheek. Help us clean up our creek!

On the posters they displayed, the level of fecal coliform levels was listed as high as 11,000,000 colonies per 100 milliliters, while the state law was a maximum limit of 2000.
A recent article in the Star newspaper displayed that levels are still dismally high. This plan offers little to actually clean that up in this area.

While like most, I have not had the time to carefully study the large document in our library concerning the plans, to my knowledge, the only thing in the plans for areas east of the Harshman/Tech high school area are for a couple " bladders" which hold the sewage during overflow, and then slowly release it back into the creek. Rather than actually separating the sewers here on the near eastside, the plan is to continue to let them overflow into our creek.

In gathering the stats you have in your proposal on community "approval" for the plan that ignores this area, a large number from our community showed up for a meeting where they were showed samples of water: Clean and clear, gray, or black. They were told that to have crystal clear water in our stream they would face sewer bills of over $100 per month, or they could have light 'gray' water (rather than the current dark gray) for about $60 mo. Being a very poor area, they voted for the 60 percent solution. But that was sheer manipulation. Poorer residents, like everyone else, want clean waterways. And while paying a far greater percentage of their income for clear water, they are getting far dirtier water with this plan.

Then, another PR session for the current plan by the city where they talked about how they would create a 'wetlands' in Brookside park, when they simply dug out an area hoping to catch some of the sewage overflow before it hit downtown areas and avoid fines from the EPA for how high it was testing. It has been said it was not positioned properly, and failed at that task. We jokingly refer to it as our 'gray poo pond'.

What is even more baffling is the fact that it was said that in testing, the worst levels of pollutants were found at Emerson and Pogues Run. That is east of all the combined sewer overflows (the creek runs from east to west). When asked if they had investigated the source of that pollution since it was east of the combined sewer overflows, they responded that funds were too limited to do that!?! We would like that investigated, and the sources forced to clean up our creek!

A belief in environmental ethics and a concern for our city's poorer area's kids is needed in these plans. Honest testing and tracking down the sources of pollution is needed in this plan. Canals and waterways should not just be for the rich. Local kids should have clean natural creeks to play along, even swim in. We have a long history of ‘turning the other cheek’; please, clean up our creek. It is a big asset to the city to have a creek running through downtown neighborhoods. Don’t stick ‘sewer bladders’ in it! Clean it up. (K. Siner, Indianapolis)

Response: Thank you for your comments. However, your description of the city’s plans for Pogues Run is not accurate. In addition to the inflatable dams and work at Harshman Middle School/Arsenal Tech High School that you mention, the city has many other projects planned for Upper Pogues Run. Those projects are described in Section 7.3.3 of the plan and include:

- **Sewer separation for CSO 143:** Sewer separation will be implemented within the combined sewer area near to CSO 143, thus eliminating this remote sewer overflow upstream of Forest Manor Park.

- **Upper Pogues Run Improvements:** An underground storage facility will be constructed near Spades Park to store flows from nine outfalls located in Forest Manor, Brookside and Spades parks. The facility will temporarily store combined sewage during a storm, until the existing interceptors have capacity to convey flow to the Belmont AWT plant. A large collection sewer will be constructed to convey captured CSO flow from CSOs 102, 101, 100, 099, 098, 097, 096, 095, and 036 to the underground storage facility.

We are sending you a fact sheet describing these plans and including a map of proposed projects.

Your description of the samples shown at the October 2004 public meeting also is not accurate. The three jars contained dark sewage sludge found in our waterways, gray-looking raw sewage entering our treatment plants, and clear treated water coming out of our treatment plants. The city’s plan will maximize the amount of sewage receiving full treatment. The $100 option wasn’t for “crystal clear” water, but for sewer separation, which actually would result in more polluted urban stormwater in Pogues Run. The $60 option, which the city chose, will ensure that 95-97 percent of our sewage in wet weather gets full treatment represented by the third jar. Some overflows will still occur, but only during the largest storms when people are not using the streams. On Pogues Run, about 60 storms in a typical year cause overflows of raw sewage today. When the plan is complete, just four storms will cause overflows in a year with typical rainfall.

We are aware of the “poo pond” moniker given to the dry retention pond in Brookside Park, but it was never intended to hold “sewage.” It was built to capture floodwater from Pogues Run when it floods during the heaviest rainstorms. The retention pond is the last stage of a two-stage flood control system for Pogues Run. The basin built at Interstate 70/Emerson Avenue is designed to fill up with floodwaters first, followed by the Brookside Park pond only during the largest storms. To date, we have not had a storm large enough to require use of the Brookside Park retention pond. This flood control project is working as it was designed.

We agree that Pogues Run is a community asset and our plan will make dramatic improvements to the creek. The city has moved forward aggressively to improve water quality and flood control in Pogues Run, with many projects already constructed. However, urban waterways will never be pristine natural creeks, at least not with the technology we have today. Parents should still warn their children away from the creek and make sure they wash their hands after contact with any urban stream.

The Department of Public Works and Clean Stream Team would be happy to meet with neighborhood groups in the Pogues Run area to discuss the proposed plan and address any questions or concerns you may have.

Comments from Public Hearing

Comment: My name is Sandhya Markand and I’m with the Greater Indianapolis Chamber of Commerce. We are a nonprofit member-based organization that represents the business community. Dating back to 1991, the Indianapolis Chamber of Commerce has been a strong advocate for updating the city’s infrastructure system. Within the last five years, we have maintained our support to fix our sewers and clean our waterways by backing the stormwater utility rates. The business community realizes the importance of a high-quality infrastructure system in order to increase the growth of economic development within our region. We

understand that the higher investments we make in the upcoming years will better our community as well as the expansion of business and industry. Our members would like to ensure that the rate increase dollars are spent on projects designed to improve our sewers and water. The Indianapolis Chamber is pleased to see the city move forward with these projects and will continue to support this effort. (S. Markand, Indianapolis Chamber of Commerce)
Response: Thank you for giving the business community's support for this plan. We agree that our infrastructure will help encourage continued economic growth, as well as improved public health. As you stated, sanitary funds were recently loaned to Marion County to temporarily cover the cost of leasing 200 additional jail beds to address jail overcrowding and critical public safety needs. This loan, as approved in City-County Special Ordinance No. 5, 2006, must be repaid no later than June 30, 2007. This short-term loan will not affect our ability to deliver sewer improvement projects within the required schedule.

Comment: I wanted to take a minute just to tell a little story. I think that this is a really important effort, and I want to congratulate the city for moving forward on it in a very serious way. A couple of years ago I had the opportunity to take some visitors from Milwaukee out to look at some aspects of our sewer system. They were interested in that because Milwaukee was sort of re-evaluating their sewer upgrades. But we went out on a day similar to this one, a very hot day, and we found people along Fall Creek, quite a few people, sitting their with lawn chairs and fishing poles, their feet in the water, you know, really enjoying the stream. And just right while we were there – and they didn't have their cameras – there was a cloudburst and it started raining really hard for a very short time. And then the storm passed and a rainbow came out, and seriously, it was very photogenic, but those people did not move. You know, they stayed there, and I'm thinking that the sewers are probably overflowing and these people may or may not know that, but they're still in the stream.

So, I think that our use of the stream is an important focal point for many members of our community, and I think the process for this plan and its development has been a really solid process. There are some aspects of it that we would like to see tweaked a little bit. We'd like to see more emphasis on water conservation, and that is something that we have brought up over and over, but it seems somehow distinct from this planning process, whereas we see it more as inherently related, because if we can reduce our water use, we can reduce the flow in the sewer pipes, and possibly even minimize our infrastructure expenses. So, we'd like to see more emphasis on water conservation, and we would also like to see more emphasis on infiltration through something like leaching basins or constructed wetlands, biofilters. Of course, the downspout disconnection is an important factor, but what do you do with that downspout water? Well, one thing that a lot of cities have done is construct rain gardens and promote rain gardens. These are very popular in Chicago and Milwaukee.

So, there are ways to use the soil to filter that water and recharge the groundwater and slow down the flow of our stormwater getting to the streams. I saw on the CD-Rom I saw some mention of the leaching basins, and there was kind of a dismissal of them because it said there was potential for groundwater contamination, but I've seen several EPA publications that say these leaching basins are very effective, and I'd like to ask the city to take another look at that. Again, those are kind of just tweaking the technical aspects of the plan. I guess our biggest concern is with the use attainability analysis part of the plan, kind of the last chapter, which to paraphrase, is saying that since the waters have never met the water quality standards for recreation, the recreational use has not existed, and we know a lot of people are out there recreating in the stream so we would hate to see that recreational use designation removed. I think I'll stop there. Thanks. (R. Schnapp, Hoosier Environmental Council)
Response: The city agrees that water conservation measures and improved stormwater management are important elements to improved water quality and water resource management. For this reason, the city requires property owners disturbing more than a half-acre of land in the combined sewer area to install stormwater best management practices as part of their development project. By requiring BMPs within the combined sewer area, the city has exceeded its stormwater permit requirements and demonstrated its resolve to better control stormwater runoff in order to mitigate combined sewer overflows. Our analysis of long-term sewer overflow

solutions did not rely on these efforts, however, because water conservation, rain garden programs and similar approaches require voluntary efforts by property owners with benefits that cannot be guaranteed. This does not preclude the city from encouraging water conservation and better stormwater management as it implements the long-term plan.

The city has worked with IDEM to achieve a decision on the interpretation of "existing use," which is concept written in federal regulations to protect waterways that have "actually attained" a beneficial use. On June 27, 2005, IDEM issued a letter to the city agreeing that there are no existing uses that would preclude a refinement of the designated recreational use during severe wet-weather events and resultant CSOs. The text in the long-term control plan merely summarizes the existing use submittal presented to IDEM and the agency's decision. IDEM's decision enabled the city to move forward with a Use Attainability Analysis to determine what recreational uses can be attained on CSO-impacted waterways. The UAA also will go through a public comment and review process before the designated recreational use can be modified. We look forward to working with IDEM, EPA and interested stakeholders during this process.

Comment: My name is John Trypus. I'm an environmental engineer. I just wanted to comment on the Indianapolis long-term control plan in the context that I moved to Indianapolis about two years ago and spent over 30 years in Washington, DC, and have personal involvement in working on their CSO long-term control plan. In 2004 they implemented a signed a similar consent decree as Indianapolis has started the process, and their overall plan, a $2 billion program, was similar, with a tunnel system, and provided a good benefit for water quality at the best affordable rate. In reviewing the Indianapolis one, I think it's also a good plan that's good for the ratepayers. (J. Trypus)
Response: Thank you for your comments and support.

Comment: My name is Turae Dabney and I'm here representing the Indianapolis Black Chamber of Commerce. Our organization's mission is to educate, advocate and enhance Greater Indianapolis through black businesses. The purpose of my comments today is to look at the economic development side of this project, and very simply, we want to encourage you and the city to comply with the 15 percent MBE participation in the construction of this project. We are happy about – and excited – about the health improvements, but want to encourage, as I said, again, to include – have more inclusion of the 15 percent MBE participation in accordance to the city's ordinance. (T. Dabney, Indianapolis Black Chamber of Commerce)
Response: Thank you for your comments. The City of Indianapolis is committed to meeting the 15 percent MBE participation goal as it implements this important program.

Comment: First of all, I'd like to thank you for moving forward with the project, and also for going over and above what the EPA required. Whenever you go over and above the call of duty, that's a good thing. I think there are some additional – or in addition to the practical benefits of reducing the overflows, there are some spin-off benefits. The waterways that would enjoy the greatest improvements or changes are the ones that are the most underutilized today, which is why the project is so important. Upon substantial completion, the waterways will become areas where people will actually want to congregate, which is different than the way they are now. Because these blighted areas are areas where people don't congregate but where they will, I believe there will be some economic development potential in the waterways. One potential economic development benefit might be trying to attract water sports. I'm not sure if it's practical or feasible, I'm not sure if our waterways are wide enough or deep enough or configured in the correct way, but if they are and if we could attract a nationally recognized – preferably nationally televised – water sporting event, that would be a good feather in our cap as we move forward with this project. In terms of the increase in tax, I am not an advocate of increased taxes, but I am an advocate of structuring tax increases appropriately, and I believe the structure is appropriate. It's a little bit at a time, which is really good. Having said that, what's a little bit to me might be a lot to someone else, but I do believe that the structure is a good structure. So, I ask that you all move forward with all deliberate speed, and I look forward to improving these assets. (T. Aden, Indianapolis)

Response: Thank you for your comments. We agree that this program will add value to waterways that are underutilized today. We expect there will be many economic benefits as a result of the project. One key to continued economic growth will be structuring rate increases so they are affordable for our residents and competitive with other cities. We will strive to do both.

Summary of Changes to Indianapolis LTCP in Response to Public Comment
September 6, 2006

Executive Summary: Non-substantive changes were made to pages 2 and 19 to remove references to public comment period.

Section 1: Minor change to page 1 to remove reference to public comment version of plan.

Section 2: Corrected redundant references to pesticides on pages 2-5 and 2-103.

Section 3: Reference to chemical formula for ozone deleted from page 3-14.

Section 4: No changes

Section 5: Public Works Board and advisory committee members updated. Added new Section 5.9 to document 2006 public comment period, comments received and city's responses.

Section 6: No changes.

Section 7: Three changes:

Table 7-5/Exhibit 1 – Edits to Footnote 6:

> [6] CSO Control Measures will be designed to achieve Performance Criteria of 97 percent capture for the Fall Creek watershed and 95 percent capture for other CSO receiving waters, and 2 CSO events for the Fall Creek watershed and 4 CSO events for each of the other CSO receiving waters in a "typical year." "Typical year" performance, and achievement of Performance Criteria, shall be assessed in accordance with Section 8.4 (Post-Construction Monitoring) using the average annual statistics generated by the collection system model for the representative five-year simulation period of 1996 to 2000 (or another ~~subsequently approved~~ five-year simulation period subsequently proposed by the city and approved by IDEM and U.S. EPA)~~. in accordance with Section 8.4 (Post-Construction Monitoring)~~

7.3.2 Fall Creek Control Measures: A new paragraph was added to explain how the city will prevent and detect groundwater contamination from the tunnel. The paragraph reads:

> Because groundwater is such an important resource for the City of Indianapolis, the city will take all necessary steps to prevent groundwater contamination during construction and operation of the deep tunnel along Fall Creek and White River. The city's Groundwater Management Plan includes the following components: 1) reviewing available groundwater data to evaluate where groundwater impacts might occur along the preliminary tunnel alignments; 2) developing a calibrated groundwater model to evaluate alternatives for tunnel construction in the bedrock; 3) developing a groundwater risk registry and mitigation controls to be considered during construction and future operation; and 4) reviewing specialized construction techniques to protect groundwater. The plan also includes information on recommended groundwater monitoring both during and after tunnel construction to verify groundwater protection.

7.4.3 Aquatic Life Use Attainment: Subtitle and final sentence were edited to clarify the goal is to eliminate the dissolved oxygen impairment.

7.4.3 Dissolved Oxygen Standard ~~Aquatic Life Use~~ Attainment

The selected plan is expected to eliminate violations of the 4.0 mg/L dissolved oxygen standard by achieving 95 percent capture in White River and 97 percent capture on Fall Creek. The city also plans to remove Boulevard Dam in Fall Creek, modify Chevy and Stout dams in White River, and provide aeration, if needed, within White River and Fall Creek to ensure attainment of the dissolved oxygen standard. This is expected to ensure sufficient dissolved oxygen to support a vigorous aquatic community in affected waterways."~~fully restore aquatic life uses in waterways affected by CSOs.~~

Section 8: No changes.

Section 9: First two paragraphs were edited to read:

~~While complete elimination of combined sewer overflows would be both unaffordable and infeasible, t~~The selected long-term control plan will achieve an extremely high level of CSO control, resulting ~~. Specifically, the LTCP is expected to result~~ in the capture of 95-97 percent of CSO volumes after full program implementation. This is an extraordinary level of control of urban stormwater throughout the CSO area.

"Nevertheless, a few residual CSOs will occur during storms that exceed the LTCP design and performance criteria. This will result in limited periods when CSOs would combine with other pollutant sources (and issues, such as stream flow/velocity) to make urban waters unsuitable for recreational use. ~~To address this reality, f~~Federal and state laws provide a process for refining designated uses through a Use Attainability Analysis (UAA). The UAA is an analysis to identify attainable use designations for CSO receiving waters."

Section 9.4.1: First sentence in first paragraph was edited to read "during and after wet weather events."

Not surprisingly in these urban waters, there are human-caused conditions and sources of pollution that prevent full attainment of the recreational use during and after wet weather events.

Appendix D-2

Public Outreach Documentation – Post CSO LTCP Approval

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

City of Indianapolis’
Clean Streams-Healthy Neighborhoods Program

August 20, 2009

David Sherman, Director
Department of Public Works

DPW

INDIANAPOLIS
CLEAN STREAM TEAM

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

INDIANAPOLIS CLEAN STREAM TEAM

Agenda

- Program overview
  - Addressing raw sewage overflows under the Environmental Protection Agency’s mandated consent decree
  - Rehabilitating aging sewers, increasing capacity, eliminating failing septic systems and improving drainage and flood control
- Key projects
- Financing updates
- Value Engineering initiatives

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

INDIANAPOLIS CLEAN STREAM TEAM

City's 20-Year Plan to Reduce Raw Sewage Overflows

- Required under a federally mandated agreement (consent decree) with state and federal regulatory agencies
- $1.7 billion estimated cost (in 2004 dollars); Completed by 2025
- Long Term Control Plan goals by 2025:
  - Come into compliance with state and federal Clean Water Act and NPDES permit requirements
  - Reduced average overflow frequency from 45 to 80 times per year to two to four times per year on average
  - Capture up to 97 percent of raw sewage overflow volume that otherwise would be released into waterways
  - Reduce overflows in a cost effective manner

City's 20-Year Plan to Reduce Raw Sewage Overflows

- Consent Decree (CD)
  - 12 of 31 CSO control measures complete (~$70 million)
  - 3 of 7 SSD control measures complete (~$10 million)
  - IDEM and EPA approved the first amendment to the CD in April 2009
- CD Projects to be completed by Dec. 31, 2013
  - CSO 205 Relocation: Reroute CSO to Lift Station 507
  - Lift Station 507
  - Pogues Run CSO 143 Sewer Separation
  - Belmont Secondary Treatment
  - Castleton Relief Sewer

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

INDIANAPOLIS CLEAN STREAM TEAM

City's 20-Year Plan to Reduce Raw Sewage Overflows

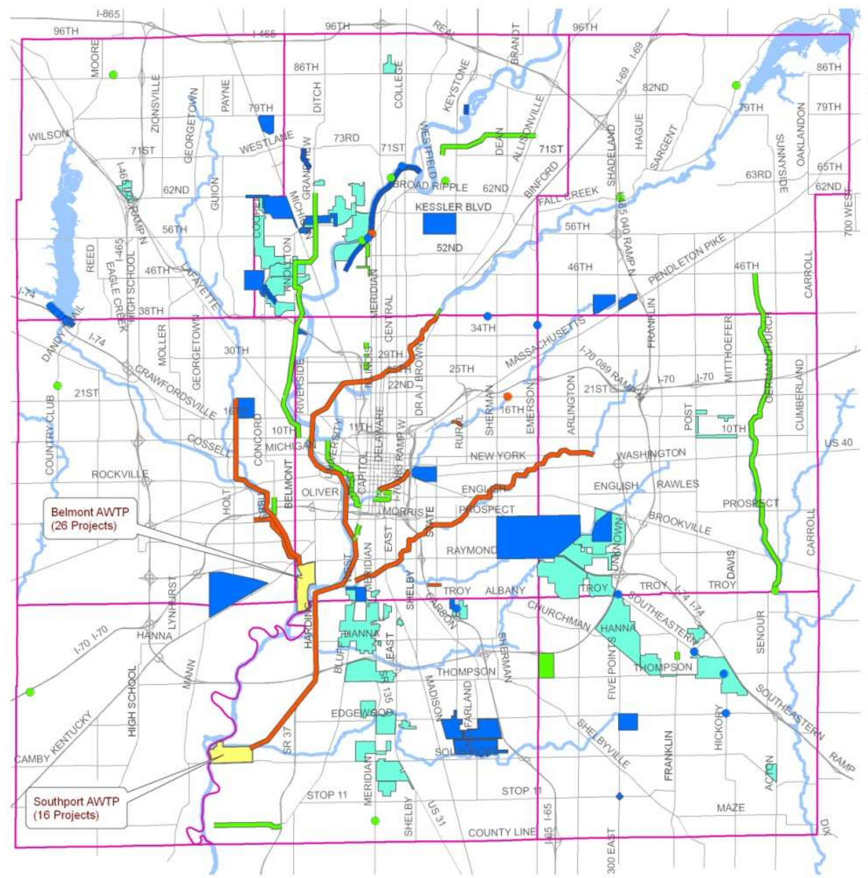
- Major plan components:
  - Deep Rock Tunnel Connector, 18 feet in diameter
  - Storage Tunnels (16' to 18') in deep rock along White River, Fall Creek, Pogues Run and Pleasant Run
  - Large consolidation sewers and interceptors to capture overflows and convey to Tunnel Storage
  - Sewer separation with "green solutions" in some neighborhoods
  - Major treatment plant upgrades

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

INDIANAPOLIS
CLEAN STREAM TEAM

2009-2013 Capital Improvement Program

- $750 million sanitary 2009-2013 capital program
- $75 million storm water 2009-2013 capital program
- Benefits throughout Indianapolis
- City will remain in compliance with federal consent decree for CSO LTCP



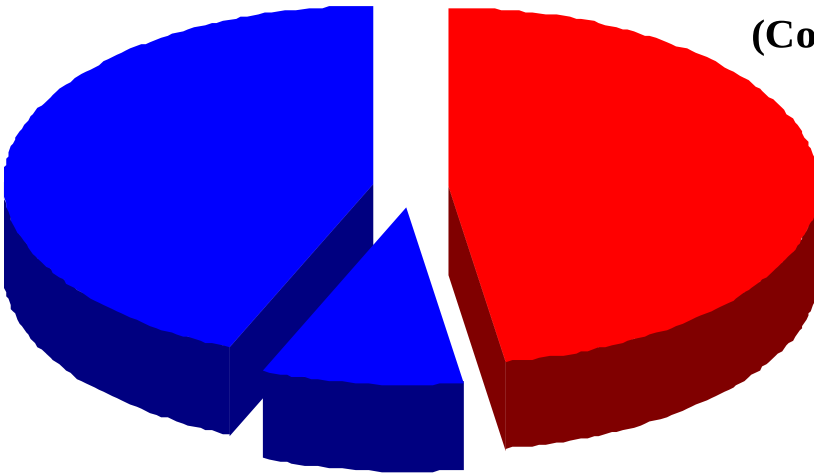
CLEAN STREAMS
HEALTHY NEIGHBORHOODS

DPW
INDIANAPOLIS CLEAN STREAM TEAM

Consent Decree and City-Controlled 20-Year Capital Program (2005-2025)

Rehabilitation/Expansion (City Controlled) ($1.5 Billion)

Long Term Control Plan (Consent Decree) ($1.7 Billion)



Septic Tank Elimination Program (STEP) (City Controlled) ($0.3 Billion)

Sanitary Capital Program Projects and Highlights

Sanitary Sewer and Treatment Plant Improvements

- Addressing sewer needs outside the old city limits
- Additional improvements are needed to:
  - Maintain and upgrade the city's sewage treatment plants
  - Rehabilitate aging sewers and increase sewer capacity
  - Keep sewage pumps and lift stations in working order

Key Sanitary Projects 2009-2013

- Deep Rock Tunnel Connector
- Fall Creek/White River Tunnel
- Belmont North Relief Interceptor
- Wet Weather Secondary Treatment Project
- Castleton Relief Sewer
- East Marion County Interceptor

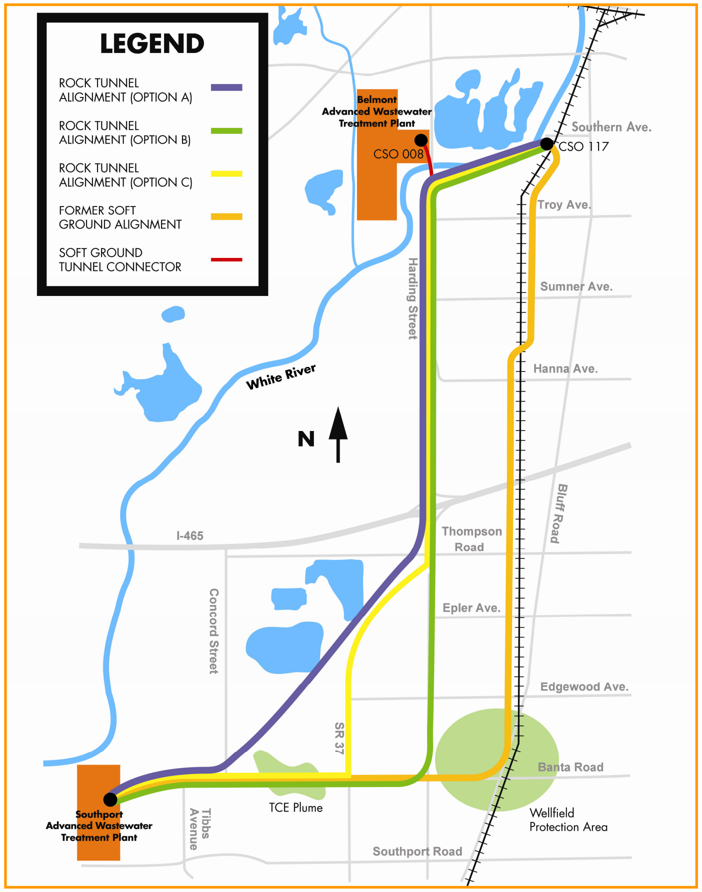
CLEAN STREAMS
HEALTHY NEIGHBORHOODS

INDIANAPOLIS CLEAN STREAM TEAM

Sanitary Capital Program Projects and Highlights (2009 – 2013)

Deep Rock Tunnel Connector

- In design
- First large-scale project of the CD
- Phase I of the Fall Creek/White River tunnel system
- Addresses CSO 117 as well as CSO 008 (3.5 years earlier than anticipated)
- Tunnel will be 18 feet in diameter
- Increased storage capacity
- Construction will begin by May 31, 2011 to meet CD requirements
- Recent amendment to the CD allows the Deep Rock Tunnel to be built 250 feet below ground through reusable limestone
- Estimated project cost: $257 million



Sanitary Capital Program Projects and Highlights (2009 – 2013)

Fall Creek/White River Tunnel

- In planning
- Tunnel storage and conveyance system to capture overflows along both Fall Creek and White River
- Will reduce raw sewage overflows
- Estimated project cost: $562 million

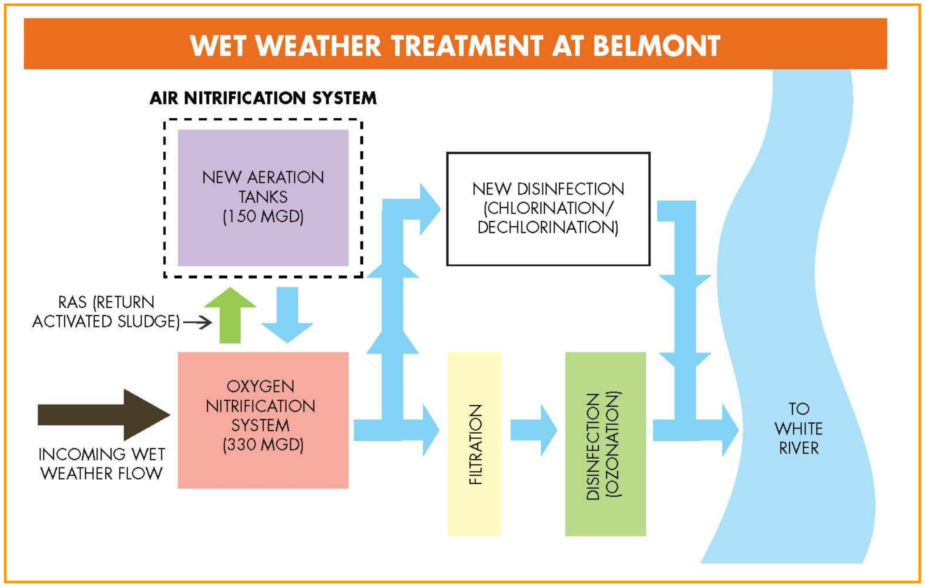
CLEAN STREAMS
HEALTHY NEIGHBORHOODS

INDIANAPOLIS CLEAN STREAM TEAM

Sanitary Capital Program Projects and Highlights (2009 – 2013)

Belmont Wet Weather Secondary Treatment

- In design
- Bid date: December 2009
- Project will double the peak secondary biological treatment capacity and eliminate primary effluent bypass at the Belmont Advanced Wastewater Treatment Plant (AWT)
- Estimated project cost: $120 million



Sanitary Capital Program Projects and Highlights (2009 – 2013)

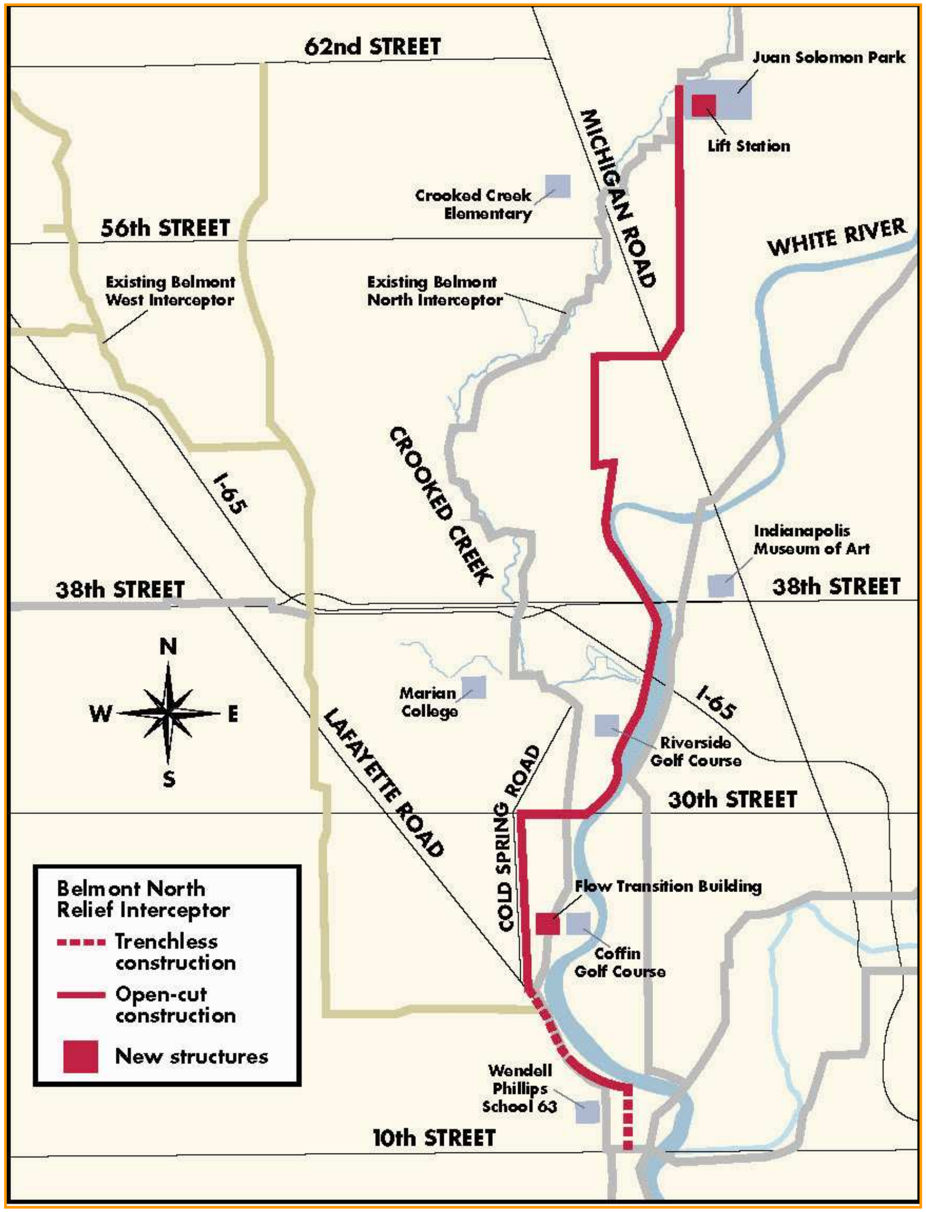
Belmont North Relief Interceptor

- Phase I, in construction
- Phase II, bids September 2009
- Construction to be completed by late 2011
- Seven mile relief interceptor to relieve capacity issues
- Thousands of homes will be able to connect to the sanitary sewer through STEP
- Project includes a lift station and flow transition building
- Project cost estimated at $100 million for planning, design, construction and inspection
- Value engineering has identified nearly $50 million in capital project cost savings

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

INDIANAPOLIS CLEAN STREAM TEAM

- Belmont North Relief Interceptor alignment



CLEAN STREAMS
HEALTHY NEIGHBORHOODS

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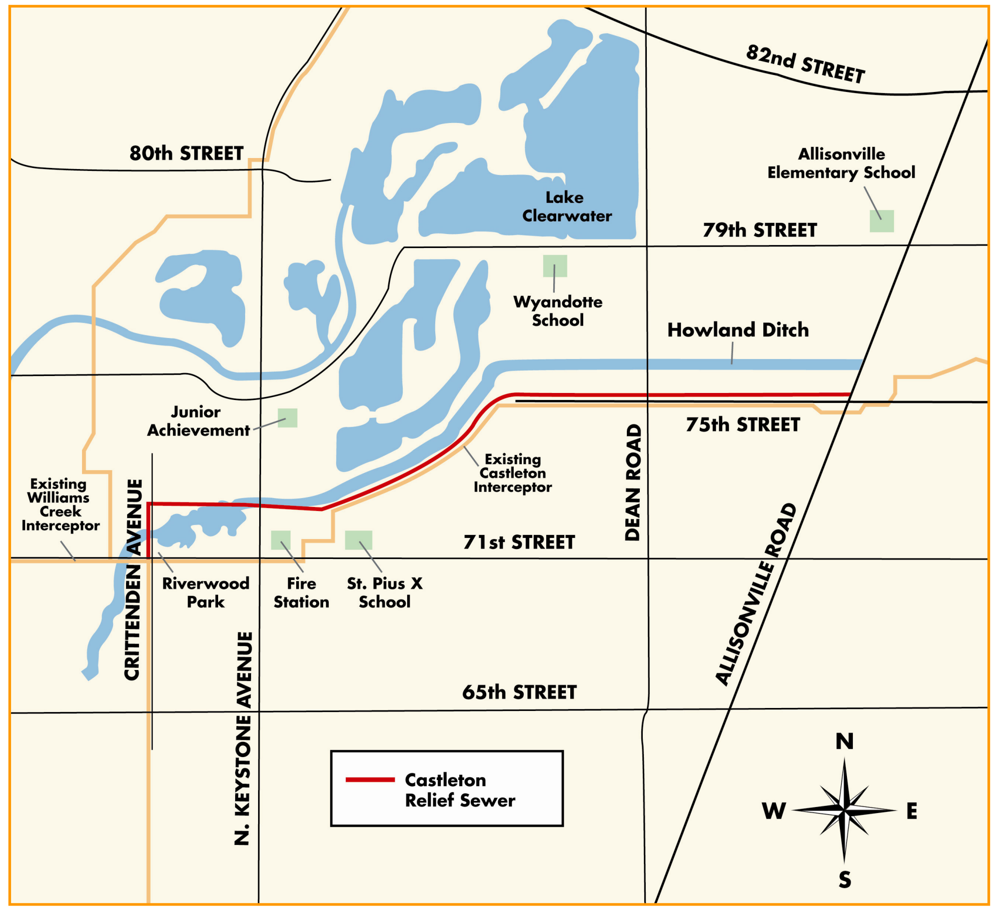
Sanitary Capital Program Projects and Highlights (2009 – 2013)

Castleton Relief Sewer

- In design
- Project bid date: December 2010
- Relief sewer on north side
- Eliminates sewer overflows into Howland Ditch/basement backups
- Increases sewer capacity, allowing for STEP connections
- Sewer be operational by December 2013 to meet CD requirements
- Estimated project cost: $15 million



CLEAN STREAMS
HEALTHY NEIGHBORHOODS

INDIANAPOLIS CLEAN STREAM TEAM

Sanitary Capital Program Projects and Highlights (2009 – 2013)

East Marion County Interceptor

- In planning
- Capacity problems due to growth in area and undersized lift station
- Facility plan is complete
- Lift Station 313 (Buck Creek) Upgrade
  - Located in southeastern Marion County
  - Upgrade capacity of undersized lift station
  - Estimated project cost: $7.28 million

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

DPW INDIANAPOLIS CLEAN STREAM TEAM

Septic Tank Elimination Program (STEP)

STEP SEPTIC TANK ELIMINATION PROGRAM

- More than 27,000 homes in Indianapolis are served by private septic systems
- The city will bring sewers to approximately 7,000 homes currently on septic systems from 2009 through 2013
- The STEP Master Plan Update has identified additional unsewered homes that were previously unidentified by the Barrett Law Master Plan

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

DPW INDIANAPOLIS CLEAN STREAM TEAM

Storm Water Capital Projects and Highlights (2009 – 2013)

- More than $300 million over 20 years is needed to address storm water issues throughout Indianapolis

Key Storm Water Projects 2009-2013

- Mars Hill Storm Water Improvements Project
- Highland Creek Storm Water Improvements Project
- 17th Street and Livingstone Avenue Area Drainage Improvements
- Indianapolis North Flood Damage Reduction Project

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

INDIANAPOLIS CLEAN STREAM TEAM

Storm Water Capital Projects and Highlights (2009 – 2013)

Mars Hill Storm Water Improvements

- Completed summer 2009
- Alleviated neighborhood and street flooding by diverting storm water runoff to State Ditch and an existing lake
- Closed off storm water inlet connections to the sanitary sewer, reducing clear water infiltration which contributes to raw sewage overflows
- Repaved streets to address drainage issues
- Project cost: $5.9 million

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

DPW INDIANAPOLIS CLEAN STREAM TEAM

Storm Water Capital Projects and Highlights (2009 – 2013)

Highland Creek Storm Water Improvements

- In design
- Reduce yearly flooding, address septic issues
- 80 percent of storm water redirected
- Storm water quality measures incorporated
- Anticipated construction start: Early 2010
- Estimated project cost: $1.5 million

17th Street and Livingstone Avenue Area Drainage Improvements

- In planning
- Phase I bid date: April 2010
- Neighborhood drainage improvements
- Estimated project cost: $9.25 million

CLEAN STREAMS
HEALTHY NEIGHBORHOODS

INDIANAPOLIS CLEAN STREAM TEAM

Storm Water Capital Projects and Highlights (2009 – 2013)

Indianapolis North Flood Damage Reduction Project

- Removal of approximately 2,400 homes from the 100-year floodplain
- Three phases of construction: South Warfleigh, Warfleigh and Monon-Broad Ripple
- City working with U.S. Army Corps of Engineers
- Estimated construction completion: Summer 2012
- Estimated project cost: $30 million
  - Indianapolis to pay 25 percent or $7.5 million
  - Federal funding to pay 75 percent or $22.5 million

Monon-Broad Ripple Section

Financing Updates

- Standard & Poor's upgraded the Indianapolis Sanitary District credit rating from AA to AA+ in July 2009
- The storm water district has also been upgraded to AA+ in August 2009
- City's strong management of the sanitary sewer capital improvement program and the federally mandated CD cited as reasons for upgrade
- The improved rating allows the city to borrow at a lower interest rate on future loans and help keep future sanitary sewer rates lower

Financing Updates

- Indianapolis closed a new loan agreement in July 2009
- Loan closed for $32.05 million with an interest rate of 2.58 percent
- Interest rate reduced from 2.84 percent, saving sanitary users more than $1 million in future investment payments over 20 years
- This loan includes construction of the following projects:
  - Belmont North Parallel Interceptor Phase I
  - Fox Hill/Hoover STEP project
  - Southeastern/Troy STEP project

Value Engineering Initiatives

- City is reviewing proposed enhancements to 14 control measures of the Consent Decree
- Enhancements would not delay progress or delay current compliance dates
- Includes a re-sequence of the schedule of projects to capture billions of gallons of sewage overflows sooner than originally scheduled
- Improve reliability and reduce operational risks
- Enhanced performance of new tunnels

Next steps

- EPA and IDEM reviewing the proposed CD enhancements
- EPA, IDEM and the City of Indianapolis must agree to final enhancements and amend the CD

Questions?

CWA Authority, Inc.
Long Term Control Plan Report - November 2017

Public Outreach and Community Activity Log

Date	Event
12/15/11	South Keystone STEP Preliminary Public Meeting
10/16/12	82nd Street - Meridian Road STEP Preliminary Public Meeting
05/15/13	CMAA Quarterly Meeting (Rathskeller)
07/18/13	62nd Street - Lafayette Road STEP Preliminary Public Meeting
08/08/13	Michigan Street - Pleasant Run Pky STEP Preliminary Public Meeting
08/15/13	ICA Leadership Development Committee/ERMCO office
08/19/13	77th Street - Hoover Road STEP Preliminary Public Meeting
09/30/13	Morris Street - Tibbs Avenue STEP Preliminary Public Meeting
10/28/13	Earlham Drive - Thompson Road STEP Preliminary Public Meeting
11/01/13	Dire States Documentary/DRTC Site
11/21/13	IWEA DRTC Construction Update Presentation
11/22/13	CEG SPG Hosted IWEA DRTC Tunnel Tour / DRTC Site
12/17/13	Wastewater Technical Advisory Group (TAG) DRTC Construction Update Presentation
01/16/14	CSI Monthly Meeting
01/17/14	Sharing the Dream Project
01/20/14	Society of Women Engineer's Event
01/21/14	Marion County Planning Consortium - Monthly Meeting
01/29/14	IMAA/JW Marriott
01/30/14	Met with the Indiana Fair Grounds
01/31/14	UCT DRTC Construction Update Presentation
02/10/14	Met with KIB
02/11/14	Mayor's Night Out at Franklin Central High School
02/18/14	National Engineer's Week Presentation/ Ben Davis High School

Public Outreach and Community Activity Log

Date	Event
02/18/14	Wastewater Technical Advisory Group (TAG) DRTC Construction & WR CCS Phase 1 Update Presentation
02/19/14	Marion County Planning Consortium - Monthly Meeting
02/19/14	National Engineer's Week Presentation/ Indianapolis Lighthouse Charter School
02/20/14	ISA Owner Network Pavillion/ JW Marriott
02/20/14	Engineer's Week Presentation / Fall Creek Valley Middle School
03/07/14	ROW - Reconnecting to Our Waterways Yearly Meeting / Old City Hall
03/13/14	Indiana Construction Roundtable - Industry Outreach Committee - Monthly Planning Meeting / ICR Offices, 200 N. Meridian
03/19/14	Marion County Planning Consortium - Monthly Meeting
03/19/14	Indy DPW Annual PPR Training - Keynote Presentation / 82nd Street Marriott
04/07/14	IUPUI CEMT Soils Class - Guest Lecture
04/10/14	Indiana Construction Roundtable - Industry Outreach Committee - Monthly Planning Meeting / ICR Offices, 200 N. Meridian
04/10/14	Mid-States Minority Supplier Development Council - Match Maker Sessions / JW Marriott
04/15/14	Wastewater Technical Advisory Group (TAG) DRTC, DRTC PS & WR CCS Phase 1 Update Presentation
04/21/14	Met with ROW
04/22/14	IUPUI Earth Day Celebration/Lilly Auditorium
04/30/14	Meeting with Mapleton Fall Creek
05/06/14	ROW - Reconnecting to Our Waterways Pogues Run Monthly meeting
05/13/14	Indiana Society of Professional Engineers Monthly Dinner Meeting
06/09/14	Marion County Planning Consortium - Monthly Meeting
06/24/14	Flanner House Meeting and DRTC Site Visit
07/08/14	Indiana Construction Roundtable - Industry Outreach Committee - Monthly Planning Meeting / ICR Offices, 200 N. Meridian
07/28/14	ROW - Pleasant Run Waterway Meeting
08/12/14	Citizens Wastewater TAG

CWA Authority, Inc.
Long Term Control Plan Report - November 2017

Public Outreach and Community Activity Log

Date	Event
08/12/14	Indiana Construction Roundtable - Industry Outreach Committee - Monthly Planning Meeting / ICR Offices, 200 N. Meridian
08/20/14	Indiana Energy Association - Utility Invitational
08/20/14	Marion County Planning Consortium - Monthly Meeting
08/25/14	ROW - Pleasant Run Waterway Meeting
09/06/14	White River Festival
09/08/14	Madison Avenue - Lilac Drive STEP Preliminary Public Meeting
09/19/14	Early Learning Center Svc. Project with Bowen
09/22/14	ROW - Pleasant Run Waterway Meeting
09/24/14	Marion County Planning Consortium - Thoroughfare Plan Stakeolders Meeting
09/25/14	Indiana Construction Roundtable - Quality Criterion Committee Meeting
09/25/14	Citizens Direct Business Opportunity Fair
10/14/14	Indiana Construction Roundtable - Annual Educational Event
10/21/14	Citizens Wastewater TAG
10/21/14	Irvington Community Council - Public Meeting
10/25/14	Citizens Tree Planting Day
10/27/14	ROW - Pleasant Run Waterway Meeting
10/28/14	Indiana Construction Roundtable - Leadership Committee Meeting
10/29/14	Indiana Construction Roundtable - Quality Criterion Committee Meeting
11/06/14	Little Eagle Creek Reconnecting Our Waterways Meeting
11/10/14	ACEC - Annual Business Networking Fair
11/11/14	Indiana Construction Roundtable - Outreach Committee
11/12/14	Carmel Middle School - Indianapolis Deep Tunnel Project Presentation
11/24/14	ROW - Pleasant Run Waterway Meeting

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Long Term Control Plan Report - November 2017

Public Outreach and Community Activity Log

Date	Event
12/02/14	Harrison Terrace Senior Community - Bowtie Breakfast
12/02/14	IUPUI CEMT Soils Class - Guest Lecture
12/04/14	Indiana Construction Roundtable - Quality Criterion Committee Meeting
12/05/14	Department of Minority and Women Business Development End of Year Forum
12/16/14	Citizens Wastewater TAG
01/15/15	Sharing the Dream Project
01/16/15	Sharing the Dream Project
01/20/15	CMAA monthly membership meeting
01/21/15	Marion County Planning Consortium - Thoroughfare Plan Stakeolders Meeting
01/22/15	Indiana Water Environment Association Executive Board Meeting
01/26/15	ROW-Pleasant Run Waterway Meeting
02/10/15	Indiana Construction Roundtable - Outreach Committee
02/16/15	Fox 59 Tunnel Tour
02/16/15	Indiana Construction Roundtable - Executive Committee Meeting
02/17/15	Citizens Wastewater TAG
02/19/15	Northwest Quality of Life Planning Group
02/19/15	Indiana Subcontractors Association
02/20/15	SKL Executive Leadership Business Group
02/22/15	United Way Oscar Night Party
02/23/15	National Engineer's Week Presentation/ Fall Creek Valley Middle School
02/23/15	Engineering Week Presentation at Pike High Scholl
02/26/15	Engineer's Week Presentation / Heritage Christian School
02/27/15	National Engineer's Week Presentation/Sheridan High School

CWA Authority, Inc.
Long Term Control Plan Report - November 2017

Public Outreach and Community Activity Log

Date	Event
03/06/15	Keep Indianapolis Beautiful Workshop
03/09/15	ROW Annual Meeting
03/23/15	Knightstown Intermediate School Presentations
04/09/15	Indiana Water Environment Association Executive Board Meeting
04/16/15	ACSCE Annual State Meeting Presentation
05/02/15	Indianapolis Mini-Marathon Waterstop
05/05/15	Rotary Club of Indianapolis Presentation
05/07/15	IWEA Strategic Planning Committee Meeting
05/12/15	Dawnbury Neighborhood Assn Mtg - 64th/Evanston project area STEP Preliminary Public Meeting
06/17/15	Public Meeting for Vermont & Cossell Main Extension Project
06/24/15	Community Relations Committee Jail II
09/25/15	Decatur Twp Land Use Committee STEP Preliminary Public Meeting

Indianapolis
Gregory A. Ballard, Mayor

PRESS RELEASE

FOR IMMEDIATE RELEASE
DECEMBER 1, 2010

MEDIA CONTACT:
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MAYOR DETAILS $740 MILLION IN TAXPAYER SAVINGS FOR MODIFIED COMBINED SEWER OVERFLOW CONSENT DECREE

Plan is latest in series of major achievements delivering savings, improved neighborhoods and quality of life to residents of Indianapolis

INDIANAPOLIS – Mayor Greg Ballard today detailed plans to save Indianapolis residents $740 million and provide cleaner waterways faster than originally planned. During a meeting of the Greater Indianapolis Progress Committee this morning, the Mayor discussed the savings ratepayers will realize from the city's modifications to the Consent Decree with the U.S. Environmental Protection Agency (EPA) and the Indiana Department of Environmental Management (IDEM). In addition to the savings, the improvements will divert ahead of schedule 3.5 billion gallons of sewage from polluting local waterways.

"Indianapolis was the first city in the nation to successfully renegotiate its agreement with the EPA. This announcement will save hundreds of millions of dollars for our residents, improve the environment and strengthen the city's position as a great place to do business," said Mayor Ballard.

The Combined Sewer Overflow (CSO) Consent Decree is an agreement between the City and the EPA and IDEM, under which Indianapolis developed and is executing a 20-year plan to curb the overflow of raw sewage from combined sewers into waterways. At Mayor Ballard's direction, the Indianapolis Department of Public Works (DPW) assessed the decree's cost-overruns and through value engineering achieved the modification plan, which will allow the City to meet the required Consent Decree performance criteria and 2025 timeline but in a more cost-effective manner.

"With these improvements, we can revise project schedules to increase capacity at the treatment plant as more overflows are captured, prevent more sewage from reaching our rivers and streams earlier, and use more cost-effective strategies," said DPW Director David Sherman.

The EPA, IDEM and the U.S. Department of Justice (DOJ) approved the plan on June 3. Final approval by the courts is required. The plan will modify 14 of the 32 Consent Decree control measures, provide new projects including pump stations, and change schedules and operational aspects to capture overflows earlier than initially planned.

"Like our community's streets, bridges and sidewalks, our sewer system is a component of Indianapolis' infrastructure that is woefully outdated and in need of repairs," said Bill Blomquist, president of the Infrastructure Advisory Commission. "I am very pleased to see CSO as a priority and one that is being tackled as aggressively as other major infrastructure needs."

The Consent Decree requires that, by 2025, the city capture and treat 97 percent of the sewage overflows in the Fall Creek watershed and 95 percent in the White River watershed in a typical year. By 2025, overflows will be allowed to occur during two storms per year on Fall Creek and four storms per year on White River and other waterways, in a typical year.

"It is very much in the interest of the business community, as well as that of every resident and organization in Marion County, that we address the sewage overflow issue aggressively," said Deborah Daniels, chairperson of the Greater Indianapolis Progress Committee. "I am gratified to see Mayor Ballard and his administration making these tremendous strides with efficiency – getting more done than planned, in less time, at lower cost."

In addition to its environmental and economic impact, the plan will help improve neighborhoods through design and construction of co-functional buildings and improvements at sites around the city including Juan Solomon Park and Coffin Golf Course. The plan has earned recognition from the EPA and other national organizations. Mayor Ballard presented details of the plan at the U.S. Conference of Mayors (USCOM) Water Committee in June and the American Water Summit in November and will travel to Washington, D.C., next week to present the City's major infrastructure improvements to an audience of national leaders at the USCOM Water Summit.

Citywide Tunnel System to Capture Sewage Overflows Years Ahead of Schedule
Currently, when Indianapolis experiences as little as a quarter inch of rain, combined sewers reach capacity and raw sewage overflows into local rivers and streams. To address raw sewage overflows, the City's Consent Decree requires a citywide storage tunnel system in which wastewater will be stored until space is available at the city's two wastewater treatment plants – Belmont Advanced Wastewater Treatment (AWT) Plant or Southport AWT Plant.

The citywide tunnel system will be comprised of five tunnels: the Deep Rock Tunnel Connector (formerly the Interplant Connection), Fall Creek, White River, Pleasant Run and Lower Pogues Run. The tunnel system will have the capacity to store 250 million gallons of raw sewage during large storm events and will significantly reduce raw sewage overflows. The tunnel system will address combined sewer overflow locations throughout Indianapolis by serving as a more integrated, underground storage facility for sewage.

The Deep Rock Tunnel Connector, which will extend from the Southport AWT Plant at Southport Road and Tibbs Avenue to north of the Belmont AWT Plant near the White River and Harding Street, will be the first phase of the tunnel system. From the Deep Rock Tunnel Connector, the four remaining storage tunnels will be extended along White River, Fall Creek, Pleasant Run and Pogues Run.

###

CLEAN WATER ACT SETTLEMENT WITH INDIANAPOLIS WILL REDUCE POLLUTION AT LOWER COSTS

WASHINGTON – The Department of Justice, the Environmental Protection Agency (EPA), and the state of Indiana have reached an agreement with the city of Indianapolis on important modifications to a 2006 consent decree that will make Indianapolis' sewer system more efficient, leading to major reductions in sewage contaminated water at a savings to the city of approximately $444 million.

Prior to 2006, the city of Indianapolis and its 800,000 residents experienced Combined Sewer Overflows (CSO's) totaling approximately 7.8 billion gallons per year. Combined sewer systems, which have not been constructed for decades in the United States, carry both sanitary wastewater (domestic sewage from homes, as well as industrial and commercial wastewater), and storm water runoff (from rainfall or snowmelt) in a single system of pipes to a publicly owned treatment works.

A consent decree approved by a federal court in 2006 required the city to construct 31 CSO control measures, including a 24-million gallon capacity shallow interceptor sewer, to reduce the city's overflows to approximately 642 million gallons per year. Those improvements were expected to cost approximately $1.73 billion over a 20-year period.

After the 2006 consent decree was approved, the city undertook additional engineering studies of its system and ultimately proposed a number of changes to its system to make it more efficient and to further reduce the numbers and volumes of overflows. The first change, which was approved in a 2009 amendment to the 2006 consent decree, eliminated the shallow interceptor in favor of a 54-million gallon, 25 mile long Deep Rock Tunnel Connector.

The second set of changes to the system would be achieved through the amendment announced today. With the proposed changes, the city is now expected to reduce the amount of total annual discharge to about 414 million gallons, a significant improvement from the 642 million gallons that were expected under the original consent decree, and reduce the cost of the project by about $444 million.

The project's modifications would also result in an accelerated construction schedule to capture 7 billion gallons of CSO discharges and their associated disease-causing organisms.

"Only under unique circumstances would we modify the terms of a settlement," said Ignacia S. Moreno, Assistant Attorney General for the Environment and Natural Resources Division of the Department of Justice. "The proposed modifications will benefit the environment and reduce costs for the city of Indianapolis. In my view, this is a classic 'win-win'"

"EPA is committed to enforcing laws that protect the public from discharges of raw sewage," said EPA Regional Administrator Susan Hedman. "As a result of the amendment, Indianapolis will further reduce its overflows and save money."

A copy of the proposed Amendment , which must be approved by a federal court, is available on the Justice Department website at www.justice.gov/enrd/Consent_Decrees.html .

10-1264

Environment and Natural Resources Division

Updated September 15, 2014

www.chicagotribune.com/news/chi-ap-in-seweroverflows-in,0,32472.story

chicagotribune.com

Indianapolis, US reach deal on sewage overflows

Associated Press

3:26 PM CST, November 8, 2010

INDIANAPOLIS

Federal officials have reached an agreement with Indianapolis that modifies the city's plans to reduce raw sewage overflows into several rivers and streams.

The Justice Department and Environmental Protection Agency announced the deal Monday.

The agreement modifies a 2006 consent decree. The new plan includes an accelerated construction schedule for the city's efforts to reduce sewage overflows from systems that carry both storm runoff and sanitary waste.

The new plan is expected to reduce overflows from about 7.8 billion gallons to about 414 million gallons per year.

The Justice Department says Indianapolis would save about $444 million of the original projected 20-year cost of $1.73 billion.

A federal judge must approve the agreement.

Indianapolis Gregory A. Ballard, Mayor
REBUILDINDY
Department of Public Works

NEWS RELEASE

FOR IMMEDIATE RELEASE
MARCH 2, 2011

MEDIA CONTACT:
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IMPROVEMENTS TO INDY'S SEWER PROGRAM NOTED AS FIRST OF ITS KIND IN NATION

COST SAVINGS, EFFICIENCIES AND A HIGHER QUALITY OF LIFE TO BENEFIT RESIDENTS

INDIANAPOLIS – The City's amended sewer program recently was recognized with the cover story by the magazine *Engineering News-Record* (ENR), the preeminent trade journal in the construction and engineering fields. The article calls the agreement the first of its kind in the nation and lauds it as an innovative approach to engineering, resulting in major cost savings and more efficiency.

"When I took office, it was imperative that we not only eliminate the hundreds of millions in cost overruns that the City's sewer program, or Consent Decree, had been allowed to balloon, but that we also look for quicker, more sustainable ways to ensure that Indianapolis had clean rivers and streams," said Mayor Greg Ballard. "Our hard work paid off with the results we wanted: clean water, cost savings, and a more sustainable solution."

The Combined Sewer Overflow (CSO) Consent Decree is an agreement between the City, the U.S. Environmental Protection Agency and the Indiana Department of Environmental Management, under which Indianapolis developed and is executing a 20-year plan to curb the overflow of raw sewage from combined sewers into local waterways. At Mayor Ballard's direction, the Department of Public Works (DPW) assessed cost overruns and through value engineering, achieved the modification plan. The plan allows the City to meet the required Consent Decree performance criteria and 2025 timeline, but in a more cost-effective manner that removes 3.5 billion gallons of sewage ahead of schedule.

By utilizing value engineering and implementing sustainable approaches, the City has achieved $740 million in savings. The new Consent Decree program is slated to reduce sewage overflows from the current average of 7.8 billion gallons per year to 414 million gallons at the end of the program. That reduction is an even greater reduction than the original Consent Decree required.

Not only will the new Consent Decree remove billions of gallons of sewage from entering the storm water system, but its projects will now cost less and involve less risk to groundwater contamination. The Deep Rock Tunnel Connector (DRTC), scheduled to bid this spring, is an integral component. The DRTC is more than six miles long and will extend from the Southport Advanced Wastewater Treatment Plant to north of the Belmont Advanced Wastewater Treatment Plant. Because the DRTC is larger than original designed, it eliminates the need for a $30 million pumping station to assist in controlling excess wastewater. DPW also adjusted the design of the Belmont treatment plant expansion, which saved approximately $90 million.

To read the entire ENR article highlighting the City's consent decree, please visit www.indy.gov.

##

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Indianapolis, US agencies forge new agreement to reduce sewage overflows, save money

THE ASSOCIATED PRESS
First Posted: November 08, 2010 - 5:24 pm
Last Updated: November 08, 2010 - 5:25 pm

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INDIANAPOLIS — Federal officials have reached an agreement with Indianapolis that modifies the city's plans to reduce raw sewage overflows into several rivers and streams.

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The new plan is expected to reduce overflows from about 7.8 billion gallons to about 414 million gallons per year.

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A federal judge must approve the agreement.

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JUSTICE NEWS

Department of Justice

Office of Public Affairs

FOR IMMEDIATE RELEASE Monday, November 8, 2010

Clean Water Act Settlement with Indianapolis Will Reduce Pollution at Lower Costs

WASHINGTON – The Department of Justice, the Environmental Protection Agency (EPA), and the state of Indiana have reached an agreement with the city of Indianapolis on important modifications to a 2006 consent decree that will make Indianapolis' sewer system more efficient, leading to major reductions in sewage contaminated water at a savings to the city of approximately $444 million.

Prior to 2006, the city of Indianapolis and its 800,000 residents experienced Combined Sewer Overflows (CSO's) totaling approximately 7.8 billion gallons per year. Combined sewer systems, which have not been constructed for decades in the United States, carry both sanitary wastewater (domestic sewage from homes, as well as industrial and commercial wastewater), and storm water runoff (from rainfall or snowmelt) in a single system of pipes to a publicly owned treatment works.

A consent decree approved by a federal court in 2006 required the city to construct 31 CSO control measures, including a 24-million gallon capacity shallow interceptor sewer, to reduce the city's overflows to approximately 642 million gallons per year. Those improvements were expected to cost approximately $1.73 billion over a 20-year period.

After the 2006 consent decree was approved, the city undertook additional engineering studies of its system and ultimately proposed a number of changes to its system to make it more efficient and to further reduce the numbers and volumes of overflows. The first change, which was approved in a 2009 amendment to the 2006 consent decree, eliminated the shallow interceptor in favor of a 54-million gallon, 25 mile long Deep Rock Tunnel Connector.

The second set of changes to the system would be achieved through the amendment announced today. With the proposed changes, the city is now expected to reduce the amount of total annual discharge to about 414 million gallons, a significant improvement from the 642 million gallons that were expected under the original consent decree, and reduce the cost of the project by about $444 million.

The project's modifications would also result in an accelerated construction schedule to capture 7 billion gallons of CSO discharges and their associated disease-causing organisms.

"Only under unique circumstances would we modify the terms of a settlement," said Ignacia S. Moreno, Assistant Attorney General for the Environment and Natural Resources Division of the Department of Justice. "The proposed modifications will benefit the environment and reduce costs for the city of Indianapolis. In my view, this is a classic 'win-win'"

"EPA is committed to enforcing laws that protect the public from discharges of raw sewage," said EPA Regional Administrator Susan Hedman. "As a result of the amendment, Indianapolis will further reduce its overflows and save money."

A copy of the proposed Amendment , which must be approved by a federal court, is available on the Justice Department website at www.justice.gov/enrd/Consent_Decrees.html .

10-1264 Environment and Natural Resources Division

With A Modified Consent Decree, Indianapolis Is Cleaning Up | ENR: Engineering News Record | McGraw-Hill Construction

When Indianapolis Mayor Greg Ballard came into office in 2008, he inherited a wastewater treatment and sewer system that was averaging 7.8 billion gallons of overflow each year, according to federal officials. At the time, it was not unusual for as little as one-quarter to a half inch of rainfall to fill the combined sewers to capacity and flood raw sewage into local rivers and streams. Ballard also inherited a two-year-old consent decree with the U.S. Dept. of Justice to bring the city in compliance with the Clean Water Act as well as a project to expand its wastewater treatment systems that were running over budget by an estimated $300 million and months behind schedule, due in part to complex design approaches.

Photo: Courtesy of Indianapolis Dept. Of Public Works

Tunnel boring machine in the Belmont North Relief Interceptor, added to the plan.

Although the city had built separate storm and sanitary sewers in newer neighborhoods, development over the years had lagged behind in older, densely populated areas of the city. As far back as the early 1990s, combined sewer overflows (CSOs) were a problem for local streams during extended wet weather.

The remediation plan was originally estimated to cost $1.73 billion, but costs quickly escalated to $1.975 billion, mainly because of cost overruns on one of the wastewater treatment plants. This kind of status quo was not acceptable to a mayor who had a vision of sustainable and affordable infrastructure for a city of more than 800,000 residents, says Mark Jacob, vice president with Columbus, Ohio-based DLZ, a program manager for the consent decree.

The mayor brought in industry veteran David Sherman, a former president of United Water, to head up his Public Works Dept. and take a hard look at the program. “[Ballard] wanted to make sure [Indianapolis] was a clean-water city, that we took care of the overflows, and he was willing to make the investment to value-engineer the whole program,” says Sherman.

What they came up with is a mix of value engineering and innovative green approaches to absorbing water runoff before it reaches the upgraded wastewater treatment plants. The re-engineered approach has cut more than $740 million off the city’s 20-year consent-decree program, officials say. In December, a federal court approved modifications to the city’s 2006 consent decree, a highly unusual step, according to the Justice Dept.

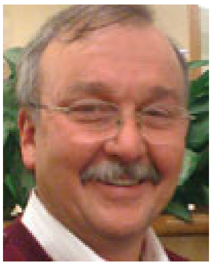
Now, the mayor and other city groups are touting Indianapolis as a model for how to use value engineering to create cost savings and solutions that are better for the environment and can shave off millions from the compliance plans.

Sherman worked with the existing engineering team, mainly local firms such as Indianapolis-based R.W. Armstrong. To review the plan, DLZ brought in firms such as Overland Park, Kan.-based Black & Veatch and Broomfield, Colo.-based MWH, both of which have experience working with consent decrees. “It was a collaborative effort—we had an open-door policy,” Sherman says. The plan involved two main approaches: expanding the sewer system to catch more wastewater and changing the design of the sewage plant’s secondary-treatment scheme. In addition to the engineering approaches, a separate green system, deployed to absorb more of the water before it’s treated, could become a blueprint for other cities struggling to comply with the Clean Water Act.

Deep Rock Tunnel Connector Changes the Equation

The original consent decree required the city to construct 31 combined sewer control measures, including a 24-million-gallon-capacity shallow interceptor sewer, in order to reduce the city's overflow average of 7.8 billion gallons to a less offending 642 million gallons per year, according to the Dept. of Justice.

The design and public-works teams decided to shape a new plan. They replaced a 12-ft-dia shallow interceptor sewer—mainly a conveyance tunnel—with a 54-million-gallon, seven-mile-long Deep Rock Tunnel Connector that will extend between the city's two wastewater treatment plants, which are typically overwhelmed during storm events.



" The reason we saved the money and we're getting more sewage up early—we took a holistic approach."

—David Sherman, director, Indianapolis DPW

The Deep Rock Tunnel Connector will be wider than the earlier shallow interceptor sewer—with an internal diameter of 18 ft, compared to 12 ft. The tunnel will act as a kind of holding area where multiple sewer overflows can be stored.

Because the new tunnel is wider and deeper, it is expected to capture—and capture earlier—an additional one billion gallons of raw sewage through 2021, compared to the original design, according to DPW.

DLZ's Jacob says the new tunnel eliminates the need for one of the pumping stations in the original plan that would have cost approximately $30 million. By deploying the Deep Rock Tunnel Connector plan, the city is able to avoid the extra costs of rights-of-way issues with utilities as well as potential groundwater contamination, Jacob says. "It's a much less risky venture, and it still provides for us to meet the performance criteria [of the consent decree] and actually store a lot of the flows," he says.

The $257-million Deep Rock Tunnel Connector portion of the overall project is being designed by Los Angeles-based AECOM. Officials expect it to go out for bid in spring 2011, well ahead of the Dec. 31 consent-decree deadline, Jacob says. The project is expected to be completed in 2017.

Although the Deep Rock Tunnel will require a slightly higher up-front investment than the shallow interceptor plan—which was estimated to cost $151 million—Sherman says, "we knew ultimately we wouldn't need as much volume out there in the field" for overflows because of the Deep Rock Tunnel's ability to hold more water, which would save money down the road. Plus, the approach helps modulate another key portion of the compliance plan: how much water the secondary-treatment design could handle.

Primary Changes in Secondary-Treatment Design

The city of Indianapolis and the engineering team re-evaluated the design at the Belmont advanced wastewater treatment plant expansion, which is located just south of the city. The newer approaches are expected to nearly double the secondary-treatment capacity to 300 million gallons per day.

After evaluating the plan and looking at a $90 million estimate that had more than doubled, the team opted to switch from a trickling filter system for secondary treatment to an activated sludge system.

According to Robert Bolden, vice president at Kansas City, Mo.-based HNTB, the designer on the project,...

Environmental PROTECTION

Amended CWA Settlement May Save Indianapolis Millions

Nov 09, 2010

The Department of Justice, the U.S. Environmental Protection Agency, and the state of Indiana have reached an agreement with the city of Indianapolis on important modifications to a 2006 consent decree that will make Indianapolis' sewer system more efficient, leading to major reductions in sewage contaminated water at a savings to the city of approximately $444 million.

Prior to 2006, the city and its 800,000 residents experienced combined sewer overflows (CSOs) totaling approximately 7.8 billion gallons per year. Combined sewer systems, which have not been constructed for decades in the United States, carry both sanitary wastewater (domestic sewage from homes, as well as industrial and commercial wastewater), and stormwater runoff (from rainfall or snowmelt) in a single system of pipes to a publicly owned treatment works.

A consent decree approved by a federal court in 2006 required the city to construct 31 CSO control measures, including a 24-million gallon capacity shallow interceptor sewer, to reduce the city's overflows to approximately 642 million gallons per year. Those improvements were expected to cost approximately $1.73 billion over a 20-year period.

After the 2006 consent decree was approved, the city undertook additional engineering studies of its system and ultimately proposed a number of changes to make the system more efficient and to further reduce the number and volume of overflows. The first change, which was approved in a 2009 amendment to the 2006 consent decree, eliminated the shallow interceptor in favor of a 54-million gallon, 25-mile-long Deep Rock Tunnel Connector.

The second set of changes would be achieved through the amendment announced Nov. 8. With the proposed changes, the city is now expected to reduce the amount of total annual discharge to about 414 million gallons, a significant improvement from the 642 million gallons that were expected under the original consent decree, and reduce the cost of the project by about $444 million.

The project's modifications would also result in an accelerated construction schedule to capture 7 billion gallons of CSO discharges and their associated disease-causing organisms.

"Only under unique circumstances would we modify the terms of a settlement," said Ignacia S. Moreno, assistant attorney general for the Environment and Natural Resources Division of the Department of Justice. "The proposed modifications will benefit the environment and reduce costs for the city of Indianapolis. In my view, this is a classic 'win-win'"

A copy of the proposed amendment , which must be approved by a federal court, is available at www.justice.gov/enrd/Consent_Decrees.html .

Indianapolis Gregory A. Ballard, Mayor
REBUILDINDY
Department of Public Works

NEWSLETTER

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Mayor Announces Innovative Agreement to Reduce Raw Sewage Overflows

EPA and IDEM Recognize Long-Term Environmental Benefits and Cost Savings

INDIANAPOLIS – Mayor Greg Ballard is happy to announce the approval of modifications to the City's Combined Sewer Overflow (CSO) Consent Decree. This agreement will prevent billions of gallons of raw sewage from flowing into local waterways years ahead of the original schedule, and at a reduced cost to Indianapolis citizens.

The Indianapolis Department of Public Works (DPW) anticipates an estimated cost savings of more than $500 million (2004 dollars) as a result of the approved Consent Decree modifications known as the Enhancement Plan. Those savings will help to keep sanitary sewer user rates lower for Indianapolis ratepayers.

The city of Indianapolis is working under a federally-mandated plan to curb the overflow of raw sewage into our rivers and streams. The $1.7 billion, 20-year plan, is required under a Consent Decree with the U.S. Environmental Protection Agency (EPA) and the Indiana Department of Environmental Management (IDEM).

In addition to the requirement of the current Consent Decree, the Enhancement Plan will allow the city to prevent approximately 3.5 billion gallons of raw sewage from flowing into waterways years ahead of the original Consent Decree schedule. This enhancement allows the raw sewage overflows from select CSO locations to be captured and treated up to four years earlier than originally planned.

"The Enhancement Plan provides significant environmental benefits that were not part of the original Consent Decree," Mayor Greg Ballard said. "For more than a year, city staff worked diligently with state and federal agencies to develop a plan that will achieve lasting environmental benefits. Through that partnership, we were able to foster improvements. The end result will be cleaner, healthier waterways and more efficient operations."

DPW began discussing the Enhancement Plan with the EPA and IDEM in March 2009, and the plan was approved by EPA, the U.S. Department of Justice (DOJ) and IDEM on June 3, 2010, and received final approval by the Courts this week. The Enhancement Plan will modify 14 of the 31 Consent Decree control measures.

"Approval of the Enhancement Plan required a substantial commitment of time and attention to detail from our staff," DPW Director David Sherman said. "With these improvements, project schedules will be revised so capacity at the treatment plant will increase as more sewer overflows are captured. These modifications will allow the city to prevent more sewage from flowing into our rivers and streams earlier, while using more cost effective strategies."

Citywide Tunnel System to Capture Sewage Overflows Years Ahead of Schedule

Currently, when as little as a quarter inch of rain falls, combined sewers reach capacity, and raw sewage overflows into local rivers and streams. To address raw sewage overflows, the city's Consent Decree requires a citywide storage tunnel system in which wastewater will be stored until capacity is available at the city's two wastewater treatment plants—Belmont Advanced Wastewater Treatment (AWT) Plant or Southport AWT Plant.

The citywide tunnel system will be comprised of five tunnels—the Deep Rock Tunnel Connector (formerly the Interplant Connection), Fall Creek, White River, Pleasant Run and Lower Pogues Run. The tunnel system will have the capacity to store 250 million gallons of raw sewage during large storm events and will significantly reduce raw sewage overflows. The tunnel system will address combined sewer overflow (CSO) locations throughout Indianapolis by serving as a more integrated, underground storage facility for sewage.

The Deep Rock Tunnel Connector, which will extend from the Southport AWT Plant located at Southport Road and Tibbs Avenue to north of the Belmont AWT Plant near the White River and Harding Street, will be the first phase of the tunnel system. From the Deep Rock Tunnel Connector, the four remaining storage tunnels will be extended along White River, Fall Creek, Pleasant Run and Pogues Run.

The Enhancement Plan will allow the city to meet the required Consent Decree performance criteria and 2025 timeline but in a more cost-effective manner. The Consent Decree requires that the city capture and treat 97 percent of the sewage overflows in the Fall Creek watershed and 95 percent in the White River watershed in a typical year. By 2025, overflows will be allowed to occur during two storms per year on Fall Creek and four storms per year on White River and other waterways, in a typical year.

New Consent Decree Projects to Provide Added Value, Improve Water Quality

During discussions with EPA, DOJ and IDEM, the city also committed to completing more cost effective projects, four of which are now part of the Consent Decree. The following projects will increase sanitary sewer capacity on the northwest side of Indianapolis, improve the operational efficiency of the city's wastewater treatment plants, and reduce raw sewage overflows from CSO 008, one of the city's largest overflow points.

- <u>Crooked Creek Area Sewer Improvements</u>: This new sanitary relief interceptor will allow thousands of homes on failing septic systems to connect to the sewer as part of the Septic Tank Elimination Program (STEP). The $58 million project is expected to be completed in late 2011.
- <u>Belmont Plant Wet Weather Pump Station:</u> New infrastructure will be installed at the Belmont Plant to increase capacity at the plant by 30 million gallons per day and capture additional overflows from CSO 008. The $500,000 project will be completed in 2012.
- <u>Belmont Plant Drain Pump Station:</u> New infrastructure was installed to increase treatment capacity by 20 million gallons per day and capture additional overflows from CSO 008. The project was completed in 2009 for an estimated construction cost of $2.3 million.
- <u>Belmont Plant Primary Effluent Pump Station:</u> A lift station was installed at the Belmont Plant, which transports up to 35 million gallons per day of wastewater to the Southport AWT Plant, helping to balance the treatment of organic loads at both plants. The project was completed in 2008 for an estimated construction cost of $2.5 million.

Project Schedules Revised to Accommodate Enhancement Plan Implementation

To ensure efficient implementation of the Consent Decree, modifications to individual project schedules for the Deep Rock Tunnel Connector, other tunnel projects and wastewater treatment plant improvements also have been granted by the EPA and DOJ. The following project schedules have been revised as part of the Enhancement Plan:

- The Deep Rock Tunnel Connector
    - The Achievement of Full Operations extended 18 months to Dec. 31, 2017
    - CSO 118, formerly a part of the later White River Tunnel, is now being included as part of the Deep Rock Tunnel Connector—sewage overflows to be captured four years earlier when compared to the original Consent Decree schedule
- Southport AWT Plant
    - Wet Weather Secondary Treatment Achievement of Full Operations extended one year to Dec. 31, 2017
    - Wet Weather Disinfection Achievement of Full Operations extended one year to Dec. 31, 2017
    - Headworks Expansion Achievement of Full Operations accelerated one year to Dec. 31, 2017
- Belmont AWT Plant
    - Belmont Raw Wastewater Pumping Capacity Expansion Achievement of Full Operations accelerated seven years to Dec. 31, 2012

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Indianapolis, US reach deal on sewage overflows

Associated Press - November 8, 2010 5:34 PM ET

INDIANAPOLIS (AP) - Federal officials have reached an agreement with Indianapolis that modifies the city's plans to reduce raw sewage overflows into several rivers and streams.

The Justice Department and Environmental Protection Agency announced the deal Monday.

The agreement modifies a 2006 consent decree. The new plan includes an accelerated construction schedule for the city's efforts to reduce sewage overflows from systems that carry both storm runoff and sanitary waste.

The new plan is expected to reduce overflows from about 7.8 billion gallons to about 414 million gallons per year.

The Justice Department says Indianapolis would save about $444 million of the original projected 20-year cost of $1.73 billion.

A federal judge must approve the agreement.

fox59.com/news/sns-ap-in--seweroverflows-indianapolis,0,4086775.story

fox59.com

Indianapolis, US agencies forge new agreement to reduce sewage overflows, save money

By Associated Press

6:25 PM EST, November 8, 2010

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Associated Press November 8, 2010

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INSIDE INDIANA BUSINESS
WITH GERRY DICK
INDIANA'S BUSINESS NEWS LEADER

Ballard says in addition to the savings, the improvements will divert ahead of schedule 3.5 billion gallons of sewage from polluting local waterways.

updated: 12/1/2010 2:40:20 PM

Indianapolis Outlines Plans to Provide Cleaner Water

InsideINdianaBusiness.com Report

Indianapolis Mayor Greg Ballard has outlined sewage system improvement plans he says will save taxpayers $740 million. He says the savings will come from modifications to a consent decree with the U.S. Environmental Protection Agency and the Indiana Department of Environmental Management.

Source: Inside INdiana Business

INDIANA BUSINESS NEWS

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December 1, 2010

News Release

INDIANAPOLIS – Mayor Greg Ballard today detailed plans to save Indianapolis residents $740 million and provide cleaner waterways faster than originally planned. During a meeting of the Greater Indianapolis Progress Committee this morning, the Mayor discussed the savings ratepayers will realize from the city's modifications to the Consent Decree with the U.S. Environmental Protection Agency (EPA) and the Indiana Department of Environmental Management (IDEM). In addition to the savings, the improvements will divert ahead of schedule 3.5 billion gallons of sewage from polluting local waterways.

"Indianapolis was the first city in the nation to successfully renegotiate its agreement with the EPA. This announcement will save hundreds of millions of dollars for our residents, improve the environment and strengthen the city's position as a great place to do business," said Mayor Ballard.

The Combined Sewer Overflow (CSO) Consent Decree is an agreement between the City and the EPA and IDEM, under which Indianapolis developed and is executing a 20-year plan to curb the overflow of raw sewage from combined sewers into waterways. At Mayor Ballard's direction, the Indianapolis Department of Public Works (DPW) assessed the decree's cost-overruns and through value engineering achieved the modification plan, which will allow the City to meet the required Consent Decree performance criteria and 2025 timeline but in a more cost-effective manner.

"With these improvements, we can revise project schedules to increase capacity at the treatment plant as more overflows are captured, prevent more sewage from reaching our rivers and streams earlier, and use more cost-effective strategies," said DPW Director David Sherman.

The EPA, IDEM and the U.S. Department of Justice (DOJ) approved the plan on June 3. Final approval by the courts is required. The plan will modify 14 of the 32 Consent Decree control measures, provide new projects including pump stations, and change schedules and operational aspects to capture overflows earlier than initially planned.

“Like our community’s streets, bridges and sidewalks, our sewer system is a component of Indianapolis’ infrastructure that is woefully outdated and in need of repairs,” said Bill Blomquist, president of the Infrastructure Advisory Commission. “I am very pleased to see CSO as a priority and one that is being tackled as aggressively as other major infrastructure needs.”

The Consent Decree requires that, by 2025, the city capture and treat 97 percent of the sewage overflows in the Fall Creek watershed and 95 percent in the White River watershed in a typical year. By 2025, overflows will be allowed to occur during two storms per year on Fall Creek and four storms per year on White River and other waterways, in a typical year.

“It is very much in the interest of the business community, as well as that of every resident and organization in Marion County, that we address the sewage overflow issue aggressively,” said Deborah Daniels, chairperson of the Greater Indianapolis Progress Committee. “I am gratified to see Mayor Ballard and his administration making these tremendous strides with efficiency – getting more done than planned, in less time, at lower cost.”

In addition to its environmental and economic impact, the plan will help improve neighborhoods through design and construction of co-functional buildings and improvements at sites around the city including Juan Solomon Park and Coffin Golf Course. The plan has earned recognition from the EPA and other national organizations. Mayor Ballard presented details of the plan at the U.S. Conference of Mayors (USCOM) Water Committee in June and the American Water Summit in November and will travel to Washington, D.C., next week to present the City’s major infrastructure improvements to an audience of national leaders at the USCOM Water Summit.

Citywide Tunnel System to Capture Sewage Overflows Years Ahead of Schedule

Currently, when Indianapolis experiences as little as a quarter inch of rain, combined sewers reach capacity and raw sewage overflows into local rivers and streams. To address raw sewage overflows, the City’s Consent Decree requires a citywide storage tunnel system in which wastewater will be stored until space is available at the city’s two wastewater treatment plants – Belmont Advanced Wastewater Treatment (AWT) Plant or Southport AWT Plant.

The citywide tunnel system will be comprised of five tunnels: the Deep Rock Tunnel Connector (formerly the Interplant Connection), Fall Creek, White River, Pleasant Run and Lower Pogues Run. The tunnel system will have the capacity to store 250 million gallons of raw sewage during large storm events and will significantly reduce raw sewage overflows. The tunnel system will address combined sewer overflow locations throughout Indianapolis by serving as a more integrated, underground storage facility for sewage.

The Deep Rock Tunnel Connector, which will extend from the Southport AWT Plant at Southport Road and Tibbs Avenue to north of the Belmont AWT Plant near the White River and Harding Street, will be the first phase of the tunnel system. From the Deep Rock Tunnel Connector, the four remaining storage tunnels will be extended along White River, Fall Creek, Pleasant Run and Pogues Run.

Source: City of Indianapolis

print email newsletters

Water News Update

Brought to you by the Clean Water Council

November 9, 2010

Tuesday's Water News: Indianapolis Reaches Agreement to Modify Consent Decree

Posted in Idaho, Illinois, Indiana, Missouri, New Jersey, New York, Ohio, Pennsylvania at 6:28 pm by bengann

The Department of Justice, EPA, and the state of Indiana have reached an agreement with the city of Indianapolis on important modifications to a 2006 consent decree that will make Indianapolis' sewer system more efficient, leading to major reductions in sewage contaminated water at a savings to the city of approximately $444 million.

Headlines
The final step of getting Lorain, Ohio's sewer system in line with EPA orders is on track to begin next year. It will be starting a construction of a $46 million retention tunnel, next year and the project is expected to be completed in 2014.

The village of Naples, New York is reaching out to residents who may have to pay as much as $3,000 out-of-pocket to run sewer lines from their homes if a multi-million dollar project is approved by voters next week.

Utility crews in suburban St. Louis are repairing two water mains today after breaks early this morning caused major flooding and a mess for morning commuters. It is believed the breaks were caused because the pipes decayed after being installed 80 years ago.

Stimulus Spotlight
Village officials in Maple Park, Illinois have moved to claim $100,000 in economic stimulus money to upgrade a portion of its water delivery system. The money will fund a project estimated to cost $303,000.

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INDIANA NEWS

City: Changes to Sewer Upgrade Plan Will Soften Expected Rate Hikes

Revised 20-year plan lops $740M off price tag

By Eric Berman
12/1/2010

Indianapolis water rates are heading up -- but not as much as expected.

Mayor Greg Ballard says changes to the city's 20-year plan for modernizing its sewers will save nearly three-quarters of a billion dollars off the $3.8 billion price tag. He says that means rates will not rise as steeply.

The city has warned rates would rise as the city implements upgrades required under a 2005 legal settlement with the U-S Environmental Protection Agency. The city won approval in June for the proposed reengineering of the upgrade plan.

The administration has predicted the sale of the Indianapolis Water Company to Citizens Gas will reduce rate hikes by 25-percent. Ballard says he doesn't know how much the lowered costs of the sewer project will change that.

The biggest component of the revised plan is a storage tunnel linking the Southport and Belmont treatment plant. Ballard says adding that to the plan eliminated the need for 14 other projects within the upgrade package.

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RAW SEWAGE OVERFLOW WARNING TODAY

Indianapolis' Combined Sewer System within the original City limits is more than 100 years old and was designed to carry both raw sewage and rainwater in the same pipe. As little as a quarter-inch (0.25") of rain can overload the Combined Sewer System, causing raw sewage mixed with rainwater to overflow into nearby streams. Other circumstances occasionally occur that may also cause Combined Sewer Overflows such as mechanical failures, blockages, and hydrant flushing/water main breaks. Citizens has posted signs along our streams to identify more than 130 Combined Sewer discharge points where contact with the water could be hazardous to your health.

Even in dry weather, it is best to avoid contact with Combined Sewer impacted streams and teach children to stay out of the water. Swallowing or hand-to-mouth contact with contaminated water could make you sick. Always wash your hands with soap and water or use hand sanitizer after contacting surface water in urban areas, including downstream of the Combined Sewer areas, especially before eating, drinking, preparing food, or smoking.

Today, raw sewage overflows will occur or have occurred due to a rain event, a localized rain event, or other circumstances within the last 72 hours.

Please avoid all contact with streams for the next 4 days downstream of the Combined Sewer areas which include:

- White River downstream from 56th Street
- Fall Creek downstream from Keystone Avenue
- Little Eagle Creek downstream from Michigan Street
- Eagle Creek downstream from the confluence of Little Eagle Creek
- Pogues Run downstream from 21st Street
- Pleasant Run downstream from Kitley Avenue
- State Ditch downstream from Southern Avenue
- Bean Creek downstream from I-65

Citizens Energy Group is implementing a 20-year, long-term plan to capture raw sewage overflows during all but a few large storms each year. To view a list of planned projects or to learn how to protect yourself from raw sewage overflows, visit CitizensEnergyGroup.com.

Figure 3-9: Raw Sewage Overflow Warning Notification Email

Prevent Sewer Backups this Thanksgiving

11/24/2015

INDIANAPOLIS – With Thanksgiving just days away, you are probably busy planning the menu for your Turkey Day feast. But, have you taken time to plan how you will properly dispose of the fats, oils and grease your tasty foods will leave behind? Fats, oils and grease (FOG) can be found in many Thanksgiving favorites like fried food and baked goods.

"Washing FOG down the sink or drain is, unfortunately, a common practice," said Jamie Dillard, Director of Wastewater Operations at Citizens Energy Group. "The first time a home or business owner does this they may not notice the consequences. Over time, however, FOG build ups and can create blockages which ultimately lead to sewer backups. Sewer backups are not only a health hazard, but they can cause significant property damage."

Each year, up to 80 sewer blockages are caused by FOG. While the majority of the incidents happen during the summer months, the problem usually starts during the holiday season when FOG is washed down sinks. FOG starts as a liquid and then solidifies and attaches to the sewer system's pipes and joints.

Reducing FOG is easy to do:

- Pour FOG into a small container. Once the liquid solidifies, place it in the garbage. Grease that doesn't solidify should be disposed of at an Indianapolis ToxDrop site. For a Tox Dop location, click here. (http://www.indy.gov/toxdrop)
- Use a paper towel or napkin to wipe grease off pots, pans and dishes before washing them.
- For restaurants or other food preparation establishments, FOG can be a valuable resource as a recyclable. FOG can be sold to rendering companies for use in soaps, fertilizers and animal feed.

Citizens' crews respond to sewer blockages in order to restore and maintain sewer service. Responding includes removal of FOG blockages and investigating where the FOG originated. Homeowners should be aware these investigations can result in fines, penalties and the cost associated with FOG removal and sewer cleaning. For more information about FOG, visit CitizensEnergyGroup.com. (http://www.citizensenergygroup.com/Education/FatsOilsGrease.aspx)

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DigIndy Tunnel System Completion Plan Announced

4/21/2016

INDIANAPOLIS – Citizens Energy Group announced today a plan for the completion of the DigIndy Tunnel System that will result in $70 million of additional savings and a further reduction in potential sewer overflows now impacting area rivers and streams.

Citizens announced that J.F. Shea and Kiewit (S-K JV), the current tunnel contractor, is expected to be awarded an estimated $500 million contract to complete the remaining 18 miles of tunnel and drop shafts to be built over the next 9 years. DigIndy is a 28-mile network of concrete tunnels being constructed 250 feet beneath Indianapolis to prevent sewage overflows from reaching area waterways during moderate rain events.

DigIndy and the associated expansion of the utility's two sewage treatment plants are the primary components of an approximate $2 billion plan to nearly eliminate sewage overflows to areas streams by the year 2025 in accordance with a Consent Decree with the U.S. Environmental Protection Agency.

"Our plan to complete the DigIndy Tunnel System significantly under budget while further reducing sewage overflows represents a big win for our customers, the community and the environment," said Jeffrey Harrison, President & Chief Executive Officer of Citizens Energy Group. "Thanks to the value engineering efforts of Citizens technical team and its partners, such as S-K JV, we have increased the savings on the Consent Decree from $330 million to $400 million. Citizens' original plan required it to prevent 95 percent of raw sewage overflows from reaching most area streams. Under the new plan Citizens will prevent 99 percent of potential sewage overflows from reaching area waterways."

Mayor Joe Hogsett said the DigIndy Project will produce remarkable benefits for the community. "By restoring our rivers and streams to levels not seen in over 100 years, DigIndy will enhance recreational opportunities, facilitate neighborhood redevelopment, and improve overall quality of life across Central Indiana," Hogsett said. "Citizens and its partner Shea Keiwit have positioned DigIndy as a model for how the public and private sectors can work together to achieve better outcomes for the community and the environment."

Hogsett added that today's announcement should not overshadow the benefits Citizens has already delivered since acquiring the community's water and wastewater utilities. "Since 2011, Citizens has invested more than $1 billion in the water and wastewater utilities to improve the reliability of both systems while preventing over 3 billion gallons of raw sewage per year from reaching area waterways," Hogsett said. "Citizens' utility investments are making Indianapolis a more livable and sustainable city."

Harrison explained that as each segment of DigIndy opens additional benefits will result. "Late next year when the first 10 miles of the DigIndy Tunnel System open an additional 1 billion gallons of raw sewage per year will be prevented from overflowing into the White River and Eagle Creek."

Hogsett commented that Citizens' investments in utility infrastructure are making significant contributions to economic development. "The DigIndy Project is creating or supporting good paying jobs across Central Indiana in several fields, including engineering, construction, and trucking. Of course these jobs also add to our local tax base that supports an array of community needs from schools to roads," Hogsett commented.

A recent economic impact study commissioned by Citizens estimates that the utility will invest more than $4 billion in its water, wastewater and natural gas systems from 2011-2025. The study estimates these investments will create or support 58,000 jobs in Indiana that will generate more than $450 million of state and local taxes.

"While we are pleased with our progress in keeping DigIndy on schedule and below budget, our employees are continuously looking for ways to achieve additional savings on other projects while maximizing benefits to the community and the environment," said Harrison. "As we prepare to participate in Earth Day activities this Saturday, the DigIndy Project is restoring our waterways to once again make them cherished community assets."

For more information, visit DigIndy (http://www.digindytunnel.com/).

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Community to Benefit from Planting 10,000 Trees

10/28/2016

INDIANAPOLIS- Citizens, Indianapolis Mayor Joe Hogsett, Indy Parks, the Department of Public Works (DPW) and Keep Indianapolis Beautiful (KIB) joined forces today to announce the beginning of a long-term partnership that will forever change the landscape of dozens of Indianapolis neighborhoods. Ten Thousand Trees is an initiative to plant 10,000 trees in support of the city's consent decree, an agreement with the US EPA to make our waterways cleaner by the year 2025.

"At Citizens we always seek ways to decrease the amount of raw sewage that overflows into Indianapolis' rivers and streams," said Citizens President and CEO, Jeffrey Harrison. "The Ten Thousand Trees initiative offers a unique solution to reduce raw sewage overflows as just one mature tree can store up to 100 gallons of water, keeping excess stormwater out of the combined system, thus reducing overflows. When 10,000 trees have been planted and are mature, the community will reap the benefits of cleaner waterways."

Trees will be planted in parks and neighborhoods throughout Indianapolis' combined sewer area. In partnership with KIB, Citizens is evaluating combined sewer areas of the city that will benefit most from additional trees. Among the other criteria being considered is whether or not the area currently has a limited tree canopy and if there are suitable areas available for planting.

"Trees provide myriad benefits from clean and healthy communities, to safe and beautiful neighborhoods," said David Forsell, KIB President. "These trees will also give back in the form of jobs for our city's youth. KIB's Youth Tree Team will lead community plantings, and help with the maintenance and stewardship of this wonderful addition to the city's tree canopy. We're excited about this unique partnership opportunity and look forward to our city reaping the benefits of it for decades to come."

Once the trees are planted, they will be maintained by Citizens and KIB for their first three years of growth, which is pertinent for long-term survivability and flourishment. After that time, DPW and Indy Parks will own and maintain the trees.

"The Ten Thousand Trees initiative is an innovative and practical plan, in keeping with the city and Citizens' commitment to clean up our city's waterways by the year 2025, " said Mayor Joe Hogsett. "It's exciting to see public-private partnerships like this, bringing together municipal and non-profit agencies in order to invest in our neighborhoods."

The Ten Thousand Trees pilot program began today with the initial tree plantings in Douglass Park. The next phase of the initiative will begin in spring of 2017. Citizens is currently identifying other areas in the combined sewer overflow basins that will benefit from tree plantings in 2017 and beyond.

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Water Wizard Designed to Answer Questions about Drinking Water

3/16/2017

INDIANAPOLIS- What makes my water pressure vary? Why does my water have a different taste or odor? Why is my water discolored? If you have ever asked these questions, Citizens Energy Group's Water Wizard is for you.

"Protecting our water sources, ensuring quality control in the water treatment process and properly maintaining our water distribution system are just some of the ways we ensure our drinking water is clean," said Jeffrey Harrison, Citizens President and CEO. "Customers may still have questions about their drinking water, however, and Citizens' new Water Wizard is an easy-to-use tool that helps customers get answers."

Designed to assist you in diagnosing some of the most common questions or concerns about water quality, the Water Wizard is an online tool that allows you to choose a category that best describes your question or concern. For example, if your water has an odor, visiting the Water Wizard allows you to select from three buttons categorizing the smell as sulfur, musty or chlorine-like. After clicking the button that best describes your issue, you will receive information about what may be causing the odor and what action is recommended to address the issue. The Water Wizard also addresses other common questions about water like discoloration, water pressure variation and particles and solids in water.

The Water Wizard's "Open a Case" feature takes your questions one step further. If the Water Wizard does not answer your question, you can manually submit it online. After filling out a simple form, you will receive a response from a Citizens team member within 24 to 48 hours.

"Customers call daily with questions about their drinking water, so we know the topic is on their minds," said Michael Strohl, Senior Vice President and Citizens Chief Customer Officer. "We want customers to have as much knowledge about their drinking water as possible and we hope our easy-to-use Water Wizard becomes a tool that provides quick, concise and useful knowledge."

To check out the Water Wizard tool, click here
(http://contact.citizensenergygroup.com/e1t/c/*V2qtc83HGdlBW1t4cLn5TR3Wg0/*W9f8_4_96__G2W2bmtp44dG2-Q0/5/f18dQhb0S82-9ctxnjW3Bh7Dx5214tPN5sqSkYsNz_hVsgWvd57FkhrW5r8vy28yym7NW5yMmSf5vLKBwW8p-HvP61LB1fN63KFFGSbFwSW8tC0qF8zF_QkW65ljxT3J4xlbN35yhYrRzbHqW65HPbm1s60dzN48kZbWwfxXxW1Dp6RL1HltsQW2VtC3z7t5r0hW4h9xmm7v5xp_W3b3Hq-2MkPgFW3Ft-_m7xR9_sW2Vjhb05bPQ0kN7v4vH3MBCtBW2StQ5c6FgYFWW2JDZKm2JDgVLVP88Qh3pSFDyN8vRm7_4cNXyW75WRL394rMtqW30V2BF6175zdW7LJFFC54ZL9CW53fmY45RcXQTW92GShf3xBtxQW94k8M261hrpCW55B0fb8lw1YnW5JTJhk1hqNRGW8Qq41P1ytWNNW5nwHvx2W_5qFW1VtdTw940bYHW1NFfl48P4zkJW7mp3dP6PtxRW8PPKjD743mnhW6Q7BVs4HwDyqN6lMgJydm8X5V1Bcc45k2RYH103).

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White River Cleanup Planned Tomorrow

4/7/2017

INDIANAPOLIS – Hundreds of volunteers from Citizens Energy Group, Friends of the White River, the Indianapolis Department of Public Works (DPW), and other organizations will team up tomorrow to remove tons of trash from the banks of the White River.

Starting at 8 a.m., volunteers will work on both sides of the river, near Morris Street, Raymond Street and White River Parkway to remove trash and debris. A celebration of the event's 29th year will follow the cleanup.

What: **29th Annual White River Cleanup**

When: **Saturday, April 8, from 8 a.m. to noon (media availability 10-10:30 a.m.)**

Where: **White River, 700 W. Morris Street**

"Our annual support of the White River Cleanup is an important part of our ongoing commitment to restoring the rivers and streams of Central Indiana," said Jeffrey Harrison, President & CEO of Citizens. "Another important milestone in our restoration efforts will occur later this year when the first 9 miles of the DigIndy Tunnel System opens and begins reducing potential sewer overflows by 1 billion gallons per year."

"Each year the White River Cleanup has a bigger impact on this valuable natural resource. We appreciate the support of all of our sponsors and volunteers as we work together to return the White River and other streams to their original grandeur," said Kevin Hardie, Executive Director of Friends of the White River.

For more information about the 29th Annual White River Cleanup, please visit www.friendsofwhiteriver.org (http://www.friendsofwhiteriver.org/).

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Students, Citizens and KIB to Celebrate Arbor Day

4/27/2017

INDIANAPOLIS – Students and parents of Eleanor Skillen Elementary School will join tomorrow with partners from Citizens Energy Group and Keep Indianapolis Beautiful for a fruit tree planting event at the school in celebration of Arbor Day. The tree planting is part of Citizens' continuing 10 Thousand Trees initiative.

What: Fruit tree plantings involving students and parents to celebrate Arbor Day
Where: Eleanor Skillen Elementary School at 1410 Wade St.
When: Friday, April 28, 9 a.m.

10 Thousand Trees
To help keep Indy's Waterways Clean!

"We are pleased to continue our 10 Thousand Trees initiative with KIB and the students at Eleanor Skillen Elementary School. This tree planting allows us to help beautify the school grounds and contribute to cleaner rivers and streams for our community," said Jeffrey Harrison, President & CEO, Citizens Energy Group.

Citizens, Indy Parks, the Department of Public Works (DPW) and KIB joined forces last fall to begin a long-term partnership to plant 10,000 trees across the city as a way to beautify neighborhoods and reduce combined sewer overflows to area waterways.

"This event will be a wonderful hands-on opportunity for our students and parents to celebrate Arbor Day and understand the great value that trees bring to our natural environment," said Angela Ludlum, Principal of Eleanor Skillen Elementary School.

"The orchard planting has been in the works for two years since the wonderful teachers of Eleanor Skillen Elementary dreamed of turning the triangle of vacant land across from the school into something useful for the neighborhood. We are so excited to finally see it come together as a collaboration of the school, the neighborhood, and our dedicated corporate partners," said David Forsell, President of Keep Indianapolis Beautiful. "The students will care for and maintain the orchard, but the apples, pears and native Indiana fruit will be an asset to the entire community. It will serve as a hands-on learning space for students for years to come!"

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Citizens DigIndy Project Moves Above Ground

6/6/2017

INDIANAPOLIS – Work on Citizens Energy Group's DigIndy Project will increasingly impact commuters in Indianapolis this summer with lane restrictions and road closures.

DigIndy is a $2 billion, federally-mandated project to build a 28-mile long network of deep rock tunnels 250 feet beneath the city. The tunnels will store 250 million gallons of sewage and storm water during rain events and nearly eliminate about 6 billion gallons of overflows to area waterways by the year 2025. DigIndy will help restore area rivers and streams, enhance recreational opportunities and drive community revitalization and economic development.

"This tunnel system is the largest public works project in our city's history," said Jeffrey Harrison, President and CEO of Citizens Energy Group. "Consequently, it impacts a significant part of our city – both underground and now above ground. Our team is working efficiently to ensure we remain on schedule so that any disruptions to our neighborhoods are marginal. We remain committed to communicating frequently with our customers and community about any work that affects them."

Commuters and residents will currently experience the greatest impact in the following areas of our city:

NORTH: The Fall Creek Collection Consolidation Sewer (CCS) work is impacting commuters and residents in two locations:

- Fall Creek Parkway at Central Avenue – Fall Creek Parkway and Central Avenue are set to re-open by June 23 (some restoration efforts may remain). However, the City's Department of Public Works (DPW) has an ongoing project in the same area, which will continue to restrict traffic lanes.
- 28^{th} Street and Capitol Avenue – **Throughout construction, residents will experience road closures on 28^{th} Street from west to east at Boulevard Place to Illinois Street.** Illinois St. will remain open during Citizens construction, as well as the DPW's work on the Capitol Avenue bridge over Fall Creek. Detour routes are posted. Citizens work on 28^{th} Street is expected to last until Spring 2018.

WEST: Preliminary construction on the White River Collection Consolidation Sewer (CCS) began on May 22 and will cause disruption for approximately eight months. **Throughout construction, residents and commuters will experience road closures on Miley Avenue from W. Michigan Street to St. Clair Street (including intersections),** impeding access to N. White River Parkway W. Drive from W. Michigan Street. Detour routes are posted.

EAST: Beginning June 19, construction will begin on the Upper Pogues Run Combined Sewer Overflow (CSO) Reduction project. The construction will disrupt street parking at Forest Manor Park and, later this fall, will close the disc golf course and trail access on the south end of Brookside Park, near the intersection of Brookside Parkway S. Drive and N. Rural Street. Construction in both locations is expected to last 24 months.

Customers can get up-to-the minute updates on road restrictions and closings resulting from utility projects and repairs at Citizens Outage Map (http://www.citizensenergygroup.com/our-company/news-financials/outage-map). DigIndy also has a new look online with the launch of a refreshed webpage at CitizensDigIndy (http://www.citizensenergygroup.com/Our-Company/Our-Projects/Dig-Indy). To stay connected to the DigIndy updates on Twitter, follow @DigIndy.

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Sewer Rehabilitation Project Near Monon Trail

6/29/2017

INDIANAPOLIS – This week, Citizens Energy Group will begin work on a severely deteriorated section of sewer that will likely spark the curiosity of some Monon Trail users in the northeast corridor of the city. In most cases, sewer rehabilitation projects are minimally disruptive, but neighbors may experience some road restrictions. In the areas where crews are working, signage will be posted as well as any necessary detour routes.

So as not to disrupt service to customers in the area, this sewer rehabilitation project will require bypass piping to divert sewage flow from the pipe being rehabilitated to a downstream manhole. The bypass will consist of large, black heavy-duty pipes that will sit above ground for the duration of the project. These pipes will be visible to trail-users and will run parallel to Sutherland Avenue from approximately East 34th Street to approximately Winthrop Avenue.

This project is expected to take approximately two months to complete. During this time, the Monon Trail will remain accessible.

For information on this or other Citizens projects, please visit: www.CitizensEnergyGroup.com/Construction (http://www.citizensenergygroup.com/Construction).

About Citizens Energy Group

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Beware of Raw Sewage Overflows in Area Waterways

7/12/2017

INDIANAPOLIS – – With the 3.5 inches of rain Central Indiana received over the past 24 hours, Citizens Energy Group is warning the public to stay away from area waterways due to raw sewage overflows.

The combined storm and wastewater sewer system in Marion County overflows into area waterways when as little as one quarter of an inch of rain falls. The 3.5 inches of rain that fell since yesterday caused about 700 million gallons of raw sewage to overflow into the White River and tributaries such as Fall Creek. Raw sewage contains dangerous bacteria such as E-coli, which can cause serious illness.

The DigIndy Project, a 28-mile network of underground tunnels now under construction, will nearly eliminate sewer overflows in Marion County by the year 2025. The first 9 miles of the tunnel system will open later this year and begin preventing nearly 1 billion gallons of sewer overflows annually.

"We look forward to nearly eliminating all sewer overflows on the White River and Eagle Creek south of downtown Indianapolis later this year when the first sections of DigIndy open. When the system is complete in 2025, water quality in area waterways will be restored to levels not seen in 100 years," said Jeffrey Harrison, President & CEO of Citizens Energy Group.

To learn more about our infrastructure investments to improve water quality, visit DigIndyTunnel (http://www.citizensenergygroup.com/Our-Company/Our-Projects/Dig-Indy).

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Sewer Rehabilitation on South Side of Indianapolis

8/1/2017

INDIANAPOLIS – Citizens Energy Group has begun sewer rehabilitation work that is visible in the area of Southport Road, Orinoco Avenue and Stop 10 on the south side of Indianapolis. The project will repair a deteriorating pipe to better serve the area, which has greatly developed since the pipe was installed in the late 1950s.

Sewer rehabilitation projects are usually minimally disruptive. In this case, motorists may experience some temporary road closures or restricted entrances to shopping centers. In the areas where crews are working, signage and any necessary detour routes will be posted.

So as not to disrupt service to customers in the area, this sewer rehabilitation project will require bypass piping to divert sewage flow from the pipe being rehabilitated to a downstream manhole. The bypass will consist of large, black heavy-duty pipes that will sit above ground for the duration of the project. These pipes will be visible along Southport Road, Orinoco Avenue and East Stop 10 Road. Following completion of the project, any areas disturbed by the work will be restored to their prior condition.

This project is expected to be complete by the end of October.

For information on this or other Citizens projects, please visit: www.CitizensEnergyGroup.com/Construction (http://www.citizensenergygroup.com/Construction).

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Keeping Things Clear

When it comes to your rates and the problems we face with our city's water and wastewater systems, we want to be clear with you. President and CEO Jeff Harrison explains:

Proposed Rate Increases

In order to begin fixing our outdated water and wastewater systems, Citizens Energy Group has proposed the following rate increases to the Indiana Utility Regulatory Commission:

- Average water bill would increase $5 per month in spring 2016
- Average wastewater bill would increase $8.50 per month in 2016 and another $2.50 per month in 2017

Note: The Indiana Utility Regulatory Commission (IURC) is reviewing rate increase requests for Citizens Energy Group's water and wastewater systems. **These rate increases do not apply to Citizens Westfield utilities.**

Why Rate Increases are Necessary

Much of our community's water and wastewater systems are more than 100 years old resulting in system failures and impacts to the environment. Customer rates are the only source of funds for our system improvements. There are no government grants that can be utilized and Citizens does not draw on taxes to fund its operations.

Crumbling Water System

Keeping Things Clear

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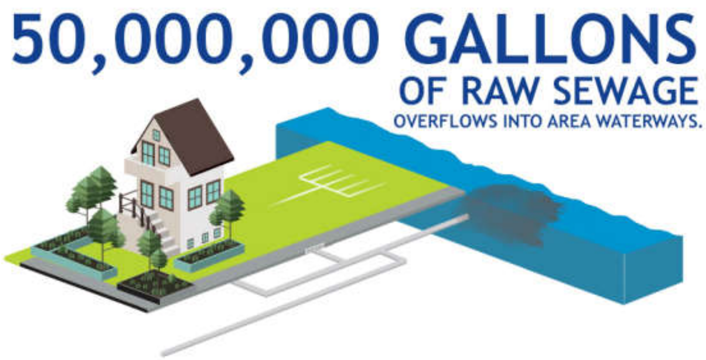
Utilities Held in a Trust - Citizens Energy Group is a Public Charitable Trust, meaning utility assets are held in a Trust and operated only for the benefit of customers and the community. The Trust status means we operate our utilities without a profit and without shareholders.

Water & Wastewater Acquisition - Citizens acquired the community's water and wastewater utilities in 2011 from the City of Indianapolis. Much of the systems are more than 100 years old and are badly in need of repair.

No Tax Dollars - Citizens does not use tax dollars to operate or maintain any of its utilities. Federal grants are also not available for system improvements.

Antiquated Sewer System

Combined sewers are a method for conveying both stormwater and wastewater (sewage) in one system. Historically, these systems were built in hundreds of communities across the United States before indoor plumbing became commonplace. As Indianapolis has grown, our now overloaded system releases up to 50 million gallons of raw sewage into rivers and streams each time it rains just a quarter inch. Citizens Energy Group must comply with a federal mandate to eliminate sewer overflows by 2025.



YOU'VE SEEN THE PROBLEMS.

SEE WHAT YOUR RATE INCREASES CAN DO FOR INDIANAPOLIS.

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What These Rate Increases Will Fund

Water System Improvements

Citizens Energy Group is proposing about $100 million of improvements to the water system over the next two years, including:

Development of Citizens Reservoir

Citizens plans to fill an 88-acre, 230-foot deep quarry in Hamilton County with about 3 billion gallons of water, which is about 50 percent of the capacity of the 1,800-acre Geist Reservoir. The new reservoir will ensure adequate water supply for population growth and economic development over the next 20 years at a fraction of the cost of building a conventional reservoir. Learn More (/Our-Company/News-Financials/News-Releases/Citizens-Develops-2-7-Billion-Gallon-Reservoir)

Reservoir dredging

Dredging of Morse and Geist Reservoir will be conducted to begin restoring the storage capacity of each reservoir, which are both more than 50 years old.

New water mains

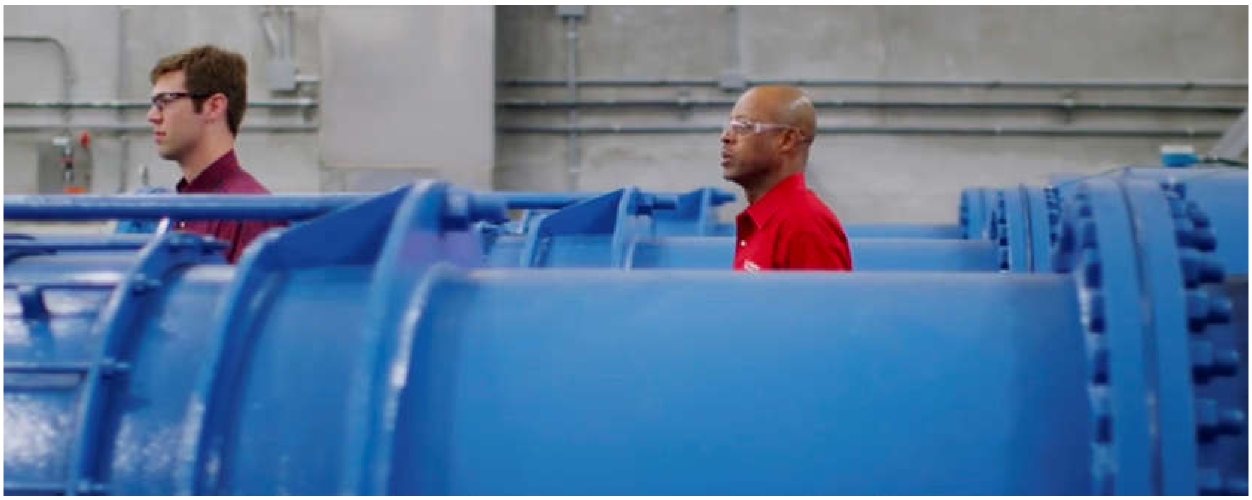
54 water main segments throughout the metropolitan area will be replaced to reduce water loss and ensure system reliability.

New water intake

A new intake will allow the movement of 20 million gallons of water per day from Fall Creek to the Central Canal in order to ensure water delivery during drought conditions.

Treatment plant upgrades

New equipment will be installed to ensure water quality and safety at Citizens' 9 water treatment plants.



Well rehabilitation

Citizens will rehabilitate existing groundwater wells to ensure they can provide water when necessary.

Wastewater System Investments

Citizens is proposing about $435 million of improvements to the wastewater system over the next two years, including nearly $295 million on projects mandated by the federal consent decree to eliminate sewer overflows to area rivers and streams.

Dig Indy Project

Work has begun on a 28-mile network of 18-foot diameter tunnels located 250 feet beneath the ground and stretching across Marion County. The first 9 miles of the tunnel system will be complete in 2017. When the full network is finished in the year 2025, it will prevent 95-97% of the current sewer overflows. Learn more (/Our-Company/Our-Projects/Dig-Indy)

Septic Tank Elimination Program

The sewer system will be extended to another 1,600 homes throughout the county that now depend on failing septic systems. Learn more (/STEP)

Treatment Plants

Work will continue on the expansion of the Belmont and Southport sewage treatment plants.

Sewer improvements

Planned work includes new sewer interceptors, relocation, replacement and reinforcement of older pipes with high failure rates. Learn more (/Our-Company/Our-Projects/Sewer-Rehabilitation)

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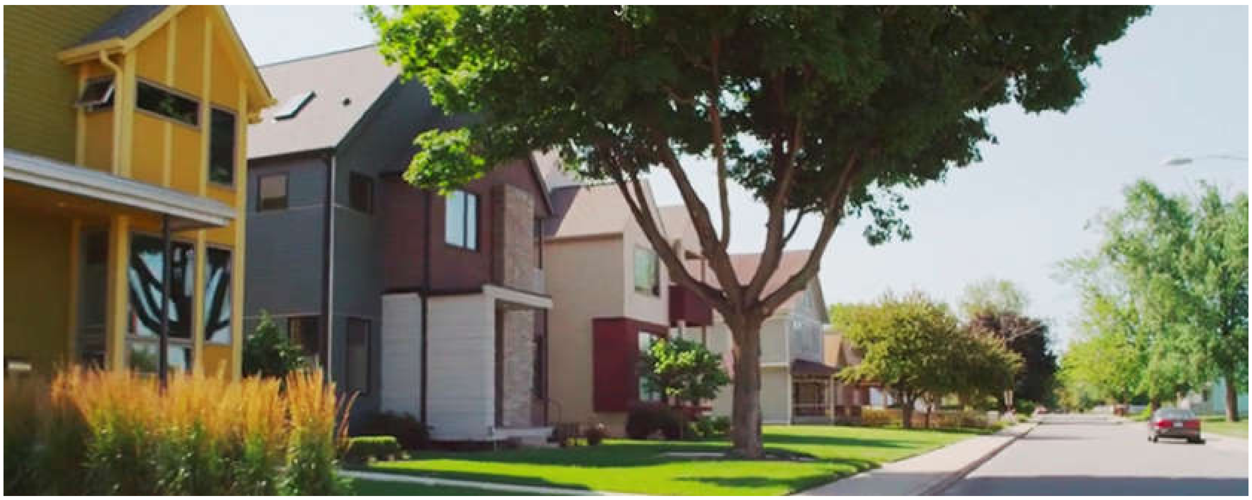
Investing In Our Community



Since acquiring the water and wastewater systems in 2011 we have made great progress upgrading both systems. Citizens has invested about $230 million in the water system and about $775 million in the wastewater system. But we have only just begun. These investments and solutions will take years to be completed. Wastewaster project timeline (/Our-Company/Our-Projects/Dig-Indy/The-Solution)

The benefits of our system investments to quality of life in Central Indiana are immeasurable. Benefits that will be delivered over the next decade include:

Cleaner rivers and streams

We will transform water quality in the White River, Fall Creek and other area streams to levels not seen in more than 100 years. This transformation will enhance recreational opportunities such as fishing and canoeing on our revitalized waterways.

Neighborhood revitalization

Our investments will help revitalize neighborhoods across the city, especially those bordering our cleaner rivers and streams.

Reduced water loss

Fewer water main breaks will mean less waste of drinking water, fewer service interruptions and less damage to streets.

Water supply for the future

Our investments will ensure vital water supplies necessary for population growth and economic development.

Economic development

Our investments will create or support about 58,000 good-paying jobs in Indiana over the next decade, including about 13,000 jobs from our capital investments over the next two years.

Supplier diversity

As we make system investments, we are meeting supplier diversity goals set back in 2011. In 2015, Citizens spent about $100 million with minority, women and veteran owned businesses. Learn more (/Our-Company/About-Citizens/Commitment-to-Diversity)

Keeping Things Clear

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Appendix E

Information to Support Existing Use Determination

April 5, 2005

Thomas W. Easterly, P.E., DEE, QEP
Commissioner
Indiana Department of Environmental Management
100 N. Senate Ave., IGCN 1301
Indianapolis, IN 46204

Re: Existing Use Determination for CSO-Impacted Portions of Marion County Streams

Dear Commissioner Easterly:

Thank you again for our meeting on February 22 to discuss combined sewer overflow (CSO) issues. I appreciate your willingness to help work through the regulatory and legal issues that many CSO communities face.

Enclosed please find two revised copies of "Information to Support an Existing Use Determination During Selected Storm Events for CSO-Impacted Portions of Marion County Streams." This information provides analysis by the City of Indianapolis of whether there are existing recreational uses in these waterways, as defined in 40 CFR 131.3(e) and IDEM's September 2001 *Combined Sewer Overflow (CSO) Long-Term Control Plan Use Attainability Analysis Guidance*. It replaces information submitted to IDEM on October 28, 2004, and takes into account verbal comments received since then from your staff. We made the following significant changes to the document since the October 2004 version:

- Clarified that the city is requesting the no existing use determination for certain storm events, which will allow us to proceed with a use attainability analysis (UAA)
- Clarified that the determination should apply to both primary and secondary contact recreation
- Explained how the ordinance prohibiting swimming in the CSO areas is enforced
- Added references to Senate Bill 620, which is now being considered by the Indiana General Assembly
- Revised the upstream definition of the White River CSO area to 56th Street instead of Kessler Boulevard to more accurately reflect the first Indianapolis CSO on the river

We believe the data we have collected supports a determination of "no existing use" during the storm events described herein, which would allow us to proceed with a use attainability analysis (UAA) to revise or temporarily suspend recreational water quality standards to reflect unavoidable wet weather impacts of CSOs. We would like IDEM to make a decision on this information as soon as possible. Most importantly, we would like IDEM's approval to move forward with a UAA, which we feel is necessary to finalize our CSO long-term control plan.

We realize this has been a very difficult issue that involves varying opinions and numerous legal and policy considerations. We appreciate your staff's willingness this year to work through the existing use issues in a productive manner.

The City of Indianapolis is determined to move forward to gain regulatory approval of our long-term control plan and to continue implementing projects under that plan. In that spirit, we have completed this analysis based upon your September 2001 guidance, which is expected to be revised in the coming months.

We appreciate your prompt review so we can finalize our long-term control plan and continue improving water quality for our citizens.

Very truly yours,

(signature on file)
James A. Garrard, Director

Enclosure
Cc: Jo-Lynn Traub, Director, Water Division, EPA Region 5 (w/ two enclosures)

Information to Support a
No Existing Use Determination
During Selected Storm Events for
CSO-Impacted Portions of Marion County Streams

Revised Submittal
Prepared by
Indianapolis Clean Stream Team
Indianapolis Department of Public Works
March 25, 2005

Executive Summary

The City of Indianapolis is seeking a modification or temporary suspension of water quality standards for *E. coli* bacteria for combined sewer overflows (CSOs) that will occur after implementation of its long-term control plan. This modification would apply only during infrequent, large storm events that exceed the capacity of CSO control facilities and cause untreated overflows to occur.

The City of Indianapolis is revising its April 2001 long-term control plan for reducing combined sewer overflows to Marion County streams. Once completed and approved by the U.S. Environmental Protection Agency (U.S. EPA) and Indiana Department of Environmental Management (IDEM), the plan will dramatically reduce the frequency and duration of combined sewer overflows and significantly reduce the volume of raw sewage flowing into neighborhood streams and the White River.

Although water quality will improve dramatically and overflows will be reduced significantly from the current average of 60 events per year, the city cannot completely eliminate sewer overflows because some storms inevitably will be too large for the facilities that we will build under our long-term control plan.

U.S. EPA and IDEM have recognized that CSO communities may seek to revise or temporarily suspend water quality standards to reflect wet weather impacts of CSOs and to define an attainable goal for CSO-impacted waterways. The City of Indianapolis is one of those communities.

Under federal regulations at 40 CFR 131.3(e), a water body's designated use cannot be removed if it is an "existing use," defined as a "use *actually attained* in the water body on or after November 28, 1975." (Emphasis added.) Before finalizing its long-term control plan and applying for a change to the water quality standards, however, the city must obtain a determination from the state that there are no "existing uses" of these waterways during specific storm events that are likely to cause overflows following full implementation of the LTCP.

The City of Indianapolis has collected data to demonstrate that there is no existing full-body or partial-body contact recreational use, as defined in 40 CFR 131.3(e), within CSO-impacted waterways. This demonstration is based upon the following reasons:

- Recreational activities (such as swimming and wading) are not known to occur during storm events, such as those exceeding a 1.7-month storm.
- CSO-impacted waterways are unsuitable for recreational use during and following large storm events due to high *E. coli* bacteria levels and high stream flows.
- The city has implemented a proactive and effective public outreach program to prevent and control access to waterways during and after wet weather events.

The city's reasoning and data collection are consistent with the principles stated in IDEM's 2001 guidance on CSO long-term control planning and use attainability analyses, as demonstrated in the documents that follow.

Recreational Use Doesn't Occur During Large Storms

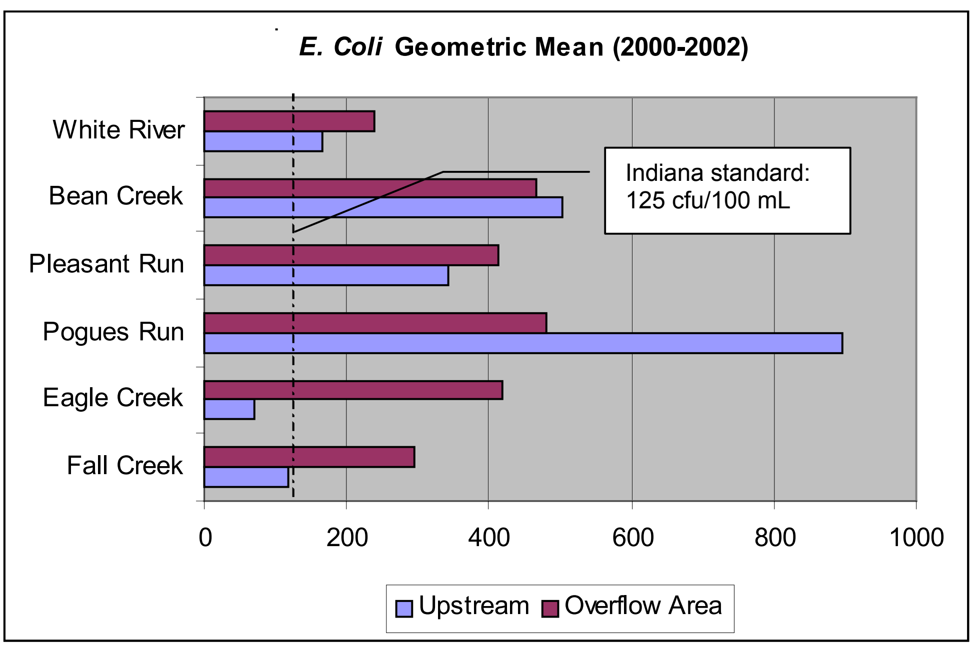
The city used extensive surveys and other public participation methods to gather information on the extent and frequency of water recreation activities in and along CSO-impacted streams. Based upon this information, the city identified a number of locations where recreational uses do occur. According to people who live along and near these streams, the primary use of CSO-impacted waterways is walking, jogging and/or biking along the greenways adjoining the streams. Swimming, wading and other water-contact activities are reported much less frequently, if at all. There are no public or private bathing beaches along any CSO-impacted waterways.

Where recreational activities do occur, survey results demonstrate that people are more likely to recreate in dry weather or after a light rain than a major storm. The evidence collected by the city indicates that recreational use is extremely rare or non-existent during large storm events.

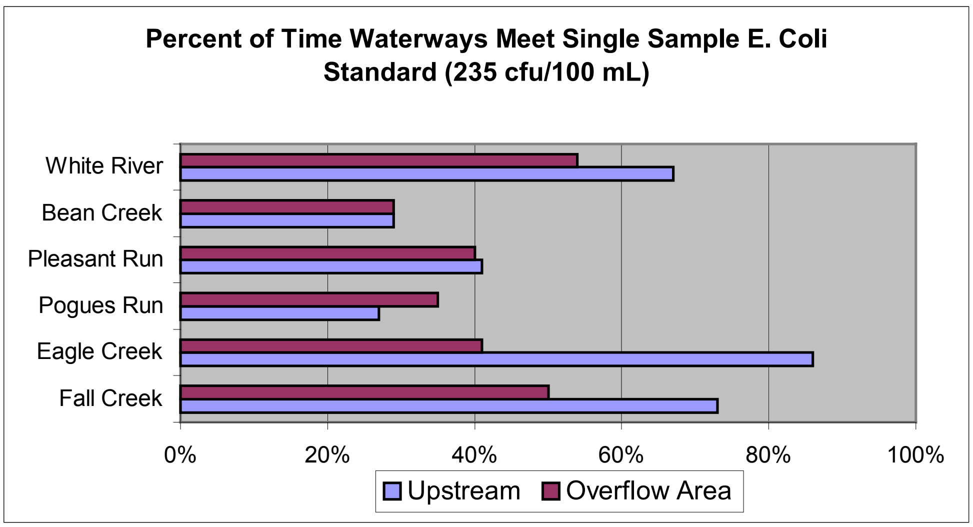
Waters Are Unsuitable for Recreational Use During Large Storms

Under current conditions, Marion County waters affected by CSOs do not always meet in-stream *E. coli* bacteria standards established to protect recreational uses. While the city's long-term control plan is expected to significantly reduce bacteria levels during and after storm events, no level of CSO control will attain the recreational standard 100 percent of the time.

The graph below demonstrates that CSO-impacted waterways do not meet Indiana's *E. coli* geometric mean standard for recreational uses, based upon samples collected from 2000-2002 by the Indianapolis Office of Environmental Services and the Marion County Health Department. Only Fall Creek above the CSO area and Eagle Creek above the CSO area meet the standard of 125 cfu/100 mL. Within the CSO area, no stream meets the geometric mean standard established to protect water contact recreation. When the city submits its Use Attainability Analysis, it will demonstrate that while the long-term control plan's implementation is expected to improve the geometric mean, these waterways will still not meet the 125 standard.



The graph below demonstrates that CSO-impacted waterways do not meet the single sample maximum *E. coli* standard of 235 cfu/100 mL, based upon the same OES/MCHD sampling data collected from 2000-2002. In fact, the data reveal substantial wet weather bacteria impairments upstream of the CSO areas, as well as within CSO areas. A finding of “no existing use” during large storm events on CSO-impacted streams will enable Indianapolis to devote more resources toward addressing non-CSO bacteria sources in these upstream areas. These sources cause impairments much more frequently than the handful of large storms that will cause overflows during and following implementation of a cost-effective long-term control plan. When the city submits its Use Attainability Analysis, it will demonstrate that while the long-term control plan and other water quality improvements are expected to increase the percent of time these waterways meet the single sample *E. coli* standard, these waterways will not meet the standard following CSO events.



Currently, *E. coli* standards are *never* met during the large storm events that will cause untreated overflows following implementation of a cost-effective long-term control plan. Where the city was able to correlate existing in-stream sampling data with large storm events from 2000-2002, the streams consistently were above the *E. coli* single sample maximum standard, as shown in the table below. Based upon a NetStorm simulation of LTCP Systemwide Control Plan 1, the city identified 17 storm events that would have resulted in untreated overflows if the city had installed CSO control facilities to achieve 93 percent capture. The city does not have data to correlate to all 17 storm events, since the OES/MCHD sampling program is designed to collect data on a periodic basis without regard to weather conditions. However, when data was collected that correlated to an estimated overflow event, the single sample maximum standard consistently was not met. Further data supporting these conclusions is provided in documentation for each stream.

Comparison of Estimated Overflow Events and Historic E. coli Sampling Data, 2000-2002

E. coli bacteria sampling average (cfu/100 mL) within CSO Area

Estimated Overflow Event Date	Date of Sample	Fall Creek	Eagle Creek	Pogues Run	Pleasant Run	Bean Creek	White River
4/7/2000	4/7/2000	48,200	N/A	1,800	N/A	N/A	N/A
5/26/2000	*No samples obtained that correlate to this rain event.*						
7/4/2000	7/5/2000	5,200	N/A	6,600	N/A	N/A	10,300
8/17/2000	*No samples obtained that correlate to this rain event.*						
9/10/2000	9/11/2000	N/A	N/A	N/A	5,300	N/A	N/A
10/4/2000	10/4/2000	N/A	N/A	N/A	N/A	N/A	900
10/4/2000	10/5/2000	N/A	84,000[2]	54,500	N/A	120,000	N/A
6/5/2001	6/5/2001	2,100	N/A	3,700	N/A	N/A	N/A
6/5/2001	6/6/2001	N/A	N/A	N/A	72,300	N/A	N/A
7/1/2001[1]	7/2/2001	N/A	13,300	N/A	24,500	N/A	N/A
10/10/01	*No samples obtained that correlate to this rain event.*						
10/24/2001[1]	*No samples obtained that correlate to this rain event.*						
4/21/2002[1]	*No samples obtained that correlate to this rain event.*						
4/24/2002	*No samples obtained that correlate to this rain event.*						
4/27/2002	*No samples obtained that correlate to this rain event.*						
5/7/2002	5/7/2002	2900	N/A	N/A	N/A	N/A	N/A
5/12/2002	5/13/2002	N/A	N/A	N/A	6,000	3,200	N/A
9/20/2002	*No samples obtained that correlate to this rain event.*						
11/10/2002[1]	*No samples obtained that correlate to this rain event.*						

Source: Estimated Overflow Dates: 1950-2003 NetSTORM Simulation for System Wide Plan 1, 93% and 95% Capture Level of Control.
Sampling Data: 2000 - 2002 instream *E. coli* bacteria sampling by OES and MCHD.

Notes:

1. Overflow events that would occur at 93% Capture only.
2. The Eagle Creek value on 10/5/2000 represents a single sample and not an average of several samples.
3. Sampling data is presented only for wet-weather samples taken on or following the estimated overflow event date, and for locations within the CSO area.
4. The 10/4/2000 and 6/5/2001 overflow event dates are shown on two rows because samples were collected on two different days that could be correlated to those events.

The city maintains that these types of storm events would have caused overflow events both before and after November 28, 1975, the date after which an existing use must be protected if it has been "attained."

In addition, the city has demonstrated in the attached documentation that stream flows are extremely high and unsafe for recreational use during wet weather events exceeding a 1.7-month storm, as shown in the table below. This storm was chosen as an example large storm that might not be controlled by the city's long-term control plan. Similar conditions in terms of flow, water quality, etc. would result from 2-month, 3-month or larger storms.

Modeled Maximum Stream Flow in CSO-Impacted Areas of Marion County Streams

	3-month storm	1.7-month storm
Fall Creek	500-685 cfs	360-535 cfs
Eagle Creek	620-645 cfs	465-485 cfs
Pogues Run	340-565 cfs	260-440 cfs
Pleasant Run	415-510 cfs	280-395 cfs
White River	595-2550 cfs	440-2000 cfs

Therefore, the physical and water quality conditions of CSO-impacted waterways make primary and secondary contact recreational activities unsuitable, undesirable, and unsafe during significant wet weather events.

City Programs Prevent and Control Access to Waterways

The city's programs to prevent and control use of CSO-affected waterways include legal barriers to use, warning signs, public notification and education programs, and capital investments in safer water recreation alternatives. These programs are described in more detail in the documentation that follows. Together, they represent an aggressive and proactive outreach/educational program to prevent and control both adults and children from using CSO-impacted waterways during and immediately following a significant wet weather event. In recent comments after a review of the city's program, U.S. EPA's Region V office complimented the city for providing a "good, solid program" that provides multiple pathways for disseminating information to the public and that includes bilingual signs with graphics and warnings about sewage. Since at least 1975, the city's policy, practice and law have worked together to prevent, control and discourage public contact with waters impacted by CSOs. The city has strengthened its efforts in recent years to prevent and control public access to its waterways, and will continue to operate and improve such programs in the future. After LTCP controls are in place, the city is willing to take reasonable steps to prevent access to areas where full-body or partial-body contact may occur shortly after large storms that cause sewage overflows.

Conclusion

Based upon the data collected, the City of Indianapolis concludes that full-body and partial-body contact recreation has not been attained as an existing use under 40 CFR 131.3(e) during storm events exceeding the 1.7-month storm. Therefore, we request that IDEM affirm the city's conclusion and allow the city to proceed with a UAA to evaluate the attainable uses of CSO-impacted streams during the periods and conditions under which we contemplate having residual overflow events.

Introduction

The City of Indianapolis is revising its April 2001 Long-Term Control Plan for reducing combined sewer overflows to Marion County streams. Once completed and approved by the U.S. Environmental Protection Agency (U.S. EPA) and Indiana Department of Environmental Management (IDEM), the plan will dramatically reduce the frequency and duration of combined sewer overflows and significantly reduce the volume of raw sewage flowing into neighborhood streams and the White River.

In October 2004, the city sought public input on three systemwide plans. These plan options were: storage/conveyance facilities with central treatment, storage/conveyance with some remote treatment, or total sewer separation. The city's chosen plan of storage/conveyance facilities with central treatment will be combined with sewer separation in isolated areas, improved stormwater management, conversion of neighborhoods on septic systems to sewers, and stream corridor restoration as the city adopts an integrated watershed approach to improving water quality. The plan also will include expansion projects at the Belmont and Southport Advanced Wastewater Treatment Plants to enable the plants to treat more flows during and after wet weather.

A critical question in preparing the long-term control plan is the recommended size of storage tunnels, tanks and on-site treatment facilities. The larger the facilities, the more sewage and stormwater they will capture and the fewer times overflows will occur. However, as size increases, so does the cost. The city, in conjunction with the community, is seeking consensus behind a plan that will best protect public health and the environment in an affordable and cost-effective way. Although water quality will improve dramatically and overflows will be reduced significantly from the current average of 60 events per year, the city cannot completely eliminate sewer overflows because some storms inevitably will be too large for the storage and/or treatment facilities.

Both federal and state legislation, regulations, policy and guidance anticipate the need of many combined sewer overflow (CSO) communities to revise or temporarily suspend water quality standards to reflect wet weather impacts of CSOs.

- U.S. EPA's July 2001 guidance on "Coordinating CSO Long-Term Planning with Water Quality Standards Review" states that EPA's goal "is for CSO communities to develop and implement cost-effective [long-term control plans] that achieve compliance with applicable water quality standards and with other [Clean Water Act] requirements, and *for states to review and revise water quality standards as appropriate to ensure they are attainable*." (Emphasis added.)
- Senate Enrolled Act 431, enacted by the Indiana General Assembly in 2000, provides that designated uses and associated water quality standards would be temporarily suspended for waters affected by discharges from CSOs if specific conditions are met, including preparation of a Use Attainability Analysis (UAA).
- Senate Bill 620, currently under consideration in the General Assembly, would create a limited recreational use subcategory for CSO-impacted waterways.

Currently, Marion County waters affected by CSOs do not meet *E. coli* bacteria standards established to protect recreational uses at all times. Furthermore, no level of CSO control will attain the recreational standard 100 percent of the time. Some storms would always be too large for the control facilities to capture all flows, unless all sewers were separated. Furthermore, other sources do currently and will continue to prevent Indianapolis streams from meeting the bacteria standards, even during storms in which CSOs are fully captured and treated.

Sewer separation would reduce the loading of *E. coli* bacteria caused by CSOs. However, the reductions in CSO discharges would be offset by increases in stormwater bacteria discharges. Thus, complete sewer separation will not eliminate bacteria loadings to the streams. Therefore, Indianapolis waterways still would not attain recreational standards during wet weather. Sewer separation would cost an estimated $6.2 billion, or an additional $119 per month for the average household – greater than 2 percent of the median household income of the sewer service area. Sewer separation also would result in more frequent urban stormwater discharges of a greater magnitude than streams currently experience.

The City of Indianapolis desires IDEM and EPA approval of an aggressive, cost-effective long-term control plan that will provide a high level of CSO control. However, for the few residual overflows that remain, the city will seek a temporary suspension of water quality standards associated with *E. coli* bacteria or a limited use recreation subcategory, as authorized under state law. To obtain a temporary suspension, subcategory or other modification to the designated use, the city must prepare and gain approval of a Use Attainability Analysis (UAA). The UAA will seek to modify water quality standards for *E. coli* bacteria for overflows that will occur after implementation of the city's long-term control plan.

Under federal regulations, a designated use cannot be removed if it is an existing use, defined as a "use *actually attained* in the water body on or after November 28, 1975." (Emphasis added.) The State of Indiana is responsible for making the existing use determination.

This submittal provides data and information that would allow IDEM and the Indiana Water Pollution Control Board to make a "no existing use" determination for primary and secondary contact recreation during storm events exceeding the 1.7-month storm. The determination would apply to CSO-impacted portions of affected waterways, based upon the principles stated in IDEM's September 2001 guidance. If a determination of "no existing use" during these storm events is made, Indianapolis will proceed with a Use Attainability Analysis to determine what uses are attainable on CSO-impacted streams during wet weather.

Existing Use Requirements

Federal Requirements: The Clean Water Act sets forth that "wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved." Federal regulations describe the requirements and procedures for "developing, reviewing, revising, and approving water quality standards" by the states. A state must conduct a Use Attainability Analysis (UAA) whenever the state wishes to remove a designated use that is specified in Section 101(2)(2) of the Clean Water Act. 40 CFR § 131.10(j). A UAA is "a structured scientific assessment of the factors affecting the attainment of the use which may include physical, chemical, biological, and economic factors as described in Sec. 131.10(g)." 40 CFR 131.3(g). However, a state may remove a designated use from its water quality standards only if the designated use is not an existing use. 40 CFR 131.10(g) and (h)(1).

"Existing uses" are defined as "those uses *actually attained* in the water body on or after November 28, 1975, whether or not they are included in the water quality standards." 40 CFR 131.3(e). This federal regulation does not specify how to determine whether a use has been "actually attained."

Introduction

State Requirements: During its 2000 session, the Indiana General Assembly approved Senate Enrolled Act 431, which was signed into law by Gov. Frank O'Bannon on March 17, 2000. Section 20(a) of the statute provides that "designated uses and associated water quality criteria are temporarily suspended on a site specific basis, for waters affected by discharges from combined sewer overflow points listed in the National Pollutant Discharge Elimination System (NPDES) permit due to wet weather events," if specific conditions are met, including the federal requirements relating to the UAA process. *See* IC 13-18-3-2.5(a).

IDEM issued its final *Combined Sewer Overflow Long Term Control Plan and Use Attainability Analysis Guidance* (IDEM guidance) on September 19, 2001, which became effective on December 14, 2001. IDEM's guidance identifies the steps that must be followed to apply for, obtain and maintain a temporary suspension of a designated use. In the first step, IDEM must determine if a designated use is an existing use, using information provided by a community through the UAA process. The guidance notes that:

> *Remembering that an "existing use" cannot be removed, suspended, or otherwise modified, unless modified to make it more protective, it is important that IDEM determines, with input from the community what existing uses may apply to their water bodies. IDEM will determine that a use exists if the use is or has been "actually attained" or the water quality necessary to support the use is in place even if the use, itself, is not currently established, as long as other non-water quality related factors would not prohibit the use. Any decision regarding whether recreational uses are an "existing use" must be a water body-specific determination.* (IDEM guidance, p. 1)

The IDEM guidance also recognizes that "a recreational use that has occurred on or after November 29, 1975, may not have occurred 365 days each year. For example, people are unlikely to be engaging in recreational activity in the water during the winter or during severe storm events. Therefore, there may be specific time periods when IDEM will not consider a water body to have an existing recreational use." (IDEM guidance, pp. 50-51.)

IDEM guidance further notes that physical conditions, water hazards and steps taken by a municipality to prevent and control recreational use may affect the existing use determination for a specific waterway. (IDEM guidance, p. 51.)

Factors for Determining a Recreational Use

IDEM guidance establishes that an existing use determination must be made on a case-by-case basis. The guidance indicates that although actual recreational uses may occur, other factors may preclude an existing use determination. Based upon principles set forth in IDEM guidance, an actual recreational use may not be an existing use based upon a review of the following factors:

1. Lack of proximity to residential neighborhoods, parks and schools and/or presence of physical hazards, access, flow or substrate that make such areas unsuitable for recreational use;
2. Waters that are dangerous due to physical hazards such as swift currents, rapids, dams or shipping traffic;
3. Limited extent of actual recreational uses;
4. Limited extent of recreational use during or immediately after a significant wet weather event; or

5. Unsafe water quality combined with municipal programs to prevent and control access to the water.

Information supporting conditions 1-4 are provided in attached documents for each CSO-impacted watershed in Marion County: Fall Creek, Eagle Creek, Pogues Run, Pleasant Run/Bean Creek and White River. Because some information relating to the fifth condition is not watershed-specific, information describing the city's programs to prevent and control access to the water is provided below.

5. **Unsafe water quality combined with municipal programs that prevent and control access to the water.**

IDEM guidance notes that water quality unsafe for recreational uses and municipal programs to prevent and control access may be a factor in determining an existing use:

> *If the water quality is unsafe and access to the water is precluded by (a) existing impediments to physical access such as steep banks, fencing or high retaining walls, then IDEM will not presume an existing recreational use. In order for IDEM to determine that access is precluded by the municipality, the municipality must take steps to actively prevent adults and children from actually using the water. This requires the municipality to prevent and control access to the water and to conduct a reasonable proactive outreach media and educational program to prevent actual use during and immediately following a significant wet weather event. This presumption will not apply to recreational beaches open to the public and other swimming areas designated for public recreation.* (IDEM guidance, p. 51.)

Water Quality: See documentation for each watershed.

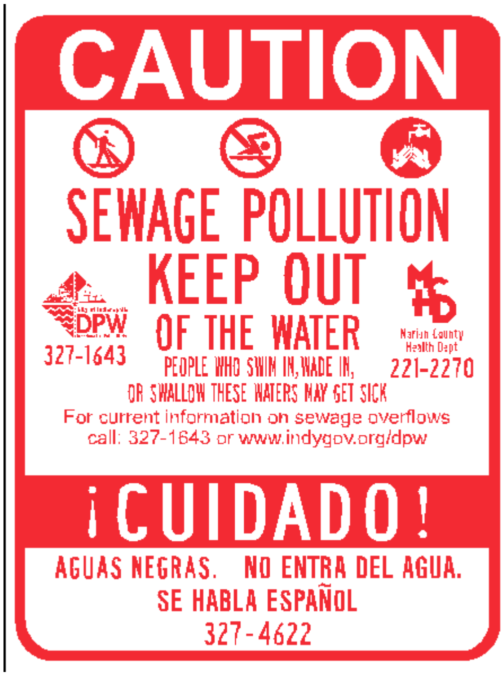
Municipal Programs to Prevent and Control Access: The city's programs to prevent and control use of CSO-affected waterways include legal barriers to use, warning signs, public notification and education programs, and capital investments in safer water recreation alternatives. These programs are described below:

a) Legal barriers to use. The City of Indianapolis historically has recognized the poor quality of its streams and the associated potential for the transmission of various diseases. In 1975, the city adopted an ordinance that prohibited swimming in most waterways in Marion County, including all streams in the combined sewer area. The ordinance states, "It shall be unlawful for any person to fish, bathe, wash, operate boats in or enter any public waterways, or to send, drive or ride any animal into any public waterways, where not authorized for such purposes." (Code 1975, Sec. 7-21) In addition, as late as 1996, the Health and Hospital Corporation of Marion County passed an ordinance prohibiting full-body and partial-body contact recreation in the CSO area stating that public swimming or wading beaches "shall not be located in areas subject to pollution by sewage." (Gen. Ord. 8-1996(A)) Thus, swimming is prohibited by ordinance in all CSO-impacted waterways in Marion County. These ordinances are provided in Appendix E.

Both the Indianapolis Police Department and Indy Parks law enforcement officers enforce these ordinances by ordering violators out of the waterways, or, in some instances, issuing a citation.

b) Warning signs about sewage pollution. The city and the Marion County Health Department have installed more than 230 warning signs at all CSO outfalls and at public access points to the waterways. The first signs were posted in the 1990s at CSO outfalls and locations where recreational activities were known to occur. New signs were posted in 2003 in additional locations. The public access signs warn citizens of sewage pollution and that swimming and wading are not permitted. Signs include both English and Spanish warnings. The city evaluated 180 areas for signs, including schools, bridges, boat docks, boat ramps, canoe launches and other public access areas located on or adjacent to affected waters. Criteria for determining locations of warning signs were ease and ability to access affected waters, ownership of the land, presence of and distance to an existing sign, and ability to inform the greatest number of people. Additional information on the warning signs is included in the city's CSO Public Notification Program Standard Operating Procedures, included as Appendix F.

c) Public notification program. In response to requests from the public, the City of Indianapolis developed a CSO public notification program in 2002. This program was the first of its kind in the state and was implemented prior to the Water Pollution Control Board's passage of a rule requiring such programs in all CSO communities. The overall objective and goal of the city's CSO Public Notification Program is to:



- Notify affected and interested persons when sewage overflows are likely to occur;
- Educate affected and interested persons as to the health hazards and impacts associated with sewage in our waterways;
- Enable affected and interested persons to take the appropriate steps to protect themselves from hazards associated with sewage in waterways; and
- Comply with 327 IAC 5-2.1 (Combined Sewer Overflow Public Notification Rule).

The city's Wet Weather Technical Advisory Committee (WWTAC) was involved in developing the public notification plan. The WWTAC was encouraged to take information about the program back to their respective organizations, which include industry, the Marion County Health Department, Improving Kid's Environment, the Audubon Society, Sierra Club, and Friends of the White River.

The program includes daily monitoring of weather reports, e-mail notification, a telephone hotline, a warning on government access television station and reports to IDEM on monthly Discharge Monitoring Reports. Interested parties can sign up for the e-mail listserve via the city's Web site at http://www.indygov.org/dpw. Further, the telephone hotline can be called 24 hours a day to obtain current information on current or impending sewage overflows. The hotline number (327-1643) is included on the signs posted at parks and other public access points.

The city notified citizens of the CSO public notification program through public meetings, the city's Web site, letters to more than 500 neighborhood associations and community groups, and a water bill insert that reached roughly 242,000 households. The city took notification efforts one step further by sending letters to schools, downstream communities and appropriate government organizations. In all, the city mailed program information to approximately 670 schools, day care centers and day ministries; six downstream health departments; seven county parks departments and/or government offices; three DNR district headquarters; and one downstream state park.

d) Additional public education programs. In addition to prohibiting stream use through its ordinance, the city discourages the public from recreating in urban waters through extensive public education programs. Since the late 1990s, public outreach has been conducted in the following phases:

Phase I: Formation of the Wet Weather Technical Advisory Committee (1996). This committee is composed of technical experts and community activists with an interest in water quality and wet weather issues. It has provided continuing involvement of key stakeholders and professionals in the city's analysis of stream conditions and control alternatives. The committee also advised the city in the development of its first public education program on water quality issues, known as WaterWise.

Phase II: Formation of Mayor's Raw Sewage Overflow Advisory Committee and public education/input sessions (2000). The mayor's committee is composed of a broad cross-section of the community, including business leaders, environmental activists, neighborhood representatives, and representatives of legal, financial, engineering, construction, labor and other professions. It guided the city as it conducted an extensive series of public education meetings in 2000, followed by public input sessions throughout the community. The committee analyzed the input received and provided recommendations to the mayor on how to proceed in developing the long-term control plan. The public meetings were televised on the local government cable channel and covered in the local news media.

Phase III: Publication of draft long-term control plan and 30-day public comment period and public hearing (2001). The city's draft plan was distributed widely in the community and comments were accepted in writing, via the city's Web site or telephone hotline, and at a public hearing. These activities were covered by the local news media.

Phase IV: Stream use survey and neighborhood outreach meetings to identify ways in which residents use CSO-impacted waterways in Marion County (2002). The city conducted non-random intercept surveys followed by neighborhood meetings to collect information from stream users, neighborhood leaders and environmental and recreational groups. These meetings also provided an opportunity to educate the public about sewage pollution.

Phase V: Creation of the Indianapolis Clean Stream Team public outreach and education program (2003). This comprehensive outreach program is designed to build public support and understanding of CSO and other water quality issues. The program utilizes a variety of methods and materials to inform citizens about progress toward addressing raw sewage overflows. Activities have included display booths at Earth Day and other community events, an 8-minute educational video aired on Channel 16 and distributed to area schools, program and project fact sheets, PowerPoint presentations for neighborhood meetings, and media events to showcase CSO early action projects.

The Clean Stream Team also publishes the Stream Line newsletter quarterly to inform citizens about progress toward addressing combined sewer overflow issues and other issues relating to water quality and sewer infrastructure. It is distributed via mail and electronically to nearly 1,500 persons.

In 2003, the Clean Stream Team launched the Team WET (Water Education for Teachers) Schools urban water education curriculum in three middle schools in the Indianapolis Public Schools system. The program works with teachers to incorporate urban water education into science, social studies, history and other subjects. The activities promote learning about a range of water issues, from ecology and pollution prevention to wastewater treatment and water stewardship. The Team WET schools are: McFarland Middle School between Pleasant Run and Bean Creek; Harshman Middle School next to Pogues Run; and John Marshall Middle School, located at the northern edge of the Grassy Creek watershed, which drains into Buck Creek. Just north of Grassy Creek is Indian Creek watershed, which drains into Fall Creek.

Web Page: The City of Indianapolis maintains an award-winning Web site at www.indygov.org that is used to convey extensive information relating to the wastewater collection system. Web pages relevant to CSO-related activities include:

- DPW WebPages (www.indygov.org/dpw)
- Indianapolis Clean Stream Team (www.indycleanstreams.org)
- WaterWise (www.indygov.org/dpw/waterwise)

e) Capital investments in safer water recreation alternatives. IDEM's guidance states that municipal programs to prevent and control access do not remove an existing use presumption from recreational beaches open to the public and other swimming areas designated for public recreation. The city does not have any recreational beaches open to the public or other swimming areas along any of the CSO-impacted waterways. To the city's knowledge, there are no public facilities such as designated bathing beaches, lifeguards, or bath houses within or downstream of the combined sewer area along any CSO-impacted streams, including CSO-impacted portions of White River downstream of Marion County. The geographic extent of the CSO-impacted area for each stream is documented later in this document.

Furthermore, the city's parks department has 22 facilities with swimming pools that provide a safer and more popular form of water recreation for the citizens of Indianapolis. These pools have approximately 285,000 users each year. In addition, the city has constructed eight spray pools that provide free water recreation in a number of parks, with three more in planning or design.

The table on the following page details Indy Parks with swimming pools or spray areas near the CSO-impacted areas of each watershed. The location of each facility is also shown on the recreational use survey maps in Appendix C for each watershed.

Indy Parks Swimming Pools and Spray Areas near CSO-Impacted Waterways

Park	Watershed	Year Built	Year Renovated	Average Annual Attendance
Krannert Indoor Pool	Eagle Creek	1959		5,000 to 6,000
Krannert Park Pools and Spray Area	Eagle Creek	1968	1991 & 2003	
Thatcher Park Pool	Eagle Creek	1972		8,000 to 10,000
Centennial & Groff Park Spray Area	Eagle Creek/White River	1955	1995	2,000 to 3,000
Haughville Park Spray Area	Eagle Creek/White River	1955	1992	3,000 to 4,000
LaShonna Bates Aquatics Center	Eagle Creek/White River	1998		10,000 to 14,000
Rhodius Park Pool	Eagle Creek/White River	1972	1992	7,000 to 9,000
Arsenal Park Spray Area	Fall Creek	1998		3,000 to 4,000
Douglass Park Pool	Fall Creek	1972		4,000 to 6,000
Martin Luther King Park Pool	Fall Creek	1972	1995	3,500 to 5,000
Bethel Park Pool and Spray Area	Pleasant Run		1996	5,000 to 6,000
Christian Park Spray Area	Pleasant Run	early to mid 1980's	n/a	more than 852
Ellenberger Park Pool	Pleasant Run	1930	1974	24,000 to 27,000
Garfield Aquatic Center	Pleasant Run	1996		25,000 to 28,000
Brookside Park Pool and Spray Area	Pogues Run		1993	10,000 to 12,000
Willard Park Pool and Spray Area	Pogues Run/Pleasant Run	1982	2003 & 2004	6,000 to 7,000
Broad Ripple Park Pool	White River	1983		13,000 to 16,000
Broadway & 61st Park Spray Area	White River	1955	1995	4,000 to 5,000
Municipal Gardens Spray Area	White River	1998		
Riverside Park Pool and Spray Area	White River	1992		7,000 to 9,000
Andrew Ramsey Park Spray Area	White River/Fall Creek	2002		3,000 to 4,000

Since at least 1975, the city's policy, practice and law have worked together to prevent, control and discourage public contact with waters impacted by CSOs. The city has strengthened its efforts in recent years to prevent and control public access to its waterways, and will continue to operate and improve such programs in the future. After LTCP controls are in place, the city is willing to take reasonable steps to prevent or discourage access to areas where water recreation may occur shortly after large storms that cause sewage overflows.

Introduction

In the following sections, the city provides documentation for each CSO-impacted stream reach relative to the other four existing use principles noted in IDEM guidance:

1. Lack of proximity to residential neighborhoods, parks and schools and/or presence of physical hazards, access, flow or substrate that make such areas unsuitable for recreational use;
2. Waters that are dangerous due to physical hazards such as swift currents, rapids, dams or shipping traffic;
3. Limited extent of actual recreational uses;
4. Limited extent of recreational use during or immediately after a significant wet weather event.

This documentation also includes information on water quality conditions to support the fifth factor: unsafe water quality combined with municipal programs to prevent and control access to the water.

Information Supporting Fall Creek Existing Use Determination

Within the CSO area, some citizens occasionally use Indianapolis streams for full- or partial-body contact recreation, based upon surveys conducted by the City of Indianapolis. However, although actual recreational uses may occur on a sporadic basis, other factors preclude an existing use determination. Documentation supporting factors 1-4 on Fall Creek is provided below and in the attachments.

The city is seeking a "no existing use" determination under 40 CFR 131.3(e) for the CSO area of Fall Creek, which extends from Keystone Avenue to the confluence with the White River.

1. Lack of proximity to residential neighborhoods, parks and schools and/or presence of physical hazards, access, flow or substrate that make such areas unsuitable for recreational use

IDEM's principles for making an existing use determination note that physical access, flow and substrate are factors to consider. (IDEM guidance, p. 51) IDEM also recognizes that waters may be too shallow during dry periods to allow for adult swimming. The City of Indianapolis collected the following information on Fall Creek's physical access, flow and substrate to support IDEM's existing use determination:

Physical Access: During a physical stream survey in May-July 2001, the city collected data on the slopes of stream banks and presence of vegetation along CSO-impacted waterways. Maps and tables summarizing the data collected are provided in Appendix A**.** Although Fall Creek is accessible in some places, dense vegetation or steep slopes discourage use in other areas:

- Dense vegetation (dense brush) covers approximately 87 percent of the stream banks from Keystone Avenue to the confluence with White River. The rest of the area has five percent medium vegetation (some brush) and eight percent light vegetation (grass).
- Steep slopes (greater than 1:1 ratio) discourage use for about 48 percent of the Fall Creek stream bank; moderate slopes (approximately 1:1) affect about 43 percent of the stream bank in the CSO area.

Heavy vegetation borders the channel throughout much of Fall Creek between the Keystone Dam and 34th Street. Land use from Keystone to 38th Street is light industrial and from 38th to 34th street is mixed residential and light industry. Heavy vegetation and steep slopes along much of the stream limit access in this reach.

From 34th Street to Boulevard Dam, Fall Creek flows through older residential neighborhoods. Large trees typically border the channel in this area. Steep flood control levees restrict access throughout much of this reach. There are, however, a number of potential access points along the Fall Creek Greenway, which parallels the north bank of Fall Creek in this area.

Land use in this area is mixed parkland, residential, and light industry. Stream access is mixed in this reach. The stream can be accessed by the public in Watkins Park and at Fall Creek & 16th Street Park and along much of the Fall Creek Greenway. However, steep levee slopes, heavy vegetation, and unstable banks in these locations tend to make that access difficult.

Stream Flow and Depth: Streamflow in Fall Creek is highly variable and is related to precipitation. Flow in Fall Creek is generally highest in the late winter and early spring and, occasionally, during the summer during intense rainfall. Both high and low streamflows can significantly affect the quality of the water. During wet weather, Fall Creek streamflows are predominantly made up of CSO flows downstream of the Keystone Dam. During the summer and fall, most of the water above the Keystone Dam is diverted into the Indianapolis Water treatment plant, allowing little water to pass over the dam. To demonstrate the variability in flow, a hydrograph of U.S. Geological Survey gauge data is provided in Appendix B. Stream flow during wet weather is described in more detail under Factor 2 below.

Stream depth varies in the CSO-impacted portions of Fall Creek, ranging from 1-3 feet during dry weather. A number of exposed sandbars and islands have formed from sediments deposited due to reduced flow downstream of the Indianapolis Water drinking water intake at Keystone Dam.

Substrate: The substrate in Fall Creek is sand and rocks. However, organic sludge lies in many areas and would discourage wading. CSO control is expected to improve the substrate by reducing the primary source of organic sludge deposits.

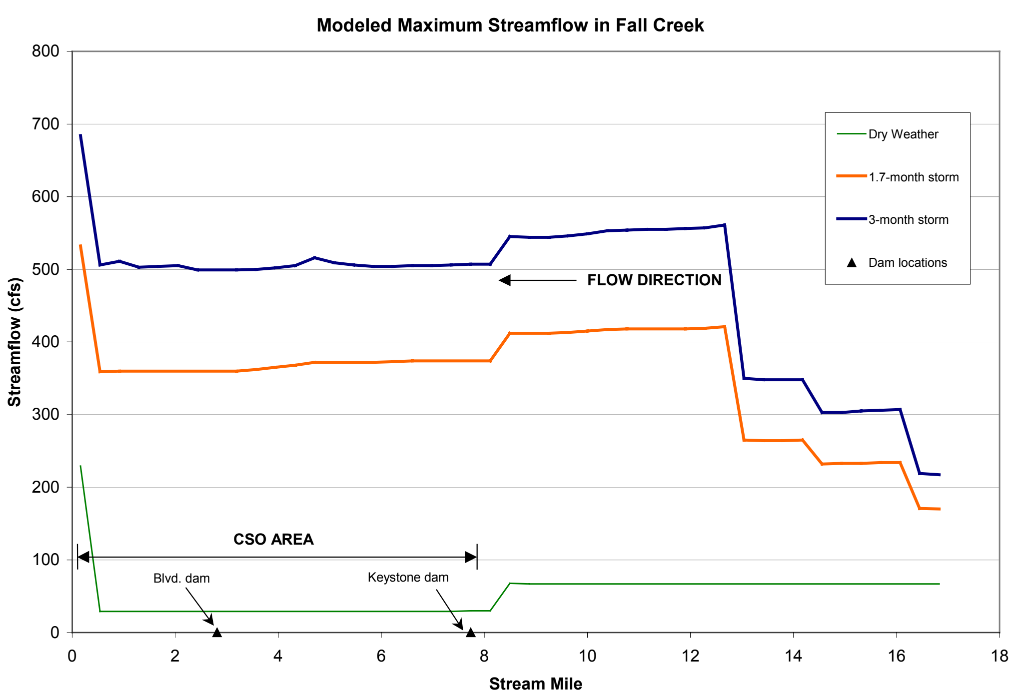
Summary: Although Fall Creek is accessible to the public in some areas, its dense vegetation, steep-to-medium slopes, and low stream flow make the waterway very poor for full-body or partial-body contact recreational activities. Dense vegetation covers the stream banks and discourages public access along 87 percent of the CSO-impacted area. Steep to moderate stream bank slopes discourage access along approximately 91 percent of the area. Throughout the CSO area, much of Fall Creek is too shallow to support swimming by adults or children during dry weather, when people are most likely to seek out water recreation. Much of the area has a depth between 1 and 3 feet during the recreational season.

2. Waters that are dangerous due to physical hazards such as swift currents, rapids, dams or shipping traffic

The U.S. Geological Survey maintains a gauging station on Fall Creek at Millersville (i.e., Emerson Way bridge, 9.2 river-miles upstream of its mouth). This gauging station is upstream of the Keystone Avenue dam, where Indianapolis Water makes water supply withdrawals. Wet weather events can transform the low flow nature of the stream into a dangerous waterway, as shown in the photographs below. The first photograph shows Boulevard Dam during summertime dry weather. Note that the walls of the dam are visible on both sides of the creek in the photograph.

The photograph below shows the same location following the September 1, 2003, 100-year rainfall event. Note that the dam is submerged, but turbulence can be seen in the location of the dam. Stream flows are too dangerous for recreational activities.

For purposes of the existing use determination, the city reviewed storm events greater than a 1.7-month storm (1.25 inches of rainfall over a 24-hour period). This storm was chosen as an example large storm that might not be controlled by the city's long-term control plan. Similar conditions in terms of flow, water quality, etc. would result from 2-month, 3-month or larger storms. As shown in the hydrograph below, estimated maximum stream flows due to a 1.7-month storm range from 360-535 cfs in the CSO area of Fall Creek. During these infrequent storms, Fall Creek is not safe for recreation. In comparison, estimated maximum stream flows due to a 3-month storm range from 500 cfs to 685 cfs.



One gauge of safety for water contact recreation is the safety of wading, since streams that are not safe for wading would also not be safe for swimming or other water contact activities. Each wader should know and strictly adhere to their personal wading abilities and limitations. When stream flows are low, trained USGS employees measure stream discharge by wading into the stream. When stream flows are high or potentially dangerous, USGS hydrologists make discharge measurements using acoustic Doppler current meters deployed from a tethered boat. At the Millersville gauge, the USGS staff generally did not wade in flows above 340 cfs. Although USGS hydrologists occasionally wade at higher flows, they are equipped with a personal flotation device and have extensive wading safety training and experience. It would not be safe for an inexperienced person to wade the stream at such high flows. During rain events ranging from 1.7 months to 3 months, estimated stream flows range from 360 to 685 cfs and are too dangerous for wading. Although wading is reported in some locations along Fall Creek, it is not known to occur during stream flows occurring from a 1.7-month storm or greater.

Summary: Large storms create stream flows and velocities that are dangerous in Fall Creek, precluding use of the stream for water contact activities such as wading or swimming. These currents will continue to render Fall Creek unsafe for recreational activities during combined sewer overflow events. This data supports a finding of "no existing use" during storm events exceeding the 1.7-month storm on Fall Creek for primary and secondary recreation.

3. Limited extent of actual recreational uses

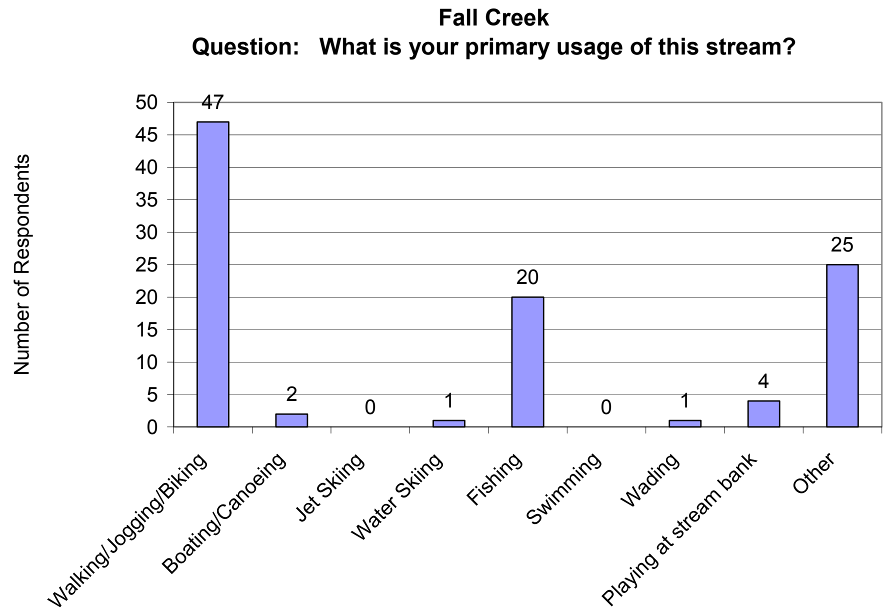
IDEM's principles for making an existing use determination establish that "the occasional or incidental use by individual adults does not automatically establish an existing use for recreation." (IDEM guidance, p. 51). Therefore, the limited extent and frequency of actual uses of waterways should be a factor when determining whether a recreational use is an existing use. There are no community-sanctioned or privately owned recreational areas for swimming, kayaking or other recreational uses on the CSO-impacted portions of Fall Creek. However, some limited and isolated recreational uses do occur. To establish the extent of actual recreational uses, the city conducted public meetings and a non-random face-to-face survey to collect data on how people use or have seen others use CSO-impacted waterways. Sources of information used by the city included:

- Physical stream survey in May-July 2001
- Public non-random intercept survey in June 2002 (Fall Creek Use Survey)
- Public outreach meetings with neighborhood associations, environmental activists and recreational groups in September-November 2002
- Marion County Health Department reports of stream use from 2001-2002
- Indy Parks stream use survey in October 2002

Location of Uses: Isolated recreational uses on Fall Creek in the CSO area are found predominantly along the many parks and greenways located along this low-flow, neighborhood stream. However, these recreational uses are precluded during large storm events. Based upon the above data sources, the city identified 18 reported fishing locations, 12 reported playing-at-stream-bank locations, three reported wading locations, and zero reported swimming locations on Fall Creek. Wading and playing by the stream bank are reported at various spots along the greenways, including Fall Creek Greenway, adjacent to Watkins Park, and 30th Street. A map illustrating the observed and reported uses is located in Appendix C.

Extent of Uses: While recreational activities do occur on Fall Creek within the CSO area, the number of people engaging in water contact activities and the frequency of those activities is limited. In the Fall Creek Use Survey, the primary recreational activity reported by adults surveyed along Fall Creek was walking/jogging/biking (47 of 100 people surveyed). Approximately 25 percent of respondents reported a primary use of fishing, wading or playing at stream bank, as shown in the figure below. For purposes of the survey, the following definitions were used:

- **Swimming:** Full-body contact[1] with the water, including a high potential for swallowing the water (water should be deep enough to permit actual swimming).
- **Wading:** Partial-body contact[2] with the water (usually water contact to lower legs and possibly hands and arms).
- **Playing at the Stream Bank:** Kneeling, squatting or sitting at stream bank (some water contact may occur when hands reach into the water to touch or pick up something).
- **Fishing:** Fishing at the stream bank or from a boat (water contact occurs through handling fish and tackle).



Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

Note in the figure above that one person said his or her primary usage of Fall Creek is water skiing. Water skiing is not possible on Fall Creek because it is not a navigable stream.

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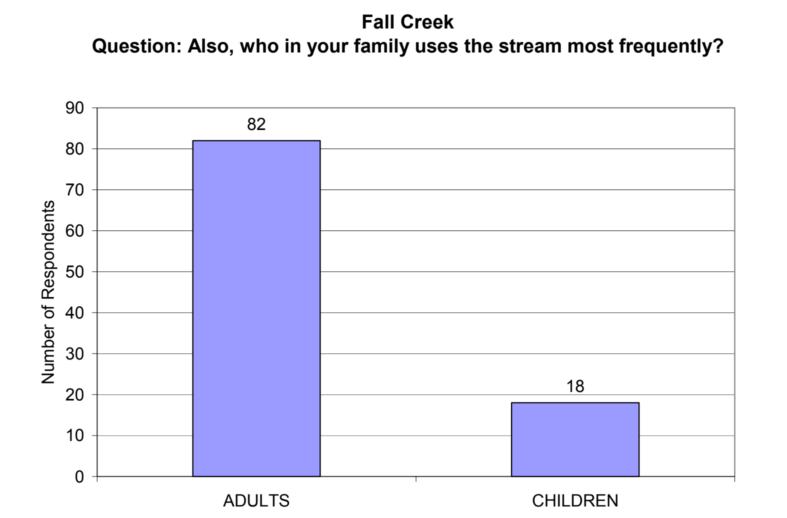
[1] This is also known as primary contact recreation.

[2] This is also known as secondary contact recreation.



Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

Also according to those surveyed, adults are more likely than children to use Fall Creek for recreational activities.

The full results of the Fall Creek Use Survey are located in Appendix D. Note that the survey results cannot be extrapolated to the city's general population. The survey was designed to identify and survey adults most likely to use the waterways and was not conducted using random sampling. Nor is the sample size large enough to warrant extrapolation of the results to the general population.

Frequency of Use: In a typical year, 39 percent of the respondents reported participating in recreational activities along Fall Creek every week and 31 percent reported less than once a month. This data includes all recreational activities, including those not involving water contact.

Summary: The city used a variety of data sources and public participation methods to gather information on the extent and frequency of water recreation activities in and along Fall Creek. Based upon this information, the city identified a number of locations where recreational uses occur along Fall Creek. The primary use of this waterway for 47 percent of respondents is walking, jogging and/or biking along the greenways adjoining the stream. Swimming was not reported. Wading and other water-contact activities are reported much less frequently. There are no public or private bathing beaches along Fall Creek.

4. Limited extent of recreational use during or immediately after a significant wet weather event.

Little evidence exists of full-body or partial-body contact recreational uses of CSO-impacted portions of Fall Creek, especially after significant wet weather events. Where there is evidence of use, it is very infrequent. Most respondents to the Fall Creek Use Survey indicated that recreational usage within 24 hours after a rainfall is observed infrequently or not at all. Fifty-one percent said that, based on their experience, they have seen adults or children playing in the stream when the current is slow, compared to 9 percent who have seen children or adults playing in the stream when the current is fast. Eighty percent of the interviewees also reported that use is infrequent (only once or twice a month) within 24 hours after a rainfall. However, 33 percent of respondents reported observing children or adults playing in the stream during or within 24 hours after a rainfall. The survey did not characterize the size of the rainfall events after which recreation was observed. Based on the answer to the question about fast or slow currents, people are more likely to recreate in dry weather or after a light rain than a major storm. The evidence collected by the city indicates that recreational use is rare or non-existent during and after large storm events.

5. Unsafe water quality combined with municipal programs that prevent and control access to the water.

IDEM guidance notes that water quality that is unsafe for recreational use and municipal programs to prevent and control access may be a factor in determining an existing use:

> *If the water quality is unsafe and access to the water is precluded by (a) existing impediments to physical access such as steep banks, fencing or high retaining walls, then IDEM will not presume an existing recreational use. In order for IDEM to determine that access is precluded by the municipality, the municipality must take steps to actively prevent adults and children from actually using the water. This requires the municipality to prevent and control access to the water and to conduct a reasonable proactive outreach media and educational program to prevent actual use during and immediately following a significant wet weather event. This presumption will not apply to recreational beaches open to the public and other swimming areas designated for public recreation. (IDEM guidance, p. 51.)*

Information on the city's programs to prevent and control access to CSO-impacted waterways is presented in the introduction section to this submittal. Information documenting unsafe water quality on Fall Creek is presented below.

Water Quality: To demonstrate there is no existing recreational use under this factor, the city should demonstrate that recreational water quality standards are not achieved within the CSO-impacted area of Fall Creek during storm events. The table below provides a summary of in-stream water quality data collected in the CSO area of Fall Creek from 2000 – 2002 by the Indianapolis Office of Environmental Services and the Marion County Health Department. Results are shown for all data, dry weather data only and wet weather data. The data show that during wet weather, the geometric mean within the CSO area in Fall Creek was 552 *E. coli* colonies/100 mL, exceeding the state's recreational use standard of 125 cfu/100 mL. More than 65 percent of samples taken in wet weather periods exceed the single sample standard of 235 cfu/100 mL.

Fall Creek *E. coli* Bacteria Compliance (CSO Area)

Data Source	Geometric Mean of 2000-2002 data[1]	% of Samples > 235 cfu/100 mL	Total Number of Samples
All Data	295	50.1%	902
Dry Weather Data	146	33.2%	425
Wet Weather Data	552	65.2%	477

(1) Indiana's standard for geometric mean is 125 cfu/100 mL.

To determine whether water quality standards are being met in the CSO area of Fall Creek during or after large storm events, the city further analyzed in-stream water quality data collected in 2000-2002. Based upon a NetStorm simulation of LTCP Systemwide Control Plan 1, the city identified 17 storm events that would have resulted in untreated overflows if the city had installed CSO control facilities that achieve 93 percent capture. The city does not have data to correlate to all 17 storm events, since the city's existing sampling program is designed to collect data on a periodic basis without regard to weather conditions. However, on the days when existing 2000-2002 data could be correlated to an estimated overflow event, the data consistently show that the single sample maximum standard of 235 *E. coli* colonies/100 mL is not being met. This demonstrates that the CSO area of Fall Creek is unsafe for recreational use during and after those storm events. These types of storm events would have caused overflow events both before and after November 28, 1975, the date after which an existing use must be protected if it has been "attained."

FALL CREEK COMPARISON OF ESTIMATED OVERFLOW EVENTS AND HISTORICAL E. *COLI* BACTERIA SAMPLING 2000-2002

Estimated Overflow Event Date (93% Capture)	Date of Sample	16th St OES (cfu/100 mL)	30th St (cfu/100 mL)	Central (cfu/100 mL)	Capitol (cfu/100 mL)	MLK (cfu/100 mL)	Stadium (cfu/100 mL)	Average (cfu/100 mL)
4/7/00	4/7/00	N/A	55,000	72,000	74,000	21,000	19,000	48,200
5/26/00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7/4/00	7/5/00	N/A	5,900	6,300	5,500	3,300	4,800	5,200
8/17/00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9/10/00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10/4/00	10/5/00	200,000	N/A	N/A	N/A	N/A	N/A	N/A
4/10/01	4/10/01	N/A	410	200	100	100	100	200
6/5/01	6/5/01	N/A	1,340	1,340	1,560	3,280	2,780	2,100
7/1/01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10/10/01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10/24/01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/21/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/24/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/27/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5/7/02	5/7/02	2,400	4,400	2,650	2,650	1,850	3,400	2,900
5/12/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9/20/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11/10/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: Estimated Overflow Dates: 1950-2003 NetSTORM Simulation for System Wide Plan 1, 93% Capture Level of Control.
Sampling Data: 2000 - 2002 instream *E. coli* bacteria sampling by OES and MCHD.
Note: Sampling data is presented only for dates on or following the estimated overflow event date, and for locations within the CSO area.

Recreational users also may be discouraged during storm events due to high flows, murky water as it moves sediments downstream, and unattractive odors from the stream. Water quality is clearly unsafe for recreational use, particularly during these large wet weather events.

Summary

Although occasional recreational uses occur along the CSO-impacted areas of Fall Creek, these should not be considered existing uses under 40 CFR 131.3(e) based upon the following factors:

1. Physical access and flow that are unsuitable for recreational use during large storm events, such as those exceeding a 1.7-month storm;
2. Waters that are dangerous during large storm events due to swift currents and rapids
3. Limited extent and frequency of actual recreational uses
4. Minimal recreational use during or immediately after significant wet weather events;
5. Unsafe water quality combined with extensive municipal programs to prevent and control access to the water following wet weather events.

Furthermore, the physical and water quality conditions of Fall Creek downstream of Keystone Avenue make primary and secondary contact recreational activities unsuitable, undesirable, and unsafe during significant wet weather events. Based upon this data, we conclude that full-body and partial-body contact recreation is not an existing use of Fall Creek downstream of Keystone Avenue during storm events exceeding the 1.7-month storm. Therefore, we request that IDEM affirm the city's conclusion and allow the city to proceed with a UAA to evaluate the attainable uses of the CSO area of Fall Creek during the periods and conditions under which we contemplate having residual overflows.

Appendices:
A. Physical Stream Survey Maps and Tables
B. USGS flow graph
C. Fall Creek Recreational Use Map
D. 2002 Fall Creek Use Survey

Reference:

U.S. Geological Survey, 1996. Low-Flow Characteristics of Indiana Streams. USGS Water Resources Investigation Report 96-4128. Page 128.

Information Supporting Eagle Creek Existing Use Determination

Within the CSO area, some citizens occasionally use Indianapolis streams for full- or partial-body contact recreation, based upon surveys conducted by the City of Indianapolis. However, although actual recreational uses may occur on a sporadic basis, other factors preclude an existing use determination. Documentation supporting factors 1-4 on Eagle Creek is provided below and in the attachments.

The city is seeking a "no existing use" determination during storm events exceeding the 1.7-month storm for the CSO area of Eagle Creek, which begins at Tibbs Avenue and ends at its confluence with White River. It also includes the portion of Little Eagle Creek from Vermont Street to its confluence with Eagle Creek.

1. Lack of proximity to residential neighborhoods, parks and schools and/or presence of physical hazards, access, flow or substrate that make such areas unsuitable for recreational use

IDEM's principles for making an existing use determination note that physical access, flow and substrate are factors to consider. (IDEM guidance, p. 51) IDEM also recognizes that waters may be too shallow during dry periods to allow for adult swimming. The City of Indianapolis collected the following information on Eagle Creek's physical access, flow and substrate to support IDEM's existing use determination:

Physical Access: During a physical stream survey in May-July 2001, the city collected data on the slopes of stream banks and presence of vegetation along CSO-impacted waterways. Maps and tables summarizing the data collected are provided in Appendix A**.** Although Eagle Creek is accessible in some places, dense vegetation or steep slopes discourage use in other areas:

- Dense vegetation (dense brush) covers approximately 43 percent of the stream banks from Michigan Street to the confluence with White River. The rest of the area has 14 percent medium vegetation (some brush) and 42 percent light vegetation (grass).
- Steep slopes (greater than 1:1 ratio) discourage use for about 10 percent of the Eagle Creek stream bank; moderate slopes (approximately 1:1) affect about eight percent of the stream bank in the CSO area.
- Portions of Eagle Creek flow through urban and industrial areas.

The section of Little Eagle Creek approximately 0.75 miles upstream of Cossell Road is characterized by dense vegetation along both sides of the channel. Land use in this section is primarily industrial with some small residential areas. Stream access in this reach is limited by dense vegetation.

Between Cossell Road and Kentucky Avenue both Little Eagle Creek and Eagle Creek are bounded by earthen levees. Land use is mixed industry and high density residential. The levees are maintained in mown turfgrass. Some riparian forest is developing near the channel in the lower reaches of this section. Despite the steep levees throughout much of this reach, accessibility is good. There are several areas where vehicles can drive right up to the stream.

From Kentucky Avenue to its confluence with the White River, Eagle Creek is a channelized stream that flows through a heavily industrial area. The channel is bounded by earthen levees throughout this section. The levees are maintained in mown turf. Some riparian forest is developing near the channel in the lower reaches of this section. Accessibility is very limited in this reach by industrial activity along both banks.

Stream Flow and Depth: Stream flow in Eagle Creek is highly variable and is related to precipitation and water releases from the Eagle Creek dam. Flow in Eagle Creek is generally highest in the late winter and early spring and, occasionally, during the summer following intense rainfall. Both high and low stream flows can significantly affect water quality. To demonstrate the variability in flow, a hydrograph of U.S. Geological Survey flow gauge data is provided in Appendix B. Stream flow during wet weather is described in more detail under Factor 2 below.

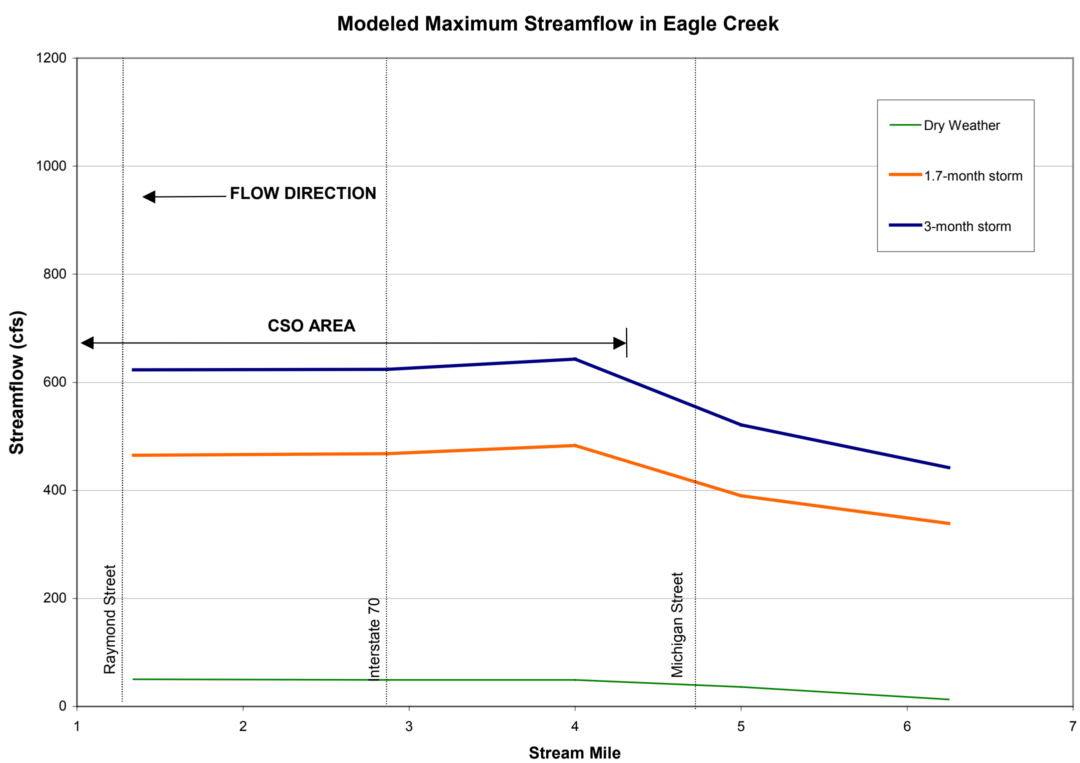
Stream depth is generally low in the CSO-impacted portions of Eagle Creek, typically less than one foot deep during dry weather, according to the May/June 2001 field survey.

Substrate: The substrate in Eagle Creek is mostly sand and rocks. Although the substrate and shallow depths in Eagle Creek can be suitable for wading, occasional deep pools make wading potentially dangerous, especially to children.

Summary: Although portions of Eagle Creek are inaccessible to the public, much of the stream is accessible due to light vegetation and gradual slopes. The majority of the area has a depth between 6 and 12 inches during the recreational season. In the lower reaches, the high industrial activity on both banks discourages people from accessing the stream at these locations.

2. Waters that are dangerous due to physical hazards such as swift currents, rapids, dams or shipping traffic

The U.S. Geological Survey maintains a gauging station on Eagle Creek on the downstream side of the bridge on Lynhurst Drive (i.e., 7.1 river-miles upstream of its mouth). Wet weather events can transform the low flow nature of the stream into a dangerous and unsafe waterway. The first photograph below shows Eagle Creek at low flow conditions in June 2001 upstream of the railroad bridge near McCarty Avenue. The second photograph shows the same location following a 1.25” rain event in October 2004. The sandy, graveled areas and low stream flows conducive to recreation are covered by fast-flowing and murky water following such a storm event.



For purposes of the existing use determination, the city reviewed storm events greater than a 1.7-month storm. This storm was chosen as an example large storm that might not be controlled by the city's long-term control plan. Similar conditions in terms of flow, water quality, etc. would result from 2-month, 3-month or larger storms. As shown in the hydrograph below, estimated maximum stream flows due to a 1.7-month storm range from 465-485 cfs in the CSO area of Eagle Creek. In comparison, estimated maximum stream flows due to a 3-month storm range from 620-645 cfs. During these infrequent storms, Eagle Creek is not safe for recreation.

One gauge of safety for water contact recreation is the safety of wading, since streams that are not safe for wading would also not be safe for swimming or other water contact activities. Each wader should know and strictly adhere to their personal wading abilities and limitations.

When stream flows are low, trained USGS employees measure stream discharge by wading into the stream. When stream flows are high or potentially dangerous, USGS hydrologists make discharge measurements using acoustic Doppler current meters deployed from a tethered boat. At the Lynhurst gauge on Eagle Creek, the USGS staff generally did not wade in flows above 140 cfs. Although USGS hydrologists occasionally wade at higher flows, they are equipped with a personal flotation device and have extensive wading safety training and experience. It would not be safe for an inexperienced person to wade the stream at such high flows. During rain events ranging from 1.7 months to 3 months, estimated stream flows range from 465-645 cfs and are too dangerous for wading. Although wading is reported in some locations along Eagle Creek, it is not known to occur during stream flows occurring from a 1.7-month storm or greater.

Summary: Large storms create stream flows and velocities that are dangerous in Eagle Creek, precluding use of the stream for water contact activities such as wading or swimming. These currents will continue to render Eagle Creek unsafe for recreational activities during combined sewer overflow events. This data supports a finding of “no existing use” during storm events exceeding the 1.7-month storm on Eagle Creek.

3. Limited extent of actual recreational uses

IDEM’s principles for making an existing use determination establish that “the occasional or incidental use by individual adults does not automatically establish an existing use for recreation.” (IDEM guidance, p. 51.) Therefore, the limited extent and frequency of actual uses of waterways should be a factor when determining whether a recreational use is an existing use. There are no community-sanctioned or privately owned recreational areas for swimming, kayaking or other recreational uses on the CSO-impacted portions of Eagle Creek. However, some recreational uses do occur.

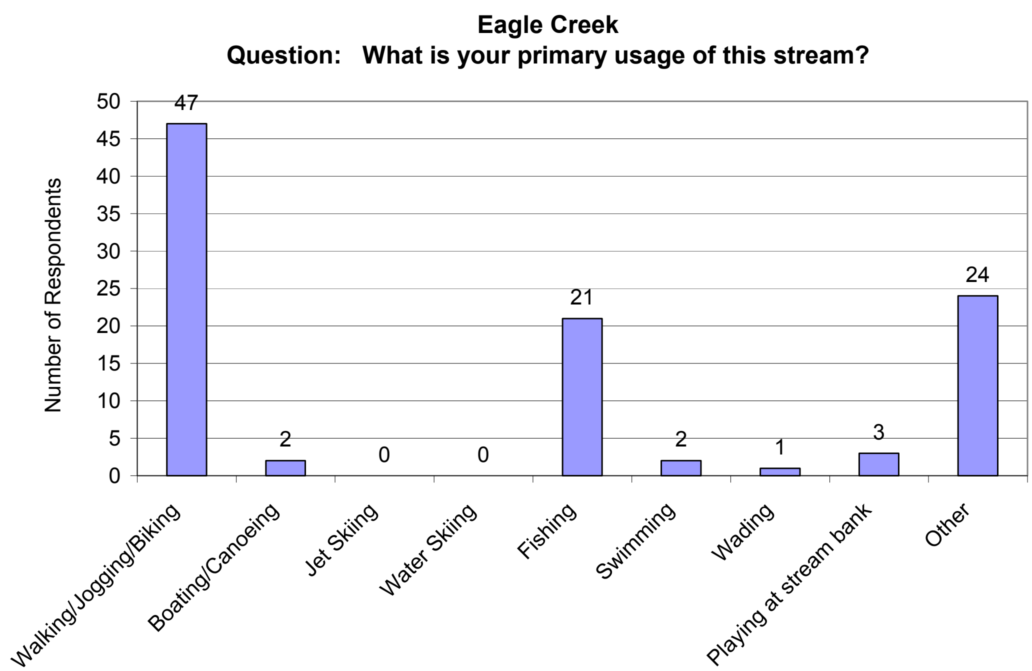
To establish the extent of actual recreational uses, the city conducted public meetings and a non-random face-to-face survey to collect data on how people use or have seen others use CSO-impacted waterways. Sources of information used by the city included:

- Physical stream survey in May-July 2001
- Public non-random intercept survey in June 2002 (Eagle Creek Use Survey)
- Public outreach meetings with neighborhood associations, environmental activists and recreational groups in September-November 2002
- Marion County Health Department reports of stream use from 2001-2002
- Indy Parks stream use survey in October 2002

Location of Uses: Isolated recreational uses on Eagle Creek in the CSO area are found predominantly in residential areas. Based upon the above data sources, the city identified eight reported fishing locations, five reported playing-at-stream-bank locations, seven reported wading locations, and nine reported swimming locations on Eagle Creek. Wading and playing by the stream bank are reported at various spots, including Cossell Road, adjacent to Ridenour Park, and Sadie Street. Fishing also is reported along numerous locations along this stream. Swimming was reported along Eagle Creek at many of the same points as wading was reported. Based upon the information gathered in this survey, the city placed additional warning signs along Eagle Creek to discourage wading and swimming. A map illustrating the observed and reported uses is located in Appendix C.

Extent of Uses: While some recreational activities do occur on Eagle Creek within the CSO area, the number of people engaging in water contact activities and the frequency of those activities is limited. In the Eagle Creek Use Survey, the primary recreational activity reported by people along Eagle Creek was walking/jogging/biking (47 of 100 people surveyed). Twenty-one percent reported a primary use of fishing. Very few reported swimming, wading or playing at stream bank as a primary use, as shown in the graph below. For purposes of the survey, the following definitions were used:

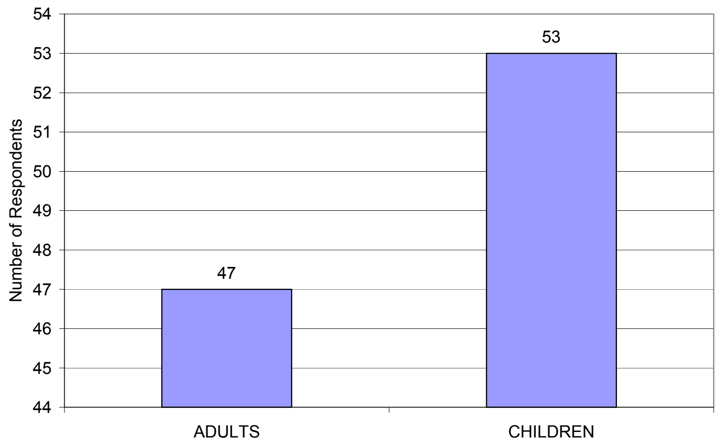
- **Swimming:** Full-body contact with the water, including a high potential for swallowing the water (water should be deep enough to permit actual swimming)
- **Wading:** Partial body contact with the water (usually water contact to lower legs and possibly hands and arms)
- **Playing at the Stream Bank:** Kneeling, squatting or sitting at stream bank (some water contact may occur when hands reach into the water to touch or pick up something)
- **Fishing:** Fishing at the stream bank or from a boat (water contact occurs through handling fish and tackle)



Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

Also according to the survey, children are more likely than adults to use Eagle Creek for recreational activities.

Eagle Creek
Question: Also, who in your family uses the stream most frequently?



Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

According to the survey and additional neighborhood meetings to confirm the survey's findings, swimming is observed or practiced much less frequently than activities that do not involve full-body contact. The full results of the Eagle Creek Use Survey are located in Appendix D. Note that the survey results cannot be extrapolated to the city's general population. The survey was designed to identify people most likely to use the waterways and was not conducted using random sampling. Nor is the sample size large enough to warrant extrapolation of the results to the general population.

Frequency of Use: In a typical year, 21 percent of the respondents reported participating in recreational activities along Eagle Creek every week and 23 percent reported less than once a month.

Summary: The city used a variety of data sources and public participation methods to gather information on the extent and frequency of water recreation activities in and along Eagle Creek. Based upon this information, the city identified a number of locations where recreational uses occur along Eagle Creek. The primary use of this waterway for 47 percent of respondents is walking, jogging and/or biking along the greenways adjoining the stream. Swimming, wading and other water-contact activities are reported much less frequently. There are no public or private bathing beaches within the CSO-impacted areas of Eagle Creek.

4. Limited extent of recreational use during or immediately after a significant wet weather event.

Little evidence exists of full-body or partial-body contact recreational uses of CSO-impacted portions of Eagle Creek, especially after significant wet weather events. Where there is evidence of use, it is very infrequent. Most respondents to the Eagle Creek Use Survey indicated that recreational usage within 24 hours after a rainfall is observed infrequently or not at all. Seventy-four percent said that, based on their experience, they have seen adults or children playing in the stream when the current is slow, compared to 23 percent who have seen children or adults playing in the stream when the current is fast. Seventy-seven percent of the interviewees also reported that use is infrequent (only once or twice a month) within 24 hours after a rainfall. However, 39 percent of respondents reported observing children or adults playing in the stream during or within 24 hours after a rainfall. The survey did not characterize the size of the rainfall events after which recreation was observed. Based on the answer to the question about fast or slow currents, people are more likely to recreate in dry weather or after a light rain than a major storm. The evidence collected by the city indicates that recreational use is rare or non-existent during and after large storm events.

5. Unsafe water quality combined with municipal programs that prevent and control access to the water.

IDEM guidance notes that unsafe water quality and municipal programs to prevent and control access may be a factor in determining an existing use:

> *If the water quality is unsafe and access to the water is precluded by (a) existing impediments to physical access such as steep banks, fencing or high retaining walls, then IDEM will not presume an existing recreational use. In order for IDEM to determine that access is precluded by the municipality, the municipality must take steps to actively prevent adults and children from actually using the water. This requires the municipality to prevent and control access to the water and to conduct a reasonable proactive outreach media and educational program to prevent actual use during and immediately following a significant wet weather event. This presumption will not apply to recreational beaches open to the public and other swimming areas designated for public recreation. (IDEM guidance, p. 51.)*

Information on the city's programs to prevent and control access to CSO-impacted waterways is presented in the introduction section to this submittal. Information documenting unsafe water quality on Eagle Creek is presented below.

Water Quality: To demonstrate there is no existing recreational use under this factor, the city should demonstrate that recreational water quality standards are not achieved within the CSO-impacted area of Eagle Creek during storm events.

The table below provides a summary of in-stream water quality data collected in the CSO area of Eagle Creek from 2000 – 2002 by the Indianapolis Office of Environmental Services and the Marion County Health Department. Results are shown for all data, dry weather data only and wet weather data. The data show that during wet weather, the geometric mean within the CSO area in Eagle Creek was 1719 *E. coli* colonies/100 mL, exceeding the state's recreational use standard of 125 cfu/100 mL. More than 80 percent of samples taken in wet weather periods exceed the single sample standard of 235 cfu/100 mL.

Eagle Creek *E. coli* Bacteria Compliance (CSO Area)

Data	Geometric Mean 2000-2002 [1]	% of Samples 235 cfu/100	Total of
All	419	58.7	63
Dry Weather	165	44.7	38
Wet Weather	171	80.0	25

(1) Indiana's standard for geometric mean is 125

To determine whether water quality standards are being met in the CSO area of Eagle Creek during or after large storm events, the city further analyzed in-stream water quality data collected in 2000-2002. Based upon a NetStorm simulation of LTCP Systemwide Control Plan 1, the city identified 17 storm events that would have resulted in untreated overflows if the city had installed CSO control facilities that achieve 95 percent capture. The city does not have data to correlate to all 17 storm events, since the city's existing sampling program is designed to collect data on a periodic basis without regard to weather conditions. However, on two dates when existing 2000-2002 data could be correlated to an estimated overflow event, the data show that the single sample maximum standard of 235 *E. coli* colonies/100 mL was not being met. This demonstrates that the CSO area of Eagle Creek is unsafe for recreational use during and after those storm events. These types of storm events would have caused overflow events both before and after November 28, 1975, the date after which an existing use must be protected if it has been "attained."

EAGLE CREEK COMPARISON OF ESTIMATED OVERFLOW EVENTS AND HISTORICAL E. *COLI* BACTERIA SAMPLING 2000-2002

Estimated Overflow Event Date (93% Capture)	Date of Sample	Raymond OES (cfu/100 mL)	Vermont (cfu/100 mL)	McCarty (cfu/100 mL)	Minnesota (cfu/100 mL)	Average (cfu/100 mL)
4/7/00	N/A	N/A	N/A	N/A	N/A	N/A
5/26/00	N/A	N/A	N/A	N/A	N/A	N/A
7/4/00	N/A	N/A	N/A	N/A	N/A	N/A
8/17/00	N/A	N/A	N/A	N/A	N/A	N/A
9/10/00	N/A	N/A	N/A	N/A	N/A	N/A
10/4/00	10/5/00	84,000	N/A	N/A	N/A	N/A
4/10/01	N/A	N/A	N/A	N/A	N/A	N/A
6/5/01	N/A	N/A	N/A	N/A	N/A	N/A
7/1/01	7/2/01	N/A	17,250	12,960	9,580	13,300
10/10/01	N/A	N/A	N/A	N/A	N/A	N/A
10/24/01	N/A	N/A	N/A	N/A	N/A	N/A
4/21/02	N/A	N/A	N/A	N/A	N/A	N/A
4/24/02	N/A	N/A	N/A	N/A	N/A	N/A
4/27/02	N/A	N/A	N/A	N/A	N/A	N/A
5/7/02	N/A	N/A	N/A	N/A	N/A	N/A
5/12/02	N/A	N/A	N/A	N/A	N/A	N/A
9/20/02	N/A	N/A	N/A	N/A	N/A	N/A
11/10/02	N/A	N/A	N/A	N/A	N/A	N/A

Source: Estimated Overflow Dates: 1950-2003 NetSTORM Simulation for System Wide Plan 1, 93% Capture Level of Control.
Sampling Data: 2000 - 2002 instream *E. coli* bacteria sampling by OES and MCHD.
Note: Sampling data is presented only for dates on or following the estimated overflow event date, and for locations within the CSO area.

Summary

Although occasional recreational uses occur along the CSO-impacted areas of Eagle Creek, these should not be considered existing uses under 40 CFR 131.3(e) based upon the following factors:

1. Physical access and flow that are unsuitable for recreational use during large storm events, such as those exceeding a 1.7-month storm;
2. Waters that are dangerous during large storm events due to swift currents and rapids
3. Limited extent and frequency of actual recreational uses
4. Minimal recreational use during or immediately after significant wet weather events;
5. Unsafe water quality combined with extensive municipal programs to prevent and control access to the water following wet weather events.

Furthermore, the physical and water quality conditions of Eagle Creek downstream of Tibbs Avenue make primary and secondary contact recreational activities unsuitable, undesirable, and unsafe during significant wet weather events. Based upon this data, we conclude that full-body and partial-body contact recreation is not an existing use of Eagle Creek downstream of Tibbs Avenue during storm events exceeding the 1.7-month storm. Therefore, we request that IDEM affirm the city's conclusion and allow the city to proceed with a UAA to evaluate the attainable uses of the CSO area of Eagle Creek during the periods and conditions under which we contemplate having residual overflows.

Appendices:
A. Physical Stream Survey Maps and Tables
B. USGS flow graph
C. Eagle Creek Recreational Use Map
D. 2002 Eagle Creek Use Survey

Reference:
U.S. Geological Survey, 1996. Low-Flow Characteristics of Indiana Streams. USGS Water Resources Investigation Report 96-4128. Page 134.

Information Supporting Pogues Run Existing Use Determination

Within the CSO area, some citizens occasionally use Indianapolis streams for full- or partial-body contact recreation, based upon surveys conducted by the City of Indianapolis. However, although actual recreational uses may occur on a sporadic basis, other factors preclude an existing use determination. Documentation supporting Factors 1-4 on Pogues Run is provided below and in the attachments.

The city is seeking a "no existing use" determination during storm events exceeding the 1.7-month storm under 40 CFR 131.3(e) for the CSO area of Pogues Run, which extends from Interstate 70 to its confluence with the White River. Note below in Factor 1 that the portion of Pogues Run from New York Street to the confluence with the White River is enclosed in a tunnel that flows under the downtown area and is not accessible for any recreational use.

1. Lack of proximity to residential neighborhoods, parks and schools and/or presence of physical hazards, access, flow or substrate that make such areas unsuitable for recreational use

IDEM's principles for making an existing use determination note that physical access, flow and substrate are factors to consider. (IDEM guidance, p. 51) IDEM also recognizes that waters may be too shallow during dry periods to allow for adult swimming. The City of Indianapolis collected the following information on Pogues Run's physical access, flow and substrate to support IDEM's existing use determination:

Physical Access: During a physical stream survey in May-July 2001, the city collected data on the slopes of stream banks and presence of vegetation along CSO-impacted waterways. Maps and tables summarizing the data collected are provided in Appendix A**.** Pogues Run has variable accessibility. In some areas dense vegetation or steep slopes discourage use:

- Dense vegetation (dense brush) covers approximately 64 percent of the stream banks from 21st Street to the Pogues Run Tunnel (New York Avenue). The rest of the area has 23 percent medium vegetation (some brush) and 13 percent light vegetation (grass).
- Steep slopes (greater than 1:1 ratio) discourage use for about 32 percent of the Pogues Run stream bank; moderate slopes (approximately 1:1) affect about 35 percent of the stream bank in the CSO area.
- Similar to Pleasant Run, much of the stream flows through city parkland. The remainder flows through high-density residential and light industrial areas.

Pogues Run from 21st Street (Forest Manor Park) to State Avenue (Spades Park) flows through three city parks: Forest Manor, Brookside, and Spades. Dense vegetation and steep slopes can limit stream access throughout most of this reach. However, there are abundant public access points in the parks and along the greenway.

From State Avenue (Spades Park) to New York Street, Pogues Run flows through a mixed residential and urban corridor. Streamside vegetation is typically turfgrass. This section of Pogues Run is generally very accessible.

From New York Street to the confluence with White River, Pogues Run is enclosed in an underground conduit. This section of Pogues Run flows under downtown Indianapolis and is not accessible to the public.

Stream Flow and Depth: Stream flow in Pogues Run is highly variable and is related to precipitation. Flow in Pogues Run is generally highest in the late winter and early spring and, occasionally, during the summer following intense rainfall. Both high and low stream flows can significantly affect water quality. During wet weather, most of the flow in Pogues Run comes from CSO outfalls. The U. S. Geological Survey does not maintain a gauging station on Pogues Run. However, the Pogues Run and Pleasant Run watersheds and flow characteristics are very similar, so professional knowledge of Pogues Run and USGS data for Pleasant Run were used to determine flow conditions on Pogues Run. Stream flow during wet weather is described in more detail under Factor 2 below.

Baseflow is minimal as a result of a heavily urbanized watershed, which results in very low flow conditions during dry months and high flows in response to runoff. Stream depth varies but is typically less than 1 foot deep during dry weather, according to the 2001 stream survey.

Substrate: In the upper reach, high runoff has created a very rocky substrate in much of this reach by removing most of the finer grained sediments. The scoured rocky substrate in dry weather is not a desirable wading area. In the lower reach, the substrate remains rocky as a result of high runoff flows, but bank instability leads to a buildup of silt during low flow periods. The silt builds up on the rocky substrate, also creating an undesirable and unsafe wading area due to the possibility of slipping or losing your footing.

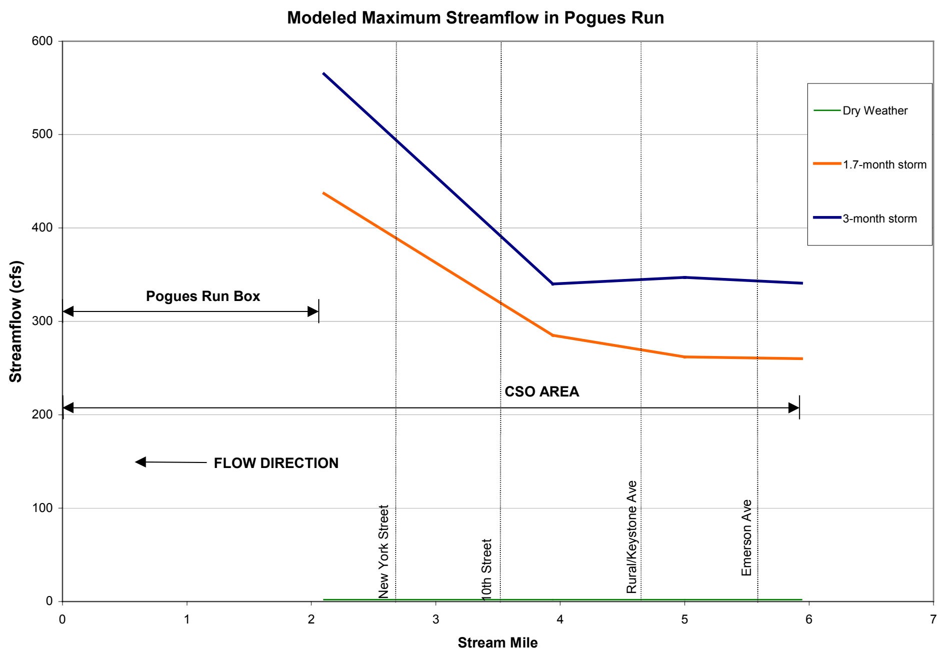
Summary: Pogues Run has variable accessibility to the public. In some areas its dense vegetation, steep-to-medium slopes, and low stream flow make the waterway undesirable for partial- or full-body contact recreational activities. Dense vegetation covers the streambanks and discourages public access along 64 percent of the CSO-impacted area. Steep to moderate streambanks discourage access along approximately 34 percent of the area. Throughout the CSO area, Pogues Run is too shallow to support swimming by adults or children during dry weather, when people are most likely to seek out water recreation. The majority of the area has a depth between 6 and 12 inches during the recreational season.

2. Waters that are dangerous due to physical hazards such as swift currents, rapids, dams or shipping traffic

The U. S. Geological Survey does not maintain a gauging station on Pogues Run. However, the Pogues Run and Pleasant Run watersheds are very similar, so USGS data for Pleasant Run is used below. Wet weather events can transform the low flow nature of the stream into a dangerous and unsafe waterway, similar to Pleasant Run. Stream flows are dominated by combined sewer overflows and are not safe for recreational activities.

The first photograph below shows Pogues Run at low flow conditions in June 2001 downstream of Arsenal and 10th Street bridge near IPS School 101. The second photograph shows the same location immediately following a 1.25” rain event in October 2004. The clear water and low stream flows conducive to recreation have been replaced by fast-flowing, murky water following such a storm event.

For purposes of the existing use determination, the city reviewed storm events greater than a 1.7-month storm. This storm was chosen as an example large storm that might not be controlled by the city's long-term control plan. Similar conditions in terms of flow, water quality, etc. would result from 2-month, 3-month or larger storms. As shown in the hydrograph below, modeled maximum stream flows due to a 1.7-month storm range from 260-440 cfs on Pogues Run. In comparison, modeled maximum stream flows due to a 3-month storm range from 340-565 cfs. During these infrequent storms, Pogues Run is not safe for recreation.



One gauge of safety for water contact recreation is the safety of wading, since streams that are not safe for wading would also not be safe for swimming or other water contact activities. Each wader should know and strictly adhere to their personal wading abilities and limitations.

When stream flows are low, trained USGS employees measure stream discharge by wading into the stream. When stream flows are high or potentially dangerous, USGS hydrologists make discharge measurements using acoustic Doppler current meters deployed from a tethered boat. At the Arlington gauge on Pleasant Run, the USGS staff generally did not wade in flows above 16 cfs. Although USGS hydrologists occasionally wade at higher flows, they are equipped with a personal flotation device and have extensive wading safety training and experience. It would not be safe for an inexperienced person to wade the stream at such high flows. During rain events ranging from 1.7 months to 3 months, estimated stream flows range from 260 to 565 cfs and are too dangerous for wading or swimming.

Summary: Large storms create stream flows and velocities that are dangerous in Pogues Run, precluding use of the stream for water contact activities such as wading or swimming. These currents will continue to render Pogues Run unsafe for recreational activities during combined sewer overflow events. This data supports a finding of "no existing use" during storm events exceeding the 1.7-month storm on Pogues Run.

3. Limited extent of actual recreational uses

IDEM's principles for making an existing use determination establish that "the occasional or incidental use by individual adults does not automatically establish an existing use for recreation." (IDEM guidance, p. 51.) Therefore, the limited extent and frequency of actual uses of waterways should be a factor when determining whether a recreational use is an existing use. There are no community-sanctioned or privately owned recreational areas for swimming, kayaking or other recreational uses on the CSO-impacted portions of Pogues Run. However, some recreational uses do occur.

To establish the extent of actual recreational uses, the city conducted public meetings and a non-random face-to-face survey to collect data on how people use or have seen others use CSO-impacted waterways. Sources of information used by the city included:

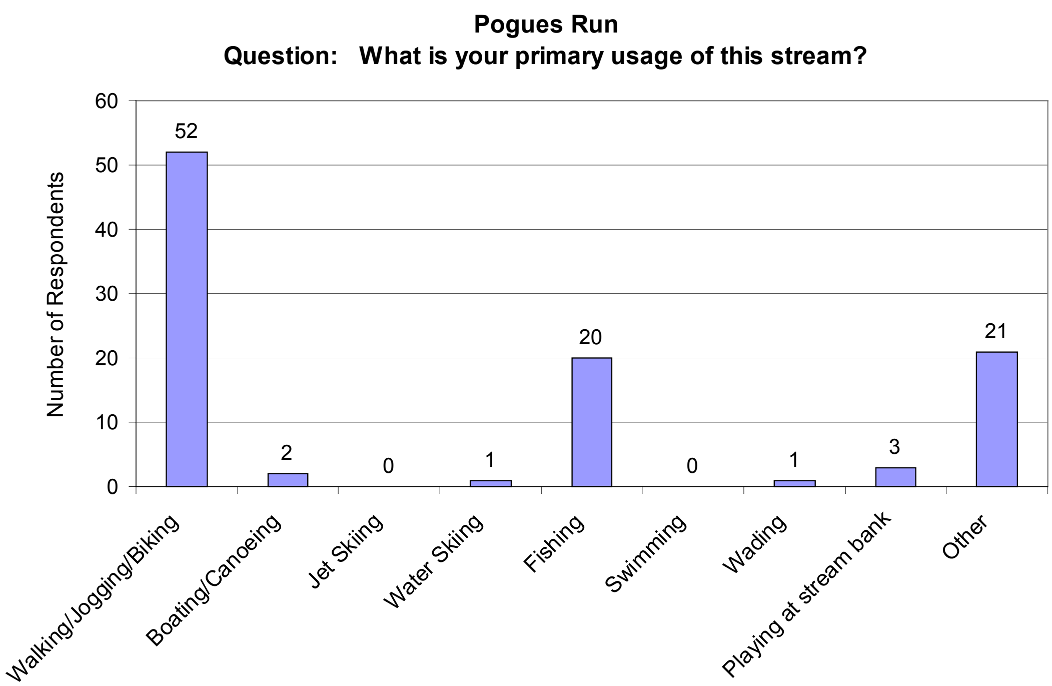
- Physical stream survey in May-July 2001
- Public non-random intercept survey in June 2002 (Pogues Run Use Survey)
- Public outreach meetings with neighborhood associations, environmental activists and recreational groups in September-November 2002
- Marion County Health Department reports of stream use from 2001-2002
- Indy Parks stream use survey in October 2002

Location of Uses: Isolated recreational uses on Pogues Run in the CSO area are found predominantly along the parks and greenways located along this low-flow, neighborhood stream. Based upon the above data sources, the city identified two reported fishing locations, 11 reported playing-at-stream-bank locations, 13 reported wading locations, and two reported swimming locations on Pogues Run. Wading and playing by the stream bank are reported at various spots along the greenways, including Forest Manor Park, Brookside Park, Spades Park, and Highland Park. Fishing also is reported, although the fishing reported in this small stream involves hunting for crayfish rather than traditional sport fishing. Swimming is reported in two locations, although stream flows are too low to support full-body contact along most of Pogues Run. One small swimming hole was reported on Pogues Run in Brookside Park and another near Brookside Avenue. These are reportedly used occasionally by small numbers of neighborhood children. A map illustrating the observed and reported uses is located in Appendix C.

Extent of Uses: While some recreational activities do occur on Pogues Run within the CSO area, the number of people engaging in water contact activities and the frequency of those activities is limited. In the Pogues Run Use Survey, the primary recreational activity reported by people along Pogues Run was walking/jogging/biking (52 of 100 people surveyed). Less than 5 percent of respondents reported a primary use of swimming, wading or playing at stream bank, as shown in the graph below. For purposes of the survey, the following definitions were used:

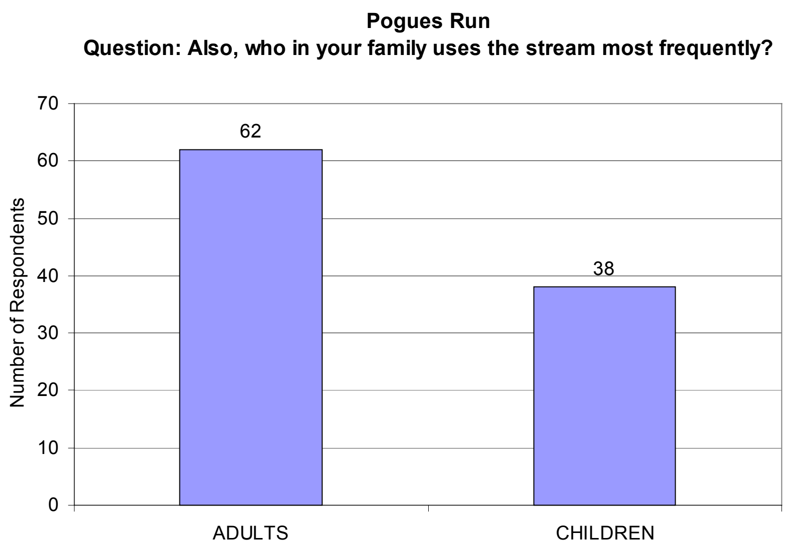
- **Swimming:** Full-body contact with the water, including a high potential for swallowing the water (water should be deep enough to permit actual swimming)
- **Wading:** Partial body contact with the water (usually water contact to lower legs and possibly hands and arms)
- **Playing at the Stream Bank:** Kneeling, squatting or sitting at stream bank (some water contact may occur when hands reach into the water to touch or pick up something)
- **Fishing:** Fishing at the stream bank or from a boat (water contact occurs through handling fish and tackle)

While the fishing definition above implies sport fishing, the fishing reported in this small stream usually involves hunting for crayfish.



Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

Also according to the survey, adults are more likely than children to use Pogues Run for recreational activities.



Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

According to the survey and additional neighborhood meetings to confirm the survey's findings, swimming is observed or practiced much less frequently than activities that do not involve full-body contact. The full results of the Pogues Run Use Survey are located in Appendix D. Note that the survey results cannot be extrapolated to the city's general population. The survey was designed to identify people most likely to use the waterways and was not conducted using random sampling. Nor is the sample size large enough to warrant extrapolation of the results to the general population.

Frequency of Use: In a typical year, 30 percent of the respondents reported participating in recreational activities along Pogues Run every week and 26 percent reported less than once a month. These recreational activities include both water-contact and non-water-contact activities.

Summary: The city used a variety of data sources and public participation methods to gather information on the extent and frequency of water recreation activities in and along Pogues Run. Based upon this information, the city identified a number of locations where recreational uses occur along Pogues Run. The primary use of this waterway for 52 percent of respondents is walking, jogging and/or biking along the greenways adjoining the stream. Swimming, wading and other water-contact activities are reported much less frequently. In two locations where swimming is reported to occur, it is said to involve small numbers of children from adjacent neighborhoods. There are no public or private bathing beaches along Pogues Run.

4. Limited extent of recreational use during or immediately after a significant wet weather event.

Little evidence exists of full-body or partial-body contact recreational uses of CSO-impacted portions of Pogues Run, especially after significant wet weather events. Where there is evidence of use, it is very infrequent. Most respondents to the Pogues Run Use Survey indicated that recreational usage within 24 hours after a rainfall is observed infrequently or not at all. Sixty-six percent said that, based on their experience, they have seen adults or children playing in the stream when the current is slow, compared to 15 percent who have seen children or adults playing in the stream when the current is fast. Eighty-six percent of the interviewees also reported that use is infrequent (only once or twice a month) within 24 hours after a rainfall. However, 39 percent of respondents reported observing children or adults playing in the stream during or within 24 hours after a rainfall. The survey did not characterize the size of the rainfall events after which recreation was observed. Based on the answer to the question about fast or slow currents, people are more likely to recreate during dry weather or after a light rain than a major storm. The evidence collected by the city indicates that recreational use is rare or non-existent during and after large storm events.

5. Unsafe water quality combined with municipal programs that prevent and control access to the water.

IDEM guidance notes that unsafe water quality and municipal programs to prevent and control access may be a factor in determining an existing use:

> *If the water quality is unsafe and access to the water is precluded by (a) existing impediments to physical access such as steep banks, fencing or high retaining walls, then IDEM will not presume an existing recreational use. In order for IDEM to determine that access is precluded by the municipality, the municipality must take steps to actively prevent adults and children from actually using the water. This requires the municipality to prevent and control access to the water and to conduct a reasonable proactive outreach media and educational program to prevent actual use during and immediately following a significant wet weather event. This presumption will not apply to recreational beaches open to the public and other swimming areas designated for public recreation. (IDEM guidance, p. 51.)*

Information on the city's programs to prevent and control access to CSO-impacted waterways is presented in the introduction section to this submittal. Information documenting unsafe water quality on Pogues Run is presented below.

Water Quality: To demonstrate there is no existing recreational use under this factor, the city should demonstrate that recreational water quality standards are not achieved within the CSO-impacted area of Pogues Run during storm events. The table below provides a summary of in-stream water quality data collected in the CSO area of Pogues Run from 2000 – 2002 by the Indianapolis Office of Environmental Services and the Marion County Health Department. Results are shown for all data, dry weather data only and wet weather data. The data show that during wet weather, the geometric mean within the CSO area in Pogues Run was 934 *E. coli* colonies/100 mL, exceeding the state's recreational use standard of 125 cfu/100 mL. Nearly 80 percent of samples taken in wet weather periods exceed the single sample standard of 235 cfu/100 mL.

Pogues Run *E. coli* Bacteria Compliance (CSO Area)

Data Source	Geometric Mean of 2000-2002 data [1]	% of Samples > 235 cfu/100 mL	Total Number of Samples
All Data	481	64.9%	536
Dry Weather Data	251	51.3%	271
Wet Weather Data	934	78.9%	265

(1) Indiana's standard for geometric mean is 125 cfu/100 mL.

To determine whether water quality standards are being met in the CSO area of Pogues Run, the city further analyzed in-stream water quality data collected in 2000-2002. Based upon a NetStorm simulation of LTCP Systemwide Control Plan 1, the city identified 17 storm events that would have resulted in untreated overflows if the city had installed CSO control facilities that achieve 95 percent capture. The city does not have data to correlate to all 17 storm events, since the city's existing sampling program is designed to collect data on a periodic basis without regard to weather conditions. However, on the days when existing 2000-2002 data could be correlated to an estimated overflow event, the data consistently show that the single sample maximum standard of 235 *E. coli* colonies/100 mL is not being met. This demonstrates that the CSO area of Pogues Run is unsafe for recreational use during and after those storm events. These types of storm events would have caused overflow events both before and after November 28, 1975, the date after which an existing use must be protected if it has been "attained."

POGUES RUN COMPARISON OF ESTIMATED OVERFLOW EVENTS AND HISTORICAL E. *COLI* BACTERIA SAMPLING 2000-2002									
Estimated Overflow Event Date (93% Capture)	**Date of Sample**	**New York OES (cfu/100 mL)**	**21st St OES (cfu/100 mL)**	**Brookside OES (cfu/100 mL)**	**21st St (cfu/100 mL)**	**Rural (cfu/100 mL)**	**10th St (cfu/100 mL)**	**New York (cfu/100 mL)**	**Average (cfu/100 mL)**
4/7/00	4/7/00	N/A	N/A	N/A	1,900	700	1,200	3,300	1,800
5/26/00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7/4/00	7/5/00	N/A	N/A	N/A	3,000	7,500	8,000	8,000	6,600
8/17/00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9/10/00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10/4/00	10/5/00	89,000	20,000	N/A	N/A	N/A	N/A	N/A	54,500
4/10/01	4/10/01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6/5/01	6/5/01	N/A	N/A	N/A	4,570	3,270	2,430	4,500	3,700
7/1/01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10/10/01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10/24/01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/21/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/24/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/27/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5/7/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5/12/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9/20/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11/10/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: Estimated Overflow Dates: 1950-2003 NetSTORM Simulation for System Wide Plan 1, 93% Capture Level of Control.
Sampling Data: 2000 - 2002 instream *E. coli* bacteria sampling by OES and MCHD.
Note: Sampling data is presented only for dates on or following the estimated overflow event date, and for locations within the CSO area.

Summary

Although occasional recreational uses occur along CSO-impacted areas of Pogues Run, these should not be considered existing uses under 40 CFR 131.3(e) based upon the following factors:

1. Physical access and flow that are unsuitable for recreational use during large storm events, such as those exceeding a 1.7-month storm;
2. Waters that are dangerous during large storm events due to swift currents and rapids
3. Limited extent and frequency of actual recreational uses
4. Minimal recreational use during or immediately after significant wet weather events;
5. Unsafe water quality combined with extensive municipal programs to prevent and control access to the water following wet weather events.

Furthermore, the physical and water quality conditions of the CSO-impacted areas of Pogues Run make primary and secondary contact recreational activities unsuitable, undesirable, and unsafe during significant wet weather events. Based upon this data, we conclude that full-body or partial-body contact recreation is not an existing use of the CSO-impacted areas of Pogues Run during storm events exceeding the 1.7-month storm. Therefore, we request that IDEM affirm the city's conclusion and allow the city to proceed with a UAA to evaluate the attainable uses of the CSO area of Pogues Run during the periods and conditions under which we contemplate having residual overflows.

Appendices:
A. Physical Stream Survey Maps and Tables
B. See USGS hydrograph for Pleasant Run
C. Pogues Run Recreational Use Map
D. 2002 Pogues Run Use Survey

Reference:
U.S. Geological Survey, 1996. Low-Flow Characteristics of Indiana Streams. USGS Water Resources Investigation Report 96-4128. Page 130.

Information Supporting Pleasant Run/Bean Creek Existing Use Determination

Within the CSO area, some citizens occasionally use Indianapolis streams for full- or partial-body contact recreation, based upon surveys conducted by the City of Indianapolis. However, although actual recreational uses may occur on a sporadic basis, other factors preclude an existing use determination. Documentation supporting factors 1-4 on Pleasant Run is provided below and in the attachments.

The city is seeking a "no existing use" determination under 40 CFR 131.3(e) for the CSO area of Pleasant Run, which extends from 9th Street to the confluence with the White River, and of Bean Creek, from State Street to its confluence with Pleasant Run in Garfield Park.

1. Lack of proximity to residential neighborhoods, parks and schools and/or presence of physical hazards, access, flow or substrate that make such areas unsuitable for recreational use

IDEM's principles for making an existing use determination note that physical access, flow and substrate are factors to consider. (IDEM guidance, p. 51) IDEM also recognizes that waters may be too shallow during dry periods to allow for adult swimming. The City of Indianapolis collected the information below on Pleasant Run's physical access, flow and substrate to support IDEM's existing use determination. The CSO-impacted portion of Bean Creek has much the same physical character as described for Pleasant Run.

Physical Access: During a physical stream survey in May-July 2001, the city collected data on the slopes of stream banks and presence of vegetation along CSO-impacted waterways. Maps and tables summarizing the data collected are provided in Appendix A**.** Although Pleasant Run is accessible in some areas, dense vegetation or steep slopes discourage use in other areas:

- Dense vegetation (dense brush) covers approximately 75 percent of the stream banks from Pleasant Run Golf Course to the confluence with White River. The rest of the area has 12 percent medium vegetation (some brush) and 13 percent light vegetation (grass).
- Steep slopes (greater than 1:1 ratio) discourage use for about 43 percent of the Pleasant Run stream bank; moderate slopes (approximately 1:1) affect about 28 percent of the stream bank in the CSO area.
- Approximately 50 percent of the stream flows through city parkland. The remainder flows through urban and industrial areas.

Between 10th Street and Bluff Road, Pleasant Run flows through Pleasant Run Golf Course, 3 city parks (Ellenberger, Christian, and Garfield) and the wide Pleasant Run Greenway. Dense vegetation and steep slopes limit accessibility in some locations. However, there are access points used by the public in the parks and along the greenway. From English Avenue to Prospect Street, Pleasant Run flows through the Citizens Gas and Coke Utility property. Throughout the Citizen's Gas facility there is light vegetation along the stream and steep, unstable banks. Pleasant Run is not accessible to the public as it flows through the Citizen's Gas complex.

Bluff Road to White River is a short (approximately 0.5 mile) downstream section of Pleasant Run that has been channelized. This reach runs through the Bluff Road industrial corridor. Streamside vegetation is primarily invasive bush honeysuckle with some areas of mown turfgrass. Stream banks in this reach are steep and unstable; erosional slumps are common. This reach of Pleasant Run is fairly accessible. Dense vegetation can limit access at some points, but that vegetation is not continuous. There is some limited accessibility near the Bluff Road industrial corridor.

Stream Flow and Depth: Stream flow in Pleasant Run is highly variable and is related to precipitation. Flow in Pleasant Run is generally highest in the late winter and early spring and, occasionally, during the summer following intense rainfall. Both high and low stream flows can significantly affect water quality. During wet weather, most of the flow in Pleasant Run comes from CSO outfalls. To demonstrate the variability in flow, a hydrograph of U.S. Geological Survey flow gauge data is provided in Appendix B. Stream flow during wet weather is described in more detail under Factor 2 below.

Stream depth varies in the CSO-impacted portions of Pleasant Run and Bean Creek, ranging from 6 inches to 1 foot deep during dry weather.

Substrate: The substrate in Pleasant Run is mostly sand, rocks, and pebbles. Although the substrate in Pleasant Run is suitable for wading, dense vegetation and steep to moderate streambanks limit the access to most of these areas.

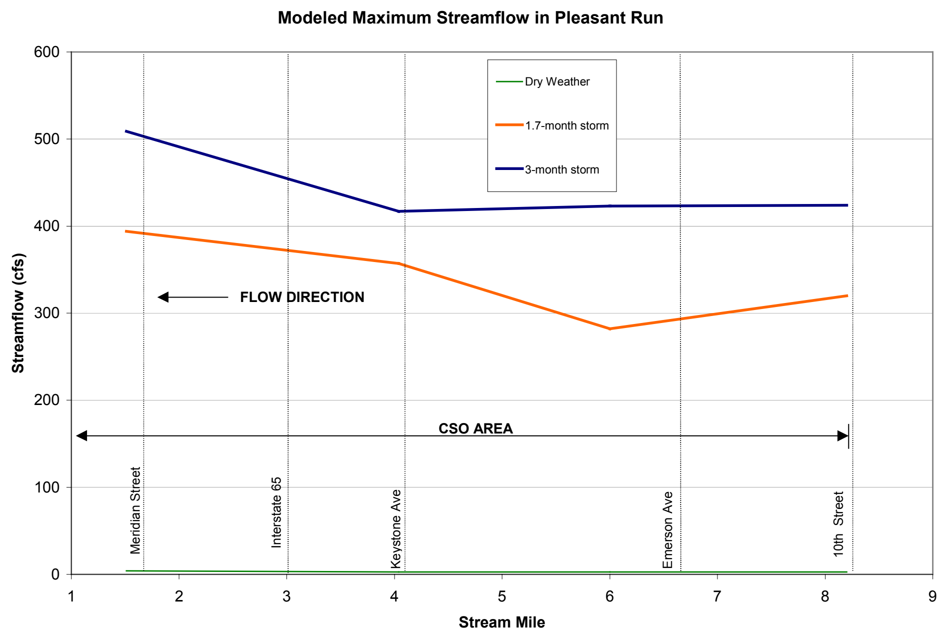
Summary: Although Pleasant Run is accessible to the public in some areas, its dense vegetation, steep-to-medium slopes, and low stream flow make the waterway undesirable for full-body or partial-body contact recreational activities. Dense vegetation covers the streambanks and discourages public access along 75 percent of the CSO-impacted area. Steep to moderate streambanks discourage access along approximately 70 percent of the area. Throughout the CSO area, most of Pleasant Run is too shallow to support swimming by adults or children during dry weather, when people are most likely to seek out water recreation. The majority of the area has a depth between 6 and 12 inches during the recreational season.

2. Waters that are dangerous due to physical hazards such as swift currents, rapids, dams or shipping traffic

The U.S. Geological Survey maintains a gauging station on Pleasant Run at Arlington Avenue (i.e., 7.9 river-miles upstream of its mouth). The drainage area above this gauging station is 7.58 square miles. Based on low flow measurements taken from 1943-1993, the Q7-10 is 0.1 cubic feet per second (cfs). The average flow for Pleasant Run at the USGS gauge is 8.17 cfs (USGS, 1996). Wet weather events can transform the low flow nature of the stream into a dangerous waterway, as shown in the photographs below. The first photograph shows an area known locally as “Pleasant Run Falls” during dry weather. Note the extremely low stream flow at the far right hand corner of the photograph.

The photograph below shows the same location following a 1.91-inch rainfall. Stream flows are dominated by discharges from combined sewer overflows and are too dangerous for recreational activities.

For purposes of the existing use determination, the city reviewed storm events greater than a 1.7-month storm. This storm was chosen as an example large storm that might not be controlled by the city's long-term control plan. Similar conditions in terms of flow, water quality, etc. would result from 2-month, 3-month or larger storms. As shown in the hydrograph below, estimated maximum stream flows due to a 1.7-month storm range from 280-395 cfs in the CSO area of Pleasant Run. In comparison, modeled maximum stream flows due to a 3-month storm range from 415-510 cfs. During these infrequent storms, Pleasant Run and Bean Creek are not safe for recreation.



One gauge of safety for water contact recreation is the safety of wading, since streams that are not safe for wading would also not be safe for swimming or other full-body or partial-body contact activities. Each wader should know and strictly adhere to their personal wading abilities and limitations.

When stream flows are low, trained USGS employees measure stream discharge by wading into the stream. When stream flows are high or potentially dangerous, USGS hydrologists make discharge measurements using acoustic Doppler current meters deployed from a tethered boat. At the Arlington gauge on Pleasant Run, the USGS staff generally did not wade in flows above 16 cfs. Although USGS hydrologists occasionally wade at higher flows, they are equipped with a personal flotation device and have extensive wading safety training and experience. It would not be safe for an inexperienced person to wade the stream at such high flows. During rain events ranging from 1.7 months to 3 months, estimated stream flows range from 280 to 510 cfs and are too dangerous for wading. Although wading is reported in some locations along Pleasant Run and Bean Creek, it is not known to occur during stream flows occurring from a 1.7-month storm or greater.

Summary: Large storms create high stream flows that are dangerous in Pleasant Run and Bean Creek, precluding use of the streams for water contact activities such as wading or swimming. These currents will continue to render Pleasant Run and Bean Creek unsafe for recreational activities during combined sewer overflow events. This data supports a finding of "no existing use" during storm events exceeding the 1.7-month storm on Pleasant Run and Bean Creek.

3. Limited extent of actual recreational uses

IDEM's principles for making an existing use determination establish that "the occasional or incidental use by individual adults does not automatically establish an existing use for recreation." (IDEM guidance, p. 51.) Therefore, the limited extent and frequency of actual uses of waterways should be a factor when determining whether a recreational use is an existing use. There are no community-sanctioned or privately owned recreational areas for swimming, kayaking or other recreational uses on the CSO-impacted portions of Pleasant Run and Bean Creek. However, some recreational uses do occur.

To establish the extent of actual recreational uses, the city conducted public meetings and a non-random face-to-face survey to collect data on how people use or have seen others use CSO-impacted waterways. Sources of information used by the city included:

- Physical stream survey in May-July 2001
- Public non-random intercept survey in June 2002 (Pleasant Run Use Survey)
- Public outreach meetings with neighborhood associations, environmental activists and recreational groups in September-November 2002
- Marion County Health Department reports of stream use from 2001-2002
- Indy Parks stream use survey in October 2002

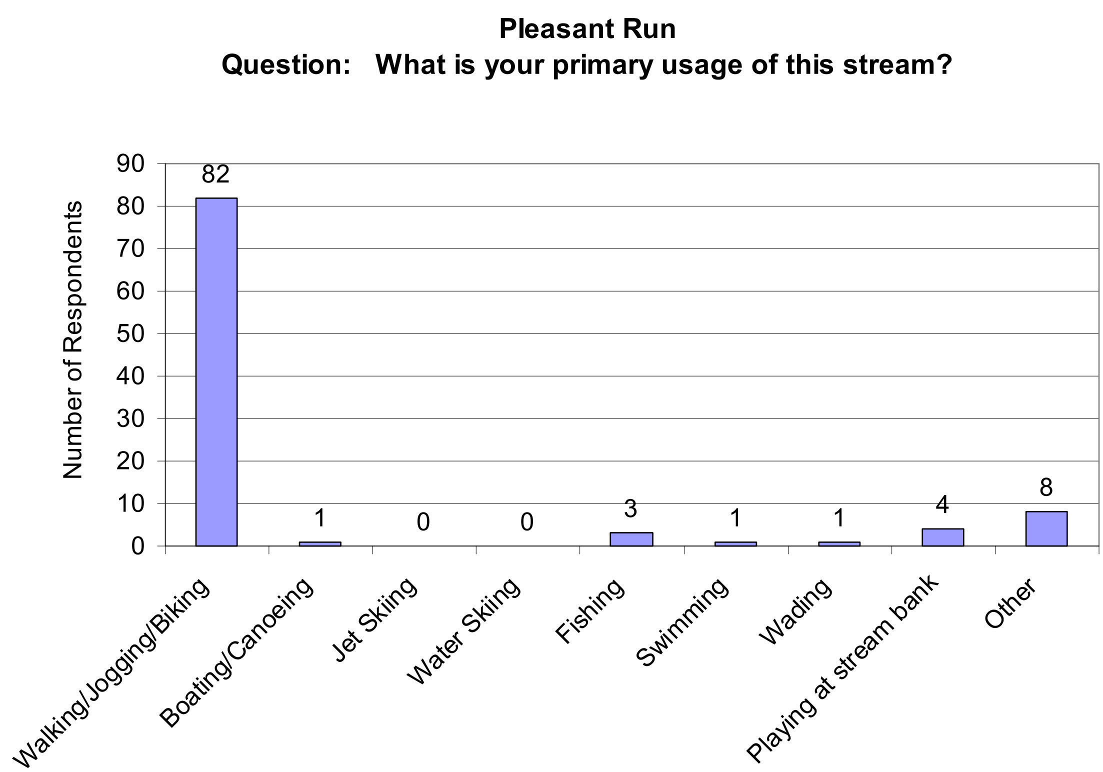
Location of Uses: Isolated recreational uses on Pleasant Run and Bean Creek in the CSO area are found predominantly along the many parks and greenways located along this low-flow, neighborhood stream. Based upon the above data sources, the city identified two reported fishing locations, 16 reported playing-at-stream-bank locations, 9 reported wading locations, and three reported swimming locations on Pleasant Run. Wading and playing by the stream bank are reported at various spots along the greenways, including Pleasant Run Golf Course, Ellenberger Park, Christian Park, and Garfield Park. Fishing also is reported, although the fishing reported in this small stream involves hunting for crayfish rather than traditional sport fishing. Swimming is reported in three locations, although stream flows are too low to support full-body contact along most of Pleasant Run/Bean Creek. One small swimming hole was reported on Pleasant Run downstream of Prospect Street and another along Bean Creek near Keystone Avenue. These are reportedly used occasionally by small numbers of neighborhood children. A third reported swimming hole, between Meridian and Bluff, is believed to refer to a gravel pit just north of Pleasant Run and not physically linked to its waters. A map illustrating the observed and reported uses is located in Appendix C.

Extent of Uses: While some recreational activities do occur on Pleasant Run/Bean Creek within the CSO area, the number of people engaging in water contact activities and the frequency of those activities is limited. In the Pleasant Run Use Survey, the primary recreational activity reported by people along Pleasant Run was walking/jogging/biking (82 of 100 people surveyed). Less than 5 percent of respondents reported a primary use of fishing, swimming, wading or playing at stream bank, as shown in the graph below. For purposes of the survey, the following definitions were used:

- **Swimming:** Full-body contact with the water, including a high potential for swallowing the water (water should be deep enough to permit actual swimming)
- **Wading:** Partial body contact with the water (usually water contact to lower legs and possibly hands and arms)

- **Playing at the Stream Bank:** Kneeling, squatting or sitting at stream bank (some water contact may occur when hands reach into the water to touch or pick up something)
- **Fishing:** Fishing at the stream bank or from a boat (water contact occurs through handling fish and tackle)

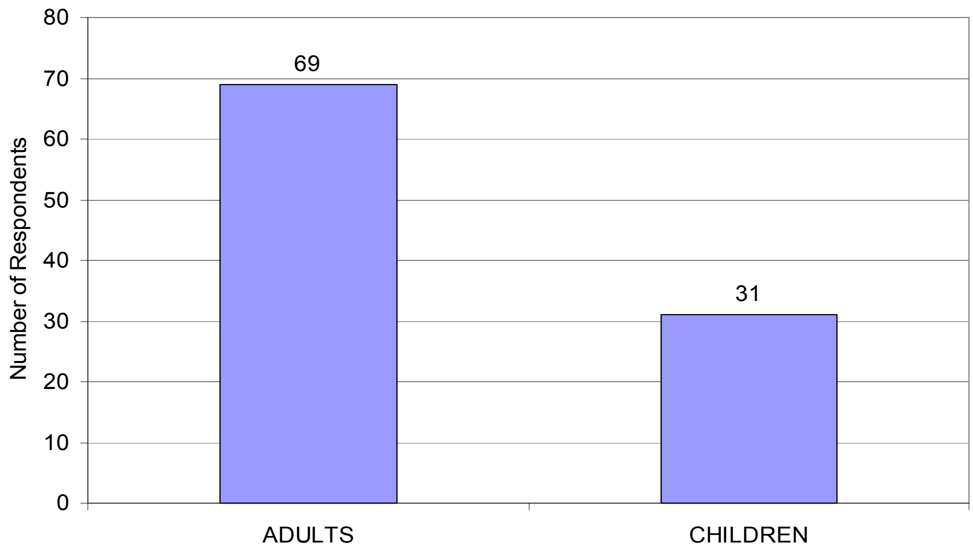
While the fishing definition above implies sport fishing, the fishing reported in this small stream usually involves hunting for crayfish.



Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

Also according to the survey, adults are more likely than children to use Pleasant Run for recreational activities.

Pleasant Run
Question: Also, who in your family uses the stream most frequently?



Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

According to the survey and additional neighborhood meetings to confirm the survey's findings, swimming is observed or practiced much less frequently than activities that do not involve full-body contact. The full results of the Pleasant Run/Bean Creek Use Survey are located in Appendix D. Note that the survey results cannot be extrapolated to the city's general population. The survey was designed to identify people most likely to use the waterways and was not conducted using random sampling. Nor is the sample size large enough to warrant extrapolation of the results to the general population.

Frequency of Use: In a typical year, 47 percent of the respondents reported participating in recreational activities along Pleasant Run every week and 13 percent reported less than once a month. These recreational activities include both water-contact and non-water-contact activities.

Summary: The city used a variety of data sources and public participation methods to gather information on the extent and frequency of water recreation activities in and along Pleasant Run. Based upon this information, the city identified a number of locations where recreational uses occur along Pleasant Run. The primary use of this waterway for 82 percent of respondents is walking, jogging and/or biking along the greenways adjoining the stream. Swimming, wading and other water-contact activities are reported much less frequently. In two locations where swimming is reported to occur, it is said to involve small numbers of children from adjacent neighborhoods. There are no public or private bathing beaches along Pleasant Run or Bean Creek.

4. Limited extent of recreational use during or immediately after a significant wet weather event.

Little evidence exists of full-body or partial-body contact recreational uses of CSO-impacted portions of Pleasant Run and Bean Creek, especially after significant wet weather events. Where there is evidence of use, it is very infrequent. Most respondents to the Pleasant Run/Bean Creek Use Survey indicated that recreational usage within 24 hours after a rainfall is observed infrequently or not at all. Eight-four percent said that, based on their experience, they have seen adults or children playing in the stream when the current is slow, compared to 11 percent who have seen children or adults playing in the stream when the current is fast. Sixty-nine percent of the interviewees also reported that use is infrequent (only once or twice a month) within 24 hours after a rainfall. However, 66 percent of respondents reported observing children or adults playing in the stream during or within 24 hours after a rainfall. The survey did not characterize the size of the rainfall events after which recreation was observed. Based on the answer to the question about fast or slow currents, people are more likely to recreate in dry weather or after a light rain than a major storm. The evidence collected by the city indicates that recreational use is rare or non-existent during and after large storm events.

5. Unsafe water quality combined with municipal programs that prevent and control access to the water.

IDEM guidance notes that unsafe water quality and municipal programs to prevent and control access may be a factor in determining an existing use:

> *If the water quality is unsafe and access to the water is precluded by (a) existing impediments to physical access such as steep banks, fencing or high retaining walls, then IDEM will not presume an existing recreational use. In order for IDEM to determine that access is precluded by the municipality, the municipality must take steps to actively prevent adults and children from actually using the water. This requires the municipality to prevent and control access to the water and to conduct a reasonable proactive outreach media and educational program to prevent actual use during and immediately following a significant wet weather event. This presumption will not apply to recreational beaches open to the public and other swimming areas designated for public recreation. (IDEM guidance, p. 51.)*

Information on the city's programs to prevent and control access to CSO-impacted waterways is presented in the introduction section to this submittal. Information documenting unsafe water quality on Pleasant Run and Bean Creek is presented below.

Water Quality: To demonstrate there is no existing recreational use under this factor, the city should demonstrate that recreational water quality standards are not achieved within the CSO-impacted area of Pleasant Run and Bean Creek during storm events. The table below provides a summary of in-stream water quality data collected in the CSO area of Pleasant Run and Bean Creek from 2000 – 2002 by the Indianapolis Office of Environmental Services and the Marion County Health Department. Results are shown for all data, dry weather data only and wet weather data. The data show that during wet weather, the geometric mean within the CSO area in Pleasant Run was 676 *E. coli* colonies/100 mL and in Bean Creek was 625 *E. coli* colonies/100 mL, both exceeding the state's recreational use standard of 125 cfu/100 mL. More than 66 percent of Pleasant Run samples and 72 percent of Bean Creek samples taken in wet weather periods exceed the single sample standard of 235 cfu/100 mL.

Pleasant Run and Bean Creek *E. coli* Bacteria Compliance (CSO Area)

Data Source	Geometric Mean of 2000-2002 data[1]	% of Samples > 235 cfu/100 mL	Total Number of Samples
Pleasant Run -All Data	413	59.5%	862
Bean Creek - All Data	466	71.3%	178
Pleasant Run - Dry Weather Data	269	53.8%	461
Bean Creek - Dry Weather Data	346	70.5%	88
Pleasant Run - Wet Weather Data	676	66.1%	401
Bean Creek - Wet Weather Data	625	72.2%	90

(1) Indiana's standard for geometric mean is 125 cfu/100 mL.

To determine whether water quality standards are being met in the CSO area of Pleasant Run and Bean Creek during or after large storm events, the city further analyzed in-stream water quality data collected in 2000-2002. Based upon a NetStorm simulation of LTCP Systemwide Control Plan 1, the city identified 17 storm events that would have resulted in untreated overflows if the city had installed CSO control facilities that achieve 93 percent capture. The city does not have data to correlate to all 17 storm events, since the city's existing sampling program is designed to collect data on a periodic basis without regard to weather conditions. However, on the days when existing 2000-2002 data could be correlated to an estimated overflow event, the data consistently show that the single sample maximum standard of 235 *E. coli* colonies/100 mL is not being met. This demonstrates that the CSO area of Pleasant Run and Bean Creek are unsafe for recreational use during and after those storm events. These types of storm events would have caused overflow events both before and after November 28, 1975, the date after which an existing use must be protected if it has been "attained."

PLEASANT RUN COMPARISON OF ESTIMATED OVERFLOW EVENTS AND HISTORICAL E. *COLI* BACTERIA SAMPLING 2000-2002

Estimated Overflow Event Date (93% Capture)	Date of Sample	Meridian St OES (cfu/100 mL)	Arlington (cfu/100 mL)	Southeastern (cfu/100 mL)	Barth (cfu/100 mL)	Garfield Park (cfu/100 mL)	Bluff (cfu/100 mL)	Average (cfu/100 mL)
4/7/00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5/26/00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7/4/00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8/17/00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9/10/00	9/11/00	N/A	4,190	6,090	6,090	4,410	5,560	5,300
10/4/00	10/5/00	108,000	N/A	N/A	N/A	N/A	N/A	N/A
4/10/01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6/5/01	6/6/01	N/A	46,110	77,010	81,640	92,080	64,880	72,300
7/1/01	7/2/01	N/A	17,250	36,090	36,540	17,230	15,290	24,500
10/10/01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10/24/01	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/21/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/24/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/27/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5/7/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5/12/02	5/13/02	8,000	N/A	3,160	4,800	4,800	9,200	6,000
9/20/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11/10/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: Estimated Overflow Dates: 1950-2003 NetSTORM Simulation for System Wide Plan 1, 93% Capture Level of Control.
Sampling Data: 2000 - 2002 instream *E. coli* bacteria sampling by OES and MCHD.
Note: Sampling data is presented only for dates on or following the estimated overflow event date, and for locations within the CSO area.

BEAN CREEK COMPARISON OF ESTIMATED OVERFLOW EVENTS AND HISTORICAL E. COLI *BACTERIA* SAMPLING 2000-2002					
Estimated Overflow Event Date (93% Capture)	**Date of Sample**	**Southern - OES (cfu/100 mL)**	**Garfield Park - OES (cfu/100 mL)**	**Garfield Park (cfu/100 mL)**	**Average (cfu/100 mL)**
4/7/00	N/A	N/A	N/A	N/A	N/A
5/26/00	N/A	N/A	N/A	N/A	N/A
7/4/00	N/A	N/A	N/A	N/A	N/A
8/17/00	N/A	N/A	N/A	N/A	N/A
9/10/00	9/11/00	N/A	N/A	7,940	N/A
10/4/00	10/5/00	40,000	200,000	N/A	120,000
4/10/01	N/A	N/A	N/A	N/A	N/A
6/5/01	6/6/01	N/A	N/A	16,640	N/A
7/1/01	7/2/01	N/A	N/A	31,300	N/A
10/10/01	N/A	N/A	N/A	N/A	N/A
10/24/01	N/A	N/A	N/A	N/A	N/A
4/21/02	N/A	N/A	N/A	N/A	N/A
4/24/02	N/A	N/A	N/A	N/A	N/A
4/27/02	N/A	N/A	N/A	N/A	N/A
5/7/02	N/A	N/A	N/A	N/A	N/A
5/12/02	5/13/02	2,700	N/A	3,600	3,200
9/20/02	N/A	N/A	N/A	N/A	N/A
11/10/02	N/A	N/A	N/A	N/A	N/A

Source: Estimated Overflow Dates: 1950-2003 NetSTORM Simulation for System Wide Plan 1, 93% Capture Level of Control.
Sampling Data: 2000 - 2002 instream *E. coli* bacteria sampling by OES and MCHD.
Note: Sampling data is presented only for dates on or following the estimated overflow event date, and for locations within the CSO area.

Summary

Although occasional recreational uses occur along the CSO-impacted areas of Pleasant Run and Bean Creek, these should not be considered existing uses under 40 CFR 131.3(e) based upon the following factors:

1. Physical access and flow that are unsuitable for recreational use during large storm events, such as those exceeding a 1.7-month storm;
2. Waters that are dangerous during large storm events due to swift currents and rapids
3. Limited extent and frequency of actual recreational uses
4. Minimal recreational use during or immediately after significant wet weather events;
5. Unsafe water quality combined with extensive municipal programs to prevent and control access to the water following wet weather events.

Furthermore, the physical and water quality conditions of Pleasant Run downstream of 9th Street and Bean Creek downstream of State Street make primary and secondary contact recreational activities unsuitable, undesirable, and unsafe during significant wet weather events. Based upon this data, we conclude that full-body or partial-body contact recreation is not an existing use of Pleasant Run downstream of 9th Street or Bean Creek downstream of State Street during storm events exceeding the 1.7-month storm. Therefore, we request that IDEM affirm the city's conclusion and allow the city to proceed with a UAA to evaluate the attainable uses of the CSO area of Pleasant Run and Bean Creek during the periods and conditions under which we contemplate having residual overflows.

Appendices:
A. Physical Stream Survey Maps and Tables
B. USGS flow graph
C. Pleasant Run Recreational Use Map
D. 2002 Pleasant Run Use Survey

Reference:
U.S. Geological Survey, 1996. Low-Flow Characteristics of Indiana Streams. USGS Water Resources Investigation Report 96-4128. Page 130.

Information Supporting White River Existing Use Determination

Within the CSO area, some citizens occasionally use Indianapolis streams for full- or partial-body contact recreation, based upon surveys conducted by the City of Indianapolis. However, although actual recreational uses may occur on a sporadic basis, other factors preclude an existing use determination. Documentation supporting factors 1-4 on White River is provided below and in the attachments.

The city is seeking a "no existing use" determination under 40 CFR 131.3(e) for the area of the White River impacted by Indianapolis CSOs. This area extends from a location just west of East 56th Street and Westfield Boulevard on the Indianapolis northside to State Road 58 near Elnora, just south of the Greene-Davies county line in southwestern Indiana. See Figure 2-2a for the upstream boundary of the CSO area on White River.

1. Lack of proximity to residential neighborhoods, parks and schools and/or presence of physical hazards, access, flow or substrate that make such areas unsuitable for recreational use

IDEM's principles for making an existing use determination note that physical access, flow and substrate are factors to consider. (IDEM guidance, p. 51) IDEM also recognizes that waters may be too shallow during dry periods to allow for adult swimming. The City of Indianapolis collected the following information on White River's physical access, flow and substrate to support IDEM's existing use determination:

Physical Access: During a physical stream survey in May-July 2001, the city collected data on the slopes of stream banks and presence of vegetation along CSO-impacted waterways inside Marion County. Maps and tables summarizing the data collected are provided in Appendix A**.** Although White River is accessible in some places, dense vegetation or steep slopes discourage use in other areas:

- Dense vegetation (dense brush) covers approximately 72 percent of the stream banks from Holliday Park to just south of I-465. The rest of the area has 12 percent medium vegetation (some brush) and 16 percent light vegetation (grass).
- Steep slopes (greater than 1:1 ratio) discourage use for about 31 percent of the White River stream bank; moderate slopes (approximately 1:1) affect about 29 percent of the stream bank in the CSO area.
- White River flows through city parkland, state parkland, residential, urban, industrial and agricultural areas.

Land use along the White River between Holliday Park and 42nd Street tends to be primarily low density residential. Much of the channel in this section is tree lined. Stream accessibility is mixed in this reach. While accessibility is good in public areas such as Holliday and Friedman Parks, much of this reach flows through low-density residential areas where access is restricted to individual landowners and their neighbors.

Between 42nd Street and 16th Street, land use is mixed, with much of the river bordered by city parks and golf courses. The central portion of this section, upstream of the dam, is locally known as Lake Indy. This portion of the river is very accessible as it flows through city parks and golf courses. There is a public boat launch in Riverside Park.

The section from the Emrichsville Dam at 16th Street to Morris Street is the most urban portion of the White River in Indianapolis. Land use in this section is high density residential, mixed industry, and mixed urban. The floodplain in this section is restricted by the levees; much of the floodplain is maintained as turfgrass, with few trees along the channel. White River State Park also is located along this stream reach. Accessibility is mixed in this reach. While the levees are steep, there are frequent unofficial access points that allow vehicles onto the floodplain. Along the east bank of the river in the lower portions of this reach access is restricted by industrial development.

From Morris Street south to County Line Road, the White River begins to lose its urban character. The river begins to meander downstream of Stout Dam, and pool and riffle sequences begin to develop. Land use in this section is predominately aggregate mining and agriculture with some light residential. The aggregate mining and industry in the area limit access to the river in this section.

Stream Flow and Depth: Stream flow in White River is highly variable and is related to precipitation. Flow in White River is generally highest in the late winter and early spring and, occasionally, during the summer following intense rainfall. Both high and low stream flows can significantly affect water quality. To demonstrate the variability in flow, a hydrograph of U.S. Geological Survey flow gauge data is provided in Appendix B. Stream flow during wet weather is described in more detail under Factor 2 below.

Stream depth varies in the CSO-impacted portions of White River, ranging from 2-3 feet in most areas during dry weather, according to the 2001 stream survey conducted within Marion County. However, pools in some locations can be greater than 10 feet in depth. Currents in the stream also can be strongest in the deepest parts of the channel.

Substrate: The substrate in the downtown area (from the 16^{th} Street Dam to the Perry K Dam) is silt and does not encourage wading. In areas of the White River where the substrate consists mostly of sand, rocks and pebbles and is suitable for wading, most of the associated streambanks have a high slope and are covered by dense vegetation that discourages public access.

Summary: Although White River is accessible to the public in some areas, its dense vegetation and steep-to-medium slopes make the waterway undesirable for full-body or partial-body contact recreational activities. Dense vegetation covers the streambanks and discourages public access along 72 percent of the CSO-impacted area. Steep to moderate streambanks discourage access along approximately 60 percent of the area.

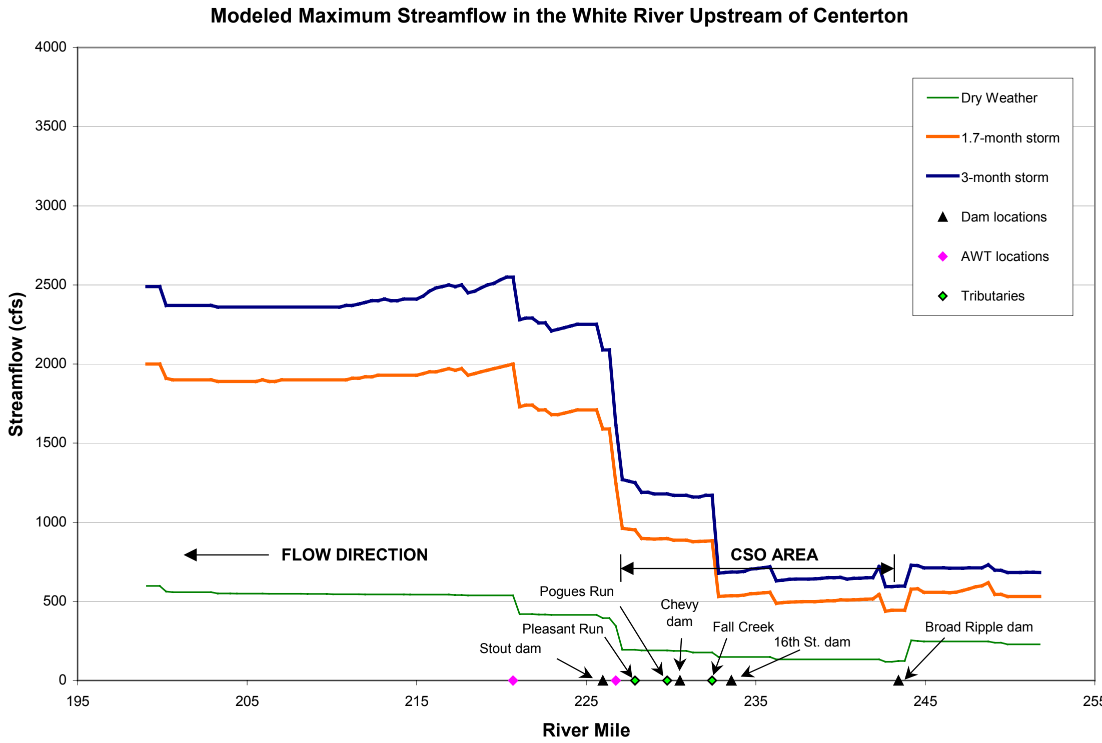
2. Waters that are dangerous due to physical hazards such as swift currents, rapids, dams or shipping traffic

The U.S. Geological Survey maintains a gauging station on the White River at the Morris Street Bridge at river-mile 230.3 (i.e., 2.6 river-miles downstream from Fall Creek, 3.4 river-miles upstream from Eagle Creek and 4.0 river-miles upstream from Indianapolis Power and Light dam). Wet weather events can transform the nature of the river into a dangerous waterway, as shown in the photographs below.

The first photograph shows an area looking downstream from Perry K dam during dry weather. Note the sandbank at the far side of the stream in the photograph.

The photograph below shows the same location following approximately 1.1 inches of rainfall. Stream flows during wet weather event generate undertows and surface currents that are too dangerous for full-body or partial-body contact recreational activities.

For purposes of the existing use determination, the city reviewed storm events greater than a 1.7-month storm. This storm was chosen as an example large storm that might not be controlled by the city's long-term control plan. Similar conditions in terms of flow, water quality, etc. would result from 2-month, 3-month or larger storms. As shown in the hydrograph below, modeled maximum stream flows due to a 1.7-month storm range from 440-2000 cfs in White River. In comparison, modeled maximum stream flows due to a 3-month storm range from 595 to 2550 cfs. During these infrequent storms, White River is not safe for recreation.



One gauge of safety for water contact recreation is the safety of wading, since streams that are not safe for wading would also not be safe for swimming or other water contact activities. Each wader should know and strictly adhere to their personal wading abilities and limitations.

When stream flows are low, trained USGS employees measure stream discharge by wading into the stream. When stream flows are high or potentially dangerous, USGS hydrologists make discharge measurements using acoustic Doppler current meters deployed from a tethered boat. At the Morris Street gauge, the USGS staff generally did not wade in flows above 540 cfs. Although USGS hydrologists occasionally wade at higher flows, they are equipped with a personal flotation device and have extensive wading safety training and experience. It would not be safe for an inexperienced person to wade the stream at such high flows. During rain events ranging from 1.7 months to 3 months, estimated stream flows range from 440-2550 cfs and are too dangerous for wading. Although wading and swimming are reported in some locations within the CSO-impacted areas of White River, they are not known to occur extensively or frequently under stream flows occurring from a 1.7-month storm or greater.

Summary: Large storms create stream flows and velocities that are dangerous in White River, precluding use of the stream for water contact activities such as wading or swimming. These currents will continue to render White River unsafe for recreational activities during combined sewer overflow events. This data supports a finding of “no existing use” during storm events exceeding the 1.7-month storm on White River.

3. Limited extent of actual recreational uses

IDEM’s principles for making an existing use determination establish that “the occasional or incidental use by individual adults does not automatically establish an existing use for recreation." (IDEM guidance, p. 51.) Therefore, the limited extent and frequency of actual uses of waterways should be a factor when determining whether a recreational use is an existing use. There are no community-sanctioned or privately owned recreational areas for swimming on the CSO-impacted portions of White River. There is one city-owned boat launch in Marion County within the CSO area and approximately seven state-authorized public access points downstream of Marion County. The city's research has shown that recreational uses do occur on White River, but not extensively or frequently during or after large storm events.

To establish the extent of actual recreational uses, the city conducted public meetings and a non-random face-to-face survey to collect data on how people use or have seen others use CSO-impacted waterways. Sources of information used by the city included:

- Physical stream survey in May-July 2001
- Public non-random intercept survey in June 2002 (White River Use Survey)
- Public outreach meetings with neighborhood associations, environmental activists and recreational groups in September-November 2002
- Marion County Health Department reports of stream use from 2001-2002
- Indy Parks stream use survey in October 2002
- Downstream County and State Agencies Survey

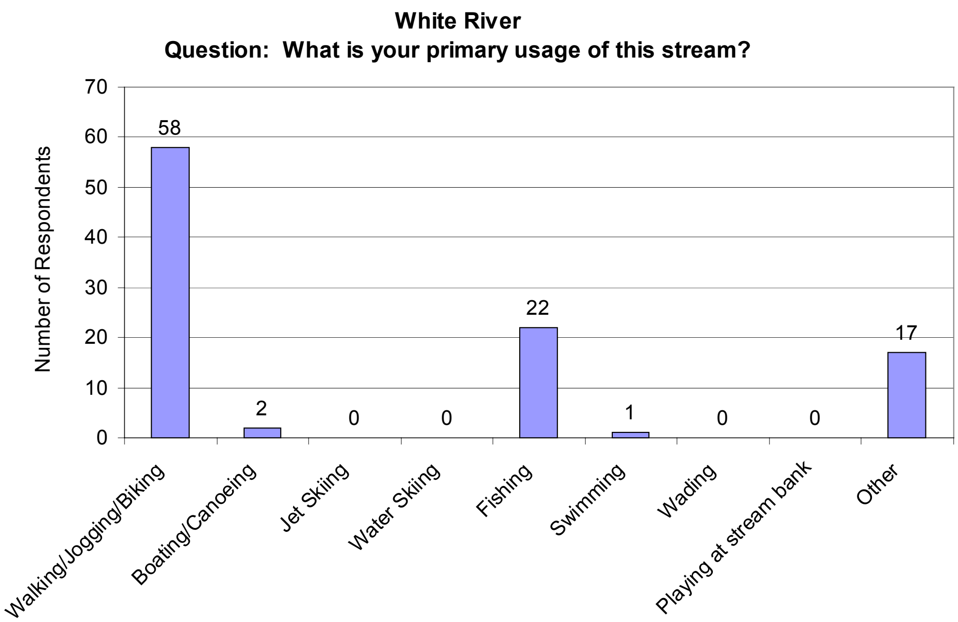
Location of Uses: Recreational uses on White River in the CSO area within Marion County are found predominantly along the many parks and greenways located along this low-flow river. Based upon the above data sources, the city identified 43 reported fishing locations, nine reported playing-at-stream-bank locations, 15 reported wading locations, 10 reported private canoe launch areas, two boat launches and five reported swimming locations on White River. A map illustrating the observed and reported uses is located in Appendix C.

In October 2002, DPW sent written survey instruments to downstream county health departments, parks departments and government offices in Daviess, Greene, Johnson, Knox, Morgan, and Owen counties. Surveys also were sent to McCormick Creek State Park, as well as the Department of Natural Resources Headquarters in Districts 5-7. Nine completed surveys were returned and included in the city's database.

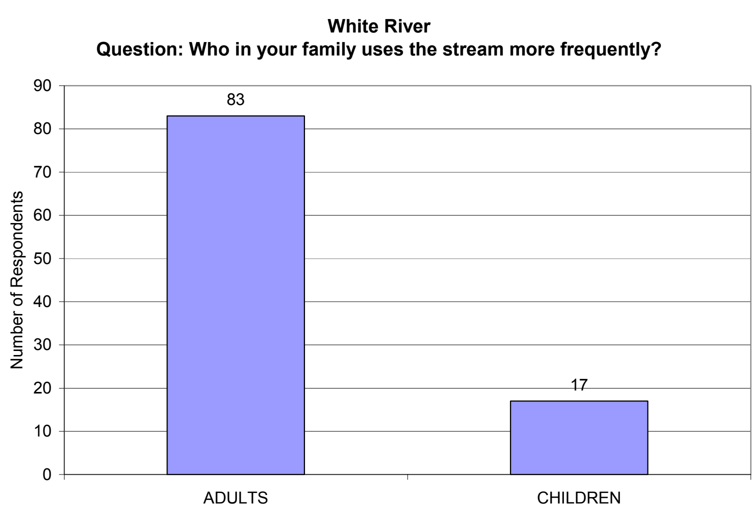
Recreational uses on White River downstream of White River were reported predominantly along parks, public access points, and towns. Based upon the above data sources, the city identified 10 reported fishing locations, six reported playing-at-stream-bank locations, four reported wading locations, five reported canoe launch areas, five reported boat launches, two reported swimming locations, and one duck hunting location. Swimming also was reported near McCormick Creek State Park and at Bloomfield. However, the city knows of no public swimming beaches along the river within this area. Downstream from Bloomfield land use is primarily agricultural and fewer water contact recreational uses were reported to the city. A map illustrating the observed and reported uses downstream of Marion County is located in Appendix C.

Extent of Uses: While some recreational activities do occur on White River within the CSO area, the number of people engaging in water contact activities and the frequency of those activities is limited. In the White River Use Survey, the primary recreational activity reported by people along White River in Marion County was walking/jogging/biking (58 of 100 people surveyed). Approximately 23 percent of respondents reported a primary use of fishing, swimming, wading or playing at stream bank, as shown in the graph below. For purposes of the survey, the following definitions were used:

- **Swimming:** Full-body contact with the water, including a high potential for swallowing the water (water should be deep enough to permit actual swimming)
- **Wading:** Partial body contact with the water (usually water contact to lower legs and possibly hands and arms)
- **Playing at the Stream Bank:** Kneeling, squatting or sitting at stream bank (some water contact may occur when hands reach into the water to touch or pick up something)
- **Fishing:** Fishing at the stream bank or from a boat (water contact occurs through handling fish and tackle)



Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.



Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

Also according to the survey, adults are more likely than children to use White River for recreational activities.

According to the survey and additional neighborhood meetings to confirm the survey's findings, swimming is observed or practiced much less frequently than activities that do not involve full-body contact. The full results of the White River Use Survey are located in Appendix D. Note that the survey results cannot be extrapolated to the city's general population. The survey was designed to identify people most likely to use the waterways and was not conducted using random sampling. Nor is the sample size large enough to warrant extrapolation of the results to the general population.

Frequency of Use: In a typical year, 36 percent of the respondents reported participating in recreational activities along White River in Marion County every week and 27 percent reported less than once a month. These activities include both water-contact and non-water-contact activities.

Summary: The city used a variety of data sources and public participation methods to gather information on the extent and frequency of water recreation activities in and along White River. Based upon this information, the city identified a number of locations where recreational uses occur along White River in Marion County and downstream in CSO-impacted areas. The primary use of this waterway for 58 percent of respondents is walking, jogging and/or biking along the greenways adjoining the stream. Swimming, wading and other water-contact activities are reported much less frequently. There are no public or private bathing beaches within the CSO-impacted areas of White River.

4. Limited extent of recreational use during or immediately after a significant wet weather event.

Little evidence exists of full-body or partial-body contact recreational uses of CSO-impacted portions of White River, especially after significant wet weather events. Where there is evidence of use, it is very infrequent. Most respondents to the White River Use Survey indicated that recreational usage within 24 hours after a rainfall is observed infrequently or not at all. Fifty-eight percent said that, based on their experience, they have seen adults or children playing in the stream when the current is slow, compared to 29 percent who have seen children or adults playing in the stream when the current is fast. Sixty-four percent of the interviewees also reported that use is infrequent (only once or twice a month) within 24 hours after a rainfall. Twenty-seven percent of respondents reported observing children or adults playing in the stream during or within 24 hours after a rainfall. The survey did not characterize the size of the rainfall events after which recreation was observed. Based on the answer to the question about fast or slow currents, people are more likely to recreate during dry weather or after a light rain than a major storm. The evidence collected by the city indicates that recreational use is rare or non-existent during and after large storm events.

5. Unsafe water quality combined with municipal programs that prevent and control access to the water.

IDEM guidance notes that unsafe water quality and municipal programs to prevent and control access may be a factor in determining an existing use:

> *If the water quality is unsafe and access to the water is precluded by (a) existing impediments to physical access such as steep banks, fencing or high retaining walls, then IDEM will not presume an existing recreational use. In order for IDEM to determine that access is precluded by the municipality, the municipality must take steps to actively prevent adults and children from actually using the water. This requires the municipality*

> *to prevent and control access to the water and to conduct a reasonable proactive outreach media and educational program to prevent actual use during and immediately following a significant wet weather event. This presumption will not apply to recreational beaches open to the public and other swimming areas designated for public recreation. (IDEM guidance, p. 51.)*

Information on the city's programs to prevent and control access to CSO-impacted waterways is presented in the introduction section to this submittal. Information documenting unsafe water quality on White River is presented below.

Water Quality: To demonstrate there is no existing recreational use under this factor, the city should demonstrate that recreational water quality standards are not achieved within the CSO-impacted area of White River during storm events. The table below provides a summary of in-stream water quality data collected in the CSO area of White River from 2000-2002 by the Indianapolis Office of Environmental Services and the Marion County Health Department. Results are shown for all data, dry weather data only and wet weather data. The data show that during wet weather, the geometric mean within the CSO area in White River was 561 *E. coli* colonies/100 mL, exceeding the state's recreational use standard of 125 cfu/100 mL. Two-thirds of samples taken in wet weather periods exceed the single sample standard of 235 cfu/100 mL.

White River *E. coli* Bacteria Compliance (CSO Area)

Data Source	Geometric Mean of 2000-2002 data[1]	% of Samples > 235 cfu/100 mL	Total Number of Samples
All Data	238	46.2%	84
Dry Weather Data	99	25.3%	91
Wet Weather Data	561	66.7%	93

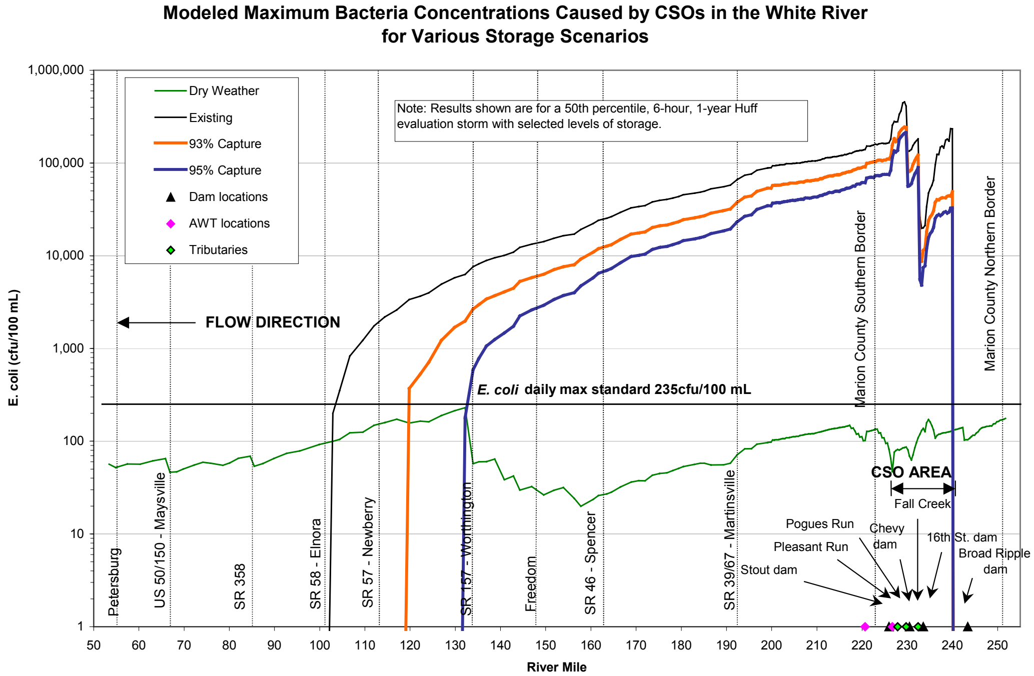
(1) Indiana's standard for geometric mean is 125 cfu/100 mL.

To determine whether water quality standards are being met in the CSO area of White River during or after large storm events, the city further analyzed in-stream water quality data collected in 2000-2002. Based upon a NetStorm simulation of LTCP Systemwide Control Plan 1, the city identified 17 storm events that would have resulted in untreated overflows if the city had installed CSO control facilities that achieve 93 percent capture. The city does not have data to correlate to all 17 storm events, since the city's existing sampling program is designed to collect data on a periodic basis without regard to weather conditions. However, on the days when existing 2000-2002 data could be correlated to an estimated overflow event, the data consistently show that the single sample maximum standard of 235 *E. coli* colonies/100 mL is not being met. This demonstrates that the CSO area of White River is unsafe for recreational use during and after those storm events. These types of storm events would have caused overflow events both before and after November 28, 1975, the date after which an existing use must be protected if it has been "attained."

WHITE RIVER COMPARISON OF ESTIMATED OVERFLOW EVENTS AND HISTORICAL E. *COLI* BACTERIA SAMPLING 2000-2002							
Estimated Overflow Event Date (93% Capture)	**Date of Sample**	**30th St OES (cfu/100 mL)**	**Morris St OES (cfu/100 mL)**	**Harding St OES (cfu/100 mL)**	**Raymond (cfu/100 mL)**	**New York (cfu/100 mL)**	**Average (cfu/100 mL)**
4/7/00	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5/26/00	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7/4/00	7/5/00	980	20,000	9,909	N/A	N/A	10,300
8/17/00	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9/10/00	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10/4/00	10/4/00	400	1,803	380	N/A	N/A	900
4/10/01	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6/5/01	6/5/01	N/A	N/A	N/A	N/A	410	N/A
7/1/01	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10/10/01	N/A	N/A	N/A	N/A	N/A	N/A	N/A
10/24/01	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/21/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/24/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4/27/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5/7/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5/12/02	5/13/02	N/A	N/A	N/A	N/A	10,462	N/A
9/20/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11/10/02	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: Estimated Overflow Dates: 1950-2003 NetSTORM Simulation for System Wide Plan 1, 93% Capture Level of Control.
Sampling Data: 2000 - 2002 instream *E. coli* bacteria sampling by OES and MCHD.
Note: Sampling data is presented only for dates on or following the estimated overflow event date, and for locations within the CSO area.

Downstream Water Quality: The figure below shows modeled maximum *E. coli* bacteria concentrations in White River downstream of Indianapolis, based upon existing conditions in dry weather and a 1-year storm. The figure also shows conditions resulting from a 1-year storm under CSO control levels of both 93 and 95 percent capture. The modeled analysis demonstrates that the single sample maximum standard is not met as far downstream as State Road 58 near Elnora following a 1-year storm under current conditions. The extent of downstream impacts is expected to decrease during and following implementation of the city's final long-term control plan. The 93 and 95 percent capture scenarios are presented as potential outcomes of the LTCP. However, the final long-term control plan is subject to public input, affordability and negotiation with IDEM and EPA. Nevertheless, the information below is sufficient to demonstrate that recreational water quality standards are not being met in downstream reaches of White River. Combined with the city's public notification programs to downstream communities, this factor supports a "no existing use" determination for White River during storm events exceeding the 1.7-month storm as far downstream as State Road 58.



Summary

Although occasional recreational uses occur along the CSO-impacted areas of White River, these should not be considered existing uses under 40 CFR 131.3(e) based upon the following factors:

1. Physical access and flow that are unsuitable for recreational use during large storm events, such as those exceeding a 1.7-month storm;
2. Waters that are dangerous during large storm events due to swift currents and undertows
3. Limited extent and frequency of actual recreational uses
4. Minimal recreational use during or immediately after significant wet weather events;
5. Unsafe water quality combined with extensive municipal programs to prevent and control access to the water following wet weather events.

Furthermore, the physical and water quality conditions of CSO-impacted areas of White River make primary and secondary contact recreational activities unsuitable, undesirable, and unsafe during significant wet weather events. Based upon this data, we conclude that full-body or partial-body contact recreation is not an existing use of CSO-impacted areas of White River during storm events exceeding the 1.7-month storm. Therefore, we request that IDEM affirm the city's conclusion and allow the city to proceed with a UAA to evaluate the attainable uses of the CSO area of White River during the periods and conditions under which we contemplate having residual overflows.

Appendices:
A. Physical Stream Survey Maps and Tables
B. USGS flow graph
C. White River Recreational Use Map
D. 2002 White River Use Survey

Reference:

U.S. Geological Survey, 1996. Low-Flow Characteristics of Indiana Streams. USGS Water Resources Investigation Report 96-4128. Page 129.

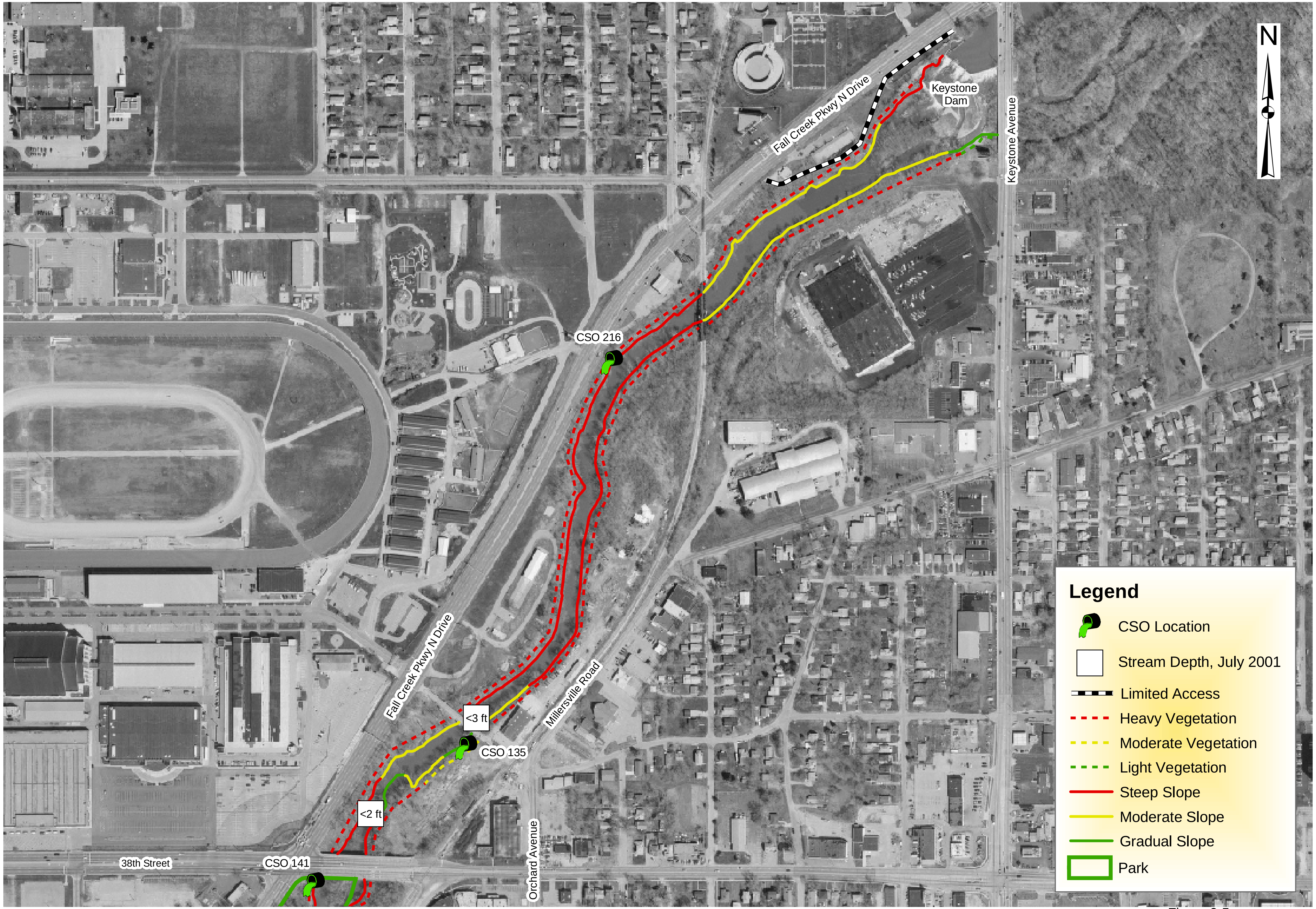


Figure 2-5a
Physical Stream Characteristics
Fall Creek
Sheet 1 of 7

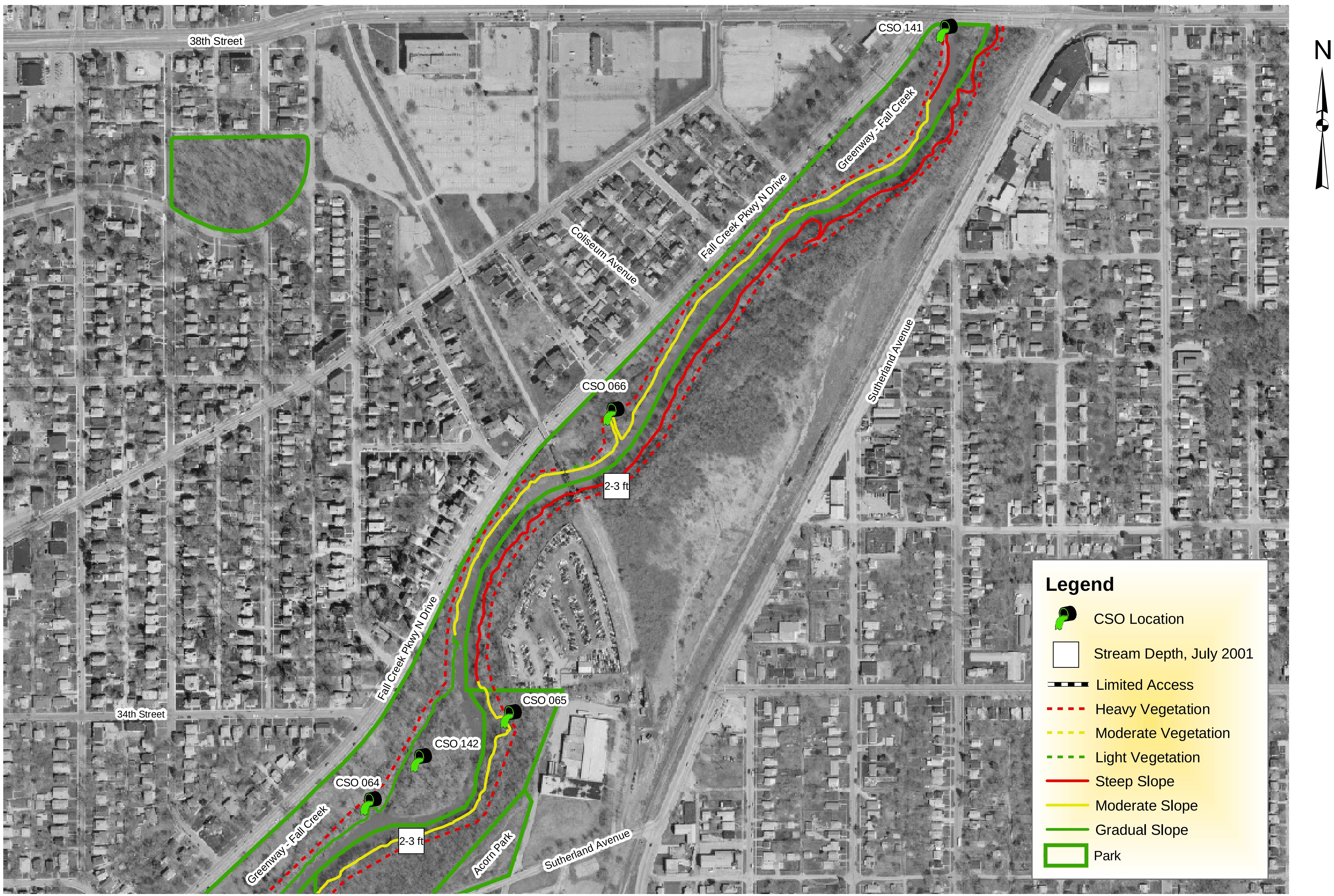


Figure 2-5b
Physical Stream Characteristics
Fall Creek
Sheet 2 of 7

Figure 2-5c
Physical Stream Characteristics
Fall Creek
Sheet 3 of 7

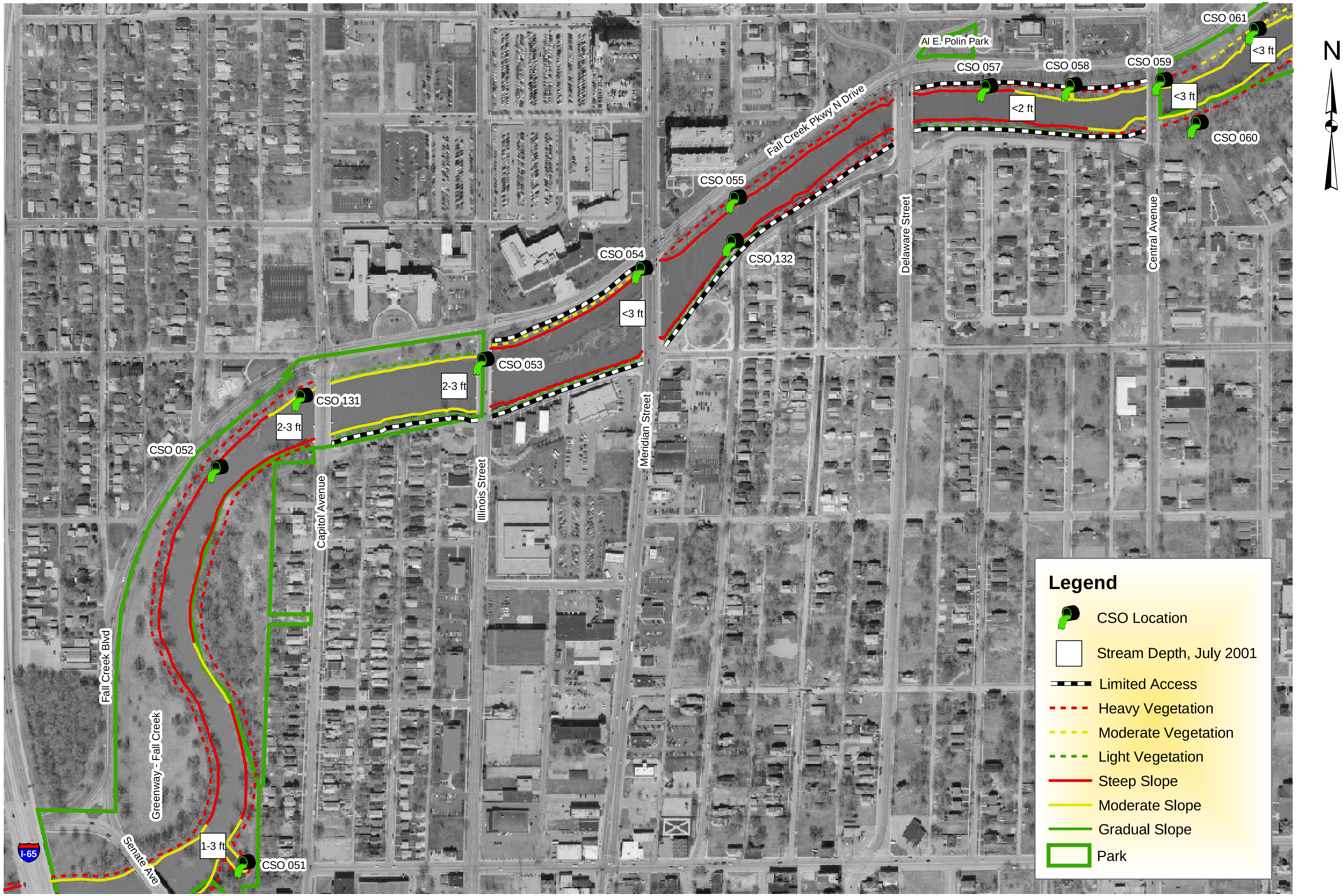


Figure 2-5d
Physical Stream Characteristics
Fall Creek
Sheet 4 of 7

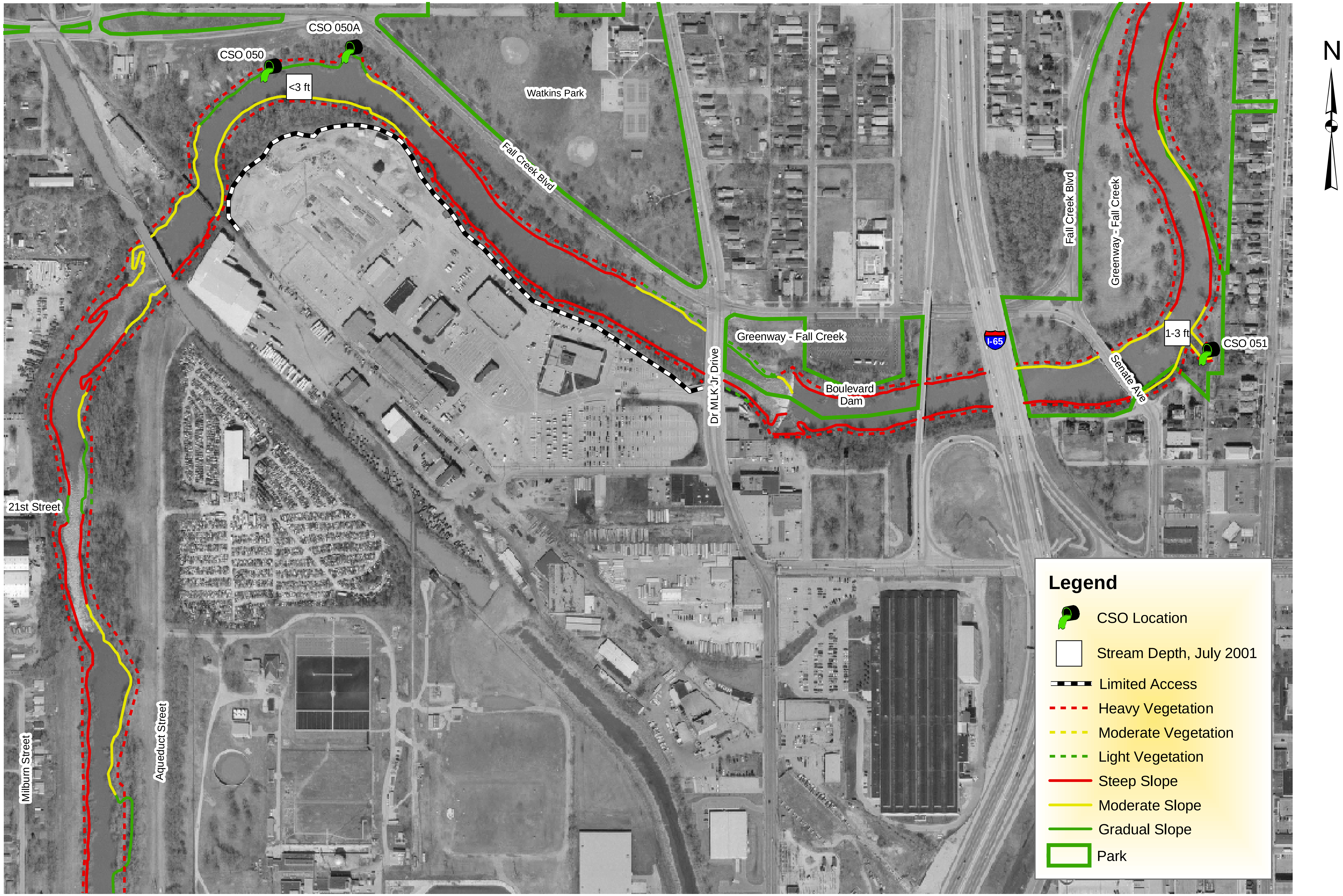


Figure 2-5e
Physical Stream Characteristics
Fall Creek
Sheet 5 of 7

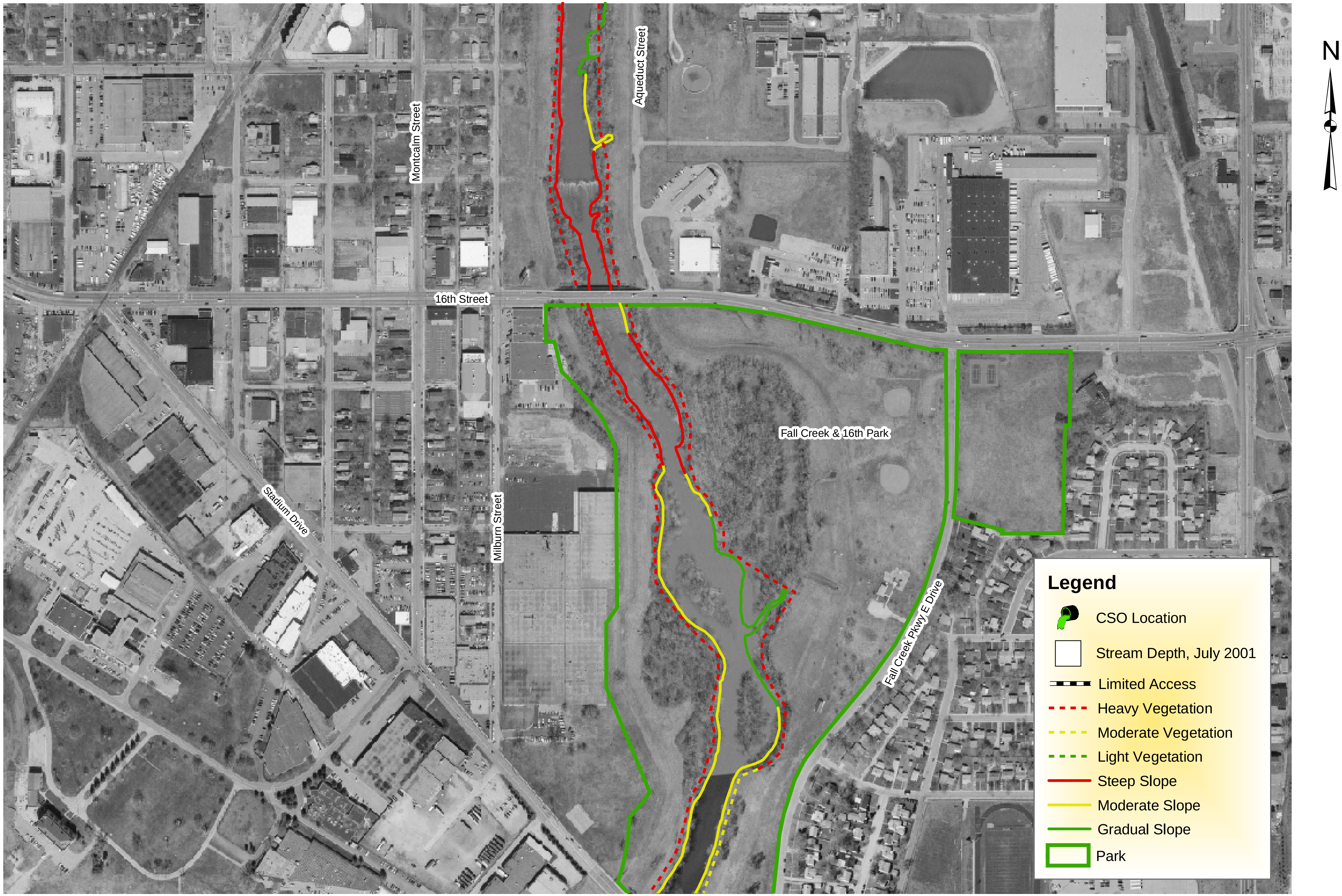


Figure 2-5f
Physical Stream Characteristics
Fall Creek
Sheet 6 of 7

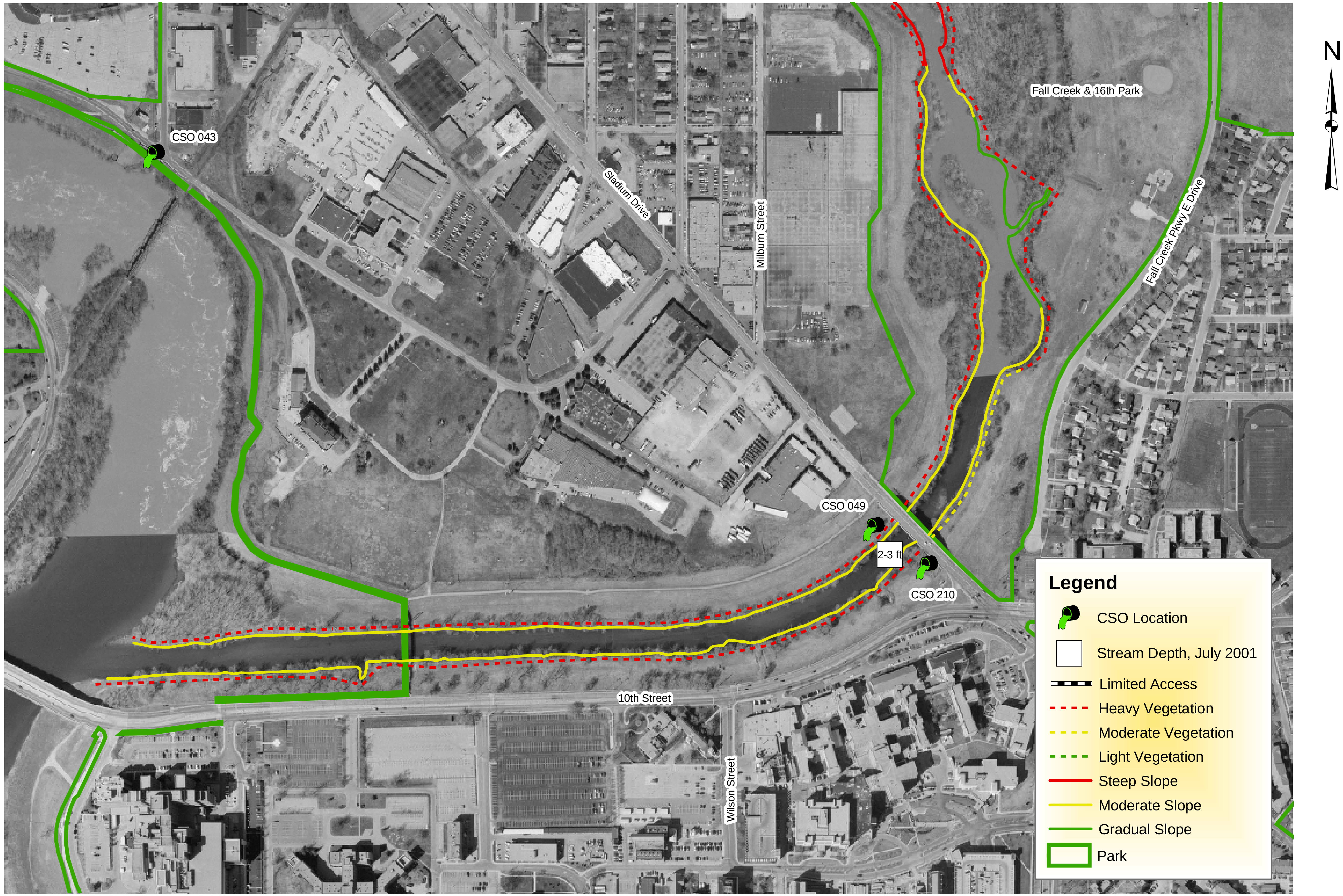


Figure 2-5g
Physical Stream Characteristics
Fall Creek
Sheet 7 of 7

Fall Creek

Criteria	103 [3] 3900 N. Sherman	216 Crittenden Ave. and 42nd St.	135 Orchard Ave. and 39th St.	141 College Ave. and 38th St.	066 Fall Creek Blvd. and Balsam Ave.	065 [3] Sutherland Ave. and 34th St.	142 College Ave. and 38th St.	064 Winthrop Ave. and 34th St.	063 FCPND and 32nd St.	63A FCPND and 32nd St.	062 Guilford Ave. and 30th St.	213 [3] Hillside Ave. and 29th St.	061 FCPND and Ruckle St.
Overflows per year (average) [1]	9	44	38	14	42	33	29	36	52	52	22	3	84
Annual Overflow Volume Range (MG/year) [1]	5-6	45-61	77-104	37-49	26-35	110-148	36-49	5-7	151-204	14-19	119-161	<1	254-344
Other Discharges													
Location													
Type													
Factors that support/encourage recreational use													
School	no	no	no	no	no	no	no	no	no	no	no	no	no
Park	no	State Fairgrounds	State Fairgrounds	no	no	no	no	no	no	no	no	no	no
Trail	no	no	no	no	no	no	no	no	no	no	no	no	no
Other							open grassy area	open grassy area					
Factors that prohibit/discourage recreational use													
Warning Signs/City Ordinance [2]	yes	could not locate	yes	yes	yes, deep in woods	could not locate	yes	yes	yes	yes	could not locate	could not locate	could not locate
Fence	no	no	no	no	yes	yes	no	no	no	no	no	no	no
Steep Banks	no	yes	no	yes	gradual	yes	no	no	gradual	gradual	gradual on west side	gradual on west side	gradual
Other		dense woods	no	dense vegetation	dense vegetation	dense vegetation	dense vegetation	dense vegetation	dense vegetation	dense vegetation	dense vegetation on west side, wall on east side	dense vegetation on west side, wall on east side	
Access													
North Bank	Easy	Extremely Difficult	Extremely Difficult	Moderately Difficult	Moderately Difficult	Extremely Difficult			Extremely Difficult	Extremely Difficult	Extremely Difficult	Moderately Difficult	Extremely Difficult
South Bank	Easy	Extremely Difficult	Moderately Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult			Extremely Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult
Stream's Physical Attributes													
Depth	~ 6 in.		~ 3 ft.	~ 2 ft.	~2-3 ft.	> 7 ft.	~2-3 ft.	~2-3 ft.	~2-3 ft.	~2-3 ft.	3 ft.	variable	3 ft.
Velocity	slow	could not see creek	slow	slow	slow	quick	slow	slow	slow	slow	slow	moderate	slow
Width	5 ft.		50 ft.	50 ft.	50 - 60 ft.	65 ft.	50 - 80 ft.	50 - 80 ft.	50 ft.	50 ft.	60 ft.	50 ft.	40 - 50 ft.
Substrate	rocky		could not distinguish	could not distinguish	could not distinguish	sandy	could not distinguish	could not distinguish	rocky by creek banks	rocky by creek banks	rocky	sandy	rocks by banks
Safety	OK		no	no	no	no	no	no	no	no	no	no	no
Land Use													
Public	no	yes	yes	yes	no	no	no	no	no	no	yes	yes	no
Residential/Wooded	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Industrial/Commercial	no	no	no	no	no	no	no	no	no	no	no	no	no
Stream Use													
Habitat for Aquatic Species													
Natural riparian		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes, on west side		yes
Partially Developed (Subdivision)	yes										yes		
Fully Urbanized Development												yes	
Other Comments						Access extremely difficult, dense vegetation, steep slopes, restricted access			Dangerous crossing Fall Creek Pkwy. to get to CSO, guard rail is very close to road.				

Notes:
1. Overflows per year and volume range were revised June 2004.
2. New bilingual warning signs are being placed at all CSO locations.
3. The data for this CSO was collected in June 2004.
4. Pictures not taken by CSO, additional river pictures.

INDIANAPOLIS CSO LONG-TERM CONTROL PLAN

Use Attainability Analysis

Description of Marion County Streams

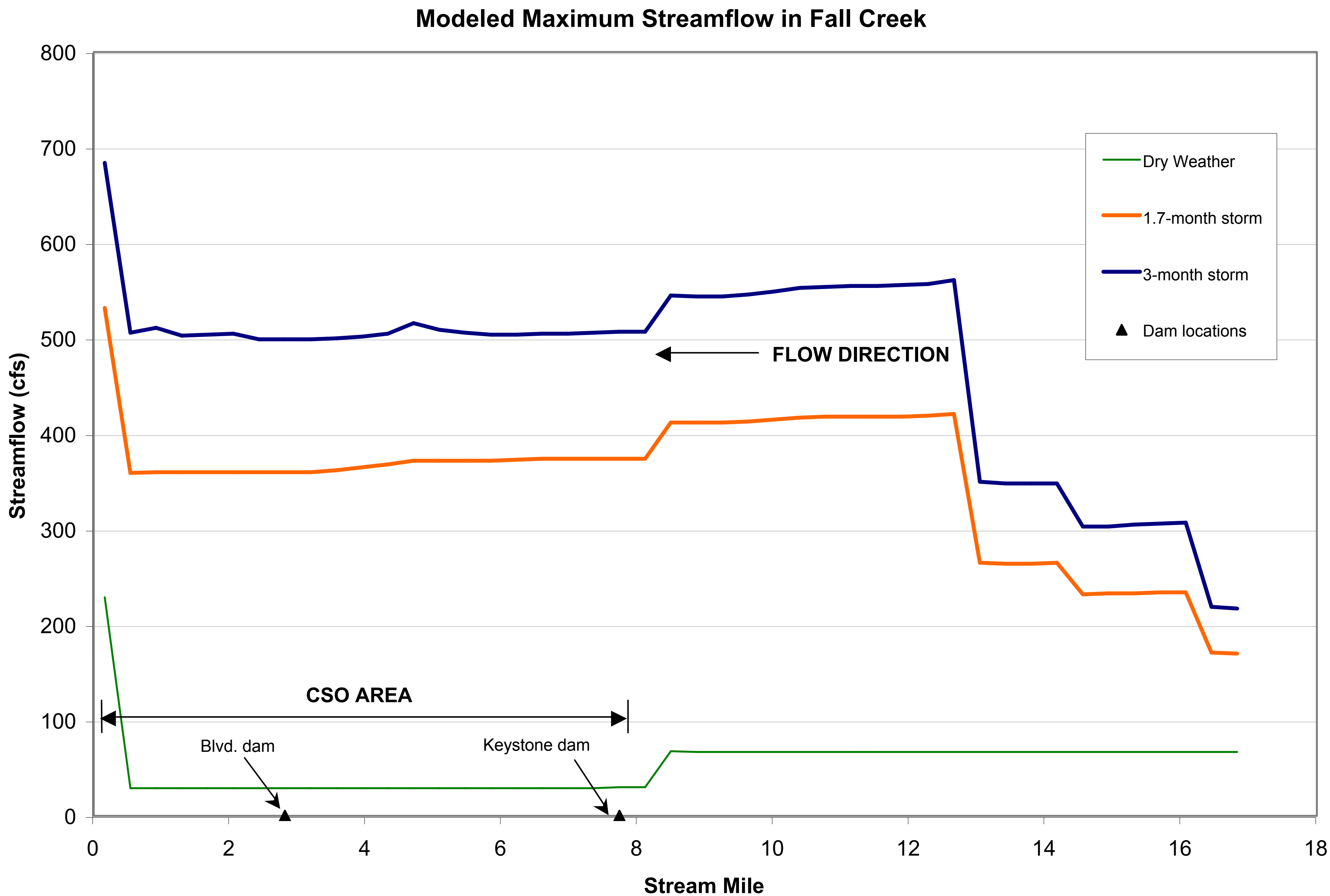
Fall Creek

Criteria	059 FCPND and Central Ave.	060 Sutherland Ave. and Central Ave.	058 28th St. and New Jersey St.	057 28th St. and Washington Blvd.	055 28th St. and Talbot St.	132 FCPND and Pennsylvania St.	054 FCPND and Meridian St.	053 FCPND and Illinois St.	131 Fall Creek Blvd. and Capitol Ave.	052 Fall Creek Blvd. And Boulevard Pl.	051 Capitol Ave. and 22nd St.	[4] Indianapolis Ave. and Fall Creek	50A [3] Northwestern Ave. and 24th St.
Overflows per year (average) [1]	8	33	28	1	21	23	4	5	21	43	40		38
Annual Overflow Volume Range (MG/year) [1]	1-2	15-20	2-3	<1	1-1	4-6	1-2	2-3	4-5	41-55	251-339		56-76
Other Discharges													
Location													
Type													
Factors that support/encourage recreational use													
School	no	no	no	yes, child care center	no	no	yes, Ivy Tech	no	no	no	no	no	no
Park	no	no	no	no	no	no	no	open grassy area	no	no	no	no	yes
Trail	no	no	no	along south side	no	no	no	no	no	no	no	no	no
Other										church	alley	dam	
Factors that prohibit/discourage recreational use													
Warning Signs/City Ordinance [2]	could not locate	could not locate	yes	could not locate	yes	yes	yes	yes	yes	yes	yes	N/A	yes
Fence	no	no	no	no	guard rail	guard rail	no	no	no	no	no	no	no
Steep Banks	gradual	gradual	wall on south side	wall on north side	yes	yes	walls	gradual	no	yes	gradual	gradual	no
Other	dense vegetation on east side	dense vegetation on east side	vegetation on north side	heavily wooded	dense vegetation	dense vegetation	dense vegetation	dense vegetation of NW and SW sides, wall on NE and SE sides	vegetation on SW side	dense vegetation	big rocks		below water level
Access													
North Bank	Extremely Difficult	Extremely Difficult	Moderately Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult	Easy	Easy	Extremely Difficult	Extremely Difficult	Moderately Difficult	Easy
South Bank	Extremely Difficult	Extremely Difficult	Extremely Difficult	Moderately Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult	Easy	Moderately Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult	Easy
Stream's Physical Attributes													
Depth	3 ft.	3 ft.	~ 2 ft.	~ 2 ft.	could not	could not	3 ft.	2 - 3 ft.	2 - 3 ft.	could not	1 - 3 ft.	1 - 3 ft.	> 10 ft.
Velocity	slow	slow	slow	slow	see creek	see creek	slow	slow	slow	see creek	slow	1 -2 fps (higher velocity because of dam)	moderate
Width	50 -60 ft.	50 -60 ft.	50 ft.	50 ft.			creek is split, 25 ft. on each side	100 ft.	100 ft.		80 - 100 ft.	80 - 100 ft.	60 ft.
Substrate	rocky	rocky	very muddy by bank	very muddy by bank			could not distinguish	could not distinguish	could not distinguish		sand and rocks	sand and rocks	sandy
Safety	no	no	no	no			no	no	no		no	no	no
Land Use													
Public	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Residential/Wooded	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Industrial/Commercial	no	no	no	no	no	no	no	no	no	no	no	no	no
Stream Use													
Habitat for Aquatic Species													
Natural riparian	yes	yes	yes	yes				yes	yes		yes	yes	
Partially Developed (Subdivision)													
Fully Urbanized Development			yes on south side	yes on north side			yes	yes (on NE and SE sides)					yes
Other Comments													

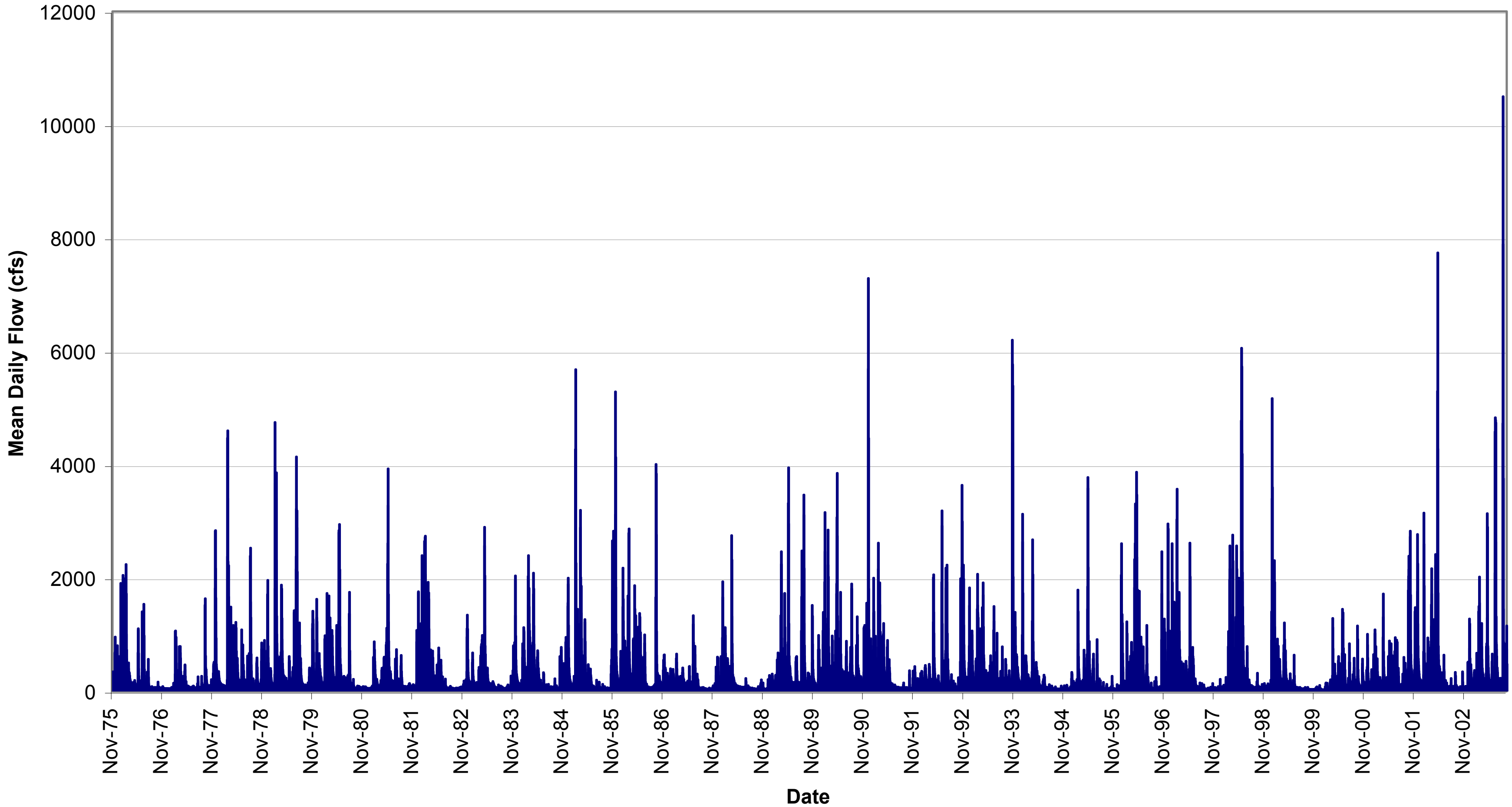
Notes:
1. Overflows per year and volume range were revised June 2004.
2. New bilingual warning signs are being placed at all CSO locations.
3. The data for this CSO was collected in June 2004.
4. Pictures not taken by CSO, additional river pictures.

Criteria	050 Fall Creek Blvd. and Burdsal Pkwy.	[4] Montcalm St. and 21st St.	[4] 16th St. and Aqueduct St.	049 Stadium Dr. and Fall Creek	210 Indiana Ave. and 10th St.
Overflows per year (average) [1]	42			18	54
Annual Overflow Volume Range (MG/year) [1]	103-140			2-2	66-89
Other Discharges					
Location					
Type					
Factors that support/encourage recreational use					
School	no	no	no	no	no
Park	yes	no	no	no	no
Trail	no	no	no	Fall Creek greenways	Fall Creek greenways
Other					
Factors that prohibit/discourage recreational use					
Warning Signs/City Ordinance [2]	could not locate	N/A	N/A	yes	yes
Fence	no	no	no	no	no
Steep Banks	no	no	gradual	gradual	gradual
Other	dense vegetation	vegetation	dense vegetation	vegetation	vegetation
Access					
North Bank	Moderately Difficult	Moderately Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult
South Bank	Extremely Difficult	Moderately Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult
Stream's Physical Attributes					
Depth	~ 3 ft.	1 - 3 ft.	1 - 3 ft.	~2-3 ft.	~2-3 ft.
Velocity	slow	slow	slow	slow	slow
Width	50 - 60 ft.	80 - 100 ft.	80 - 100 ft.	50 - 60 ft.	50 - 60 ft.
Substrate	sand and rocks	sand and rocks	sand and rocks	rocky banks	rocky banks
Safety	no	no	no	no	no
Land Use					
Public	yes	yes	no	yes	yes
Residential/Wooded	yes	yes	yes	no	no
Industrial/Commercial	no	no	no	yes	yes
Stream Use					
Habitat for Aquatic Species					
Natural riparian	yes	yes	yes	yes	yes
Partially Developed (Subdivision)					
Fully Urbanized Development					
Other Comments					CSO flows into pit, would take a lot of flow to reach creek.

Notes:
1. Overflows per year and volume range were revised June 2004.
2. New bilingual warning signs are being placed at all CSO locations.
3. The data for this CSO was collected in June 2004.
4. Pictures not taken by CSO, additional river pictures.

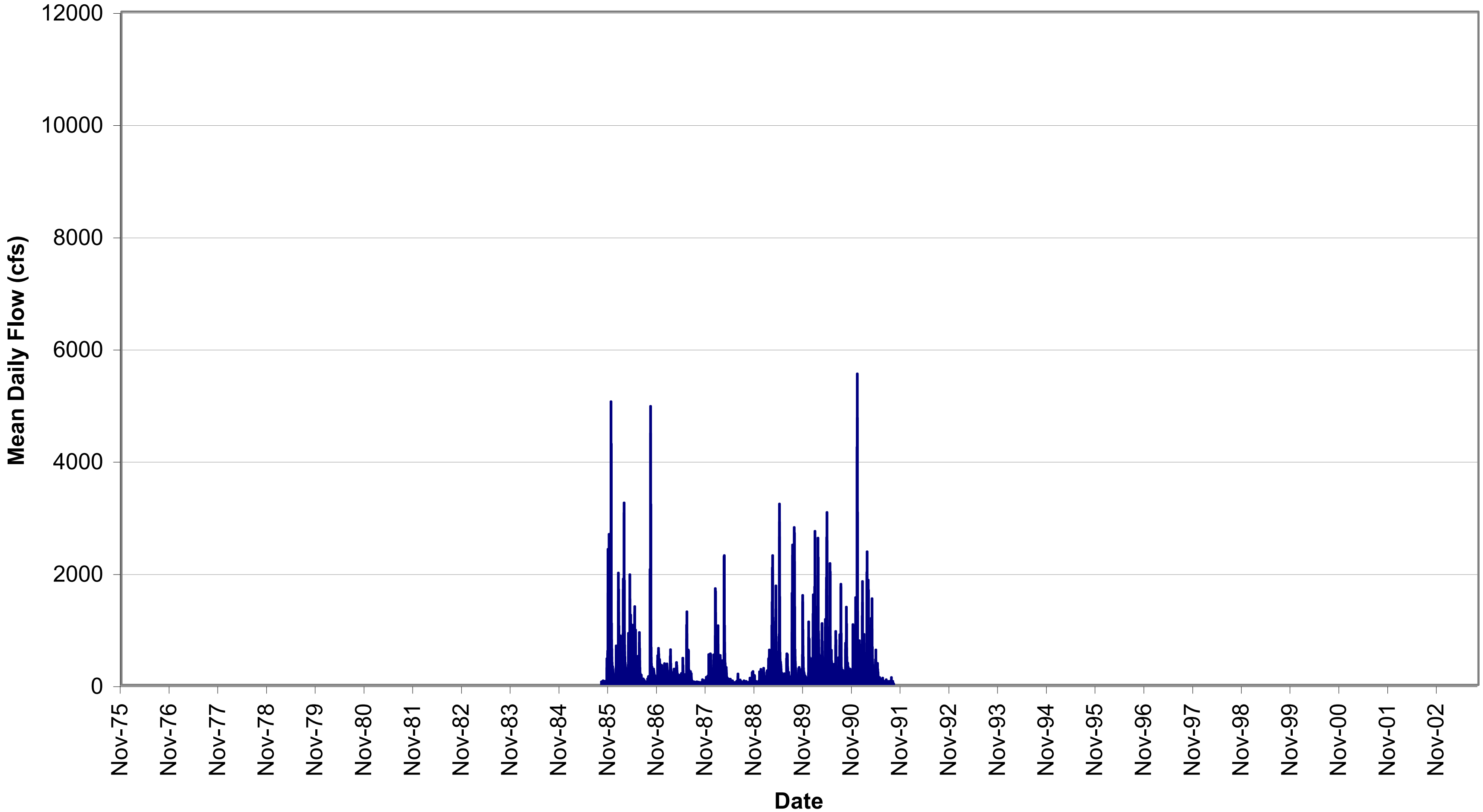


Modeled Maximum Streamflow in Fall Creek
Streamflow (cfs)
800
700
600
500
400
300
200
100
0
0
2
4
6
8
10
12
14
16
18
Stream Mile
Dry Weather
1.7-month storm
3-month storm
Dam locations
FLOW DIRECTION
CSO AREA
Blvd. dam
Keystone dam



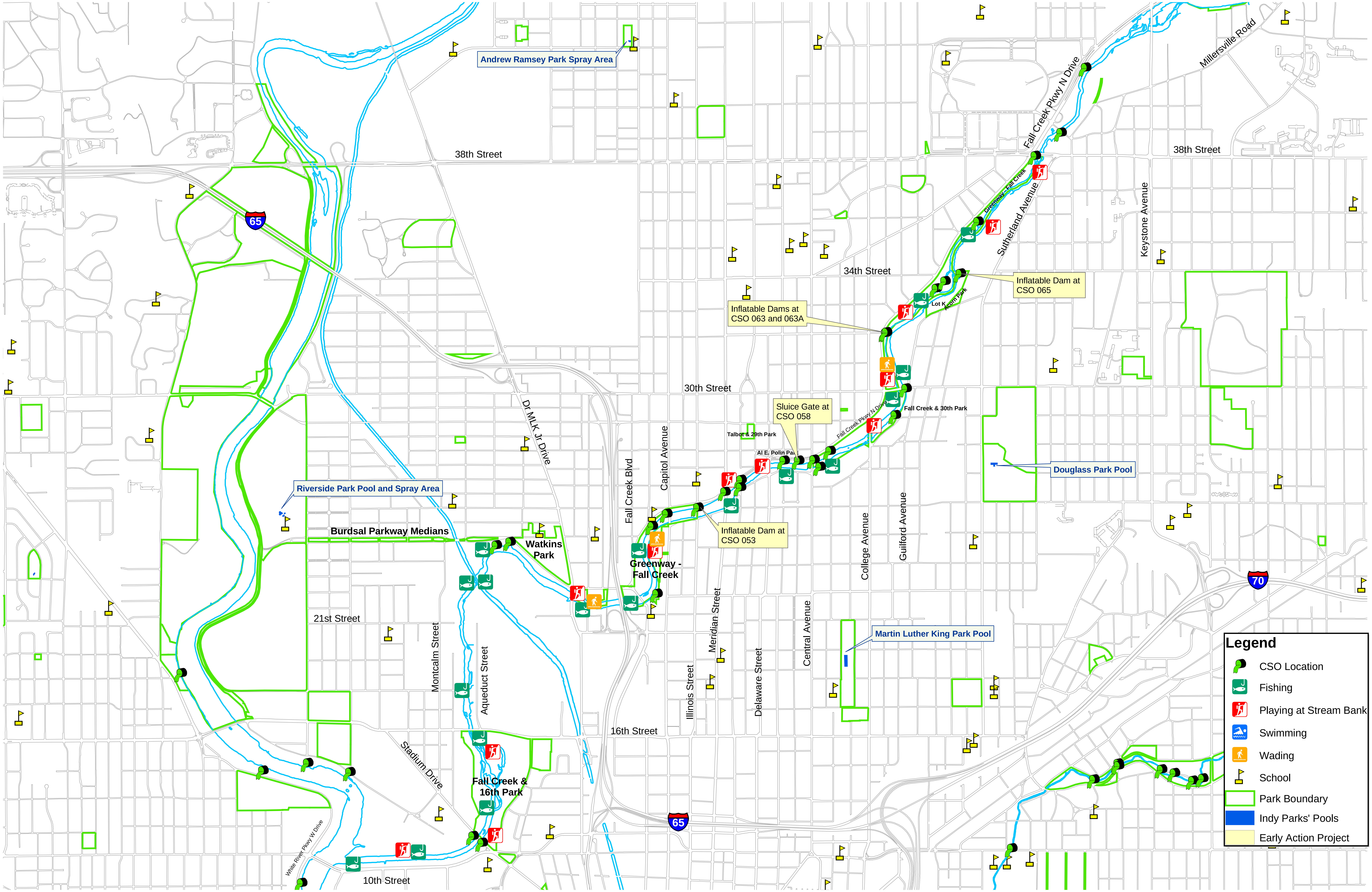
Source: USGS gauge station 03352500 in Fall Creek at Millersville,
November 28, 1975 to September 30, 2003.

Flow Variations in Fall Creek at Millersville Rd



Source: USGS gauge station 03352875 in Fall Creek at 16th Street, October 1, 1985 to September 30, 1991. Data not available before October 1, 1985 and after September 30, 1991.

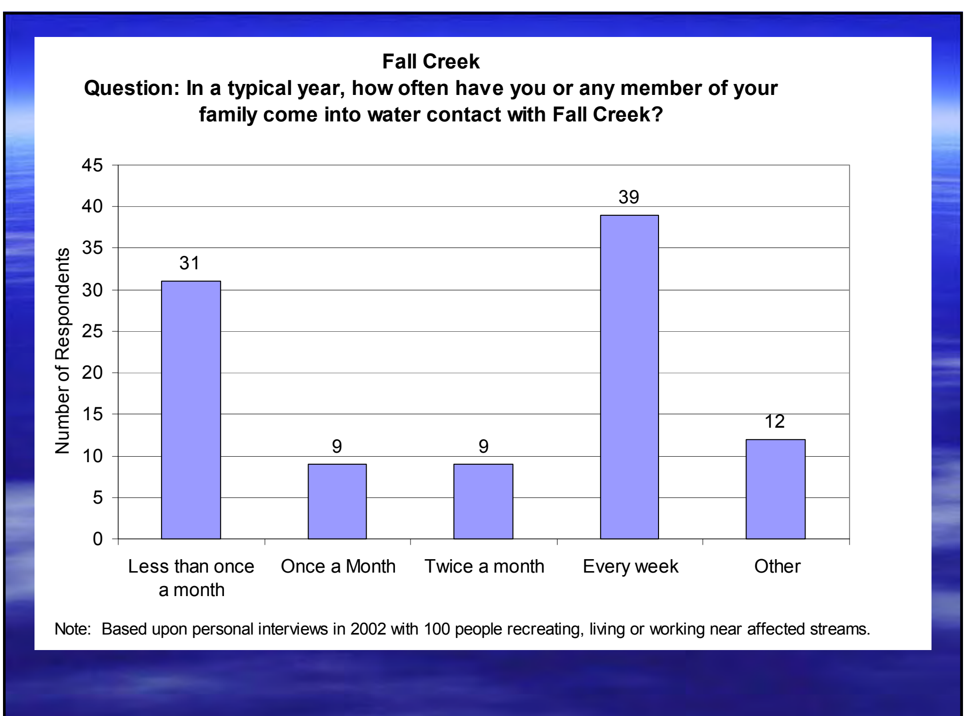
Flow Variations in Fall Creek at 16th Street

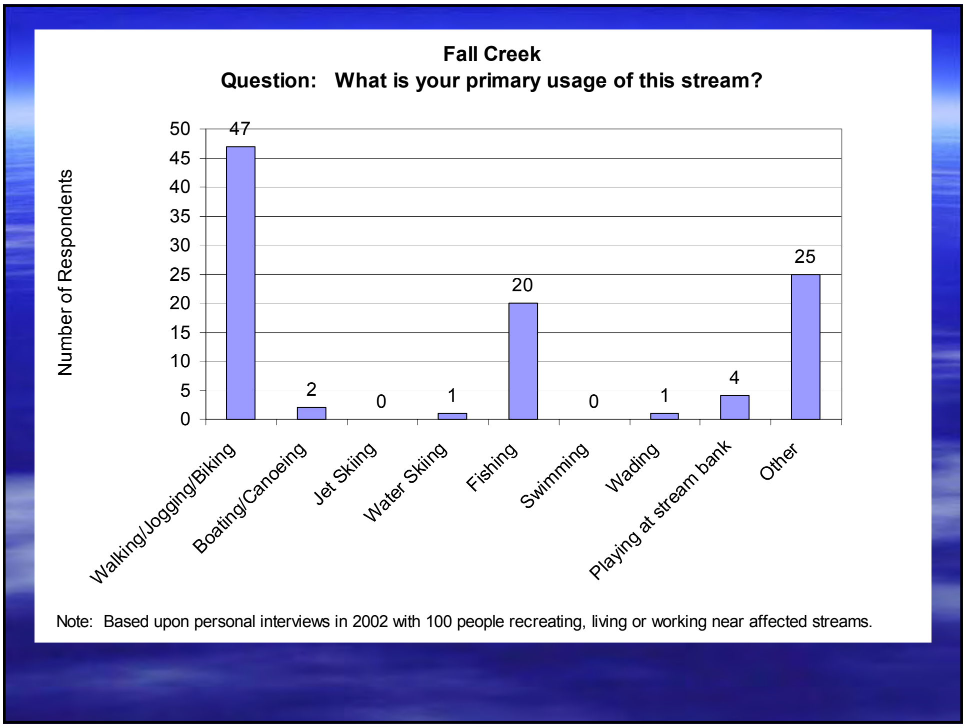


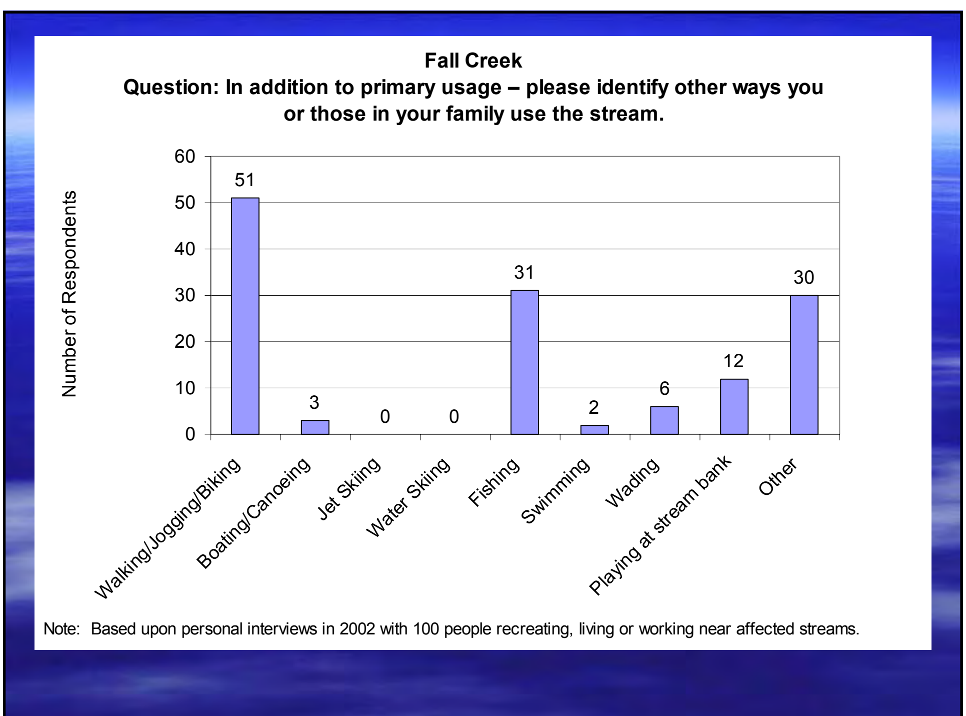
Note: Located upstream of this map, an early action project at CSO 103 will have sewer separation and rehabilitation.

Fall Creek
Reported and Observed Uses

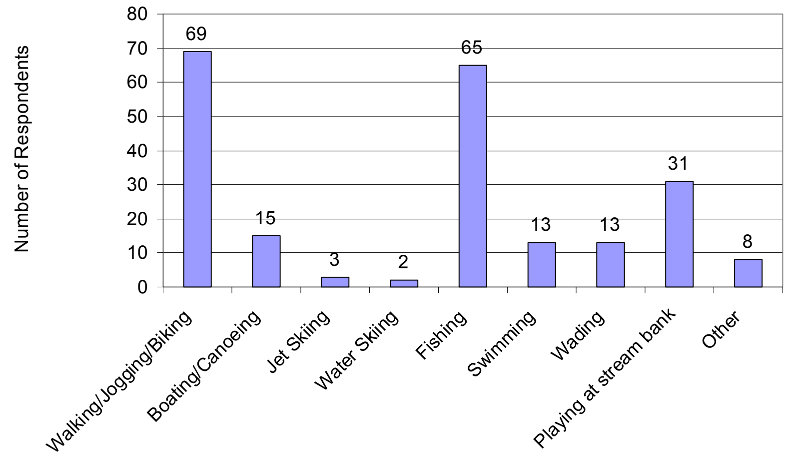

Fall Creek
Use Survey Data
Site: Fishing spot downstream of MLK Dam


Fall Creek
Question: In a typical year, how often have you or any member of your family come into water contact with Fall Creek?
Number of Respondents
0
5
10
15
20
25
30
35
40
45
31
9
9
39
12
Less than once a month
Once a Month
Twice a month
Every week
Other
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


Fall Creek
Question: What is your primary usage of this stream?
Number of Respondents
50
45
40
35
30
25
20
15
10
5
0
47
2
0
1
20
0
1
4
25
Walking/Jogging/Biking
Boating/Canoeing
Jet Skiing
Water Skiing
Fishing
Swimming
Wading
Playing at stream bank
Other
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

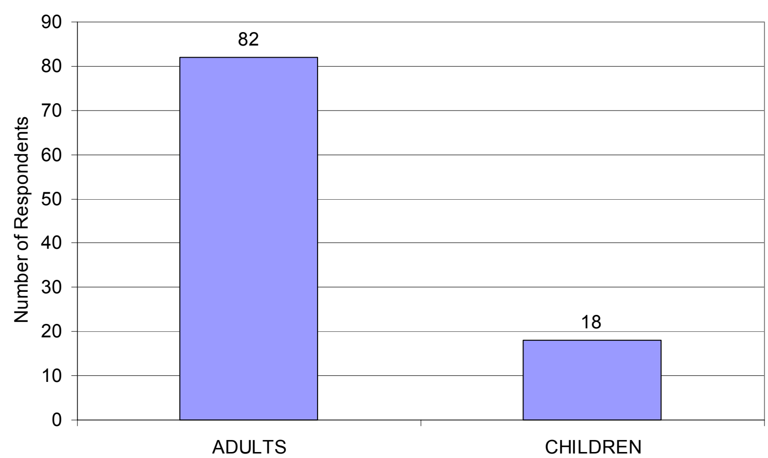

Fall Creek
Question: In addition to primary usage – please identify other ways you or those in your family use the stream.
Number of Respondents
60
50
40
30
20
10
0
51
3
0
0
31
2
6
12
30
Walking/Jogging/Biking
Boating/Canoeing
Jet Skiing
Water Skiing
Fishing
Swimming
Wading
Playing at stream bank
Other
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

Fall Creek
Question: Please identify the ways you have seen the stream used by others.

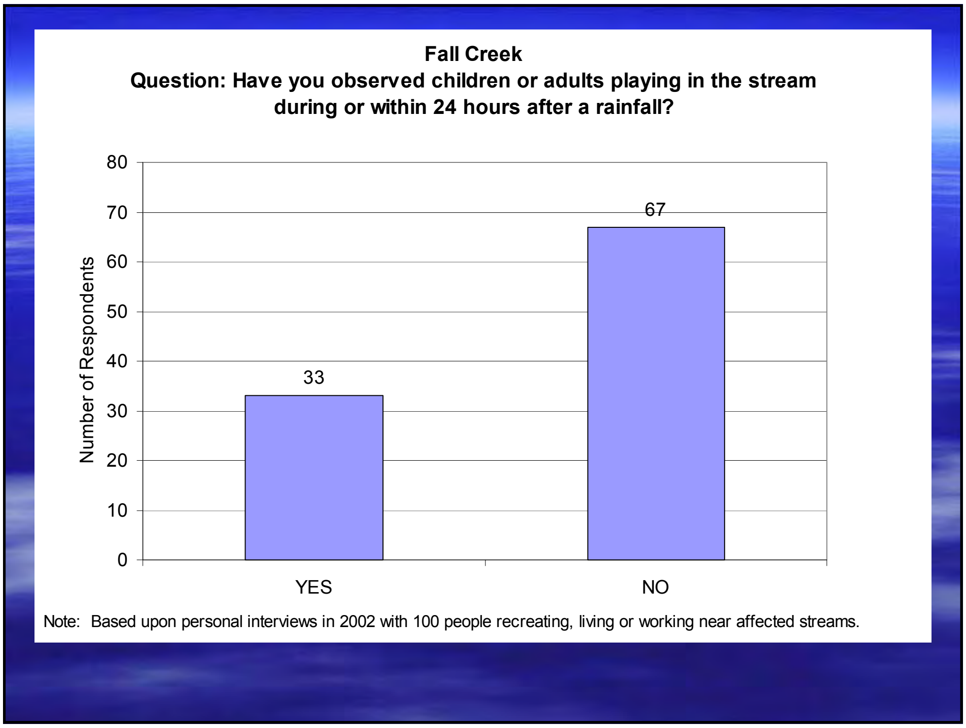


Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

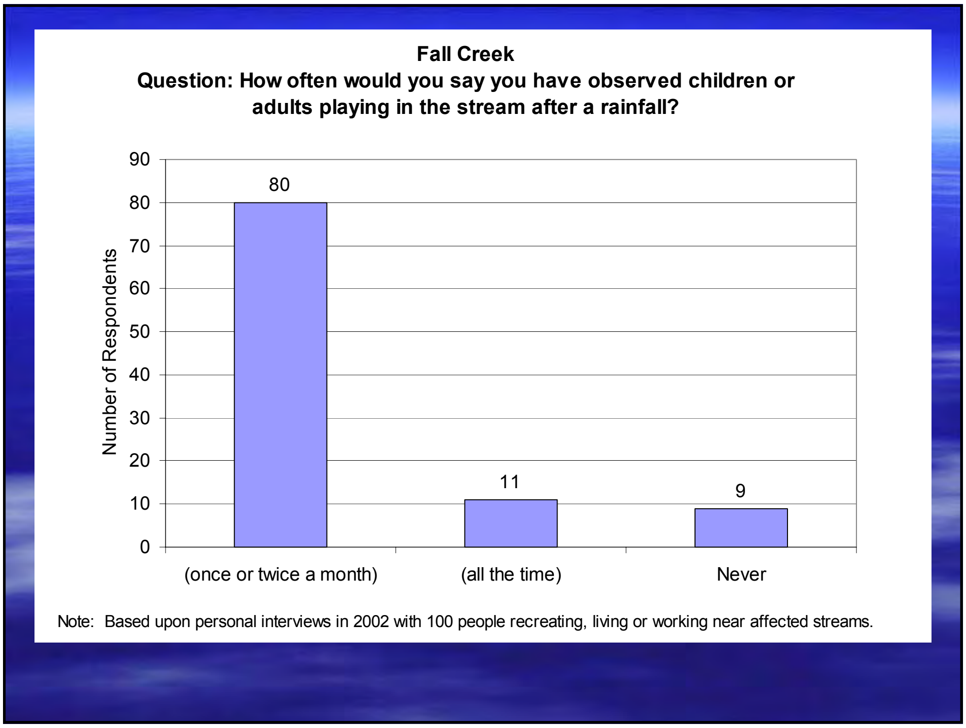
Fall Creek
Question: Also, who in your family uses the stream most frequently?

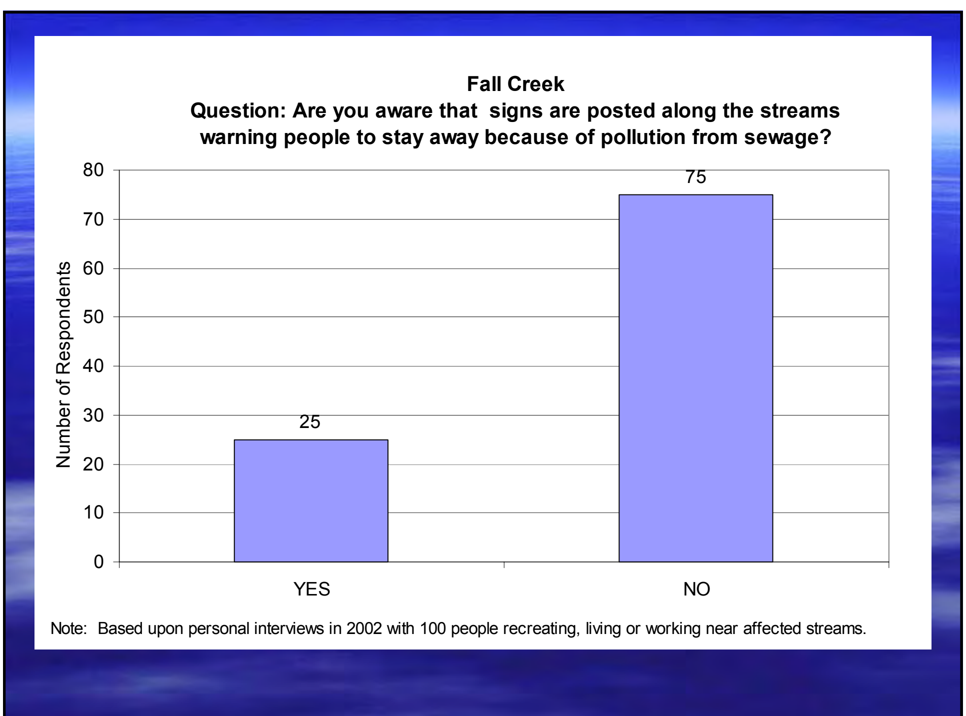


Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

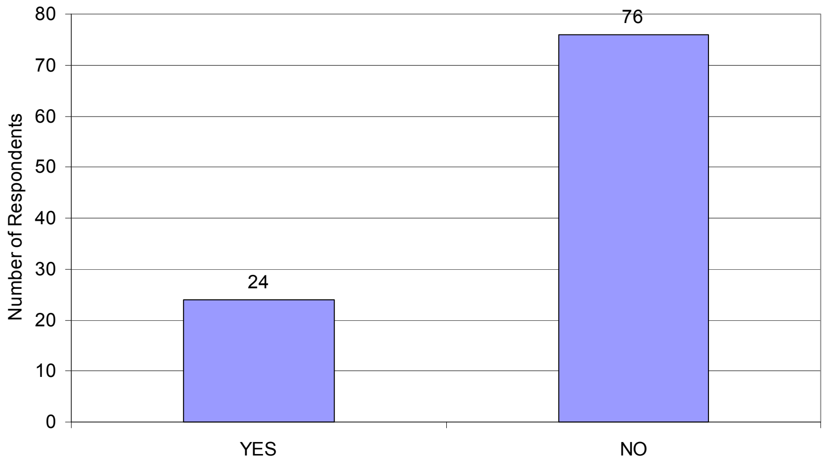

Fall Creek
Question: Have you observed children or adults playing in the stream during or within 24 hours after a rainfall?
Number of Respondents
80
70
60
50
40
30
20
10
0
33
67
YES
NO
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


Fall Creek
Question: Based on your experience, do you see children or adults playing in the stream when the current is fast or slow?
Number of Respondents
60
50
40
30
20
10
0
9
51
40
FAST
SLOW
BOTH
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


Fall Creek
Question: How often would you say you have observed children or adults playing in the stream after a rainfall?
Number of Respondents
90
80
70
60
50
40
30
20
10
0
80
11
9
(once or twice a month)
(all the time)
Never
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


Fall Creek
Question: Are you aware that signs are posted along the streams warning people to stay away because of pollution from sewage?
Number of Respondents
80
70
60
50
40
30
20
10
0
25
75
YES
NO
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

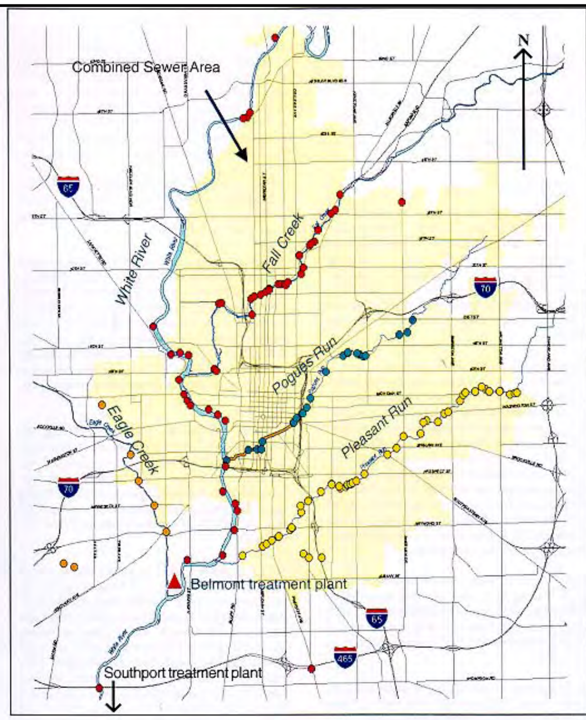
Fall Creek
Question: Have you noticed a change in the stream usage over the past 10 – 20 years?



Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

Location of Uses on Fall Creek

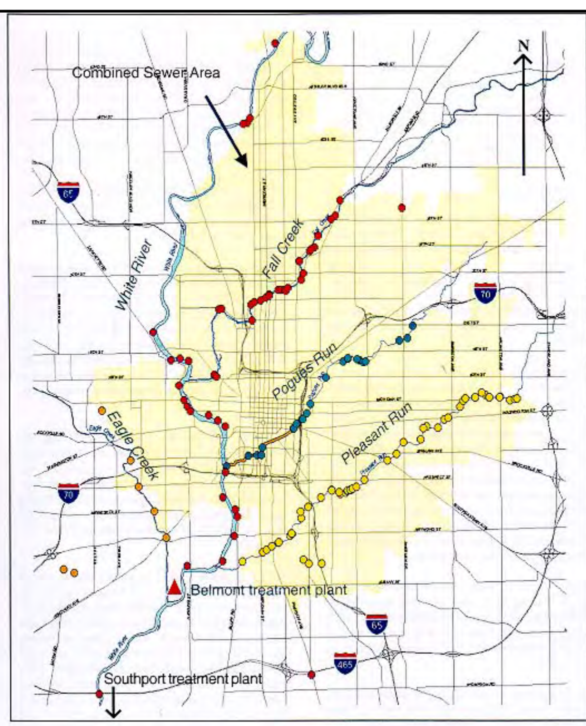
Activity	Location/Direct Respondent	Stream Survey	MCHD
Fishing	18th & Milburn		X
Fishing/ PSB	30th & Fall Creek	X	
Fishing/ PSB	South of 16th Street	X	
Fishing	Fall Creek and Martin Luther King Jr. Street	X	
Fishing	Fall Creek & Alabama		X
PSB	Sutherland & Fall Creek		X
Fishing	Between 30th & 38th Street on Fall Creek		
Fishing	Central & Fall Creek		X
PSB	25th & Fall Creek		X
Fishing	Burdsal Parkway and Montcalm	X	
Fishing	25th & Meridian Street		X
PSB	College & Fall Creek		X
PSB	Fall Creek & Delaware		X
Fishing	30th & Sutherland		X



FALL CREEK:
Location Activity
Direct Respondent

Clusters of activity: 16th St. & Milburn to 30th & Fall Creek.

1. Fishing from bridges that cross Fall Creek. College and Fall Creek, 25th and Meridian as well as accessible stream banks.
2. Playing at the stream bank is a highly observed behavior.
3. Adults attracted to fishing based on access as a sport. Historical acceptance.



FALL CREEK:
Location Activity
Direct Respondent

Fish	*18th & Milburn
Fish/PSB	† 30th & Fall Creek
Fish/PSB	† South of 16th Street
Fish	† Fall Creek and Martin Luther King Jr. Street
Fish	*Fall Creek & Alabama
PSB	*Sutherland & Fall Creek
Fish	Between 30th & 38th Street on Fall Creek
Fish	*Central & Fall Creek
PSB	*25th & Fall Creek
Fish	† Burdsal Parkway and Montcalm
Fish	*25th & Meridian Street
PSB	*College & Fall Creek
PSB	*Fall Creek & Delaware
Fish	*30th & Sutherland, North side

PSB=Playing at Stream Bank

† Reported on Stream Survey.

** Reported to MCHD.*

FINAL Survey Results - Fall Creek

In a typical year, how often have you or any member of your family come into water contact with Fall Creek?

	Total Number	%
Less than once a month	31	31%
Once a Month	9	9%
Twice a month	9	9%
Every week	39	39%
Other	12	12%
TOTALS	100	100%

What is your primary usage of this stream?

	Total Number	%
Walking/Jogging/Biking	47	47%
Boating/Canoeing	2	2%
Jet Skiing	0	0%
Water Skiing	1	1%
Fishing	20	20%
Swimming	0	0%
Wading	1	1%
Playing at stream bank	4	4%
Other	25	25%
TOTALS	100	100%

In addition to primary usage – please identify other ways you or those in your family use the stream.

	Total Number	%
Walking/Jogging/Biking	51	38%
Boating/Canoeing	3	2%
Jet Skiing	0	0%
Water Skiing	0	0%
Fishing	31	23%
Swimming	2	1%
Wading	6	4%
Playing at stream bank	12	9%
Other	30	22%
TOTALS	135	100%

Please identify the ways you have seen the stream used by others.

	Total Number	%
Walking/Jogging/Biking	69	32%
Boating/Canoeing	15	7%
Jet Skiing	3	1%
Water Skiing	2	1%
Fishing	65	30%
Swimming	13	6%
Wading	13	6%
Playing at stream bank	31	14%
Other	8	4%
TOTALS	219	100%

Also, who in your family uses the stream most frequently?

	Total Number	%
ADULTS	82	82%
CHILDREN	18	18%
TOTAL	100	100%

Have you observed children or adults playing in the stream during or within 24 hours after a rainfall?

	Total Number	%
YES	33	33%
NO	67	67%
TOTAL	100	100%

Based on your experience, do you see children or adults playing in the stream when the current is fast or slow?

	Total Number	%
FAST	9	9%
SLOW	51	51%
BOTH	40	40%
TOTALS	100	100%

How often would you say you have observed children or adults playing in the stream after a rainfall?

	Total Number	%
(once or twice a month)	80	80%
(all the time)	11	11%
Never	9	9%
TOTALS	100	100%

Are you aware that signs are posted along the streams warning people to stay away because of pollution from sewage?

	Total Number	%
YES	25	25%
NO	75	75%
TOTAL	100	100%

Age Group	Total Number	%
18-29	39	39%
30-39	19	19%
40-49	19	19%
50-59	14	14%
60+	9	9%
TOTAL	100	100%

Have you noticed a change in the stream usage over the past 10 – 20 years?

	Total Number	%
YES	24	24%
NO	76	76%
TOTAL	100	100%

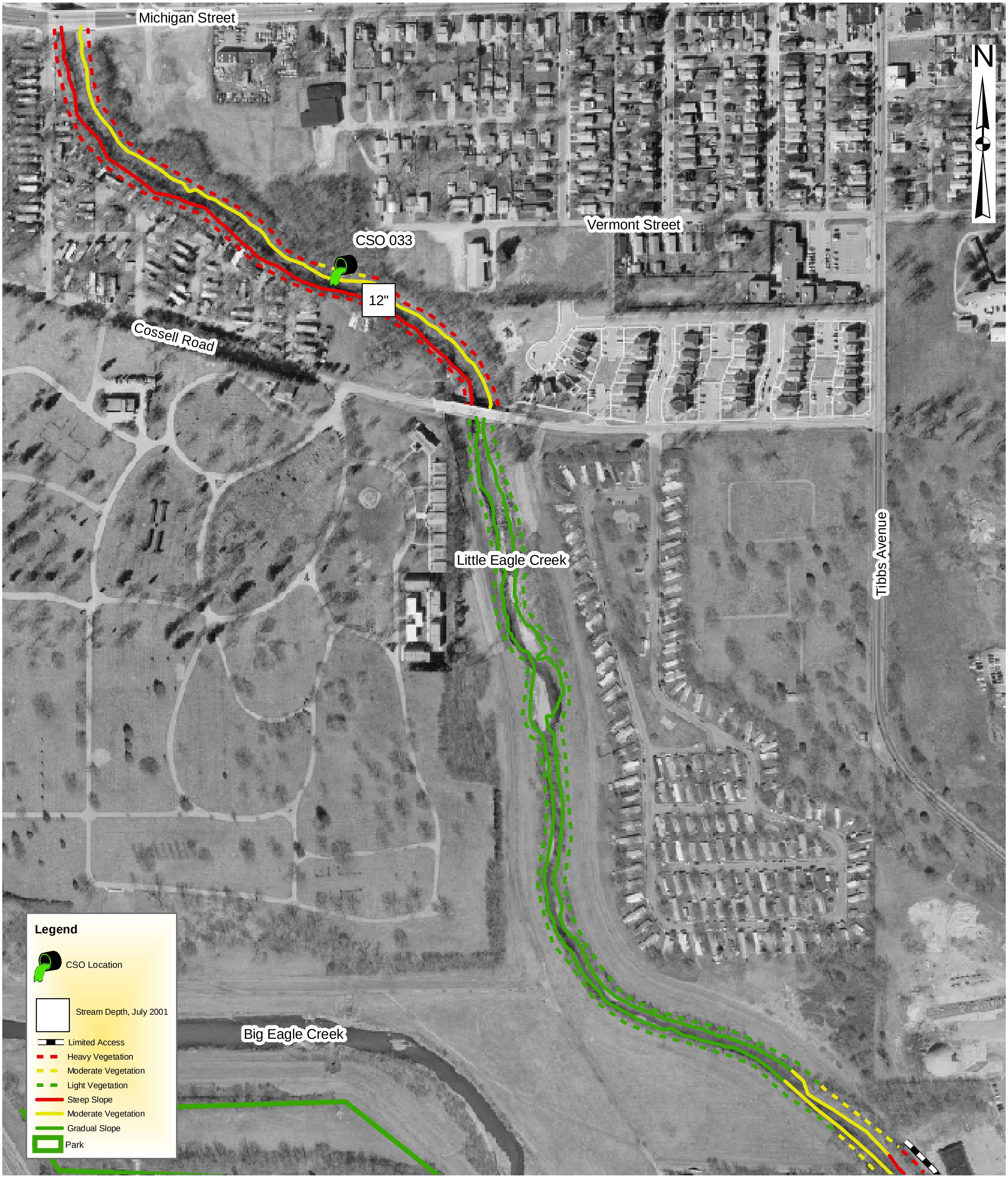


Figure 2-8a
Physical Stream Characteristics
Eagle Creek
Sheet 1 of 6

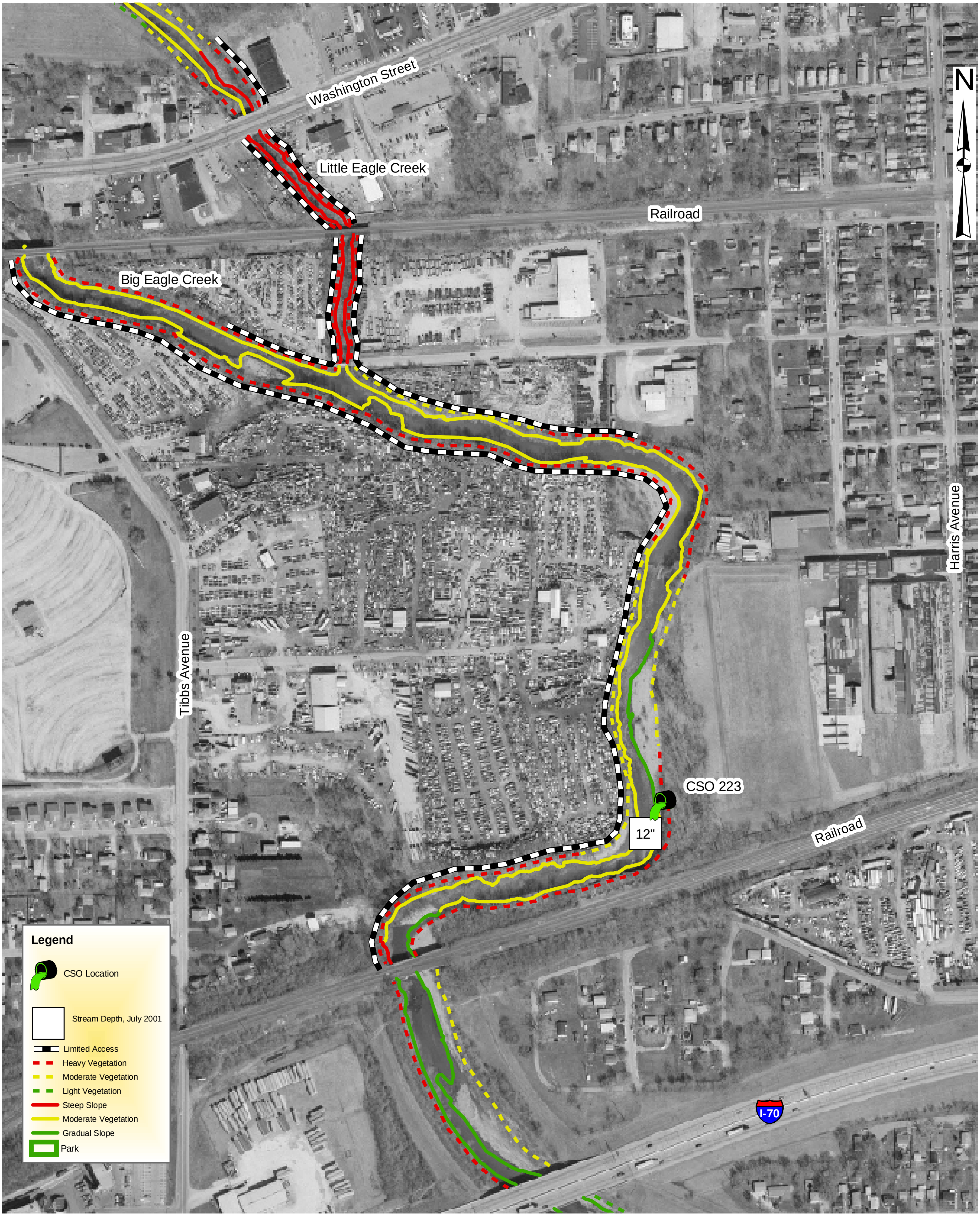


Figure 2-8b
Physical Stream Characteristics
Eagle Creek
Sheet 2 of 6

Figure 2-8c
Physical Stream Characteristics
Eagle Creek
Sheet 3 of 6

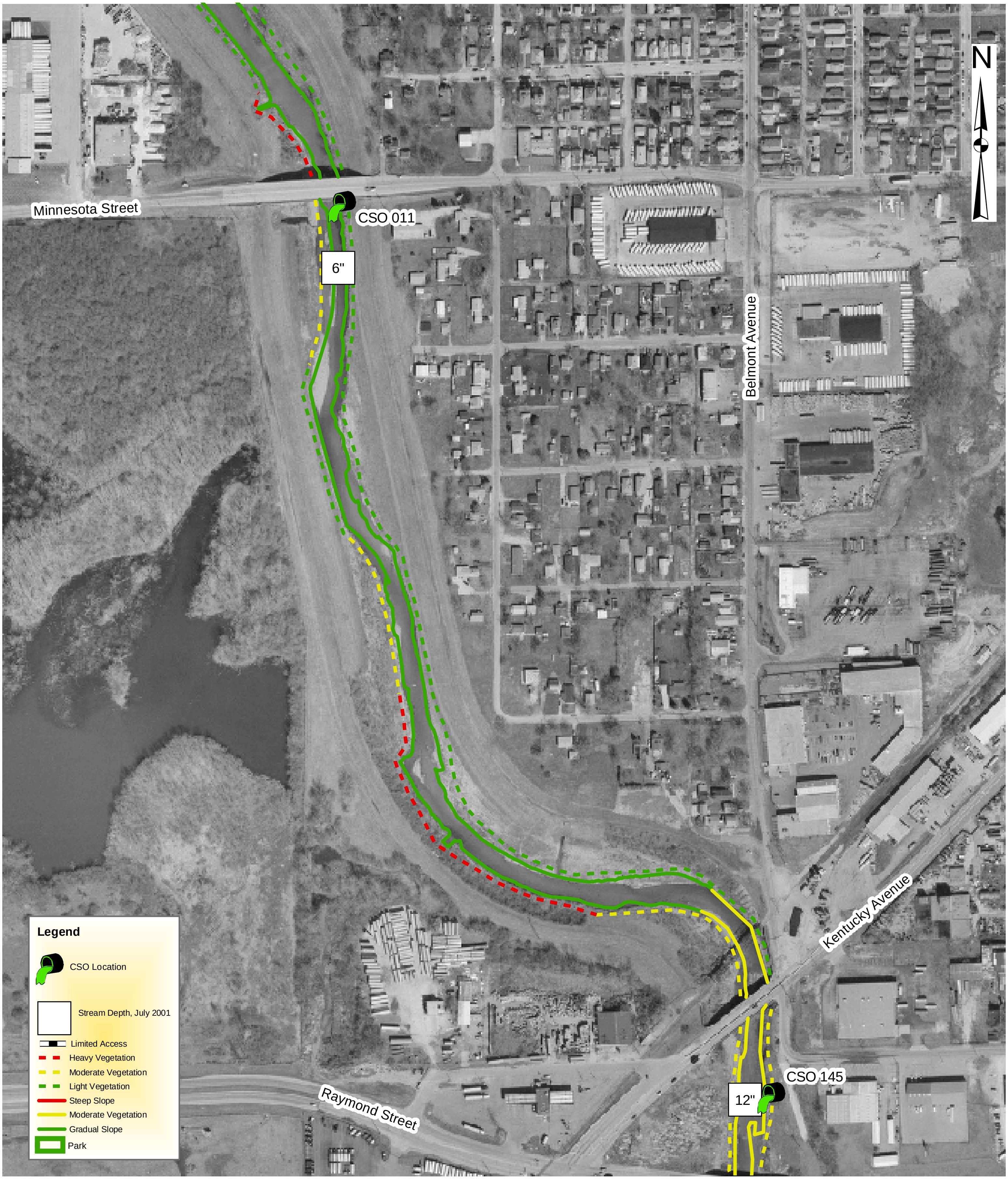


Figure 2-8d
Physical Stream Characteristics
Eagle Creek
Sheet 4 of 6

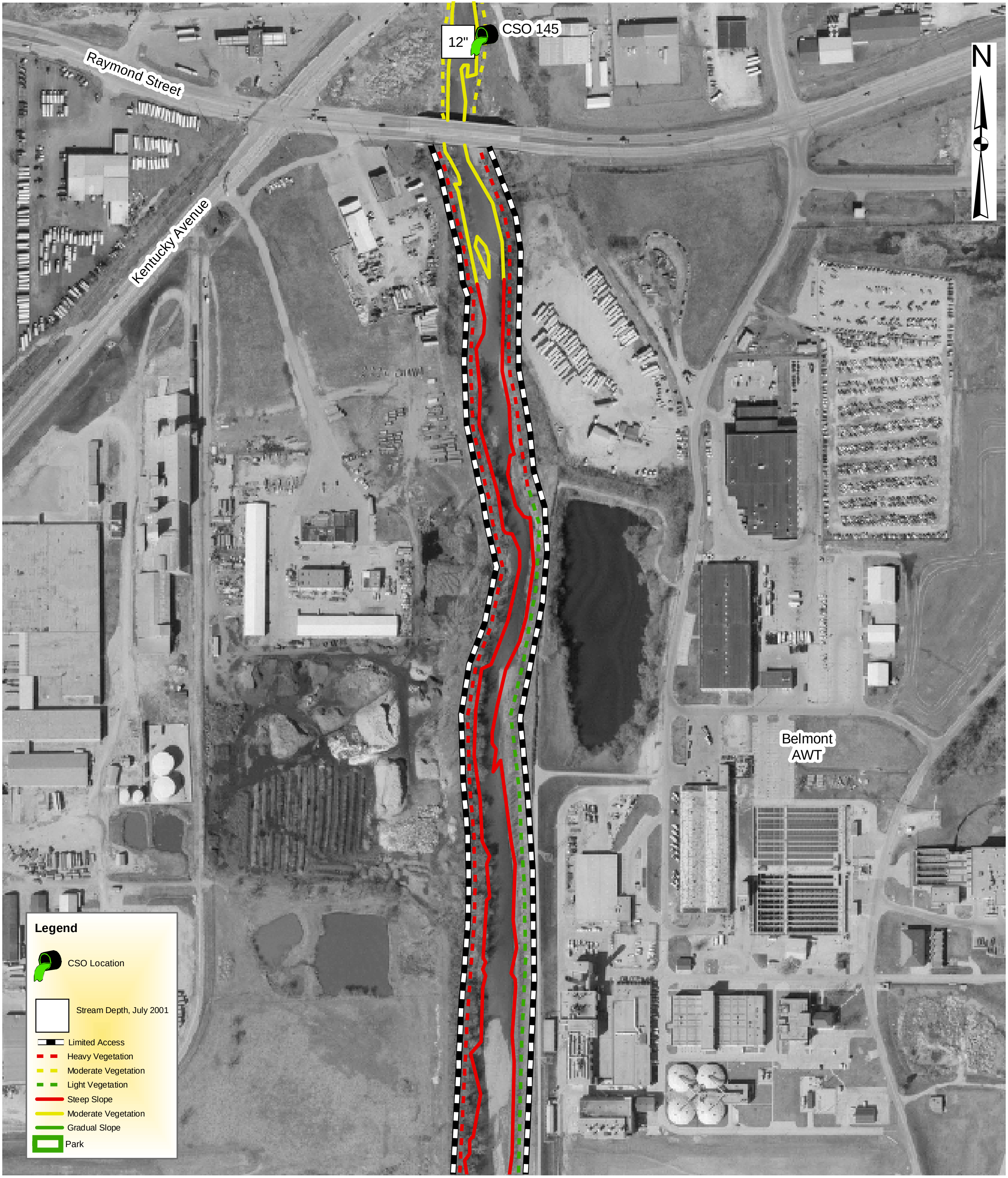


Figure 2-8e
Physical Stream Characteristics
Eagle Creek
Sheet 5 of 6

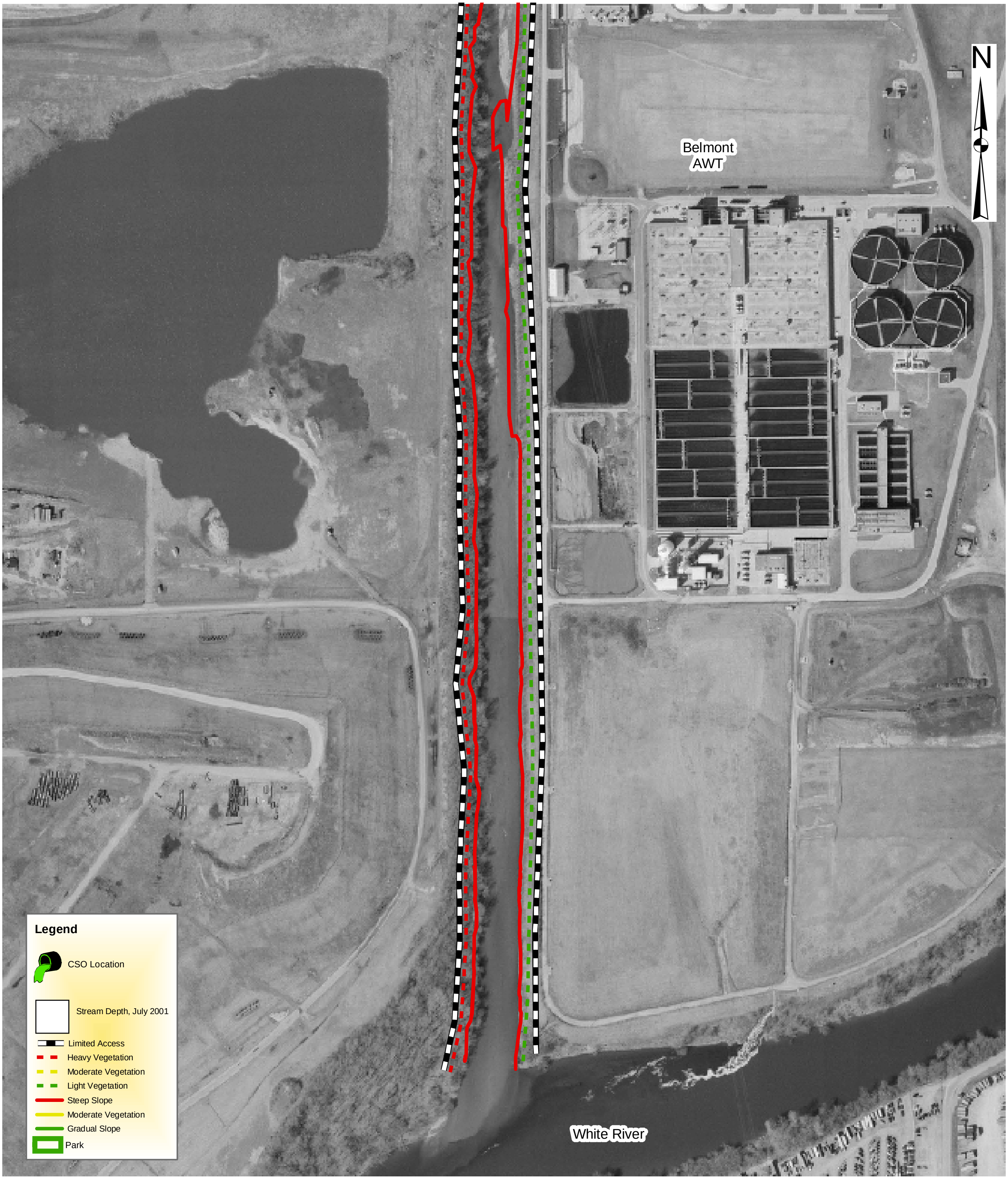
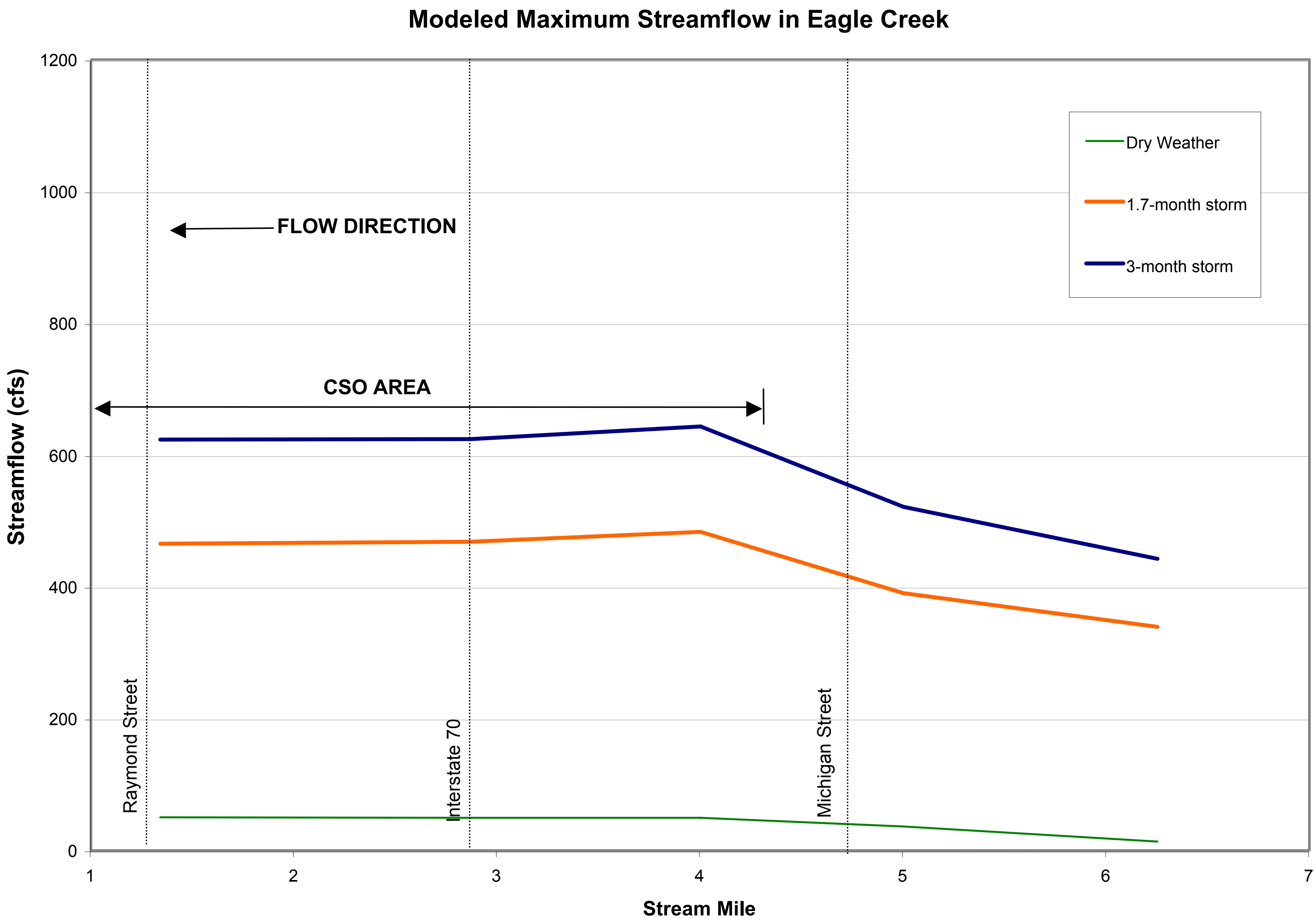
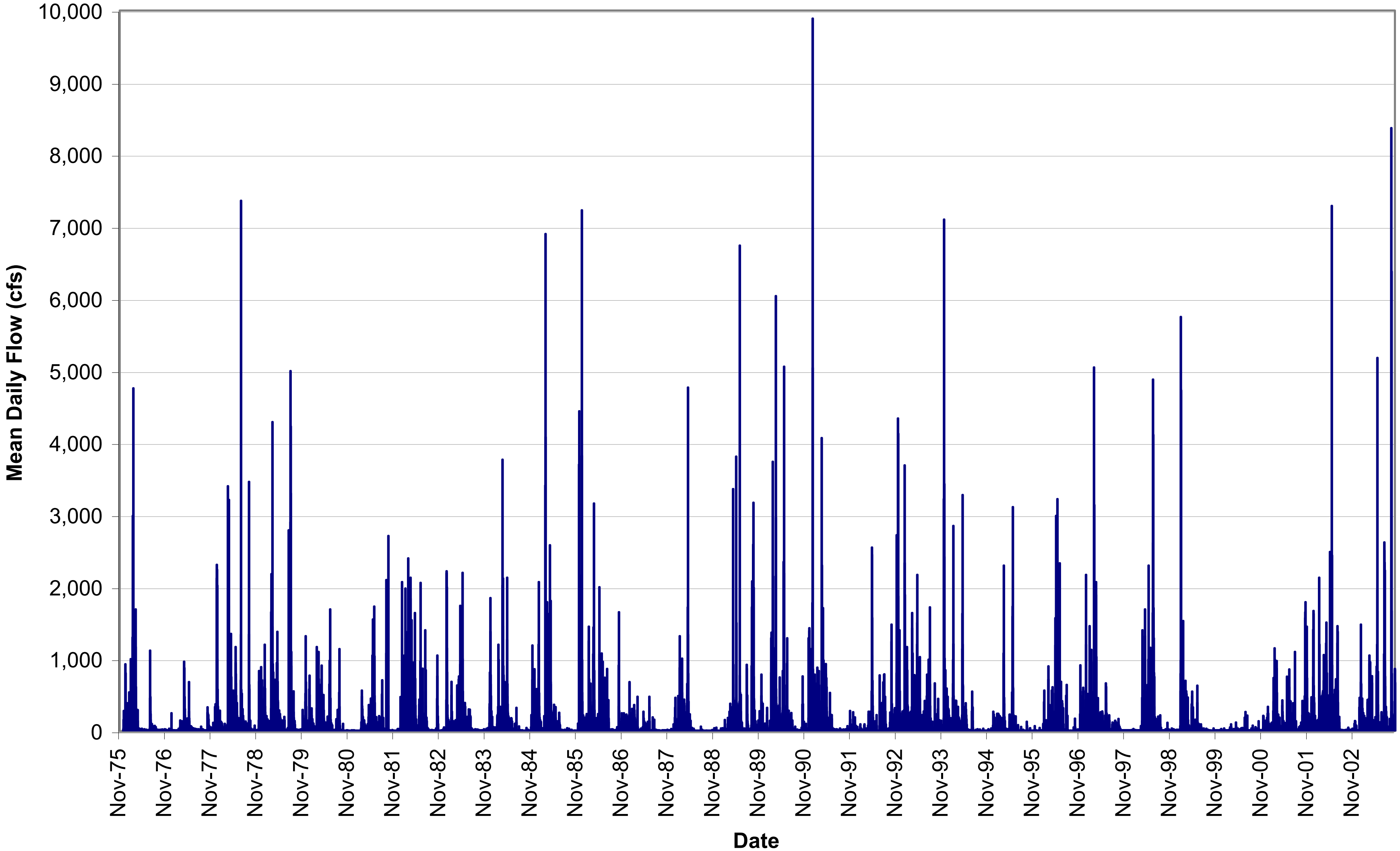


Figure 2-8f
Physical Stream Characteristics
Eagle Creek
Sheet 6 of 6

	Big Eagle Creek CSOs							Little Eagle Creek CSOs	
	[4]	223	[4]	032	[4]	011	145	[4]	033
Criteria	Washington St.	Victoria St. and Warman Ave.	McCarty St.	Morris St. and Warman Ave.	Bedford Ave. and Howard St.	Minnesota St. and Pershing Ave.	Raymond St. and Kentucky Ave.	Washington St.	Vermont St. and Somerset Ave.
Overflows per year (average) [1]		26		<1		17	<1		34
Annual Overflow Volume Range (MG/year) [1]		39-53		<1		6-8	<1		12-16
Other Discharges									
Location	downstream of bridge								
Type									
Factors that support/encourage recreational use									
School	no	no	no	no	no	no	no	no	no
Park	no	no	no	no	no	no	no	no	no
Trail	no	no	no	no	no	no	no	no	no
Other			open area by RR bridge						
Factors that prohibit/discourage recreational use									
Warning Signs/City Ordinance [2]	N/A	could not locate	N/A	yes	N/A	yes	could not locate	N/A	could not locate
Fence	no	wall	no	no	no	no	no	walls	no
Steep Banks	no	no	no	no	no	no	gradual	yes	no
Other	dense vegetation and rocky banks downstream	heavy woods				vegetation	vegetation	dense vegetation	vegetation
Access									
North/East Bank	Moderately Difficult	Extremely Difficult	Extremely Difficult	Easy	Extremely Difficult	Easy	Extremely Difficult	Extremely Difficult	Extremely Difficult
South/West Bank	Extremely Difficult	Extremely Difficult	Easy	Easy	Extremely Difficult	Easy	Extremely Difficult	Extremely Difficult	Extremely Difficult
Stream's Physical Attributes									
Depth	1 ft.	6 inch - 1 ft.	1 ft. **	1 ft.	6 inch - 1 ft.	6 inches	6 inch - 1 ft.	1 ft.	1 ft.
Velocity	slow	slow	slow	slow	slow	slow	slow	slow	slow
Width	20 ft.	25 - 30 ft.	20 ft.	20 ft.	20 ft.	20 ft.	25 - 30 ft.	20 - 25 ft.	20 - 25 ft.
Substrate	sandy upstream, rocky downstream	rocks	some rocks, sand	some rocks, sand	some rocks	some rocks, sand	sandy, rock	rocky	some rocks, sand
Safety	no	no	no	yes	OK	yes	OK	no	OK upstream, no downstream
Land Use									
Public	yes	no	no	yes	no	no	no	yes	yes
Residential/Wooded	no	yes	yes	yes	no	yes	no	no	yes
Industrial/Commercial	yes	no	no	no	yes	yes	yes	yes	no
Stream Use									
Habitat for Aquatic Species									
Natural riparian	yes	yes	yes	yes	yes	yes	yes	yes, downstream	yes
Partially Developed (Subdivision)									
Fully Urbanized Development		yes						yes, upstream	

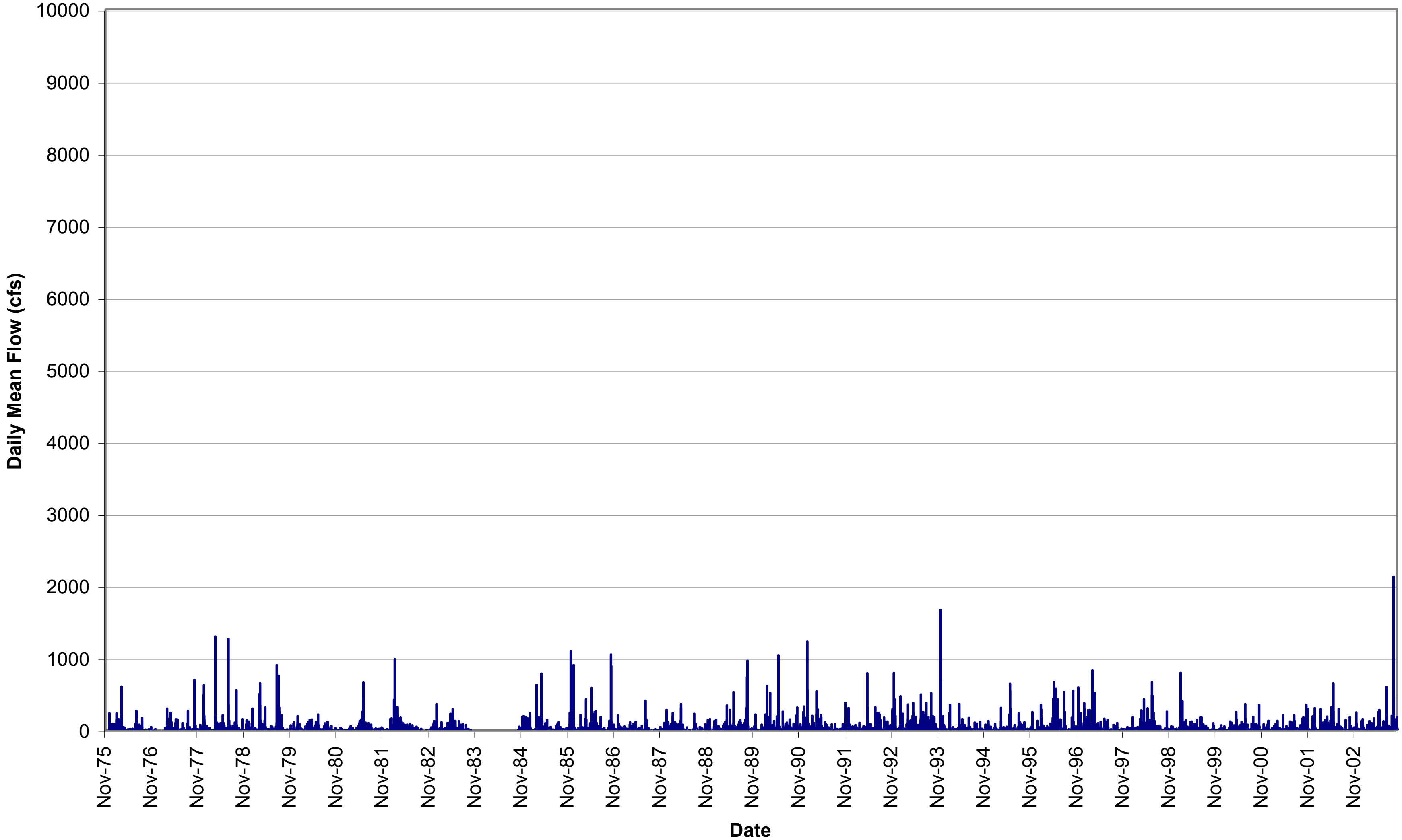
Notes:
1. Overflows per year and volume range were revised June 2004.
2. New bilingual warning signs are being placed at all CSO locations.
3. The data for this CSO was collected in June 2004.
4. Pictures not taken by CSO, additional river pictures.


Modeled Maximum Streamflow in Eagle Creek
Streamflow (cfs)
1200
1000
800
600
400
200
0
Stream Mile
1
2
3
4
5
6
7
Dry Weather
1.7-month storm
3-month storm
FLOW DIRECTION
CSO AREA
Raymond Street
Interstate 70
Michigan Street



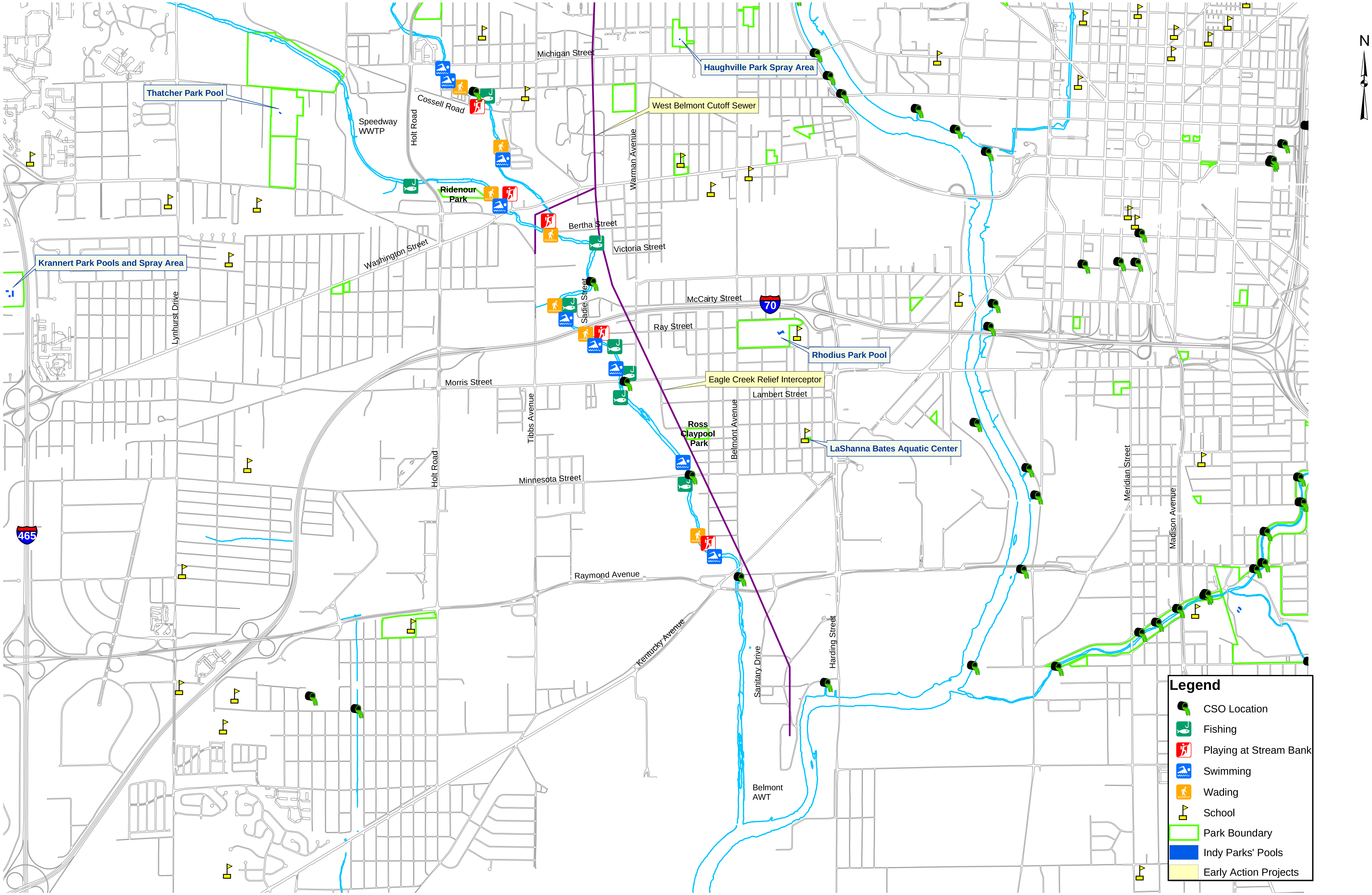
Source: USGS gauge station 03353500 in Eagle Creek at Indianapolis,
November 28, 1975 to September 30, 2003.

Flow Variations in Eagle Creek at Lynnhurst Drive



Flow Variations in Little Eagle Creek at Speedway

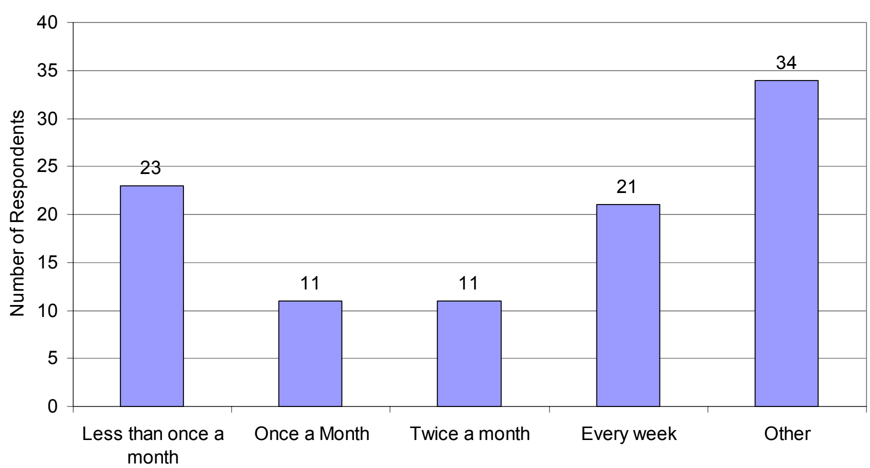
Source: USGS gauge station 03353600 in Little Eagle Creek at Speedway, November 28, 1975 to September 30, 2003.



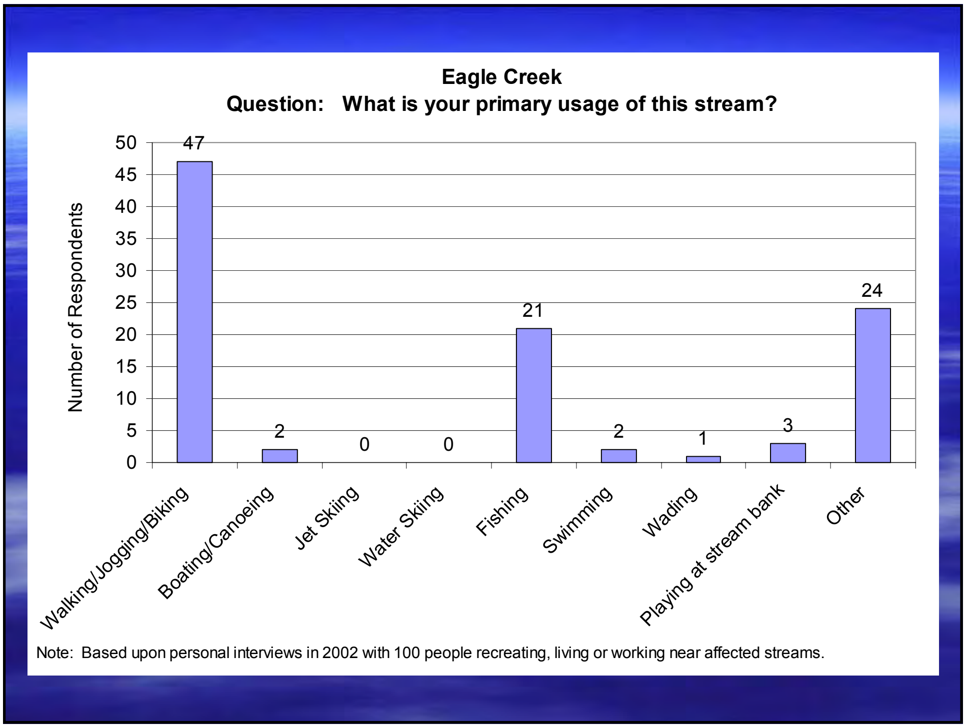
Eagle Creek
Reported and Observed Uses

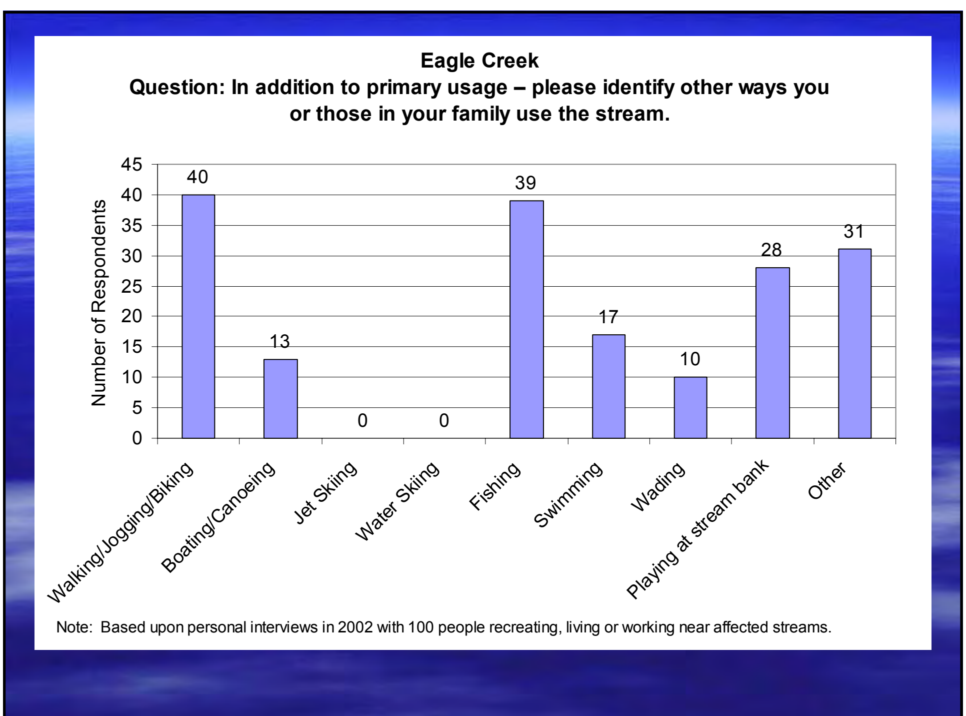
Eagle Creek

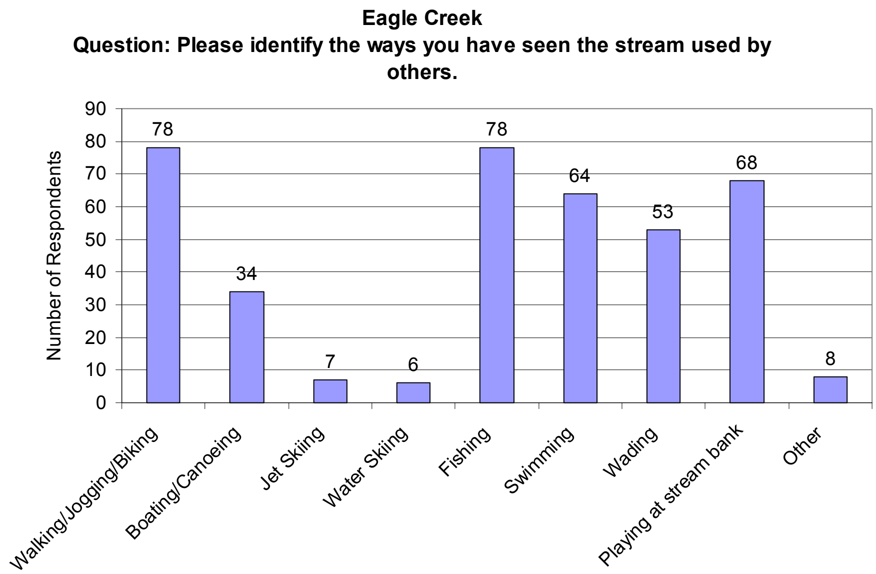
Question: In a typical year, how often have you or any member of your family come into water contact with Eagle Creek?



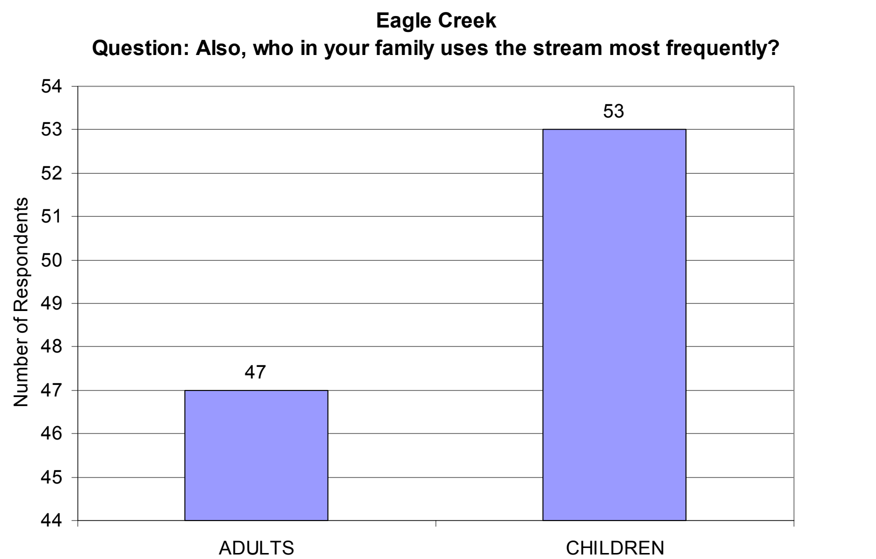
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


Eagle Creek
Question: What is your primary usage of this stream?
Number of Respondents
50
45
40
35
30
25
20
15
10
5
0
47
2
0
0
21
2
1
3
24
Walking/Jogging/Biking
Boating/Canoeing
Jet Skiing
Water Skiing
Fishing
Swimming
Wading
Playing at stream bank
Other
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

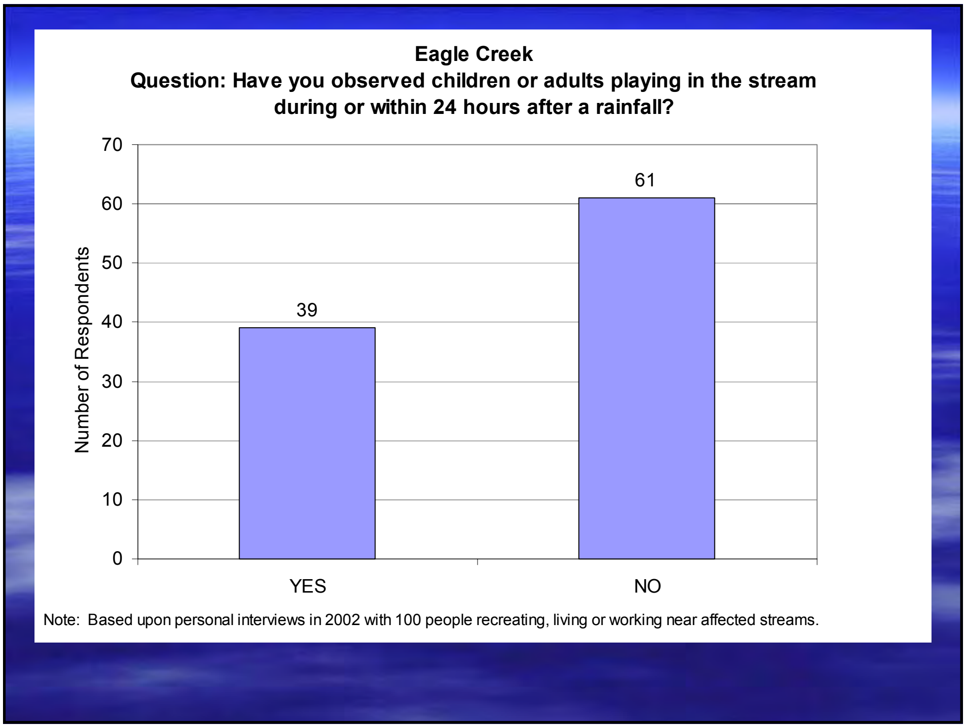

Eagle Creek
Question: In addition to primary usage – please identify other ways you or those in your family use the stream.
Number of Respondents
45
40
35
30
25
20
15
10
5
0
40
13
0
0
39
17
10
28
31
Walking/Jogging/Biking
Boating/Canoeing
Jet Skiing
Water Skiing
Fishing
Swimming
Wading
Playing at stream bank
Other
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

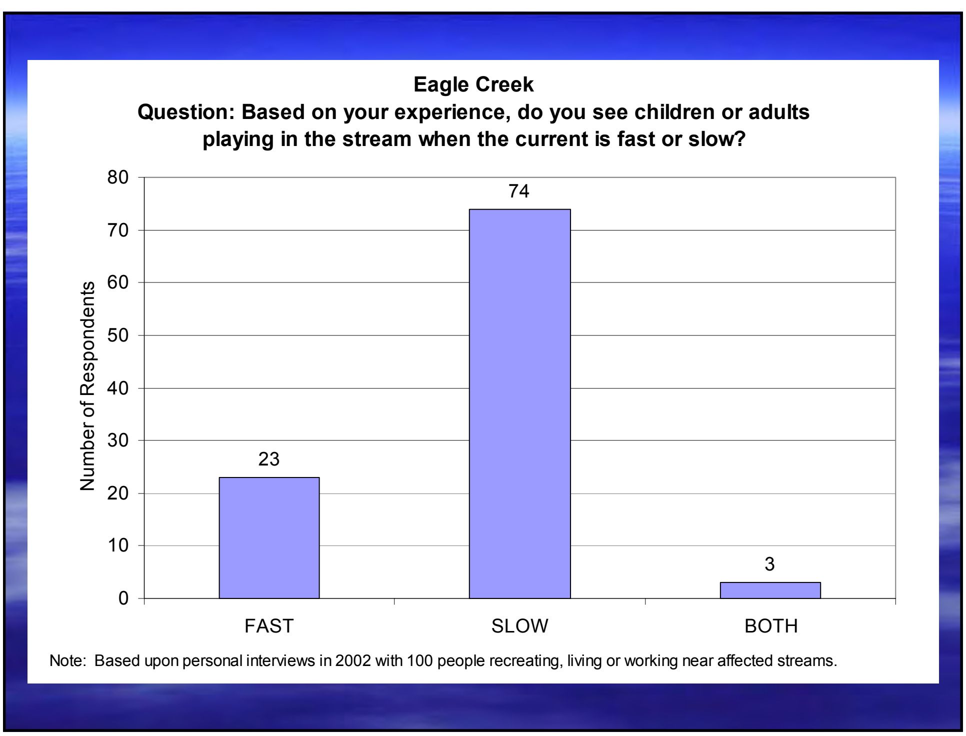


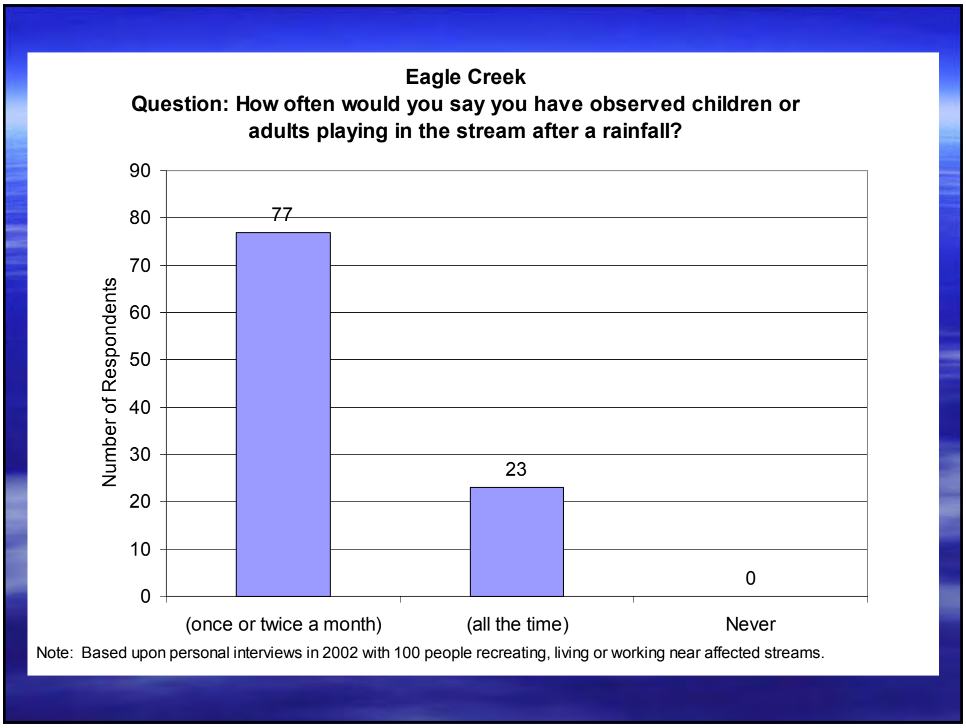
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

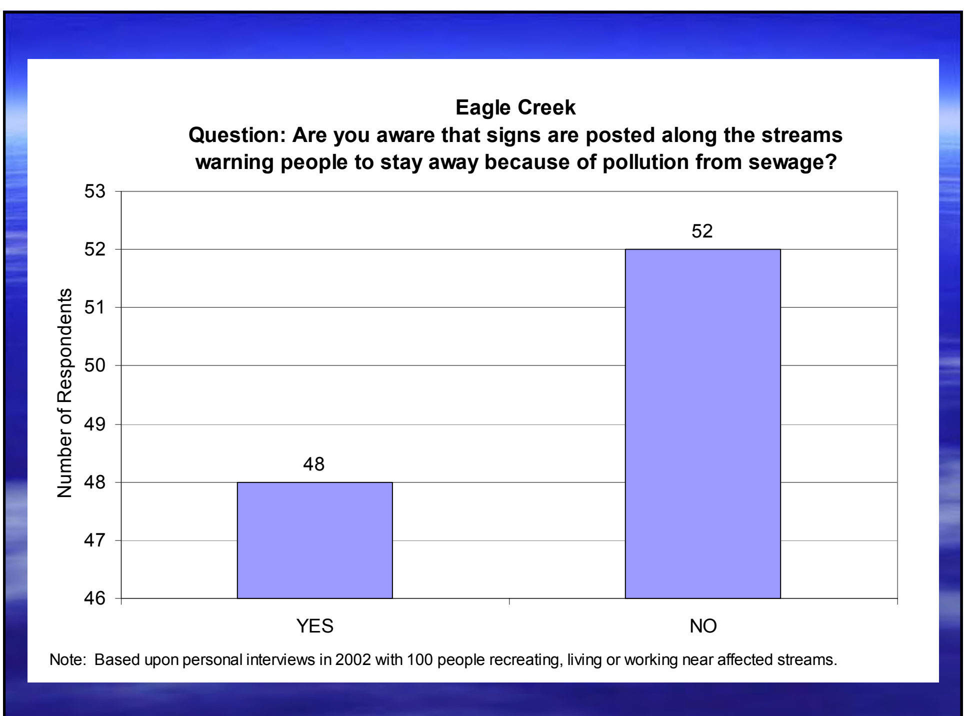


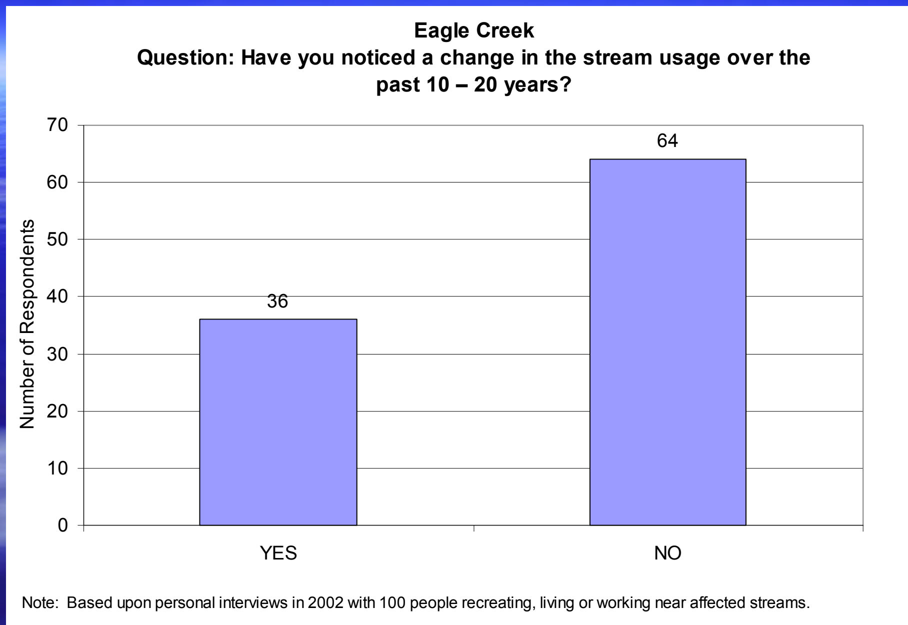
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


Eagle Creek
Question: Have you observed children or adults playing in the stream during or within 24 hours after a rainfall?
Number of Respondents
70
60
50
40
30
20
10
0
39
61
YES
NO
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


Eagle Creek
Question: Based on your experience, do you see children or adults playing in the stream when the current is fast or slow?
Number of Respondents
80
70
60
50
40
30
20
10
0
23
74
3
FAST
SLOW
BOTH
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

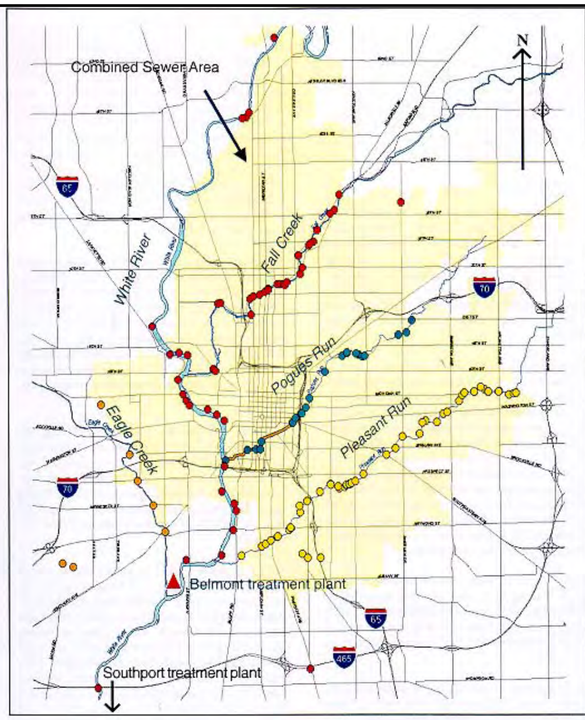

Eagle Creek
Question: How often would you say you have observed children or adults playing in the stream after a rainfall?
Number of Respondents
90
80
70
60
50
40
30
20
10
0
77
23
0
(once or twice a month)
(all the time)
Never
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


Eagle Creek
Question: Are you aware that signs are posted along the streams warning people to stay away because of pollution from sewage?
Number of Respondents
53
52
51
50
49
48
47
46
48
52
YES
NO
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.



Location of Uses on Eagle Creek

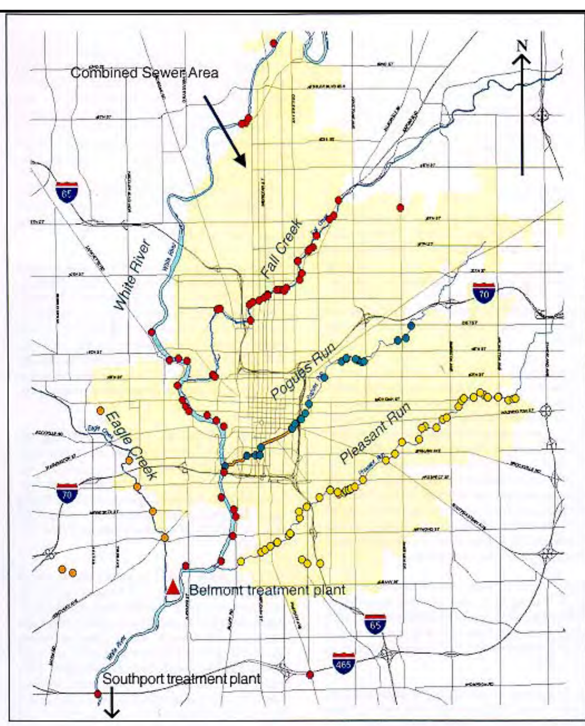
Activity	Location/Direct Respondent	Stream Survey	MCHD
PSB/W/S	Pershing Street		
PSB/W/S	835 Sadie St. to 805 Sadie St.(off McCarty St..)		
PSB/W/S	3746 W. Creston to 3852 W. Creston		
PSB/W/S	2800 Ray St. to 2899 Ray St.		
Wade/Swim	Ponderosa Trailer Park (Cossell Rd.)		
Fishing	I-70 Trailer Park (Washington & Tibbs)		
PSB/Wade	Little Eagle Trailer Park area		
Swim	Under bridge that is over Michigan St. on south side of Michigan St. (east of Holt Rd.)		
Fishing	3500 block of West Morris St. (I-70 Trailer Park)		
Fishing	Standard St. (off of Warman)		
Fishing	Off of Warman St. near Bertha		
Swim & Fishing	Minnesota & Belmont	X	X
Wade/Swim & Fishing	McCarty & Tip	X	X
Fish/Swim	Morris		
PSB/S/W	The Bottoms (area referenced for children in the water, boundaries defined as: Warman E., Levee W., McCarty N., Washington & Standard S.)		



EAGLE CREEK:
Location Activity
Direct Respondent

Clusters of activity noted Minnesota to Washington.

1. Stream access slope.
2. Close proximity of levee to residents.
3. Attractive water depth.
4. Multiple trailer parks where pools are not allowed.
5. Attract children to the water (wade, swim, play at stream bank).
6. Adults attracted to fishing as sport given access. (Although 80% of verbatims cited, "We don't eat the catch".)



EAGLE CREEK:
Location Activity
Direct Respondent

PSB/W/S	Pershing Street
PSB/W/S	835 Sadie St. to 805 Sadie St.(off McCarty St..)
PSB/W/S	3746 W. Creston to 3852 W. Creston
PSB/W/S	2800 Ray St. to 2899 Ray St.
Wade/Swim	Ponderosa Trailer Park (Cossell)
Fishing	I-70 Trailer Park (Washington & Tibbs)
PSB/Wade	Little Eagle Trailer Park area
Swim	Under bridge that is over Michigan St. on south side of Michigan St. (east of Holt Rd.)
Fishing	3500 block of West Morris St. (I-70 Trailer Park)
Fishing	Standard St. (off of Warman)
Fishing	Off of Warman St. near Bertha
Swim & Fish	† *Minnesota & Belmont
W/S/F	† * McCarty & Tip
Fish/Swim	Morris
PSB/S/W	The Bottoms (area referenced for children in the water, boundaries defined as: Warman E., Levee W., McCarty N., Washington & Standard S.)

† ***Reported on Stream Survey.***

* ***Reported to MCHD.***

FINAL Survey Results - Eagle Creek

In a typical year, how often have you or any member of your family come into water contact with EAGLE CREEK?

	Total Number	%
Less than once a month	23	23%
Once a Month	11	11%
Twice a month	11	11%
Every week	21	21%
Other	34	34%
TOTALS	100	100%

What is your primary usage of this stream?

	Total Number	%
Walking/Jogging/Biking	47	47%
Boating/Canoeing	2	2%
Jet Skiing	0	0%
Water Skiing	0	0%
Fishing	21	21%
Swimming	2	2%
Wading	1	1%
Playing at stream bank	3	3%
Other	24	24%
TOTALS	100	100%

In addition to primary usage – please identify other ways you or those in your family use the stream.

	Total Number	%
Walking/Jogging/Biking	40	22%
Boating/Canoeing	13	7%
Jet Skiing	0	0%
Water Skiing	0	0%
Fishing	39	22%
Swimming	17	10%
Wading	10	6%
Playing at stream bank	28	16%
Other	31	17%
TOTALS	178	100%

Please identify the ways you have seen the stream used by others.

	Total Number	%
Walking/Jogging/Biking	78	20%
Boating/Canoeing	34	9%
Jet Skiing	7	2%
Water Skiing	6	2%
Fishing	78	20%
Swimming	64	16%
Wading	53	13%
Playing at stream bank	68	17%
Other	8	2%
TOTALS	396	100%

Also, who in your family uses the stream most frequently?

	Total Number	%
ADULTS	47	47%
CHILDREN	53	53%
TOTAL	100	100%

Have you observed children or adults playing in the stream during or within 24 hours after a rainfall?

	Total Number	%
YES	39	39%
NO	61	61%
TOTAL	100	100%

Based on your experience, do you see children or adults playing in the stream when the current is fast or slow?

	Total Number	%
FAST	23	23%
SLOW	74	74%
BOTH	3	3%
TOTALS	100	100%

How often would you say you have observed children or adults playing in the stream after a rainfall?

	Total Number	%
(once or twice a month)	77	77%
(all the time)	23	23%
Never	0	0%
TOTALS	100	100%

Are you aware that signs are posted along the streams warning people to stay away because of pollution from sewage?

	Total Number	%
YES	48	48%
NO	52	52%
TOTAL	100	100%

Age Group	Total Number	%
18-29	32	32%
30-39	31	31%
40-49	21	21%
50-59	8	8%
60+	8	8%
TOTAL	100	100%

Have you noticed a change in the stream usage over the past 10 – 20 years?

	Total Number	%
YES	36	36%
NO	64	64%
TOTAL	100	100%

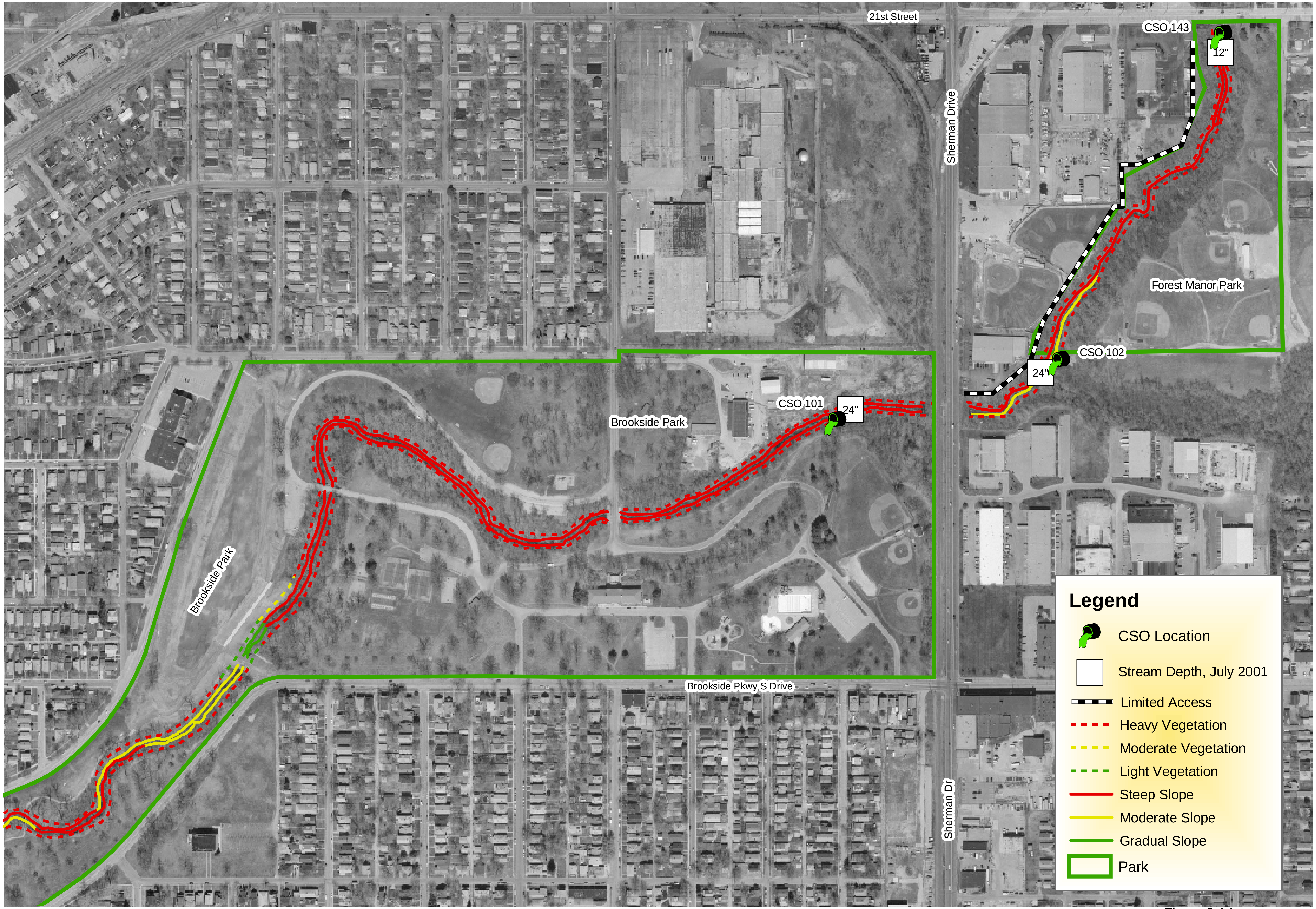


Figure 2-14a
Physical Stream Characteristics
Pogues Run
Sheet 1 of 3

Figure 2-14b
Physical Stream Characteristics
Pogues Run
Sheet 2 of 3

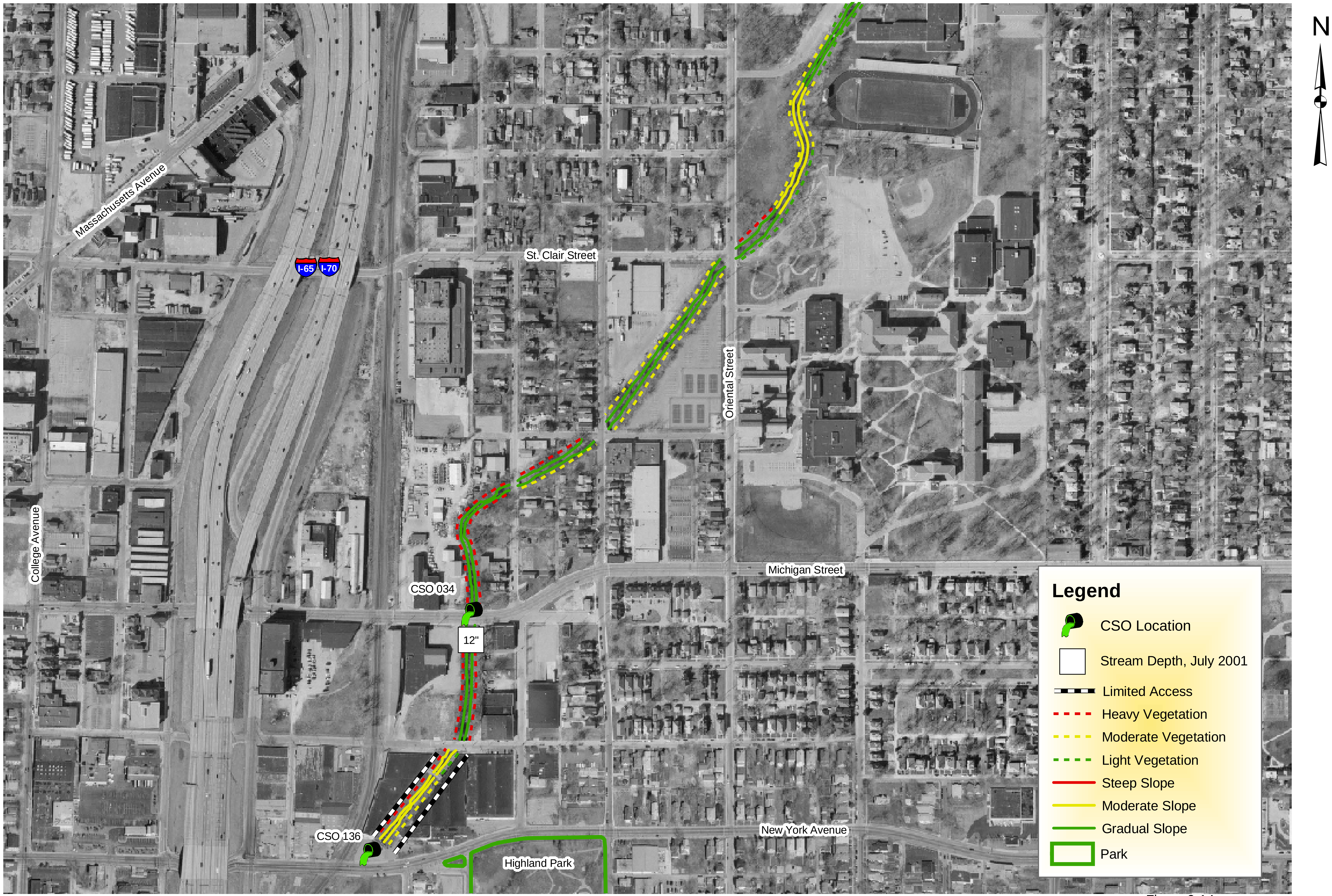


Figure 2-14c
Physical Stream Characteristics
Pogues Run
Sheet 3 of 3

Pogues Run

Criteria	143 Forest Manor Ave. and 21st St.	102 Forest Manor Ave. and 19th St.	101 Sherman Dr. and BPND	100 BPSD and Rural St.	099 BPSD and Temple Ave.	098 Tacoma Ave. and Nowland Ave.	097 BPSD and Keystone Ave.	096 BPSD and Nowland Ave.	095 BPND and Coyner Ave.	036 Nowland Ave. and Tecumseh St.	[4] Steele and Brookside Ave.	[4] Newman St. and Nowland Ave.
Overflows per year (average)[1]	1	6	10	40	53	2	17	24	2	16		
Annual Overflow Volume Range (MG/year)[1]	<1	3-3	14-19	24-32	155-210	<1	2-2	1-2	1-2	1-1		
Other Discharges												
Location												
Type												
Factors that support/encourage recreational use												
School	no	no	no	no	no	no	no	no	no	no	no	no
Park	yes	ball field	yes, pool and ball field	yes, Spades Park	yes	yes	yes	yes	yes	yes	yes	no
Trail	yes, to CSO	yes	no	no	no	no	no	no	no	leading to CSO, among vegetation	no	no
Other												
Factors that prohibit/discourage recreational use												
Warning Signs/City Ordinance [2]	could not locate	yes	yes	could not locate	could not locate	yes	yes	yes	yes	yes	N/A	N/A
Fence	no	no	yes, around CSO	no	no	no	no	no	no	no	no	yes
Steep Banks	yes	gradual	yes	yes on west side	no	gradual	gradual	gradual	gradual	gradual	no	yes
Other	dense vegetation		dense vegetation	dense vegetation	dense vegetation on south side					dense vegetation, but accessible	dense vegetation, but accessible	concrete wall and dense vegetation
Access												
North Bank	Extremely Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult	Moderately Difficult	Extremely Difficult	Extremely Difficult	Moderately Difficult		Extremely Difficult	Moderately Difficult	Extremely Difficult
South Bank	Extremely Difficult	Moderately Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult	Moderately Difficult	Moderately Difficult	Moderately Difficult		Extremely Difficult	Moderately Difficult	Extremely Difficult
Stream's Physical Attributes												
Depth	1 ft.	1 -2 ft.	1 -2 ft.	6 inches	6 inches	6 inch - 1 ft.	6 inch - 1 ft.	6 inch - 1 ft.	6 inch - 1 ft.	6 inch - 1 ft.	6 inch - 1 ft.	6 inch - 1 ft.
Velocity	very slow	slow	slow	slow	slow	slow	slow	slow	slow	slow	slow	slow
Width	15 ft.	10 - 15 ft.	10 - 15 ft.	10 - 15 ft.	10 - 15 ft.	10 - 15 ft.	10 - 15 ft.	10 - 15 ft.	10 - 15 ft.	10 ft.	10 ft.	10 ft.
Substrate	rocky	sand and rocks	sand and rocks	rocky	rocky	rocky	rocky	rocky	rocky	rocky	rocky	rocky
Safety	no	no	no	no	no	no	no	no	no	no	no	no
Land Use												
Public	yes	yes	yes	no	no	no	no	no	no	no	no	no
Residential/Wooded	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Industrial/Commercial	no	no	no	no	no	no	no	no	no	no	no	no
Stream Use												
Habitat for Aquatic Species												
Natural riparian	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	
Partially Developed (Subdivision)												yes
Fully Urbanized Development												
Other Comments			In Brookside Park by ball field tucked back deep in woods, no sign outside of very dense woods									

Notes:
1. Overflows per year and volume range were revised June 2004.
2. New bilingual warning signs are being placed at all CSO locations.
3. The data for this CSO was collected in June 2004.
4. Pictures not taken by CSO, additional river pictures.

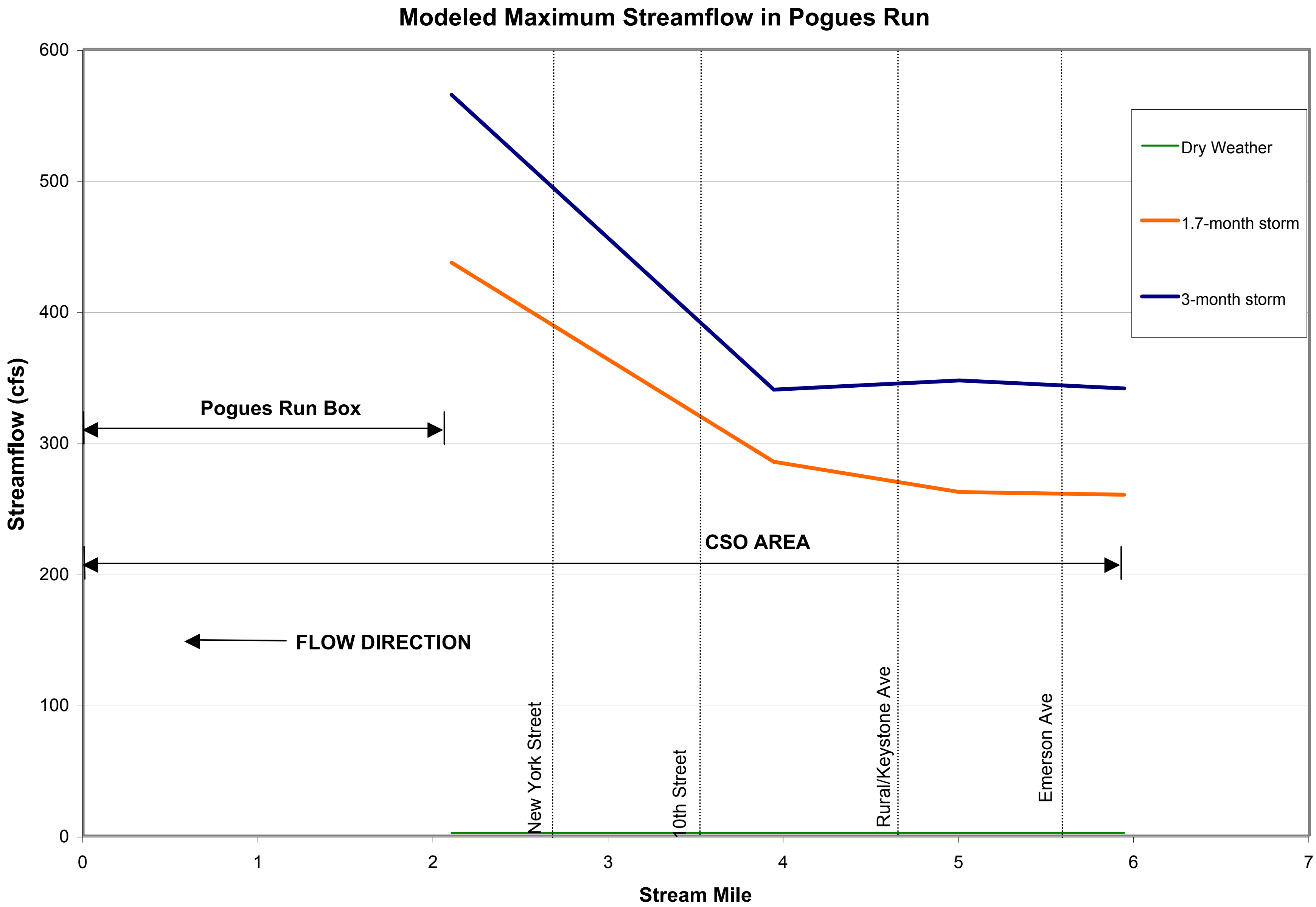
Pogues Run

	035	034	034A [3]	[4]	136	137	152	133	138	125	129	153
Criteria	Arsenal Ave. and 10th St.	Michigan St. and Dorman Ave.	548 Dorman Ave.	Vermont St.and Dorman St.	New York St. and Dorman Ave.	Pine St. and Ohio St.	Pine St. and Ohio St.	Market St. and Pine St.	College Ave. and Washington St.	Meridian St. and South St.	Meridian St. and Merrill St.	Illinois Ave. and Merrill St.
Overflows per year (average)[1]	31	19			12	5	48	13	4	9	4	8
Annual Overflow Volume Range (MG/year)[1]	24-32	56-76			1-1	<1	77-104	4-6	<1	26-35	2-2	<1
Other Discharges												
Location					**In Pogues Run**	**In Pogues Run**	**In Pogues Run**	**In Pogues Run**	**In Pogues Run**	**In Pogues Run**	**In Pogues Run**	**In Pogues Run**
Type					**Tunnel**	**Tunnel**	**Tunnel**	**Tunnel**	**Tunnel**	**Tunnel**	**Tunnel**	**Tunnel**
Factors that support/encourage recreational use												
School	yes, 101	no	no	no								
Park	no	no	no	no								
Trail	no	no	no	no								
Other												
Factors that prohibit/discourage recreational use												
Warning Signs/City Ordinance [2]	yes	yes, near CSO	could not locate	N/A								
Fence	no	no	no	no								
Steep Banks	no	no	no	concrete slope on east bank upstream from bridge								
Other		vegetation	vegetation	dense vegetation and rocks on west bank								
Access												
North Bank	Easy	Extremely Difficult	Easy	Extremely Difficult								
South Bank	Easy	Extremely Difficult	Easy	Moderately Difficult								
Stream's Physical Attributes												
Depth	6 inch - 1 ft.	6 inch - 1 ft.	3 inch.	6 inch - 1 ft.								
Velocity	slow	slow	slow	slow								
Width	5 - 8 ft.	10 ft.	8 ft.	10 ft.								
Substrate	mostly rocky	rocky	rocky	rocky								
Safety	OK	no	no	no								
Land Use												
Public	yes	yes	no	no								
Residential/Wooded	yes	no	yes	yes								
Industrial/Commercial	no	no	no	yes								
Stream Use												
Habitat for Aquatic Species												
Natural riparian	yes	yes		yes, on east bank								
Partially Developed (Subdivision)			yes									
Fully Urbanized Development				yes, on west bank								
Other Comments		very strong smelling										

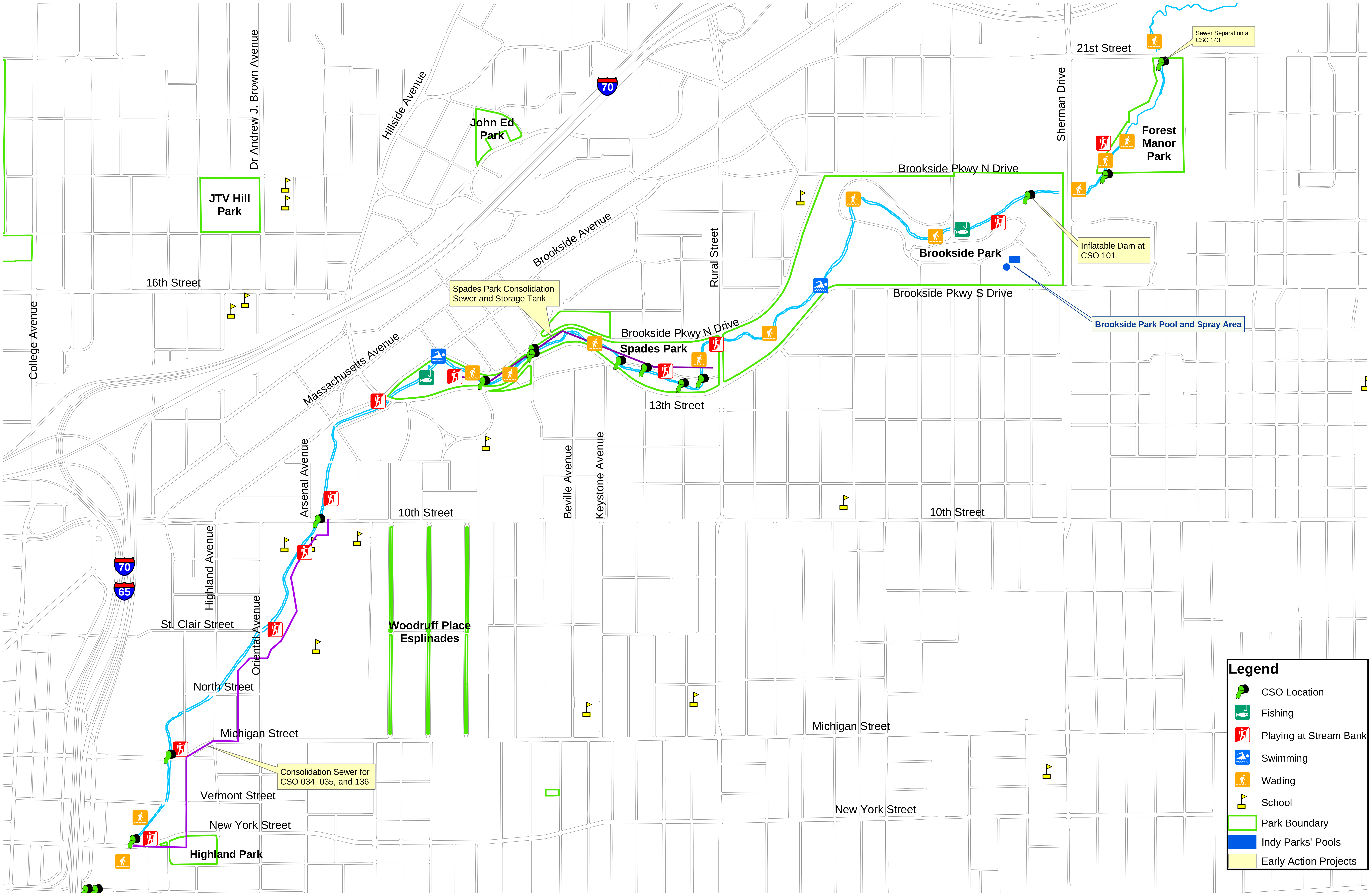
Notes:
1. Overflows per year and volume range were revised June 2004.
2. New bilingual warning signs are being placed at all CSO locations.
3. The data for this CSO was collected in June 2004.
4. Pictures not taken by CSO, additional river pictures.

	128	115	A38
Criteria	Senate Ave. and Merrill St.	Henry St. and Kentucky Ave.	Davidson St. and Washington St.
Overflows per year (average)[1]	33	79	28
Annual Overflow Volume Range (MG/year)[1]	131-177	378-512	41-55
Other Discharges			
Location	**In Pogues Run**	**In Pogues Run**	**In Pogues Run**
Type	**Tunnel**	**Tunnel**	**Tunnel**
Factors that support/encourage recreational use			
School			
Park			
Trail			
Other			
Factors that prohibit/discourage recreational use			
Warning Signs/City Ordinance [2]			
Fence			
Steep Banks			
Other			
Access			
North Bank			
South Bank			
Stream's Physical Attributes			
Depth			
Velocity			
Width			
Substrate			
Safety			
Land Use			
Public			
Residential/Wooded			
Industrial/Commercial			
Stream Use			
Habitat for Aquatic Species			
Natural riparian			
Partially Developed (Subdivision)			
Fully Urbanized Development			
Other Comments			

Notes:
1. Overflows per year and volume range were revised June 2004.
2. New bilingual warning signs are being placed at all CSO locations.
3. The data for this CSO was collected in June 2004.
4. Pictures not taken by CSO, additional river pictures.


Modeled Maximum Streamflow in Pogues Run
Streamflow (cfs)
600
500
400
300
200
100
0
0
1
2
3
4
5
6
7
Stream Mile
Dry Weather
1.7-month storm
3-month storm
Pogues Run Box
CSO AREA
FLOW DIRECTION
New York Street
0th Street
Rural/Keystone Ave
Emerson Ave

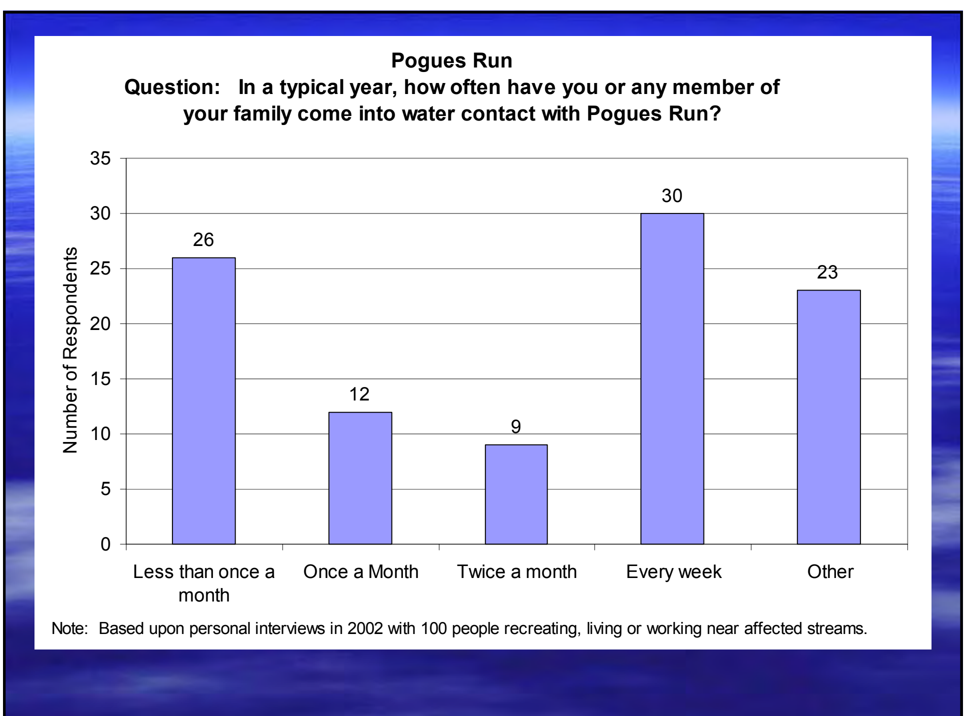
The USGS does not have a gauge on Pogues Run. However, given the similarities between the Pogues Run and Pleasant Run watersheds, the flow measured by the USGS gauges on Pleasant Run can be assumed similar to flows in Pogues Run. These flow graphs are located in Pleasant Run's Appendix B.

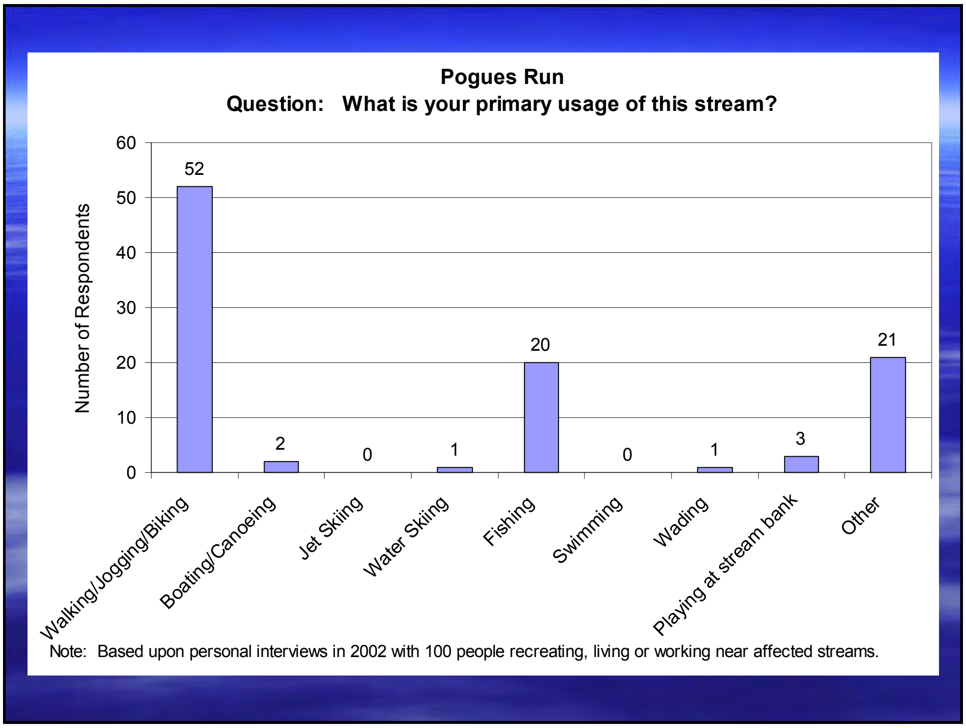


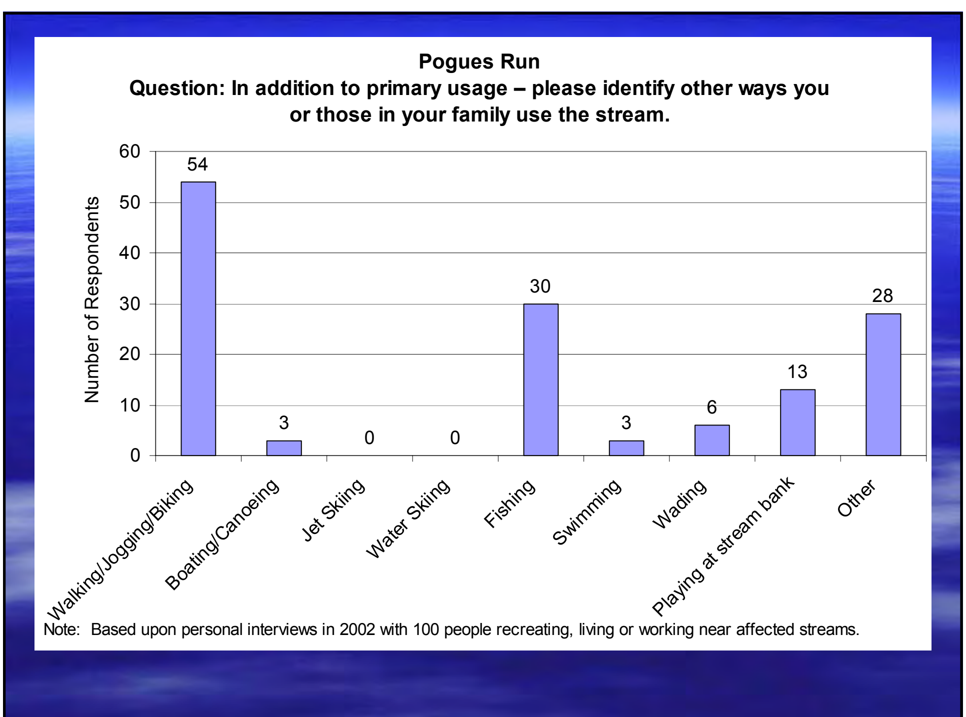
Note: There is also an early action project for Pogues Run on converting part of the tunnel for storage.

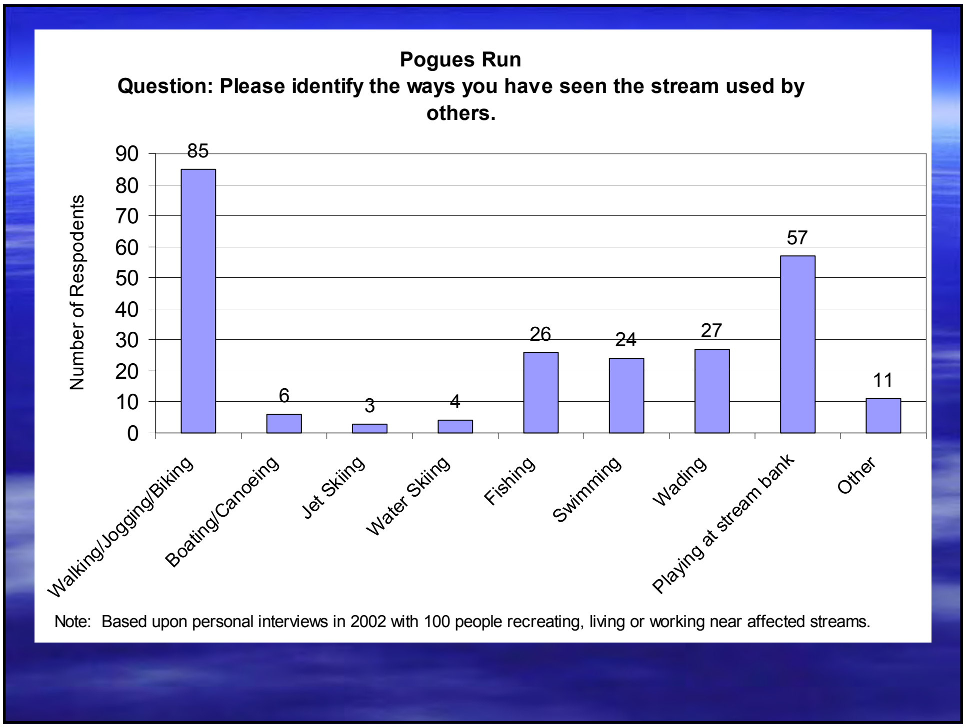
Pogues Run
Reported and Observed Uses

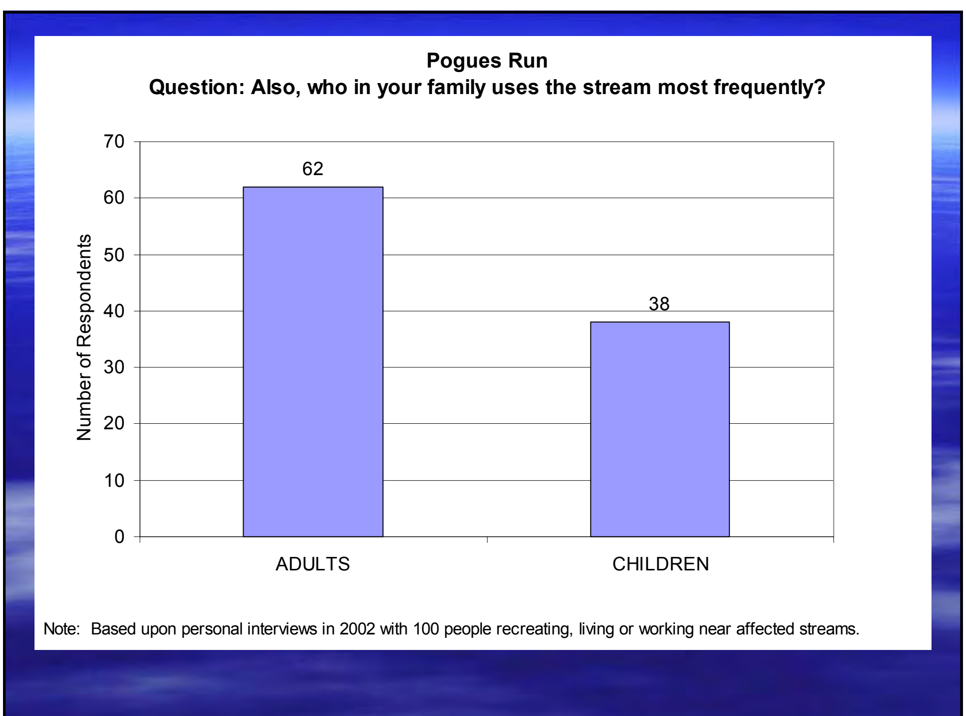

Pogue's Run
Use Survey Data
Site: Downstream of Brookside Ave. bridge

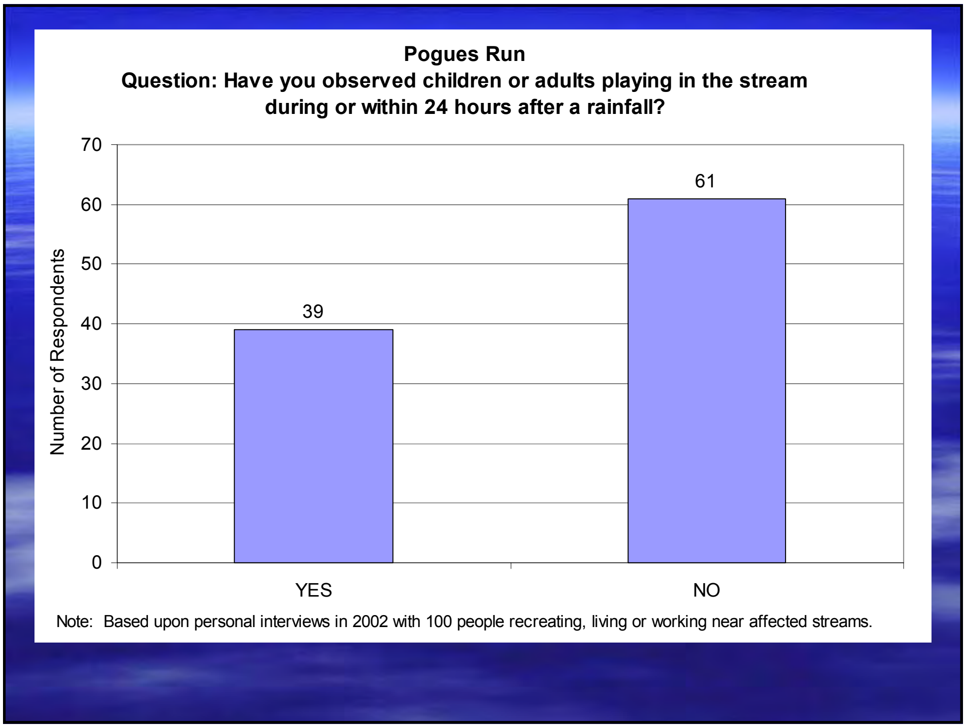

Pogues Run
Question: In a typical year, how often have you or any member of your family come into water contact with Pogues Run?
Number of Respondents
0
5
10
15
20
25
30
35
26
12
9
30
23
Less than once a month
Once a Month
Twice a month
Every week
Other
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

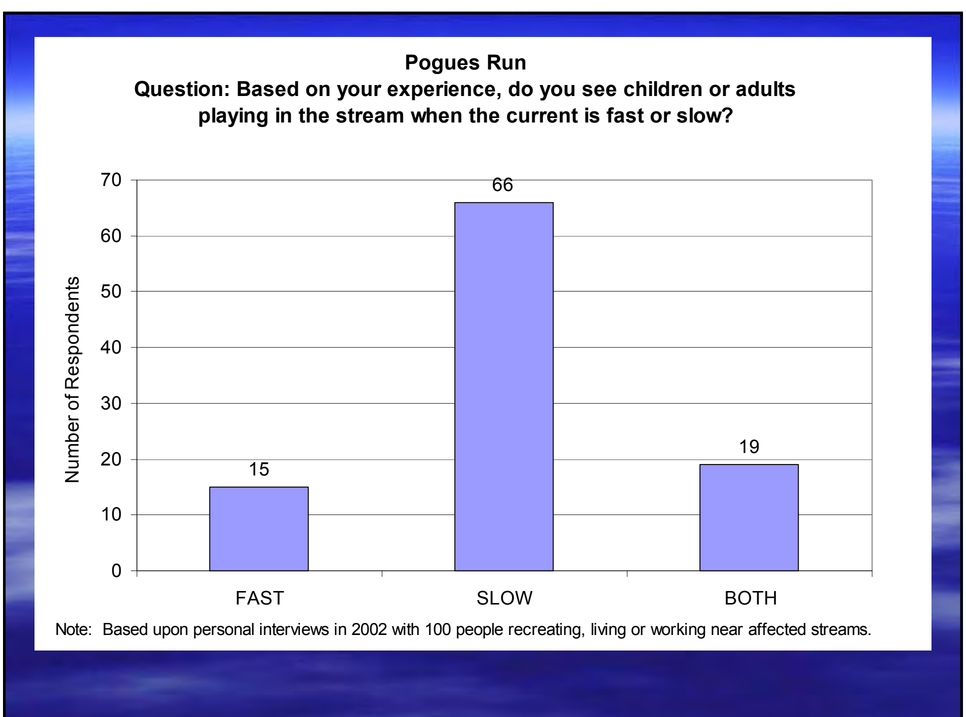

Pogues Run
Question: What is your primary usage of this stream?
Number of Respondents
60
50
40
30
20
10
0
52
2
0
1
20
0
1
3
21
Walking/Jogging/Biking
Boating/Canoeing
Jet Skiing
Water Skiing
Fishing
Swimming
Wading
Playing at stream bank
Other
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

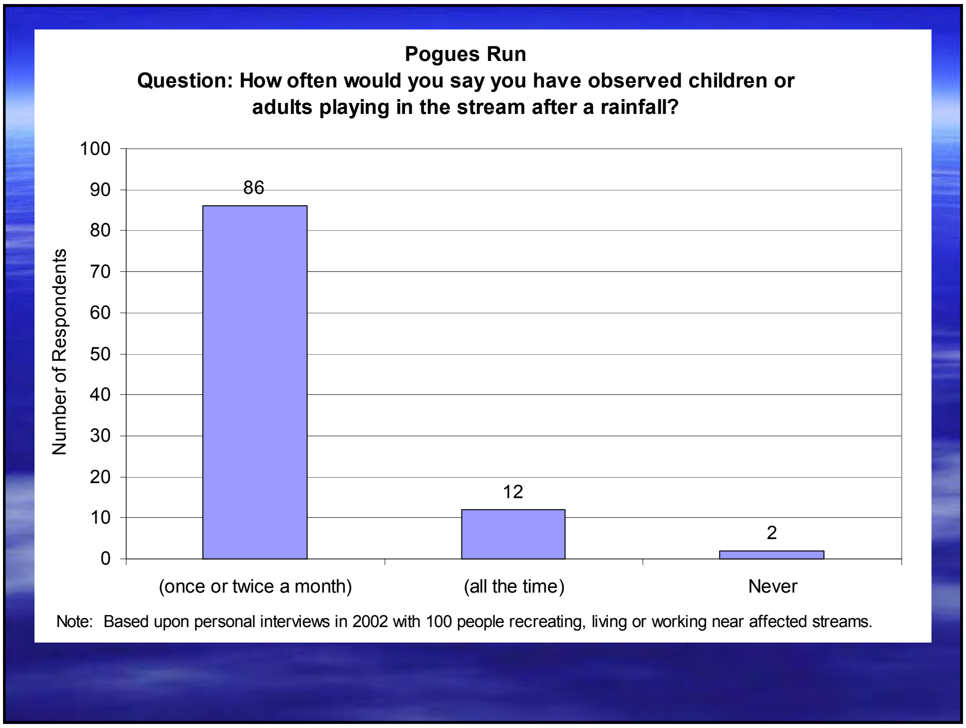

Pogues Run
Question: In addition to primary usage – please identify other ways you or those in your family use the stream.
Number of Respondents
60
50
40
30
20
10
0
54
3
0
0
30
3
6
13
28
Walking/Jogging/Biking
Boating/Canoeing
Jet Skiing
Water Skiing
Fishing
Swimming
Wading
Playing at stream bank
Other
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

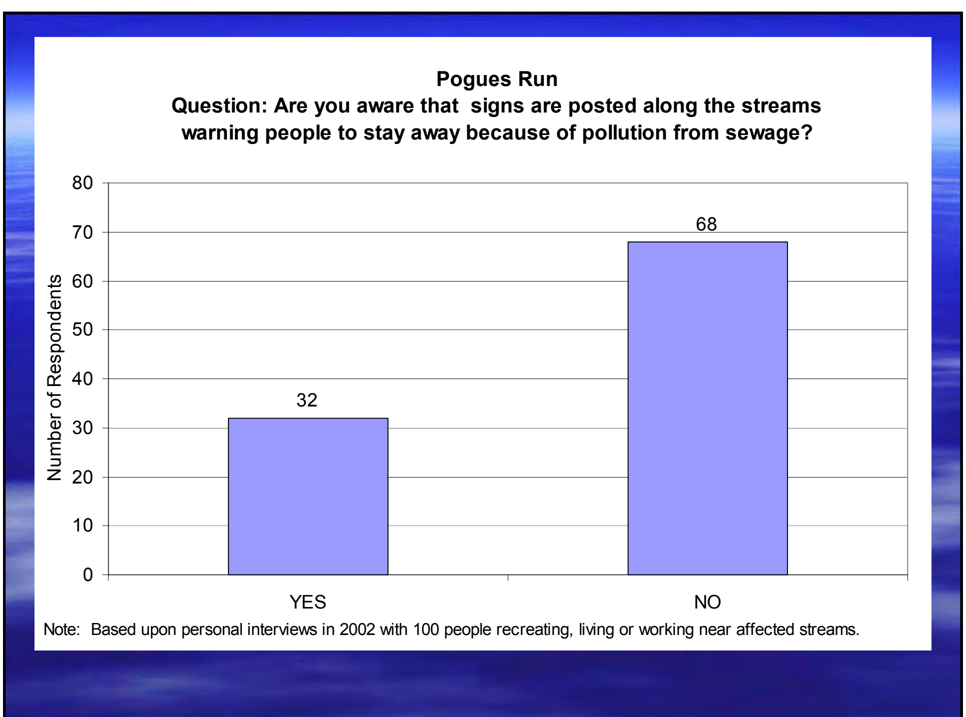

Pogues Run
Question: Please identify the ways you have seen the stream used by others.
Number of Respodents
90
80
70
60
50
40
30
20
10
0
85
6
3
4
26
24
27
57
11
Walking/Jogging/Biking
Boating/Canoeing
Jet Skiing
Water Skiing
Fishing
Swimming
Wading
Playing at stream bank
Other
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


Pogues Run
Question: Also, who in your family uses the stream most frequently?
Number of Respondents
70
60
50
40
30
20
10
0
62
38
ADULTS
CHILDREN
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

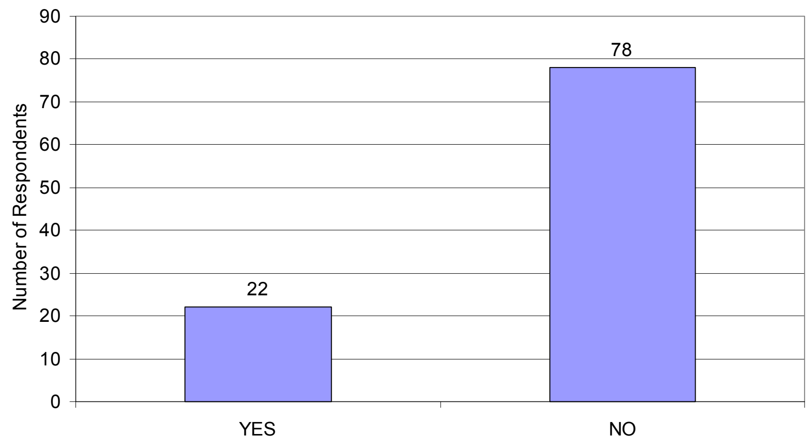

Pogues Run
Question: Have you observed children or adults playing in the stream during or within 24 hours after a rainfall?
Number of Respondents
70
60
50
40
30
20
10
0
39
61
YES
NO
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


Pogues Run
Question: Based on your experience, do you see children or adults playing in the stream when the current is fast or slow?
Number of Respondents
70
60
50
40
30
20
10
0
15
66
19
FAST
SLOW
BOTH
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


Pogues Run
Question: How often would you say you have observed children or adults playing in the stream after a rainfall?
100
90
80
70
60
50
40
30
20
10
0
Number of Respondents
86
12
2
(once or twice a month)
(all the time)
Never
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


Pogues Run
Question: Are you aware that signs are posted along the streams warning people to stay away because of pollution from sewage?
80
70
60
50
40
30
20
10
0
Number of Respondents
32
68
YES
NO
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

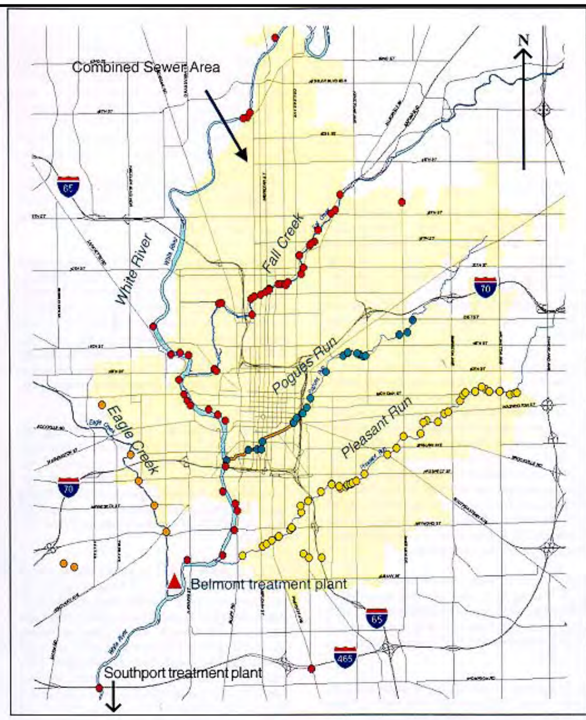
Pogues Run
Question: Have you noticed a change in the stream usage over the past 10 – 20 years?



Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

Location of Uses on Pogues Run

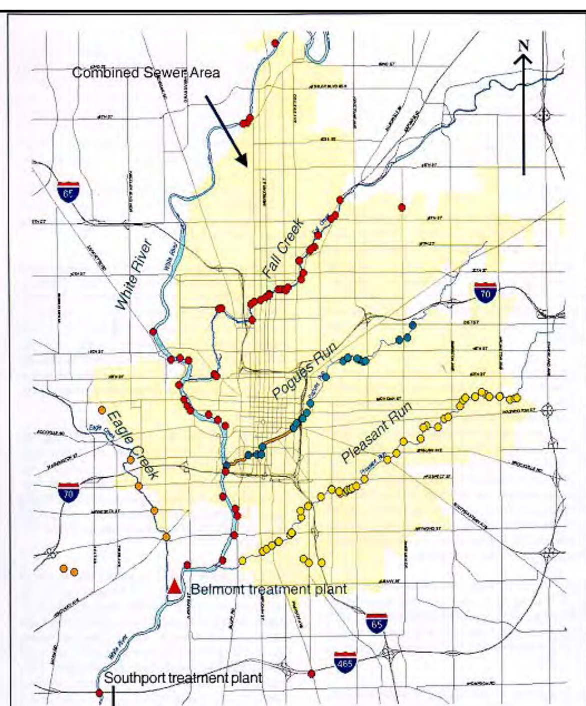
Activity	Location/Direct Respondent	Stream Survey	MCHD
PSB	Brookside Park Pool area		
PSB	Near Trail (Bridge)		
PSB	Spades Park		
PSB	Brookside Ave. to Nowland Ave.		
PSB	Nowland Ave. to Brookside Pkwy. South Drive		
PSB	Brookside Park near Rural	X	X
PSB	10th & Arsenal Ave.	X	X
PSB	New York St. (at Pogue's Run)	X	X



POGUES RUN:
Location Activity
Direct Respondent

Activity Cluster: New York to Rural.

1. Brookside and 10th St. and Brookside Park key areas for playing at the stream.
2. Stream access depth and close proximity to schools and parks promotes familiarity and use.
3. Kids are attracted to the water.
4. Respondents asked for symbol "no" use signs, given the potential of language barriers.



POGUES RUN:
Location Activity
Direct Respondent

PSB Brookside Park Pool area (Near 16th & Sherman Dr.)
PSB Spades Park
PSB Brookside Ave. to Nowland Ave.
PSB Nowland Ave. to Brookside Pkwy. South Drive
PSB † * Brookside Park near Rural
PSB † * 10th & Arsenal Ave.
PSB † * New York St.

PSB=Playing at Stream Bank

† *Reported on Stream Survey.*
* *Reported to MCHD.*

FINAL Survey Results - Pogues Run

In a typical year, how often have you or any member of your family come into water contact with POGUES RUN?

	Total Number	%
Less than once a month	26	26%
Once a Month	12	12%
Twice a month	9	9%
Every week	30	30%
Other	23	23%
TOTALS	100	100%

What is your primary usage of this stream?

	Total Number	%
Walking/Jogging/Biking	52	52%
Boating/Canoeing	2	2%
Jet Skiing	0	0%
Water Skiing	1	1%
Fishing	20	20%
Swimming	0	0%
Wading	1	1%
Playing at stream bank	3	3%
Other	21	21%
TOTALS	100	100%

In addition to primary usage – please identify other ways you or those in your family use the stream.

	Total Number	%
Walking/Jogging/Biking	54	39%
Boating/Canoeing	3	2%
Jet Skiing	0	0%
Water Skiing	0	0%
Fishing	30	22%
Swimming	3	2%
Wading	6	4%
Playing at stream bank	13	9%
Other	28	20%
TOTALS	137	100%

Please identify the ways you have seen the stream used by others.

	Total Number	%
Walking/Jogging/Biking	85	35%
Boating/Canoeing	6	2%
Jet Skiing	3	1%
Water Skiing	4	2%
Fishing	26	11%
Swimming	24	10%
Wading	27	11%
Playing at stream bank	57	23%
Other	11	5%
TOTALS	243	100%

Also, who in your family uses the stream most frequently?

	Total Number	%
ADULTS	62	62%
CHILDREN	38	38%
TOTAL	100	100%

Have you observed children or adults playing in the stream during or within 24 hours after a rainfall?

	Total Number	%
YES	39	39%
NO	61	61%
TOTAL	100	100%

Based on your experience, do you see children or adults playing in the stream when the current is fast or slow?

	Total Number	%
FAST	15	15%
SLOW	66	66%
BOTH	19	19%
TOTALS	100	100%

How often would you say you have observed children or adults playing in the stream after a rainfall?

	Total Number	%
(once or twice a month)	86	86%
(all the time)	12	12%
Never	2	2%
TOTALS	100	100%

Are you aware that signs are posted along the streams warning people to stay away because of pollution from sewage?

	Total Number	%
YES	32	32%
NO	68	68%
TOTAL	100	100%

Age Group	Total Number	%
18-29	30	0%
30-39	35	273%
40-49	16	318%
50-59	8	145%
60+	11	73%
TOTAL	100	100%

Have you noticed a change in the stream usage over the past 10 – 20 years?

	Total Number	%
YES	22	0%
NO	78	28%
TOTAL	100	100%

Pleasant Run

Criteria	092 PLRPSD and Ridgeview Dr.	091 PLRPSD and Kenmore Rd.	090 Lowell Ave. and Sheridan Ave.	089A [3] PLRPND and Arlington Ave.	089 PLRPND and Arlington Ave.	229 [3] PLRPND and Arlington Ave.	088 PLRPND and Graham Ave.	228 Michigan St. and Graham Ave.	087 PLRPND and Audubon Ave.	227 [3] PLRPND and Audubon Ave.	086 PLRPND and Ritter Ave.
Overflows per year (average) [1]	<1	8	<1	10	25	3	1	<1	32	29	<1
Annual Overflow Volume Range (MG/year) [1]	<1	<1	<1	<1	2-3	1-1	<1	<1	8-11	<1	<1
Other Discharges											
Location											
Type											
Factors that support/encourage recreational use											
School	no	no	no	no	no	no	no	no	no	no	no
Park	no	no	no	no	no	yes	no	no	no	yes	yes
Trail	yes	no	trail leading to stream	golf course paths	golf course paths	no	no	no	no	no	yes
Other	golf course	golf course		church next to it					bus stop		viaduct
Factors that prohibit/discourage recreational use											
Warning Signs/City Ordinance [2]	yes	painted over	painted over	yes	could not locate	yes	could not locate	could not locate	yes	could not locate	yes
Fence	no	no	no	no	gate and bridge	no	no	no	no	no	no
Steep Banks	yes	yes	no	no	no	no	yes	yes	gradual	no	no
Other			no		no	Dense Vegetation	heavy woods	heavy woods	wooded, concrete structure	dense vegetation	some rocks
Access											
North Bank	Moderately Difficult	Moderately Difficult	Moderately Difficult	Moderately Difficult	Extremely Difficult	Moderately Difficult		Extremely Difficult		Moderately Difficult	
South Bank	Extremely Difficult	Extremely Difficult	Extremely Difficult	Moderately Difficult	Extremely Difficult	Moderately Difficult		Extremely Difficult		Easy, backyard	
Stream's Physical Attributes											
Depth	6 inch.	6 inch.	6 inch.	12 inch.	6 inch.	6 inch.	~ 3 inch.	~ 3 inch.	< 1 inch	NA	< 1 inch
Velocity	slow	slow	slow	slow	slow	quick	very slow	very slow	very slow	NA	very slow
Width	20-25 ft.	20-25 ft.	20-25 ft.	30 ft.	20-25 ft.	25 ft.	20 ft.	20 ft.	20 ft.	NA	20 ft.
Substrate	some rocks/sand	some rocks/sand	some rocks/sand	sandy	some rocks/sand	rocky	pebbles	pebbles	pebbles		pebbles
Safety	OK	OK	OK	OK	OK		OK	OK	OK		OK
Land Use											
Public	yes, golf course	yes, golf course	yes, golf course	yes, golf course	yes, golf course	yes	no	no	no	yes	yes
Residential/Wooded	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no
Industrial/Commercial	no	no	no	no	no	no	no	no	no	no	no
Stream Use											
Habitat for Aquatic Species											
Natural riparian	yes	yes	yes	yes	yes	yes	yes	yes	yes		yes
Partially Developed (Subdivision)											
Fully Urbanized Development											
Other Comments										side channel with no flow	

Notes:
1. Overflows per year and volume range were revised June 2004.
2. New bilingual warning signs are being placed at all CSO locations.
3. The data for this CSO was collected in June 2004.
4. Pictures not taken by CSO, additional river pictures.

Criteria	085 PLRPND and Ritter Ave.	084 [3] PLRPND and Michigan St.	154 PLRPND and Michigan St.	083 Hawthorne Ln. and Lowell Ave.	224 PLRPND and Washington St.	081 PLRPND and Riley Ave.	080 PLRPND and Wallace Ave.	079 PLRPND and Linwood Ave.	226 PLRPND and Colorado Ave.	078 PLRPSD and Brookville Rd.	077 PLRPND and Sherman Ave.
Overflows per year (average) [1]	23	28	27	<1	2	<1	29	Eliminated (April 2001)	Eliminated (September 2001)	31	1
Annual Overflow Volume Range (MG/year) [1]	4-5	32-43	9-12	<1	<1	<1	15-20			11-15	<1
Other Discharges											
Location											
Type											
Factors that support/encourage recreational use											
School	no	no	no	no	no	Howe M.S.	Howe H.S.	no	no	no	no
Park	no	yes	yes	no	no	no	no	yes	no	no	yes, ball field
Trail	no	yes	no	leading to stream	yes	no	yes	no	yes	yes	no
Other											
Factors that prohibit/discourage recreational use											
Warning Signs/City Ordinance [2]	yes	yes	yes	yes	yes	yes	yes	could not locate	could not locate	yes	yes
Fence	no	no	no	no	no	no	no	no	no	no	no
Steep Banks	yes	no	yes	no	yes	gradual	no	yes	yes	gradual	yes
Other	no		heavy woods	wooded area	rocky	wall	no			heavy woods	heavy woods
Access											
North Bank		Easy							Extremely Difficult		
South Bank		Easy							Extremely Difficult		
Stream's Physical Attributes											
Depth	< 1 inch	6 inch.	6 inch.	< 6 inch.	1 ft.	1 ft.	< 6 inch.	1 ft.	< 1 inch	1 ft.	6 inch.
Velocity	very slow	quick	slow	slow	slow	slow	slow	slow	slow	slow	slow
Width	20 ft.	20 ft.	20 ft.	20 ft.	20 ft.	20 ft.	20 ft.	20 ft.	20 ft.	20 ft.	20 ft.
Substrate	pebbles	rocky	pebbles	some sand, some rocks	mossy rocks	mossy rocks	some sand, some rocks	rocky	rocks, concrete	rock, concrete	rock, concrete
Safety	OK	OK	OK	OK	no	no	OK	no	OK	OK	OK
Land Use											
Public	yes	yes	no	no	yes	yes	yes	no	yes	no	yes
Residential/Wooded	yes	yes	yes	yes	no	yes	yes	yes	no	yes	yes
Industrial/Commercial	no	no	no	no	commercial	no	no	no	no	no	no
Stream Use											
Habitat for Aquatic Species											
Natural riparian	yes	yes	yes	yes	yes		yes	yes	yes	yes	yes
Partially Developed (Subdivision)						yes					
Fully Urbanized Development											
Other Comments											

Notes:
1. Overflows per year and volume range were revised June 2004.
2. New bilingual warning signs are being placed at all CSO locations.
3. The data for this CSO was collected in June 2004.
4. Pictures not taken by CSO, additional river pictures.

INDIANAPOLIS CSO LONG-TERM CONTROL PLAN

Use Attainability Analysis

Description of Marion County Streams

Pleasant Run

076	Criteria	075	074	073	072	107	108	109	031 [3]	106 [3]	030
PLRPSD and English Ave.		PLRPND and Southeastern Ave.	PLRPND and Prospect St.	PLRPND and Keystone Ave.	PLRPND and Saint Peter St.	PLRPND and Saint Paul St.	PLRPSD and Saint Paul St.	PLRPND and Churchman Ave.	PLRPSD and Chruchman Ave.	PLRPND and Orange St.	PLRPSD and Randolph St.
29	Overflows per year (average) [1]	23	<1	27	4	11	26	3	4	6	<1
28-37	Annual Overflow Volume Range (MG/year) [1]	5-7	<1	9-13	<1	13-18	4-5	<1	1-2	<1	<1
	Other Discharges		2		2						
	Location		DS of CSO								
	Type										
	Factors that support/encourage recreational use										
no	School	no	no	no	no	no	no	no	no	no	yes, #20
no	Park	no	no	no	no	no	no	no	no	yes	no
by bridge	Trail	no	no	no	yes	yes	no	yes	yes	yes	no
	Other										
	Factors that prohibit/discourage recreational use										
yes	Warning Signs/City Ordinance [2]	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
no	Fence	no	no	no	no	no	no	no	no	no	no
no	Steep Banks	yes	yes, concrete walls	yes, concrete along bridge	no	gradual	yes	yes	yes, north side	yes	yes
	Other	very rocky		heavy woods	heavy woods			dense vegetation			dense vegetation
	Access										
	North Bank		Extremely Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult		Extremely Difficult	Moderately Difficult	Extremely Difficult
	South Bank		Extremely Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult		Moderately Difficult	Moderately Difficult	Extremely Difficult
	Stream's Physical Attributes										
1 ft.	Depth	6 inch. - 1 ft.	?	1 ft.	1-2 ft.	6 inch.	6 inch.	6 inch.	2 inch.	< 6 inch.	< 6 inch.
slow	Velocity	slow	1-2 fps	slow	slow	slow	slow	slow	slow	slow	slow
20 ft.	Width	10 ft.	10-25 ft.	20 ft.	20 ft.	20-25 ft.	20-25 ft.	20-25 ft.	20 ft.	20 ft.	20 ft.
rocky	Substrate	some sand/some rocks	rocks	some sand/some rocks	some sand/some rocks	small rocks, rocks DS	rocky	rocky	rocky	rocky	rocky
OK	Safety	dangerous getting down to stream	no	OK	no, slippery rocks	OK	no	no			no
	Land Use										
no	Public	no	no	no	yes	no	no	no	yes	yes	yes
yes	Residential/Wooded	no	no	yes	yes	yes	yes	yes	yes	yes	yes
commercial	Industrial/Commercial	yes	yes	commercial	no	no	no	no	no	no	no
	Stream Use										
	Habitat for Aquatic Species										
yes	Natural riparian	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
	Partially Developed (Subdivision)										
	Fully Urbanized Development										
	Other Comments										

Notes:
1. Overflows per year and volume range were revised June 2004.
2. New bilingual warning signs are being placed at all CSO locations.
3. The data for this CSO was collected in June 2004.
4. Pictures not taken by CSO, additional river pictures.

029	**Criteria**	028	127	027	025	023	119	151	149	022	150
Orange St. and Randolph St.		PLRPND and State St.	1325 S. State and Pleasant Run	PLRPSD and Cottage Ave.	PLRPND and Shelby St.	PLRPND and Iowa St.	PLRPSD and Beecher St.	PLRPND and Beecher St.	PLRPSD and Garfield Dr.	PLRPSD and Raymond St.	PLRPND and Raymond St.
6	Overflows per year (average) [1]	10	4	4	10	7	11	42	8	12	56
<1	Annual Overflow Volume Range (MG/year) [1]	2-3	<1	1-2	3-4	2-3	14-19	6-9	20-27	11-15	23-31
	Other Discharges										
	Location										
	Type										
	Factors that support/encourage recreational use										
no	School	no	no	no	no	no	no	no	no	no	no
yes, Orange park	Park	no	no	yes	no	no	no	no	yes	yes	yes
yes	Trail	no	no	no	no	no	yes	yes	yes	yes	yes
	Other										no
	Factors that prohibit/discourage recreational use										
yes	Warning Signs/City Ordinance [2]	yes	yes	yes	could not locate	yes	yes	yes	yes	yes	yes
no	Fence	no	no	no	no	no	guard rail	no	no	no	no
gradual	Steep Banks	yes	yes	yes	yes	no	gradual	yes	no	no	no
	Other	wall	rocky	very rocky access	dense vegetation		dense vegetation	dense vegetation	rocks next to CSO and along bank		rocks
	Access										
Extremely Difficult	North Bank	Extremely Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult		Moderately Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult
Extremely Difficult	South Bank	Extremely Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult		Extremely Difficult	Extremely Difficult	Extremely Difficult	Moderately Difficult	Moderately Difficult
	Stream's Physical Attributes										
< 6 inch.	Depth	6 inch.	6 inch.	6 inch.	6 inch.	6 inch. - 1 ft.	1 ft.	6 inch - 1 ft.	2 ft.	1 ft.	1-2 ft.
slow	Velocity	slow	slow	slow	~ 1 fps	slow	~ 1 fps	~ 2 fps	very slow	~ 1 fps	slow
20 ft.	Width	25 ft.	25 ft.	25 ft.	20 ft.	12-20 ft.	20-25 ft.	20-25 ft.	20-25 ft.	20 ft.	20 ft.
rocky	Substrate	rocky	rocky	rocky	rocky	sand/some rocks	rocky	rocky	sandy, small rocks	rocky	sandy, small rocks
no	Safety	no	no	no	no	OK	no	no	no	no	OK
	Land Use										
yes	Public	yes	yes	no	yes	no	yes	yes	yes	yes	yes
yes	Residential/Wooded	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
no	Industrial/Commercial	no	no	no	no	no	no	no	no	no	no
	Stream Use										
	Habitat for Aquatic Species										
yes	Natural riparian	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
	Partially Developed (Subdivision)										
	Fully Urbanized Development										
	Other Comments										

Notes:
1. Overflows per year and volume range were revised June 2004.
2. New bilingual warning signs are being placed at all CSO locations.
3. The data for this CSO was collected in June 2004.
4. Pictures not taken by CSO, additional river pictures.

							Pleasant Run via Bean Creek		
021		130	148	020	019	120	017	016	015
PLRPND and Ransdall St.	**Criteria**	Manual High School	PLRPND and Madison Ave.	PLRPND and Pennsylvania St.	PLRPND and Meridian St.	PLRPSD and Southern Ave.	Boyd Ave. and Nelson Ave.	Shelby St. and Willow Dr.	Southern Ave. and Manker Ave.
28	Overflows per year (average) [1]	1	22	13	3	24	8	21	10
35-48	Annual Overflow Volume Range (MG/year) [1]	<1	1-2	1-1	1-1	31-42	<1	6-9	4-6
	Other Discharges								
	Location							On Willow	
	Type							storm	
	Factors that support/encourage recreational use								
yes	School	yes, Manual H.S.	yes	no	no	no	no	no	no
no	Park	no	no	yes	no	no	no	no	yes
no	Trail	no	no	no	no	no	no	no	no
	Other						house		
	Factors that prohibit/discourage recreational use								
yes	Warning Signs/City Ordinance [2]	yes	yes	yes	yes	could not locate	painted over	yes	yes
no	Fence	no	no	no	no	along Metal fabrication company property	no	yes	yes
gradual	Steep Banks	no	gradual	no	yes	no	no	no	yes
vegetation	Other	no	vegetation	dense vegetation	dense vegetation	vegetation	dense vegetation	dense vegetation	vegetation
	Access								
Extremely Difficult	North Bank	Extremely Difficult		Extremely Difficult	Extremely Difficult	Moderately Difficult	Extremely Difficult	Extremely Difficult	Moderately Difficult
Easy	South Bank	Easy		Extremely Difficult	Extremely Difficult	Extremely Difficult	Moderately Difficult	Extremely Difficult	Moderately Difficult
	Stream's Physical Attributes								
1 ft.	Depth	1 ft.	1 ft.	6 inch. - 1 ft.	1-2 ft.	1-2 ft.	6 inch. - 1 ft.	6 inch.	6 inch.
slow	Velocity	slow	very slow	very slow	very slow	slow	very slow	very slow	very slow
15-20 ft.	Width	15-20 ft.	20 ft.	15-20 ft.	15-25 ft.	20 ft.	15-20 ft.	15-20 ft.	20 ft.
sand/some rocks	Substrate	sandy	sandy, small rocks	sand, rocks DS of CSO	small rock	some sand, some rocks	rocky	rocky	rocky
OK	Safety	OK	OK	OK	no	no	no	no	no
	Land Use								
yes	Public	yes	yes	no	yes	no	no	yes	no
yes	Residential/Wooded	yes	yes	yes	yes	no	yes	yes	yes
no	Industrial/Commercial	no	no	no	no	yes	no	no	no
	Stream Use								
	Habitat for Aquatic Species								
yes	Natural riparian	yes	yes	yes	yes	yes	yes		
	Partially Developed (Subdivision)							yes	yes
	Fully Urbanized Development								
	Other Comments								

Notes:
1. Overflows per year and volume range were revised June 2004.
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3. The data for this CSO was collected in June 2004.
4. Pictures not taken by CSO, additional river pictures.

Figure 2-11a
Physical Stream Characteristics
Pleasant Run
Sheet 1 of 8

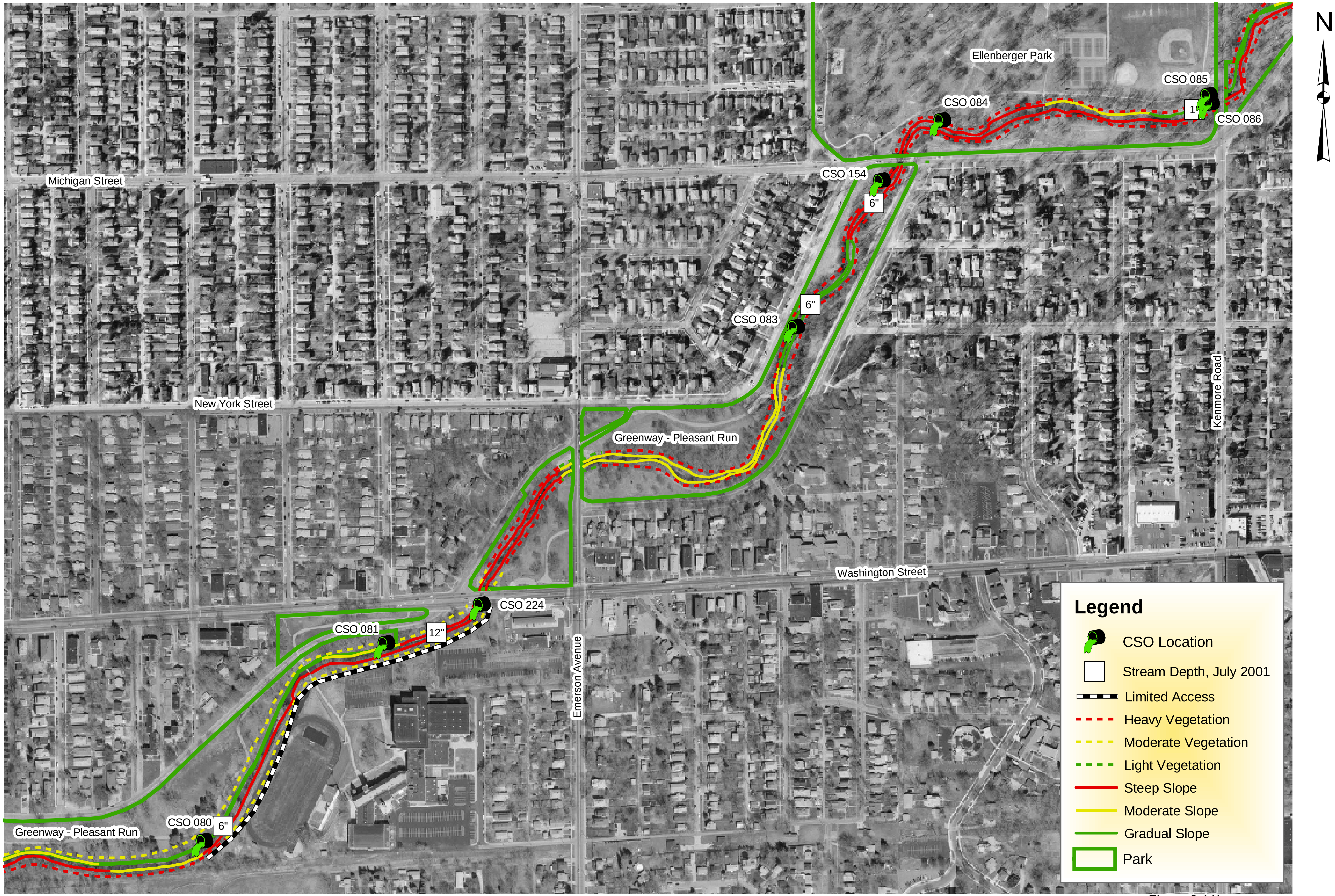


Figure 2-11b
Physical Stream Characteristics
Pleasant Run
Sheet 2 of 8

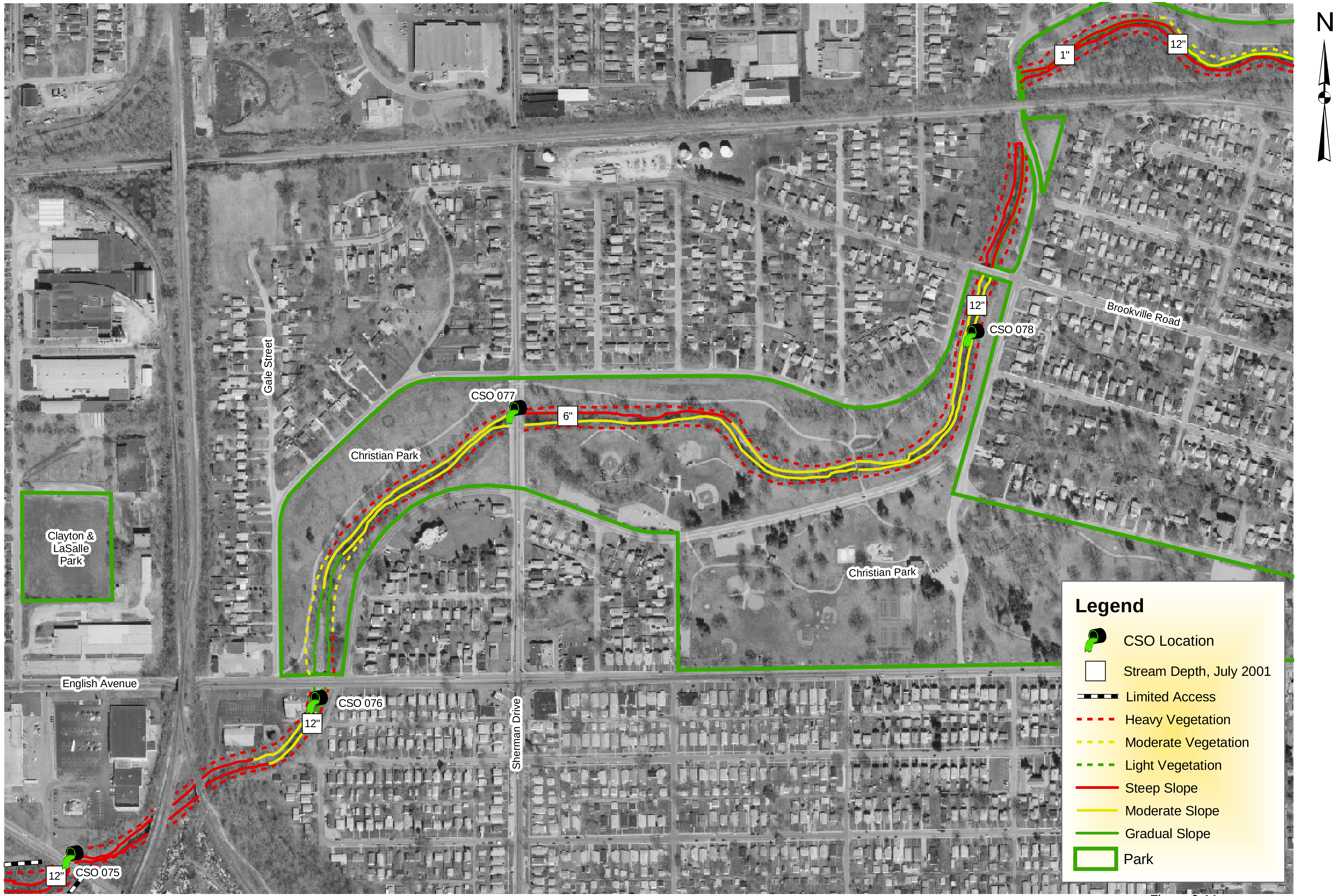


Figure 2-11c
Physical Stream Characteristics
Pleasant Run
Sheet 3 of 8

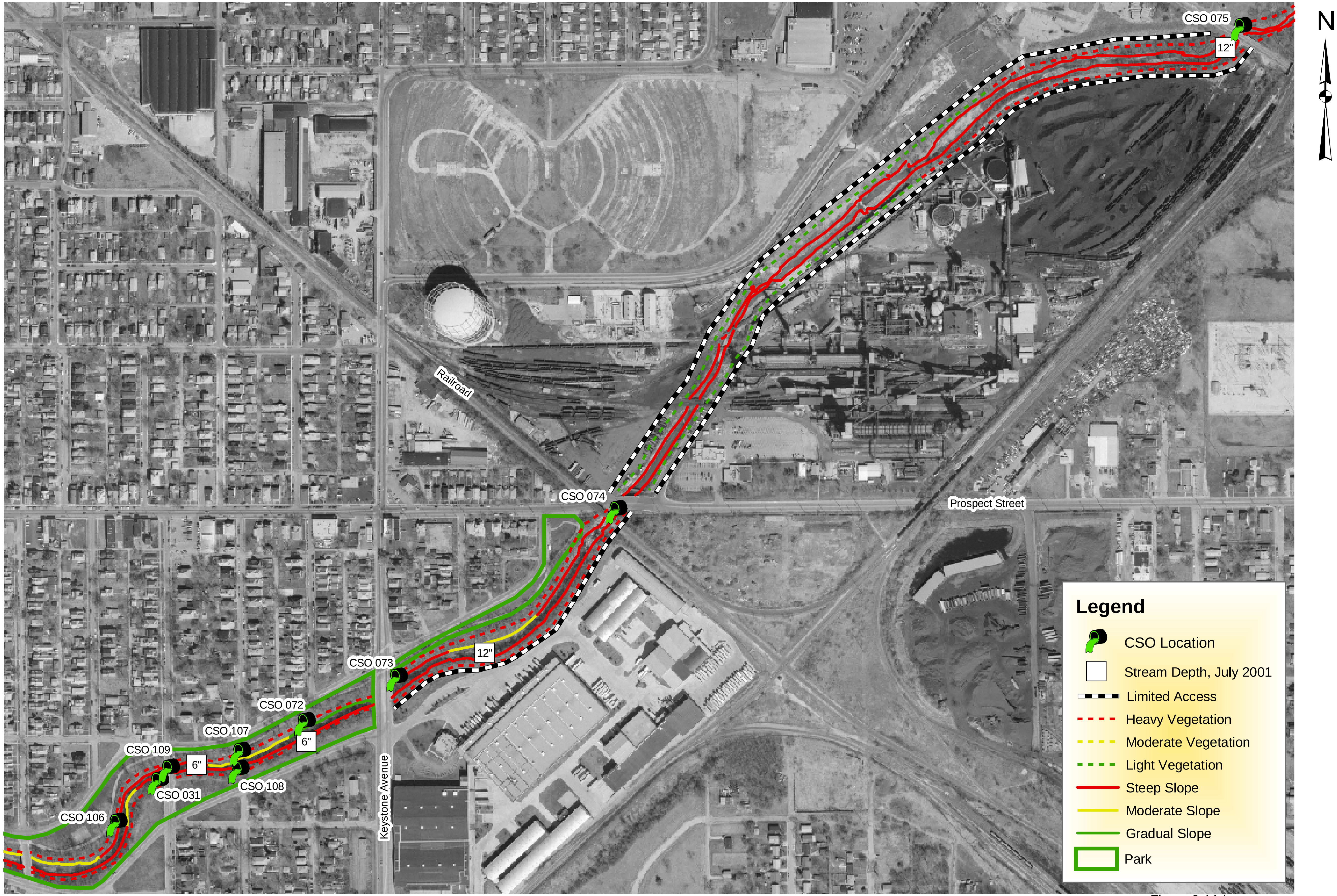


Figure 2-11d
Physical Stream Characteristics
Pleasant Run
Sheet 4 of 8

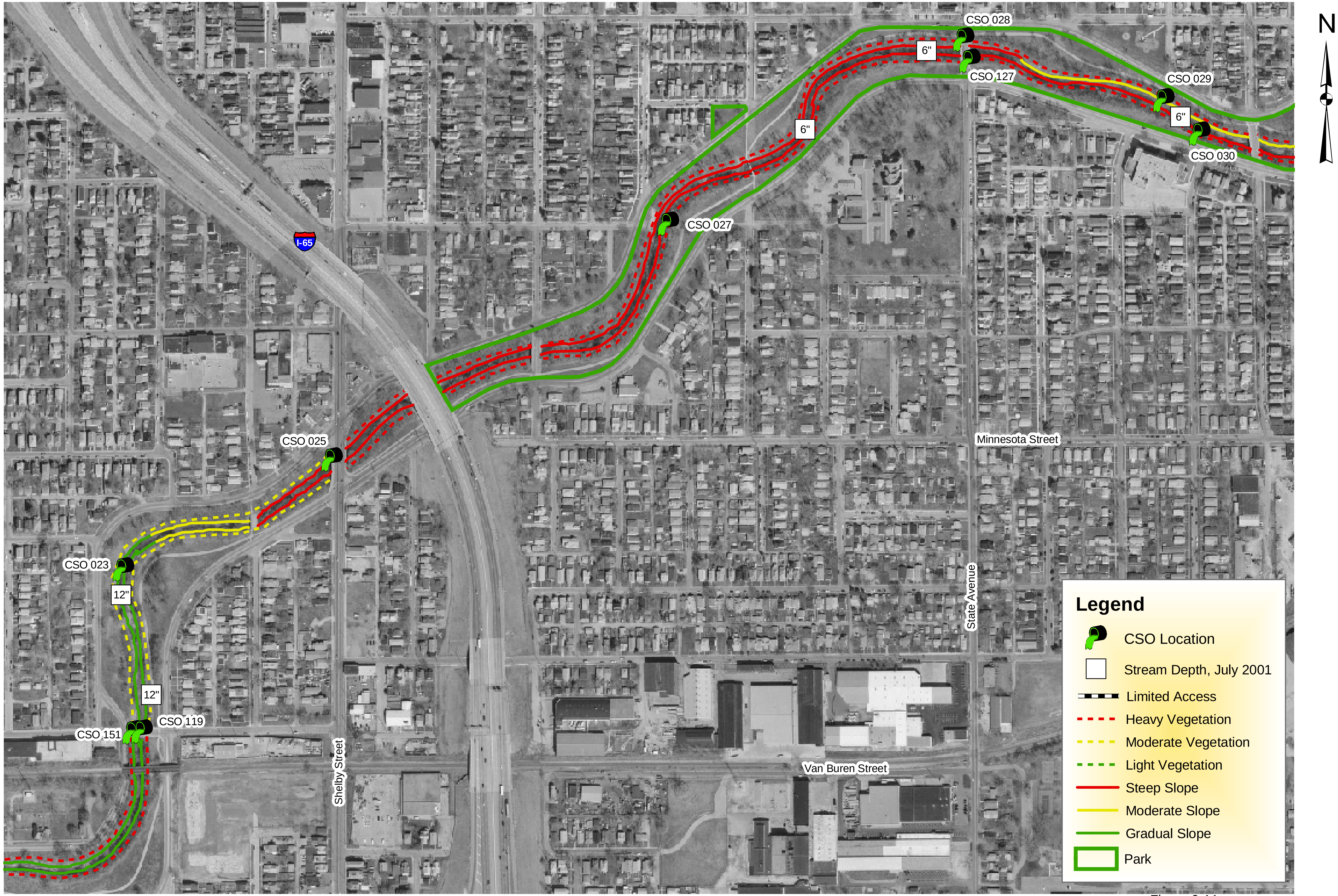


Figure 2-11e
Physical Stream Characteristics
Pleasant Run
Sheet 5 of 8

Figure 2-11f
Physical Stream Characteristics
Pleasant Run
Sheet 6 of 8

Figure 2-11g
Physical Stream Characteristics
Pleasant Run
Sheet 7 of 8

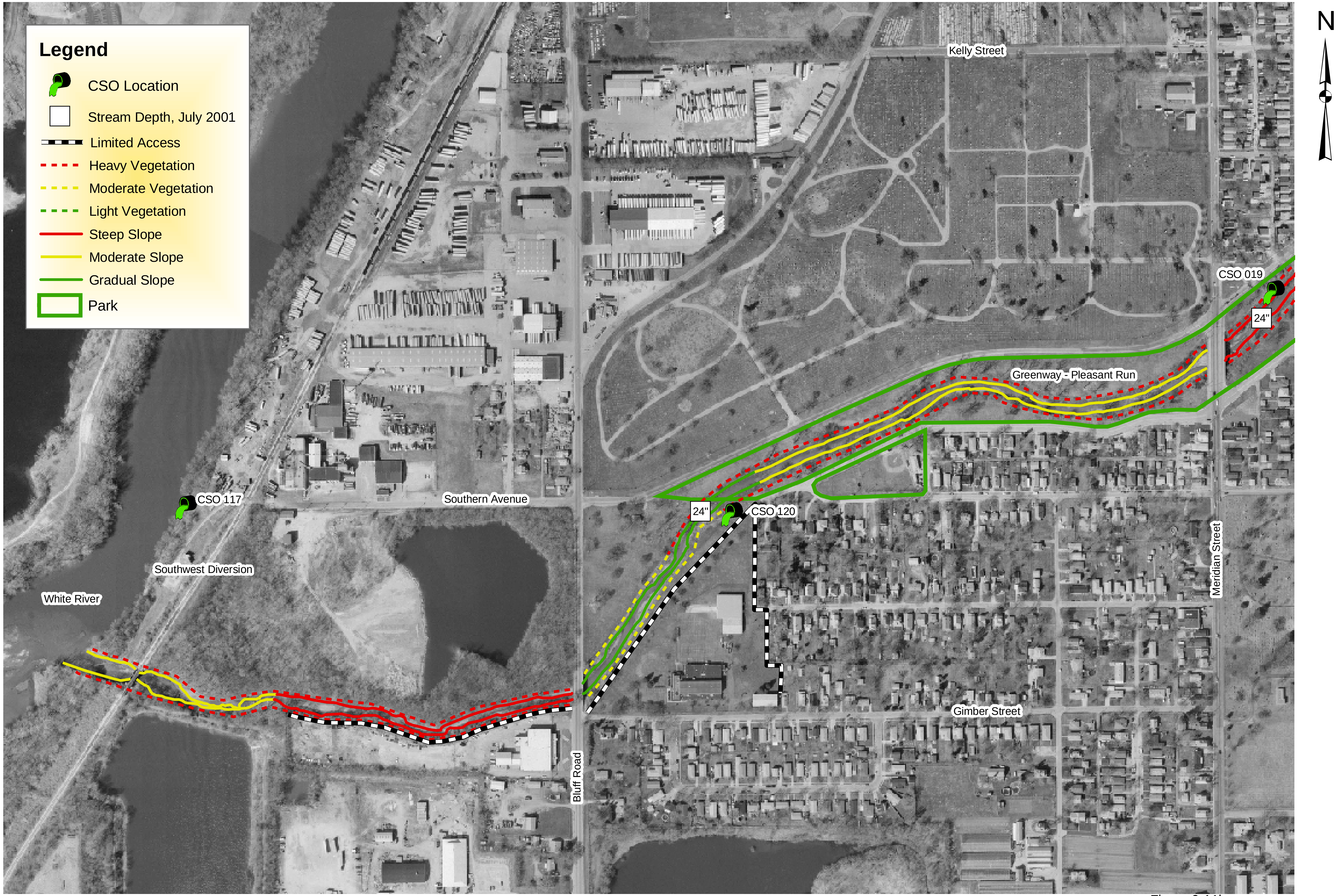
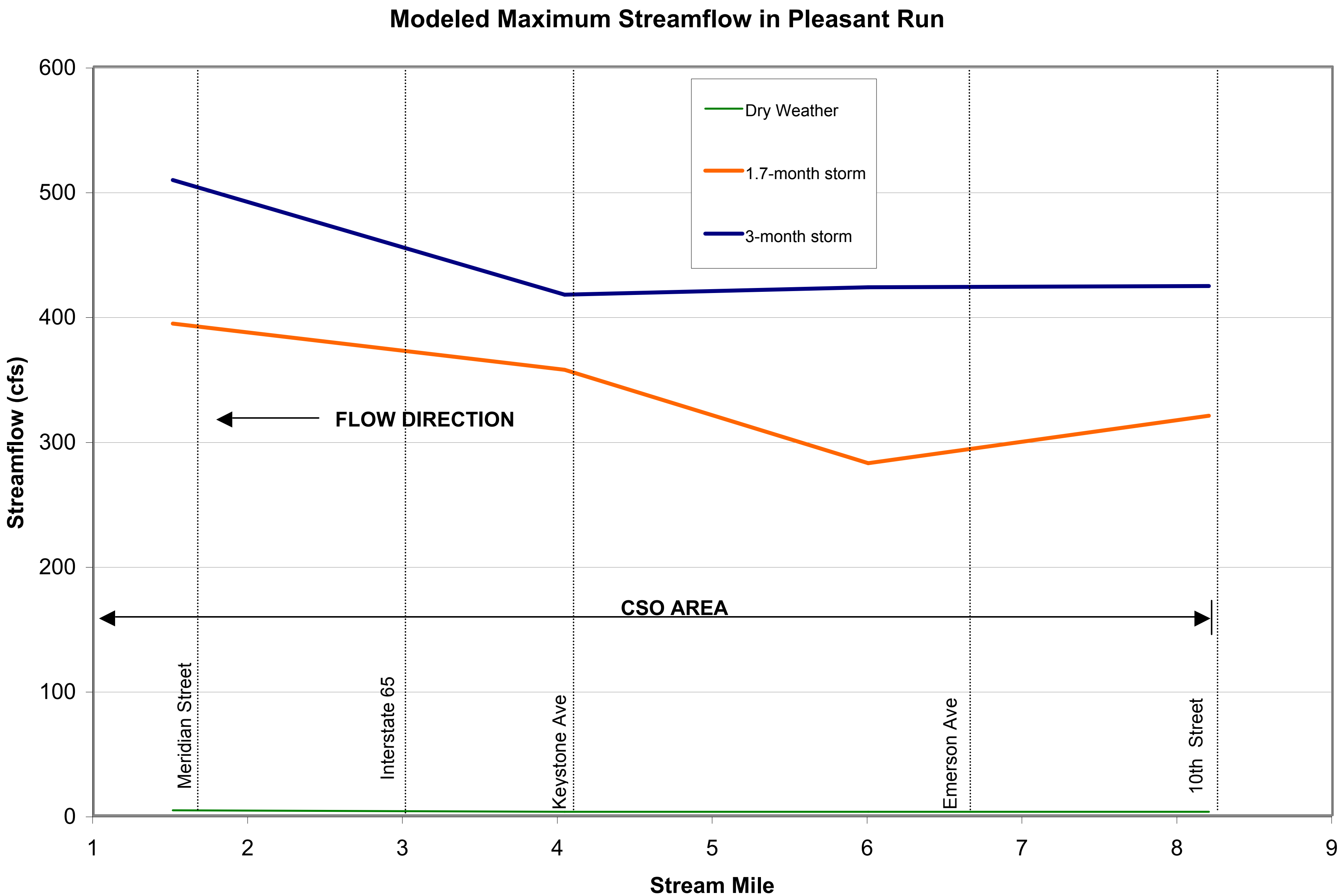
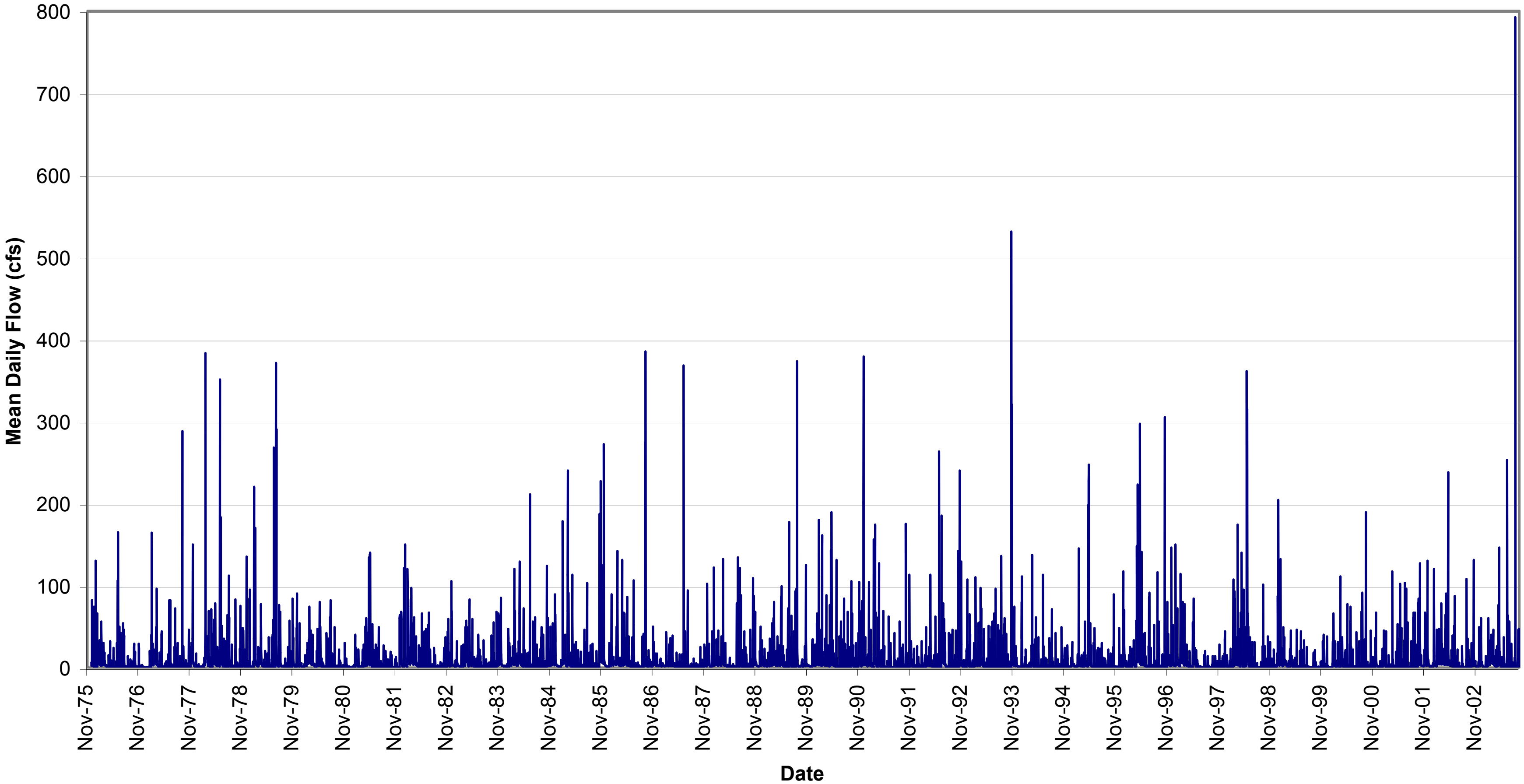


Figure 2-11h
Physical Stream Characteristics
Pleasant Run
Sheet 8 of 8

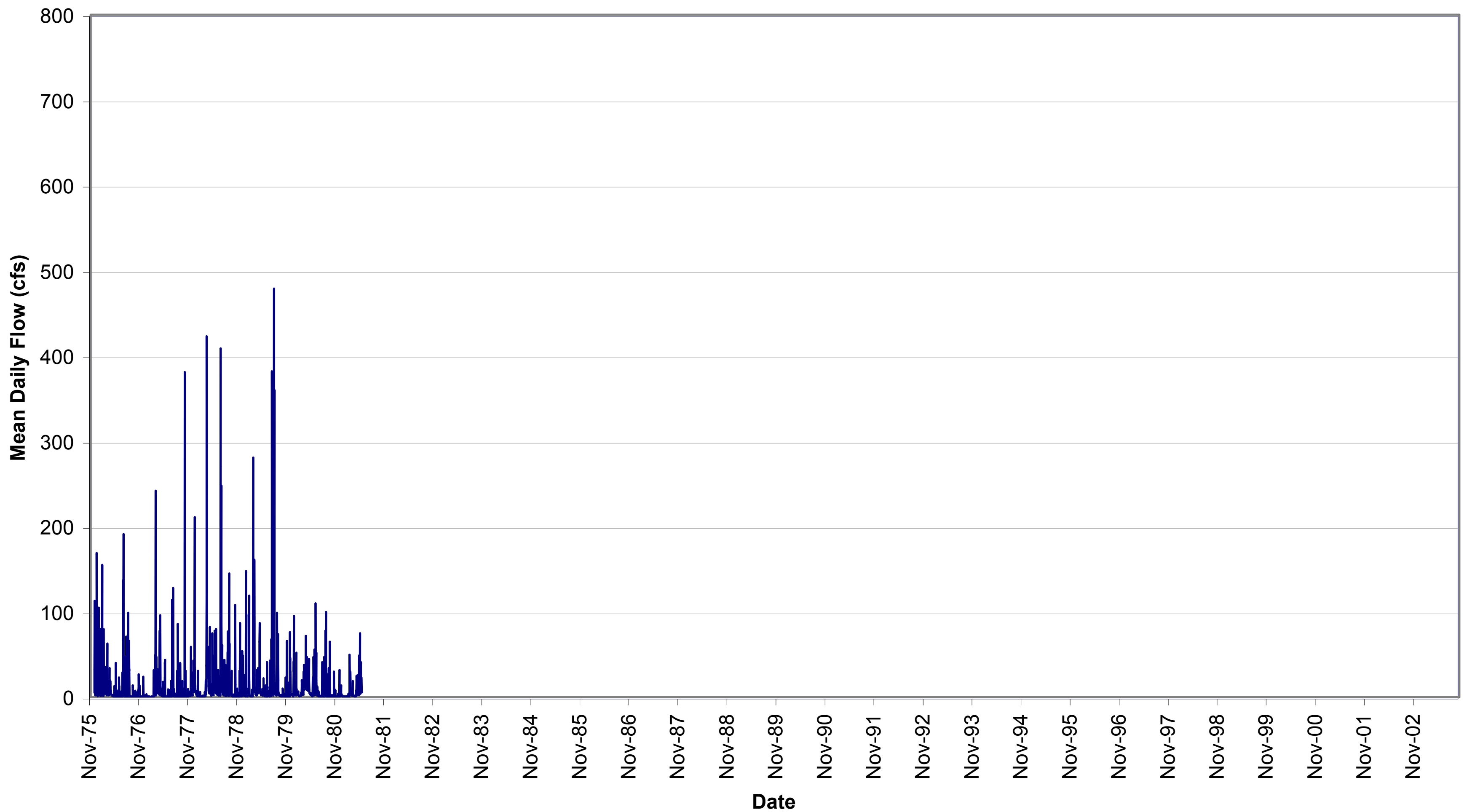


Modeled Maximum Streamflow in Pleasant Run
Streamflow (cfs)
600
500
400
300
200
100
0
1
2
3
4
5
6
7
8
9
Stream Mile
Dry Weather
1.7-month storm
3-month storm
FLOW DIRECTION
CSO AREA
Meridian Street
Interstate 65
Keystone Ave
Emerson Ave
10th Street



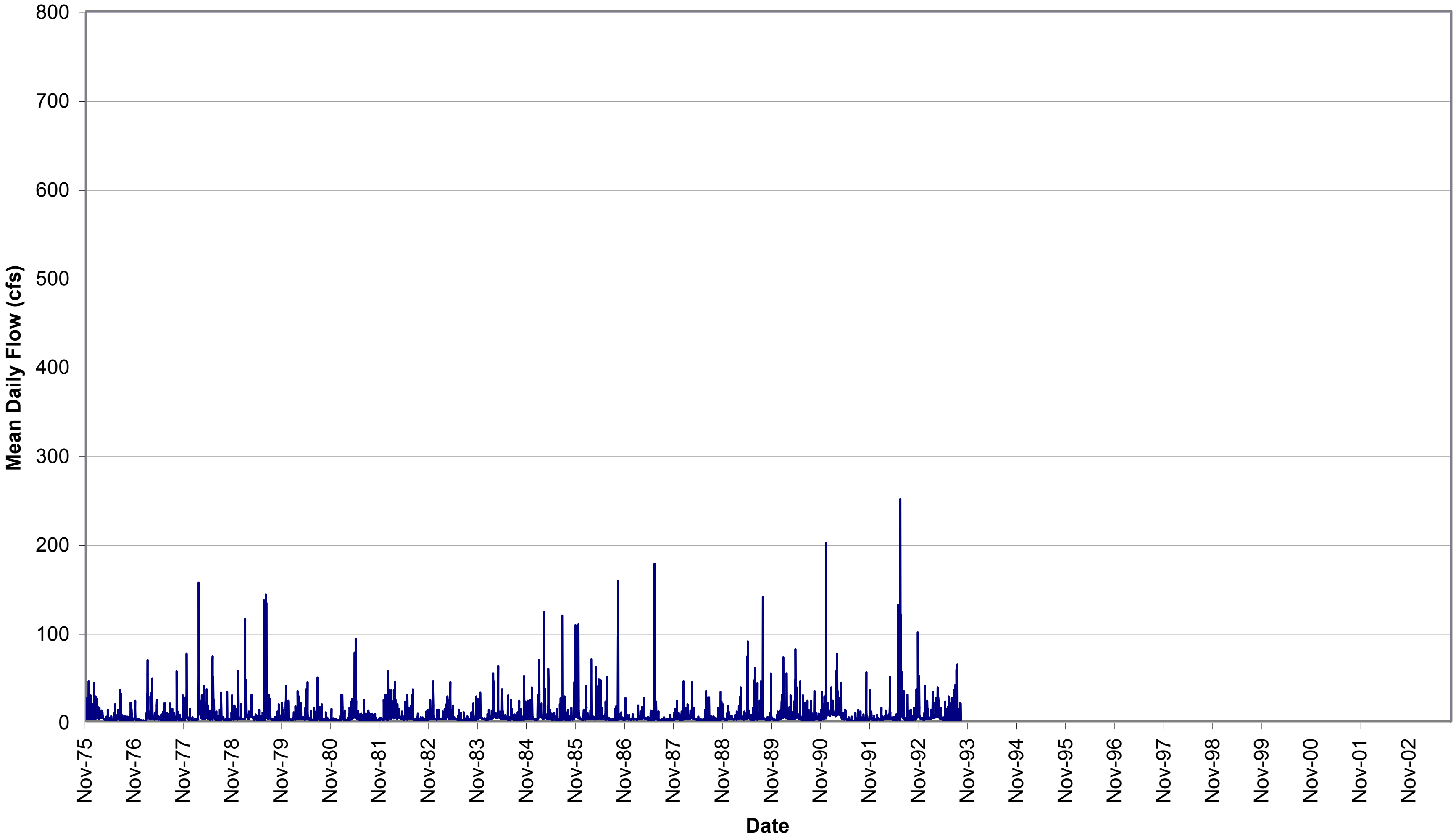
Source: USGS gauge station 03353120 in Pleasant Run at Arlington Avenue,
November 28, 1975 to September 30, 2003.

Flow Variations in Pleasant Run at Arlington Avenue



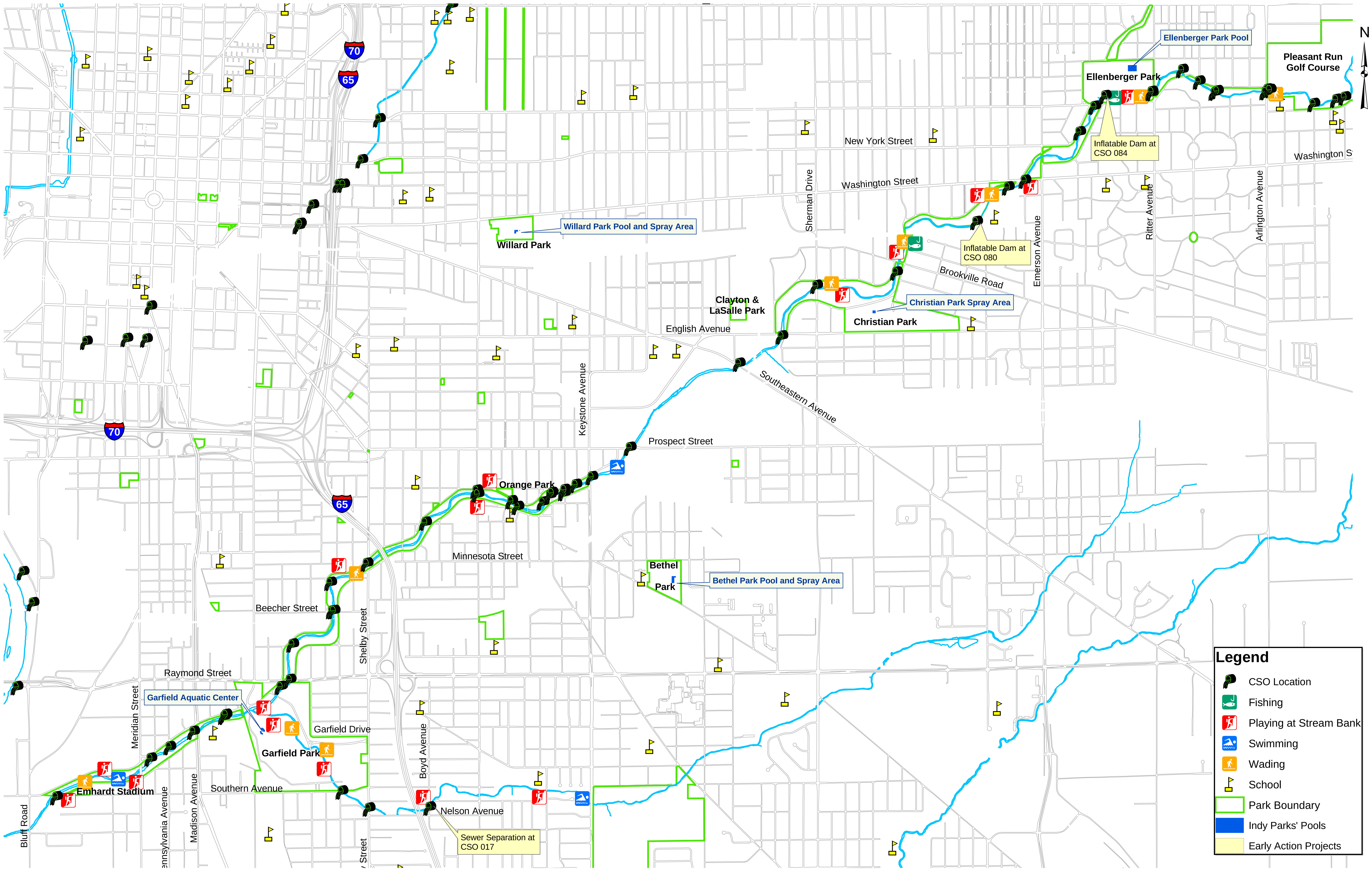
Source: USGS gauge station 03353160 in Pleasant Run at Brookville Road, November 28, 1975 to May 13, 1981. Data not available after September 30, 1993.

Flow Variations in Pleasant Run at Brookville Road



Source: USGS gauge station 03353180 in Bean Creek, 80 feet upstream of Keystone Avenue, November 28, 1975 to September 30, 1993. Data not available after September 30, 1993.

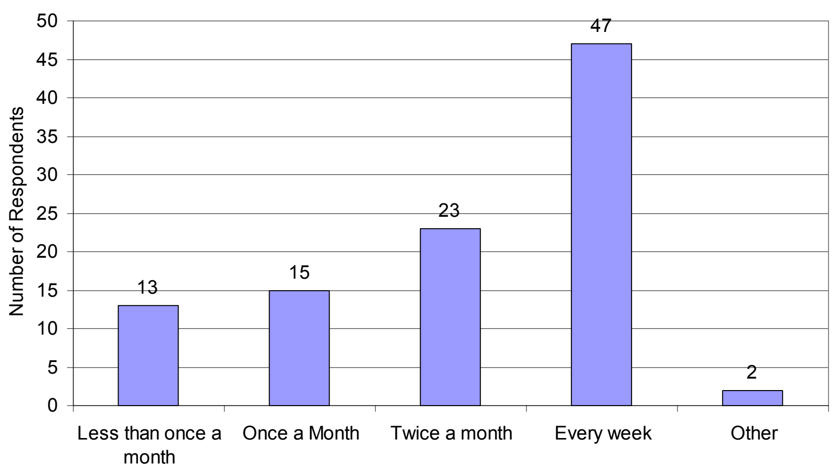
Flow Variations in Bean Creek



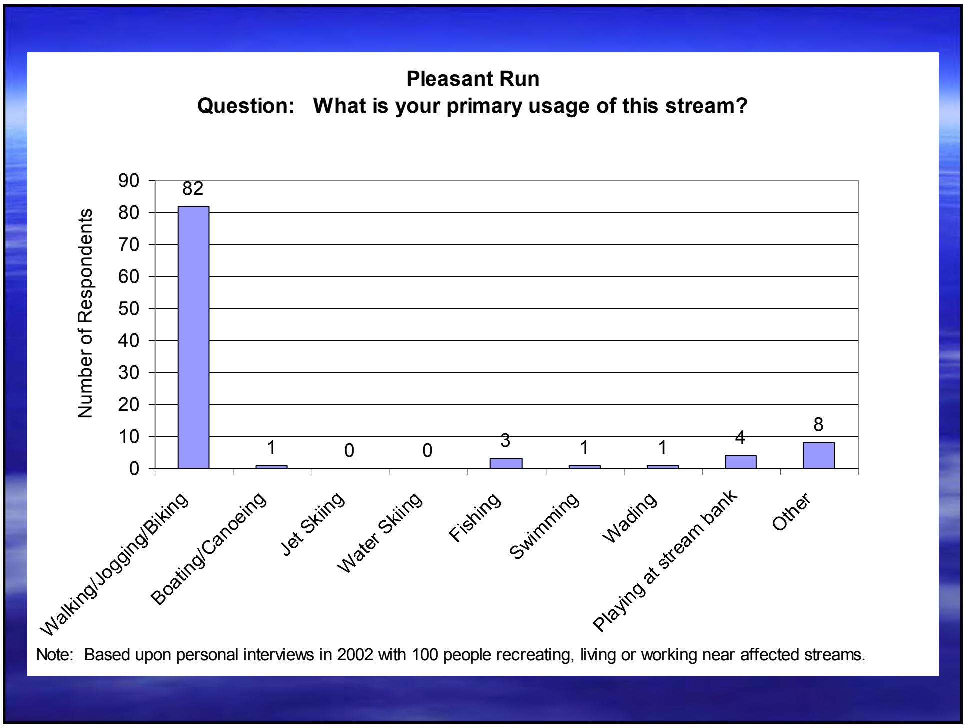
Pleasant Run
Reported and Observed Uses

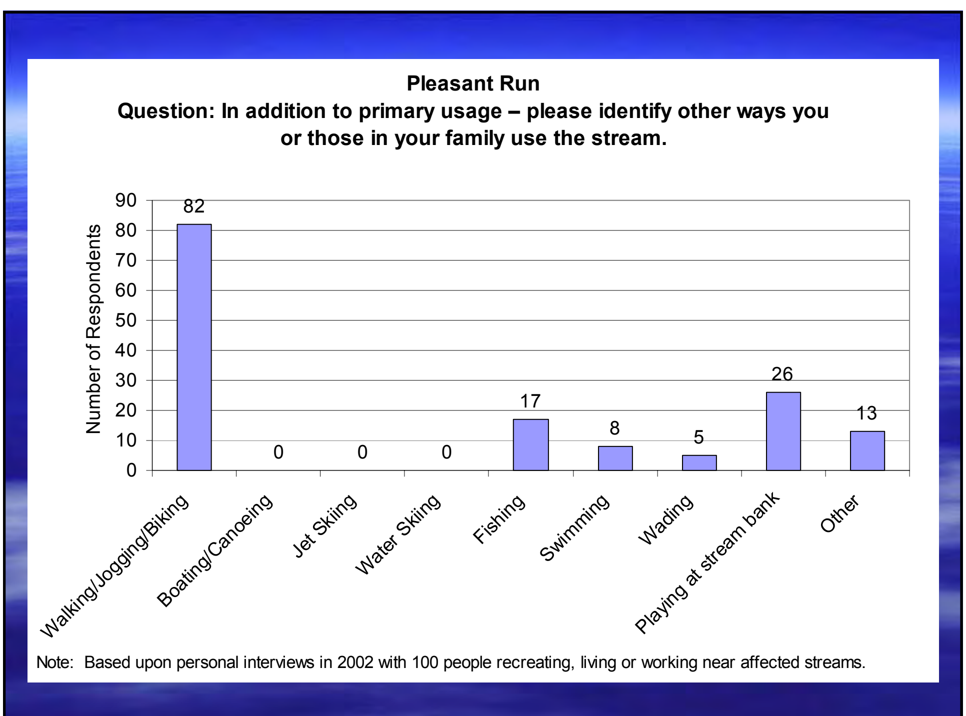
Pleasant Run

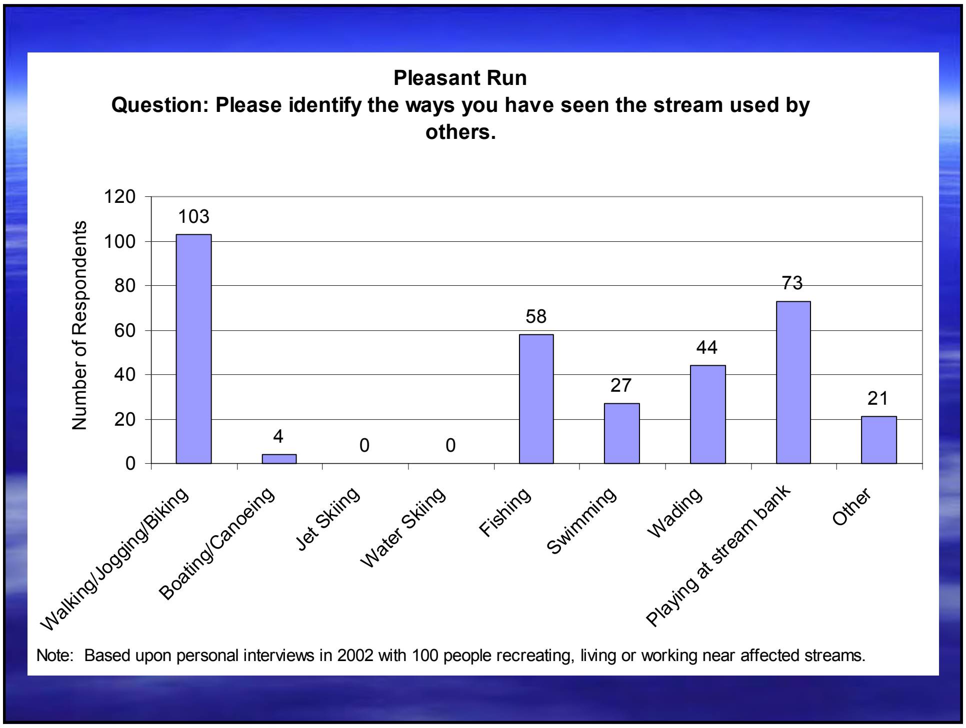
Question: In a typical year, how often have you or any member of your family come into water contact with Pleasant Run?

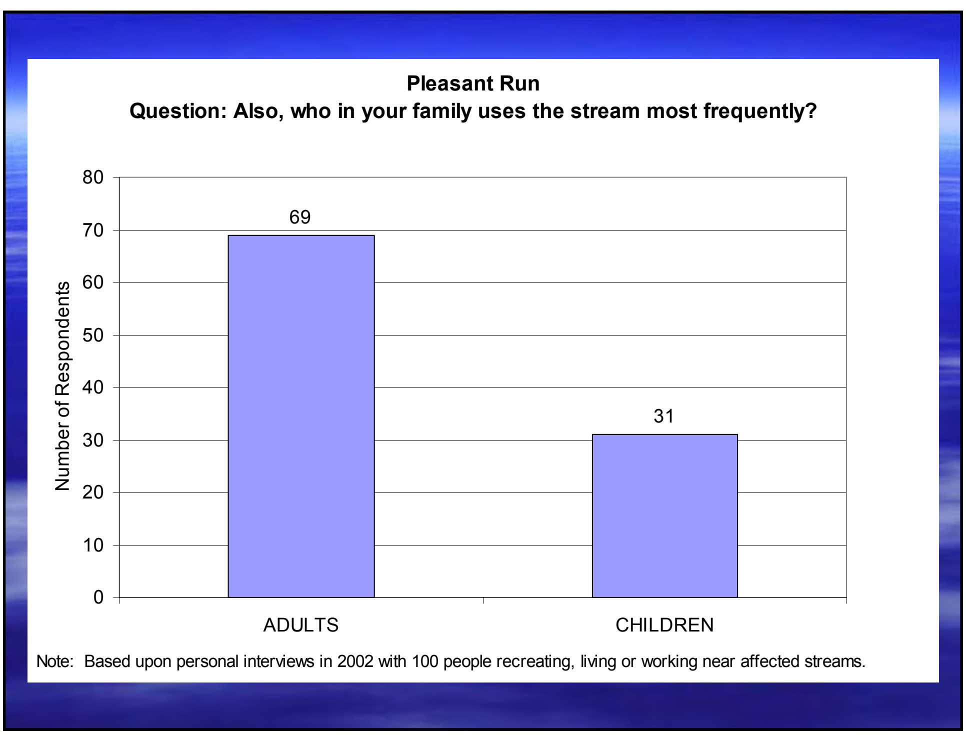


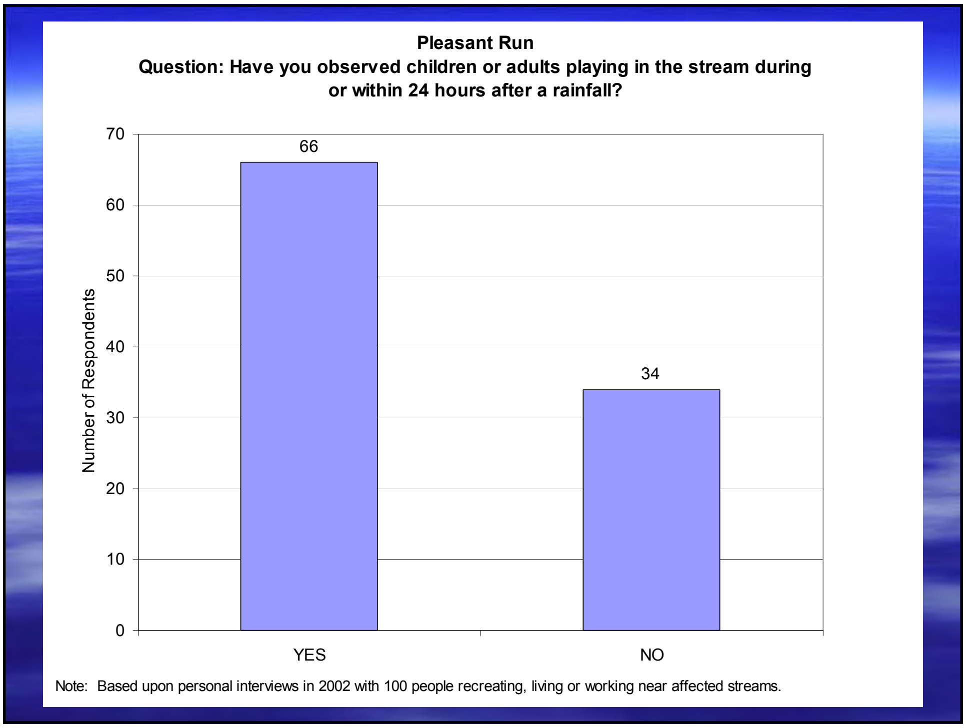
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

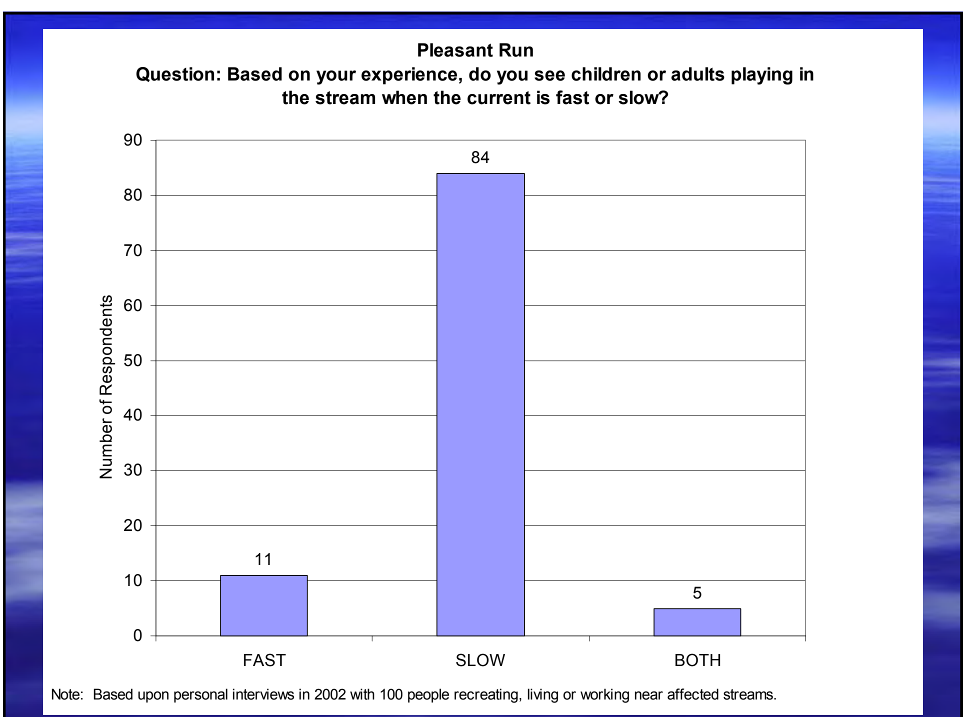

Pleasant Run
Question: What is your primary usage of this stream?
Number of Respondents
90
80
70
60
50
40
30
20
10
0
82
1
0
0
3
1
1
4
8
Walking/Jogging/Biking
Boating/Canoeing
Jet Skiing
Water Skiing
Fishing
Swimming
Wading
Playing at stream bank
Other
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

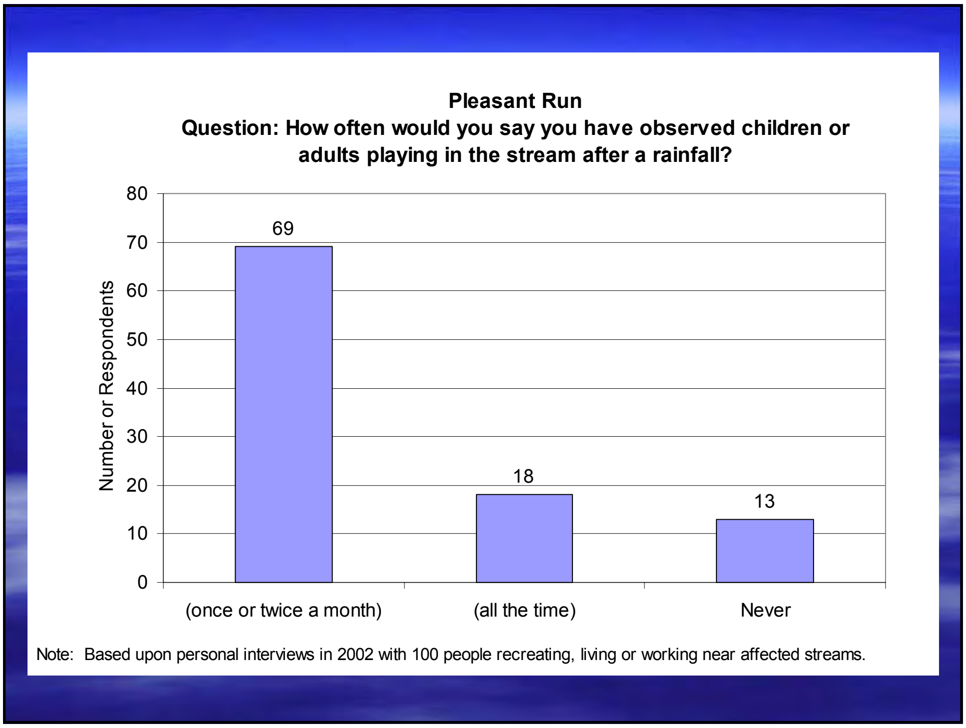

Pleasant Run
Question: In addition to primary usage – please identify other ways you or those in your family use the stream.
Number of Respondents
90
80
70
60
50
40
30
20
10
0
82
0
0
0
17
8
5
26
13
Walking/Jogging/Biking
Boating/Canoeing
Jet Skiing
Water Skiing
Fishing
Swimming
Wading
Playing at stream bank
Other
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

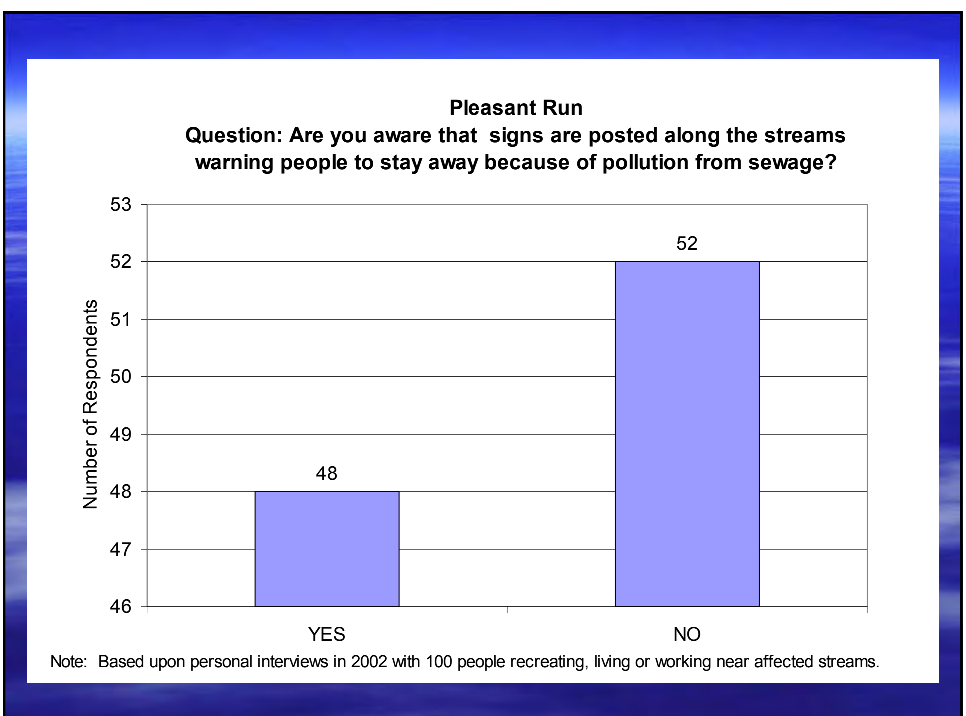

Pleasant Run
Question: Please identify the ways you have seen the stream used by others.
Number of Respondents
120
100
80
60
40
20
0
103
4
0
0
58
27
44
73
21
Walking/Jogging/Biking
Boating/Canoeing
Jet Skiing
Water Skiing
Fishing
Swimming
Wading
Playing at stream bank
Other
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

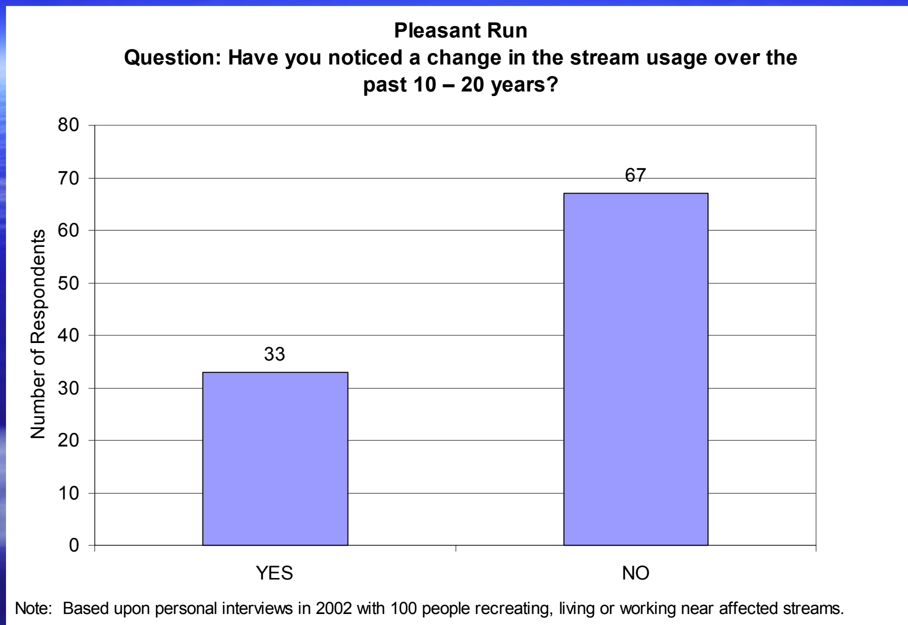

Pleasant Run
Question: Also, who in your family uses the stream most frequently?
Number of Respondents
80
70
60
50
40
30
20
10
0
69
31
ADULTS
CHILDREN
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


Pleasant Run
Question: Have you observed children or adults playing in the stream during or within 24 hours after a rainfall?
Number of Respondents
0
10
20
30
40
50
60
70
66
34
YES
NO
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


Pleasant Run
Question: Based on your experience, do you see children or adults playing in the stream when the current is fast or slow?
Number of Respondents
0
10
20
30
40
50
60
70
80
90
11
84
5
FAST
SLOW
BOTH
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

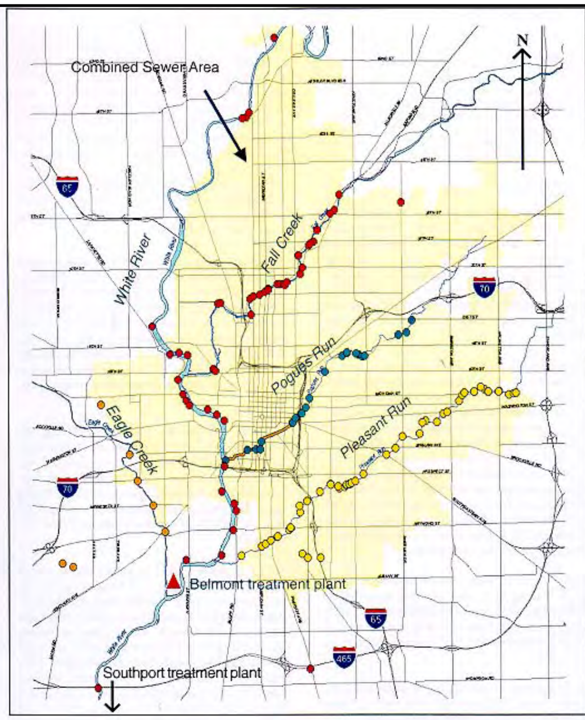

Pleasant Run
Question: How often would you say you have observed children or adults playing in the stream after a rainfall?
Number or Respondents
80
70
60
50
40
30
20
10
0
69
18
13
(once or twice a month)
(all the time)
Never
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


Pleasant Run
Question: Are you aware that signs are posted along the streams warning people to stay away because of pollution from sewage?
Number of Respondents
53
52
51
50
49
48
47
46
52
48
YES
NO
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.



Location of Use

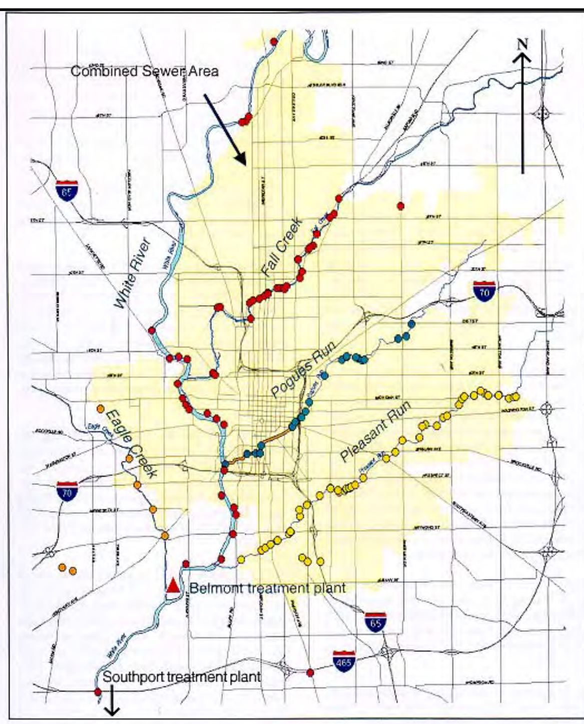
Activity	Location/Direct Respondent	Stream Survey	MCHD
PSB	Garfield St. (Garfield Park area)	X	
WBJ	700 – 900 block Pleasant Run Pkwy, N. Dr.		
WBJ	Bart St. - Beecher St.		
WBJ	Churchman and Pleasant Run Pkwy.		
WBJ	Beecher & Pleasant Run Pkwy.		
WBJ	Walk Trail		
PSB	1800 block of Minnesota	X	
WBJ	Terrace and Pleasant Run Pkwy.		
WBJ	Olive St. and Pleasant Run Pkwy.		
WBJ	Shelby and Pleasant Run Pkwy.		
WBJ	East St. and Pleasant Run Pkwy.		
PSB	Dawson St.		
PSB	Garfield Park		
WBJ	Spruce St. and Pleasant Run Pkwy., N.		
WBJ	Tri-Sab Lane		
P at SB	Barth Ave.	X	
Wading	Arlington Ave.	X	X
Wading	Ellenberger Park	X	X
Wading	North of Brookville Rd.		X
Wading	West of Shelby St.		X



PLEASANT RUN:
Location Activity
Direct Respondent

Activity Cluster: Centered around Garfield Park and Ellenberger Park.

- Playing at the stream bank reflects stream depth, access.
- High observed use of wading in concentrated areas of Ellenberger Park, Brookville Rd. and Garfield Park.



PLEASANT RUN:
Location Activity
Direct Respondent

PSB	† Garfield St. (Garfield Park area)
WBJ	700 – 900 block Pleasant Run Pkwy, N. Dr.
WBJ	Bart St. - Beecher St.
WBJ	Churchman and Pleasant Run Pkwy.
WBJ	Beecher & Pleasant Run Pkwy.
WBJ	Walk Trail
PSB	† 1800 block of Minnesota
WBJ	Terrace and Pleasant Run Pkwy.
WBJ	Olive St. and Pleasant Run Pkwy.
WBJ	Shelby and Pleasant Run Pkwy.
WBJ	East St. and Pleasant Run Pkwy.
PSB	Dawson St.
PSB	Garfield Park
WBJ	Spruce St. and Pleasant Run Pkwy., N.
WBJ	Tri-Sab Lane
PSB	† Barth Ave.
Wading	† * Arlington Ave.
Wading	† * Ellenberger Park
Wading	*North of Brookville Rd.
Wading	*West of Shelby St.

† *Reported on Stream Survey.*
* *Reported to MCHD.*

FINAL Survey Results - Pleasant Run

In a typical year, how often have you or any member of your family come into water contact with Pleasant Run?

	Total Number	%
Less than once a month	13	13%
Once a Month	15	15%
Twice a month	23	23%
Every week	47	47%
Other	2	2%
TOTALS	100	100%

What is your primary usage of this stream?

	Total Number	%
Walking/Jogging/Biking	82	82%
Boating/Canoeing	1	1%
Jet Skiing	0	0%
Water Skiing	0	0%
Fishing	3	3%
Swimming	1	1%
Wading	1	1%
Playing at stream bank	4	4%
Other	8	8%
TOTALS	100	100%

In addition to primary usage – please identify other ways you or those in your family use the stream.

	Total Number	%
Walking/Jogging/Biking	82	54%
Boating/Canoeing	0	0%
Jet Skiing	0	0%
Water Skiing	0	0%
Fishing	17	11%
Swimming	8	5%
Wading	5	3%
Playing at stream bank	26	17%
Other	13	9%
TOTALS	151	100%

Please identify the ways you have seen the stream used by others.

	Total Number	%
Walking/Jogging/Biking	103	31%
Boating/Canoeing	4	1%
Jet Skiing	0	0%
Water Skiing	0	0%
Fishing	58	18%
Swimming	27	8%
Wading	44	13%
Playing at stream bank	73	22%
Other	21	6%
TOTALS	330	100%

Also, who in your family uses the stream most frequently?

	Total Number	%
ADULTS	69	69%
CHILDREN	31	31%
TOTAL	100	100%

Have you observed children or adults playing in the stream during or within 24 hours after a rainfall?

	Total Number	%
YES	66	66%
NO	34	34%
TOTAL	100	100%

Based on your experience, do you see children or adults playing in the stream when the current is fast or slow?

	Total Number	%
FAST	11	11%
SLOW	84	84%
BOTH	5	5%
TOTALS	100	100%

How often would you say you have observed children or adults playing in the stream after a rainfall?

	Total Number	%
(once or twice a month)	69	69%
(all the time)	18	18%
Never	13	13%
TOTALS	100	100%

Are you aware that signs are posted along the streams warning people to stay away because of pollution from sewage?

	Total Number	%
YES	48	48%
NO	52	52%
TOTAL	100	100%

Age Group	Total Number	%
18-29	39	39%
30-39	28	28%
40-49	16	16%
50-59	8	8%
60+	9	9%
TOTAL	100	100%

Have you noticed a change in the stream usage over the past 10 – 20 years?

	Total Number	%
YES	33	33%
NO	67	67%
TOTAL	100	100%

Figure 2-2a
Physical Stream Characteristics
White River
Sheet 1 of 8

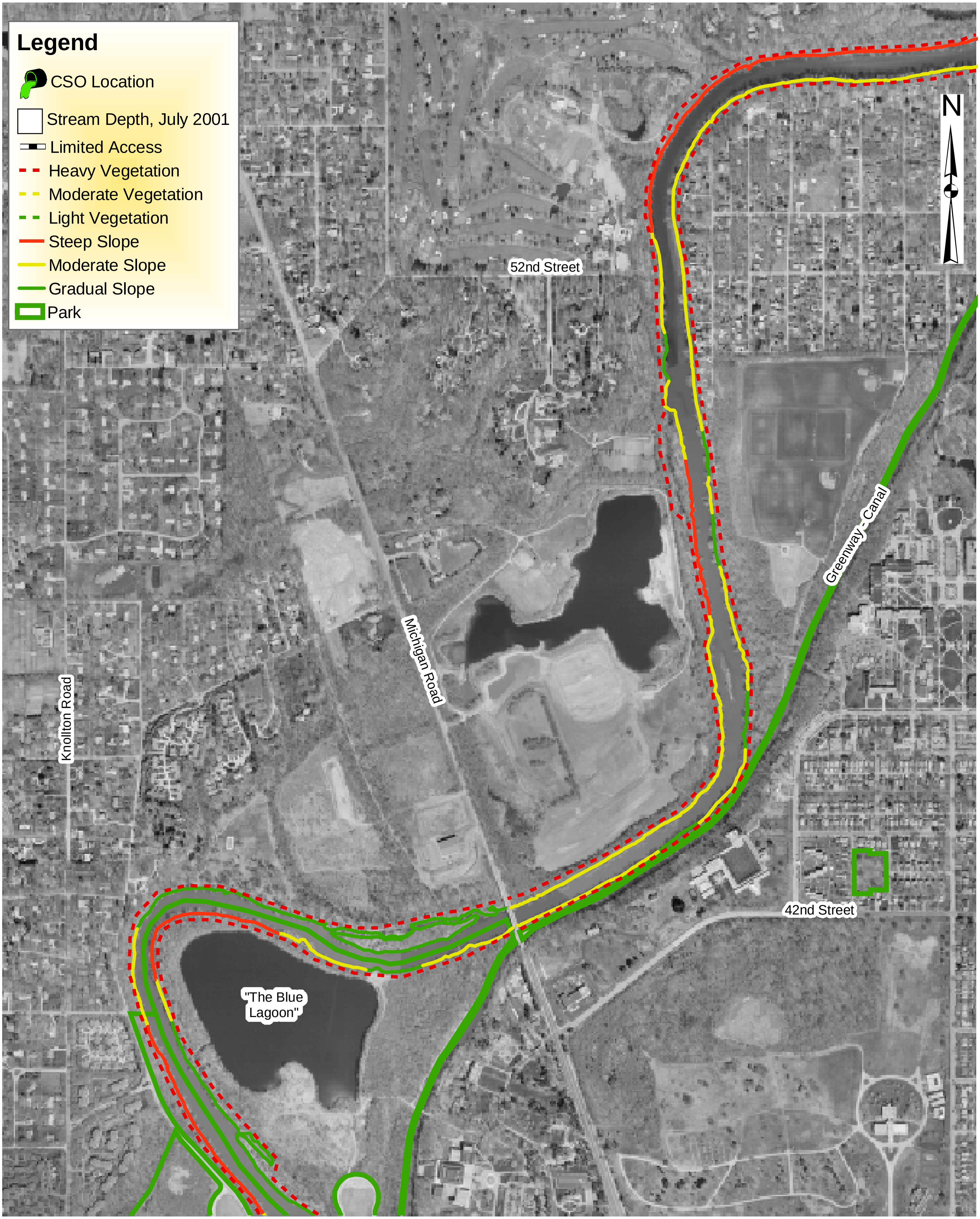


Figure 2-2b
Physical Stream Characteristics
White River
Sheet 2 of 8

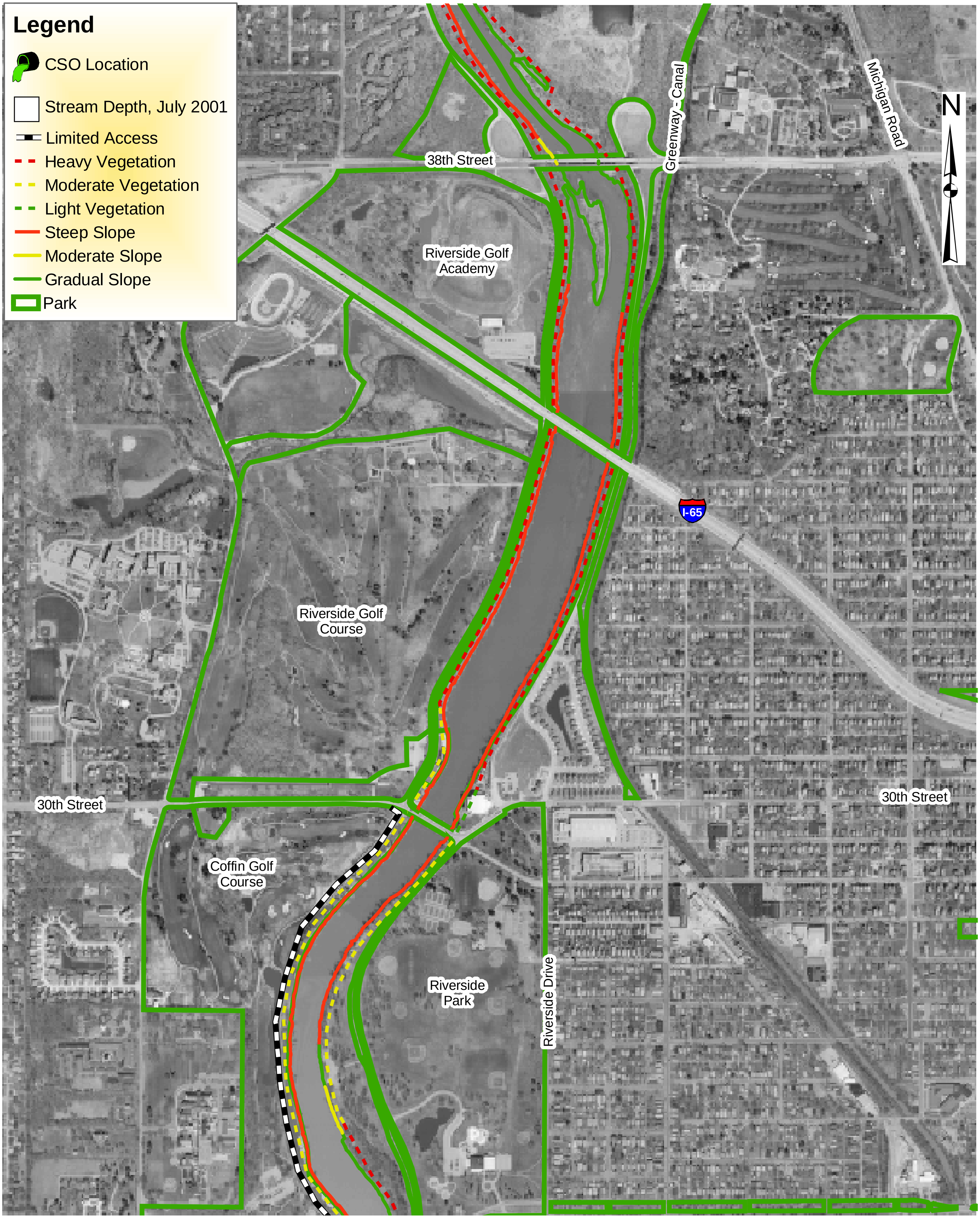


Figure 2-2c
Physical Stream Characteristics
White River
Sheet 3 of 8

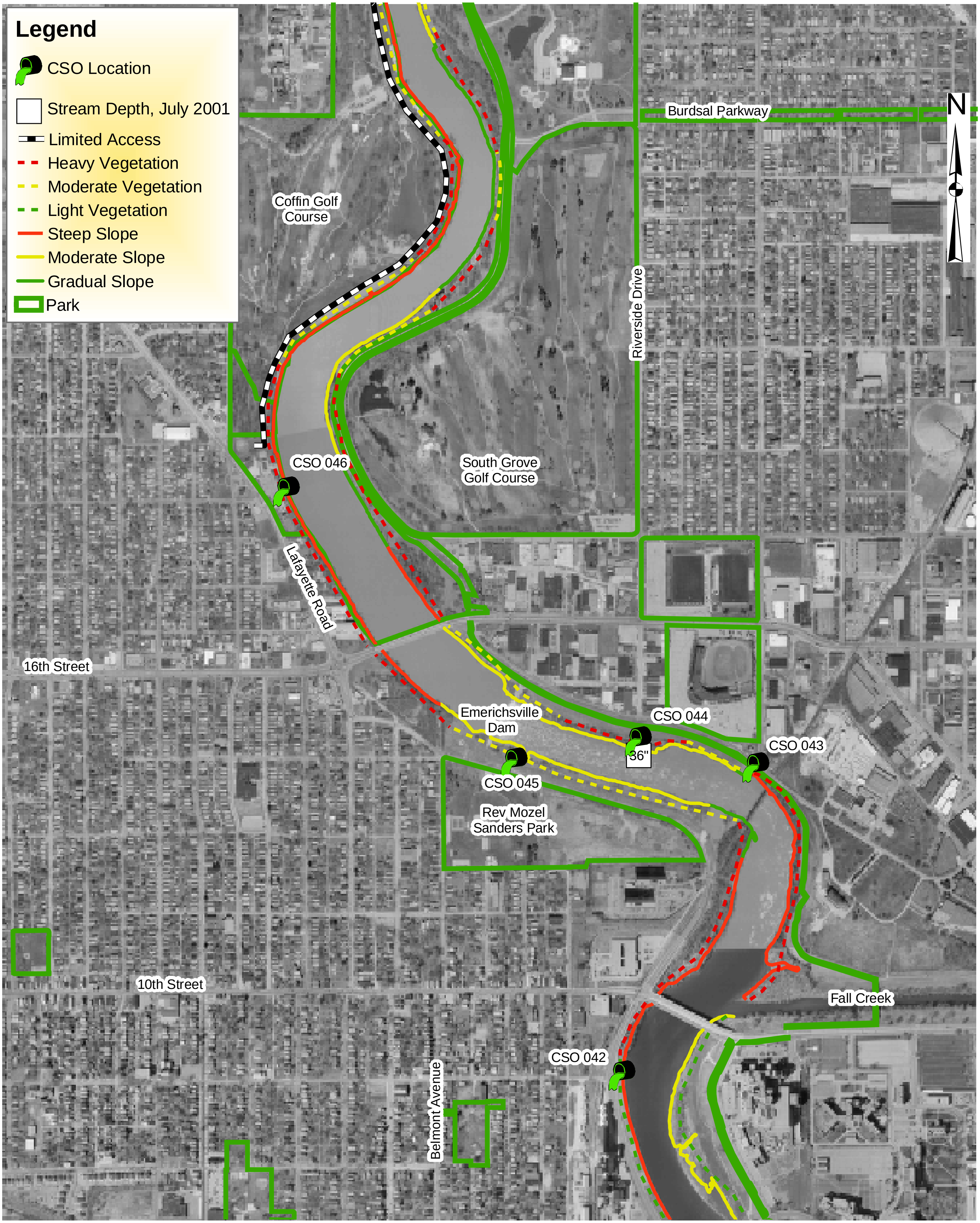


Figure 2-2d
Physical Stream Characteristics
White River
Sheet 4 of 8

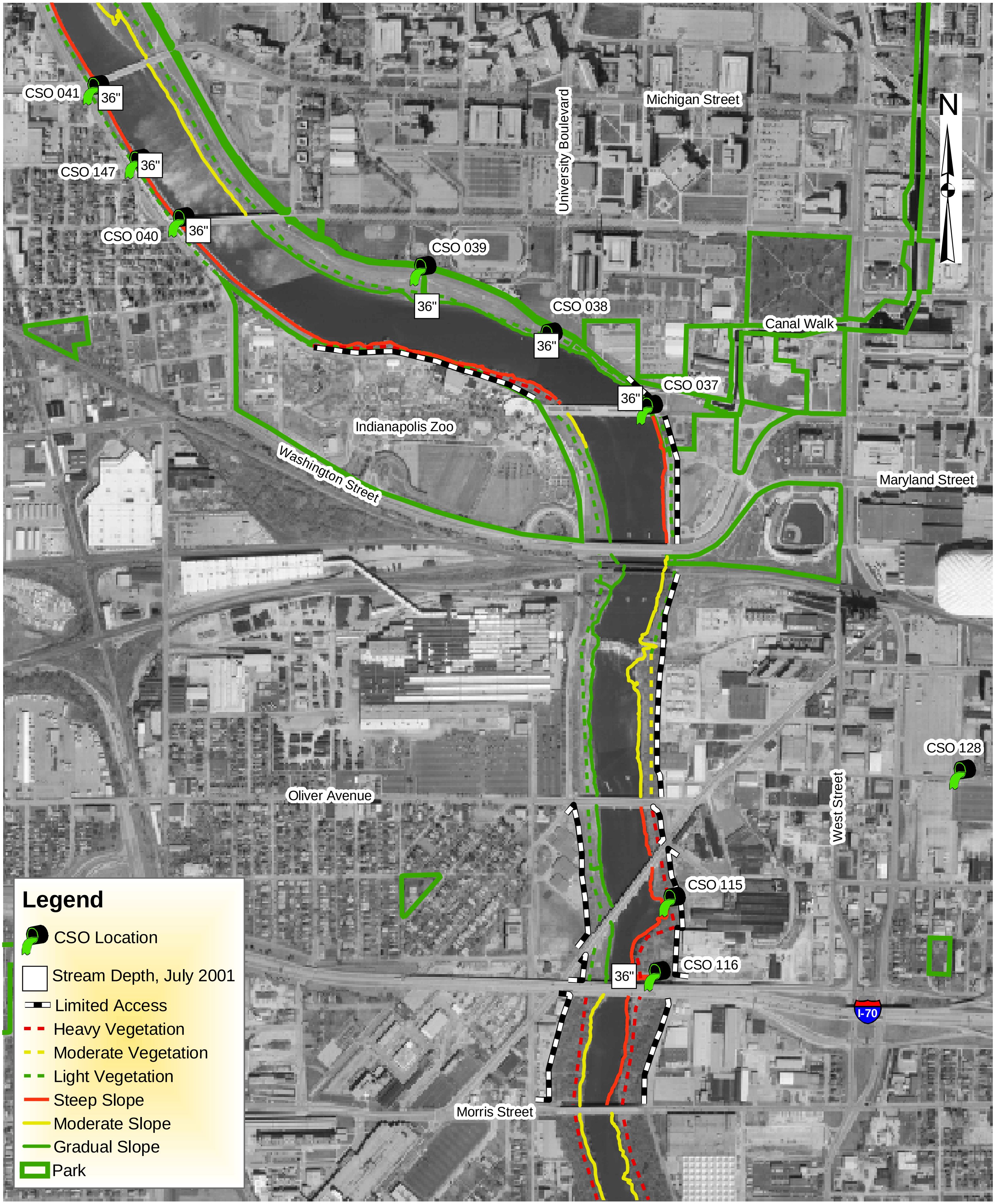


Figure 2-2e
Physical Stream Characteristics
White River
Sheet 5 of 8

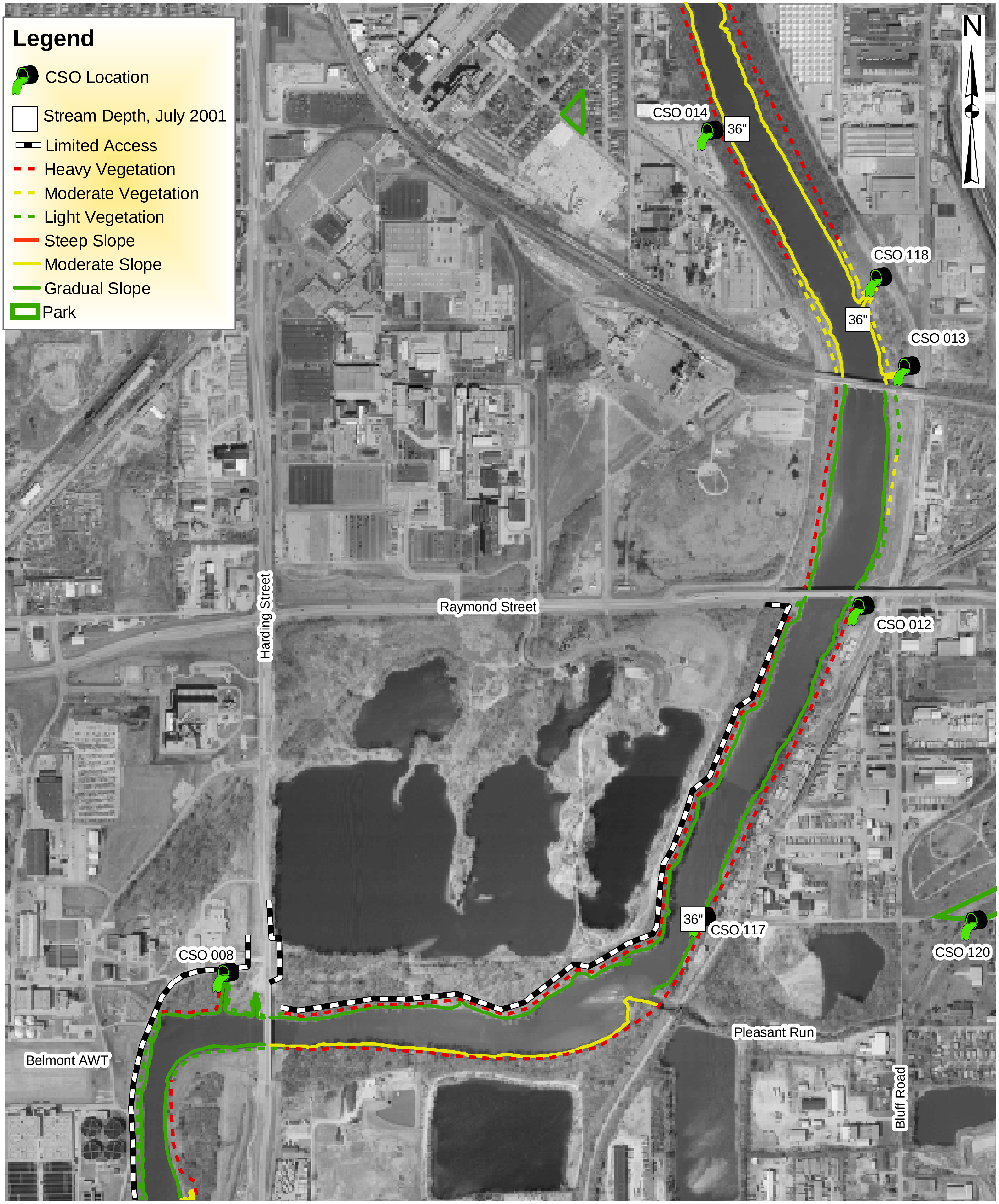


Figure 2-2f
Physical Stream Characteristics
White River
Sheet 6 of 8

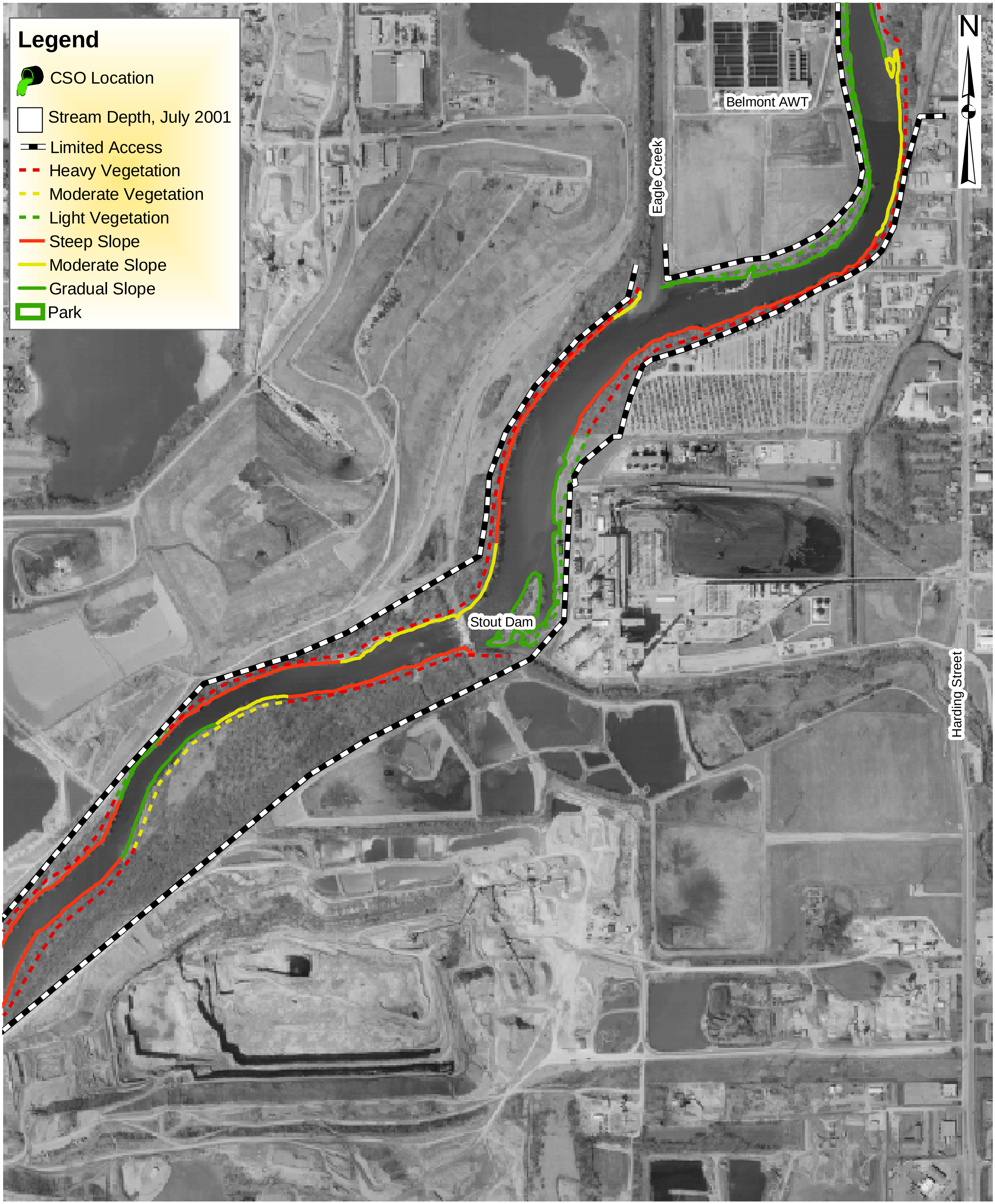


Figure 2-2g
Physical Stream Characteristics
White River
Sheet 7 of 8

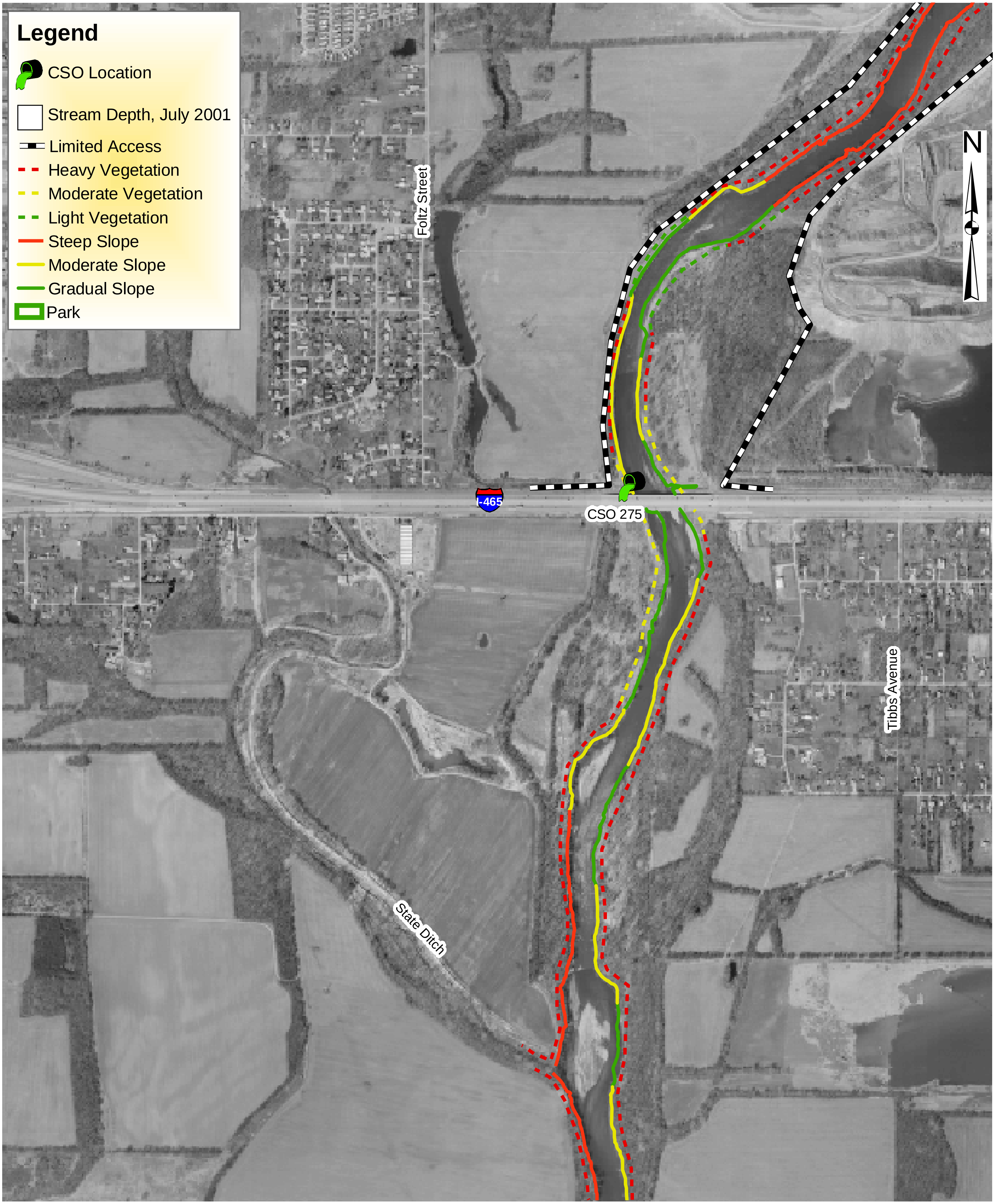


Figure 2-2h
Physical Stream Characteristics
White River
Sheet 8 of 8

Description of Marion County Streams

White River

Criteria	4 North of Holiday Park	4 North of Kessler St. Bridge	156 Kenwood Ave. and Westfield Blvd.	155 [3] Pennsylvania St. and 54th St.	205 Boulevard Pl. and Westfield Blvd.	4 Near Riviera Club	4 South of 52nd St.	4 North of Butler University	4 North of Christian Theological Seminary	4 North of Michigan Rd.	046 [3] Lafayette Rd. and 19th St.
Overflows per year (average) [1]			Eliminated (August 2002)	30	42						6
Annual Overflow Volume Range (MG/year) [1]				48-65	16-22						<1
Other Discharges											
Location											
Type											
Factors that support/encourage recreational use											
School	no	no	no	no	no	no	no	no	no	no	no
Park	yes	no	no	Riviera Club	no	Riviera Club	no	no	no	no	yes
Trail	yes, to river bank	yes, along east bank	along side CSO	no	no	no	trails along west bank	no	yes, along east bank	no	no
Other					backyard			several backyards run up to river bank			
Factors that prohibit/discourage recreational use											
Warning Signs/City Ordinance [2]	N/A	N/A	could not see from river	yes	could not see from river	N/A	N/A	N/A	N/A	N/A	yes
Fence	no	no	no	no	no	no	no	no	no	no	yes
Steep Banks	no	yes	yes, on west bank	yes	yes, on west bank	no	no	no	no	no	yes
Other	some woods	heavily wooded	wooded on both banks	wooded on both banks	rocky bank	heavily wooded on west bank	rocky east bank	heavily wooded on west bank	heavily wooded on west bank	rocky and heavily wooded banks	heavily wooded banks
Access											
West Bank	Moderately Difficult	Extremely Difficult		Moderately Difficult			Extremely Difficult	Extremely Difficult	Extremely Difficult		Extremely Difficult
East Bank		Moderately Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult	Moderately Difficult		Moderately Difficult	Moderately Difficult	Extremely Difficult	Extremely Difficult
Stream's Physical Attributes											
Depth	~ 1 - 1.5 ft.	~ 1 - 1.5 ft.	~ 3 -4 ft.	> 10 ft.	~ 3 -4 ft.	~ 7 ft.	~ 1 ft.	~ 1.5 ft.	~ 2 -3 ft.	~ 2 -3 ft.	
Velocity	slow	slow	slow	moderate - quick	slow	slow	slow	slow	slow	slow	quick
Width	~ 50 - 60 ft.	~ 50 - 60 ft.	~ 50 ft.	~ 80 ft.	~ 50 ft.	~ 50 - 60 ft.	~ 50 ft.	~ 50 ft.	~ 50 ft.	~ 50 ft.	~ 90 ft.
Substrate	rocky	rocky	some rocks, sandy	sand, cobble	some rocks, sandy	could not distinguish	rocky	sandy	could not distinguish	rocky	sandy
Safety	no	no	no	no	no	no	no	OK	OK	no	no
Land Use											
Public	yes	no	no	no	no	yes	no	no	yes	yes	yes
Residential/Wooded	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	no
Industrial/Commercial	no	no	no	no	no	no	no	no	no	no	no
Stream Use											
Habitat for Aquatic Species											
Natural riparian	yes	yes	yes		yes	yes	yes	yes	yes	yes	
Partially Developed (Subdivision)											
Fully Urbanized Development				yes							yes
Other Comments	area evaluated from kayak	area evaluated from kayak				area evaluated from kayak	area evaluated from kayak	area evaluated from kayak	area evaluated from kayak	area evaluated from kayak	accessible only by water

Notes:
1. Overflows per year and volume range were revised June 2004.
2. New bilingual warning signs are being placed at all CSO locations.
3. The data for this CSO was collected in June 2004.
4. Pictures not taken by CSO, additional river pictures.

Description of Marion County Streams

White River

Criteria	045[3]	044	043	042[3]	041	147	040	039	038	037	116
	WRPWD and Belmont Ave.	Waterway Blvd. And Riverside Dr.	Harding St. and Waterway Blvd.	Saint Clair St. and Lynn Ave.	WRPWD and Michigan St.	WRPWD and Vermont St.	New York St. and Koehne St.	New York St. and Beauty Ave.	New York St. and Agnes St.	Washington St. and Geisendorff St.	Meikel St. and Ray St.
Overflows per year (average)[1]	24	<1	46	40	26	13	13	39	31	16	40
Annual Overflow Volume Range (MG/year)[1]	19-26	<1	108-146	57-77	18-24	<1	2-3	111-151	7-9	13-17	39-53
Other Discharges											
Location								downstream	upstream		
Type								storm	storm		
Factors that support/encourage recreational use											
School	no	no	no	yes	no	no	no	yes, IUPUI	yes, IUPUI	yes, IUPUI	no
Park	no	no	no	yes	no	no	no	no	no	yes, zoo and White River Gardens	no
Trail	no	yes	yes	no	yes	yes	yes	yes	yes	yes	trails leading down to river
Other											
Factors that prohibit/discourage recreational use											
Warning Signs/City Ordinance[2]	yes	yes	yes	could not locate	yes	could not locate	could not locate	yes	yes	yes	could not locate
Fence	no	no	no	no	no	no	no	no	no	no	no
Steep Banks	no	no	yes	no	concrete west bank	concrete west bank	concrete west bank	no	concrete wall on west side	no	yes
Other		concrete bank	dense vegetation	currently under construction				no		vegetation on west side	no
Access											
West Bank	Easy	Moderately Difficult	Moderately Difficult	Easy	Extremely Difficult	Moderately Difficult	Moderately Difficult	Extremely Difficult	Extremely Difficult	Extremely Difficult	Easy
East Bank	Easy	Moderately Difficult	Extremely Difficult	Easy	Easy	Easy	Easy	Easy	Easy	Easy	Extremely Difficult
Stream's Physical Attributes											
Depth	~ 2 - 3 ft.	~ 2 - 3 ft.	~ 2 - 3 ft.		~ 2 - 3 ft.	~ 2 - 3 ft.	~ 2 - 3 ft.	~ 2 - 3 ft.	~ 2 - 3 ft.	~ 2 - 3 ft.	~ 2 - 3 ft.
Velocity	none	slow	slow	quick	slow	slow	slow	slow	slow	slow	slow
Width	~ 20 ft.	~ 80 ft.	~ 80 ft.	~ 80'	~ 80 ft.	~ 80 ft.	~ 80 ft.	~ 80 ft.	~ 80 ft.	~ 80 ft.	~ 50-60 ft.
Substrate	mud	muddy by bank	muddy by bank	sandy	could not distinguish	could not distinguish	could not distinguish	could not distinguish	could not distinguish	could not distinguish	little rocks, sandy
Safety	OK	OK	OK	no	OK	OK	OK	OK	OK	OK	OK
Land Use											
Public	yes	yes	yes	no	no	no	no	no	no	no	yes
Residential/Wooded	no	no	no	no	no	no	no	no	no	no	no
Industrial/Commercial	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Stream Use											
Habitat for Aquatic Species											
Natural riparian		yes	yes		yes, east side	yes, east side	yes, east side	yes, east side	yes, east side	yes, east side	yes
Partially Developed (Subdivision)											
Fully Urbanized Development	yes	yes, on west side		yes	yes, west side	yes, west side	yes, west side	yes, west side	yes, west side		
Other Comments	spills into side channel ~30 ft.			short side shoot							

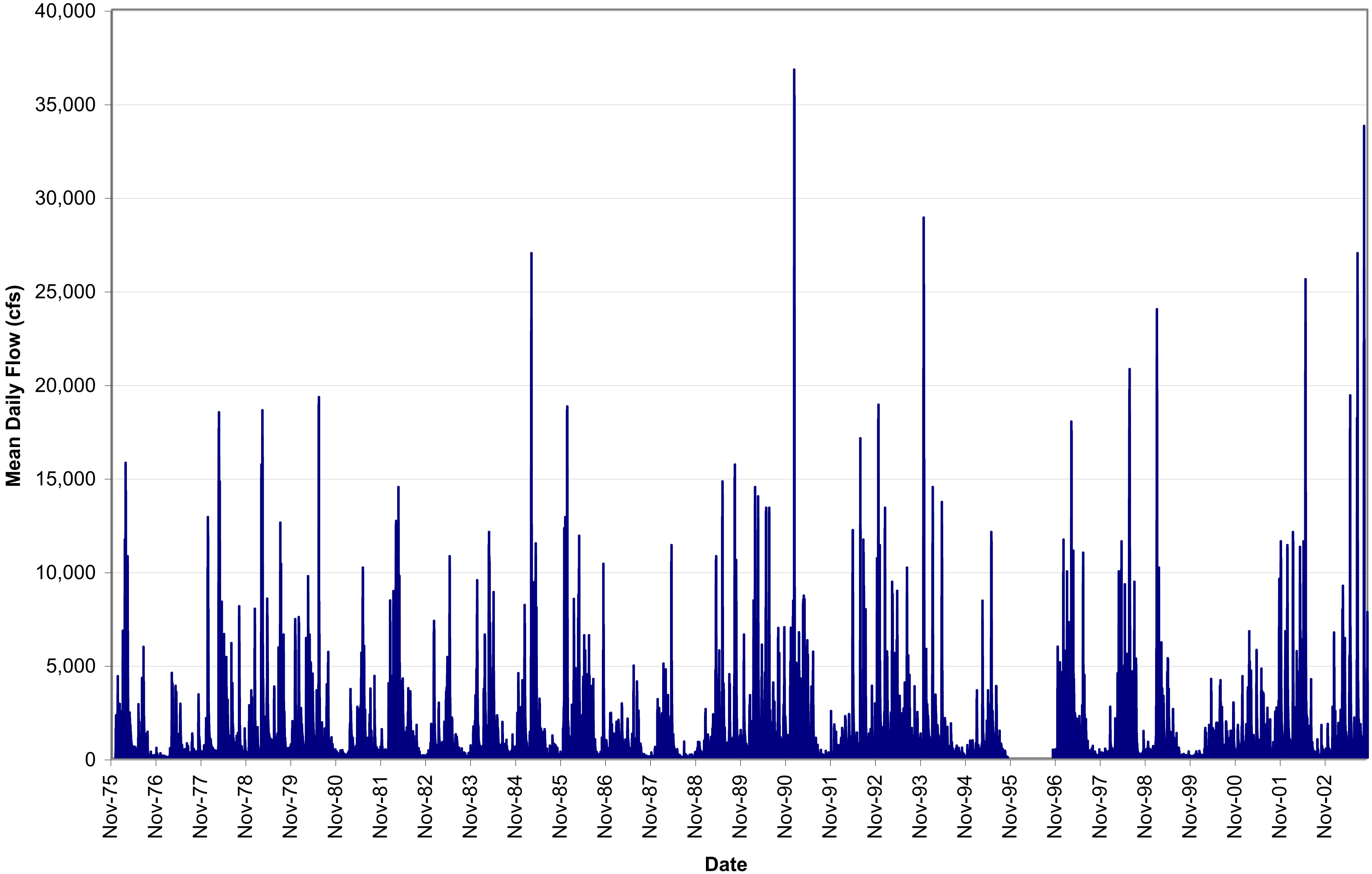
Notes:
1. Overflows per year and volume range were revised June 2004.
2. New bilingual warning signs are being placed at all CSO locations.
3. The data for this CSO was collected in June 2004.
4. Pictures not taken by CSO, additional river pictures.

Description of Marion County Streams

White River

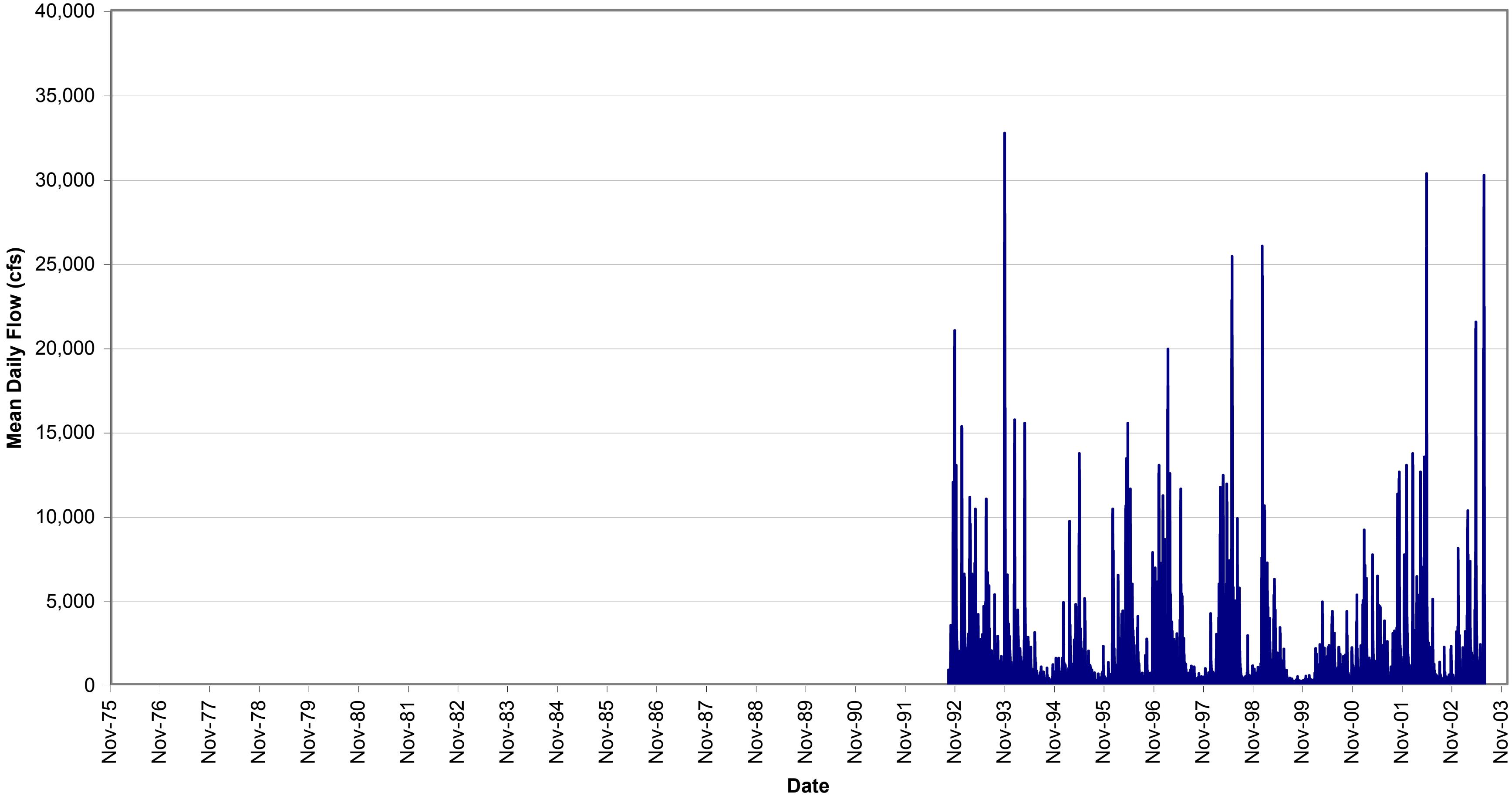
Criteria	014 Kentucky Ave. and York St.	118 WRPED and West St.	013 Meridian St. and Adler St.	012 Raymond St. and West St.	117 Southern Ave. and White River	008[3] Belmont AWT	275[3] 4945 S. Foltz
Overflows per year (average)[1]	Eliminated	51	21	34	67-70[5]	67-70[5]	3
Annual Overflow Volume Range (MG/year)[1]	(May 2002)	461-623	21-29	8-11	978-1,323[5]	978-1,323[5]	2-3
Other Discharges							
Location	NW corner of bridge			Downstream, SW side			
Type	storm			submerged			
Factors that support/encourage recreational use							
School	no	no	no	no	no	no	no
Park	no	no	no	no	no	no	no
Trail	no	no	no	yes	road by lift stations	no	yes, east side
Other					stairs down to CSO		
Factors that prohibit/discourage recreational use							
Warning Signs/City Ordinance[2]	could not locate	yes	yes	could not locate	yes	yes	could not locate
Fence	no	no	no	no	no	yes	no
Steep Banks	no	gradual, concrete	gradual, concrete	no	no	no	no
Other	dense vegetation	some vegetation	some vegetation	dense vegetation on south side	dense vegetation	dense vegetation	dense vegetation on west side
Access							
West Bank	Moderately Difficult	Moderately Difficult	Moderately Difficult	Extremely Difficult	Extremely Difficult	Moderately Difficult	Extremely Difficult
East Bank	Extremely Difficult	Extremely Difficult	Extremely Difficult	Easy	Extremely Difficult	Moderately Difficult	Easy
Stream's Physical Attributes							
Depth	2 - 3 ft.	2 - 3 ft.	2 - 3 ft.	2 - 3 ft.	~ 2 - 3 ft.	NA	variable
Velocity	slow	slow	slow	slow	slow	NA	moderate
Width	60 - 70 ft.	60 - 70 ft.	60 - 70 ft.	60 - 70 ft.	~ 50-60 ft.	NA	~ 65 ft.
Substrate	sandy	sandy	sandy	sandy	big rocks by bank	NA	cobble
Safety	OK	OK	OK	OK	no	NA	yes
Land Use							
Public	yes	no	no	yes	no	yes	no
Residential/Wooded	no	no	no	no	no	no	yes, west side
Industrial/Commercial	yes	yes	yes	yes	yes	no	yes, east side
Stream Use							
Habitat for Aquatic Species							
Natural riparian	yes	yes	yes	yes	yes		yes
Partially Developed (Subdivision)		yes, concrete banks	yes, concrete banks				
Fully Urbanized Development						yes	
Other Comments					behind National By-Products	discharges into side channel	

Notes:
1. Overflows per year and volume range were revised June 2004.
2. New bilingual warning signs are being placed at all CSO locations.
3. The data for this CSO was collected in June 2004.
4. Pictures not taken by CSO, additional river pictures.
5. CSO 117 and 008 statistics represent the cumulative statistics for CSOs 008 and 117. The individual overflow volume at CSOs 008 and 117 is dependant on the operation of the Southwest Diversion Structure operation. The cumulative overflow volume at b



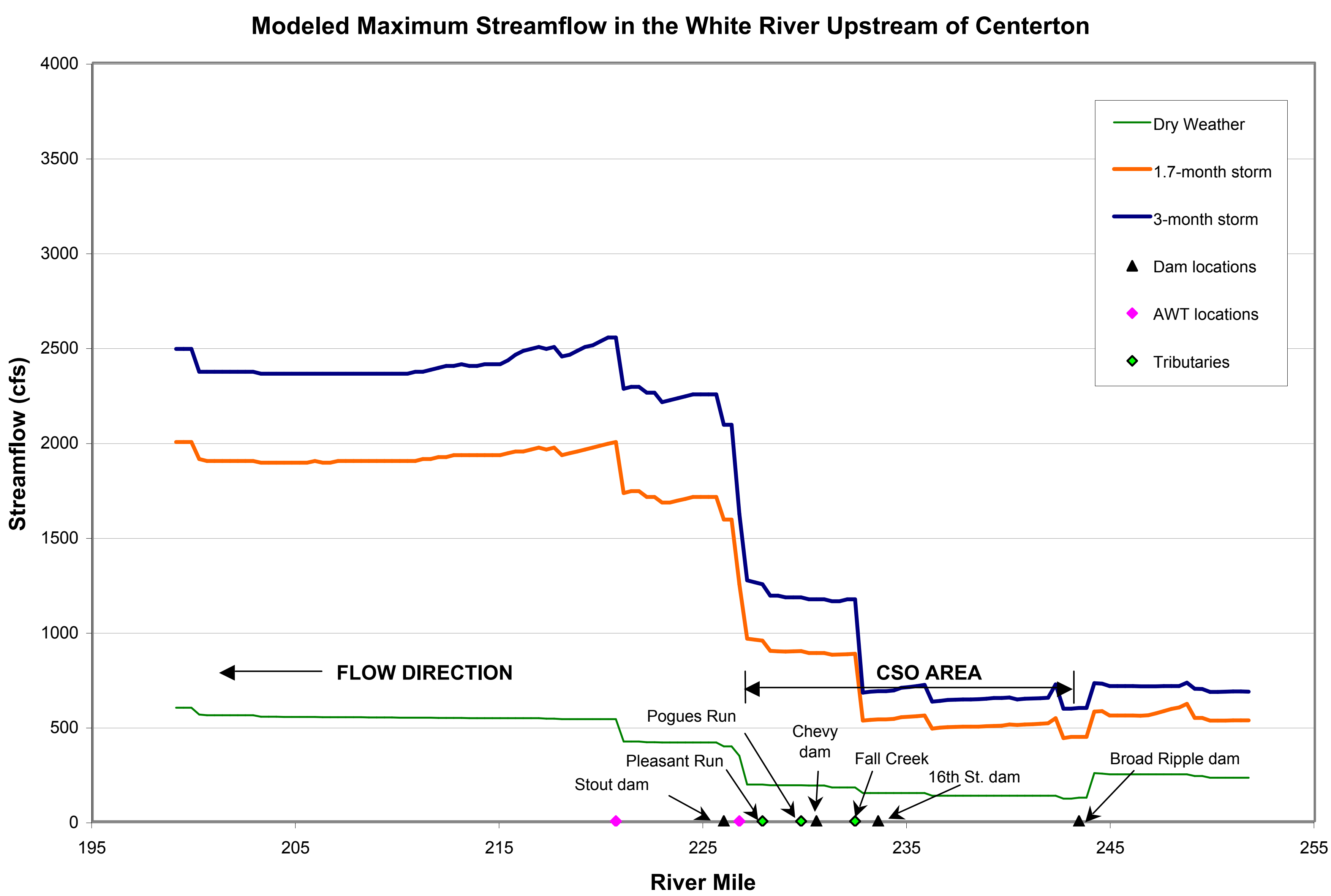
Source: USGS gauge station 03353000 in White River (at Morris Street) at Indianapolis, November 28, 1975 to September 30, 2003.

Flow Variations in White River at Morris Street

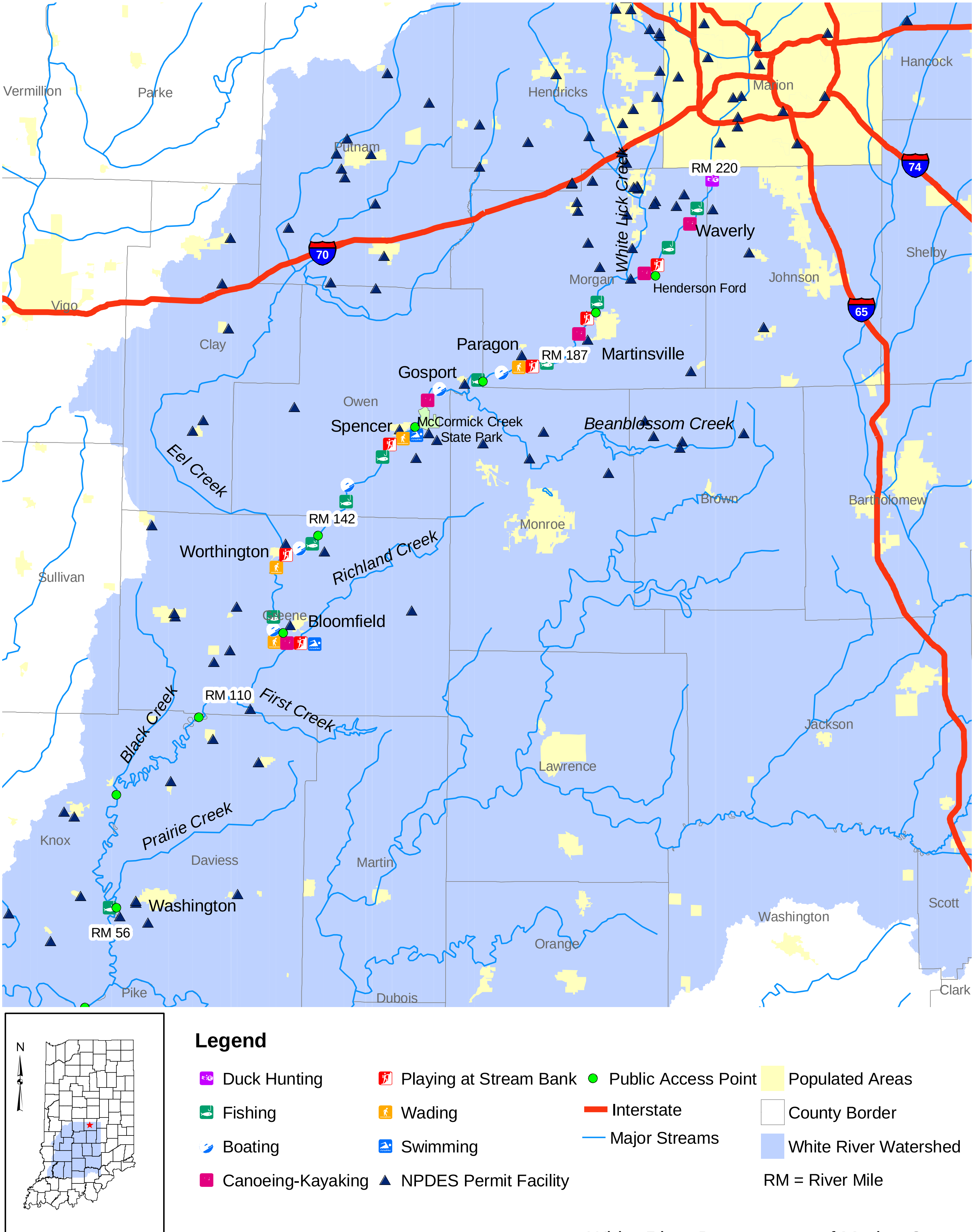


Source: USGS gauge station 03353611 in White River at Stout Gen. Stn. at Indianapolis, October 1, 1992 to September 30, 2003. Data not available before October 1, 1992.

Flow Variations in White River at Stout Generating Station



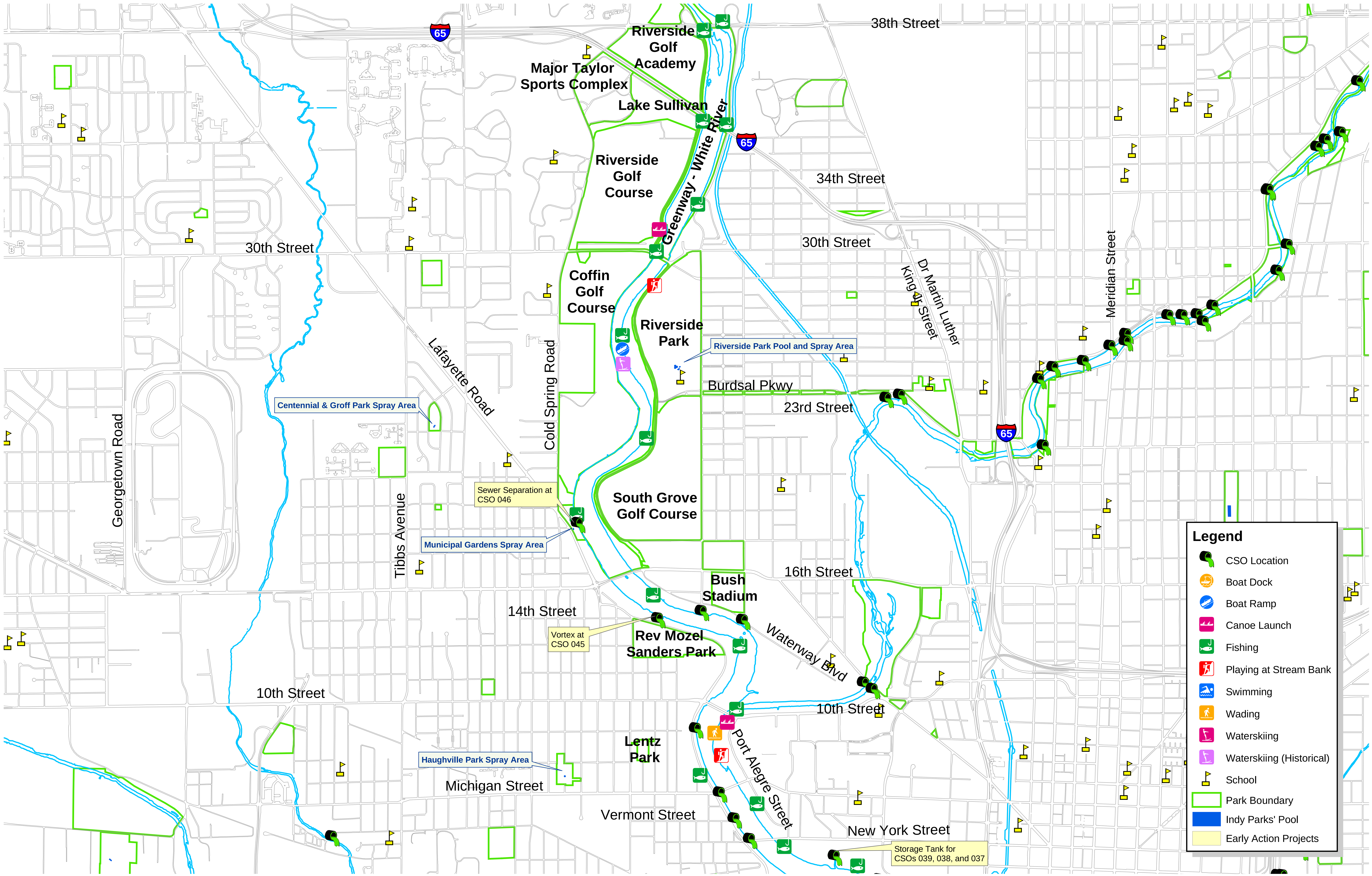
Modeled Maximum Streamflow in the White River Upstream of Centerton
Streamflow (cfs)
4000
3500
3000
2500
2000
1500
1000
500
0
195
205
215
225
235
245
255
River Mile
Dry Weather
1.7-month storm
3-month storm
Dam locations
AWT locations
Tributaries
FLOW DIRECTION
CSO AREA
Pogues Run
Chevy dam
Pleasant Run
Fall Creek
Stout dam
16th St. dam
Broad Ripple dam



White River Downstream of Marion County
Reported and Observed Uses

(IGS, 2004, http://igs.indiana.edu/arcims/statewide/download.html)
(Purdue University CAAGIS, 2004, http://danpatch.ecn.purdue.edu/~caagis/ftp/gisdata/data.html)

White River
Reported and Observed Uses
Sheet 1 of 4

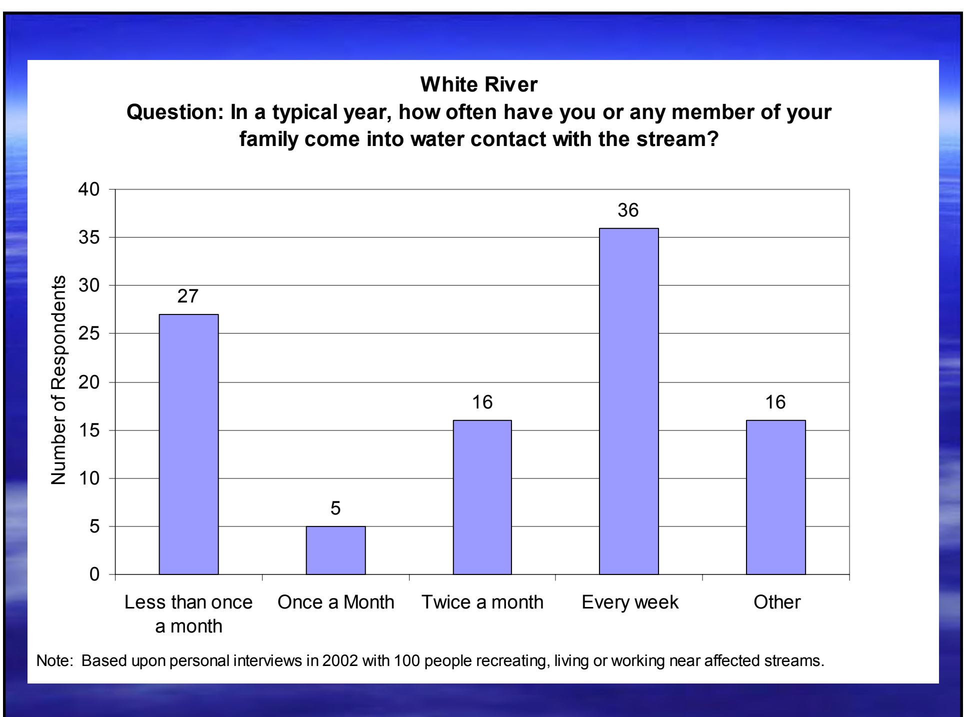


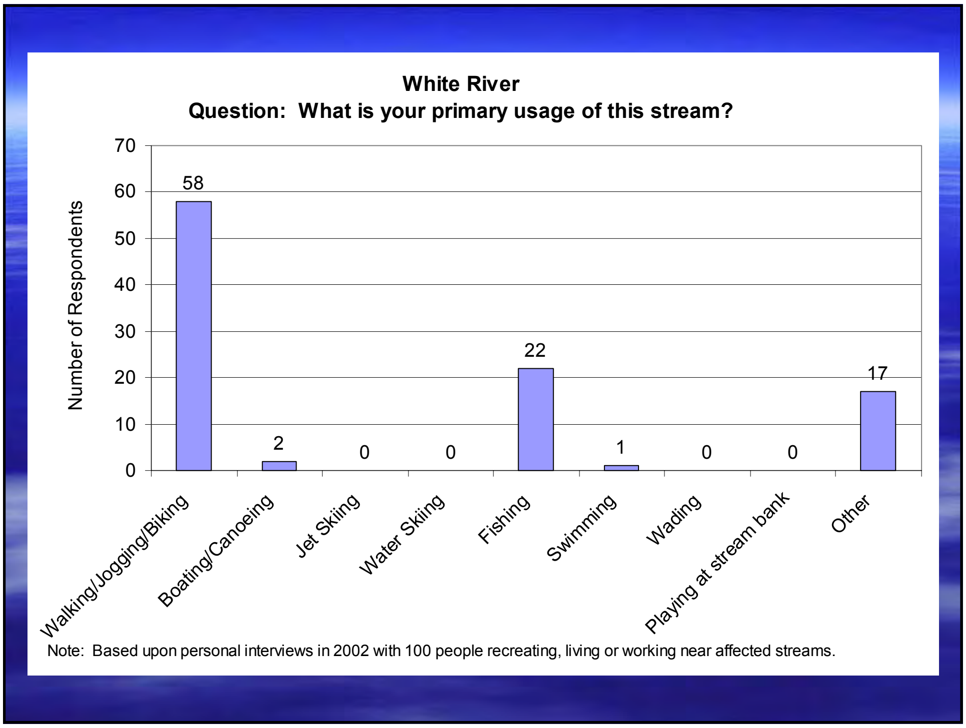
White River
Reported and Observed Uses
Sheet 2 of 4

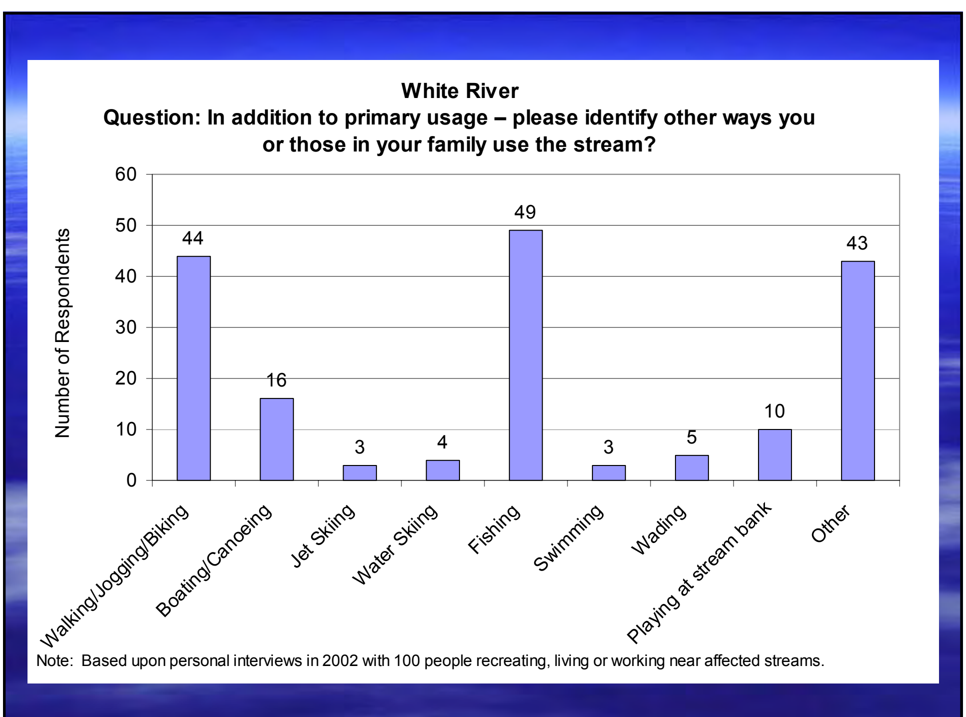

Stringtown Park
Indianapolis Zoo
Victory Field
Storage Tank for CSOs 039, 038, and 037
Washington Street
Oliver Avenue
White River Pkwy W Drive
Rhodius Park Pool
Morris Street
Drover Street
White River Pkwy E Drive
West Street
Holt Road
Tibbs Avenue
LaShanna Bates Aquatic Center
Kentucky Avenue
Inflatable Dam at CSO 118
Raymond Street
Harding Street
Interplant Connection
Troy Avenue
AWT Upgrades
Belmont AWT
Sumner Avenue
70
N
Legend
CSO Location
Boat Dock
Boat Ramp
Canoe Launch
Fishing
Playing at Stream Bank
Swimming
Wading
Waterskiing
Waterskiing (Historical)
School
Park Boundary
Indy Parks' Pools
Early Action Projects
White River
Reported and Observed Uses
Sheet 3 of 4

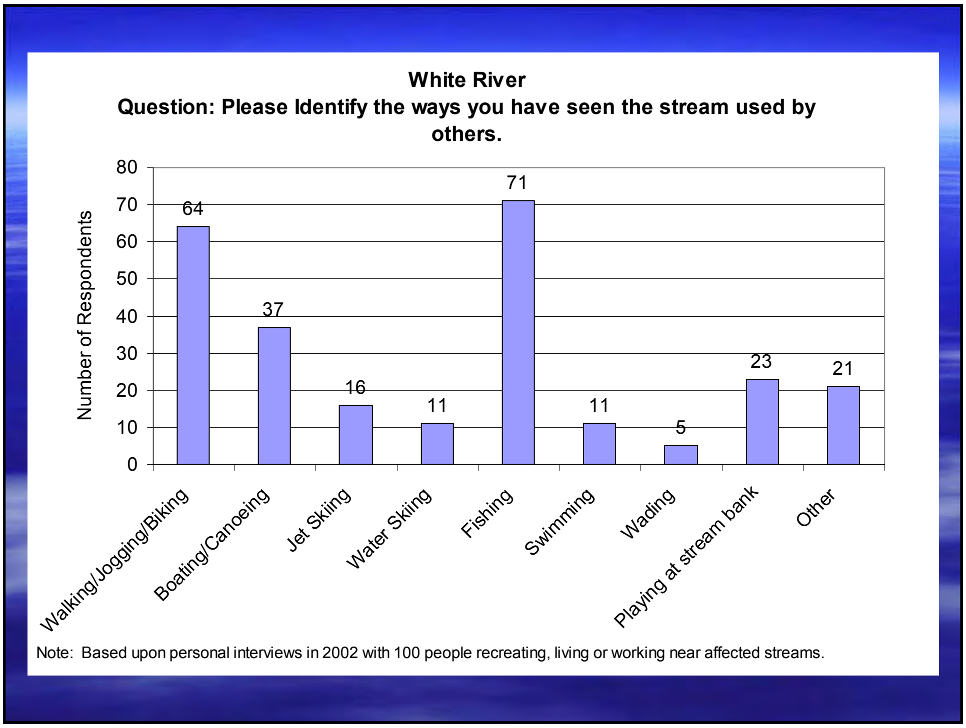
White River
Reported and Observed Uses
Sheet 4 of 4

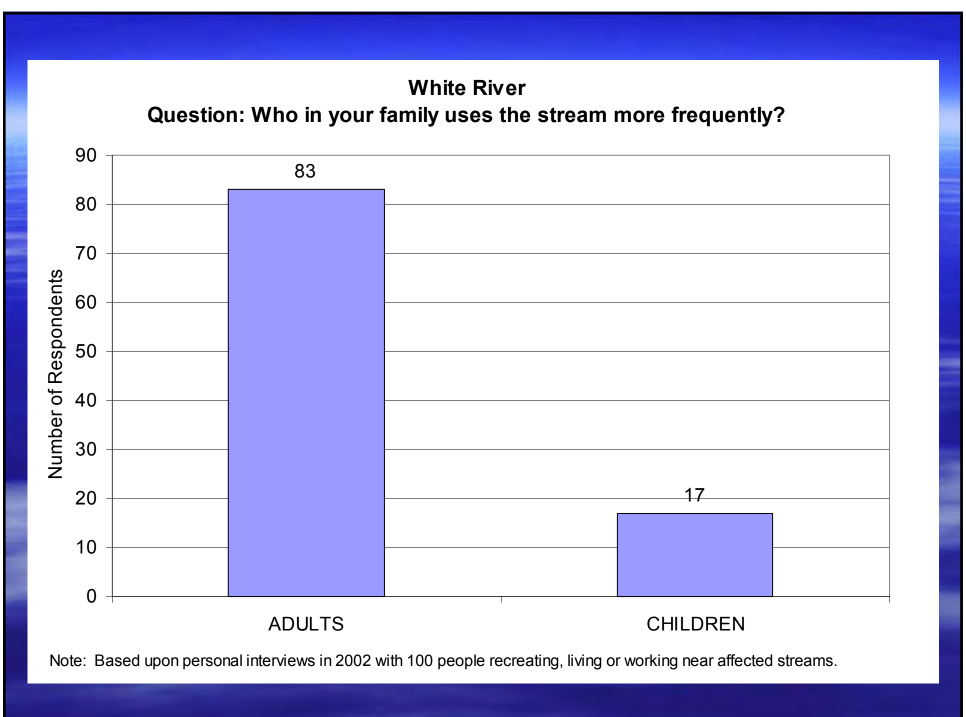

White River
Use Survey Data
Site: Upstream of New York St. bridge

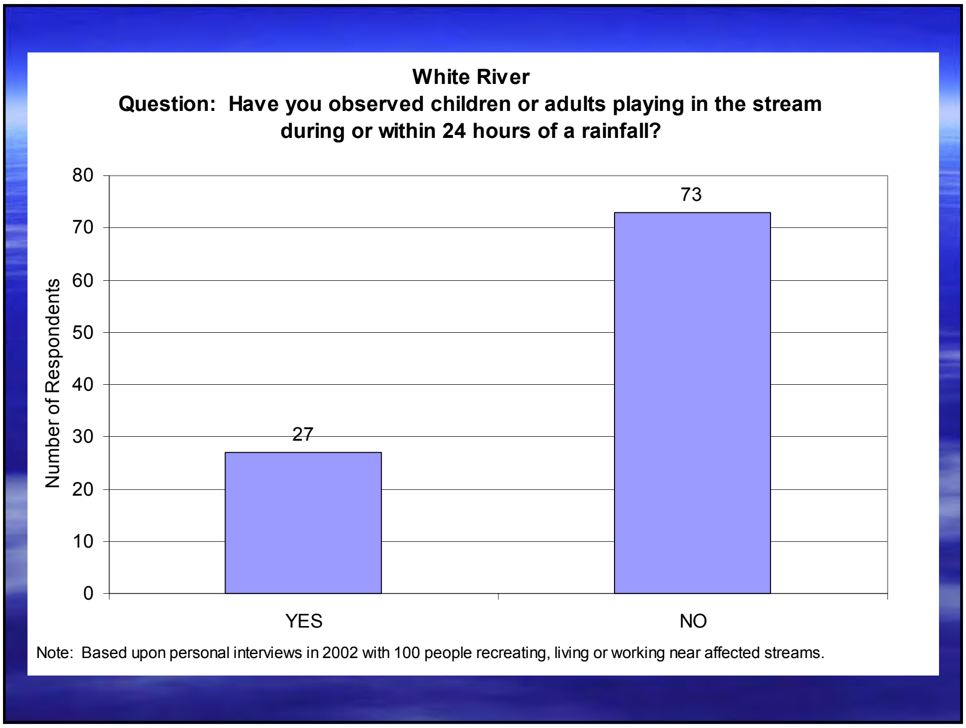

White River
Question: In a typical year, how often have you or any member of your family come into water contact with the stream?
Number of Respondents
40
35
30
25
20
15
10
5
0
27
5
16
36
16
Less than once a month
Once a Month
Twice a month
Every week
Other
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

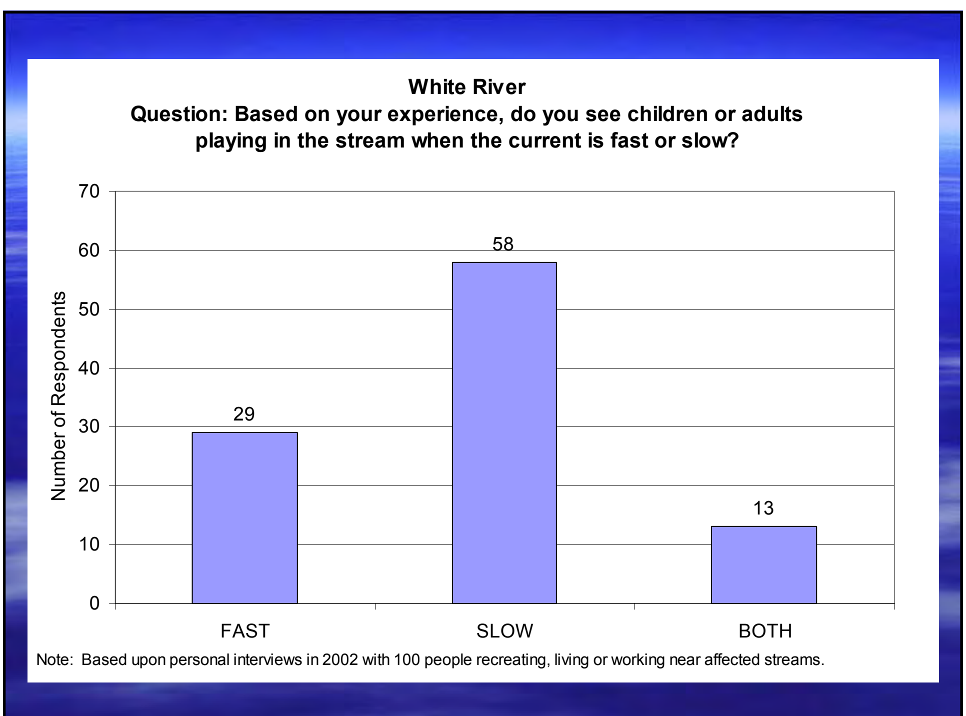

White River
Question: What is your primary usage of this stream?
Number of Respondents
70
60
50
40
30
20
10
0
58
2
0
0
22
1
0
0
17
Walking/Jogging/Biking
Boating/Canoeing
Jet Skiing
Water Skiing
Fishing
Swimming
Wading
Playing at stream bank
Other
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

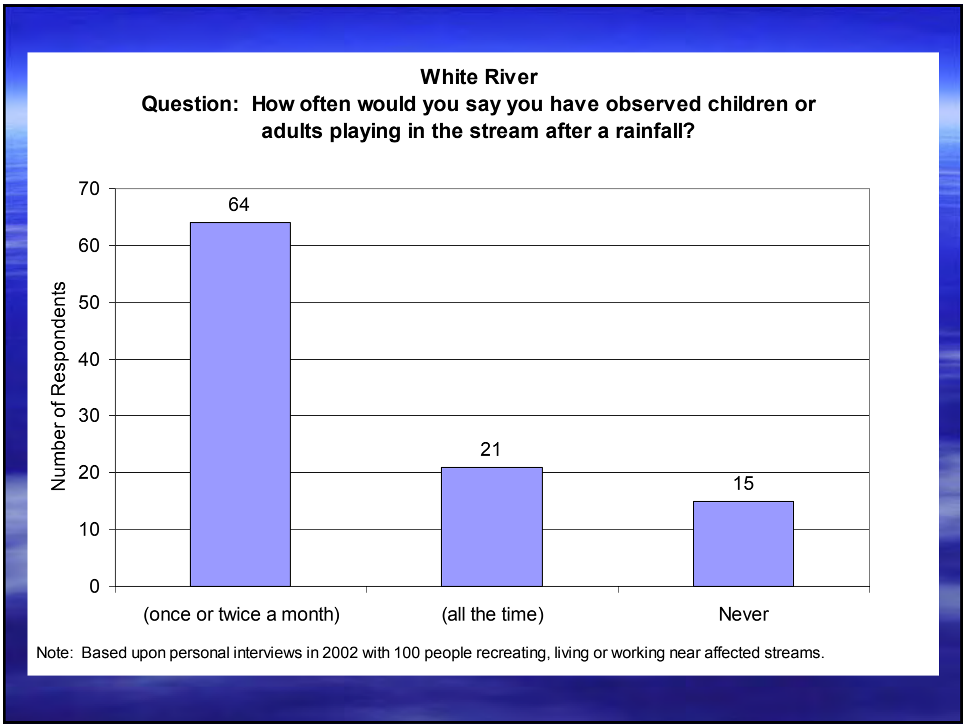

White River
Question: In addition to primary usage – please identify other ways you or those in your family use the stream?
Number of Respondents
60
50
40
30
20
10
0
44
16
3
4
49
3
5
10
43
Walking/Jogging/Biking
Boating/Canoeing
Jet Skiing
Water Skiing
Fishing
Swimming
Wading
Playing at stream bank
Other
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

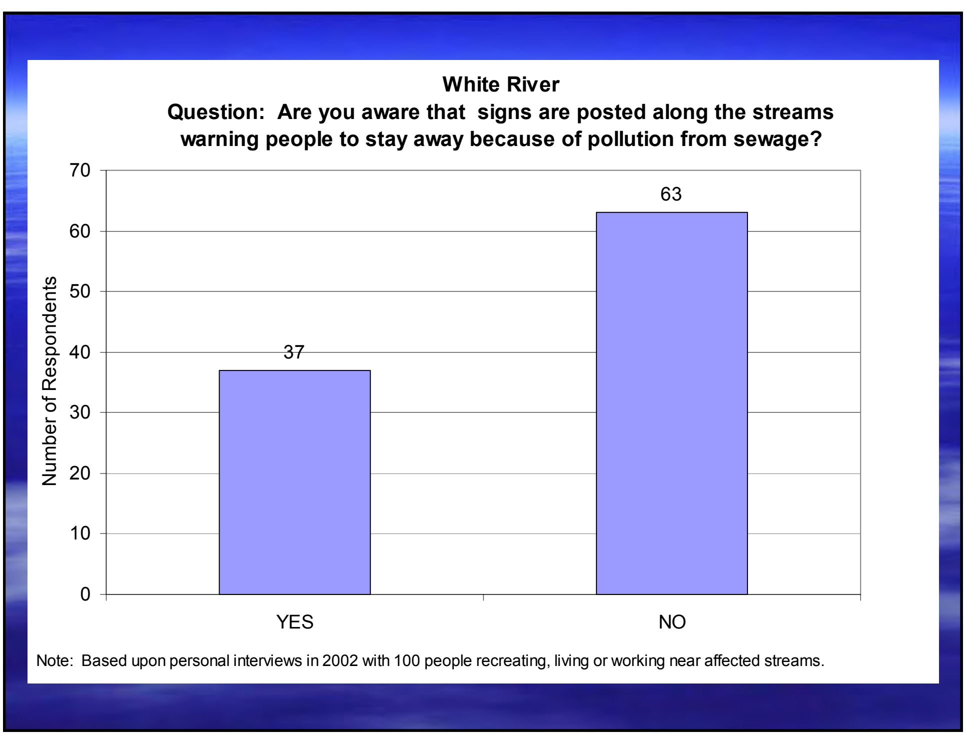

White River
Question: Please Identify the ways you have seen the stream used by others.
Number of Respondents
80
70
60
50
40
30
20
10
0
64
37
16
11
71
11
5
23
21
Walking/Jogging/Biking
Boating/Canoeing
Jet Skiing
Water Skiing
Fishing
Swimming
Wading
Playing at stream bank
Other
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

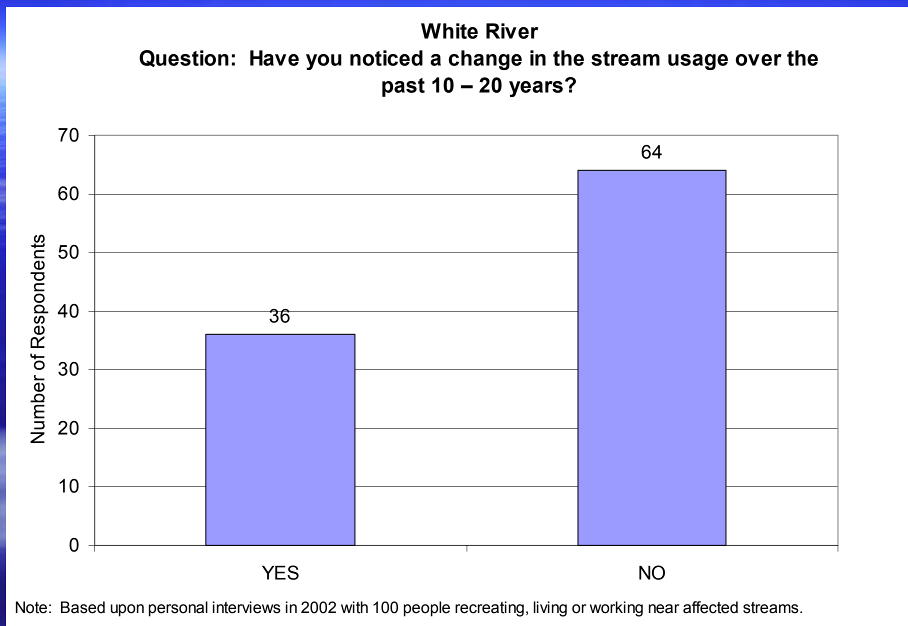

White River
Question: Who in your family uses the stream more frequently?
Number of Respondents
90
80
70
60
50
40
30
20
10
0
83
17
ADULTS
CHILDREN
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


White River
Question: Have you observed children or adults playing in the stream during or within 24 hours of a rainfall?
Number of Respondents
80
70
60
50
40
30
20
10
0
27
73
YES
NO
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


White River
Question: Based on your experience, do you see children or adults playing in the stream when the current is fast or slow?
Number of Respondents
70
60
50
40
30
20
10
0
29
58
13
FAST
SLOW
BOTH
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.

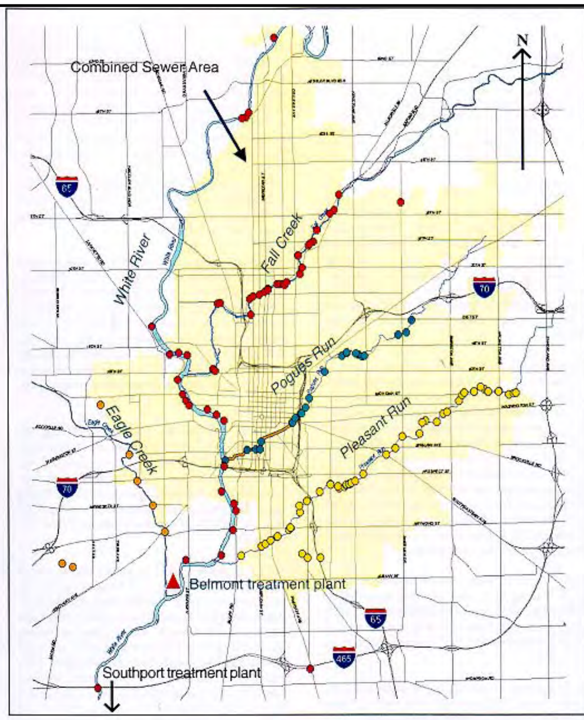

White River
Question: How often would you say you have observed children or adults playing in the stream after a rainfall?
Number of Respondents
70
60
50
40
30
20
10
0
64
21
15
(once or twice a month)
(all the time)
Never
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.


White River
Question: Are you aware that signs are posted along the streams warning people to stay away because of pollution from sewage?
Number of Respondents
70
60
50
40
30
20
10
0
37
63
YES
NO
Note: Based upon personal interviews in 2002 with 100 people recreating, living or working near affected streams.



Location of Uses on White River

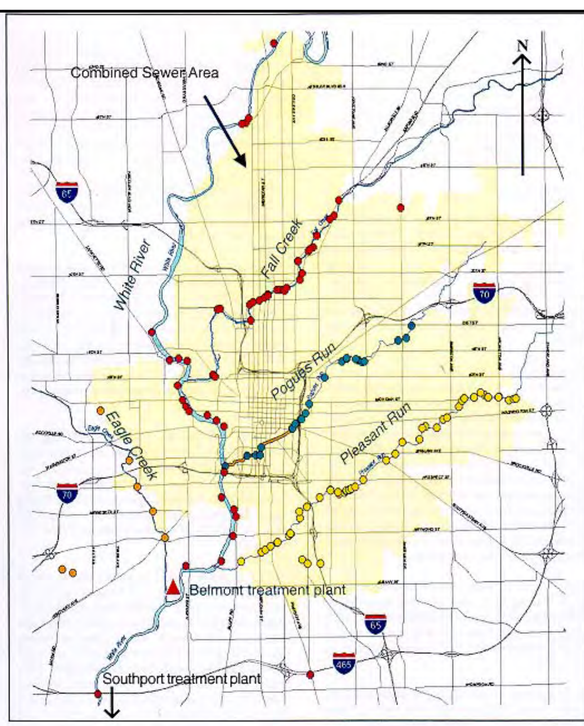
Activity	Location/Direct Respondent	Stream Survey	MCHD
Fishing/Boating	Lake Indy/30th St. Boat Ramp	X	X
PSB	Highland Trailer Park		
Boating	White River Boat Dock		
Fishing	10th St. & White River Pkwy		
Wading	Hanna Ave. (1500 E – 4600 S, Lick Creek)		
Fishing	30th Street		
Fishing	16th St. Dam		X
Fishing	Riverside & Park		X
Fishing	White River Parkway (N. of 30th St.)		X
Fishing	R&R Bridge (N. of 10th St.)		X
Fishing	I-65 Bridge (East & West bank, 56th & Westfield Blvd.)		X
Fishing	38th St. Bridge		
Wading	State Ditch (Gadsen St.)		



WHITE RIVER/ Tributaries:
Location Activity
Direct Respondent

Cluster of activity: Raymond St. to 5600 N.

1. Boat docks and water depth promote boating.
2. Fishing cluster between 16th St. & 38th St.
3. Lick Creek promotes wading and playing at stream bank, given stream access, depth and close proximity of residences to the water basin.
4. Wading was noted on State Ditch at Gadsen.



WHITE RIVER/Tributaries:
Location Activity
Direct Respondent

Fishing/Boating

	† * Lake Indy/30th St. Boat Ramp
PSB	Highland Trailer Park (Cossell Rd. near Floral Park Cemetery)
Boating	White River Boat Dock
Fishing	10th St. & White River Pkwy
Wading	Hanna Ave. (1500 E – 4600 S, Lick Creek)
Fishing	30th Street
Fishing	*16th St. Dam
Fishing	*Riverside Park
Fishing	*White River Parkway (N. of 30th St.)
Fishing	*R&R Bridge (N. of 10th St.)
Fishing	*I-65 Bridge (East & West bank, 56th & Westfield Blvd.)
Fishing	38th St. Bridge
Wading	State Ditch (Gadsen St.)

PSB=Playing at Stream Bank

† Reported on Stream Survey.
** Reported to MCHD.*

FINAL Survey Results - White River

In a typical year, how often have you or any member of your family come into water contact with WHITE RIVER?

	Total Number	%
Less than once a month	27	27%
Once a Month	5	5%
Twice a month	16	16%
Every week	36	36%
Other	16	16%
TOTALS	100	100%

What is your primary usage of this stream?

	Total Number	%
Walking/Jogging/Biking	58	58%
Boating/Canoeing	2	2%
Jet Skiing	0	0%
Water Skiing	0	0%
Fishing	22	22%
Swimming	1	1%
Wading	0	0%
Playing at stream bank	0	0%
Other	17	17%
TOTALS	100	100%

In addition to primary usage – please identify other ways you or those in your family use the stream.

	Total Number	%
Walking/Jogging/Biking	44	25%
Boating/Canoeing	16	9%
Jet Skiing	3	2%
Water Skiing	4	2%
Fishing	49	28%
Swimming	3	2%
Wading	5	3%
Playing at stream bank	10	6%
Other	43	24%
TOTALS	177	100%

Please identify the ways you have seen the stream used by others.

	Total Number	%
Walking/Jogging/Biking	64	25%
Boating/Canoeing	37	14%
Jet Skiing	16	6%
Water Skiing	11	4%
Fishing	71	27%
Swimming	11	4%
Wading	5	2%
Playing at stream bank	23	9%
Other	21	8%
TOTALS	259	100%

Also, who in your family uses the stream most frequently?

	Total Number	%
ADULTS	83	83%
CHILDREN	17	17%
TOTAL	100	100%

Have you observed children or adults playing in the stream during or within 24 hours after a rainfall?

	Total Number	%
YES	27	27%
NO	73	73%
TOTAL	100	100%

Based on your experience, do you see children or adults playing in the stream when the current is fast or slow?

	Total Number	%
FAST	29	29%
SLOW	58	58%
BOTH	13	13%
TOTALS	100	100%

How often would you say you have observed children or adults playing in the stream after a rainfall?

	Total Number	%
(once or twice a month)	64	64%
(all the time)	21	21%
Never	15	15%
TOTALS	100	100%

Are you aware that signs are posted along the streams warning people to stay away because of pollution from sewage?

	Total Number	%
YES	37	37%
NO	63	63%
TOTAL	100	100%

Age Group	Total Number	%
18-29	32	0%
30-39	31	457%
40-49	23	443%
50-59	7	329%
60+	7	100%
TOTAL	100	100%

Have you noticed a change in the stream usage over the past 10 – 20 years?

	Total Number	%
YES	36	0%
NO	64	56%
TOTAL	100	100%

City of Indianapolis

Chapter 321 BEACHES AND SWIMMING POOLS*

*Cross references: Boats, docks and waterways, ch. 341; streets, sidewalks and public ways, ch. 431.

Bathing

Sec. 321-1. Bathing in unguarded areas.

(a) It shall be unlawful for any person to swim or wade in any canal, stream, pit, pond or other body of water or watercourse within the city which is unguarded by a lifeguard who is assigned to guard such area by the owner or operator of such canal, stream, pit, pond or other body of water.

(b) The provisions of subsection (a) shall not apply to pools of the department of parks and recreation or clubs or other private beaches or pools which are guarded by lifeguards, nor to private residential swimming pools maintained by the homeowners.

(c) The first violation in any calendar year shall be subject to admission of violation and payment of the designated civil penalty through the ordinance violations bureau in accordance with chapter 103 of this Code. All second and subsequent violations in the calendar year are subject to the enforcement procedures and penalties provided in section 103-3 of this Code.

(Code 1975, § 7-20)

Sec. 321-2. Conduct generally.

It shall be unlawful for any person to fish, bathe, wash, operate boats in or enter any public waterways, or to send, drive or ride any animal into any public waterways, where not authorized for such purposes. However, the department of parks and recreation may set aside certain places and designate the rules for swimming, wading, bathing, boating and fishing by persons in any such places.

(Code 1975, § 7-21)

Sec. 321-3. Entrance and exit.

Whenever any bathing beach, public bath, swimming or wading pool is enclosed, no person shall enter or leave the same except at the indicated entrances and exits and shall pass through such entrance showers and shall wade through such chemically treated wading water as may be provided at such places before entering or upon leaving.

(Code 1975, § 7-22)

Sec. 321-4. Dangerous substances in swimming areas.

It shall be unlawful to throw, drop, place or deposit on the sands, ground or other surface adjoining bathing beaches or swimming or wading pools, or into the water or the bottom thereof, any glass bottles, broken glass, nails, tacks, wire, crockery, cans or any other sharp or cutting substances, chemicals or things dangerous to bathers or other persons.

(Code 1975, § 7-23)

Cross references: Environmental public nuisances, ch. 575.

Sec. 321-5. Conduct or play not to interfere with other bathers.

No person or group of persons shall conduct themselves in or about any municipal bathing beach or swimming or wading pool by violent racing about, churning and splashing of water, or by throwing balls or other objects or materials, or by playing games in such a manner, or by resorting to any other conduct, any of which does or tends to disturb, annoy, offend or injure other persons either on or near the beach, or in the pool or water, or to interfere with or damage any clothing or property belonging to any other person.

(Code 1975, § 7-24)

CHAPTER 16

STANDARDS FOR PUBLIC SWIMMING POOLS, PUBLIC SPAS AND BEACHES

Article 1. Definitions. Unless the context specifically indicates otherwise, the meaning of terms used in this ordinance shall be as follows:

Sec. 16-101. "Beach" shall mean any natural or artificial waterway or impoundment or any portion thereof, which is used for swimming or wading purposes and is made available to persons other than an individual for the sole use of his household and house guests .
[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96]

Sec. 16-102. "Public Bathing Facility" shall include public swimming pools, public spas and beaches as those terms are defined in this Chapter .
[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96] [Gen.Ord. 17-1996(A) Passed 11/20/96 Effective Date 11/1/96]

Sec. 16-103. "Public Spa" shall have the meaning contained in 675 IAC 20-1.1-18(i),. Notwithstanding the exclusion contained in 675 IAC 20-1.1-18(i), for purposes of enforcement of this Chapter, the term "public spa" shall also include spas which are operated for medical treatment or physical therapy under medical supervision.
[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96] [Gen.Ord. 17-1996(A) Passed 11/20/96 Effective Date 11/1/96]

Sec. 16-104. "Public Swimming Pool" shall , for purposes of enforcement of this Chapter, have the meaning contained in 410 IAC 6-2-1.
[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96] [Gen.Ord. 17-1996(A) Passed 11/20/96 Effective Date 11/1/96]

Article 2. Construction Permits For Public Bathing Facilities.

Sec. 16-201. No public bathing facilities may be constructed or undergo significant renovation in Marion County, Indiana, unless the owner has first obtained a construction permit from the Health Officer.
[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96]

Sec. 16-202. An application for a construction permit must be filed with the Health Officer prior to beginning construction. The following shall be submitted with the application:

(a) A permit fee of forty dollars ($40.00).
(b) Proof that a State Plan Release has been issued by the Indiana Department of Fire and Building Services.
(c) All information required under 675 IAC 20-2-1.

(d) Plans and specifications certified and sealed by a professional engineer or architect registered in the State of Indiana.

[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96]

Article 3. Operating Licenses.

Sec. 16-301. No person may operate a public bathing facility in Marion County, Indiana without first obtaining a valid license from the Health Officer. Such license shall be posted in a conspicuous place at the public bathing facility. Only persons who comply with the applicable provisions of The Code shall be entitled to receive and retain such a license. Operating licenses for public bathing facilities shall be valid for a term of one (1) year, beginning March 1st of each year and expiring the last day of February of the next year.
[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96]

Sec. 16-302.

(a) The operating license fee for public bathing facilities operating exclusively in any of the months of May through September is one hundred and twenty dollars ($120.00) per year.
(b) The operating license fee for public bathing facilities operating beyond the months of May through September is four hundred dollars ($400.00) per year.
(c) All license fees shall be payable on or before March 1st of each operational year. A late penalty charge of 25% of the license fee will be imposed for fees submitted after March 1st of the year. The late penalty charge will not apply to pool facilities which were not in operation the previous year.

[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96]

Article 4. General Requirements For Public Swimming Pools.

Sec. 16-401. Public swimming pools constructed and/or operated in Marion County shall comply with the requirements of 410 IAC 6-2 ,675 IAC 20-1.1 and 675 IAC 20-2, incorporated herein.
[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96]

Sec. 16-402. Gates in fence enclosures required by 675 IAC 20-2-26(f) shall be equipped with self-closing latches.
[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96]

Article 5. General Requirements For Public Spas.

Sec. 16-501. Public spas constructed and/or operated in Marion County shall adhere to the requirements applicable to public spas contained in 675 IAC 20-1.1 and 675 IAC 20-3, incorporated herein.
[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96]

Sec. 16-502. Public spas shall comply with the bacteriological standards and sampling protocol contained in 410 IAC 6-2-7(j) and (k).
[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96]

Sec. 16-503.

(a) The free residual chlorine level in a public spa shall be at least 3.0 mg/l. If other halogens are used, residuals of equivalent disinfecting strength shall be maintained. Required disinfectant levels shall be determined by a method described in the most recent edition of "Standard Methods For The Examination Of Water And Wastewater" (American Public Health Association).

(b) The requirements of 410 IAC 6-2-7(g) for pH and alkalinity shall be applicable to public spas.

(c) A test kit for measuring the concentration of the disinfectant, accurate within 0.2 mg/l, shall be used at each public spa:

   (1) For each public spa which uses chlorine as a disinfectant, the test kit shall cover a minimum range of 0.5 mg/l to 5.0 mg/l measured as free active chlorine and be capable of measuring total chlorine.

   (2) For each public spa which uses an alternate disinfectant, the test kit shall have the range and accuracy proportionate to 0.5 mg/l to 5.0 mg/l for free active chlorine.

[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96] [Gen.Ord. 17-1996(A) Passed 11/20/96 Effective Date 11/1/96]

Sec. 16- 504. The operating temperature of public spa water shall not exceed 104 degrees F.
[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96]

Sec. 16- 505. Continued use of a public spa constructed of wood and installed before January 1, 1983 is allowed only so long as the operation of the public spa otherwise conforms to the provisions of this Chapter and the public spa is maintained in a sanitary condition.
[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96]

Article 6. Standards For Public Beaches.

Sec. 16-601.

(a) The sanitation, operation and safety requirements of 410 IAC 6-2-6, 8, 10 and 11 and 675 IAC 20-2-26(f), incorporated herein, shall be applicable to beaches.

(b) Gates in fence enclosures required by 675 IAC 20-2-26(f) shall be equipped with self-closing latches.

(c) The bathhouse construction standards contained in 675 IAC 20-2-27 are incorporated herein and shall be applicable to beaches.

[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96]

Sec. 16-602.

(a) Beaches shall not be located in areas subject to pollution by sewage.
(b) The water of a beach shall conform to the bacteriological water quality standards of 327 IAC 2-1-6(d).

[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96]

Sec. 16-603. Whenever the beach consists of an area less than the total area of the body of water utilized, the area used for swimming or bathing shall be partitioned with floating lifelines.
[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96]

Article 7. Closure Of Public Bathing Facilities.

Sec. 16-701.
(a) A pool operator must close any public bathing facility whenever any of the hazardous conditions listed in Sec. 16-702 occur. Such public bathing facility shall not be reopened for use until the hazardous condition has been corrected.
(b) If a pool operator fails to close a public bathing facility as required in Sec. 16-701(a), the Health Officer may take appropriate action to ensure that the public bathing facility is closed until the hazardous condition has been corrected.

[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96]

Sec. 16-702. Public bathing facilities must be closed when any of the following hazardous conditions occur:
(a) The amount of residual disinfectant is less than the minimum amounts specified in 410 IAC 6-2-7(a),(b) (public swimming pools) and Sec. 16-503(a) of this Chapter (public spas).
(b) The microbiological quality of the public bathing facility water is below that specified in 410 IAC 6-2-7(j),(k) (public swimming pools) and Sections 16-502 (public spas) and 16-603 (beaches) of this Chapter.
(c) The pH of the swimming pool or public spa water does not comply with provisions of 410 IAC 6-2-7(g) and Sec. 16-503(b) of this Chapter.
(d) The clarity of the public swimming pool water does not comply with the provisions of 410 IAC 6-2-7(i).
(e) Lifeguards are not on duty as required in 410 IAC 6-2-11(a) (public swimming pools) and Sec. 16-601 (beaches).
(f) The recirculation system of the public swimming pool or public spa is not functioning properly per 410 IAC 6-2-7(h).
(g) The potential for transmission of communicable disease or an imminent threat to the public health and safety is present.

[Gen.Ord. 8-1996(A) Passed 6/19/96 Effective Date 6/19/96]

Table of Contents

Executive Summary

Public education and participation on environmental issues is a priority for the City of Indianapolis. The Department of Public Works (DPW) has been sharing information about sewer overflows with citizens for over two years, when we became the first city in the state to notify its citizenry of overflows. We have engaged our citizen advisory committees in the development and evaluation of our program. Since DPW began notification, we have improved our methods for initiating warnings and expanded the number of people who receive the warnings. DPW will continue to update and improve our program.

On May 9, 2003, a new Combined Sewer Overflow (CSO) Public Notification Rule took affect. Indiana CSO communities are required to develop a plan and to implement notification programs. The rule requires CSO communities to notify the public when either a discharge from a CSO outfall is occurring or is imminent, based on actual or anticipated precipitation. The City has been using a predictive, weather based criteria for issuing warnings. This method allows people to plan ahead, by giving warning when overflows are expected within the next 24 hours. This document describes the public notification program that Indianapolis will continue to implement.

The City's Wet Weather Technical Advisory Group assisted with the development and improvement of this program for over two years. They have made suggestions that have improved the accuracy of notification and improved the warning messages. The Wet Weather Technical Advisory and the Mayor's Raw Sewage Overflow Committees were given the opportunity to review and comment on this plan before its submission.

The CSO Public Notification Program for the City of Indianapolis – Marion County has a simple yet very important goal: Inform the public of the potential health risks associated with ingesting CSO affected waters in a timely and reasonable manner that wisely uses public funds. Our program includes a CSO telephone hotline, television and e-mail distribution list that is available 24 hours a day, seven days a week. We have promoted the program via print media, and posted warning signs along affected areas. This plan also describes the offer of signs for private residents and public lands, and other outreach methods; and may be found in Appendix D of the City's CSO Operational Plan (CSOOP).

This is an ever-evolving program, and the plan will be updated accordingly to reflect that. New technologies are being investigated to provide better, quicker and more reliable information. We are evaluating the capabilities and costs of automation. For example, DPW is exploring ways to utilize real-time sensors that monitor fluid levels within the CSO and transmit data via wireless connections. DPW will continue to seek new methods and improvements to the program.

Table 1[1]

Surface Drinking Water Contact Information

Name	Title	Contact Information
Jeff Dieterlen	Director of Production	USFilter P.O. Box 1220 Indianapolis, IN 46202 Office: (317) 263-6411 Mobile: (317) 710-4536 jeff.dieterlen@usfilter.com
Dale Pershing	Manager of Quality and Compliance	USFilter P.O. Box 1220 Indianapolis, IN 46202 Office: (317) 920-6474 Mobile: (317) 710-1342 Pager: (317) 310-2337 Fax: (317) 920-3387 dale.pershing@usfilter.com
Fall Creek Plant		4300 Fall Creek Rd. Indianapolis, IN 46205 Phone: (317) 546-9462 Fax: (317) 546-3144

[1] In 2004, these groups were notified about the program via letter on March 26. This will occur annually.

City of Indianapolis – Department of Public Works
Combined Sewer Overflow (CSO) Public Notification Program

Standard Operating Procedures (SOP) for Overflow Warnings

Program Objective

The overall objective and goals of the City of Indianapolis' Combined Sewer Overflow (CSO) Public Notification Program are to:

- Notify affected and interested persons when sewage overflows are likely to occur;
- Educate affected and interested persons as to the health hazards and impacts associated with sewage in our waterways;
- Enable affected and interested persons to take the appropriate steps to protect themselves from hazards associated with sewage in waterways; and
- Comply with 327 IAC 5-2.1 (Combined Sewer Overflow Public Notification Rule).

Background

The City of Indianapolis – Marion County has had a CSO notification program since spring 2002. Since then, the program has been continually improved. The City utilizes four (4) methods of notifying the public, including telephone hotline, e-mail listserv, warning signs and television. Notification will be timely, reliable, and accurate for all interested individuals. This SOP may be updated and modified, as needed. These methods will alert interested citizens of potential and/or actual CSO discharges into the waterways of Marion County.

At any time night or day, interested parties can call the telephone hotline and/or sign up for the e-mail listserv via the City's website at http://www.indygov.org/dpw. Further, signs are posted at outfall points and throughout the county at various locations including parks and public access points.

Notification Methods

As discussed above, there are four (4) CSO public notification methods being implemented by the City:

- 24-hour telephone hotline that has an up-to-date message noting whether overflows are expected or have occurred in the past 72 hours.
- E-mail listserv of registered individuals, who are provided a warning message that notes overflows are expected and how to protect yourself.
- Warning signs are posted by both the City and the Marion County Health Department, which are located where people are most likely to be warned.
- The City's government access television station runs a television warning when overflows are expected.

Method One: Telephone Hotline – (317) 327-1643

The telephone hotline will notify citizens of the current conditions of the waterways in the CSO area. There will be two (2) announcements with one being standard (*default*) for non-precipitation events and the other to be used when ¼-inch of precipitation is forecasted.

The telephone ***default message*** is as follows:

"You have reached the Indianapolis sewage overflow information line. When [it rains] or [snow melts], the sewers in the older parts of the city can overflow sending untreated rainwater and sewage into our waterways. Today, weather conditions indicate that sewage overflows are not likely to occur. Even so, contaminants in the streams could make you sick. Even in dry weather, it is best to avoid contact with urban streams and teach children to stay away from affected waterways. The City is implementing many projects to improve our waterways. Thank you for calling."

The telephone ***warning message*** is as follows:

"There is a sewage overflow warning today. You have reached the Indianapolis sewage overflow information line. When [it rains] or [snow melts], the sewers in the older parts of the city can overflow sending untreated rainwater and sewage into our waterways. Today, weather conditions indicate a strong possibility that overflows will occur or have occurred in the past 72-hours. Please avoid all contact with water near combined sewers, especially the days after a rain[snow]storm. Signs are posted along our waterways to identify more than 130 areas where contact with the water could be hazardous. The City is implementing many projects to improve our waterways. Thank you for calling."

Method Two: E-mail Listserv

Citizens and other interested organizations as well as schools and news media are invited to sign up to receive notices via e-mail with the option to be removed at any time at the City's website (http://www.indygov.org/dpw). No e-mail messages will be sent for standard, non-warning days. The e-mail notification will automatically include the following message and an option for the receiver to remove his or her e-mail address from the notification list.

The e-mail ***warning message*** is as follows:

"***SEWAGE OVERFLOW WARNING TODAY***
When it rains or snow melts, the 100-year old sewers in the older parts of Indianapolis can overflow sending untreated sewage and rainwater into our waterways. Today, weather conditions indicate a strong possibility that precipitation may cause overflows to occur or that overflows have occurred in the past 72 hours. If the precipitation occurs as snow, overflows may occur days or weeks later, when temperatures near or exceed freezing.

Please avoid all contact with water downstream of combined sewers. Swallowing or hand-to-mouth contact with sewage-contaminated water could make you sick. Signs are posted along our waterways to identify the more than 130 combined sewer outfalls and areas where contact with the water could be hazardous to your health. Even in dry weather, it is best to avoid contact with urban streams and teach children to stay away.

The affected areas include:

White River downstream from 56th Street
Fall Creek downstream from Keystone Avenue
Eagle Creek downstream from Michigan Street on Little Eagle Creek
Pogues Run downstream from 21st Street
Pleasant Run downstream from Kitley Avenue
State Ditch downstream from Southern Avenue
Lick Creek downstream from Madison Avenue
Bean Creek downstream from I-65

The City encourages you to take the following protective actions:

- Avoid contact with urban streams, especially during and three days after rain or snowmelts.
- Alter recreational activities to ones that do not contact water. For example, try walking or biking along a stream rather than swimming, wading or water skiing.
- **Always** wash your hands after contacting water in urban streams, especially before eating, drinking, smoking, or preparing food.
- Use a waterless hand sanitizer at outings that occur near urban streams.

Clean waterways are a priority for the City of Indianapolis. The City is implementing many projects to improve our waterways and reduce and eliminate sewage overflows. The City expects to invest at least $1 billion to reduce the affects of raw sewage including modernizing the wastewater treatment plant and improving the sewage collection system."

Method Three: Warning Signs

Warning signs are posted throughout CSO area warning individuals of contaminated water. For more detailed information on the warning signs, please refer to the "Signs" section of the City's CSO Public Notification Program Plan.

Method Four: Television

Earlier this year, a representative from the City's government access television station joined the e-mail listserv. Whenever a CSO warning is initiated, this individual receives the warning email and places a warning slide on Channel 16. As with the e-mail warning and telephone hotline, the television warning slide remains active and on the air for the duration of the 72 hour warning period. The warning slide notes that overflows are expected, lists the CSO impacted waterways and the telephone hotline number.

Notification Procedure

The City of Indianapolis – Department of Public Works (DPW) will implement the following procedure to notify individuals of potential combined sewer overflows:

- **Step 1** – DPW will monitor weather reports from our contracted weather service.
- **Step 2** – If the weather report indicates precipitation[2] within the next 24-hours, then skip to **Step 3**. If there is **no precipitation** predicted, or less than ¼ of an inch of precipitation is predicted for the next 24 hour period in DPW's

[2] As a guideline, 2.5 inches of snow is roughly equivalent to .25 inches of rain. (http://www.weather.com/encyclopedia/winter/precip.html, 10/6/03).

forecasted reports, the *default message*, which can be seen under "Notification Methods", will remain on the telephone hotline and **no** e-mail will be sent.

  - **Step 2** (a) – If the telephone hotline message currently holds the *warning message* and 72-hours have passed without precipitation in Marion County, DPW will change the message from warning to *default*.

- **Step 3** – If a **minimum of a ¼-inch of precipitation** is predicted and the probability for precipitation is 50% or greater for Marion County in the next 24 hour period, DPW will:
  (a) Send the warning e-mail to the City's listserv. The e-mail warning text will be automatically inserted, however, DPW will insert the correct date in the subject line. The text can be seen under "Notification Methods". DPW will send the e-mail to streams@elists.indygov.org indicating "***Streams Warning – [the date that rain is predicted]***" in the subject box.
  (b) Change the telephone hotline message from the *default message* to the *warning message* by recording a new message. The text can be seen under "Notification Methods" and must remain in place for at least 72 hours (3-days) after the last precipitation event. This may occur several days after the original *warning message* was initiated. The hotline message must be recorded in a professional voice, and all words clearly articulated.
  (c) If additional precipitation occurs on the second day of a 72-hour warning period, leave the *telephone warning message* on the hotline for 72 hours after the last precipitation event. If additional precipitation occurs on the third day after the email warning was sent, then send another *email warning message* and leave the *telephone warning message* on the hotline for another 72 hours.
  (d) In addition to precipitation triggered warnings described above, DPW may occasionally send a warning e-mail and record a *warning message* if warranted.
- **Step 4** – Seventy-two (72) hours after the *warning messages* are activated, if no additional precipitation was received in Marion County, DPW will return the telephone hotline message to the *default message*.
- **Step 5** – At the end of each month, the list of days when notification warnings were issued will be documented in the Discharge Monitoring Reports (DMR). A copy of the monthly DMRs will be kept at the two (2) advanced wastewater treatment plants.

City of Indianapolis – Department of Public Works
Combined Sewer Overflow (CSO) Public Notification Program

Outreach Efforts

Since the program's inception in spring of 2002, the City of Indianapolis' Combined Sewer Overflow (CSO) Public Notification Program has reached a multitude of individuals. The Department of Public Works (DPW) took steps to reach as many people as possible. We are enabling the public with the information they need to further protect themselves and their families from possible harm.

Summary of Methods Used to Notify the Public about Our Program:

- Citizen advisory groups
- Public meetings
- City attended events such as Black Expo, Earth Day, etc.
- City Website at Indygov.org
- Letters to community groups
- Warning signs
- Water bill inserts to homes and businesses
- TV commercials (when funds are available)
- TV warning message of overflows
- Letters to recreational providers
- Letters to local, state and federal governments entities with property on affected waters, including health, parks, and natural resource departments.
- Letters to schools located on affected waters
- Public notices in the Indy Star Newspaper
- Newsletters, Fact Sheets, school programs and other outreach by Indy's Clean Stream Team.

These methods to make the public aware of our program are described in more detail below.

People or Groups Invited to Register or Call for Notification of Overflows
Members of the City's Wet Weather Technical Advisory Committee (WWTAC) were involved in the development of the program, including both method and message development. This group represents industry, the Marion County Health Department, Improving Kid's Environment, the Audubon Society, the Urban League, Marion County Alliance of Neighborhood Associations, Sierra Club, and Friends of the White River. As stakeholder group representatives, these individuals are encouraged to share the information with other members of their organizations. All WWTAC members were encouraged to join the e-mail listserv and were provided the telephone hotline number.

Additionally, DPW invited and encouraged citizens to participate in the CSO Public Notification Program via public meetings, the City's website, letters to over 500 neighborhood associations and community groups, and via signs posted throughout Marion County. Moreover, roughly 242,000 homes and businesses received information regarding the program via their water bill since 2002. DPW intends to continue using these and other very effective means of reaching the public.

In the summers of 2002 and 2003, DPW produced and ran a 30 second commercial and ticker on the SkyTrak Weather Network. The commercial promotes the CSO Public Notification Program, clean water and protecting the environment. This commercial is available for future use as well, depending on available resources.

The City takes notification efforts one step further by contacting important stakeholders who need to know about our program. These include schools, downstream communities and appropriate government organizations via letter to share the efforts and procedures used in Indianapolis. In all, approximately 670 schools, day care centers and day ministries; six (6) downstream health departments[3]; seven (7) county parks departments and/or government offices[4]; three (3) DNR district headquarters[5]; and one (1) downstream state park[6] are informed of the City's efforts and invited to sign up for notification. The local drinking water facility was sent an invitation too.

As a result of our efforts to inform people of the program, our list of e-mail recipients includes members of the Sierra Club, the Marion County Health Department, neighborhood association members, US Filter, and the Indianapolis Star newspaper in addition to many others. The outreach efforts continue to pay off as the number of e-mail listserv recipients steadily increases on a monthly basis from roughly 90 in June of 2002 to nearly 280 in October 2003 and 420 in June 2004.

As a means to gauge the effectiveness of the City's first year of the CSO Public Notification Program, a year-end survey[7] was developed to measure and assess the overall thoughts and effectiveness of the program. Survey respondents noted that the CSO Public Notification Program was effective, and their 90% approval rating indicated an interest in the continuation of the program. Additionally, 68% of the respondents noted what they liked most about the program was the City's recognition of the problem and the immediate, up-to-date information that was provided, allowing for greater public awareness. Additional surveys may be conducted depending on available resources.

Continuing Outreach Efforts
Every year, DPW attends hundreds of meetings or events that members of the public attend, organize or support. Events such as the Black Expo, Earth Day festivities and other large public events provide DPW the opportunity to reach hundreds and sometimes thousands of people in a short time. We also sponsor or attend public meetings, neighborhood association meetings, environmental justice meetings, and multiple advisory group meetings. All of these avenues allow DPW to share information about the CSO Public Notification Program.

The Indianapolis Clean Stream Team, a DPW program, produce reports, quarterly newsletters and fact sheets on a variety of water quality topics. These publications are another vehicle to inform the public of the notification program. In addition, DPW will continue to mail program information to every residential and commercial water users

[3] Downstream Counties included were Johnson, Morgan, Owen, Greene, Knox, and Daviess Counties.
[4] Downstream Parks or Government Office included were Johnson, Morgan, Owen, Greene, Knox, and Daviess Counties and the City of Martinsville.
[5] Included were District 5-7 in Cloverdale, Nashville, and Winslow respectively.
[6] McCormick Creek State Park.
[7] The survey was disseminated on January 6, 2003 to those individuals on the e-mail listserv as well as being placed on DPW's website and available via the telephone hotline.

with their water bills at least once a year. DPW also utilizes a webpage, http://www.indygov.org/dpw, as a way to reach the public 24 hours a day, seven days a week. We continue to give the DPW website a new look and new information. The link to sign up for this program is a link on the Indygov.org homepage.

DPW will send outreach materials such as letters to the groups or individuals noted on the drinking water, media, downstream, school, and recreational contacts lists (See Tables 1, 2, 3, 4, and 5 for outreach contact information). Included will be the telephone hotline number, the website to register to receive email notification, and other pertinent information. The contact will be made each year before March 31st.

Public Notices

The City of Indianapolis – Department of Public Works (DPW) will provide public notice to the Indianapolis Star newspaper, the largest media source in Central Indiana, for distribution to the affected public and other interested persons. A media approach is being used because of the thousands of landowners on or adjacent to affected waters. Individual contact to each landowner would be prohibitively costly and extremely time consuming. The notice will be consistent with Indiana Administrative Code 5-3-1. Notification will occur annually before March 31st.

The notices will provide information to allow people to sign up for the City's CSO Public Notification Program as well as provide the telephone hotline number. Notices and letters to the downstream communities' county health departments will also provide offers of signs to landowners with property on or adjacent to affected waters.

Notification can be requested at any point throughout the course of the year via DPW's website, http://www.indygov.org/dpw.

Table 2[8]

Media Contacts

County	County-Seat	Media Outlet Address/Web Address	Contact
Marion	**Indianapolis**	Indianapolis Star 307 N. Pennsylvania St. Indianapolis, IN 46204 Website: http://www.indystar.com	Email: publicnotices@indystar.com[9]

[8] The media was used to provide the public awareness of program and offer of signs to the affected public. This will occur annually.
[9] The Indianapolis Star must receive public notices by noon two days prior to when the notice is to be advertised.

Table 3[10]

Downstream[11] Contacts

County	County-Seat/River Town	Government Office Address/Phone	Officer
Marion	**Indianapolis**	Marion County Health Department 3838 N. Rural St. Indianapolis, IN 46205-2930 (317) 221-2266 (phone) (317) 221-2288 (fax) Website: http://www.mchd.com/	Virginia A Caine, MD
	Rocky Ripple	Rocky Ripple Town Hall 930 W. 54th St. Rocky Ripple, IN 46208 (317) 257-7962	Carla Gaff-Clark
Johnson	**Franklin**/Smith Valley	Johnson County Health Department 86 W. Court St. Franklin, IN 46131-2345 (317) 736-3770 (phone) (317) 736-5264 (fax) Website: http://www.co.johnson.in.us/civil/health.html	Craig A Moorman, MD
Morgan	**Martinsville**/Waverly, Exchange, Paragon	Morgan County Health Department 180 S. Main St., Suite 252 Martinsville, IN 46151-1988 (765) 342-6621 (phone) (765) 342-1062 (fax)	John L. Reynolds, Acting
		Morgan County Government Offices 180 S. Main St., Suite. 112 Martinsville, IN 46151 (765) 342-1007	
		City of Martinsville City Hall Martinsville, IN 46151 (765) 342-2861	

[10] Entities were notified about the program and offered signage via letter on March 26, 2004. This will occur annually.
[11] Downstream contacts include those government offices that have been contacted with information about the program and encouraged to register for the notifications.

County	County-Seat/River Town	Government Office Address/Phone	Officer
Owen	**Spencer**/Gosport, Freedom, Farmers	Owen County Health Department Courthouse 1st Floor Spencer, IN 47460-1791 (812) 829-5017 (phone) (812) 829-5044 (fax)	John Stearley, MD
		Owen County Government Offices 90 N. West St. Spencer, IN 47460 (812) 829-3213	
Greene	**Bloomfield**/Worthington, Newberry, Marco	Greene County Health Department 217 E. Spring St., Suite 1 Bloomfield, IN 47424-1469 (812) 384-4496 (phone) (812) 384-2037 (fax) Website: http://www.bloomfield.lib.in.us/project1/greene_county_health_department.htm	Frederick R Ridge, MD
		Greene County Courthouse Room 104 Bloomfield, IN 47424 (812) 384-2020	
Daviess	**Washington**/Elnora, Plainville, Maysville	Daviess County Health Department 303 E. Hefron St. Washington, IN 47501-2794 (812) 254-8666 (phone) (812) 254-8643 (fax)	Robert H Rang, MD
		Daviess County Government Offices 200 E. Walnut St. Washington, IN 47501 (812) 254-8675	
Knox	**Vincennes**/Sanborn, Edwardsport, Bicknell, Iona, Decker	Knox County Health Department 624 Broadway St. Vincennes, IN 47591-2091 (812) 882-8080 (phone) (812) 882-5625 (fax)	Ralph J Jacqmain, MD
		DNR Conservation Office[12] District 5 Headquarters 1317 W. Lieber Rd., Suite 2 Cloverdale, IN 46120 (765) 795-3534	Lt. Robert McIntire

[12] Affected areas of the White River flow through this DNR District.

County	County-Seat/River Town	Government Office Address/Phone	Officer
		DNR Conservation Office[13] District 6 Headquarters P.O. Box 266 Nashville, IN 47448-0266 (812) 988-9761	Lt. Dennis Koontz
		DNR Conservation Office[14] District 7 Headquarters 2310 E. State Rd. 364 Winslow, IN 47598 (812) 789-9538	Lt. Scott Wilson

[13] Affected areas of the White River flow through this DNR District.
[14] Affected areas of the White River flow through this DNR District.

Table 4[15]

Marion County School Contacts

School	Address	Principal	Zip	Township	Tributary
Baptist Academy	2565 Villa Ave.	Barbara Padgett	46203-4499	Center	Lower White River
IPS #020 Otis E. Brown	1849 Pleasant Run Pkwy. S Dr.	Roberta Lynn Henderson	46203-2006	Center	Lower White River
IPS #042 Elder W. Diggs	1002 W. 25th St.	Minetta Richardson	46208-5330	Center	Upper White River
IPS #101 HL Harshman	1501 E. 10th St.	Linda Casey	46201-1909	Center	Lower White River
IPS Horizon Alternative School	1401 E. 10th St.	Jethro Knazze	46202-1462	Center	Lower White River
IPS #047 Thomas A Edison	777 S. White River Pkwy. W Dr.	Patricia Bolanos	46221	Center	Lower White River
IPS Arsenal Technical	1500 E. Michigan St.	Peggy Clark	46201-3098	Center	Lower White River
IPS Emmerich Manual	2405 Madison Ave.	Kenneth Poole	46225-2106	Center	Lower White River
IUPUI	815 W. Michigan St.		46202	Center	Upper White River
Christian Theological Seminary	1000 W. 42nd St.		46208	Washington	Upper White River
Butler University	4600 Sunset Ave.		46208	Washington	Upper White River
LPP & Arlington Elementary #2	6040 E. Pleasant Run Pkwy. S Dr.	Teresa Bachus-Bray	46219-6039	Warren	Lower White River
IPS Howe	4900 Julian Ave.	John Takacs	46201	Center	Lower White River
Capitol City SDA School	2143 Boulevard Pl.		46202	Center	Lower White River
C 1 Prof. Training Center	3603 E. Raymond St.		46203	Center	Lower White River
Indiana Higher Education	714 N. Senate Ave.		46202	Center	Fall Creek
Ivy Tech State College	1 W. 26th St.		46208	Center	Fall Creek
School of SPEA	334 N. Senate Ave.		46204	Center	Lower White River
Montessori Centres Inc	563 W. Westfield Blvd.		46208	Washington	Lower White River
Irvington Preschool	345 N. Kitley Ave.	Pamela Maki	46219	Warren	Lower White River
Our Savior Lutheran Academy	261 W. 25th St.	Felix Renteria	46208	Center	Lower White River

[15] These are schools located within 200 yards of an affected waterway. Entities were notified about the program and offered signage via letter on March 26, 2004. This will occur annually. These areas were also evaluated for warning signs, and were posted as appropriate.

Table 5[16]

Recreational[17] Contacts

Business Name	Address/Phone
Indy Parks and Recreation	Michael Krosschell 200 E. Washington St., Suite 1821 Indianapolis, IN 46204 (317) 327-5725
Romona Canoe Rental	Romona Rd. Spencer, IN 47460 (812) 829-0120
Johnson County Parks Department	P.O. Box 246 Franklin, IN 46131 (812) 526-6809
Knox County Parks Department	P.O. Box 1316 Vincennes, IN 47591 (812) 882-4316
McCormick Creek State Park	Route 5, Box 282 Spencer, IN 47460 (812) 829-2235

[16] Entities were notified about the program and offered signage via letter on March 26, 2004. This will occur annually.

[17] These include known access points, canoe rentals and parks south of Marion County along the White River.

Signs

In the mid to late 1990's the City of Indianapolis – Department of Public Works (DPW) posted nearly 130 combined sewer overflow (CSO) notice signs at the various outfall points and some bridges within the city. The exceptions to this are those outfalls discharging into the Pogues Run Tunnel, which is inaccessible to the public. The signs inform the public that a CSO outfall is in the vicinity, that water can become polluted during weather events, and how to contact the Mayor's Action Center. (See Figure 9 and Table 6 for existing CSO warning sign locations.)

DPW posted additional signs in 2002 in inform the public of the City's public notification program. These signs read, "For current information on water quality and sewer overflows, call the Sewer Information Hot Line at 327-1643 or visit online www.indygov.org/dpw." Like the notice signs, the additional verbiage signs were posted at each outfall with an accessible location throughout the CSO area. (See Figure 2 for CSO outfall locations.) This new sign informs the public about how they can receive current information on water quality by providing them with the sewer overflow telephone hotline number as well as DPW's web address where they can sign up for e-mail notification. (See Figure 6 for warning sign examples.)

In conjunction with DPW's efforts, the Marion County Health Department (MCHD) has warning signs placed at parks, greenways and public access points throughout the county. Together, there are approximately 160 areas where signs have been posted. (See Figure 7 and Table 7 for an example MCHD warning sign and locations.)

Posting of Signs within the CSO Area

In 2004, DPW and MCHD joined forces using a joint sign that contains logos and contact phone numbers for each department. This warning sign is the first to include Spanish. The City of Indianapolis' Mayor's Action Center phone number is displayed with "Se habla Espãnol", letting Spanish speaking persons know that there is an operator available who also speaks Spanish. Additionally, the text "Caution! Sewage Pollution. Keep out of the water," is provided in both English and Spanish.

Moreover, this sign is short, simple and easy to understand. It contains universal symbols for no swimming, no wading and wash your hands; the CSO outfall number (where appropriate); and a general warning informing individuals of sewage pollution and that contact with the water could be hazardous. (See Figure 8, for the new warning sign.) Because the messages on the various signs are equivalent and to save resources and materials, the newer signs will be used at newly identified public access points including bridges, parks and schools. The existing signs currently posted at CSO outfalls and by MCHD will continued to be used until the current sign supply stock has been exhausted, with exception to those signs in dire need of replacement due to graffiti or weathering. The current signs can be seen in Figures 6 and 7.

Although signs have been posted at outfall locations, some bridges, parks and public access points, and some schools, there are additional areas that DPW has evaluated for signage. (See Figure 3 and 4 for public access and bridge and greenway locations.) These locations include bridges and additional schools throughout the affected area that provide the public with direct access to affected water. (See Figure 10 and Tables 8, 9, 10 and 11 for areas evaluated for signage.)

Signs will be posted at appropriate locations as needed by April 15, 2004, weather permitting. Each year thereafter, DPW and MCHD will work together to maintain signs at the appropriate locations. An annual check for missing and damaged signs will occur each year before April 15th weather permitting.

Areas to Evaluate for Potential Signage
Several areas have been designated as potential locations for CSO warning signs. These areas were determined from the Marion County GeoSpatial Information Services (GIS) database and aerial photography. This data is used to assist with various policies and planning throughout the city and county in addition to being utilized for regulatory documents. In addition, the areas evaluated included areas where citizens have told us of areas that may be used by the public[18]. The data were verified via field inspection for access to the water. Once verified, the potential sign locations were geocoded and added to the GIS database. (See Figure 10 for areas evaluated for potential signage.)

For most properties it was easy to determine if they were on or adjacent to affected streams, with the exception of schools. The team determined that schools should be considered "affected" if their property lines came within 200 yards of a CSO affected waterway (see Figure 3; Table 8). This was based upon a reasonable assumption that students who attended a school within 200 yards of a CSO affected waterway could have access to the water.

DPW evaluated areas identified as potentially hosting a warning sign. The 180 areas evaluated for signs included schools, bridges, boat docks and ramps and canoe launches and other public access areas located on or adjacent to affected waters. DPW recommended 62 areas for reevaluation as potential sign locations. (See Figure 10 for areas evaluated for potential signage.) However, some of the potential areas where new signs may be posted are not on City rights-of-way. DPW contacted the appropriate property owners to determine if posting a warning sign will be permitted. A map of locations where signs were posted is being developed. There are over 230 warning signs posted in Marion County.

Criteria for determining locations of warnings signs were: Ease and ability to access affected waters, ownership of the land, presence and distance to an existing sign, and ability to inform the greatest number of people. Signs were posted at public access sites fitting the criteria by April 15, 2004, weather permitting. The ground must be sufficiently dry and thawed for postholes to be dug and posts to be properly set.

Signs for Property Owners on or Adjacent to Affected Waters
Letters and public notices offer signs to adjacent landowners. Signs will be offered to Marion County and downstream landowners with property located on or adjacent to affected waterways. The downstream counties include *Johnson, Morgan, Monroe, Owen, Greene, Knox and Daviess Counties*. This offer will be via a public notice announcement in the Indianapolis Star, the largest newspaper in general circulation in Central Indiana, and included in a letter to appropriate entities prior to March 31st of each year.

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[18] Public Outreach Water Contact Use Assessment, McCormick Group, 2002.

Offers of signs are made to:

- Members of the affected public in Marion county and downstream counties via public notice
- Schools located on affected waters via letter
- Providers of recreational opportunities in Marion County via letter
- Downstream health departments via letter
- Downstream providers of recreational opportunities via letter
- Downstream governmental entities that may provide public access via letter.

In 2004, over 550 letters were mailed to the above listed groups.

Figure 6

Department of Public Works (DPW) Existing Outfall Signs

Figure 7

Marion County Health Department (MCHD) Existing Sign

Figure 8

DPW/MCHD Warning Sign

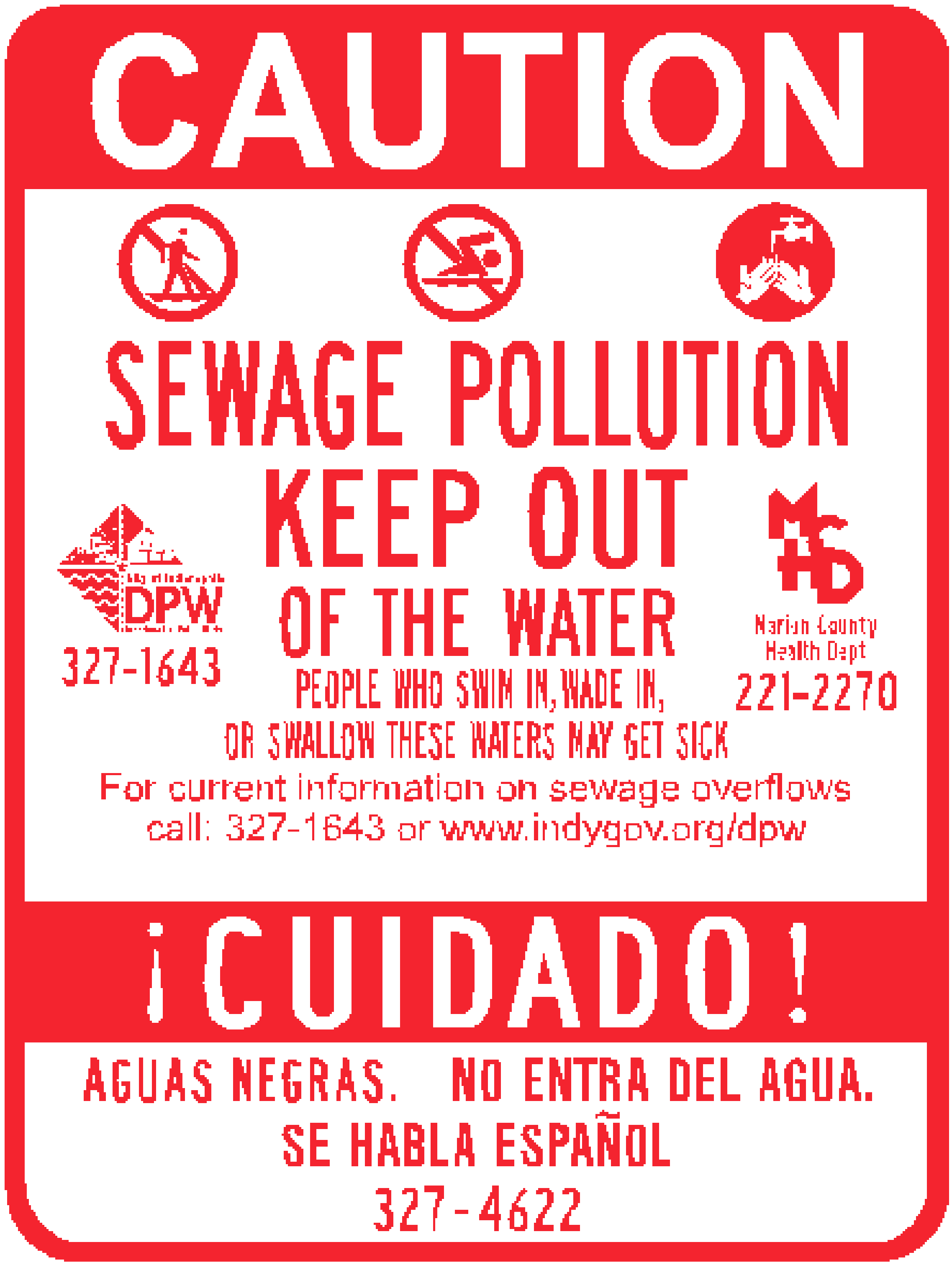


Table 6

Permitted CSOs

	Outfall Number	Tributary	Permit Location	GIS Location
1	003	Little Buck Creek	Southport Raw Wastewater Overflow	
2	008	White River	Belmont Raw Wastewater Overflow	2700 Belmont Ave.
3	011	Big Eagle Creek	Minnesota St. & Pershing Ave.	1700 S. Pershing
4	012	White River	Raymond St. & West St.	2404 West St.
5	013	White River	Meridian St. & Alder St.	1750 S. West St.
	014[19]	White River	Kentucky Ave. & York St.	1555 Kentucky Ave.
6	015	Bean Creek	Sern Ave. & Manker Ave.	2615 S. Manker
7	016	Bean Creek	Shelby St. & Willow Dr.	2700 S. Shelby
8	017	Bean Creek	Boyd Ave. & Nelson Ave.	1500 E. Nelson
9	019	Pleasant Run	PLRPND[20] & Meridian St.	20 E. Pleasant Run
10	020	Pleasant Run	PLRPND & Pennsylvania St.	60 E. Pleasant Run
11	021	Pleasant Run	PLRPND & Ransdell St.	2405 Madison Ave.
12	022	Pleasant Run	PLRPSD[21] & Raymond St.	800 E. Raymond St.
13	023	Pleasant Run	PLRPND & Iowa St.	972 E. Pleasant Run
14	025	Pleasant Run	PLRPND & Shelby St.	1600 S. Shelby
15	027	Pleasant Run	PLRPSD & Cottage Ave.	1502 S. Spruce
16	028	Pleasant Run	PLRPSD & State St.	1300 S. State
17	029	Pleasant Run	Orange St. & Randolph St.	1902 E. Orange
18	030	Pleasant Run	PLRPSD & Randolph St.	1901 E. Pleasant Run
19	031	Pleasant Run	PLRPSD & Churchman Ave	1401 S. Churchman
20	032	Big Eagle Creek	Morris St. & Warman Ave.	1200 S. Warman
21	033	Little Eagle Creek	Vermont St. & Somerset Ave.	3725 Michigan St.
22	034	Pogues Run	Michigan St. & Dorman St.	1020 Michigan St.
23	34A	Pogues Run	Dorman St. b/t North & Michigan Sts.	
24	035	Pogues Run	Arsenal Ave. & 10th St.	1520 E. 10th St.
25	036	Pogues Run	Nowland Ave. & Tecumseh St.	1404 BPND[22]
26	037	White River	Washington St. & Geisendorff St.	801 Washington St.
27	038	White River	New York St. & Agnes St.	300 N. University Blvd.
28	039	White River	New York St. & Beauty Ave.	1100 Michigan St.
29	040	White River	New York St. & Koehne St.	1533 New York St.
30	041	White River	WRPWD[23] & Michigan St.	500 N. WRPWD
31	042	White River	Saint Clair St. & Lynn Ave.	902 N. Lynn
32	043	White River	Harding St. & Waterway Blvd.	1541 W. New York St.
33	044	White River	Waterway Blvd. & Riverside Dr.	1400 N. East Riverside
34	045	White River	WRPWD & Belmont Ave.	1215 WRPWD
35	046	White River	Lafayette Rd. & 19th St.	1900 N. Lafayette Rd.
36	049	Fall Creek	Stadium Dr. & Fall Creek	1050 Stadium Dr.
37	050	Fall Creek	Fall Creek Blvd. & Burdsal Pkwy.	842 W. Burdsal Pkwy.

[19] Those items listed in RED have been eliminated.
[20] PLRPND = Pleasant Run Parkway North Drive
[21] PLRPSD = Pleasant Run Parkway South Drive
[22] BPND = Brookside Parkway North Drive
[23] WRPWD = White River Parkway West Drive

	Outfall Number	Tributary	Permit Location	GIS Location
38	50A	Fall Creek	Northwestern Ave. & 24th St.	2400 N. MLK[24]
39	051	Fall Creek	Capitol Ave. & 22nd St.	2200 N. Capitol
40	052	Fall Creek	Fall Creek Blvd. & Boulevard Pl.	261 W. 25th St.
41	053	Fall Creek	FCPND[25] & Illinois St.	100 W. FCPND
42	054	Fall Creek	FCPND & Meridian St.	2600 N. Meridian St.
43	055	Fall Creek	28th St. & Talbot St.	2800 N. Talbot
44	057	Fall Creek	28th St. & Washington Blvd.	2800 Washington Blvd.
45	058	Fall Creek	28th St. & New Jersey St.	2800 N. New Jersey St.
46	059	Fall Creek	FCPND & Central Ave.	500 E. FCPND
47	060	Fall Creek	Sutherland Ave. & Central Ave.	2665 Central Ave.
48	061	Fall Creek	FCPND & Ruckle St.	522 Ruckle St.
49	062	Fall Creek	Guilford Ave. & 30th St.	877 Guilford Ave.
50	063	Fall Creek	FCPND & 32nd St.	3200 N. Fall Creek Blvd.
51	63A	Fall Creek	FCPND & 32nd St.	3200 Fall Creek Blvd.
52	064	Fall Creek	Winthrop Ave. & 34th St.	3400 N. Winthrop
53	065	Fall Creek	Sutherland Ave. & 34th St.	3400 N. Sutherland Ave.
54	066	Fall Creek	Fall Creek Blvd. & Balsam Ave.	3500 N. Balsam
55	072	Pleasant Run	PLRPND & Saint Peter St.	2324 E. PLRPND
56	073	Pleasant Run	PLRPND & Keystone Ave.	1225 Keystone Ave.
57	074	Pleasant Run	PLRPND & Prospect St.	2950 E. Prospect
58	075	Pleasant Run	PLRPND & Southeastern Ave.	3230 Southeastern Ave.
59	076	Pleasant Run	PLRPND & English Ave.	3600 English Ave.
60	077	Pleasant Run	PLRPND & Sherman Dr.	302 S. Sherman
61	078	Pleasant Run	PLRPND & Brookville Rd.	4213 E. PLRPSD
	079	Pleasant Run	PLRPND & Linwood Ave.	4421 Pleasant Run Pkwy.
62	080	Pleasant Run	PLRPND & Wallace Ave.	4772 E. PLRPND
63	081	Pleasant Run	PLRPND & Riley Ave.	5000 E. PLRPND
64	083	Pleasant Run	Hawthorne Ln. & Lowell Ave.	5302 E. Lowell
65	084	Pleasant Run	PLRPND & Michigan St.	5301 Saint Clair St.
66	085	Pleasant Run	PLRPND & Ritter Ave.	600 N. Ritter
67	086	Pleasant Run	PLRPND & Ritter Ave.	600 N. Ritter
68	087	Pleasant Run	PLRPND & Audubon Rd.	5736 PLRPND
69	088	Pleasant Run	PLRPND & Graham Ave.	5754 PLRPND
70	089	Pleasant Run	PLRPND & Arlington Ave.	700 N. Arlington Ave.
71	89A	Pleasant Run		6000 E. 9th St.
72	090	Pleasant Run	Lowell Ave. & Sheridan Ave.	103 N. Sheridan
73	091	Pleasant Run	PLRPSD & Kenmore Rd.	6307 E. PLRPSD
74	092	Pleasant Run	PLRPSD & Ridgeview Dr.	6419 E. PLRPSD
75	095	Pogues Run	BPND & Coyner Ave.	1401 N. Jefferson
76	096	Pogues Run	BPSD[26] & Nowland Ave.	2200 E. BPSD
77	097	Pogues Run	BPSD & Keystone Ave.	2411 BPSD
78	098	Pogues Run	Tacoma Ave. & Nowland Ave.	2500 E. Nowland
79	099	Pogues Run	BPSD & Temple Ave.	2547 E. BPSD

[24] MLK = Dr. Martin Luther King, Jr. Street
[25] FCPND = Fall Creek Parkway North Drive
[26] BPSD = Brookside Parkway South Drive

	Outfall Number	Tributary	Permit Location	GIS Location
80	100	Pogues Run	BPSD & Rural St.	1350 N. Rural
81	101	Pogues Run	Sherman Dr. & BPND	1900 N. Kealing
82	102	Pogues Run	Forest Manor Ave. & 19th St.	1940 Forest Manor Ave.
83	103	Meadow Brook	Sherman & Denwood Dr. S Lift Station	3940 Sherman Dr.
84	106	Pleasant Run	PLRPND & Orange St.	2102 E. Orange
85	107	Pleasant Run	PLRPND & Saint Paul St.	2224 E. PLRPND
86	108	Pleasant Run	PLRPSD & Saint Paul St.	1327 S. Saint Paul
87	109	Pleasant Run	PLRPND & Churchman St.	1225 S. Churchman
88	115	Pogues Run	Henry St. & Kentucky Ave.	801 Kentucky Ave.
89	116	White River	Meikel St. & Ray St.	940 S. Meikel
90	117	White River	Sern Ave. & White River	700 Sern Ave.
91	118	White River	WRPED[27] & West St.	1800 West St.
92	119	Pleasant Run	PLRPSD & Beecher St.	937 E. Beecher
93	120	Pleasant Run	PLRPSD & Sern Ave.	2701 Bluff Rd.
94	125	Pogues Run	Meridian St. & South St.	300 E. South
95	127	Pleasant Run	1325 S. State St.	1325 S. State
96	128	Pogues Run	Senate Ave. & Merrill St.	230 Merrill St.
97	129	Pogues Run	Meridian St. & Merrill St.	546 Meridian St.
98	130	Pleasant Run	Manual High School	2405 Madison Ave.
99	131	Fall Creek	Fall Creek Blvd. & Capitol Ave.	200 W. FCPND
100	132	Fall Creek	FCPND & Pennsylvania St.	115 FCPSD[28]
101	133	Pogues Run	Market St. & Pine St.	720 Market St.
102	135	Fall Creek	Orchard Ave. & 39th St.	1711 39th St.
103	136	Pogues Run	New York St. & Dorman St.	925 Vermont St.
104	137	Pogues Run	Pine St. & Ohio St.	901 Ohio St.
105	138	Pogues Run	College Ave. & Washington St.	675 Washington St.
106	A38	Pogues Run	Davidson St. & Washington St.	644 College Ave.
107	141	Fall Creek	Winthrop Ave. & 38th St.	700 E. 38th St.
108	142	Fall Creek	College Ave. & 38th St.	3374 FCPND
109	143	Pogues Run	Forest Manor Ave. & 21st St.	1940 Forest Manor Ave.
110	145	Big Eagle Creek	Raymond St. & Kentucky Ave.	2075 Old Raymond St.
111	147	White River	WRPWD & Vermont St.	402 N. WRPWD
112	148	Pleasant Run	PLRPND & Madison Ave.	2400 S. Madison
113	149	Pleasant Run	PLRPSD & Garfield Dr.	749 E. PLRPSD
114	150	Pleasant Run	PLRPND & Raymond St.	2450 Shelby St.
115	151	Pleasant Run	PLRPND & Beecher St.	930 E. Beecher
116	152	Pogues Run	Pine St. & Ohio St.	901 Ohio St.
117	153	Pogues Run	Illinois Ave. & Merrill St.	600 S. Illinois
118	154	Pleasant Run	PLRPND & Michigan St.	5250 PLRPSD
119	155	White River	Pennsylvania St. & 54th St.	5640 Illinois St.
	156	White River	Capitol Ave. & Westfield Blvd.	5600 N. Kenwood
120	205	White River	Boulevard Pl. & Westfield Blvd.	5625 Sunset Ln.
121	210	Fall Creek	Indiana Ave. & 10th St.	
122	213	Fall Creek	2900 N. Hillside	2888 Sutherland Ave.

[27] WRPED = White River Parkway East Drive
[28] FCPSD = Fall Creek Parkway South Drive

	Outfall Number	Tributary	Permit Location	GIS Location
123	216	Fall Creek	Crittenden Ave. & 42^{nd} St.	4141 FCPND
124	217	State Ditch	Gadsden St. & Lyons Ave.	2701 Lyons Ave.
125	218	State Ditch	Gadsden St. & Fleming St.	2622 Fleming St.
126	223	Big Eagle Creek	Victoria St. & Warman Ave.	502 Harris Ave.
127	224	Pleasant Run	PLRPND & Washington St.	4800 Washington St.
	226	Pleasant Run	PLRPND & Colorado Ave.	4206 Colorado Ave.
128	227	Pleasant Run	5700 Emich	5650 PLRPND
129	228	Pleasant Run	Michigan St. & Graham Ave.	6776 Michigan St.
130	229	Pleasant Run	PLRPND & Arlington Ave.	414 Arlington Ave.
131	235	Lick Creek	Shelby St. & Markwood Ave.	4403 McConnell Way
132	275	White River	4945 S. Foltz	4651 Foltz St.

Table 7

Marion County Health Department (MCHD) Sign Locations

Tributary	Location	GIS Guestimate Location
Cumberland Creek	812 N. Spy Run Rd.	812 N. Spy Run Rd .
Eagle Creel	Holt Rd./Eagle Creek	50 N. Holt Rd.
Eagle Creek	McCarty St./Eagle Creek	815 Tip St.
Eagle Creek	Morris St./Eagle Creek	815 Tip St.
Fall Creek	4400 Fall Creek Pkwy.	4400 Fall Creek Pkwy.
Fall Creek	4300 Abby Creek Pkwy.	4300 Abby Creek Pkwy.
Fall Creek	3300 Fall Creek Pkwy.	3300 Fall Creek Pkwy.
Fall Creek	Near Park @ 30th & Fall Creek	2950 Fall Creek Pkwy.
Fall Creek	Dam @ MLK & Fall Creek	2201 Dr. MLK Jr. St.
Fall Creek	West of MLK across from Watkins Park	2360 Dr. MLK Jr. St.
Fall Creek	900 W. Burdsal Pkwy.	900 W. Burdsal Pkwy.
Fall Creek	10th St. & Pedestrian Bridge	1600 W. 10th St.
Fall Creek	10th St. & Pedestrian Bridge	1600 W. 10th St.
Fall Creek	Fall Creek Greenway between Keystone Ave. & Binford Blvd.	
Fall Creek	Fall Creek Greenway Binford Blvd. Parking lot	
Little Eagle Creek	Vermont St./Little Eagle Creek	3800 W. Vermont St.
Pleasant Run	5309 Pleasant Run Pkwy. S Dr.	5309 Pleasant Run Pkwy. S Dr.
Pleasant Run	By electric box, North side of creek	5301 E. Saint Clair
Pleasant Run	Ellenberger & Michigan St./near intersection	5301 E. Saint Clair
Pleasant Run	West of Pedestrian Bridge north of Tennis Courts	5301 E. Saint Clair
Pleasant Run	South & East of Pedestrian Bridge/South side of Creek	5301 E. Saint Clair
Pleasant Run	Across from 5457 Pleasant Run Pkwy.	5457 Pleasant Run Pkwy.
Pleasant Run	Near Howe High School	300 S. Wallace Ave.
Pleasant Run	Just north of Brookville Rd.	4417 Pleasant Run Pkwy. S Dr.
Pleasant Run	Pedestrian Bridge/Christian Park	4200 English Ave.
Pleasant Run	Barth Ave./bridge	1801 Shelby Ave
Pleasant Run	LeGrande Ave./pedestrian bridge	743 E. Pleasant Run Pkwy. S Dr.
Pogues Run	Brookside Park	3500 Brookside Pkwy.
Pogues Run	Brookside Park	3600 Brookside Pkwy.
Pogues Run	10th St. by School 101	1500 E. 10th St.

Tributary	Location	GIS Guestimate Location
State Ditch	Gadsden St. & Lyons	2655 S. Lyons
State Ditch	Lyon Ave.	3145 S. Lyons
White River	Lake Indy	2650 White River Pkwy. E Dr.
White River	1400 White River Pkwy.	1400 White River Pkwy. W Dr.
White River	Behind IWC	1200 N. Waterway Blvd.
White River		1500 W. New York St.
White River	East of River & Raymond St.	900 W. Raymond St.
White River	Harding St. on North side of River	2700 S. Harding St.
White River	Harding St. on South side of River	2800 S. Harding St.

Table 8

Marion County Schools[29] Evaluated for Signs

School	Address	Principal	Zip	Township	Tributary
Baptist Academy	2565 Villa Ave.	Barbara Padgett	46203-4499	Center	Lower White River
IPS #020 Otis E. Brown	1849 Pleasant Run Pkwy. S Dr.	Roberta Lynn Henderson	46203-2006	Center	Lower White River
IPS #042 Elder W. Diggs	1002 W. 25th St.	Minetta Richardson	46208-5330	Center	Upper White River
IPS #101 HL Harshman	1501 E. 10th St.	Linda Casey	46201-1909	Center	Lower White River
IPS Horizon Alternative School	1401 E. 10th St.	Jethro Knazze	46202-1462	Center	Lower White River
IPS #047 Thomas A Edison	777 S. White River Pkwy. W Dr.	Patricia Bolanos	46221	Center	Lower White River
IPS Arsenal Technical	1500 E. Michigan St.	Peggy Clark	46201-3098	Center	Lower White River
IPS Emmerich Manual	2405 Madison Ave.	Kenneth Poole	46225-2106	Center	Lower White River
IUPUI	815 W. Michigan St.		46202	Center	Upper White River
Christian Theological Seminary	1000 W. 42nd St.		46208	Washington	Upper White River
Butler University	4600 Sunset Ave.		46208	Washington	Upper White River
LPP & Arlington Elementary #2	6040 E. Pleasant Run Pkwy. S Dr.	Teresa Bachus-Bray	46219-6039	Warren	Lower White River
IPS Howe	4900 Julian Ave.	John Takacs	46201	Center	Lower White River
Capitol City SDA School	2143 Boulevard Pl.		46202	Center	Lower White River
C 1 Prof. Training Center	3603 E. Raymond St.		46203	Center	Lower White River
Indiana Higher Education	714 N. Senate Ave.		46202	Center	Fall Creek
Ivy Tech State College	1 W. 26th St.		46208	Center	Fall Creek
School of SPEA	334 N. Senate Ave.		46204	Center	Lower White River
Montessori Centres Inc	563 W. Westfield Blvd.		46208	Washington	Lower White River
Irvington Preschool	345 N. Kitley Ave.	Pamela Maki	46219	Warren	Lower White River
Our Savior Lutheran Academy	261 W. 25th St.	Felix Renteria	46208	Center	Lower White River

[29] Areas were determined based on county GIS information, aerial photography and the McCormick study.

Table 9

Park Areas[30] Evaluated for Signs

Tributary	Park	Location
White River	Friedmann Park	5670 Stonehill Dr.
White River	Riverside Park	2420 E. Riverside Dr.
White River	Belmont Park	1300 N. Belmont Ave.
White River	White River State Park	801 W. Washington St.
White River	School 47/Old Riley Park	777 W. White River Pkwy. S Dr.
White River	Southwestway Park	8400 S. Mann Rd.
Fall Creek	Fall Creek & 30th St. Park	30th St. & Fall Creek
Fall Creek	24th St. Park	24th St. & Fall Creek Pkwy.
Fall Creek	Watkins Park	2360 Dr. MLK Jr. St.
Fall Creek	Fall Creek & 16th St. Park	16th St. & Fall Creek Pkwy.
Pogues Run	Forest Manor Park	200 N. Forest Manor Ave.
Pogues Run	Brookside Park	3500 Brookside Pkwy.
Pleasant Run	Ellenberger Park	5301 E. Saint Clair St.
Pleasant Run	Christian Park	4200 English Ave.
Pleasant Run	Garfield Park	2460 S. Shelby St.
Lick Creek	Southside Park	1941 E. Hanna Ave.
Lick Creek	Bluff Park	555 W. Hanna Ave.
Little Eagle Creek	Olin Park	702 N. Olin Ave.

[30] Areas were determined based on county GIS information, aerial photography and the McCormick study.

Table 10

Boat Ramps, Docks and Canoe Launch Areas[31] Evaluated for Signs

Tributary	Facility	Location
White River	Canoe Launch	Kessler Blvd./Friedmann Park
White River	Canoe Launch	Rocky Ripple
White River	Canoe Launch	Rocky Ripple
White River	Canoe Launch	30th St. Bridge
White River	Canoe Launch	10th St. IUPUI Complex
White River	Canoe Launch	South of Indianapolis Zoo
White River	Canoe Launch	East shore, across form Indianapolis Belmont Disposal Plant
White River	Canoe Launch	White River & Lick Creek
White River	Canoe Launch	Ralston Rd. & White River/Southwestway Park
White River	Boat Dock	Rocky Ripple, across river from Highland Golf Course
White River	Boat Dock	Rocky Ripple, across river from Highland Golf Course
White River	Boat Ramp	Riverside Park (Indy Lake)
White River	Boat Ramp	Near Raymond St. & White River E Dr.

[31] Areas were determined based on county GIS information, aerial photography and the McCormick study.

Table 11

Bridge Locations[32] Evaluated for Signs

Tributary	Bridge Location
White River	Kessler Blvd.
White River	Michigan Rd.
White River	38th St.
White River	30th St.
White River	16th St.
White River	10th St.
White River	Michigan St.
White River	New York St.
White River	Washington St. Pedestrian Bridge
White River	Washington St.
White River	Oliver Ave.
White River	Kentucky Ave.
White River	Interstate 70
White River	Morris St.
White River	Raymond St.
White River	Harding St.
White River	Interstate 465
White River	Southport Rd.
Fall Creek	Keystone Ave.
Fall Creek	39th St.
Fall Creek	38th St.
Fall Creek	30th St.
Fall Creek	College Ave.
Fall Creek	Central Ave.
Fall Creek	Delaware St.
Fall Creek	Meridian St.
Fall Creek	Illinois St.
Fall Creek	Capitol Ave.
Fall Creek	Senate Ave.
Fall Creek	Interstate 65
Fall Creek	Interstate 65 Ramp
Fall Creek	Dr. MLK Jr. St.
Fall Creek	21st St.
Fall Creek	16th St.
Fall Creek	Stadium Dr.
Little Eagle Creek	Michigan St.
Little Eagle Creek	Cossell Rd.
Little Eagle Creek	Washington St.
Big Eagle Creek	Interstate 70
Big Eagle Creek	Raymond St.
State Ditch	Bradbury Ave.
State Ditch	Ironton St.

[32] Areas were determined based on county GIS information, aerial photography and the McCormick study.

Tributary	Bridge Location
State Ditch	Southern Ave.
State Ditch	Gadsden St.
State Ditch	Farnsworth St.
State Ditch	Berwyn St.
State Ditch	Troy Ave.
State Ditch	Perry St.
State Ditch	Kentucky Ave.
State Ditch	Mooresville Rd.
State Ditch	Superior Rd.
State Ditch	Interstate 465
Pogues Run	Brookside Park
Pogues Run	Brookside Park
Pogues Run	Brookside Park
Pogues Run	Rural St.
Pogues Run	Nowland Ave.
Pogues Run	Nowland Ave.
Pogues Run	Samoa St.
Pogues Run	Commercial Ave.
Pogues Run	Newman St.
Pogues Run	12^{th} St.
Pogues Run	10^{th} St.
Pogues Run	Oriental St.
Pogues Run	North St.
Pleasant Run	Emerson Ave.
Pleasant Run	Washington St.
Pleasant Run	Howe High School
Pleasant Run	Colorado Ave.
Pleasant Run	Brookville Rd.
Pleasant Run	Christian Park
Pleasant Run	Sherman Dr.
Pleasant Run	English Ave.
Pleasant Run	Southeastern Ave.
Pleasant Run	Prospect Ave.
Pleasant Run	Keystone Ave.
Pleasant Run	Churchman Ave.
Pleasant Run	Villa Ave.
Pleasant Run	State Ave.
Pleasant Run	Spruce St.
Pleasant Run	Interstate 65
Pleasant Run	Shelby St.
Pleasant Run	Beecher St.
Pleasant Run	Raymond St.
Pleasant Run	Garfield Park Center Dr.
Pleasant Run	Pagoda Dr.
Pleasant Run	Madison Ave.
Pleasant Run	Meridian St.
Pleasant Run	Bluff Rd.
Bean Creek	Interstate 65
Bean Creek	Nelson Ave.

Tributary	Bridge Location
Bean Creek	Shelby Ave.
Bean Creek	Southern Ave.
Bean Creek	Conservatory Dr.
Bean Creek	Garfield Park Center Dr.
Lick Creek	Madison Ave.
Lick Creek	Interstate 465
Lick Creek	Interstate 465
Lick Creek	East St.
Lick Creek	Interstate 465
Lick Creek	Interstate 465
Lick Creek	Meridian St.
Lick Creek	Bluff Rd.
Lick Creek	Harding St.

Table 12

CSO Public Notification Responsible Parties

Name	Division	Department/Company	Contact Information	Area of Responsibility
Amanda Shipman	Policy and Planning (Strategic Planning)	Department of Public Works	200 E. Washington St., Suite 2460 Indianapolis, IN 46204 (317) 327-2339 ashipman@indygov.org	CSO Public Notification Program Operations Manager
Mario Mazza	Operations (Water Management Services)	Department of Public Works	1735 S. West St. Indianapolis, IN 46225 (317) 327-4083 mmazza@indygov.org	DMR Reports; placement and maintenance of CSO public notification signs at outfalls
Paul Whitmore	Policy and Planning (Public Information Officer)	Department of Public Works	200 E. Washington St., Suite 2460 Indianapolis, IN 46204 (317) 327-4669 pwhitmor@indygov.org	Backup Program Operations Manager; mailing program manager; general communications and outreach
Victoria Cluck	Policy and Planning (Strategic Planning)	Department of Public Works	200 E. Washington St., Suite 2460 Indianapolis, IN 46204 (317) 327-3744 vcluck@indygov.org	Administration and Backup Program Operations Manager
Pam Thevenow	Water Quality and Hazardous Materials Management	Marion County Health Department	3838 N. Rural St. Indianapolis, IN 46205 (317) 221-2266 ptheveno@hhcorp.org	Placement and maintenance of CSO public notification signs as noted in Table 7
Lenny Addair	Operations (Maintenance Services)	Department of Public Works	1735 S. West St. Indianapolis, IN 46225 (317) 327-2935 laddair@indygov.org	Placement of new signs
Michael Krosschell	Principle Planner	Department of Parks and Recreation	200 E. Washington St., Suite 1821 Indianapolis, IN 46204 (317) 327-5725	General coordination and location of signs for the Parks Dept.

			mkrossch@indygov.org	
Dave Lister	Programming and Promotions Coordinator	Cable Communications Agency – WCTY Channel 16	200 E. Washington St. Indianapolis, IN 46204 (317) 327-2017 dlister@indygov.org	Issue television warnings as needed.

TITLE 327 WATER POLLUTION CONTROL BOARD

LSA Document #00-136(F)

DIGEST

Adds a new rule concerning public notification by National Pollutant Discharge Elimination System (NPDES) permit holders of the potential health impact of combined sewer overflows (CSOs) and amends 327 IAC 5-2-9. Effective 30 days after filing with the secretary of state.

HISTORY

First Notice of Comment Period: #00-136(WPCB) July 1, 2000, Indiana Register (23 IR 2613).

Second Notice of Comment Period and Notice of First Hearing: February 1, 2002, Indiana Register (25 IR 1736).

Date of First Hearing: April 10, 2002.

Third Notice of Comment Period and Notice of Second Hearing: November 1, 2002, Indiana Register (26 IR 422).

Date of Second Hearing and Final Adoption: January 8, 2003.

327 IAC 5-2.1

SECTION 2. 327 IAC 5-2.1 IS ADDED TO READ AS FOLLOWS:

Rule 2.1. Combined Sewer Overflow Public Notification

327 IAC 5-2.1-1 Purpose
Authority: IC 13-14-1-5; IC 13-14-8; IC 13-14-9; IC 13-18-4-1
Affected: IC 13-18-3

Sec. 1. The purpose of this rule concerning community notification of potential health impacts resulting from a combined sewer overflow discharge is to promote and accomplish the following:

(1) Educate the public, in general, and those persons who, specifically, may come into contact with water that may be affected by a combined sewer overflow discharge as to the health implications possible from combined sewer overflow discharge tainted water.

(2) Alert members of the public who may be immediately affected by a combined sewer overflow discharge or the potential for a combined sewer overflow discharge to occur.

(3) Enable members of the public to protect themselves from possible exposure to waterborne pathogens resulting from contact with or ingestion of water from a waterway that may be affected by a combined sewer overflow discharge.

(4) Complement the combined sewer overflow discharge requirements contained in a National Pollutant Discharge Elimination System (NPDES) permit but not obviate or supersede any more stringent requirements contained in an NPDES permit.

(Water Pollution Control Board; 327 IAC 5-2.1-1)

327 IAC 5-2.1-2 Applicability

Authority: IC 13-14-1-5; IC 13-14-8; IC 13-14-9; IC 13-18-4-1
Affected: IC 13-18-3

Sec. 2. Any person required to possess a National Pollutant Discharge Elimination System (NPDES) permit and having one (1) or more combined sewer overflow outfalls into waters of the state must comply with this rule. *(Water Pollution Control Board; 327 IAC 5-2.1-2)*

327 IAC 5-2.1-3 Definitions
Authority: IC 13-14-1-5; IC 13-14-8; IC 13-14-9; IC 13-18-4-1
Affected: IC 13-11-2-158; IC 13-11-2-265; IC 13-18-3

Sec. 3. The following definitions apply throughout this rule:
(1) "Affected public" means those persons who may be exposed to waterborne pathogens through direct contact with or ingestion of water affected by a combined sewer overflow discharge and is limited to:
(A) residents on or adjacent to affected waters;
(B) public and private schools on or adjacent to affected waters;
(C) owners or operators of facilities that provide access to or recreational opportunities in or on affected waters; and
(D) owners or operators of public drinking water systems with surface intakes in or on affected waters.
(2) "Affected waters" means those waters where the E.coli criteria may be exceeded due to a combined sewer overflow discharge.
(3) "Combined sewage" means a combination of wastewater, including domestic, commercial, or industrial wastewater and storm water transported in a combined sewer.
(4) "Combined sewer overflow community" or "CSO community" means a recipient of a National Pollutant Discharge Elimination System (NPDES) permit that includes one (1) or more combined sewer overflow outfalls.
(5) "Combined sewer overflow discharge" or "CSO discharge" means the discharge of combined sewage from an overflow point listed in an NPDES permit.
(6) "Combined sewer overflow outfall" or "CSO outfall" means a structure that:
(A) conveys combined sewage into a receiving waterbody; and
(B) is listed in an NPDES permit.
(7) "Combined sewer system" means a system that:
(A) is designed, constructed, and used to receive and transport combined sewage to a publicly owned wastewater treatment plant; and
(B) may contain one (1) or more combined sewer overflow outfalls that discharge sewage when the hydraulic capacity of the wastewater treatment plant, combined sewer system, or part of the system is exceeded as a result of a wet weather event.
(8) "Commissioner" means the commissioner of the department of environmental management.
(9) "Department" means the department of environmental management except as specifically referenced in this rule.
(10) "Person" has the meaning set forth at IC 13-11-2-158.
(11) "Waters of the state" has the meaning set forth for "waters" at IC 13-11-2-265.

(Water Pollution Control Board; 327 IAC 5-2.1-3)

327 IAC 5-2.1-4 CSO notification procedure

Authority: IC 13-14-1-5; IC 13-14-8; IC 13-14-9; IC 13-18-4-1
Affected: IC 13-18-3

Sec. 4. (a) A CSO community shall:

(1) develop a CSO notification procedure that meets the requirements of this rule; and

(2) incorporate the CSO notification procedure into its CSO operational plan.

(b) A CSO notification procedure must include the following information at a minimum:

(1) Determination of affected waters for the purpose of providing community notification according to section 5 of this rule.

(2) Locations of:

(A) the CSO outfalls;

(B) public access points including boat launches and bridges located on affected waters; and

(C) parks, school yards, parkways, and greenways on or adjacent to affected waters.

(3) Locations of drinking water suppliers having surface water intakes located within ten (10) river miles downstream of each CSO outfall within the CSO community's jurisdiction.

(4) Method, according to section 6 of this rule, that shall be used to provide notification to the affected public within the area of each affected water.

(5) Assignment of responsibilities within a CSO community for implementing the CSO notification procedure.

(c) A CSO notification procedure must be:

(1) submitted to the commissioner for review six (6) months after the effective date of this rule;

(2) included in the community's CSO operational plan;

(3) in the initial stages of implementation by the CSO community upon submission according to subdivision (1);

(4) fully implemented no later than ninety (90) days after the date of submission according to subdivision (1); and

(5) modified in order to ensure that the procedure is consistent with this rule if either of the following occurs:

(A) The commissioner requests such modification within six (6) months of the date of submission of the notification procedure.

(B) A member of the affected public requests that the department reevaluate the notification procedure.

(Water Pollution Control Board; 327 IAC 5-2.1-4)

327 IAC 5-2.1-5 Notification

Authority: IC 13-14-1-5; IC 13-14-8; IC 13-14-9; IC 13-18-4-1
Affected: IC 13-18-3

Sec. 5. (a) A CSO community shall provide notification to:

(1) affected public;

(2) other persons within the CSO community who request to be notified in response to the public notice required by section 6(a)(1) of this rule; and

(3) local health departments and drinking water suppliers having surface water intakes located within ten (10) river miles downstream of each CSO outfall experiencing or about to experience a CSO discharge.

(b) The notification must be appropriately worded to explain the nature of the potential health effects of a CSO discharge and steps that affected persons can take to avoid exposure.

(c) Unless specifically required in this rule, a CSO community is not responsible for confirming that the intended recipients of the notification required by subsection (a) received the notification.

(d) Notification must be provided whenever information from a reliable source indicates that:

(1) a discharge or discharges from one (1) or more combined sewer overflow outfalls is occurring; or

(2) a discharge or discharges from one (1) or more combined sewer overflow outfalls is imminent based on predicted or actual precipitation or a related event.

(e) If a CSO discharge occurred and notification was not provided according to subsection (d), the CSO community shall report this fact on the monthly report required according to section 7(a) of this rule. *(Water Pollution Control Board; 327 IAC 5-2.1-5)*

327 IAC 5-2.1-6 Community notification methods
Authority: IC 13-14-1-5; IC 13-14-8; IC 13-14-9; IC 13-18-4-1
Affected: IC 13-18-3

Sec. 6. (a) A CSO community shall do the following unless alternative procedures are identified by the community that are equivalently effective:

(1) Provide public notice in a newspaper of general circulation in March of each year to allow the following to request receipt of CSO notification:

(A) Media sources, such as newspapers, television, or radio.

(B) Affected public.

(C) Other interested persons in the CSO community.

(2) Provide notification to those identified under subdivision (1) who request receipt of CSO notification under subdivision (1):

(A) when a CSO discharge is occurring or is imminent based on predicted or actual precipitation or a related event; and

(B) in a manner that is mutually agreeable to the recipient and the CSO community.

If the recipient and CSO community do not reach agreement on an acceptable manner of notification, then the CSO community shall provide notice by a reasonable, effective means.

(b) In addition to the requirements of subsection (a), a CSO community shall post a prominent sign within the CSO community's jurisdiction:

(1) at access points to an affected water, including boat ramps, bridges, parks, and school yards;

(2) along parkways and greenways on or adjacent to affected waters at locations most likely to provide notification to persons who may come into direct contact with the water based on information available to the CSO community; and

(3) with the language printed in English or any other language common in the locale (including the language necessary to fill in the blanks) that states or is equal in meaning to the following: "Caution–Sewage or Wastewater pollution. Sewage or Wastewater may be in this water during and for several days after periods of rainfall or snow melt. People who swim in, wade in, or ingest this water may get sick. For more information, please call [insert local sewer authority, telephone number, and, if available, a Web site address]."

(c) Cautionary combined sewer overflow signs posted prior to the effective date of this rule advising that combined sewer overflows may occur at that point do not need to be replaced specifically to comply with the wording of subsection (b)(3). If, however, a cautionary combined sewer overflow sign existing prior to the effective date of this rule does need replacement due to reasons such as weathering or other reasons for replacement then the replacement sign must comply with the language suggested in subsection (b)(3).

(d) If an access point to an affected water is located on private property or property outside a CSO community's jurisdiction, then a CSO community shall:

(1) annually offer to provide the sign required under subsection (b) for the owner or operator of the private or nonjurisdictional property; and

(2) not be required to provide the sign required under subsection (b) provided the private or nonjurisdictional property owner or operator has refused the community's offer made according to subdivision (1). *(Water Pollution Control Board; 327 IAC 5-2.1-6)*

327 IAC 5-2.1-7 Record keeping and reporting
Authority: IC 13-14-1-5; IC 13-14-8; IC 13-14-9; IC 13-18-4-1
Affected: IC 13-18-3

Sec. 7. (a) A CSO community shall document its public notification efforts on its monthly CSO discharge monitoring report (DMR).

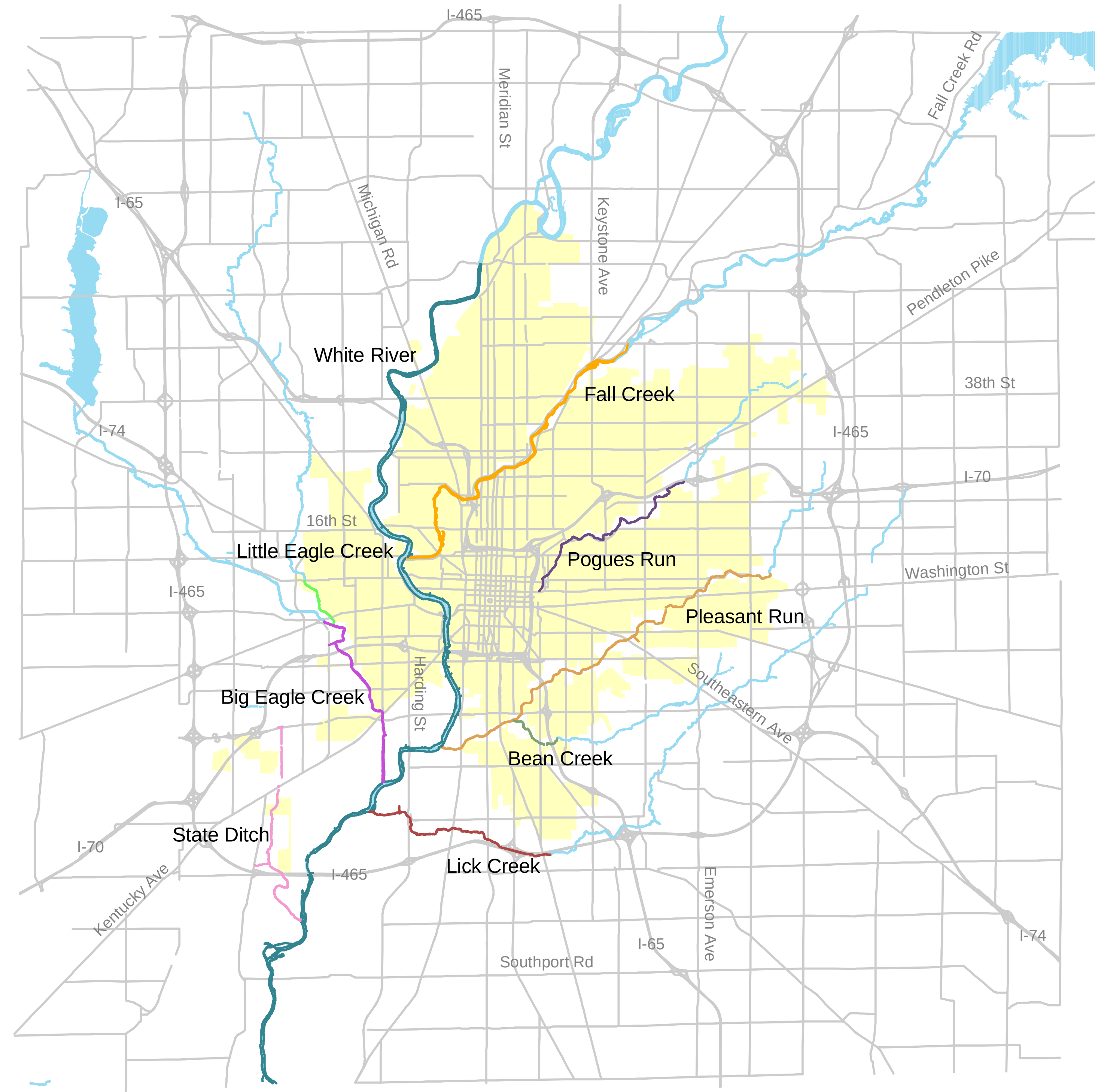
(b) A CSO community shall maintain a record of reports submitted according to subsection (a) that is:

(1) kept at the wastewater treatment plant; and

(2) available to the commissioner's representatives during the department's normal working hours.

(Water Pollution Control Board; 327 IAC 5-2.1-7)

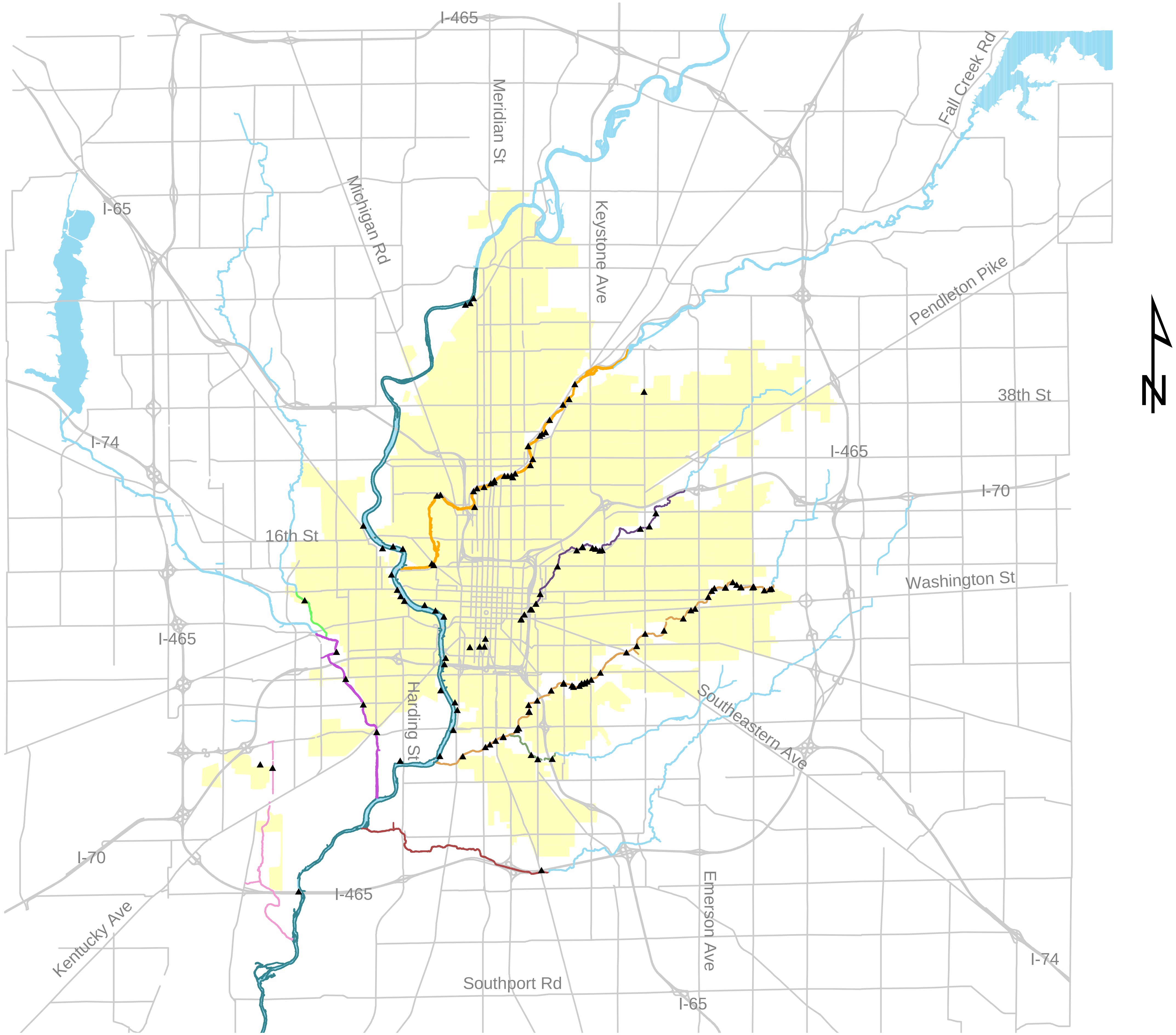
Figure 1
Streams Affected by CSOs



Legend

Streams outside CSO area	**Streams within CSO area**		LICK CREEK
Major Streets		BEAN CREEK	LITTLE EAGLE CREEK
CSO Basin		BIG EAGLE CREEK	PLEASANT RUN
		FALL CREEK	POGUES RUN
			STATE DITCH
			WHITE RIVER

Figure 2
CSO Outfall Locations



Legend

- CSO Outfall
- Major Streets
- Streams outside CSO area

Streams within CSOarea

- BEAN CREEK
- BIG EAGLE CREEK
- FALL CREEK
- LICK CREEK
- LITTLE EAGLE CREEK
- PLEASANT RUN
- POGUES RUN
- STATE DITCH
- WHITE RIVER
- CSO Basin

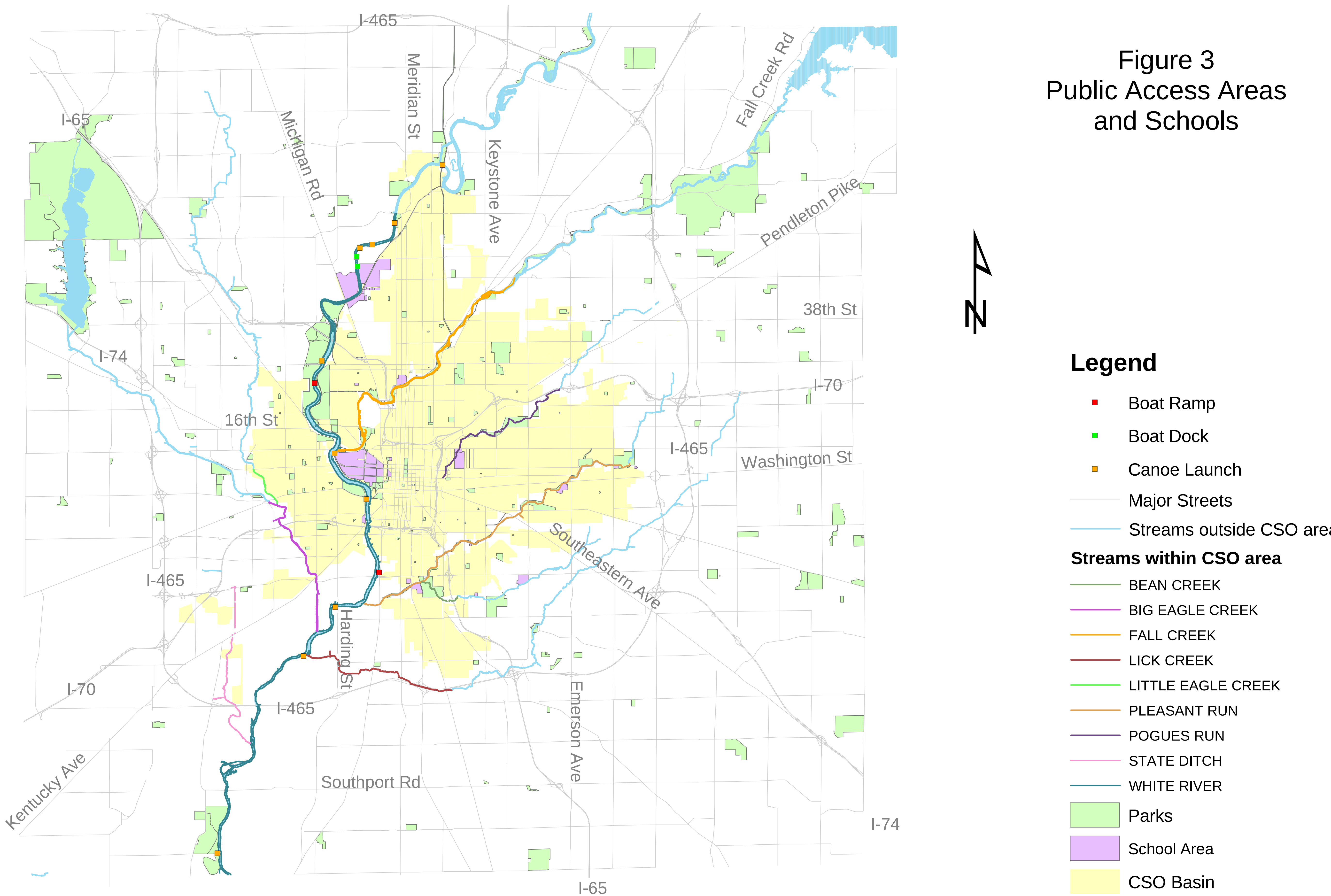


Figure 3
Public Access Areas
and Schools

Figure 4
Bridges and
Greenway Areas

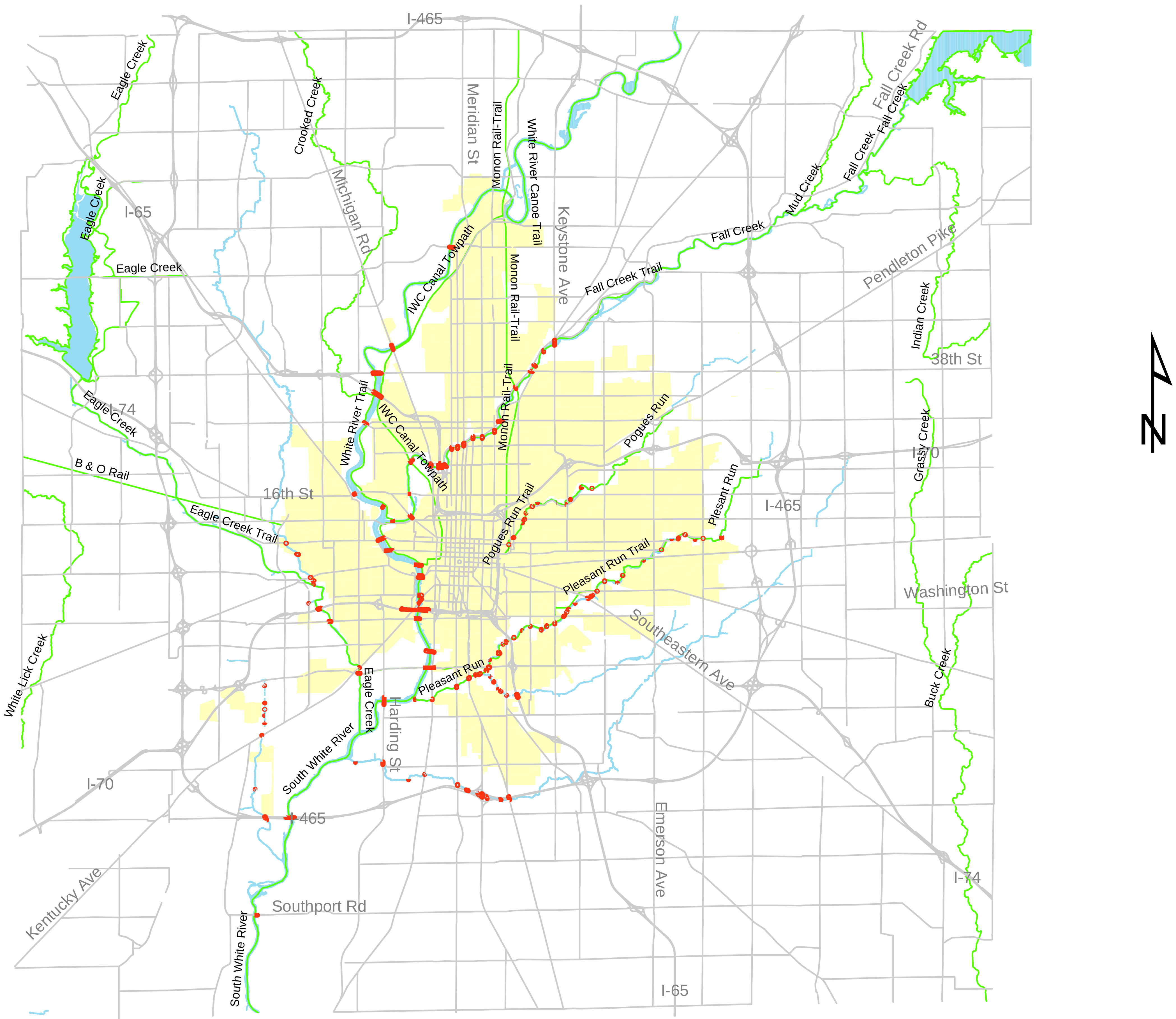
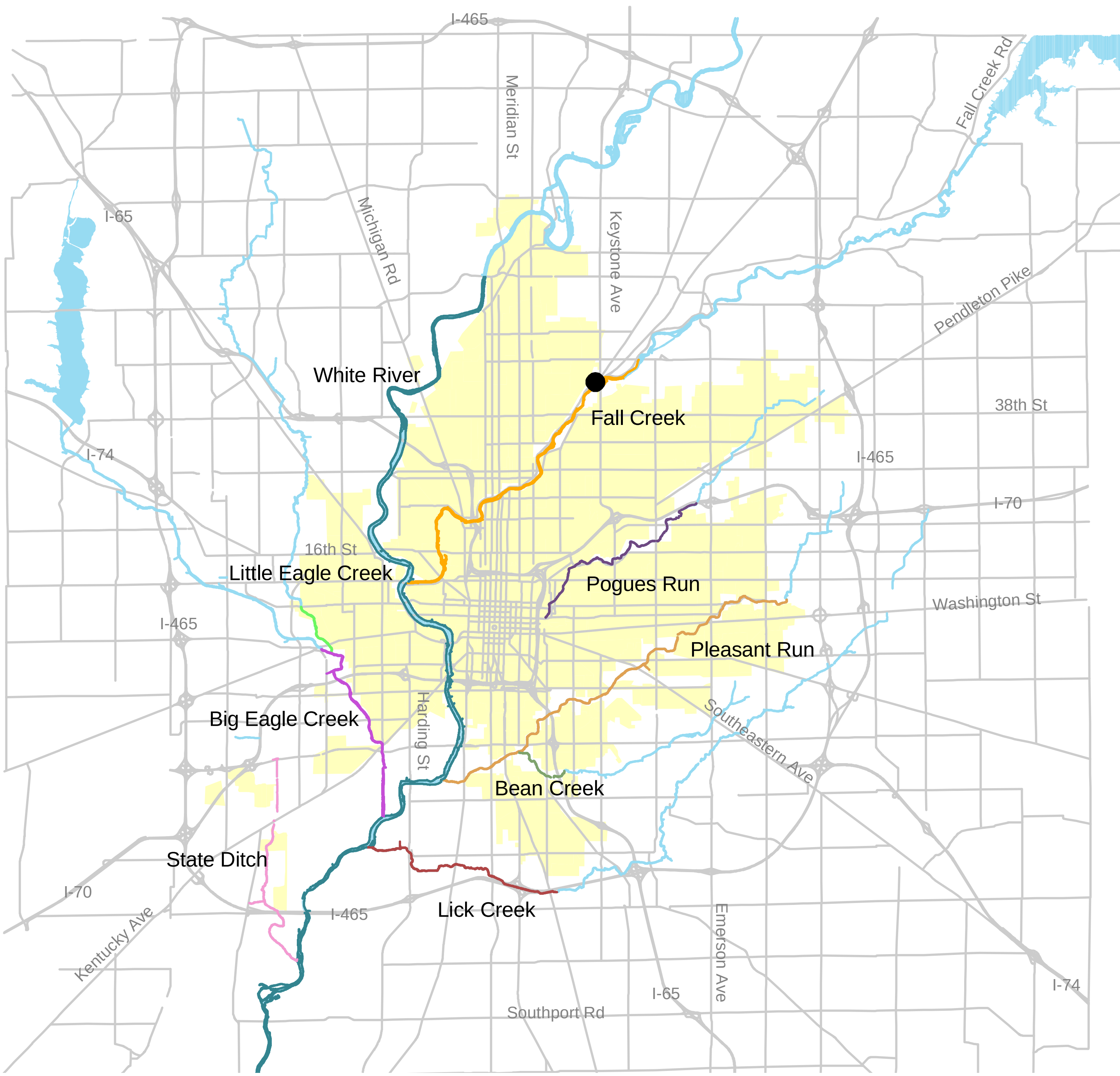


Figure 5
Surface Drinking Water Suppliers
within 10 miles downstream of a CSO



Legend

Indianapolis Water

CSO Basin

Streams outside CSO area

Streams within CSOarea

BEAN CREEK

BIG EAGLE CREEK

FALL CREEK

LICK CREEK

LITTLE EAGLE CREEK

PLEASANT RUN

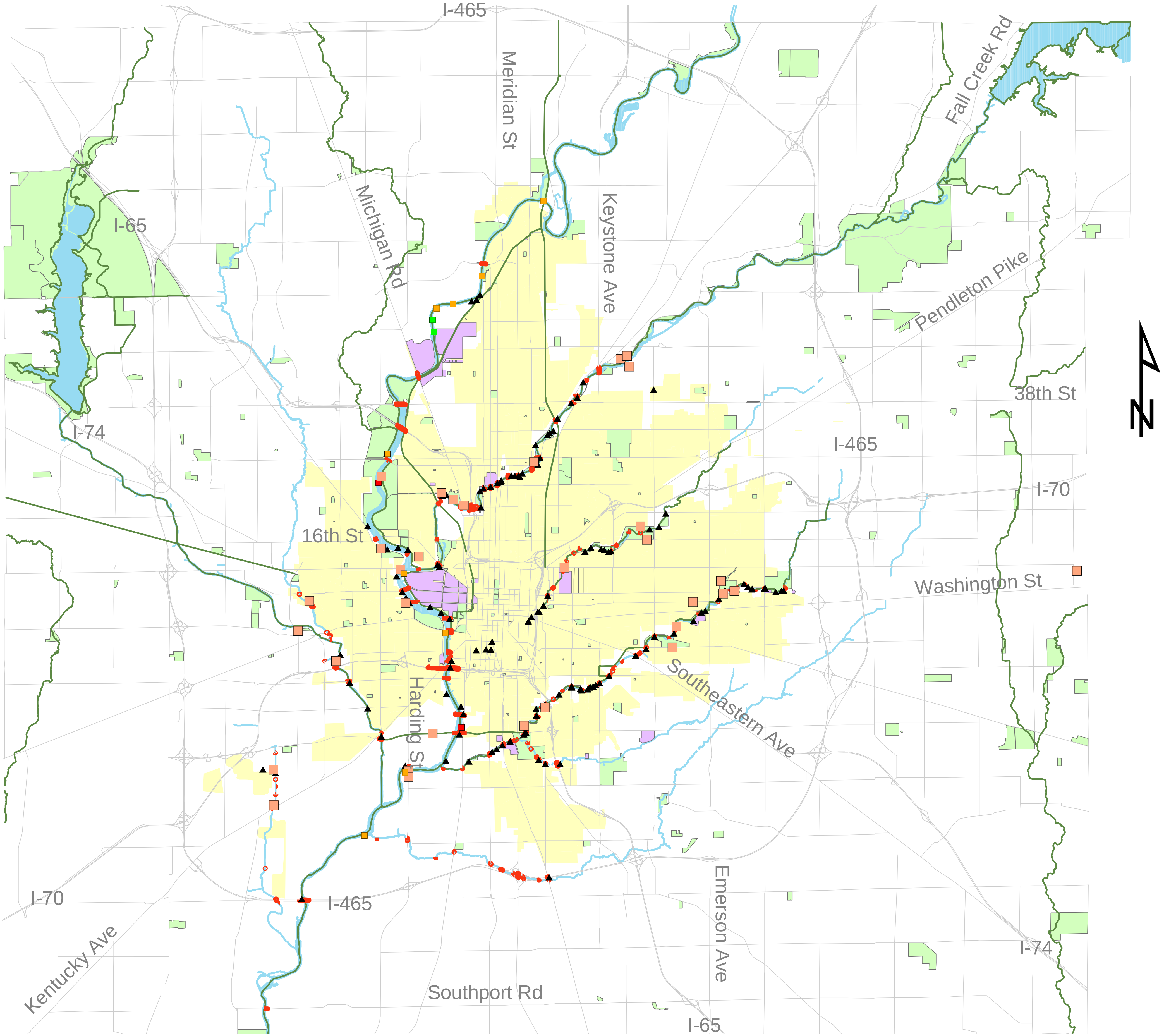
POGUES RUN

STATE DITCH

WHITE RIVER

N

Figure 9
Existing CSO Warning Signs



Legend

- CSO Outfall and DPW Sign
- MCHD CSO Signs
- Boat Ramp
- Boat Dock
- Canoe Launch
- Greenway
- Bridge
- Major Streets
- Streams
- Parks
- School Area
- CSO Basin

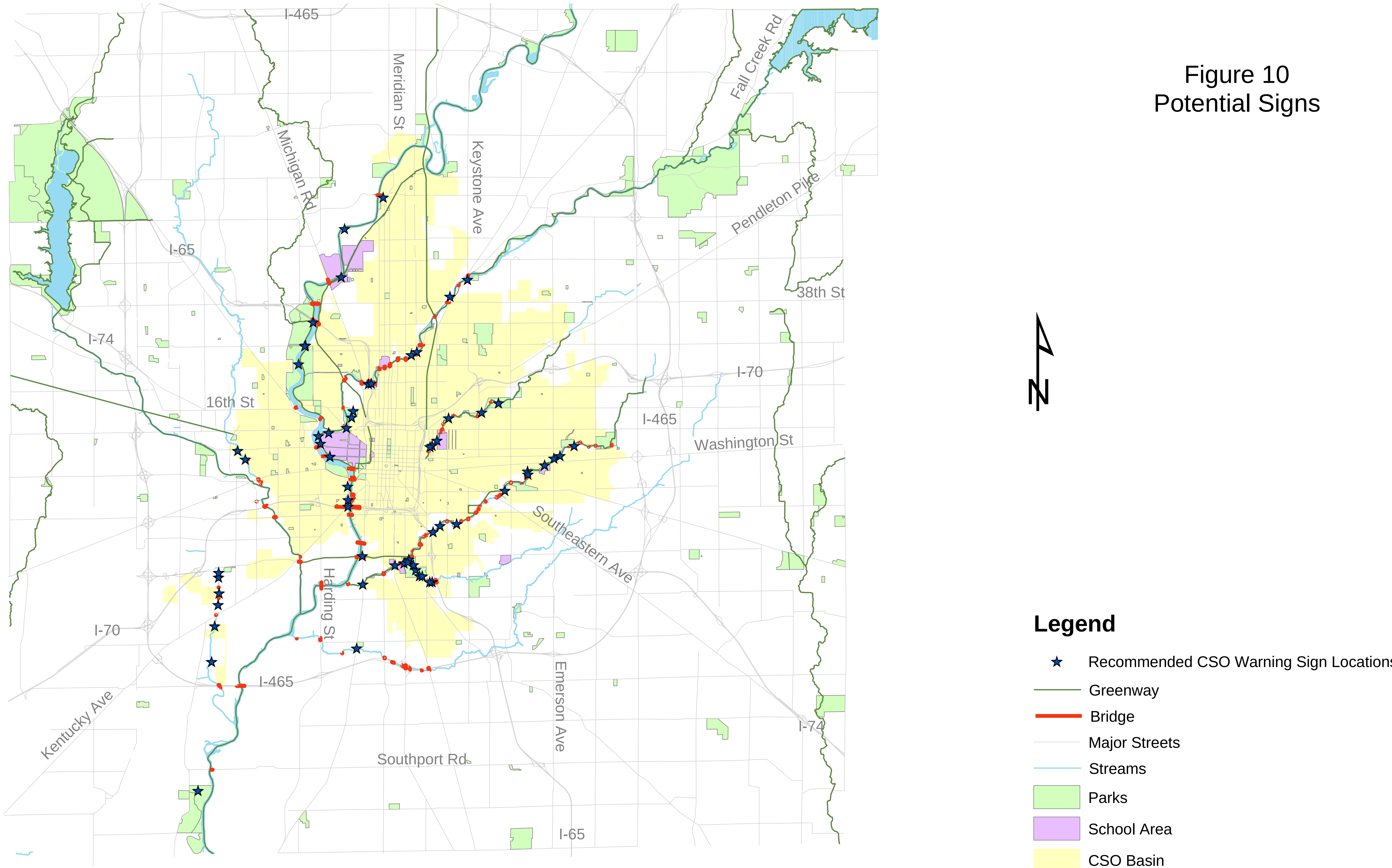


Figure 10
Potential Signs

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

We make Indiana a cleaner, healthier place to live.

Mitchell E. Daniels, Jr.
Governor

Thomas W. Easterly
Commissioner

Office of Water Quality - Mail Code 65-42
100 North Senate Avenue
Indianapolis, Indiana 46204-2251
(317) 232-8603
(800) 451-6027
www.IN.gov/idem

June 27, 2005

Mr. James A. Garrard, Director
Department of Public Works
2460 City County Building
200 East Washington Street
Indianapolis, IN 46204

Dear Mr. Garrard:

Re: Existing Use Determination for CSO-Impacted Portions of Marion County Streams

The Office of Water Quality has reviewed the above referenced plan submitted on April 5, 2005. The Indianapolis "no existing use" demonstration is based largely upon the rationale that a particular rain event results in a specific response by the CSO receiving stream, rendering the stream unsafe for recreational purposes. The information that Indianapolis provided regarding stream flows, wading and the safety of US Geological Survey (USGS) personnel is accurate as it applies to USGS staff. USGS staff wades into streams at a USGS gaging station location for the purpose of performing certain flow measuring tasks. They have equipment that must be taken into the stream and they have to be able to use it. Under certain flow conditions, USGS personnel are unable to perform their jobs efficiently and safely. The morphology of the stream plays a part in how those velocities are expressed. For example, a segment of the stream with deeper pools would expect to have slower velocities and the shallower cross sections may have faster velocities. Additionally, those stream flow measurements are only applicable to the stream conditions at the USGS gage site from where the measurements were taken, and cannot be extrapolated to the conditions at the sites where the public would access the stream.

The relationship between a storm event and a stream response is dependent on a number of factors. IDEM believes that a safety-velocity based argument is an appropriate one to determine when an existing recreational use is present. Based on the data provided by Indianapolis, IDEM accepts that primary contact recreation is not an existing use during a 3-month storm event for the portions of the CSO receiving streams the City has identified: Fall Creek, Eagle Creek, Pleasant Run, Pogues Run, and the White River. Since primary contact recreation is not an existing use under 3-month storm event flow conditions, Indianapolis may proceed with a use attainability analysis to determine the attainable recreational use for these waters. Because actual velocity at a specific point in a stream system is affected by a variety of site-specific factors, a 3-month rain event is an appropriate threshold because the estimated stream flows resulting from such an event are high enough to assume that velocities are unsafe even in recreation areas that were not monitored directly. Other flows may be determined to be acceptable based on site-specific data.

It should be also noted that any appeal of this decision must be filed under procedures outlined in IC 13-15-6, IC 4-21.5 The appeal must be initiated by filing with the Office of Environmental Adjudication (OEA) a request for adjudicatory hearing within 18 days of the mailing of this letter at the following address:

Office of Environmental Adjudication
Indiana Government Center North
100 North Senate Avenue, Room 1049
Indianapolis, IN 46204

Questions concerning appeal procedures should be directed to the Office of Environmental Adjudication, at 317/232-8591.

Please send a copy of any such appeal to:
Cyndi Wagner, Chief
Wet Weather Section
Indiana Department of Environmental Management
100 N. Senate Avenue Mail Code 65-42
Indianapolis, Indiana 46204-2251

If you have any questions regarding this letter, please contact Ms. Wagner at 317/233-0473.

Sincerely,

Thomas W. Easterly
Commissioner

cc: Bruno Pigott, OWQ Assistant Commissioner

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

August 5, 2011

C-14J

David Sherman, Director
City of Indianapolis Department of Public Works
2460 City-County Building
200 E. Washington Street
Indianapolis, Indiana 46204

Re: *United States and State of Indiana v. City of Indianapolis*, No. 1:06-cv 1456-DFH-JMS

Dear Director Sherman:

This letter is being sent, at Indianapolis' request, to explain how the United States Environmental Protection Agency (U.S. EPA) intends to exercise its prosecutorial discretion under Paragraph 8(a) of the above-referenced consent decree.

Background

At the time that the 2006 consent decree was negotiated, Indianapolis estimated that the cost of the measures required by Sections VI and VII of the consent decree would be approximately $1,868,000 (in 2005 dollars). Indianapolis also provided estimates at that time regarding the costs of achieving higher levels of control than the Performance Criteria specified in Exhibit 1 to the consent decree. Based in large part on those cost estimates and other information developed by Indianapolis in the course of developing its Long Term Control Plan (LTCP), U.S. EPA and the Indiana Department of Environmental Management (IDEM) agreed with Indianapolis that it was likely there would be adequate information in the administrative record to allow IDEM and the Indiana Water Pollution Control Board to review and act on Indianapolis' request for a revision to water quality standards within five years of the date of lodging of the consent decree (*i.e.*, by October 4, 2011).

However, in the past four-and-one half years, Indianapolis has substantially revised and updated its LTCP. The parties, including U.S. EPA, agreed on amendments to the above-referenced consent decree to incorporate those LTCP revisions. Indianapolis has also substantially revised and updated its estimates as to (a) the cost of the CSO Control Measures required by the consent decree and (b) the costs to achieve higher levels of control than the levels expected to be achieved through construction of the CSO Control Measures. Moreover, Indianapolis is in the midst of transferring its sewer system and wastewater treatment plants and waterworks assets to Citizens Energy Group, a public charitable trust that Indianapolis asserts will serve as the Department of Public Utilities for the City of Indianapolis. Due to the potential synergies of consolidating Indianapolis' five operating utilities, that transaction is expected to reduce the anticipated rate of increase in future user fees for wastewater transport and treatment costs in Indianapolis. The extent of any future savings is not known at this time.

In light of these significant changes to the LTCP and to many of the financial assumptions that had been in place in 2006, and also given the likelihood that the sewer system and wastewater treatment plants will be acquired by the Citizens Energy Group in the near future, it does not appear that there will be adequate information in the administrative record to allow a water quality standards revision by October 4, 2011.

Indianapolis' Concern Regarding U.S. EPA's Discretionary Authority Under Consent Decree Paragraph 8(a) to Require a Revised CSO Control Measures Plan

Indianapolis has expressed concern that, if the water quality standards revision process is not completed by October 4, 2011, U.S. EPA has the authority under Paragraph 8(a) of the consent decree to require Indianapolis to develop and implement a Revised CSO Control Measures Plan to achieve a higher level of control than the Performance Criteria currently specified in Exhibit 1 to the consent decree. Specifically, Indianapolis asserts that the fact that the U.S. EPA has such authority, whether it chooses to exercise it or not, will cause Indianapolis significant uncertainty as it invests hundreds of millions of dollars to design and construct its CSO Control Measures in accordance with the Design and Performance Criteria specified in Exhibit 1.

To provide Indianapolis with greater certainty, this letter clarifies that, as long as Indianapolis (or its successors or assigns) is implementing its CSO Control Measures in compliance with all aspects of Section VII of the consent decree, U.S. EPA does not intend to exercise its authority under Paragraph 8(a) to require Indianapolis to develop and implement a Revised CSO Control Measures Plan. However, if Indianapolis is no longer in compliance with its implementation obligations, or chooses to proceed with a request for a revision to water quality standards and U.S. EPA has reason to believe that Indianapolis' request might not be approved, then U.S. EPA may consider exercising its discretionary authority under Paragraph 8(a) to require Indianapolis to develop and implement a Revised CSO Control Measures Plan.

This letter pertains solely to how U.S. EPA intends to exercise its discretionary authority under Paragraph 8(a) of the consent decree while Indianapolis is implementing the CSO Control Measures in accordance with Section VII of the consent decree. Nothing in this letter is intended to limit in any way the U.S. EPA's exercise of its authority under Section 8(a) of the consent decree after Indianapolis (or its successors or assigns) completes implementation of its CSO Control Measures. Moreover, the United States and U.S. EPA preserve their authority under other provisions of the consent decree, the Clean Water Act and U.S. EPA's implementing regulations, other provisions of federal law, to take action to (a) enforce the Clean Water Act, U.S. EPA's implementing regulations, Indianapolis' National Pollutant Discharge Elimination System permits, and the requirements of the consent decree; and (b) address any imminent or substantial endangerments. Finally, as noted above, nothing in this letter should be construed as limiting Indianapolis' right to pursue revisions to water quality standards in accordance with applicable state and federal laws.

Conclusion

Please contact me if you have any questions.

Sincerely,

Gary Prichard
Associate Regional Counsel

cc: Greg Sukys, DOJ
Beth Admire, IDEM

Appendix F

Amendments to the Consent Decree

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF INDIANA

UNITED STATES OF AMERICA, and THE STATE OF INDIANA, Plaintiffs, v. THE CITY OF INDIANAPOLIS, INDIANA, A Municipal Corporation, Defendant.	Civil Action No. 1:06-cv-1456 Judge David F. Hamilton

FIRST AMENDMENT TO 2006 CONSENT DECREE

WHEREAS, the Court entered a Consent Decree in this matter on December 19, 2006 ("2006 Consent Decree"). That Consent Decree requires, among other things, that the City of Indianapolis ("City" or "Indianapolis") perform certain activities and construct certain Combined Sewer Overflow ("CSO") Control Measures in accordance with the Descriptions, Design Criteria, and dates for Completion of the Bidding Process and Achievement of Full Operation for each CSO Control Measure set forth in Table 7-5 of Section 7 of the City's Long Term Control Plan, attached to the 2006 Consent Decree at Exhibit 1 (hereinafter "Exhibit 1")

WHEREAS, CSO Control Measure 16, as set forth in the 2006 Consent Decree, requires the City to construct a shallow interceptor sewer with a peak diversion of 150 million gallons per day of CSO flow to the Southport advanced wastewater treatment plant. However, Plaintiffs United States and the State of Indiana, together with the City (the "Parties"), have agreed that CSO Control Measure 16 should be modified to require Indianapolis to undertake construction of a conveyance and storage tunnel that would be constructed approximately 200 feet below ground (the "Deep Rock Tunnel Connector"). The entire Deep Rock Tunnel Connector would provide a minimum storage volume of 54 million gallons and a minimum peak conveyance and dewatering capacity of 150 million gallons per day of CSO flow to the Southport advanced wastewater treatment plant. The project, as modified, would also provide for connection of CSO Outfall 008 to the Deep Rock Tunnel Connector as well as other associated measures.

WHEREAS, the Parties agree that the Deep Rock Tunnel Connector will increase storage capacity and thereby improve the City's ability to control CSOs. Further, constructing the Deep Rock Tunnel Connector and connecting CSO Outfall 008 to the connector will enable the City to capture discharges from CSO Outfall 008 three and one-half years earlier than otherwise prescribed by the current scope of the Consent Decree (via the construction of Control Measure 25 by 2019). Historically, CSO Outfall 008 has been the outfall in Indianapolis with the greatest volume of untreated CSO discharges on an annual basis.

WHEREAS, the Parties anticipate that it will take Indianapolis approximately three and one-half years longer to construct the Deep Rock Tunnel Connector and associated measures than it would have taken to construct the shallow interceptor sewer. However, the parties concur that allowing the City this additional amount of time to implement this element of its Long Term Control Plan is warranted by the long-term environmental benefits that are expected to accrue from the increase in storage capacity that would be realized through construction of the Deep Rock Tunnel Connector, and from the benefits of capturing discharges from CSO Outfall 008 three and one-half years earlier than was previously anticipated.

WHEREAS, the Parties believe that a modification of the 2006 Consent Decree would be the most efficient means of achieving the remedy change proposed above. To that end, the

Parties propose to modify Exhibit 1 to the 2006 Consent Decree by substituting a new Exhibit 1, which would modify the requirements pertaining to CSO Control Measures 16, 27, and 28. The modifications to Control Measures 27 and 28 are merely conforming modifications that are necessitated by the proposed modifications to CSO Control Measure 16. The new Exhibit 1 is attached hereto.

WHEREAS, the proposed modifications to Exhibit 1 are set forth in italics in the following tables. The text of footnote numbers 7 and 8, which appear at the end of both the original and the proposed modified versions of the table in Exhibit 1, is unchanged by this proposed modification. As such, the text of those footnotes is not reprinted in the following summary tables.

1. Proposed Modification of CSO Control Measure No. 16:

(Table 7-5; Exhibit 1 to 2006 Consent Decree) (proposed modifications in italics)

	CSO Control Measure		Description	Design Criteria	Performance Criteria	Critical Milestones
Original	16	Interplant Connection	Interceptor originating near CSO 117 and terminating near the headworks of the Southport facility 8/	Peak Diversion of 150 MGD CSO flow to Southport	Deliver flow from White River Tunnel to Southport AWT plant	Bid Year - 2008 Achievement of Full Operation - 2012
Proposed Modification	16	*Deep Rock Tunnel Connector, Deep Tunnel Pumping Station and Screening Facilities, and Connection of CSO 008 to the Deep Rock Tunnel Connector*	*Deep rock tunnel originating near CSO 117 and terminating near the headworks of the Southport facility,* 8/ *deep tunnel pumping station and screening facilities located near the Southport treatment facility, and structures necessary to tie CSO 008 flows into the Deep Rock Tunnel Connector*	*Provide a minimum storage volume of 54 MG within the entire Tunnel Connector project and a minimum peak conveyance and dewatering capacity of 150 MGD CSO flow to Southport*	*Maximize delivery of flow from White River Tunnel to Southport AWT Plant. Optimize capture of CSO 008 and CSO 117*	*Bid Year - May 31, 2011 Achievement of Full Operation - May 31, 2016*

2. Proposed Modification to CSO Control Measure No. 27:

(Table 7-5; Exhibit 1 to 2006 Consent Decree) (proposed modifications in italics)

	CSO Control Measure		Description	Design Criteria	Performance Criteria	Critical Milestones
Original	27	Southport Advanced Wastewater Treatment Plant Improvements -- CSO Pump Station	New pump station for additional dewatering of captured CSO from the Interplant Connection	Additional 75 MGD for routing to Enhanced High Rate Clarifiers (EHRC)	When incorporated with the rest of the Southport improvements, facility complies with current NPDES permit	Bid Year 2022 Achievement of Full Operation - 2025
Proposed Modification	27	Southport Advanced Wastewater Treatment Plant Improvements -- CSO Pump Station	New pump station for additional dewatering of captured CSO from *the Deep Rock Tunnel Connector*	Additional 75 MGD for routing to Enhanced High Rate Clarifiers (EHRC)	When incorporated with the rest of the Southport improvements, facility complies with current NPDES permit	Bid Year 2022 Achievement of Full Operation - 2025

3. Proposed Modification to CSO Control Measure No. 28:

(Table 7-5; Exhibit 1 to 2006 Consent Decree) (proposed modifications in italics)

	CSO Control Measure		Description	Design Criteria	Performance Criteria	Critical Milestones
Original	28	Southport Advanced Wastewater Treatment Plant Improvements EHRC Facility 7/	New enhanced high rate clarifiers, and new process/yard piping	Additional 75 MGD EHRC treatment for dewatering of captured CSO from the Interplant Connection	When incorporated with the rest of the Southport improvements, facility complies with current NPDES permit	Bid Year 2022 Achievement of Full Operation - 2025
Proposed Modification	28	Southport Advanced Wastewater Treatment Plant Improvements EHRC Facility 7/	New enhanced high rate clarifiers, and new process/yard piping	Additional 75 MGD EHRC treatment for dewatering of captured CSO from *the Deep Rock Tunnel Connector*	When incorporated with the rest of the Southport improvements, facility complies with current NPDES permit	Bid Year 2022 Achievement of Full Operation - 2025

NOW, THEREFORE, it is hereby ORDERED:

1. The attached Exhibit 1 supersedes Exhibit 1 to the 2006 Consent Decree. All references to "Exhibit 1" in the 2006 Consent Decree hereafter shall refer to the attached Exhibit 1.

2. This proposed First Amendment to 2006 Consent Decree shall be lodged with the Court for a period of not less than thirty (30) days, for public notice and comment in accordance with the provisions of 28 C.F.R. § 50.7. The United States reserves the right to withdraw or

withhold its consent if the comments received disclose facts or considerations which indicate that this First Amendment to 2006 Consent Decree is inappropriate, improper or inadequate. Indianapolis hereby agrees not to withdraw from, oppose entry of, or to challenge any provision of this First Amendment to 2006 Consent Decree, unless the United States has notified Indianapolis in writing that it no longer supports entry of the First Amendment to 2006 Consent Decree.

3. The Acting Assistant Attorney General for the Environment and Natural Resources Division of the United States Department of Justice, on behalf of the United States, the Indiana Assistant Attorney General signing this First Amendment to 2006 Consent Decree on behalf of Indiana, and the undersigned representative of Indianapolis each certifies that he or she is authorized to enter into the terms and conditions of this First Amendment to Consent Decree and to execute and bind legally such Party to this document.

4. The Court finds there is no just reason for delay and therefore enters this First Amendment to Consent Decree.

SO ORDERED this 23rd day of April, 2009.

David F Hamilton

DAVID F. HAMILTON, CHIEF JUDGE
United States District Court
Southern District of Indiana

The UNDERSIGNED PARTY hereby consents to the First Amendment to Consent Decree in the matter of United States and State of Indiana v. City of Indianapolis, No. 1:06-cv-1456.

FOR THE UNITED STATES OF AMERICA

Date: 3/5/09

JOHN C. CRUDEN
Acting Assistant Attorney General
Environment and Natural Resources Division
United States Department of Justice

Date: 3/9/09

GREGORY I. SUKYS
Senior Attorney
Environmental Enforcement Section
United States Department of Justice
P.O. Box 7611
Ben Franklin Station
Washington, D.C. 20044-7611
Phone: (202) 514-2068/616-6584 (FAX)

TIMOTHY M. MORRISON
United States Attorney

Date: 3/9/09

By: THOMAS E. KIEPER
Executive Assistant United States Attorney
Southern District of Indiana
10 West Market Street, Suite 2100
Indianapolis, Indiana 46204
(317) 229-2415/(419) 259-6360 (FAX)

The UNDERSIGNED PARTY hereby consents to the First Amendment to Consent Decree in the matter of United States and State of Indiana v. City of Indianapolis, No. 1:06-cv-1456.

FOR THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Date: 2/27/09

MARK POLLINS
Director, Water Enforcement Division
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460

The UNDERSIGNED PARTY hereby consents to the First Amendment to Consent Decree in the matter of United States and State of Indiana v. City of Indianapolis, No. 1:06-cv-1456.

FOR THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Date: 1/15/09

LYNN BUHL
Regional Administrator
U.S. EPA Region 5

Date: 1/7/09

ROBERT A. KAPLAN
Regional Counsel
U.S. EPA Region 5
77 W. Jackson Blvd.
Chicago, IL 60604

The UNDERSIGNED PARTY hereby consents to the First Amendment to Consent Decree in the matter of United States and State of Indiana v. City of Indianapolis, No. 1:06-cv-1456

FOR THE STATE OF INDIANA

STEVE CARTER
Attorney General of Indiana

Date: DECEMBER 12, 2008

THOMAS W. EASTERLY
Commissioner
Indiana Department of Environmental Management
100 North Senate Avenue
IGCN 1301
Indianapolis, Indiana 46204

Date: December 19, 2008

PATRICIA ORLOFF ERDMANN
Deputy Attorney General and Chief Counsel for Litigation
Office of the Attorney General
Indiana Government Center South
402 West Washington Street
Indianapolis, Indiana 46204

The UNDERSIGNED PARTY hereby consents to the First Amendment to Consent Decree in the matter of United States and State of Indiana v. City of Indianapolis, No. 1:06-cv-1456

FOR THE CITY OF INDIANAPOLIS, INDIANA

Date: 12/4/08

DAVID R. SHERMAN
Director
Department of Public Works
City of Indianapolis
200 East Washington Street
Suite 2460
Indianapolis, Indiana 46204

Date: 12/4/08

CHRIS W. COTTERILL
Corporation Counsel
City of Indianapolis
200 East Washington Street
Suite 1601
Indianapolis, Indiana 46204

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF INDIANA

UNITED STATES OF AMERICA,	)
and	)
THE STATE OF INDIANA,	) SEB-TAB
Plaintiffs,	) No. 1:06-cv-01456-~~DFH-JMS~~
v.	)
THE CITY OF INDIANAPOLIS, INDIANA, A Municipal Corporation,	)
Defendant.	)

SECOND AMENDMENT TO 2006 CONSENT DECREE

WHEREAS, this Court approved and entered a Consent Decree in this matter on December 19, 2006 ("2006 Consent Decree"). That Consent Decree required the City of Indianapolis ("City" or "Indianapolis"), among other things, to construct 31 Combined Sewer Overflow ("CSO") Control Measures and perform other activities, in accordance with the Descriptions, Design Criteria, and dates for Completion of the Bidding Process and Achievement of Full Operation of the 31 CSO Control Measures. The control measures were set forth in Table 7-5 of Section 7 of the City's Long Term Control Plan ("LTCP"), attached to the 2006 Consent Decree as Exhibit 1 (hereinafter "Exhibit 1").

WHEREAS, on April 23, 2009, the Court approved and entered a First Amendment to the 2006 Decree, which modified CSO Control Measure 16 to require the City, in lieu of constructing a shallow inter-plant connector sewer, to undertake construction of a conveyance and storage tunnel that would be constructed approximately 200 feet below ground (the "Deep

Rock Tunnel Connector" or "DRTC"). When completed, the DRTC will provide several improvements over the shallow inter-plant connector sewer. First, the Tunnel will significantly increase the system's storage capacity and thereby improve the City's ability to control CSOs, whereas the shallow inter-plant connector was primarily a conveyance mechanism. In that regard, the DRTC would provide a minimum storage volume of 54 million gallons, and a minimum peak conveyance and dewatering capacity of 150 million gallons per day ("MGD") of CSO flow to the Southport Advanced Water Treatment facility ("AWT"), thus improving the City's ability to control CSOs. Further, the DRTC would enable the City to capture discharges from CSO Outfall 008 three and one-half years earlier than had been possible under the 2006 Consent Decree. The early capture of CSO 008 was expected to result in the capture of an estimated 1 billion gallons of additional CSO volume over the life of the CSO control program. Historically, CSO Outfall 008 has been the outfall in Indianapolis with one of the greatest annual volumes of untreated CSO discharge.

WHEREAS, the First Amendment to the 2006 Consent Decree resulted from a comprehensive engineering review, conducted by the City beginning in 2008, of the City's 2006 LTCP and the 31 Control Measures ("CM") described in Exhibit 1. In that review, the City employed detailed hydraulic modeling, additional treatment plant operating and stress test data, and preliminary design and cost evaluations.

WHEREAS, the City undertook an additional engineering review of the LTCP using advanced modeling capabilities and in May 2009, presented to EPA and IDEM additional proposed modifications to the LTCP, denominated as a comprehensive "Enhancement Plan." After lengthy, in-depth, negotiations, the City, EPA and IDEM agreed on the terms of a "Modified Enhancement Plan" under which 14 of the original 31 Control Measures would be modified, two of the original Control Measures would be eliminated, and one Control Measure (No. 32) would be added.

WHEREAS, in furtherance of the Modified Enhancement Plan, the 2006 Consent Decree, as amended in 2009, is further amended for the reasons, and in the manner, discussed below:

1. Collection System and Tunnels

a. Control Measures 15, 16 and 20

The City's 2009 redesign of Control Measure 16, *i.e.*, the replacement of the shallow interplant connector sewer with the DRTC, as approved in Amendment No. 1, allowed the City to revise its overall strategy of capture and treatment of CSOs.

The DRTC will allow the City to capture the flows from CSO 008 and combined sewer flows from the west side of the White River in the deep tunnel system rather than separately in shallow sewers, and maximize the City's management of the system's combined storage and treatment capacity. The DRTC will also enable the City to harmonize the timing of flows and loads between the Belmont and Southport AWT facilities, optimize the overall tunnel system (as well as the size of many of the components of the two AWT facilities), balance the storage and treatment capacities of the system, and insure early capture of CSO flows. This balancing will also allow the City to design an expanded tunnel system consisting of the DRTC, Fall Creek, White River, Pleasant Run, and Lower Pogues Run Tunnels, which will function in a more holistic manner. As expanded, the entire tunnel system volume will achieve a storage capacity of 250 MG, while the Southport AWT's treatment capacity will increase from 150 MGD to 250 MGD, peak wet weather flow. Additionally, the design of the DRTC pump station flow was modified to require a peak pumping rate of 90 MGD.

Through its re-analysis of the system, the City determined that the DRTC can be extended one additional mile north from its originally-planned north termination point, which would allow for the early capture of CSO 118 (also one of the largest CSOs in the system) in addition to the early capture of CSO 008, discussed above. Incorporating this one mile-long extension into the DRTC project required that the bid date for the Connector project be postponed from May 31, 2011 to the end of 2011, and that the schedule for Achievement of Full Operation of the Connector project be extended from May 31, 2016 to the end of 2017, as provided in this Second Amendment to the 2006 Consent Decree.

CSO 008 will now be captured two (2) years earlier than scheduled under the 2006 Consent Decree, and CSO 118 will be captured four (4) years earlier than scheduled under the 2006 Consent Decree. The overall result of these improvements to the DRTC Project, in conjunction with the remainder of the improvements in the Modified Enhancement Plan, will be the capture of approximately 3.5 billion gallons more CSO volume than would have been achieved under the original LTCP. Thus, any deferral of environmental benefits that may result from the extension of the schedule for the Deep Rock Tunnel Connector will be more than balanced by the accelerated capture of CSOs 008 and 118. The changes to the DRTC project are reflected in the modifications to Control Measure 16. See Tables below.

b. Control Measures 18 and 29

As in the case of the shallow interceptor sewer that formerly constituted Control Measure 16, the City's re-analysis of the LTCP resulted in a determination that it would be more cost effective to not replace the projects to convert the existing Pogues Run box into a storage facility (Control Measure 18) and to construct the interceptor sewer comprising Control Measure 29, ~~but to instead extend~~ with an extension of the deep tunnel system up the Lower Pogues Run watershed and Lower Pleasant Run watershed to capture certain CSOs. The Lower Pogues Run box conversion project would have presented both operational challenges and a high risk of flooding in downtown Indianapolis. Extending the deep tunnel system up the Lower Pogues Run and Lower Pleasant Run will allow the City to eliminate the Lower Pogues Run box conversion project entirely.

Construction of the extended deep tunnel segment up the Lower Pogues Run watershed will require an additional nine years (from 2012 to 2021) to achieve full operation of that portion of the system; however, the efficiencies of the tunnel extension, and the elimination of the problems that would have resulted from converting the Pogues Run Box far outweigh any environmental benefits that might be lost by extending a part of the compliance schedule. In any event, the City has determined that the schedule extension required for construction of the extended tunnel segment will not jeopardize the City's ability to comply with the schedule for completion of the deep tunnel system that will serve Lower Pleasant Run. The changes to these two projects are reflected in the modifications to Control Measures 18 and 29. See Tables below.

c. **Control Measure 30**

The City, EPA and IDEM agreed that several aspects of Control Measure 30, the Eagle Creek watershed project, should be modified. In particular, the City discovered an alternative route for the originally-proposed Belmont West Cutoff to the Eagle Creek Interceptor - the City will now use the Belmont North Relief Interceptor (a project that was not part of the LTCP) to convey flows to that portion of the Belmont Interceptor system leading to the Belmont AWT. This change will allow the City to modify the flows in the Eagle Creek overflow collector system. See Tables below.

d. **Control Measure 31**

The City's detailed modeling efforts allowed the Parties to agree on ranges for the storage volumes and flow rates of the facilities for the Upper Pogues Run improvements to replace the "approximate" values that had been in the original Table 7-5. See Tables below.

2. Southport AWT (Control Measures 22, 23, 24, 26, 27, and 28)

The peak wet weather treatment capacity of the Southport AWT facility will be increased to 250 MGD, and additional changes will be made to the Control Measures pertaining to the facility's headworks and its primary treatment, secondary treatment and disinfection systems.

The planned modification of the DRTC project (discussed above in regard to Control Measure 16) will allow the City to take better advantage of the existing infrastructure at the Southport AWT; existing facilities will be refurbished, enhanced and expanded slightly to allow the facility to provide 250 MGD of secondary treatment capacity for wet weather flows. The changes to the Southport AWT are reflected in the modifications to Control Measures 22, 23, 24 and 26. See Tables below.

In addition, the City determined through more detailed modeling that Control Measure 27 (new pump station for additional dewatering of captured CSO), and Control Measure 28 (enhanced high rate clarification treatment), could be eliminated, because those additional treatment projects will no longer be necessary to allow the City to provide 250 MGD of secondary treatment capacity for wet weather flows. See Tables below.

3. Belmont AWT

a. **Control Measure 25**

The changes to the Belmont AWT design include modification of the influent peak wet weather flow rates to maximize the utilization of the existing wet weather storage and equalization basins that were built as early action projects, and rerouting of the existing Wet Weather Pump Station to the existing Wet Weather Storage Basin No. 1. See Tables below.

b. Control Measure 32 (New)

The City is designing a new Control Measure 32, to be comprised of two new projects to be added to the LTCP. The first project consists of construction of a Primary Effluent Pump Station, which will be able to transfer up to 35 MGD of excess primary effluent flows from the Belmont AWT to the Southport AWT facility during both dry and wet weather conditions to balance flows and loads at the two AWT facilities. The second project will consist of a new Plant Drain Pump Station, which will convey up to 20 MGD of plant drain flows to primary treatment during wet weather, and will effectively increase the raw pumping capacity of the Belmont AWT's influent screw pumps to 330 MGD. See Tables below.

c. Control Measures 17 and 21.

The City will modify the treatment process for the Belmont Wet Weather Secondary Expansion by substituting an Air Nitrification System/Oxygen Nitrification System process for the original Trickling Filter/Secondary Clarifier process. That change will allow the City to eliminate a separate wet weather outfall, consolidate all the flows in a single treatment process train, and modify the disinfection system. These changes are detailed in Control Measures 17 and 21. See Tables below.

WHEREAS, the 2010 modifications to Exhibit 1 are set forth in the following tables. The text of both the original and modified, or new, endnotes are set forth following the tables.

1. 2010 Modification of CSO Control Measure No. 15

(Table 7-5; Exhibit 1, with 2010 modifications)

	CSO Control Measure[1]		Description	Design Criteria	Performance Criteria	Critical Milestones[3]
Original 2006	15	Fall Creek Tunnel, Collector Pipes and Watershed Projects	Deep storage tunnel, consolidation sewers, elimination of CSO 103, dam removal, aeration[8]	Provide a storage volume of 110 MG	When incorporated with the rest of the Fall Creek watershed, achieve 97 percent capture and 2 overflow events[6]	Bid Year – 2006 Achievement of Full Operation - 2025
2010 Modification	15	Fall Creek Tunnel, Collector Pipes and Watershed Projects	Deep storage tunnel, consolidation sewers, elimination of CSO 103 *and* dam removal ~~aeration.~~[8]	Provide a *total effective*[11] storage volume of *250* MG *in the Fall Creek, White River, Pogues Run, Pleasant Run and DRTC tunnel system*[10]	When incorporated with the rest of the Fall Creek watershed, achieve 97 percent capture and 2 overflow events *on Fall Creek Watershed*[6]	Bid Year – 2006 Achievement of Full Operation - 2025

2. 2010 Modification of CSO Control Measure No. 16

(Table 7-5; Exhibit 1, with 2010 modifications)

	CSO Control Measure[1]		Description	Design Criteria	Performance Criteria	Critical Milestones[3]
First Amendment (2009)	16	Deep Rock Tunnel Connector, Deep Tunnel Pumping Station and Screening Facilities, and Connection of CSO 008 to the Deep Rock Tunnel Connector	Deep rock tunnel originating near CSO 117 and terminating near the headworks of the Southport facility[8] deep tunnel pumping station and screening facilities located near the Southport treatment facility, and structures necessary to tie CSO 008 flows into the Deep Rock Tunnel Connector	Provide a minimum storage volume of 54 MG within the entire Tunnel Connector project and a minimum peak conveyance and dewatering capacity of 150 MGD CSO flow to Southport	Maximize delivery of flow from White River Tunnel to Southport AWT Plant. Optimize capture of CSO 008 and CSO 117	Bid Year - May 31, 2011 Achievement of Full Operation - May 31, 2016
2010 Modification	16	Deep Rock Tunnel Connector, Deep Tunnel Pumping Station and Screening Facilities, and Connection of CSO 008, *CSO 117 and CSO 118* to the Deep Rock Tunnel Connector	Deep rock tunnel originating near *CSO 118* and terminating near the headworks of the Southport facility[8] deep tunnel pumping station and screening facilities located near the Southport treatment facility, and structures necessary to tie CSO 008, *CSO 117 and CSO 118* flows into the Deep Rock Tunnel Connector	Provide a ~~minimum~~ *total effective*[11] storage volume of ~~54 MG within the entire Tunnel Connector project and~~ *250 MG in the Fall Creek, White River, Pogues Run, Pleasant Run and DRTC tunnel system*[10] *with a minimum peak conveyance* and dewatering capacity of ~~150 MGD~~ *90 MGD* CSO flow to Southport	Maximize delivery of flow from White River Tunnel to Southport AWT Plant. Optimize capture of CSO 008, ~~and~~ CSO 117, *and CSO 118.*	Bid Year - ~~May 31,~~ 2011 Achievement of Full Operation - ~~May 31, 2016~~ 2017

3. **Modification of CSO Control Measure No. 17**

(Table 7-5; Exhibit 1, with 2010 modifications)

	CSO Control Measure[1]		Description	Design Criteria	Performance Criteria	Critical Milestones[3]
Original (2006)	17	Belmont AWT - Wet-Weather Treatment (Trickling Filters/Solids Contact: New aeration tanks and intermediate clarifiers)	Provide secondary biological treatment of the Belmont PE Bypass	Provide parallel peak biological treatment rate of 150 MGD	When incorporated with the rest of the Belmont improvements, facility complies with current NPDES permit	Bid Year – 2009 Achievement of Full Operation - 2012
2010 Modification	17	Belmont AWT -Wet-Weather Treatment- ~~(Trickling Filters/Solids Contact:New aeration tanks and intermediate clarifiers)~~ *(New aeration tanks)*	Provide secondary biological treatment of the Belmont PE Bypass	Provide ~~parallel~~ *in series* peak biological treatment rate of ~~150 MGD~~ *300 MGD*	When incorporated with the rest of the Belmont improvements, facility complies with current NPDES permit	Bid Year – 2009 Achievement of Full Operation - 2012

4. **Modification of CSO Control Measure No. 18**

(Table 7-5; Exhibit 1, with 2010 modifications)

	CSO Control Measure[1]		Description	Design Criteria	Performance Criteria	Critical Milestones[3]
Original (2006)	18	Lower Pogues Run Improvements – Continued	Conversion of existing Pogues Run Box into CSO storage facility ranging from 1.5 to 10 MG and interceptor	Diversion of CSO to White River Tunnel	When incorporated with the rest of the Pogues Run and White River watersheds, achieve 95 percent capture and 4 overflow events[9]	Bid Year - 2010 Achievement of Full Operation - 2012
2010 Modification	18	Lower Pogues Run Improvements- ~~Continued~~	Deep Storage Tunnel and consolidation sewers[8]	*Provide a total effective[11] storage volume of 250 MG in the Fall Creek, White River, Pogues Run, Pleasant Run and DRTC tunnel system[10]*	When incorporated with the rest of the Pogues Run and White River watersheds, achieve 95 percent capture and 4 overflow events[9]	Bid Year - ~~2010~~ *2011* Achievement of Full Operation – ~~2012~~ *2021*

5. Modification of CSO Control Measure No. 20

(Table 7-5; Exhibit 1, with 2010 modifications)

	CSO Control Measure[1]		Description	Design Criteria	Performance Criteria	Critical Milestones[3]
Original (2006)	20	White River Tunnel (Central Tunnel and Pump Station) and Watershed Projects	Central tunnel and pump station, consolidation sewers, sewer separation, dam modifications, and aeration[8]	Provide storage volume of 114 MG	When incorporated with the rest of the White River watershed, achieve 95 percent capture and 4 overflow events[6]	Bid Year – 2010 Achievement of Full Operation – 2021
2010 Modification	20	White River Tunnel (Central Tunnel) and Watershed Projects	Central tunnel, consolidation sewers, sewer separation *and* dam modifications[8]	Provide *a total effective*[11] storage volume of *250* MG *in the Fall Creek, White River, Pogues Run, Pleasant Run and DRTC tunnel system*[10]	When incorporated with the rest of the White River watershed, achieve 95 percent capture and 4 overflow events[6]	Bid Year – 2010 Achievement of Full Operation – 2021

6. Modification to CSO Control Measure No. 21

(Table 7-5; Exhibit 1, with 2010 modifications)

	CSO Control Measure[1]		Description	Design Criteria	Performance Criteria	Critical Milestones[3]
Original (2006)	21	Belmont AWT – Wet Weather Chlorination/ Dechlorination (Chlorine Disinfection Tank and Re-establish Existing Outfall)	New wet-weather disinfection system and new discharge to White River	Additional peak disinfection treatment rate of 150 MGD	When incorporated with the rest of the Belmont improvements, facility complies with current NPDES permit	Bid Year – 2010 Achievement of Full Operation - 2012
2010 Modification	21	Belmont AWT – Wet Weather Chlorination/ Dechlorination (Chlorine Disinfection Tank and Re-establish Existing Outfall)	New wet-weather disinfection system and new discharge to White River	~~Additional peak disinfection treatment rate of 150 MGD~~ *Additional peak disinfection treatment rate of 150 MGD for a total of 300 MGD peak disinfection treatment capacity consistent with applicable disinfection requirements of current NPDES permit*[12]	When incorporated with the rest of the Belmont improvements, facility complies with current NPDES permit	Bid Year – 2010 Achievement of Full Operation - 2012

7. Modification to CSO Control Measure No. 22

(Table 7-5; Exhibit 1, with 2010 modifications)

	CSO Control Measure[1]		Description	Design Criteria	Performance Criteria	Critical Milestones[3]
Original (2006)	22	Southport Advanced Wastewater Treatment Plant Improvements – Air Nitrification System (ANS) Expansion	Expansion of ANS from 30 MGD to 150 MGD, fine bubble aeration, new blowers, new final clarifiers, and new process/yard piping	When incorporated with the rest of the Southport Improvements, provide total peak treatment rate of 300 MGD. Provide maximum pumping rate of 350 MGD	When incorporated with the rest of the Southport improvements, facility complies with current NPDES permit	Bid Year – 2010 Achievement of Full Operation - 2016
2010 Modification	22	Southport Advanced Wastewater Treatment Plant Improvements - ~~Air Nitrification System (ANS)~~ – *Secondary Treatment System Expansion*	~~Expansion of ANS from 30 MGD to 150 MGD, fine bubble aeration, new blowers, new final clarifiers, and new process/yard piping~~ *Expansion of Secondary Treatment System from 150 MGD to 250 MGD*	When incorporated with the rest of the Southport Improvements, provide ~~total peak treatment rate of 3000 MGD~~ *secondary and disinfection treatment rate of 250 MGD consistent with applicable disinfection requirements of current NPDES permit*. Provide maximum pumping rate of ~~350~~ *345 MGD*[12]	When incorporated with the rest of the Southport improvements, facility complies with current NPDES permit	Bid Year – ~~2010~~ *2012* Achievement of Full Operation - ~~2016~~ *2017*

8. Modification to CSO Control Measure No. 23

(Table 7-5; Exhibit 1, with 2010 modifications)

	CSO Control Measure[1]		Description	Design Criteria	Performance Criteria	Critical Milestones[3]
Original (2006)	23	Southport Advanced Wastewater Treatment Plant Improvements – Wet Weather Disinfection	New disinfection facility, pump station, 25 MG equalization basin with aerators, and new process/yard piping.	When incorporated with the rest of the Southport Improvements, provide total peak treatment rate of 300 MGD. Provide maximum pumping rate of 350 MGD	When incorporated with the rest of the Southport improvements, facility complies with current NPDES permit	Bid Year – 2011 Achievement of Full Operation - 2016
2010 Modification	23	Southport Advanced Wastewater Treatment Plant Improvements – Wet Weather Disinfection	New disinfection facility ~~,pump station, 25 MG equalization basin with aerators,~~ *and new process/yard piping*	When incorporated with the rest of the Southport Improvements, provide ~~total peak reate of 300 MGD.~~ *secondary and disinfection treatment rate of 250 MGD consistent with applicable disinfection requirements of current NPDES permit*. Provide maximum pumping rate of ~~350~~ *345* MGD[12]	When incorporated with the rest of the Southport improvements, facility complies with current NPDES permit	Bid Year – ~~2011~~ *2012* Achievement of Full Operation – ~~2016~~ *2017*

9. Modification to CSO Control Measure No. 24

(Table 7-5; Exhibit 1, with 2010 modifications)

	CSO Control Measure[1]		Description	Design Criteria	Performance Criteria	Critical Milestones[3]
Original (2006)	24	Southport Advanced Wastewater Treatment Plant Improvements – Primary Clarifier Expansion	Expansion of primary clarification facility, and new process/yard piping	When incorporated with the rest of the Southport Improvements, provide peak primary treatment capacity of 300 MGD. Provide maximum pumping rate of 350 MGD	When incorporated with the rest of the Southport improvements, facility complies with current NPDES permit	Bid Year – 2012 Achievement of Full Operation - 2017
2010 Modification	24	Southport Advanced Wastewater Treatment Plant Improvements -- Primary Clarifier Expansion	~~Expansion~~ *Enhancement* of primary clarification facility, and new process/yard piping	When incorporated with the rest of the Southport Improvements, provide peak primary treatment capacity ~~of 350 MGD.~~ *as required to support secondary treatment design, and peak secondary and disinfection treatment capacity of 250 MGD consistent with applicable disinfection requirements of current NPDES permit.* Provide maximum pumping rate of ~~350~~ *345* MGD[12]	When incorporated with the rest of the Southport improvements, facility complies with current NPDES permit	Bid Year – 2012 Achievement of Full Operation - 2017

10. Modification to CSO Control Measure No. 25

(Table 7-5; Exhibit 1, with 2010 modifications)

	CSO Control Measure[1]		Description	Design Criteria	Performance Criteria	Critical Milestones[3]
Original (2006)	25	Belmont Advanced Wastewater Treatment Plant Improvements – Headworks and Grit Removal including Screens	Rehabilitation of the original headworks, new process/yard piping and supplemental disinfection from existing equalization basins	When incorporated with the rest of the Belmont Improvements, provide total peak primary and biological treatment rate of 300 MGD. Provide peak pumping rate of 450 MGD. Additional Disinfection of equalization outflow up to a peak rate of 150 MGD	When incorporated with the rest of the Belmont improvements, facility complies with current NPDES permit	Bid Year – 2015 Achievement of Full Operation – 2019
2010 Modification	25	Belmont Advanced Wastewater Treatment Plant Improvements - ~~Headworks and Grit Removal including Screens~~ *Raw Wastewater Pumping Capacity Expansion*	*Rerouting of the existing Wet Weather Pump Station (WWPS) to the existing wet weather storage basin (WWSB No.1)*	When incorporated with the rest of the Belmont Improvements, provide total peak primary and biological treatment rate of 300 MGD. Provide peak pumping rate of ~~450~~ *330* MGD[12] ~~Additional Disinfection of equalization outflow up to a peak rate of 150 MGD~~	When incorporated with the rest of the Belmont improvements, facility complies with current NPDES permit	Bid Year – ~~2015~~ *2011* Achievement of Full Operation – ~~2019~~ *2012*

11. Modification to CSO Control Measure No. 26

(Table 7-5; Exhibit 1, with 2010 modifications)

	CSO Control Measure[1]		Description	Design Criteria	Performance Criteria	Critical Milestones[3]
Original (2006)	26	Southport Advanced Wastewater Treatment Plant Improvements – Headworks	Expansion of headworks, screening, grit removal, and new process/yard piping	When incorporated with the rest of the Southport Improvements, provide total peak treatment rate of 300 MGD. Provide peak pumping rate of 350 MGD	When incorporated with the rest of the Southport improvements, facility complies with current NPDES permit	Bid Year – 2015 Achievement of Full Operation - 2018
2010 Modification	26	Southport Advanced Wastewater Treatment Plant Improvements -- Headworks	Expansion of headworks, screening, grit removal, and new process/yard piping	When incorporated with the rest of the Southport Improvements, provide total peak secondary and disinfection treatment rate of ~~300~~ *250* MGD *consistent with applicable disinfection requirements of current NPDES permit.* Provide peak pumping rate of ~~350~~ *345* MGD[12]	When incorporated with the rest of the Southport improve-ments, facility complies with current NPDES permit	Bid Year ~~2015~~ *2012* Achievement of Full Operation ~~2017~~ *2017*

12. Modification to CSO Control Measure No. 27

(Table 7-5; Exhibit 1, with 2010 modifications)

	CSO Control Measure[1]		Description	Design Criteria	Performance Criteria	Critical Milestones[3]
Original (2009 Modification)	27	Southport Advanced Waste-water Treatment Plant Improvements – CSO Pump Station	New pump station for additional dewatering of captured CSO from the Deep Rock Tunnel Connector (fka Interplant Connection)	Additional 75 MGD for routing to Enhanced High Rate Clarifiers (EHRC)	When incorporated with the rest of the Southport improve-ments, facility complies with current NPDES permit	Bid Year – 2022 Achievement of Full Operation - 2025
2010 Modification	27[9]	Deleted	Deleted	Deleted	Deleted	Deleted

13. Modification to CSO Control Measure No. 28

(Table 7-5; Exhibit 1, with 2010 modifications)

	CSO Control Measure[1]		Description	Design Criteria	Performance Criteria	Critical Milestones[3]
Original (2009 Modification)	28	Southport Advanced Wastewater Treatment Plant Improvements – EHRC Facility[7]	New enhanced high rate clarifiers, and new process/yard piping	Additional 75 MGD EHRC treatment for dewatering of captured CSO from the Deep Rock Tunnel Connector (fka Interplant Connection)	When incorporated with the rest of the Southport improvements, facility complies with current NPDES permit	Bid Year – 2022 Achievement of Full Operation - 2025
2010 Modification	28[7 & 9]	Deleted	Deleted	Deleted	Deleted	Deleted

14. Modification to CSO Control Measure No. 29

(Table 7-5; Exhibit 1, with 2010 modifications)

	CSO Control Measure[1]		Description	Design Criteria	Performance Criteria	Critical Milestones[3]
Original (2006)	29	Pleasant Run Overflow Collector Pipe (CSO Collector Pipe)	Collection interceptor and sewer separation. Collection interceptor is approximately 46,000 feet of pipe[8]	Provide approximate instantaneous peak flow rate of 125 MGD at the downstream end	When incorporated with the rest of the Pleasant Run watershed, achieve 95 percent capture and 4 overflow events[6]	Bid Year – 2010 Achievement of Full Operation – 2025
2010 Modification	29	Pleasant Run Deep Tunnel and Overflow Collector Pipe	*Deep tunnel, connection sewers, collection interceptor and sewer separation. Tunnel connects to area of White River and DRTC Tunnels and extends to the area of CSO 084*[8]	*Provide a total effective*[11] *storage volume of 250 MG in the Fall Creek, White River, Pogues Run, Pleasant Run and DRTC tunnel system*[10]	When incorporated with the rest of the Pleasant Run watershed, achieve 95 percent capture and 4 overflow events[6]	Bid Year – 2010 Achievement of Full Operation – 2025

15. Modification to CSO Control Measure No. 30

(Table 7-5; Exhibit 1, with 2010 modifications)

	CSO Control Measure[1]		Description	Design Criteria	Performance Criteria	Critical Milestones[3]
Original (2006)	30	Eagle Creek Overflow Collector Pipe (CSO Collector Pipe and Belmont West Cutoff)	Collection interceptor and relief interceptor. Collection interceptor and relief interceptor are approximately 40,000 feet of pipes	Provide approximate instantaneous peak flow rate of 50 MGD at the downstream end	When incorporated with the rest of the Eagle Creek and White River watersheds, achieve 95 percent capture and 4 overflow events[6]	Bid Year – 2013 Achievement of Full Operation - 2018
2010 Modification	30	Eagle Creek Overflow Collector Pipe (CSO Collector Pipe ~~and~~ Belmont West Cutoff *via the Belmont North Relief Interceptor System)*	Collection interceptor ~~and relief interceptor. Collection interceptor and relief interceptor are approximately 40,000 feet of pipes~~ *system and relief interceptor to achieve Performance Criteria*[8]	*Provide instantaneous peak flowrate of 38 MGD in the Belmont North Relief Interceptor System. Provide instantaneous peak flowrate of 25 to 50 MGD at the downstream end of the Eagle Creek Overflow Collector Pipe.*	When incorporated with the rest of the Eagle Creek and White River watersheds, achieve 95 percent capture and 4 overflow events[6]	Bid Year – 2013 Achievement of Full Operation - 2018

16. Modification to CSO Control Measure No. 31

(Table 7-5; Exhibit 1, with 2010 modifications)

	CSO Control Measure[1]		Description	Design Criteria	Performance Criteria	Critical Milestones[3]
Original (2006)	31	Upper Pogues Run Improvements	Off-line storage facility, collection interceptor. Collection interceptor is approximately 9000 feet of pipes	Provide approximate instantaneous peak flowrate of 65 MGD. Provide approximate storage volume of 9.5 MG	When incorporated with the rest of the Pogues Run watershed, achieve 95 percent capture and 4 overflow events[6]	Bid Year – 2017 Achievement of Full Operation – 2021
2010 Modification	31	Upper Pogues Run Improvements	Off-line storage facility, collection interceptor *to achieve Performance Criteria*[8]. ~~Collection interceptor is approximately 9000 feet of pipes~~	Provide instantaneous peak flowrate of ~~65 MGD~~ *40 to 80 MGD*. Provide ~~approximate~~ storage volume of ~~9.5 MGD~~ *1 to 3 MG*	When incorporated with the rest of the Pogues Run watershed, achieve 95 percent capture and 4 overflow events[6]	Bid Year – 2017 Achievement of Full Operation – 2021

17. New CSO Control Measure No. 32

(Table 7-5; Exhibit 1, with 2010 modifications)

	CSO Control Measure[1]		Description	Design Criteria	Performance Criteria	Critical Milestones[3]
Control Measure	32	Belmont Advanced Wastewater Treatment (AWT) Plant Improvements	Rerouting of in-plant recycle flows from the headworks to primary treatment via the Plant Drain Pump Station (PDPS). Diversion of the primary effluent from Belmont AWT to Southport AWT via the Primary Effluent Pump Station (PEPS).	When incorporated with the rest of the Belmont AWT improvements, provide total peak primary and secondary treatment rate of 300 MGD. Provide peak headworks pumping rate of 330 MGD.	When incorporated with the rest of the Belmont improvements, facility complies with current NPDES permit	Bid Year – 2008 Achievement of Full Operation – 2009

18. Modifications to Footnotes

Exhibit 1 has a number of explanatory "footnotes," several of which have been added, modified or deleted, as set forth below (additions/revisions are italicized and underlined; deletions are stricken):

> [1] Upon full implementation, the CSO Control Measures listed in Table 7-5 are expected to result in *at least* *the Performance Criteria of* 95 percent capture and 4 CSO events on the White River, Pleasant Run, Pogues Run, and Eagle Creek and 97 percent capture and 2 CSO events on Fall Creek, as evaluated in accordance with footnote 6. Either a revision to Indiana's current water quality standards or some other legal mechanism is necessary to authorize overflows due to storms exceeding those levels of control. In Section 9 of the LTCP, the City of Indianapolis is requesting a revision to the applicable water quality criteria consistent with this level of control through the establishment of a CSO wet weather limited use sub category supported by a Use Attainability Analysis ("UAA"). The design and construction of CSO Control Measures 1 through 14 ("Phase I" Projects) are not dependent upon the level of control ultimately determined, and therefore the City will implement CSO Control Measures 1 through 14 according to the terms and schedule set forth in this Table. IDEM and U.S. EPA acknowledge that the City is scheduled to start investing heavily in CSO Control Measures 15 through *32*~~32~~, which are level of control-dependent, in the years following approval of the City's LTCP. Accordingly, all parties intend that the UAA process be completed within five years of LTCP approval. If the

UAA process is not completed within five years, IDEM and U.S. EPA agree that, under certain circumstances, the City can seek a modification of the implementation schedule.

[2] ~~2 The Description and Design Criteria are based upon LTCP-level planning estimates and may be subject to revision during facility planning and design. One of the conditions of Descriptions and Design Criteria, applicable to all of the facilities set forth in this Table 7-5 is that the specific facility will be designed in accordance with good engineering practices to ensure that corresponding facility-specific, watershed-wide, and systemwide Performance Criteria will be achieved.~~ Footnote 2 deleted.

[3] The term "Bid Year" means "Completion of the Bidding Process."

[4] The CSO control measure is not expected to achieve 95 or 97 percent capture on its own and will work in conjunction with other CSO control measures at the specified CSO outfalls to achieve the performance criteria.

[5] Consistent Operation: Performs as designed on a regular basis. Failure to perform correctly is infrequent.

[6] CSO Control Measures will be designed *in accordance with the Design Criteria set forth in Table 7-5, and they shall also* ~~to~~ achieve *at least the* Performance Criteria of 97 percent capture for the Fall Creek watershed and 95 percent capture for other CSO receiving waters, and 2 CSO events for the Fall Creek watershed and 4 CSO events for each of the other CSO receiving waters in a "typical year." "Typical year" performance, and achievement of Performance Criteria, shall be assessed in accordance with Section 8.4 (Post Construction Monitoring) using the average annual statistics generated by the collection system model for the representative five-year simulation period of 1996 to 2000 (or another five-year simulation period subsequently proposed by the City and approved by IDEM and U.S. EPA).

[7] ~~The Southport EHRC facility will be constructed only if required to achieve the performance criteria for the Fall Creek and White River watersheds.~~
Footnote 7 deleted.

[8] The collection interceptor may be installed as multiple interceptors with the combined capacity as described in the Design Criteria.

[9] *Control Measures 27 and 28 deleted.*

[10] *Control Measures 15, 16, 18, 20 and 29 have a combined Design Criteria of 250 MG of 'effective' (as defined below) storage in the Fall Creek, White River, Pogues Run, Pleasant Run and DRTC Tunnel System. This total effective available system storage of 250 MG includes adits and deaeration chambers, which are tunnel connections from drop shafts to the mainline tunnels.*

[11] *'Effective' as identified for Control Measures 15, 16, 18, 20 and 29 is defined as the storage volume that will be designed and operated to ensure 250 MG of wet-weather flow may be reliably stored in the tunnel system provided Indianapolis has received sufficient precipitation to capture 250 MG of wet-weather flow in a single event or two or more sequential events.*

[12] *Control Measures 21, 22, 23, 24, 25 and 26 have flowrates as noted within the Design Criteria for each Control Measure. Control Measures 22, 23, 24 and 26 have a secondary treatment capacity of 250 MGD and a disinfection capacity of 250 MGD (consistent with applicable disinfection requirements of the City's current NPDES permit), which includes in-plant return flows. Control Measures 21 and 25 have a secondary treatment capacity of 300 MGD and a disinfection capacity of 300 MGD (consistent with applicable disinfection requirements of the City's current NPDES permit), which includes in-plant return flows.*

The new Exhibit 1 (Table 7-5), as modified by this Second Amendment to 2006 Consent Decree, is attached hereto as Exhibit 1. All references in the 2006 Consent Decree to "Exhibit 1" shall be to this new Exhibit 1.

The Court finds there is no just reason for delay and therefore enters this Second Amendment to 2006 Consent Decree.

SO ORDERED

Date: 01/27/2011

[signature]

SARAH EVANS BARKER, JUDGE
United States District Court
Southern District of Indiana

The UNDERSIGNED PARTY hereby consents to the Second Amendment to 2006 Consent Decree in the matter of United States and State of Indiana v. City of Indianapolis, No. 1:06-cv-1456.

FOR THE UNITED STATES OF AMERICA

Date: 11/2/10

IGNACIA S. MORENO
Assistant Attorney General
Environment and Natural Resources Division

Date: 11/8/2010

GREGORY L. SUKYS
Senior Attorney
Environmental Enforcement Section
United States Department of Justice
P.O. Box 7611
Ben Franklin Station
Washington, D.C. 20044-7611
Phone: (202) 514-2068/616-6584 (FAX)

The UNDERSIGNED PARTY hereby consents to the Second Amendment to 2006 Consent Decree in the matter of United States and State of Indiana v. City of Indianapolis, No. 1:06-cv-1456.

JOSEPH H. HOGSETT
United States Attorney

Date: 11/1/10

By: THOMAS E. KIEPER
Assistant United States Attorney
Southern District of Indiana
10 West Market Street, Suite 2100
Indianapolis, Indiana 46204
(317) 229-2415/(419) 259-6360 (FAX)

The UNDERSIGNED PARTY hereby consents to the Second Amendment to 2006 Consent Decree in the matter of United States and State of Indiana v. City of Indianapolis, No. 1:06-cv-1456.

FOR THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Date: 10/7/10

for [signature]

MARK POLLINS
Director, Water Enforcement Division
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460

The UNDERSIGNED PARTY hereby consents to the Second Amendment to 2006 Consent Decree in the matter of United States and State of Indiana v. City of Indianapolis, No. 1:06-cv-1456.

FOR THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Date: 9/20/10

SUSAN HEDMAN
Regional Administrator
U.S. EPA Region 5

Date: 9/16/10

ROBERT A. KAPLAN
Regional Counsel
U.S. EPA Region 5
77 W. Jackson Blvd.
Chicago, Illinois 60604

The UNDERSIGNED PARTY hereby consents to the Second Amendment to 2006 Consent Decree in the matter of United States and State of Indiana v. City of Indianapolis, No. 1:06-cv-1456

FOR THE STATE OF INDIANA

GREGORY F. ZOELLER
Attorney General of Indiana

Date: SEPTEMBER 13, 2010

THOMAS W. EASTERLY
Commissioner
Indiana Department of Environmental Management
100 North Senate Avenue
IGCN 1301
Indianapolis, Indiana 46204

Date: September 10, 2010

PATRICIA ORLOFF ERDMANN
Chief Counsel for Litigation
Office of the Indiana Attorney General
302 W. Washington Street, IGCS-5th Floor
Indianapolis, Indiana 46204

The UNDERSIGNED PARTY hereby consents to the Second Amendment to 2006 Consent Decree in the matter of United States and State of Indiana v. City of Indianapolis, No. 1:06-cv-1456

FOR THE CITY OF INDIANAPOLIS, INDIANA

Date: 9/7/10

DAVID R. SHERMAN
Director
Department of Public Works
City of Indianapolis
200 East Washington Street
Suite 2460
Indianapolis, Indiana 46204

Date: 9/7/10

SAMANTHA KARN
Corporation Counsel
City of Indianapolis
200 East Washington Street
Suite 1601
Indianapolis, Indiana 46204

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF INDIANA

UNITED STATES OF AMERICA, and THE STATE OF INDIANA, Plaintiffs, v. THE CITY OF INDIANAPOLIS, INDIANA, A Municipal Corporation, Defendant.	No. 1:06-cv-01456-SEB-TAB Honorable Sara Evans Barker Magistrate Judge Tim A. Baker

THIRD AMENDMENT TO 2006 CONSENT DECREE

PLAINTIFFS United States of America ("United States") and the State of Indiana ("Indiana"), Defendant City of Indianapolis, Indiana ("City"), and CWA Authority, Inc., have entered into this Third Amendment to the Consent Decree among the United States, Indiana, and the City, which was approved and entered by this Court on December 19, 2006 ("2006 Consent Decree").

Concurrent with the lodging of the 2006 Consent Decree, United States, on behalf of the United States Environmental Protection Agency ("U.S. EPA"), and Indiana, on behalf of the Indiana Department of Environmental Management ("IDEM"), filed a complaint (the "Complaint") in this civil action against the City, in connection with the City's operation of its municipal wastewater and sewer system. The Complaint alleges that the City violated and continues to violate the Clean Water Act, 33 U.S.C. § 1251 *et seq.* (the "CWA" or "Act"), Title 13 of the Indiana Code, Title 327 of the Indiana Administrative Code, and Indianapolis' National

Pollution Discharge Elimination System ("NPDES") permits. Through the Complaint, the United States and Indiana seek civil penalties and injunctive relief for these alleged violations.

2006 Consent Decree, and First and Second Amendments to 2006 Consent Decree

The 2006 Consent Decree resolved various violations alleged in the Complaint, and requires, among other things, that the City perform certain activities and construct certain Combined Sewer Overflow ("CSO") Control Measures in accordance with the Descriptions, Design Criteria, and dates for Completion of the Bidding Process and Achievement of Full Operation for each CSO Control Measure set forth in Table 7-5 of Section 7 of the City's Long Term Control Plan, attached to the 2006 Consent Decree at Exhibit 1. CSO Control Measure 16, as set forth in the 2006 Consent Decree, required the City to construct a shallow interceptor sewer having a total capacity of 24 million gallons.

On April 23, 2009, this Court approved and entered a First Amendment to the 2006 Consent Decree, which modified CSO Control Measure 16 to require the City, in lieu of constructing a shallow inter-plant connector sewer, to undertake construction of a conveyance and storage tunnel that would be constructed approximately 200 feet below ground (the "Deep Rock Tunnel Connector" or "DRTC").

On January 27, 2011, the Court approved and entered a Second Amendment to the 2006 Consent Decree, which further modified CSO Control Measure 16, as well as other CSO Control Measures, and the schedule for implementing those measures.

Third Amendment to 2006 Consent Decree

On August 11, 2010, the City, the CWA Authority, Inc. and certain other entities filed a Verified Joint Petition with the Indiana Utility Regulatory Commission, requesting that the Commission approve the proposed sale of the City's wastewater utility assets to the CWA

Authority, Inc. July 13, 2011 Order, at 1 (Exhibit 7). The proposed sale was approved by the Commission on July 13, 2011. July 13, 2011 Order, at 48. The transaction closed and the wastewater utility assets transferred to the CWA Authority, Inc. on August 26, 2011.

As a result, the United States, Indiana, the City and CWA Authority, Inc. (hereinafter referred to collectively as the "Parties"), have entered into this Third Amendment to 2006 Consent Decree for the purpose of making the CWA Authority, Inc. an additional Party to the 2006 Consent Decree, with the rights and obligations thereunder.

WHEREAS, the Parties agree and the Court, by entering this Consent Decree, finds, that settlement of these matters, without protracted litigation, is fair, reasonable, and in the public interest.

NOW, THEREFORE, upon consent of the Parties hereto, before the taking of testimony, and without any adjudication of issues of fact or law, it is hereby ORDERED, ADJUDGED AND DECREED as follows:

1. The 2006 Consent Decree, as amended through the First and Second Amendments discussed above, shall remain in full force and effect in accordance with its terms, except that certain paragraphs are revised as set forth below, which revisions shall become effective upon entry by this Court of this Third Amendment to 2006 Consent Decree.

2. The Table of Contents is amended by including, as a new exhibit, "Exhibit 7: Indiana Utility Regulatory Commission Order of July 13, 2011."

3. The following new paragraphs are inserted between introductory Paragraph "S" and the introductory paragraph that begins, "Whereas, the Parties agree . . . ."

WHEREAS, on April 23, 2009, this Court approved and entered a First Amendment to the 2006 Decree, which modified CSO Control Measure 16.

WHEREAS, on January 27, 2011, the Court approved and Entered a Second Amendment to 2006 Consent Decree, which further modified CSO Control Measure 16 and other CSO Control Measures, as well as the schedule for implementing those measures.

WHEREAS, on August 11, 2010, the City, and the CWA Authority, Inc. filed a Verified Joint Petition with the Indiana Utility Regulatory Commission ("Commission") which requested certain approvals, including approval of Asset Purchase Agreement ("Wastewater Purchase Agreement" or "Agreement"), relating to the proposed acquisition of certain wastewater utility assets by the CWA Authority, Inc. from the City. July 13, 2011 Order, at 1 (Exhibit 7).

WHEREAS, on July 13, 2011, the Indiana Utility Regulatory Commission issued an Order ("July 13 2011 Order") finding "the terms of the Wastewater System Agreement are reasonable and in the public interest and the transactions contemplated therein are approved; the City and the [CWA] Authority[, Inc.] are hereby authorized to take all actions necessary to effect the Agreement." July 13, 2011 Order, at 48. (Exhibit 7). The transaction closed and the wastewater utility assets transferred to the Authority on August 26, 2011.

WHEREAS, the CWA Authority, Inc. is an Indiana nonprofit corporation and political subdivision.

WHEREAS, the Wastewater System Agreement provided that the CWA Authority, Inc. would acquire all of the City's right, title, and interest to all of the assets used, necessary, or important in the operation of the Wastewater System; and that the CWA Authority, Inc. would assume the liabilities of the City relating to the Wastewater System, including without limitation ~~those~~ the obligations set forth in the agreement related to: the Septic Tank Elimination Program ("STEP"); litigation relating to the Wastewater System against the City; performance under certain contracts; the 2006 Consent Decree; and other liabilities. July 13, 2011 Order, ¶4.B.2., at 9.

WHEREAS, the United States, Indiana, the City, and CWA Authority, Inc., enter into this Third Amendment to 2006 Consent Decree for the purpose of making the CWA Authority, Inc. an additional Party to the 2006 Consent Decree, with the rights and obligations thereunder.

4. Section I, Paragraph 1 of the 2006 Consent Decree, entitled "Jurisdiction and Venue," is amended by inserting, after the last sentence, the following new sentence:

For purposes of this Third Amendment to 2006 Consent Decree, including without limitation, its entry and enforcement, CWA Authority, Inc. hereby voluntarily submits itself to the jurisdiction of this Court, agrees that this Court has jurisdiction under Fed.R.Civ.P. 19(a) to enter and enforce this Third Amendment to 2006 Consent Decree, and agrees that it shall not challenge the terms of this Consent Decree or this Court's jurisdiction to enter and enforce this Third Amendment to 2006 Consent Decree.

5. Section II, Paragraph 2, entitled, "Applicability," is amended by renumbering that Paragraph 2 as "2.(a)," and inserting the following new Paragraph 2.(b):

b. (i) Except as specified below in subparagraphs (1) and (2) below, all references to "Indianapolis" and "the City" in the 2006 Consent Decree, the Exhibits to the 2006 Consent Decree, and Exhibit 1 (Table 7-5) as amended by the First and Second Amendments to the 2006 Consent Decree, are amended to read "Indianapolis and CWA Authority, Inc." or "the City and CWA Authority, Inc." The terms "Indianapolis" and the "City" shall not be amended to include a reference to "CWA Authority, Inc." when those terms are used in the following:

(1) The introductory paragraphs of the 2006 Consent Decree, up to and including introductory paragraph "S" on page 10;

(2) Paragraphs 40-49 of the 2006 Consent Decree; and

(3) The First and Second Amendments to the 2006 Consent Decree, other than the amendments to Exhibit 1 (Table 7-5).

(ii) Notwithstanding the provisions of preceding Section II, Paragraph 2.(b)(ii), if a requirement imposed on "Indianapolis and CWA Authority, Inc." or "the City and CWA Authority, Inc." by this Consent Decree is satisfied through the action of either the City or CWA Authority, Inc., the relevant requirement will be deemed satisfied.

6. Section III, Paragraph 3, entitled "Objective," is amended by renumbering that Paragraph 3 as "3.(a)," and inserting the following new Paragraph 3.(b):

(b) The parties agree that this Third Amendment to 2006 Consent Decree is appropriate to establish that both the City and CWA Authority, Inc. are bound by the terms of the decree, as amended, and that the United States and Indiana can enforce the terms of this Consent Decree, against either or both of them.

7. Section XII, entitled, "Communications," is amended by inserting the following addresses immediately after the address for the Corporation Counsel for the City of Indianapolis:

As to CWA Authority Inc.:

Senior Vice President, Chief Legal and Compliance Officer
CWA Authority, Inc.
2020 N. Meridian Street
Indianapolis, IN 46202-1306

with a copy to

Director, Environmental Stewardship
CWA Authority, Inc.
2700 S. Belmont Ave.
Indianapolis, IN 46221

8. Section XIII, entitled "Stipulated Penalties," is amended as follows: in each place where the phrase "Indianapolis shall pay" occurs in Paragraphs 40-49 of the 2006 Consent Decree, the phrase is amended to read "Indianapolis and CWA Authority, Inc. jointly and severally shall pay".

9. This Third Amendment to 2006 Consent Decree shall be lodged with the Court for a period of not less than 30 days for public notice and comment in accordance with 28 C.F.R. § 50.7. The United States reserves the right to withdraw or withhold its consent if the comments regarding this Third Amendment to 2006 Consent Decree disclose facts or considerations indicating that the Amendment is inappropriate, improper, or inadequate. The City and CWA Authority, Inc. hereby agree not to withdraw from, oppose entry of, or to challenge any provision

of this Third Amendment to 2006 Consent Decree, unless the United States has notified them in writing that it no longer supports entry of the Third Amendment to 2006 Consent Decree.

This Third Amendment to 2006 Consent Decree is entered and approved this ______ day of __________, 2013.

____
SARA EVANS BARKER
United States District Judge

The UNDERSIGNED PARTY hereby consents to the Third Amendment to 2006 Consent Decree in the matter of United States and State of Indiana v. City of Indianapolis, No. 1:06-cv-01456-SEB-TAB (S.D. Ind.).

FOR THE UNITED STATES OF AMERICA

Date: 5/29/13

Ignacia S. Moreno

IGNACIA S. MORENO
Assistant Attorney General
Environment and Natural Resources Division

Date: 6/5/13

~~GREGORY L. SUKYS~~ Jeffrey A. Spector
Senior Attorney
Environmental Enforcement Section
United States Department of Justice
P.O. Box 7611
Ben Franklin Station
Washington, D.C. 20044-7611
(312)353-1594/ (202) 616-6584 (FAX)

The UNDERSIGNED PARTY hereby consents to the Third Amendment to 2006 Consent Decree in the matter of United States and State of Indiana v. City of Indianapolis, No. 1:06-cv-01456-SEB-TAB (S.D. Ind.).

FOR THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Date: 11·26·12

MARK POLLINS
Director, Water Enforcement Division
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460

The UNDERSIGNED PARTY hereby consents to the Third Amendment to 2006 Consent Decree in the matter of United States and State of Indiana v. City of Indianapolis, No. 1:06-cv-01456-SEB-TAB (S.D. Ind.).

FOR THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Date: 11-8-12

SUSAN HEDMAN
Regional Administrator
U.S. EPA Region 5

Date: 11/2/12

ROBERT A. KAPLAN
Regional Counsel
U.S. EPA Region 5
77 W. Jackson Blvd.
Chicago, Illinois 60604

The UNDERSIGNED PARTY hereby consents to the Third Amendment to 2006 Consent Decree in the matter of United States and State of Indiana v. City of Indianapolis, No. 1:06-cv-01456-SEB-TAB (S.D. Ind.)

FOR THE STATE OF INDIANA

GREGORY F. ZOELLER
Attorney General of Indiana

Date: 11/16/12

SIERRA ALBERTS
Deputy Attorney General
Indiana Government Center South, Fifth Floor
302 West Washington Street
Indianapolis, IN 46204
(317) 232-5663

Date: 11/16/2012

THOMAS W. EASTERLY
Commissioner
Indiana Department of Environmental Management
100 North Senate Avenue
IGCN 1301
Indianapolis, Indiana 46204

The UNDERSIGNED PARTY hereby consents to the Third Amendment to 2006 Consent Decree in the matter of United States and State of Indiana v. City of Indianapolis, No. 1:06-cv-01456-SEB-TAB (S.D. Ind.)

FOR THE CITY OF INDIANAPOLIS, INDIANA

Date: 10.29.12

LORI MISER
Director
Department of Public Works
City of Indianapolis
200 East Washington Street
Suite 2460
Indianapolis, Indiana 46204

APPROVED AS TO FORM AND LEGALITY:

Date: 10/25/12

SAMANTHA KARN
Corporation Counsel
City of Indianapolis
200 East Washington Street
Suite 1601
Indianapolis, Indiana 46204

:

The UNDERSIGNED PARTY hereby consents to the Third Amendment to 2006 Consent Decree in the matter of United States and State of Indiana v. City of Indianapolis, No. 1:06-cv-01456-SEB-TAB (S.D. Ind.).

FOR CWA AUTHORITY, INC.

CAREY B. LYKINS
President and Chief Executive Officer
CWA Authority, Inc.
2020 N Meridian St
Indianapolis, IN 46202-1306

JOHN R. WHITAKER
Senior Vice President, Chief Legal and Compliance Officer
CWA Authority, Inc.
2020 N Meridian St
Indianapolis, IN 46202-1306