VFC Index - Watershed (Plan)

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Little Calumet River Watershed Management Plan

The Little Calumet River Watershed (Group) exists to effectively and aggressively reduce pollutant loads in the subwatersheds of the Little Calumet River through coordinated planning, public education, and structural BMP implementation.

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Glossary of Terms

303(d) List - A list identifying water bodies that are impaired by one or more water quality elements there by limiting the performance of designated beneficial uses.

Aquifer - Any geologic formation containing water, especially one that supplies water for wells, springs, etc.

Best Management Practice (BMP) - Practices implemented to control or reduce non-point source pollution.

Canopy Cover - The overhanging vegetation over a given area.

Channelization - Straightening of a stream; often the result of human activity.

Clean Water Act - The primary federal law in the United States governing water pollution. Commonly abbreviated as the CWA, the act established the symbolic goals of eliminating releases to water of high amounts of toxic substances and ensuring that surface waters would meet standards necessary for human sports and recreation.

Coliform - Intestinal waterborne bacteria that indicate fecal contamination. Exposure may lead to human health risks.

Combined sewer Overflow (CSO) - Outlets that dump excess water from the sewers into streams and rivers, keeping the sewers from backing up into homes, business and streets when it rains.

Conservation Design - A development approach that seeks to protect natural resources from development impacts by taking existing landscape, drainage, and natural features into consideration.

Continental Divide - The name given to the North American portion of the mountainous ridge which separates the watersheds that drain into the Pacific Ocean from rivers which drain into the Atlantic Ocean and the Arctic Ocean.

Designated Uses - State-established uses that waters should support (e.g. fishing, swimming, acquatic life).

Detention Pond - A basin designed to slow the rate of stormwater run-off by temporary storing the run-off and releasing it at a specific rate.

Dissolved Oxygen (DO) - Oxygen dissolved in water that is available for aquatic organisms.

Downstream - In the direction of a stream's current.

Dredge - To clean, deepen, or widen a water body using a scoop, usually done to remove sediment from a streambed.

Easement - A right, such as a right of way, afforded an entity to make limited use of another's real property.

Ecoregion - A geographic area characterized by climate, soils, geology, and vegetation.

Ecosystem - A community of living organisms and their interrelated physical and chemical environment.

Erosion - The removal of soil particles by the action of water, wind, ice, or other agent.

Escherichia Coli (*E. coli*) - A type of coliform bacteria found in the intestines of warm-blooded organisms, including humans.

Exotic Species - An introduced species not native or endemic to the area in question.

Gradient - Measure of a degree of incline; the steepness of a slope.

Groundwater - Water that flows or seeps downward and saturates soil or rock.

Headwater - The origins of a stream.

Heavy Metals - The group of elements between copper and bismuth on the periodic table of the elements having specific gravities greater than 4.0. The most common ones in municipal permits are cadmium, chromium, copper, nickel, lead, mercury, and zinc.

Hydrologic Unit Code (HUC) - Unique numerical code created by the U.S. Geological Survey to indicate the size and location of a watershed within the United States. Based on four separate divisions ranging in size from regions, sub-regions, accounting units, and cataloging units.

Impervious Surface - Any material covering the ground that does not allow water to pass through or infiltrate (e.g. roads, driveways, roofs).

Infiltration - Downward movement of water through the uppermost layer of soil.

Low Impact Development (LID) - A development approach that utilizes a variety of natural or built features to promote sound management of stormwater.

Macroinvertebrates - Animals lacking a backbone that are large enough to see without a microscope.

Maximum Contaminant Level (MCL) - The highest level of a contaminant that is allowed in drinking water.

Moraine - Any glacially formed accumulation of unconsolidated debris which can occur in currently glaciated and formerly glaciated regions.

National Pollutant Discharge Elimination System (NPDES) - National program in which pollutant discharges such as factories and treatment plants are given permits with set limits of discharge allowable.

Non-point Source Pollution (NPS) - Pollution generated from large areas with no identifiable source (e.g., stormwater run-off from streets, development, commercial and residential areas).

Permeable - Capable of conveying water (e.g., soil, porous materials).

Point Source Pollution - Pollution originating from a “point,” such as a pipe, vent, or culvert.

Pollutant - As defined by the Clean Water Act (Section 502(6)): “dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wreaked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.”

Polychlorinated Biphenyls (PCB’s) - Any of a family of individual compounds produced by chlorination of biphenyl, noted primarily as an environmental pollutant that accumulates in animal tissue with resultant pathogenic and teratogenic effects.

Pool - An area of relatively deep, slow moving water in a stream.

Retention Pond - A basin designed to retain stormwater run-off so that a permanent pool is established.

Riffle - An area of shallow, swift moving water in a stream.

Riparian Zone - An area, adjacent to a water body, which is often vegetated and constitutes a buffer zone between the nearby land and water.

Run-off - Water from precipitation, snowmelt, or irrigation that flows over the ground to a water body. Run-off can pick up pollutants from the air or land and carry them into streams, lakes, and rivers.

Sediment - Soil, sand, and minerals washed from the land into a water body.

Sedimentation - The process by which soil particles (sediment) enter, accumulate, and settle to the bottom of a water body.

Septic System - A small scale sewage treatment system common in areas with no connection to main sewerage pipes.

Soil Association - A landscape that has a distinctive pattern of soils in defined proportions. Typically named for the major soils.

Steering Committee - Group of individuals responsible for the development of the procedures and policies to improve the overall water quality of the Little Calumet River and its tributaries.

Storm Drain - Constructed opening in a road system through which runoff from the road surface flows on its way to a water body.

Stormwater - The surface water runoff resulting from precipitation falling within a watershed.

Substrate - The material that makes up the bottom layer of a stream.

Topographic Map - Map that marks variations in elevation across a landscape.

Topography - The study of Earth's surface features, concerned with local detail in general, including not only relief but also vegetative and human-made features

Total Maximum Daily Load (TMDL) - Calculation of the maximum amount of a pollutant that a water body can receive before becoming unsafe and a plan to lower pollution to that identified safe level.

Tributary - A stream that contributes its water to another stream or water body.

Turbidity - Presence of sediment or other particles in water, making it unclear, murky, or opaque.

Upstream - Against the current.

Valparaiso Moraine – A terminal moraine around the Lake Michigan basin. It consists of glacial till and sand creating a series of hills and ridges that formed during the Crown Point Phase of the Wisconsin Glaciation.

Water Quality - The condition of water with regard to the presence or absence of pollution.

Water Quality Standard - Recommended or enforceable maximum containment levels of chemicals or materials in water.

Watershed - The area of land that water flows over or under on its way to a common point.

Wetlands - Lands were water saturation is the dominant factor in determining the nature of soil development and the types of plant and animal communities.

Zoning - To designate, by ordinance, areas of land reserved and regulated for specific uses, such as residential, industrial, or open space.

Acronyms

ACOE	Army Corps of Engineers
BMP	Best Management Practice
BOD	Biological (or Biochemical) Oxygen Demand
CWA	Clean Water Act
CWP	Center for Watershed Protection
EPA	Environmental Protection Agency
FCA	Fish Consumption Advisory
GAP	Gap Analysis Program
GIS	Geographic Information System
GPS	Global Positioning System
GSWMD	Gary Storm Water Management District
HUC	Hydrologic Unit Code
INDOT	Indiana Department of Transportation
IAC	Indiana Administrative Code
IDEM	Indiana Department of Environmental Management
IDNR	Indianan Department of Natural Resources
ISDA	Indiana State Department of Agriculture
ISS	Individual Septic System
LARE	Lake and River Enhancement
MRCC	Midwestern Regional Climate Center
NIRPC	Northwestern Indian Regional Planning Commission
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	Non-point Source
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
OSDS	On-site Sewage Disposal Systems
PCB	Polychlorinated Biphenyls
SSC	Suspended Sediment Concentration
SWCD	Soil and Water Conservation District
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFW	United States Fish and Wildlife
USGS	United States Geological Survey
WWTP	Wastewater Treatment Plant
E.coli	Escherichia coli
NH3	Ammonia
NO3	Nitrate
TP	Total Phosphorus
Ortho-P	Ortho Phosphorus, TSS: Total Suspended Solids
TP	Total Phosphorus
TSS	Total Suspended Solids
TKN	Total Kjeldahl Nitrogen

Executive Summary

The Little Calumet River Watershed covered by this plan includes three 14 Digit HUC watersheds. Specific waterways included in these areas are the east reach of the western branch of the Little Calumet River, the Willow Creek watershed, and a portion of the Deep River watershed. This study was funded by a Section 319 Grant through the Indiana Department of Environmental Management (IDEM) with matching funds provided by the local sponsor, the Gary Storm Water Management District (GSWMD).

The watersheds covered by this plan are located in Northwest Indiana and are highly urbanized though some agriculture does still occur. A flood control project by the Army Corp of Engineers (ACOE) is currently underway on this portion of the Little Calumet River.

The Little Calumet River Watershed Management Plan has been developed over the course of 15 months by the Steering Committee and its consultants. Nine steering committee meetings have been held with two of them advertised to the public for public input. The overall process closely followed the Indiana Watershed Planning Guide.

All of the communities within the watersheds were invited to participate prior to the beginning of the project. Once the project began they were again encouraged to attend the steering committee meetings.

The Steering Committee developed the Mission Statement for this watershed management plan and began identifying issues and concerns within the watersheds. A public meeting was conducted at Indiana University Northwest to give the public an opportunity to add to that list of identified issues and concerns.

Information was compiled from a wide variety of sources including but not limited to previous studies in this area, on going projects including the Army Corp of Engineers Flood Control and Recreation Project, the approved Total Maximum Daily Load (TMDL) for the Little Calumet River, municipal Geographic Information Systems (GIS) and sewer atlases, a limited sampling program, a stream reach survey, and numerous publicly available databases with information such as topography, land usage, aerial photographs, etc.

The Steering Committee then compiled a series of problem statement from the list of issues and concerns from each source. These problem statements were then used to set goals for this plan to improve upon those issues. The goals identified as part of this plan include:

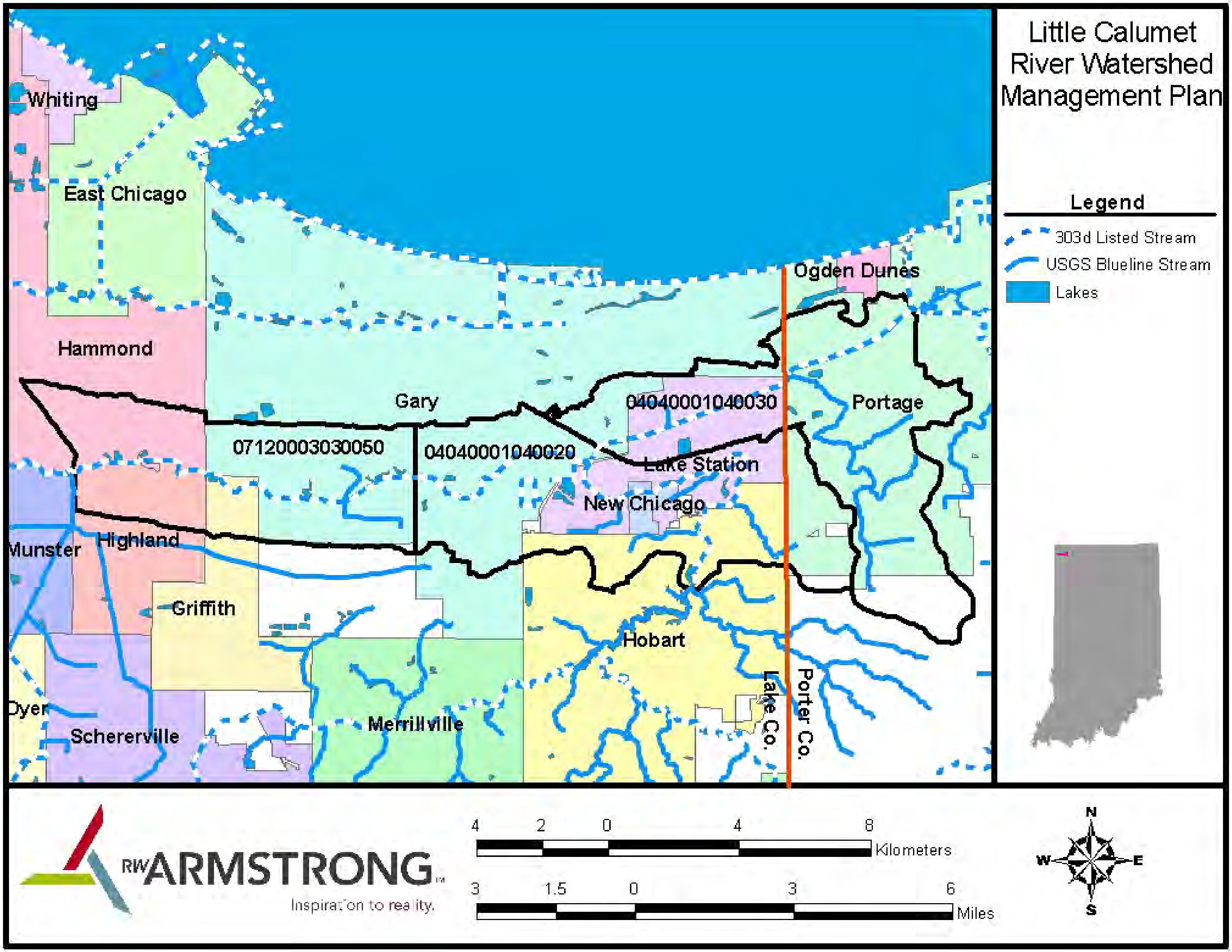
Goal 1: Reduce *E. coli* levels in the Little Calumet River by reducing loads to the River to meet beneficial uses.
Goal 2: Reduce sediment loads by source reduction strategies and, in priority subwatersheds, through the use of Best Management Practices (BMPs).

Goal 3: Reduce nutrient loads by source reduction strategies and, in priority subwatersheds, through the use of Best Management Practices (BMPs).
Goal 4: Restore, improve, and/or protect floodplains, wetlands, natural areas, and riparian corridors.
Goal 5: Improve public awareness/knowledge of pollutant loads, sources, and solutions, especially with regard to *E. coli*, and the impacts and risks associated with them.
Goal 6: Create an active watershed alliance or conservancy district that facilitates and implements information sharing including ordinances, projects/experiences, and educational materials in a central location.
Goal 7: Increase river corridor connectivity, river navigability, and public access sites and make the public aware of them.

Specific milestones toward each goal have been set with an indicator designated to measure progress toward completion of each goal. Critical areas have been identified within the watershed where efforts will be focused to have the greatest impact on water quality.

Findings from this watershed planning process include:

1. The flow control structure being built as part of the Little Calumet River Flood Control and Recreation Project will divert high flows that currently flow west toward Illinois from Hart Ditch east into this watershed. When this occurs, higher flows with larger pollutant loads will flow through the watersheds covered by this plan.
2. Base flow levels of *E.coli* bacteria were not as high as they could have been and appear to be manageable. Application of the plan will bring the River into compliance with water quality standards for *E.coli* during base flows. High flows will continue to be a problem until combined sewer overflows are eliminated and flows from Hart Ditch are not elevating bacteria counts within this watershed.
3. Other pollutants in the watersheds including Total Suspended Solids (TSS), nitrogen, and phosphorus are at levels that can adversely impact biological communities.
4. An active watershed alliance or conservancy district is needed to bridge existing political boundaries.
5. Public access to and information about the River will need to be improved as the River is cleaned up and the public wants to utilize it.
6. Natural areas along the river and its tributaries were plentiful, especially along Deep River.


Little Calumet River Watershed Management Plan
Legend
303d Listed Stream
USGS Blueline Stream
Lakes
Whiting
East Chicago
Hammond
Gary
Ogden Dunes
Portage
04040001040030
07120003030050
04040001040020
Lake Station
New Chicago
Munster
Highland
Griffith
Hobart
Dyer
Schererville
Merrillville
Lake Co.
Porter Co.
RW ARMSTRONG
Inspiration to reality.
Kilometers
Miles
N
S
E
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Section I: Project Introduction

The Gary Storm Water Management District (GSWMD) submitted an application for a Clean Water Act Section 319 grant for the Little Calumet River. After some negotiation with the Indiana Department of Environmental Management (IDEM), the grant was approved on _________________. The grant application stated the purpose was to identify pollutant contributions to the Western Branch of the Little Calumet River resulting from inappropriate or failed on-site sewage disposal systems, stream bank erosion and aquatic habitat degradation and polluted runoff from land development. The approach required by IDEM as part of the grant negotiations included a watershed wide study of this problem.

The majority of the funding for this project was supplied by a Section 319 grant in response to the GSWMD application; with the matching funds being provided by the City of Gary.

Designating the Study Area

A watershed is an area of land that water flows over or under on its way to a common point. Watersheds can be extremely large, covering thousands of square miles, or they can be small, covering areas measured only in square feet. Larger watersheds contain many smaller watersheds within them.

In the United States, watersheds are identified using a hierarchical coding system, Hydrologic Unit Codes (HUC), developed in the mid-1970's by the U. S. Geological Survey (USGS). Based on topographical surface features, this system divided the country into successively smaller hydrologic units with the smaller units contained inside the larger units. These units are broken down into four levels from largest to smallest: regions, sub-regions, accounting units, and cataloging units. A unique number was assigned to identify each level by starting with the region level. To designate different sub-regions within each region, more digits were added to the region number.

The first level of classification divides the United States into 21 regions. Figure 1.1 shows these 21 regions as they are distributed over the country. Each region is then divided into sub-regions, totaling 221. The third level of classification divides the nation into 378 accounting units contained within the sub-regions. The fourth level of classification subdivides many of the accounting units into cataloguing units. There are 2,264 cataloguing units in the United States. The cataloguing unit is the smallest unit within this classification system and is commonly referred to as 14-digit watershed; though efforts are underway to further subdivide the cataloguing units.

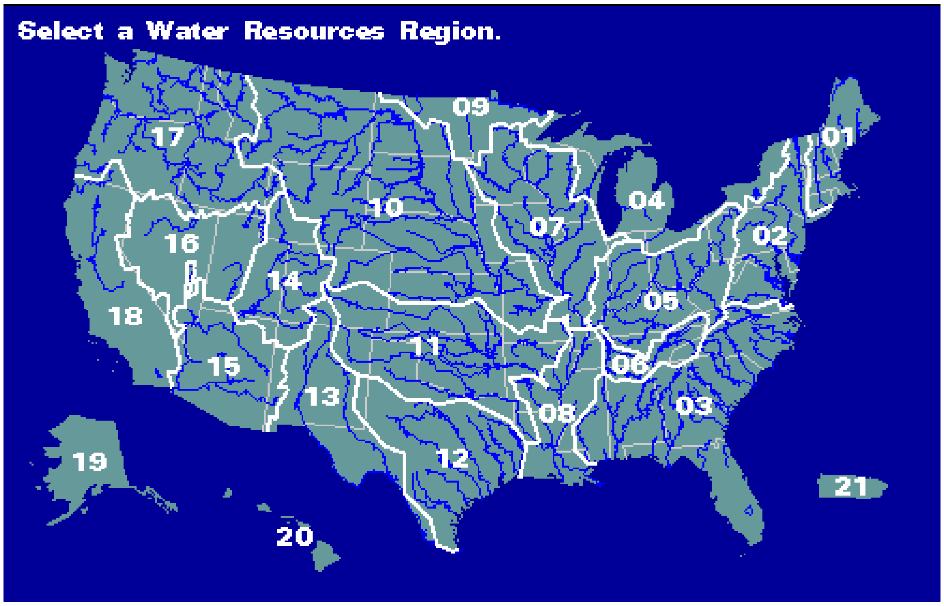


Figure 1.1: Hydrologic Unit Codes 21 regions over the United States.

The three 14-digit HUC watersheds specifically identified for consideration in this watershed management plan are:

071200003030050 – Little Calumet River East-West Split
04040001040020 – Deep River – Little Calumet River
04040001040030 –Burns Ditch - Willow Creek

The watersheds covered by this study consist of the West Branch Little Calumet River, Deep River and Willow Creek. The Little Calumet River includes areas to the east in the City of Portage and west in the City of Hammond and the Town of Highland. Figure 1.2 shows the three 14-digit HUC watersheds and the local communities. The unique location of this river segment crosses the continental divide. It is at this point that the river flow splits and drains east towards the Great Lakes and west towards the Mississippi River.

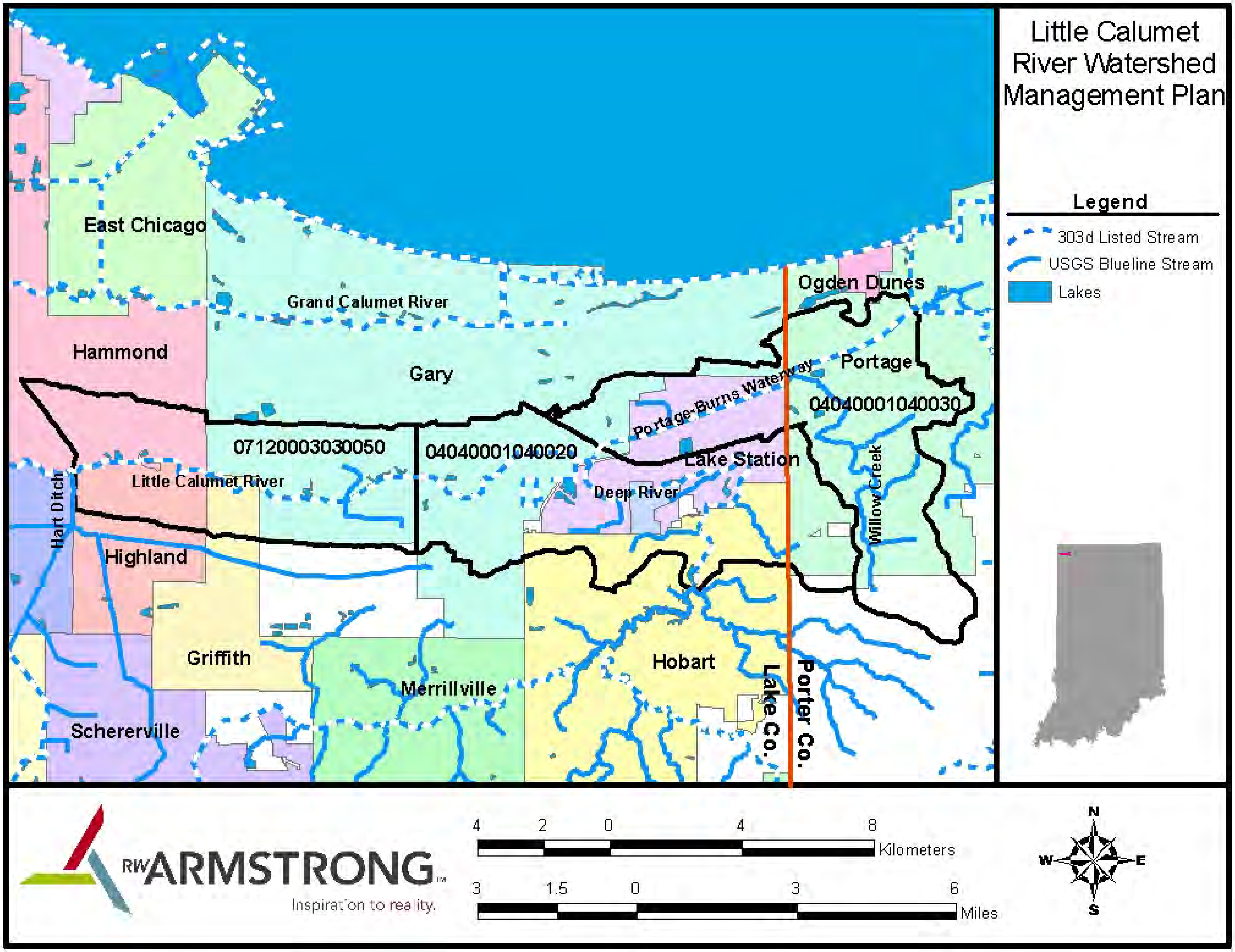


Figure 1.2: Watershed management study area with three 14-digit HUC watersheds delineated.

Building Partnerships

The Gary Storm Water Management District (GSWMD) invited all of the communities and a number of environmental groups located, or affected by, the watershed to participate in a steering committee. This invitation was in the form of a letter sent via U.S. Mail in late summer 2006. A copy of this letter is included in Appendix 1: Stakeholders Invitation. This letter was sent to:

- City of Hammond
- Town of Munster
- Town of Highland
- Town of Griffith
- City of Hobart
- City of Lake Station
- City of Portage
- City of Crown Point
- Lake County
- Porter County
- Save the Dunes Council
- Little Calumet River Basin Development Committee
- Wildlife Habitat Council
- Northwestern Indiana Regional Planning Commission
- Lake Michigan Coastal Program
- Lake County Soil & Water Conservation District

The Steering Committee of the Little Calumet River Watershed Management Plan was composed of representatives from state and local agencies with jurisdiction over at least part of the watershed. Local groups, businesses, and citizens concerned with the current condition of the river were also part of the committee. Members who participated in developing this management plan are listed in Table 1.1.

NAME	ORGANIZATION		NAME	ORGANIZATION
Antwuan Clemmons	Yourth Leaders in Action		Joe Eberts	Lake County Parks
Arnie Muzumdar	Northwest Engineering		Joe Exl	LMCP
Bill Meeks	City of Crown Point		John Bach	Town of Highland
Bill Vargo			Kathy Luther	NIRPC
Bob Helmick	RC and D		Kevin Breitzke	Porter County
Bob Theodoru	United Water		Lisa Bihl	EmPower Results
Brenda Scott Henry			Luci Horton	GSD
Carolyn Marsh	Sandy Ridge Audubon Society		Mark Gordish	Hammond
Cecile Petro	Town of Highland		Marshall Giliana	City of Lake Station
Charlotte Read	Save the Dunes Council		Martin J. Brown	GSWMD
Constance Clay	Save the Dunes Council		Mary Wiseman	NIRPC
Dan Gardner	LCRDC		Mary Lee	Glen Park Weed & Seed
Dan Gossman	Lake County Surveyor's Office		Maurice Joiner	United Water
Dan Rieden	Lake County Parks		Michael Gully	Town of Griffith
Dan Vicari	CDM		Murul Sloan	Glen Park CDC
Debi Hammonds	Golden Recognition		Nancy Valentine	
Dorothy Robinson			Nicole Sanders	RW Armstrong
Elizabeth McCloskey	U.S. Fish & Wildlife Service		Phil Gralik	RW Armstrong
Erin Crofton	Save the Dunes Council		Robert Perrine	Town of Burns Harbor
Greg Bright	Biomonitoring		Rodney Littleton	Groundwork Gary
Gregory White	Lake County Surveyor's Office		Roland Cloco	City of Lake Station
Harlee Currie	SWMD		Ronier Scott	6th District Council
Herb Read	Save the Dunes Council		Ruth Mores	Hammond
Howard Fink	Town of Merrillville		Sky Schelle	IDEM
Jeff Jones	Portage Parks		Spencer Cortwright	IU Northwest
Jenny Orsburn	IDNR Coastal Program		Stan Dostatni	City of Hammond
Jerry Haymon			Stan Petintes	SBS
Jill Hoffman	EmPower Results		Steve Truchan	Hobart
Jim Bartos			Steve West	IDEM
Jim Mandon	Town of Munster		Tammi Davis	GSWMD
Jim Meyer	Meyer & Wyott		Tom Anderson	Save the Dunes Council
Jim Meyer	Meyer & Wyatt			

Table 1.1: Watershed Management Plan Steering Committee members.

Mission Statement

The Mission Statement as developed by the Steering Committee is:

(The Little Calumet River Watershed Group) exists to effectively and aggressively reduce pollutant loads in the subwatersheds of the Little Calumet River through coordinated planning, public education, and structural BMP implementation.

Plan Development Process

The Steering Committee, comprised of watershed stakeholders, met for the first time on November 30, 2006 at the offices of the Gary Sanitary District (GSD) in Gary, Indiana. The meeting started with introductions of those in attendance and a brief introduction of the project. A draft Mission Statement was developed as well as a list of the issues and concerns of the steering committee. The list of issues developed at this meeting is included in Appendix 2: Issues Identification. Full minutes of this meeting can be found in Appendix 3: Steering Committee Meeting Minutes.

The second Steering Committee meeting was held on January 11, 2007, at the GSD offices in Gary, Indiana. The draft Mission Statement was reviewed and a goal setting exercise was conducted. The date for the first public meeting was set for March 1, 2007. Full minutes of this meeting are located in Appendix 3: Steering Committee Meeting Minutes.

The first public meeting was held at the Indiana University Northwest Library on March 1, 2007. Local politicians, citizens, and steering committee members attended. A list of public concerns was developed and prioritized by those in attendance.

The third Steering Committee meeting was held on March 14, 2007, again at the GSD offices in Gary, Indiana. Sampling Plan alternatives were presented to the committee and can be found in Appendix 4: Sampling Plan Alternatives. Ultimately, the steering committee chose to take grab samples to test for specific water quality parameters and to employ two rounds of long term *E.coli* sampling in order to determine “hot zones.” Full minutes of this meeting are located in Appendix 3: Steering Committee Meeting Minutes.

The fourth Steering Committee meeting was held on July 17, 2007 at the Northwest Indiana Regional Planning Commission (NIRPC) building in Portage, Indiana. The major discussion during this meeting regarded the land use inventory and the maps created to show this. Potential “hot spots” were identified by committee members and a strategy development session was conducted by Jill Hoffman of Empower Results. Full meeting minutes can be found in Appendix 3: Steering Committee Meeting Minutes.

The next Steering Committee Meeting was held at the Genesis Convention Center in Gary, Indiana on October 11, 2007 and was considered the fifth committee meeting. Items covered during this meeting included a review of the water quality data collected and the updated land use maps and inventory created in response to the comments at the fourth committee meeting. The problem statements, goals and strategies were reviewed and an update on the upcoming public workshop was conducted.

The sixth Steering Committee Meeting was held at the GSD Board Room in Gary, Indiana on November 28, 2007. An update was given as to the results of the public outreach activity conducted in mid-October. The Stream Reach Survey results were also reviewed to give a better idea as to the current condition of the river. A review of the problem statements, goals and strategies was completed and critical areas began discussion. A few load reduction targets were set with the knowledge that they could change depending of the BMP selections.

The seventh meeting held by the Steering Committee was on January 17, 2008 at the GSD Board Room in Gary, Indiana. During this meeting the load reduction targets and indicators were discussed and a review was held of sources and critical areas defined from these source locations. Best Management Practices (BMPs) were selected for implementation and the implementation plan was discussed with tasks and dates being developed.

The eighth and final Steering Committee meeting was held on January 30, 2008 at the GSD board room in Gary, Indiana. This meeting had discussion on the updated critical areas and load reduction targets as well as the implementation plan. The monitoring plan was discussed and indicators and responsible parties identified.

A final public meeting was held on March 13, 2008 at the Indiana University Northwest Library. The meeting allowed RW Armstrong and the Steering Committee to present the findings and plan to the public and allow public input to be considered before the final submittal of the Watershed Management Plan.

Watershed Activity

A Hoosier River Watch Day was held on Saturday, October 13, 2007, in the City of Gary along the Little Calumet River. The event was held in order to gauge the level of knowledge the public had concerning the river and the associated watershed area. As part of the River Watch Day a number of activities were organized that the public could participate in.
The activities organized and sponsored for the public to participate in included a nature walk along the river, using the levee system trails that allowed participants to identify different plant and animal species. Water quality testing was conducted by Joe Exl and a bike ride was led by Dorreen Carey. EmPower Results had a game station that allowed participants to roll a weighted die in an attempt to make their way through an ecological environment. Each station that

was visited by a roll of the dice had a different color bead that could be used to make a bracelet. The point was to show how difficult it was to get out of some environments along the river.

The water quality testing conducted by Joe Exl included a chemical monitoring sheet, a biological monitoring sheet and qualitative habitat evaluation index. The results of this water testing were similar in value to the water quality results from this study and previous studies conducted on the Little Calumet River and can be seen in Appendix 5: Watershed Activity Event.

As part of the Hoosier River Watch Day participants were given a survey to complete regarding their knowledge of the Little Calumet River, the recreational features associated with the river and the pollutant and flood concerns. A total of 76 responses were received for the survey between the River Watch Day participants and a class of Indiana University Northwest environmental engineering students. The survey results and answers to the question, "Regarding the river, my biggest concerns are:" can be found in Appendix 5: Watershed Activity Event.

Issues/Problems Identified

Two forums were utilized to identify issues within this watershed. The first was to conduct exercises at the steering committee meetings to list concerns in the watershed. The brainstorming session produced a long list of concerns that can be summarized in five categories.

The five categories and the associated statements made by the **steering committee** are:

1. Water Quality Concerns

- Low flow water quality
- Flood control impacts on water quality
- *E coli* sources
- CSOs (discharge & impacts on use)
- Sediment loads (TSS) & upstream erosion problems
- Increase in large rain events - flooding water quality
- Quantity & quality from east reach

2. "Other" Natural Resource Concerns

- Downstream impacts (Lake Michigan)
- Impact of altered hydrology
- Fishery condition – fish health
- Impacts on recreational uses
- Impacts on neighborhood's – aesthetic & habitat
- Preservation of waterways and riparian areas
- Restoration of natural areas/habitat

3. Public Involvement/Education Needs or Concerns

- Risk communication to community
- *E.coli* communication/education with public
- Who's in charge of what?
- Getting local buy-in or participation

4. Local Coordination Needs or Concerns

- Coordination with other watershed projects (DNR 6217 coordination)
- Coordination with flood control project
- TMDL coordination
- Septic systems and social issues
- Flood diversion away from Illinois
- Coordination with planning & zoning
- Communication with ACOE
- Development awareness
- Community cooperation and improved uniformity

5. Resource Needs or Concerns (data, financial, people)

- Planning tools to assess downstream impacts
- Public access

During the first public meeting, the public also went through an issue identification and prioritization exercise. A brainstorming session was first held with every issue mentioned added to a list on easels at the front of the room.

Ranking	Identified Issue	Red Dots	Yellow Dots	Green Dots	Total Points	% Points
1	Flooding	15	3	0	255	19.7%
2	Impact on Lake Michigan	7	4	0	145	11.2%
3	Watershed Education for Public*	8	1	2	140	10.8%
4	Erosion	6	1	2	110	8.5%
5	Connecting People to their Watersheds	6	0	0	90	7.0%
6	Increasing Recreational Uses	2	4	2	80	6.2%
7	Holistic Conservation Planning	2	3	3	75	5.8%
8	Coordination with Other Studies	0	6	2	70	5.4%
9	Fishery	3	1	2	65	5.0%
10	Brownfields	2	1	3	55	4.3%
11	Change in Impervious Areas	2	1	1	45	3.5%
12	Public Workshops	1	2	1	40	3.1%
13	Public Education - Who to Call*	1	1	2	35	2.7%
14	Coordination of Local Projects	0	2	2	30	2.3%
15	Map Parks, Land Trusts, & Natural Areas	1	1	1	30	2.3%
16	Interpretation Opportunities	1	0	1	20	1.5%
17	Diked areas in Watershed	0	0	2	10	0.8%
	Red Dot = 15 points Yellow Dot = 10 points Green Dot = 5 points * Both Issues are Public Education, but with a different focus					

Table 1.2: Issues presented and values given by public meeting paritcipants.

Moderators of the exercise relied on the list of issues identified in the steering committee meeting to start the exercise. When all of the additional issues identified had been recorded, each person in the audience was given three stickers. The stickers were color coded by a red dot representing the most important issue, a yellow dot for the second most important issue and a green dot to be placed on the third most important issue, in their opinion. The audience then placed the stickers on the easel pads. The issues and the prioritization are tabulated in Table 1.2.

No issue was left without some vote next to it at the completion of the exercise. Point values for each dot were assigned as noted in the table and summarized. Clearly, the most important issue was flooding which included areas outside the levee system and throughout the watershed.

Combining the issues identified by both groups under the five categories established yields the following list.

1. Water Quality Concerns

- Low flow water quality
- Flood control impacts on water quality
- *E.coli* sources

- CSOs (discharge & impacts on use)
- Sediment loads (TSS) & upstream erosion problems
- Increase in large rain events - flooding water quality
- Quantity & quality from east reach
- Impact on Lake Michigan

2. "Other" Natural Resource Concerns

- Downstream impacts (Lake Michigan)
- Impact of altered hydrology
- Fishery condition – fish health
- Impacts on recreational uses
- Impacts on neighborhood's – aesthetic & habitat
- Preservation of waterways and riparian areas
- Restoration of natural areas/habitat
- Flooding concerns
- Erosion concerns
- Change in impervious areas
- Diked areas in watershed

3. Public Involvement/Education Needs or Concerns

- Risk communication to community
- *E.coli* communication/education with public
- Who's in charge of what?
- Getting local buy-in or participation
- Watershed education for the public
- Connecting people to their watershed
- Need for public workshops
- Educating the public on whom to call with concerns or for information
- Interpretation opportunities

4. Local Coordination Needs or Concerns

- Coordination with other watershed projects (DNR 6217 coordination)
- Coordination with flood control project
- TMDL coordination
- Septic systems and social issues
- Flood diversion away from Illinois
- Coordination with planning & zoning
- Communication with ACOE
- Development awareness
- Community cooperation and improved uniformity
- Holistic conservation planning
- Coordination with other studies and projects
- Brownfield impacts
- Map parks, land trusts, and natural areas

5. Resource Needs or Concerns (data, financial, people)

- Planning tools to assess downstream impacts
- Public access
- Increasing recreational uses

Previous Work/Studies in the Watershed

Sampling

The Indiana Department of Environmental Management (IDEM) established a fixed monitoring station along the Little Calumet River in 1990 in the eastern portion of the study area. This location was sampled multiple times a year for physical and chemical water quality as well as bacteria (Fecal Coliform and *E.coli*). Four additional sampling locations (three along the Little Calumet River and one along Willow Creek) were established in 2000 as part of the IDEM *E.coli* Sampling Program. This data is included in Appendix 6: IDEM Fixed Station Data and is discussed further in Section IV of this report.

Sampling has also been performed by the United Sates Army Corps of Engineers (ACOE), the Indiana Department of Natural Resources (Hoosier Riverwatch Program), local utilities, and universities. Also, Total Maximum Daily Loads (TMDLs) were established for *E.coli* on the Little Calumet River and Potage Burns Waterway in 2004. Sampling was performed as part of the Data Report (December 2002).

U.S. Army Corp of Engineers Flood Control Project

The Little Calumet River Basin Development Commission (LCRBDC) is the local sponsor for a federal flood control project building levee systems along the west branch of the Little Calumet River.

As part of this project, earthen levees and I-walls are being constructed from the Illinois State line to the eastern boundary of the City of Gary. This line of protection limits the location of discharges to the river and allows stormwater flows to enter the river through 12 pumping stations and 11 outfalls. A map of the line of protection showing the location of these discharge points is shown in Figure 1.3 and a larger version of the same map is included in Appendix 7: ACOE Levee System.

Note the diversion structure shown in Figure 1.3 on the Little Calumet River just west of Hart Ditch, the western edge of the watershed. This diversion structure is planned to divert high flows to the east and limit the volume of flows traveling west toward the State of Illinois. <u>This addition will change the western boundary of this watershed under high flow conditions.</u>

Mitigation of wetlands is taking place in the Hobart Marsh area due to the effect that the levee system is having on the existing wetlands. No stormwater quality measures are currently being included by the Army Corp of Engineers. Trails, canoe launches, fishing piers, observation decks, and other amenities have been added along the river.

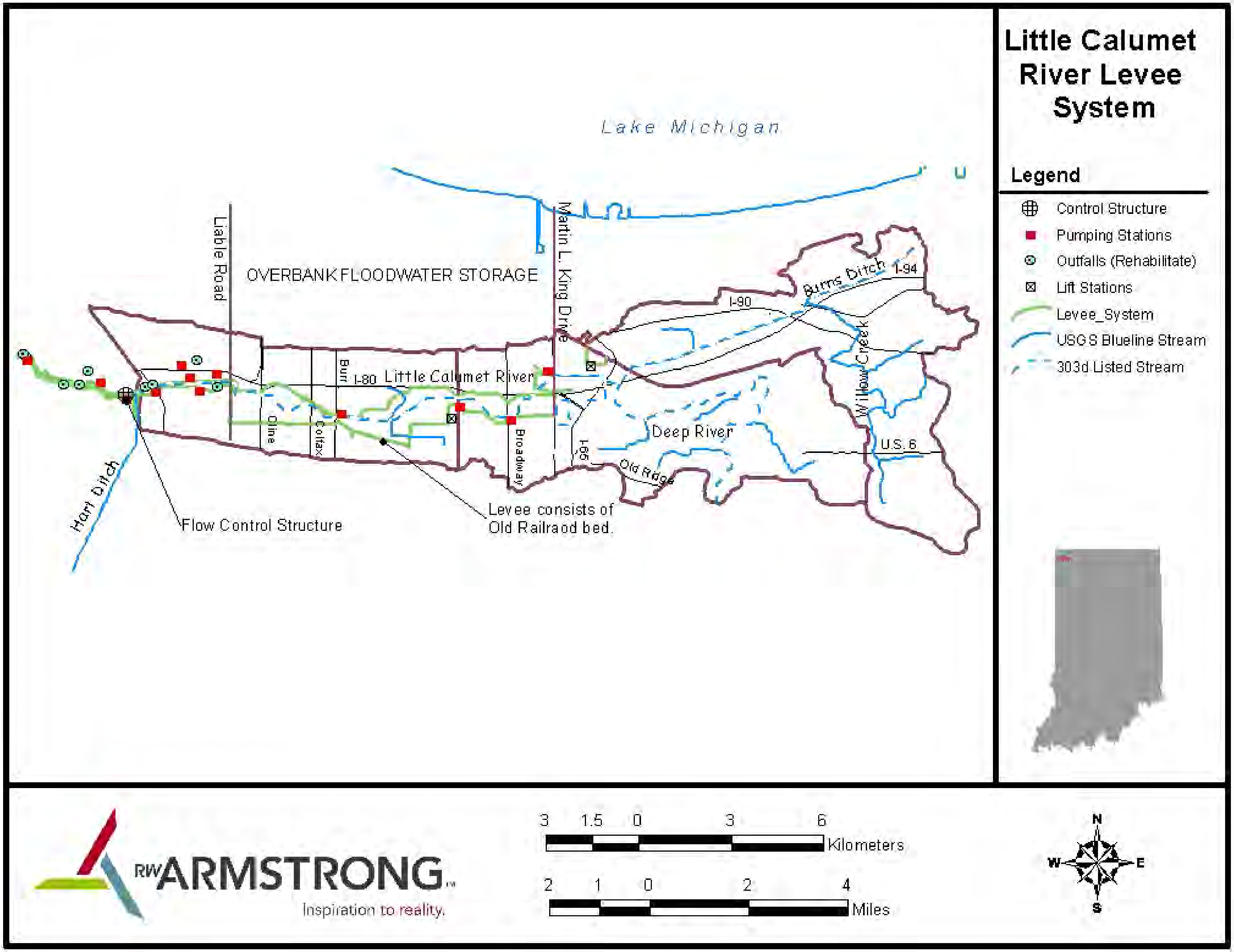


Figure 1.3: Levee system being completed by the Little Calumet River Basin Development Commission and the Army Corp of Engineers.

The long term operations and maintenance of the levee system is being negotiated with the local communities where the ACOE construction is complete. Some form of organization will most likely continue to exist, even after construction is complete and the operations and maintenance is delegated to the proper parties, to centralize and maintain records as required by the Army Corp of Engineers.

The final completion of the system should occur around 2013.

Phase II - Combined Sewer Overflow Master – Little Calumet River Sampling Program – The Sanitary District of Hammond, Indiana (November 1995)

This study monitored pump station discharges and water quality during combined sewer overflow (CSO) events. CSO events on August 11, 1994, October 8, 1994, and October 31, 1994 were sampled and analyzed. Four of the eleven sampling sites, three water quality and one CSO discharge sampling site, provided information pertinent to this watershed plan. One significant piece of data was that the water quality sampling site on Hart Ditch showed significant amounts of *E.coli* and other pollutants. A map of the sample sites and the data collected is included in Appendix 8: CSO Master Plan Phase II for the Hammond Sanitary District and discussed further in Section IV of this plan.

The Watershed Diagnostic Study of the Little Calumet-Galien River Watershed prepared for the IN DNR-Division of Water Resources (April 2001)

This study summarized the available existing data within the Little Calumet-Galien River Watershed. The goals and objectives of the study were to:

- Describe and map trends in water resources within the Little Calumet-Galien River Watershed.
- Identify potential non-point source water quality problems.
- Identify and prioritize watershed land treatment projects to address existing and potential problems.
- Project the probability of achieving program success and provide specific directions for future work to optimize success.

The study included two of the three watersheds included in this watershed management plan:
04040001040020 – Deep River – Little Calumet River
04040001040030 –Burns Ditch - Willow Creek

It did **not** include one of the three watersheds contained within this watershed management plan:
071200003030050 – Little Calumet River East-West Split

This study provides an excellent discussion of the history of this watershed and the timelines for its development. No specific, hard data was provided; however, a summary of potential point and non-point sources was included.

A comparison of the locations where high levels of pollutants were encountered within the Little Calumet-Galien River watershed with those of EPA- permitted discharges was done to determine whether point sources or non-point sources were more likely responsible for high pollutant loads. None of the locations showing excessive concentrations of lead, copper, zinc, nitrogen, phosphorus, total suspended solids, low dissolved oxygen or pH were along the Little Calumet River or Willow Creek. Fecal Coliforms were located downstream from four (4) small waste water treatment plants with no location given.

This study also states that contaminated sediments are a serious issue in the Grand Calumet River and the Indiana Harbor and Ship Canal but does not discuss sediments within the Little Calumet River.

Little Calumet River Stream Reach Characterization and Evaluation Report (October 2002)

This study was completed in October 2002 by Greeley and Hansen for the Gary Sanitary District. The aim of the study was to identify the concentrations of pollutants in the West Branch of the Little Calumet River being generated by the Combined Sewer Overflows (CSOs). The study was conducted as part of a requirement within Attachment A, Part III, of the GSD National Pollutant Discharge Elimination System (NPDES) Permit No. IN 0022977. The results of the study were also used to assist in determination of a Long Term Control Plan (LTCP) for the City of Gary.

The Little Calumet-Galien Watershed Restoration Action Strategy (WRAS) developed for IDEM (2002)

This study was reported in two parts. Part 1 provided a reference point and map to assist local citizens with improving water quality. The major water quality concerns and recommended management strategies were addressed in Part 2.

The strategy presented was not intended to dictate management and activities at the stream site or segment level, but rather the watershed as a whole. Water quality management decisions and activities for individual portions of the watershed are most effective and efficient when managed through subwatershed plans.

That being said, the summarizations of management strategies, funding sources, and superfund sites were useful in the preparation of the subwatershed plan being conducted now.

Gary Green Link Master Plan (2003-2005)
This study was completed in February 2005 with the goal to "develop, through a public process, a Master Plan for implementation and management of a natural resources greenway and recreation corridor, the Gary Green Link, which will ring the City of Gary, connecting the Grand Calumet River, Little Calumet River, and the Lake Michigan shoreline."

Some of the relevant objectives of this project were to:
- Identify, protect, and restore globally significant natural resources
- Identify, protect, and restore other locally significant natural resources, natural areas, and open spaces
- Extend the green corridor that is already part of the Indiana Dunes National Lakeshore and other protected public lands
- Provide recreational opportunity as a bicycle / pedestrian multi-use trail

This project produced useful land inventory maps of natural areas along the Little Calumet River in the City of Gary. The land inventory maps can be found in Appendix 9: Gary Green Link Master Plan.

Integrated Storm Water Drainage Plan for the Little Calumet River Watershed Study (2003-2004)
The goal of this project was to develop an integrated stormwater drainage plan for the Little Calumet River Drainage Basin (LCRDB) and the remaining areas to the south located within the Gary city limits. This integrated stormwater plan had multiple objectives; including evaluation of the existing conditions, identification of stormwater related issues and a recommended plan of action. This plan encompassed a comprehensive and holistic approach by looking at the river as a total system and not its individual parts. The end product of this project was a capital improvement plan for the City of Gary to implement to improve stormwater drainage in the study area. The improvements proposed in this plan will impact flows to and in the Little Calumet River within the City of Gary and downstream of the city limits.

Little Calumet and Portage Burns Waterway TMDL for *E.coli* Bacteria (September 2004)
This report was prepared for the Indiana Department of Environmental Management (IDEM) in response to their listing of over 30 miles of the Little Calumet River and Portage Burns Waterway on the 303(d) list of impaired waters for *E.coli* bacteria. The intent of this report was to determine the Total Maximum Daily Load (TMDL) for this pollutant in these waters as required by the Clean Water Act. This report inventoried available data, evaluated the documented sources of *E.coli* within the study's boundaries, and modeled the river system to determine the TMDL.

The report was not designed to address CSO contributions to the Little Calumet River. It relies on the Long Term Control Plans (LTCP) prepared by the Hammond Sanitary District and the Gary Sanitary District to address these sources. The TMDL report noted that "There were no apparent patterns to the water quality violations relating to *E.coli* that would suggest that violations were more common during a certain time of year or under some critical flow or weather conditions. From the available data, one could not identify the magnitude of any single source of *E.coli*." It also noted "The major sources of the *E.coli* bacteria impairment in the Little Calumet-Portage Burns Waterway appears to be non-point sources. Non-point sources most likely to be contributing to the impairment of the water quality include: failing septic systems, unknown illicit discharges of sewage, wildlife, small agriculture operations, bacteria laden sediments, and urban runoff. Point sources are well below water quality standards. Therefore, point sources of *E.coli* make up such a small percent of the total load that further reductions would not significantly improve water quality. CSO's are a known source of *E.coli* and play a major role in the water quality impairment when they occur. However, CSO's did not coincide with the dates of the simulated events, indicating that the waterbody was impaired by other sources in addition to CSO's." The report also stated that "There is a strong correlation between impervious area in a watershed and bacteria concentrations in the receiving stream."

The TMDL report concluded that a reduction of over 90% in non-point source loads would be required to meet the water quality standards for the rivers' designated uses. The report states the designated use of the Little Calumet River is full-body contact recreation and is designated for warm water communities.

The report also states that flow from Hart Ditch travels east through the reach of the Little Calumet River covered by this watershed management plan. This is contrary to the observations of steering committee members that the east/west flow divide is east of that confluence. The TMDL report gives an estimated travel time from the Hart ditch confluence to Lake Michigan of four days.

NIRPC's Watershed Management Framework Plan (October 2005)
This study provided a broad framework for smaller watersheds in Lake, Porter, and LaPorte Counties, in northwest Indiana, to develop and implement their own watershed plan.

Many of the participants in the development of the Regional Watershed Management Plan concurrently participated in the development of the Indiana Lake Michigan Coastal Program Non-point Pollution Control Plan (6217 Plan). Because many of the same issues were identified during both processes, the 6217 Plan was used as a foundation for this plan as adopted by the Watershed Advisory Group. Though the 6217 Plan addresses only the Little Calumet-Galien basin the plan management measures are consistent with the issues identified in the Kankakee River Basin, covering the Chicago Watershed.

The goals and objectives of the Watershed Management Framework Plan were:

- Implement urban and rural non-point source practices in northwest Indiana to the extent practicable to achieve and maintain applicable water quality standards and improve quality of life.
- Implement agricultural non-point source practices in northwest Indiana to the extent practicable to achieve and maintain applicable water quality standards and improve quality of life.
- Ensure the protection of northwest Indiana's water bodies from further impacts of hydromodification and wetland loss to meet and maintain applicable water quality standards.

The NIRPC Framework Plan did provide some useful historical information for this watershed management plan. Its findings did correspond to other studies and reports utilized in the production of this plan.

Lake Michigan Coastal Program Nonpoint Source Pollution Control Plan(6217 Plan)

The Indiana Lake Michigan Coastal Program (LMCP) was required by the National Oceanic and Atmospheric Administration (NOAA) and the USEPA to complete a Coastal Non-point Source Pollution Management Plan (6217 plan) as part of becoming a Coastal Zone State. The plan included a series of management measures for agricultural runoff, forestry runoff, marinas and recreational boating, channel modification, dams and erosion of stream banks and the shoreline, wetlands, riparian areas, and vegetated treatment systems.

The management measures for urban/rural areas, agricultural sources, and those for wetlands, riparian areas, and vegetated treatment systems were applicable to this plan. The management measures for hydromodification and for marinas and recreational boating were not applicable to this plan. The list of potential sources for non-point source pollution was especially useful in identifying probable sources of non-point source pollutants for this watershed study area.

Section II: Physical Description of the Watersheds

Watershed Boundaries

The watersheds covered by this study consist of the West Branch Little Calumet River, Deep River, and Willow Creek. The Little Calumet River includes areas to the east in the City of Portage and west in the City of Hammond and the Town of Highland. This river segment is crossed by the continental divide. From this point, the river flows both east toward the Great Lakes and west toward the Mississippi River.

The Little Calumet River and its tributaries in this study flow through the borders of Hammond, Highland, Griffith, Gary, Hobart, Lake Station, and Portage in Indiana. Portions of this watershed are also located in unincorporated Lake and Porter Counties. Figure 2.1 shows the study area and how it fits into the local communities and unincorporated areas.

Physical Setting

The Little Calumet River E-W Split (07120003030050) and Willow Creek /Burns Ditch (04040001040030) Watersheds are densely populated areas. The two watersheds contain very little unincorporated area. However, they contain little industrial area as the majority of the industry is north of this watershed study area.

The west branch of the Little Calumet River is approximately 18 miles long, with 10 miles located within the City of Gary. The major tributaries located within the study area to the Little Calumet River are Turkey Creek, Deep River, and Salt Creek. Each tributary originates on the Valparaiso Moraine and flows north to the Little Calumet River.

The Little Calumet River has major tributaries but collects most of its waters from small streams and drainage ditches in northwest Indiana. The flow of the river is roughly parallel to the Lake Michigan shoreline and the flow direction may change depending on a number of factors. The eastward flow empties into Lake Michigan via Burns Ditch and the westward flow enters the Calumet Harbor in Illinois. A unique feature of the Little Calumet River is that its direction of flow corresponds with the water levels in Lake Michigan. The location of the east-west split in flow depends on the water levels in both Lake Michigan and the river as well as climate conditions throughout the year.

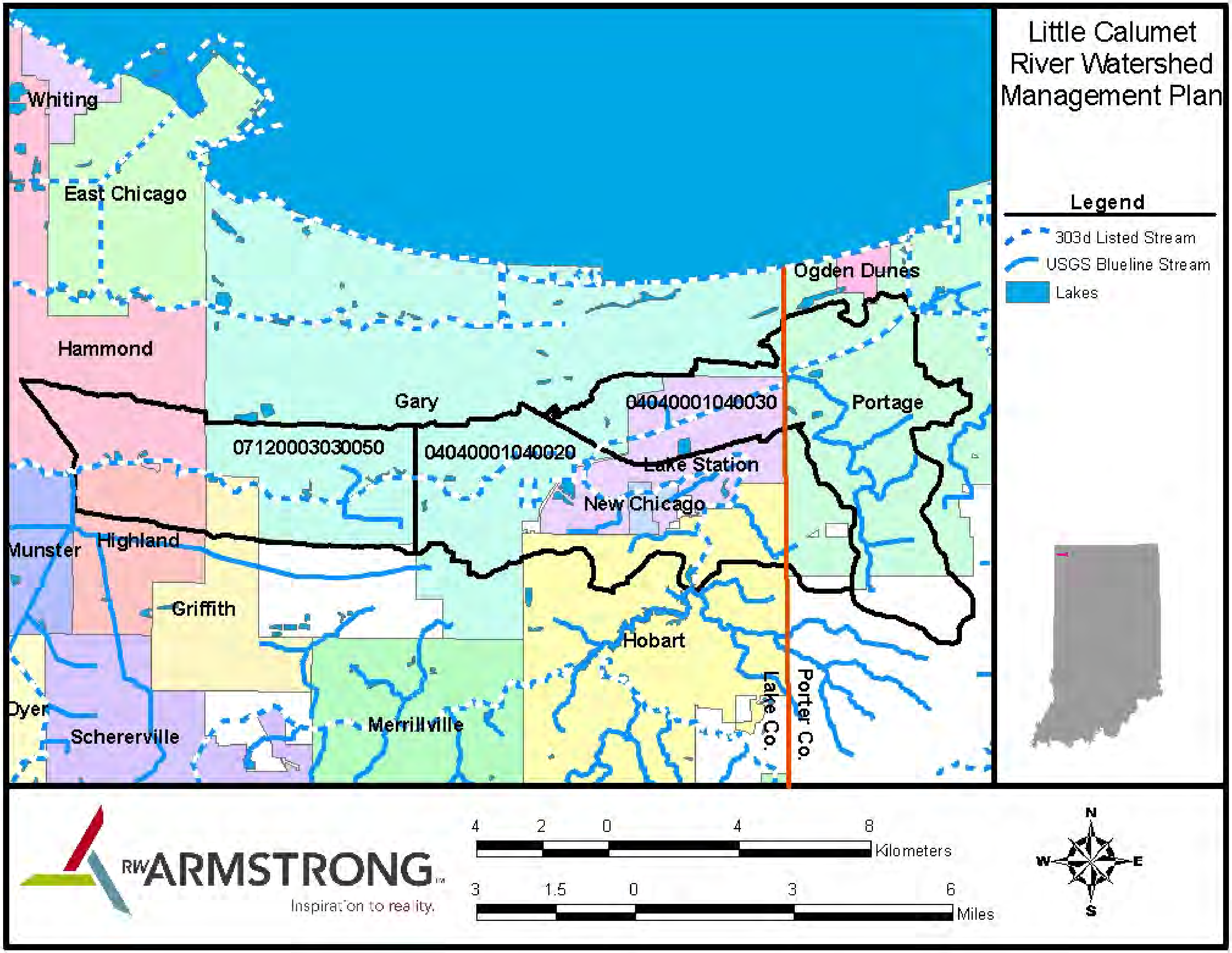


Figure 2.1: Little Calumet River Watershed Management Plan study area showing the local communities.

Slope and Elevation

The area encompassed by the watershed study area is extremely flat and many areas have little relief or elevation. This lack of difference between the normal flow elevation of the river and the surrounding communities make flooding a serious concern. Open ditches designed for stormwater drainage are an added problem as sedimentation eliminates the small amount of slope they are built with.

History

Thousands of years ago, the study area was glaciated. The advancing and retreating of glaciers formed the geology and soils of the region. Advancing and retreating of glaciers leads to the creation of complex geological arrangements known as “moraines.” Thus the soils, geology and topography of the region is not likely to be uniform and is more likely to be quite diverse, even within the same basin.

The Little Calumet River has gone through many changes since the glaciers melted away and reshaped the land. At one time the Little Calumet River and Grand Calumet River was one water body. The Calumet River flowed westward into Illinois, made a hairpin turn at present-day Blue Island, and flowed back eastward into Indiana; where it eventually discharged into Lake Michigan at present-day Marquette Park Lagoon.

This area has been claimed by the Menomonee and Potawatomi, as well as by France, England, and the United States over its history. However, not much is known about the history of the Grand Calumet River (GCR) and Little Calumet River (LCR) before the 1800s, but the earliest known name for the rivers, given by the Native Americans, was the “Grand and Little Killainick Rivers”.

The 1800’s saw a variety of changes in this area. The war of 1812 saw the French expelled from the region and the 1830’s saw the Native Americans forced from the area. European settlement in this area continued through these times and into the mid 1800’s. The growth rate in the Chicago area though dwarfed the growth rate of northwest Indiana which was viewed as a “marshy hinterland” and not suitable for urbanization.

In the late 1800s, as Chicago became more of a transportation hub, the U.S. Congress delegated funds to allow construction of a “Harbor of Refuge” for Lake Michigan which was located in the Calumet area. Until this time, the Calumet Rivers were shown on maps as a swamp area. This began the flow of the Calumet Rivers into Lake Michigan at Chicago. The Little Calumet River became the smaller river to the south discharging to Lake Michigan in Illinois, while the Grand Calumet River ran to the north and discharged to the east in Indiana. Soon after construction was completed, ships started to use this new channel.

In the early 1870s, after the great Chicago fire, many manufacturing companies that were destroyed relocated to the Calumet area. The present outlet for the Grand Calumet River was constructed in the 1900s at the Indiana Harbor Ship Canal. A U.S. Topographic Bureau map from 1845 showed the Grand Calumet River no longer flowing into Lake Michigan because it was clogged with aquatic vegetation and sand (IDNR-ILMCP, 2001).

The late 1800's also saw the rise of the railroad industry and steel industry in this region. This industrialization brought a population boom to the area. This led directly to the draining of the marshes through the installation of ditches and sewers to make the area more suitable to its residents.

Much of the region's sanitary sewage and garbage was dumped into the river systems. This dumping, combined with the ship and barge traffic, polluted both the river and Lake Michigan. The pollution in Lake Michigan was severe, especially by the early 1920s.

In the early 1960s, the Army Corps of Engineers (ACOE) designed the T.J. O'Brien Lock and Dam. This lock system reversed the flow of the LCR and GCR away from Chicago. Until this time, the LCR flowed into the GCR near the Illinois border. The LCR now combines with Deep River near the intersection of Interstate 80/94 and Interstate 65. As it flows east from its confluence with Deep River, the LCR is sometimes referred to as "Burns Ditch". Burns Ditch is a channelized section of the LCR that connects it to Burns Harbor. The outlet to Lake Michigan at Burns Harbor is in Portage, Indiana. Burns Ditch is a man-made channel which allows the LCR and Deep River to flow into Lake Michigan, via Burns Harbor.

According to the ACOE, the LCR still has a high point in its channel bed somewhere near Indianapolis Boulevard which is in the City of Hammond. The channel bed undulates but gradually slopes down to the east and west from this point.

The massive hydromodifications to the river channel itself in addition to the development within the watershed have drastically changed the flow characteristics of the river. Reversing the flow direction left the river with just enough slope over its entire length to flow to the east. The minimal slope in that direction leaves the river prone to influence by the water levels in Lake Michigan. Flow direction can change based on lake levels and weather patterns.

Soils

The majority of the soil types in the watershed are sand or silt. These highly permeable and erodible soils allow relatively quick infiltration; however, the ground water table is very high throughout most of the watershed study area.

Much of the basin has been drained by ditches and buried drainage tiles to allow agricultural and urban development in this watershed study area. High ground water tables still hamper development in many areas though. The sandy soils are not well suited to on site sewage disposal facilities as little attenuation of the pollutants is achieved before the effluent reaches the ground water.

Soils on the low parts of the landscape have hydric morphology, periodically high water tables, redox depletions (gray colors), and supported hydrophytic vegetation. Soils on dunes have deep water tables, lack redox depletions and concentrations, and have upland vegetation.

Figures 2.2 and 2.3 show the soils in Lake and Porter Counties; respectively. A summarized breakdown of the soil types, including a definition for the soil abbreviations, can be found in Table 2.1 and 2.2 for Lake and Porter Counties; respectively.

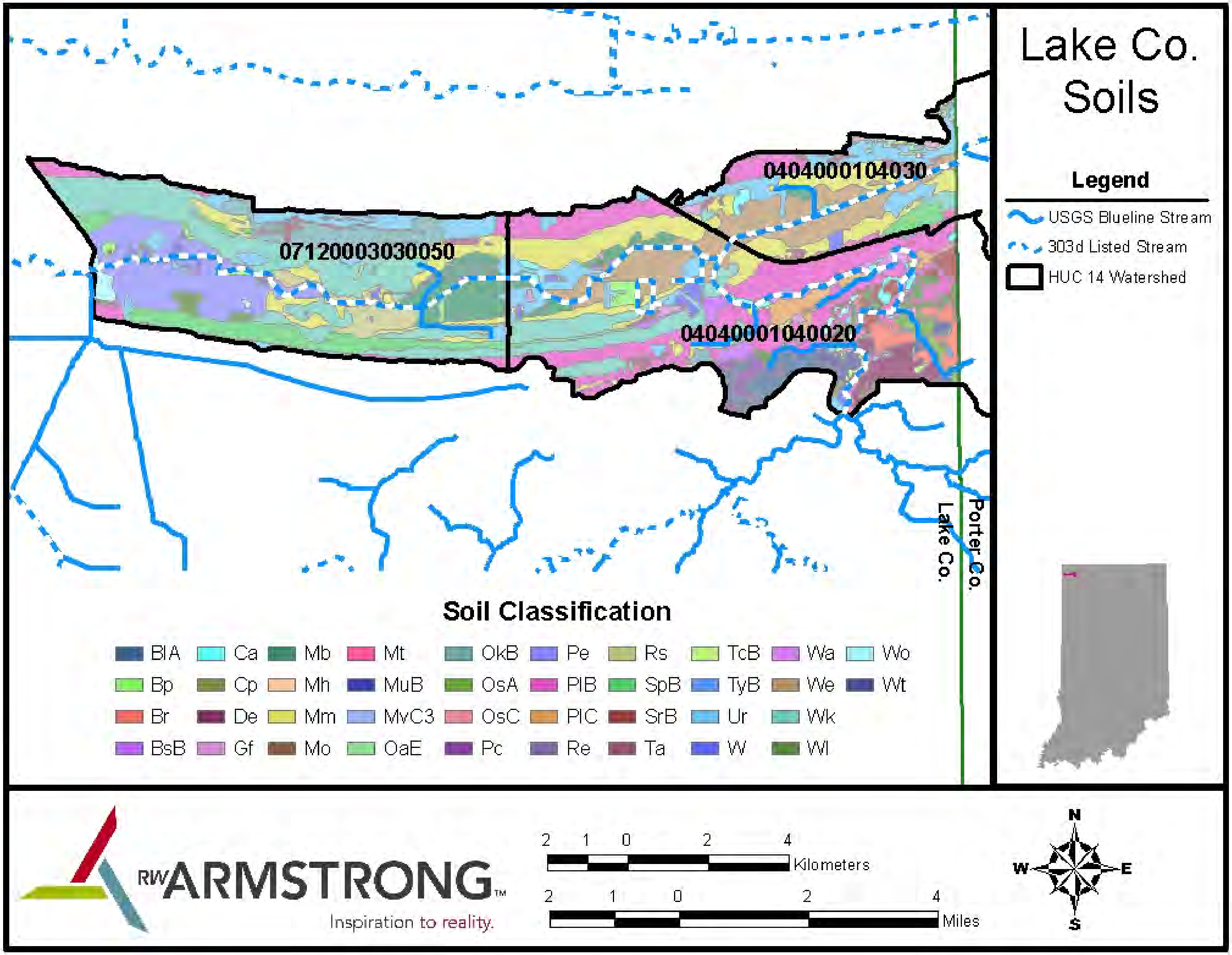


Figure 2.2: Lake County soil classification

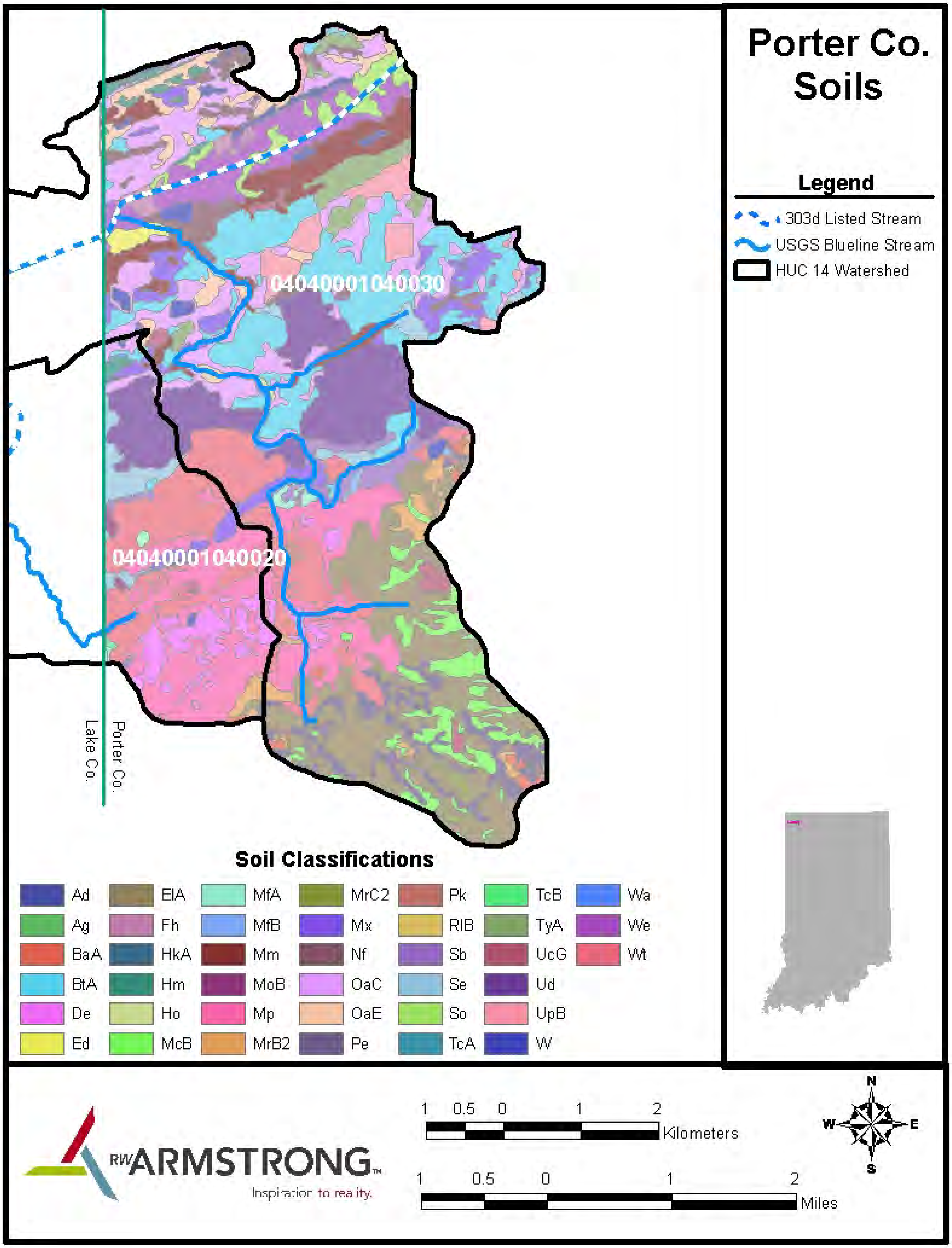


Figure 2.3: Porter County soil classifications.

Map Unit Symbol	Lake County Description	Area (Acres)	Percentage
BlA	Blount silt loam, 0 to 2 percent slopes	343.9	1.42%
Bp	Borrow pits	211.5	0.87%
Br	Brady fine sandy loam	330.2	1.36%
BsB	Brems fine sand, 0 to 4 percent slopes	162.6	0.67%
Ca	Houghton muck, drained, 0 to 1 percent slopes	206.2	0.85%
Cp	Clay pits	13.9	0.06%
De	Del Rey silt loam	384.2	1.59%
Gf	Gilford mucky fine sandy loam	137.4	0.57%
Mb	Marl beds	981.4	4.05%
Mh	Marsh	11	0.05%
Mm	Maumee loamy fine sand	2760.8	11.40%
Mo	Milford silt loam, overwash	50.5	0.21%
Mt	Milford-Palms-Wallkill complex	254.2	1.05%
MuB	Morley silt loam, 2 to 6 percent slopes	30	0.12%
MvC3	Morley silty clay loam, 6 to 12 percent slopes, severely eroded	23.1	0.10%
OaE	oakville fine sand, 12 to 25 percent slopes	100.7	0.42%
OkB	Oakville-Adrian complex, 0 to 6 percent slopes	825.4	3.41%
OsA	Oshtemo fine sandy loam, 0 to 2 percent slopes	146	0.60%
OsC	Oshtemo fine sandy loam, 6 to 12 percent slopes	16.4	0.07%
Pc	Pewamo silty clay loam	208.4	0.86%
Pe	Pewamo silty clay loam, calcareous variant	1639.4	6.77%
PlB	Plainfield fine sand, 0 to 6 percent slopes	3570.8	14.75%
PlC	Plainfield fine sand, 6 to 12 percent slopes	275.5	1.14%
Re	Rensselaer loam	21.4	0.09%
Rs	Rensselaer loam, calcareous subsoil variant	390.1	1.61%
SpB	Sparta fine sand, 0 to 4 percent slopes	1156.4	4.78%
SrB	Sparta fine sand, silty clay loam substraatum, 0 to 4 percent slopes	236.2	0.98%
Ta	Adrian muck, drained, 0 to 1 percent slopes	398.6	1.65%
TcB	Tracy loam, 2 to 6 percent slopes	60.8	0.25%
TyB	Tyner loamy fine sand, 0 to 6 percent slopes	7.1	0.03%
Ur	Urban land	2163.9	8.94%
W	Water	569	2.35%
Wa	Wallkill silt loam	205.5	0.85%
We	Warners silt loam	2034.9	8.40%
Wk	Watseka loamy fine sand	3600.2	14.87%
Wl	Watseka loamy sand, moderately deep variant	318.8	1.32%
Wo	Wauseon fine sandy loam	150.8	0.62%
Wt	Whitaker loam	216.9	0.90%
	TOTALS	24214.2	100.00%

Table 2.1: Lake County soil descriptions and percentage of total area covered.

Map Unit Symbol	Porter County Description	Area (Acres)	Percentage
Ad	Adrian muck, drained	91.7	0.87%
Ag	Alida loam	0.7	0.01%
BaA	Blount silt loam, 0 to 3 percent slopes	58.4	0.56%
BtA	Brems sand, 0 to 3 percent slopes	1074.9	10.22%
De	Del Rey silt loam	254.6	2.42%
Ed	Edwards muck, drained	41.4	0.39%
ElA	Elliott silt loam, 0 to 3 percent slopes	1207.8	11.48%
Fh	Fluvaquents	51.5	0.49%
HkA	Haskins loam, 0 to 2 percent slopes	2.5	0.02%
Hm	Houghton muck, ponded	72.5	0.69%
Ho	Houghton muck, drained	9	0.09%
McB	Markham silt loam, 2 to 6 percent slopes	346	3.29%
MfA	Martinsville loam, 0 to 2 percent slopes	30.4	0.29%
MfB	Martinsville loam, 2 to 6 percent slopes	12.3	0.12%
Mm	Maumee loamy sand	433.2	4.12%
MoB	Metea loamy fine sand, 1 to 6 percent slopes	16.3	0.15%
Mp	Milford silty clay loam	1063.9	10.12%
MrB2	Morley silt loam, 2 to 6 percent slopes,eroded	155	1.47%
MrC2	Morley silt loam, 6 to 12 percent slopes, eroded	24.3	0.23%
Mx	Morocco loamy sand	372	3.54%
Nf	Newton loamy fine sand	227.7	2.16%
OaC	Oakville fine sand, 4 to 12 percent slopes	944.6	8.98%
OaE	Oakville fine sand, 18 to 40 percent slopes	256.8	2.44%
Pe	Pewamo silty clay loam	321.9	3.06%
Pk	Pits	9.6	0.09%
RlB	Riddles silt loam, 2 to 6 percent slopes	1.6	0.02%
Sb	Sebewa loam, shaly sand substratum	194.4	1.85%
Se	Selfridge loamy fine sand	191.5	1.82%
So	Suman silt loam	155.2	1.48%
TcA	Tracy sandy loam, 0 to 2 percent slopes	0.2	0.00%
TcB	Tracy sandy loam, 2 to 6 percent slopes	2.5	0.02%
TyA	Tyner loamy sand, 0 to 3 percent slopes	199.3	1.89%
UcG	Udorthents, loamy, 3 to 30 percent slopes	78.2	0.74%
Ud	Urban land-Brems complex	893.5	8.49%
UpB	Urban land-Psamments complex, 0 to 6 percent slopes	234.9	2.23%
W	Water	107.1	1.02%
Wa	Wallkill silt loam	29.9	0.28%
We	Warners silt loam	375.8	3.57%
Wt	Whitaker loam	974.6	9.27%
	TOTALS	10517.4	100.00%

Table 2.2: Porter County soil descriptions and percent of total area covered.

Topography

The watershed area covered in this study is extremely flat. The river has experienced both course and direction changes throughout the year. The low gradient gives the river only a small current. Before human alteration, water flowed westward from LaPorte County, Indiana along the Little Calumet River, made a complete turn, and flowed east along the Grand Calumet into Lake Michigan at the Miller section of Gary, Indiana.

As Figure 2.4 shows, most of the watershed is located in the flat areas along the Little Calumet River itself and is contained within the 605 contour line. Higher elevations are found in the Willow Creek watershed, especially as you move south, but elevation drops off rapidly as the creek flows north.

Wetlands

The U.S. Fish and Wildlife Services wetlands are delineated in Figures 2.5 through 2.7, one map for each 14-digit HUC watershed. The vast majority of wetlands within the study area are located along the river channel and its tributaries. This is expected given the highly developed state of the watershed study area. Table 2.3 summarizes the wetland categories found in each watershed and the acreage they cover.

Once the ACOE has completed the levee system for the Little Calumet River large areas of land located between the lines of protection may present opportunities to increase the wetlands acreage.

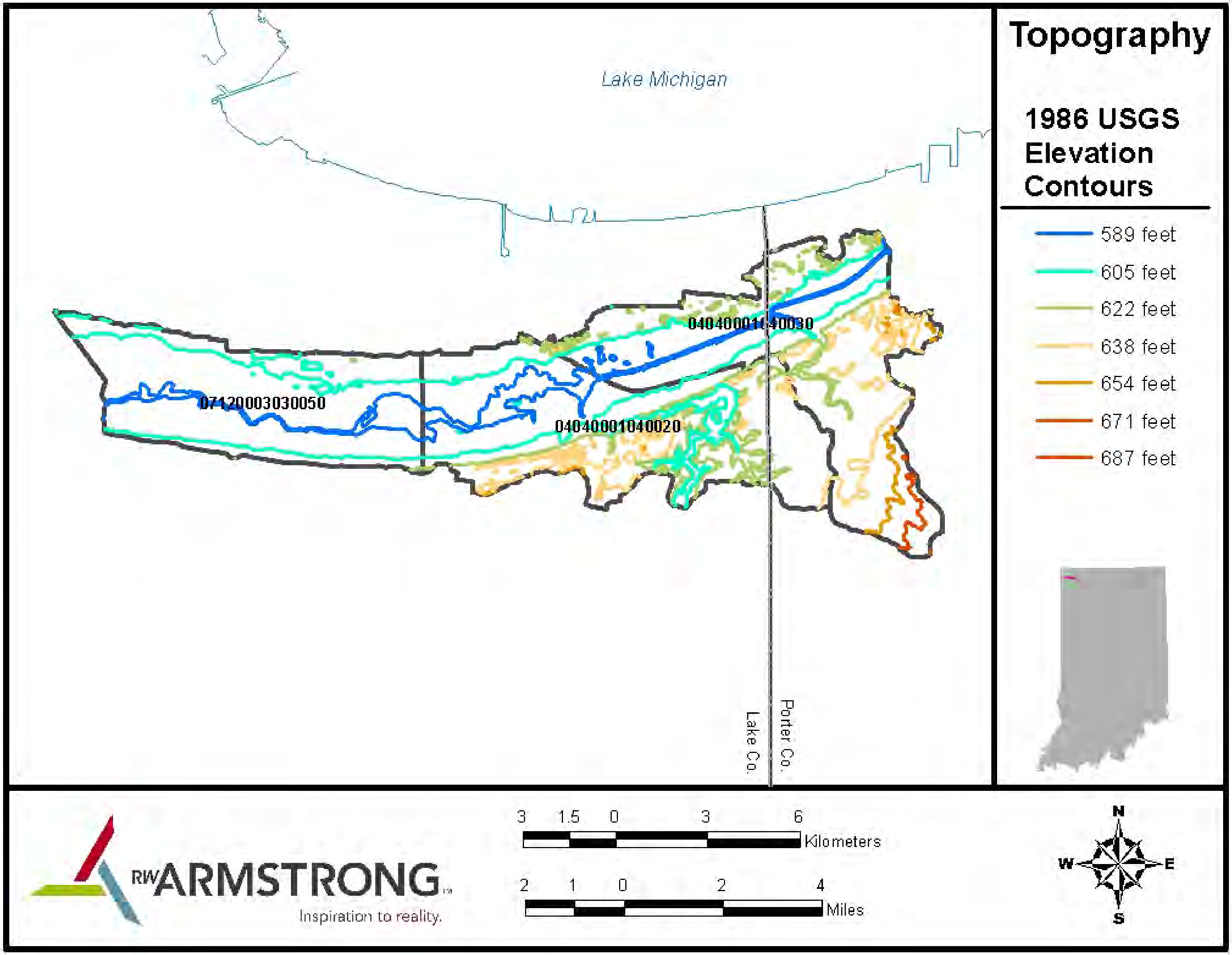


Figure 2.4: Topography for the study area, note the flat portions in the west and central portions.

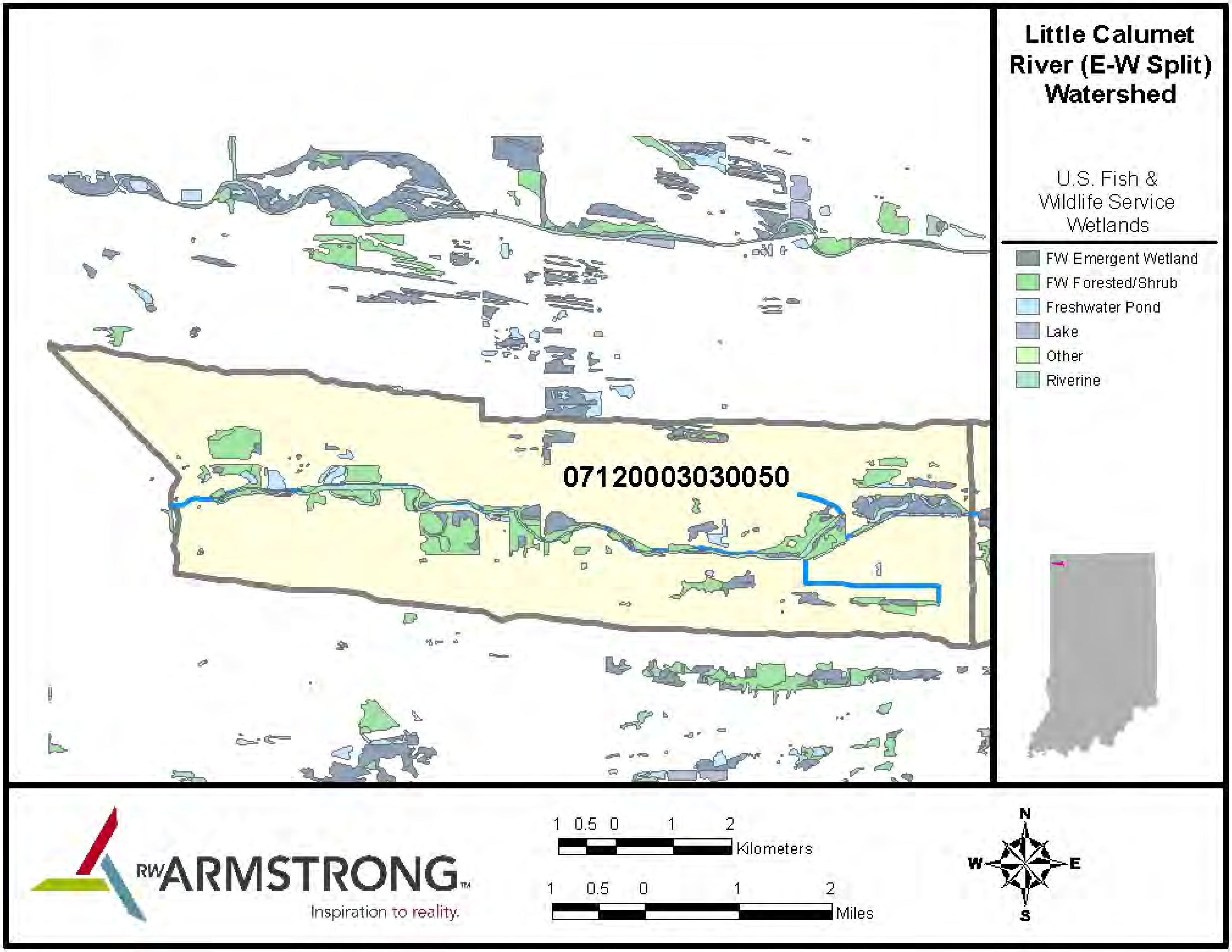


Figure 2.5: Little Calumet River (E-W Split) watershed wetlands.

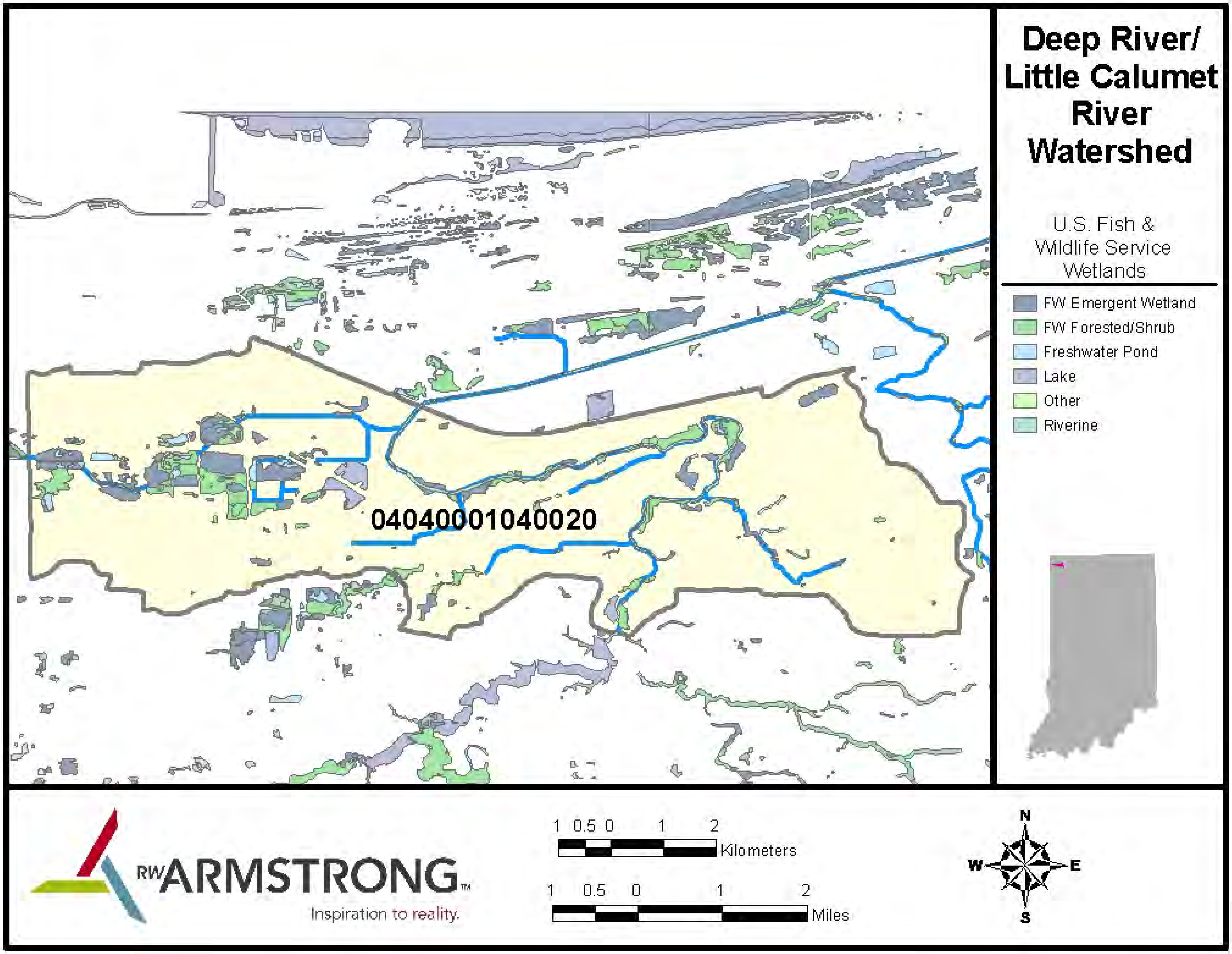


Figure 2.6: Little Calumet River and Deep River Watershed wetlands map.

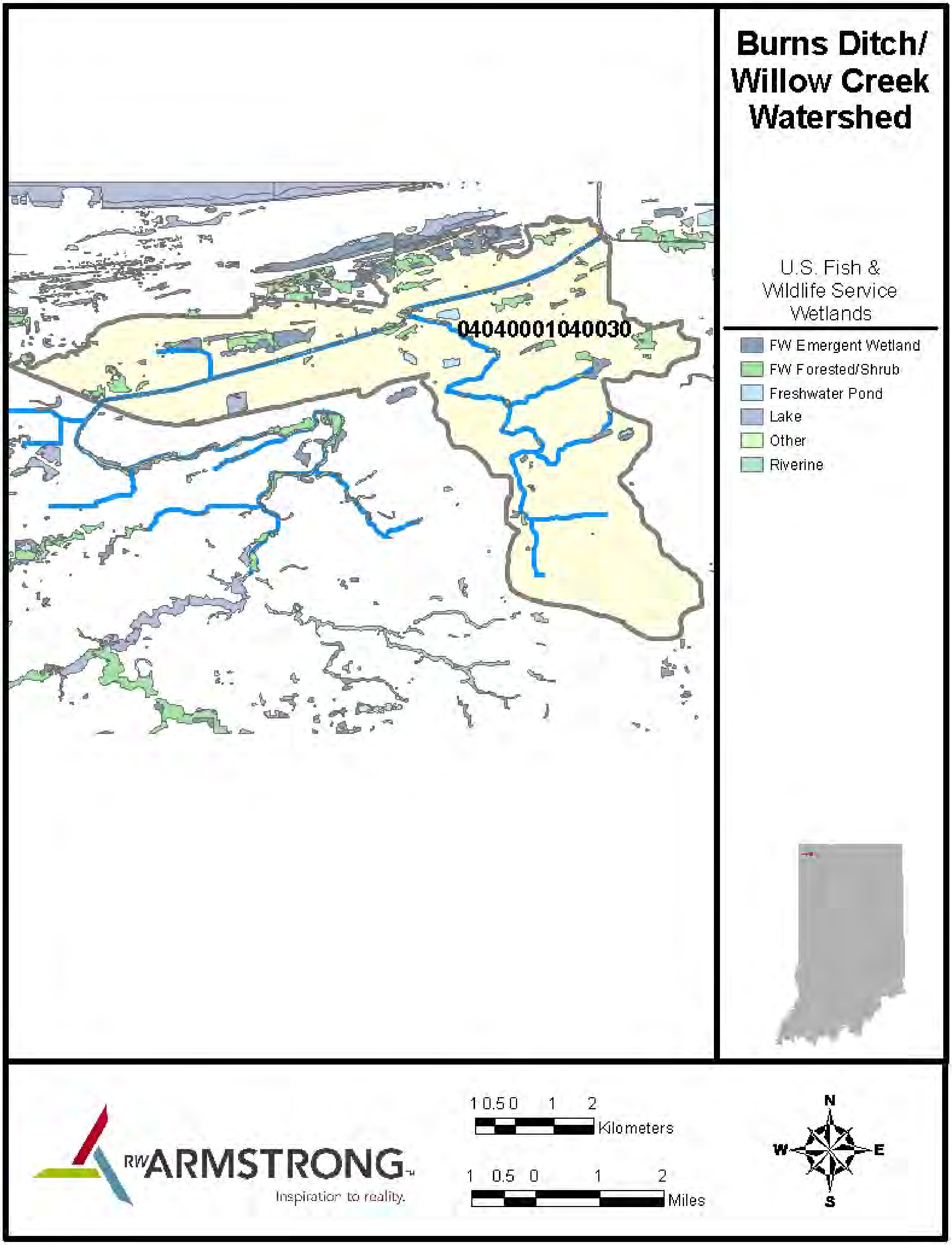


Figure 2.7: Willow Creek and Burns Ditch Watershed wetlands map.

Watershed		Area (acres)	% of Total Area
E-W Split Wetlands HUC 07120003030050	Freshwater Emergent Wetland	324.7	3.4
	Freshwater Forested/Shrub Wetland	643.3	6.6
	Riverine	115.3	1.2
		1083.3	11.2
Deep River Wetlands HUC 04040001040020	Freshwater Emergent Wetland	520	4.1
	Freshwater Forested/Shrub Wetland	463.6	3.7
	Riverine	314.8	2.5
		1298.4	10.4
Burns Ditch Wetlands HUC 04040001040030	Freshwater Emergent Wetland	593.8	4.7
	Freshwater Forested/Shrub Wetland	535.9	4.3
	Riverine	246.7	2
		1376.4	11

Table 2.3: Watershed study area wetlands classification and acreage.

Endangered Species

Appendix 10: NIRPC Watershed Management Framework Plan contains a listing of threatened and endangered species found within Lake, Porter, and LaPorte Counties taken from the Watershed Management Framework Plan produced by NIRPC in October of 2005. Appendix 9: Gary Green Link Master Plan contains a list of endangered and threatened species identified in the Gary Green Link Master Plan. Also included is a figure from the plan that maps the habitats of the endangered and threatened species.

Section III: Land Use Description of the Watershed

Land Use

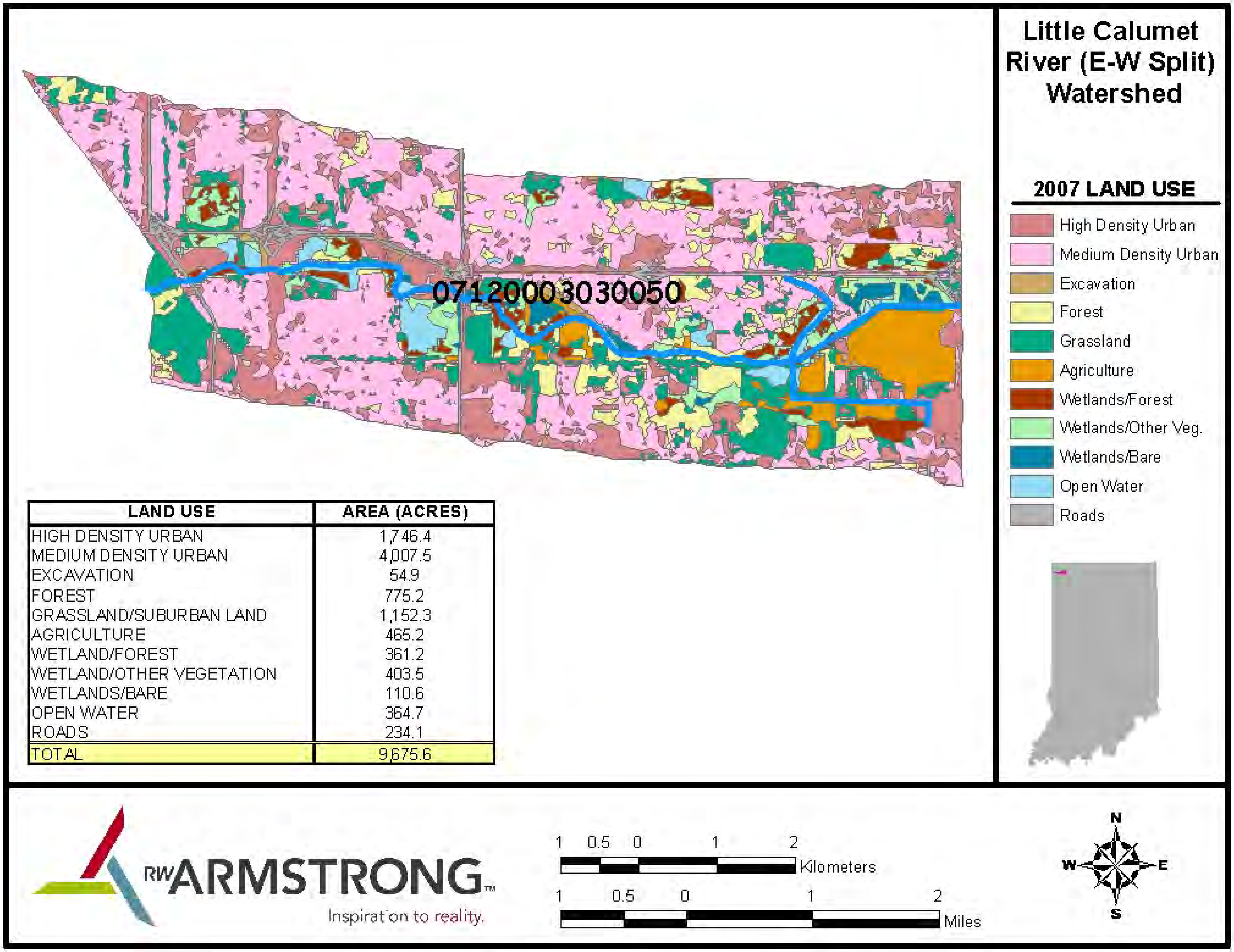
The watershed study area is heavily populated and touches most of the urbanized communities in northern Lake and northwestern Porter counties. While the watershed area is primarily urban, land uses range from agricultural to industrial.

Due to the large variety of land uses in the watershed eleven (11) different land use categories were delineated. They include the following:

- High Density Urban
- Medium Density Urban
- Excavation
- Forest
- Grassland/Suburban land
- Agriculture
- Wetlands: Forest
- Wetlands: Other Vegetation
- Wetlands: Bare
- Open Water
- Roads

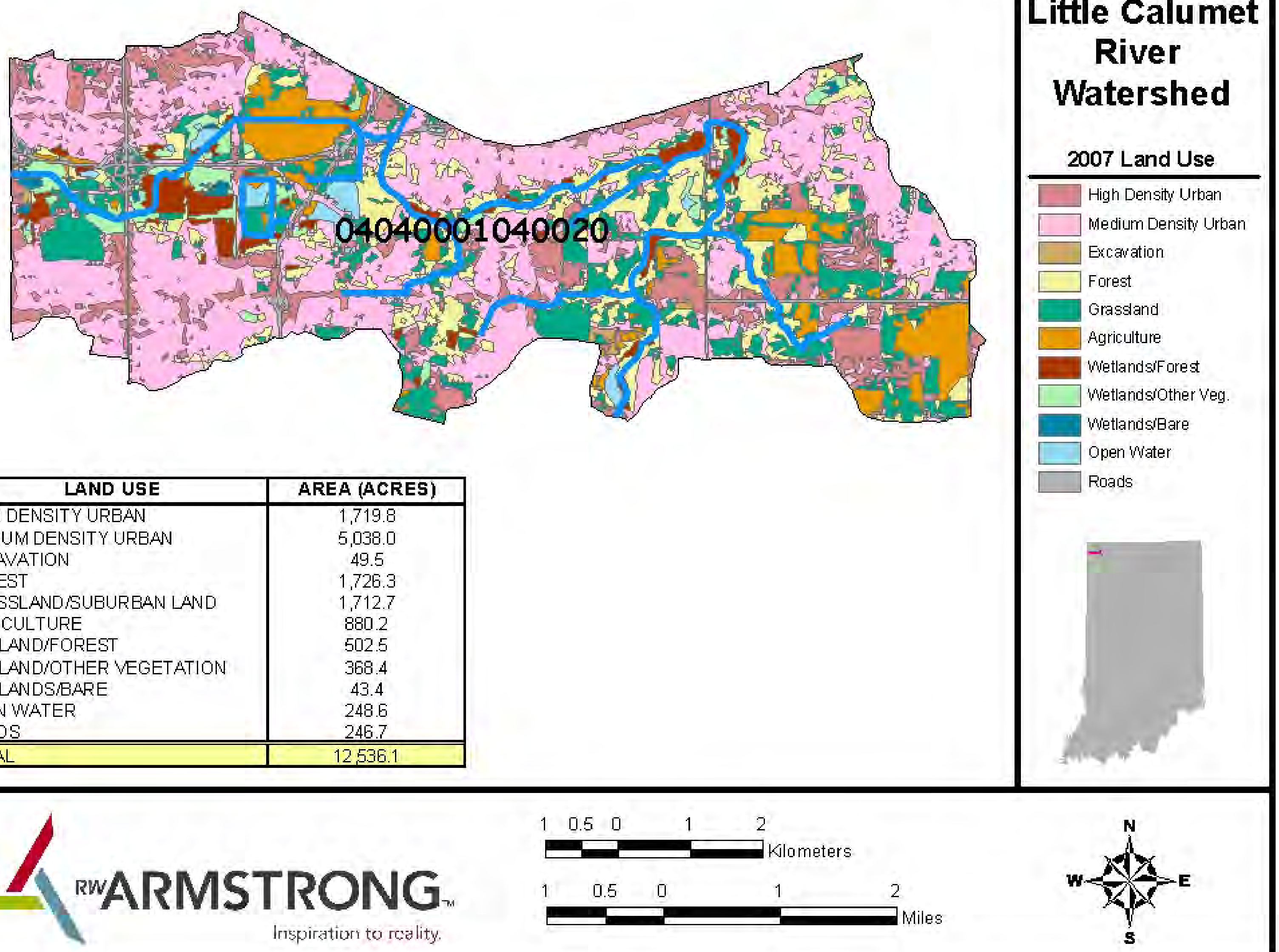
Many of the land use categories are self explanatory but others do need further definition. The difference between a high density urban area and a medium density urban area is the number of dwellings per acre. A high density area will have five (5) to seven (7) dwellings per acre while a medium density area will only have two (2) to four (4) dwellings per acre. All golf courses are included in the grassland/suburban land category and only major roads (i.e. interstates and U.S. Highways) are delineated for the road category. The wetlands were divided into three land use categories so that the quality could be noted. The forest wetlands include areas along the river and other bodies of water that are wooded. The other vegetation category includes the Heron Rookery and portions of the Oxbow Park while the bare category refers mostly to marshes and swamps.

The land use delineation for the three 14-digit HUC watersheds are shown in Figures 3.1 to 3.3 with a table included in each figure showing the total area, in acres, of each land use category. In all three watersheds the prevailing land use is Medium Density Urban. Table 3.1 summarizes the land use areas for the entire study area. The overall second most common land use was found to be High Density Urban. The three other major land use contributors are Forest, Grassland/Suburban land and Agriculture. These five land use categories cover over 87% of the study area.



LAND USE	AREA (ACRES)
HIGH DENSITY URBAN	1,746.4
MEDIUM DENSITY URBAN	4,007.5
EXCAVATION	54.9
FOREST	775.2
GRASSLAND/SUBURBAN LAND	1,152.3
AGRICULTURE	465.2
WETLAND/FOREST	361.2
WETLAND/OTHER VEGETATION	403.5
WETLANDS/BARE	110.6
OPEN WATER	364.7
ROADS	234.1
TOTAL	9,675.6

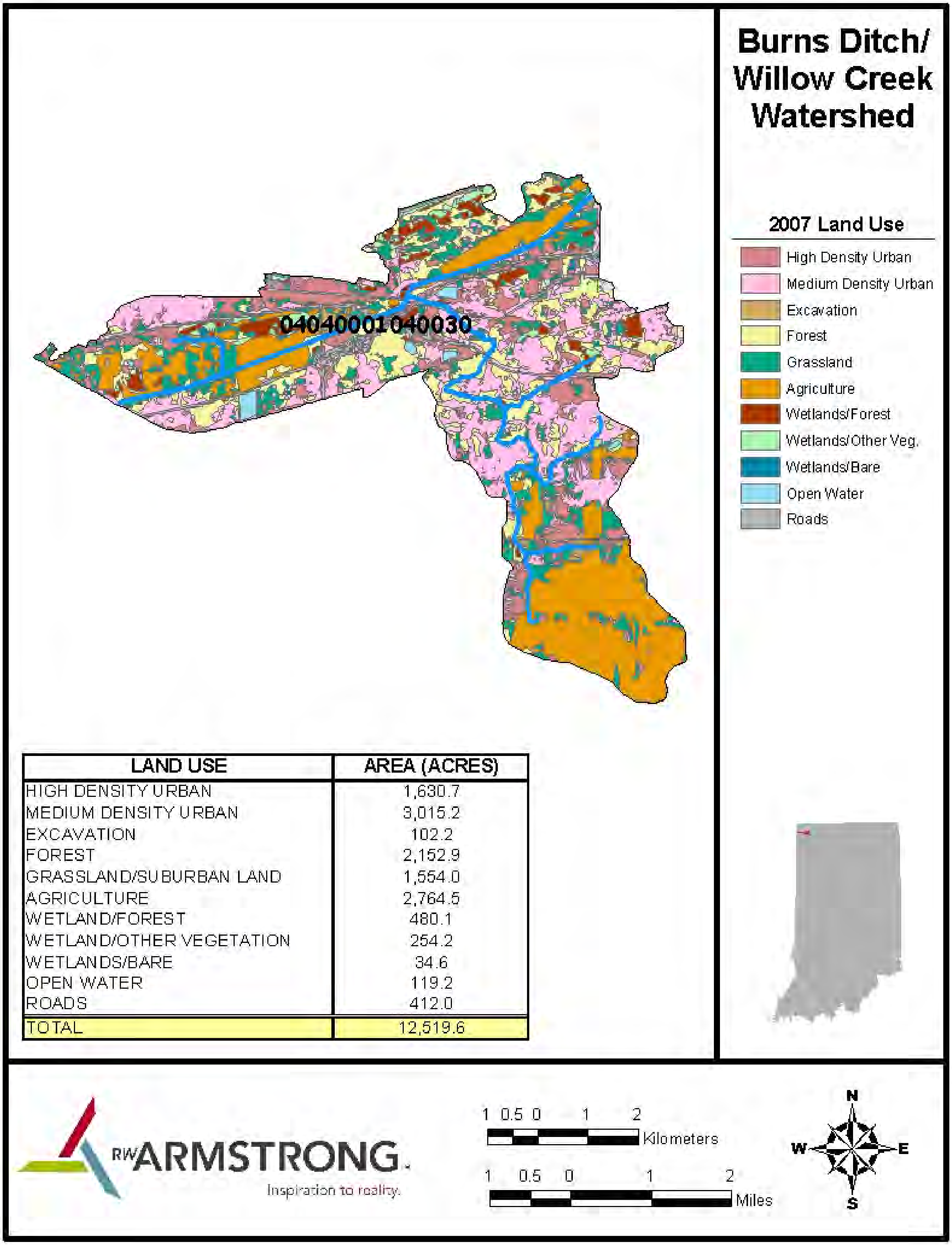
Figure 3.1: Land use map for HUC 07120003030050, Little Calumet River E-W Split Watershed.



LAND USE	AREA (ACRES)
HIGH DENSITY URBAN	1,719.8
MEDIUM DENSITY URBAN	5,038.0
EXCAVATION	49.5
FOREST	1,726.3
GRASSLAND/SUBURBAN LAND	1,712.7
AGRICULTURE	880.2
WETLAND/FOREST	502.5
WETLAND/OTHER VEGETATION	368.4
WETLANDS/BARE	43.4
OPEN WATER	248.6
ROADS	246.7
TOTAL	12,536.1

RW ARMSTRONG
Inspiration to reality.

Figure 3.2: Land use map for HUC 04040001040020, Deep River & Little Calumet River Watershed.



LAND USE	AREA (ACRES)
HIGH DENSITY URBAN	1,630.7
MEDIUM DENSITY URBAN	3,015.2
EXCAVATION	102.2
FOREST	2,152.9
GRASSLAND/SUBURBAN LAND	1,554.0
AGRICULTURE	2,764.5
WETLAND/FOREST	480.1
WETLAND/OTHER VEGETATION	254.2
WETLANDS/BARE	34.6
OPEN WATER	119.2
ROADS	412.0
TOTAL	12,519.6

Figure 3.3: Land use map for HUC 04040001040030, Burns Ditch & Willow Creek Watershed.

LAND USE TYPE	AREA (ACRES)	% OF TOTAL AREA
HIGH DENSITY URBAN	5,097.0	14.68%
MEDIUM DENSITY URBAN	12,060.7	34.73%
EXCAVATION	206.6	0.59%
FOREST	4,654.4	13.40%
GRASSLAND/SUBURBAN LAND	4,419.0	12.72%
AGRICULTURE	4,109.9	11.83%
WETLANDS: FOREST	1,343.8	3.87%
WETLANDS: OTHER VEGETATION	1,026.1	2.95%
WETLANDS: BARE	188.6	0.54%
OPEN WATER	732.5	2.11%
ROADS	892.9	2.57%
TOTAL AREA =	**34,731.5**	**100.00%**

Table 3.1: Land use acreage for entire watershed study area.

Impervious Areas

Urbanization and the resulting impervious areas are one of the most significant factors affecting non-point source pollution.

Several studies have reported a direct relationship between the increase of impervious areas and the degradation of the receiving water bodies. Of these studies, most agree that once impervious cover exceeds 10% of the land in the watershed, the receiving waters will be negatively impacted. Watersheds with an impervious cover of 10% to 30% are often said to be “impacted” and watersheds with greater than 30% of the available land covered with an impervious surface are often categorized as seriously degraded.

An increase in impervious area leads directly to an increase in runoff volume and a reduction of surface water infiltration. This added runoff often leads to increased flow velocities, increased flooding severity and frequency, and a decrease in water quality.

The impervious area was calculated for all three HUC watersheds (Tables 3.2 to 3.4) according to their land use map category. Impervious area factors were used based on the land use type and a total area of 12,905 acres was found to be impervious. This acreage results in 37% of the overall watershed study area being considered impervious and consequently puts the area in the seriously degraded category.

LITTLE CALUMET RIVER (E-W SPLIT) WATERSHED HUC 07120003030050				
LAND USE	AREA (ACRES)	IMPERVIOUS AREA FACTOR	IMPERVIOUS AREA (ACRES)	% OF HUC WATERSHED
HIGH DENSITY URBAN	1,746.4	75%	1,309.8	13.54%
MEDIUM DENSITY URBAN	4,007.5	65%	2,604.9	26.92%
EXCAVATION	54.9	2%	1.1	0.01%
FOREST	775.2	2%	15.5	0.16%
GRASSLAND/SUBURBAN LAND	1,152.3	2%	23.0	0.24%
AGRICULTURE	465.2	4%	18.6	0.19%
WETLAND/FOREST	361.2	0%	0.0	0.00%
WETLAND/OTHER VEGETATION	403.5	0%	0.0	0.00%
WELANDS/BARE	110.6	0%	0.0	0.00%
OPEN WATER	364.7	0%	0.0	0.00%
ROADS	234.1	100%	234.1	2.42%
TOTALS	**9,675.8**		**4,207.1**	**43.48%**

Table 3.2: Impervious area based on land use category for E-W Split Watershed.

LITTLE CALUMET RIVER & DEEP RIVER WATERSHED HUC 04040001040020				
LAND USE	AREA (ACRES)	IMPERVIOUS AREA FACTOR	IMPERVIOUS AREA (ACRES)	% OF HUC WATERSHED
HIGH DENSITY URBAN	1,719.8	75%	1,289.9	10.29%
MEDIUM DENSITY URBAN	5,038.0	65%	3,274.7	26.12%
EXCAVATION	49.5	2%	1.0	0.01%
FOREST	1,726.3	2%	34.5	0.28%
GRASSLAND/SUBURBAN LAND	1,712.7	2%	34.3	0.27%
AGRICULTURE	880.2	4%	35.2	0.28%
WETLAND/FOREST	502.2	0%	0.0	0.00%
WETLAND/OTHER VEGETATION	368.4	0%	0.0	0.00%
WELANDS/BARE	43.4	0%	0.0	0.00%
OPEN WATER	248.6	0%	0.0	0.00%
ROADS	246.7	100%	246.7	1.97%
TOTALS	**12,535.8**		**4,916.2**	**39.22%**

Table 3.3: Impervious area based on land use category for Little Calumet & Deep River Watershed.

BURNS DITCH & WILLOW CREEK WATERSHED HUC 04040001040030				
LAND USE	AREA (ACRES)	IMPERVIOUS AREA FACTOR	IMPERVIOUS AREA (ACRES)	% OF HUC WATERSHED
HIGH DENSITY URBAN	1,630.7	75%	1,223.0	9.77%
MEDIUM DENSITY URBAN	3,015.2	65%	1,959.9	15.65%
EXCAVATION	102.2	2%	2.0	0.02%
FOREST	2,152.9	2%	43.1	0.34%
GRASSLAND/SUBURBAN LAND	1,554.0	2%	31.1	0.25%
AGRICULTURE	2,764.5	4%	110.6	0.88%
WETLAND/FOREST	480.1	0%	0.0	0.00%
WETLAND/OTHER VEGETATION	254.2	0%	0.0	0.00%
WELANDS/BARE	34.6	0%	0.0	0.00%
OPEN WATER	119.2	0%	0.0	0.00%
ROADS	412.0	100%	412.0	3.29%
TOTALS	**12,519.6**		**3,781.7**	**30.21%**

Table 3.4: Impervious area based on land use category for Burns Ditch & Willow Creek Watershed.

Recreational Areas and Publicly Controlled Lands

As part of the Little Calumet River Basin Development Commission (LCRBDC) project being completed in conjunction with the Army Corp of Engineers (ACOE), recreational features are being added along the river. The recreational features being included in the flood protection project include canoe launches, walking trails, and fishing piers. A preliminary outline of the LCRBDC recreational features is shown in Figure 3.4.

In addition to the recreational features being added to the study area by the ACOE there are many other features in the watershed area currently that can be used for recreation. Figures 3.5 to 3.7 highlight the publicly controlled lands in each of the 14-digit HUC watersheds. Majority of the areas included are undeveloped and will remain that way, with the exception of schools and other government lands that were included. The maps created for the recreational features are the result of data taken from several sources, including aerial photographs, park foundation maps from Lake and Porter Counties, local street maps and information listed in other previous studies.

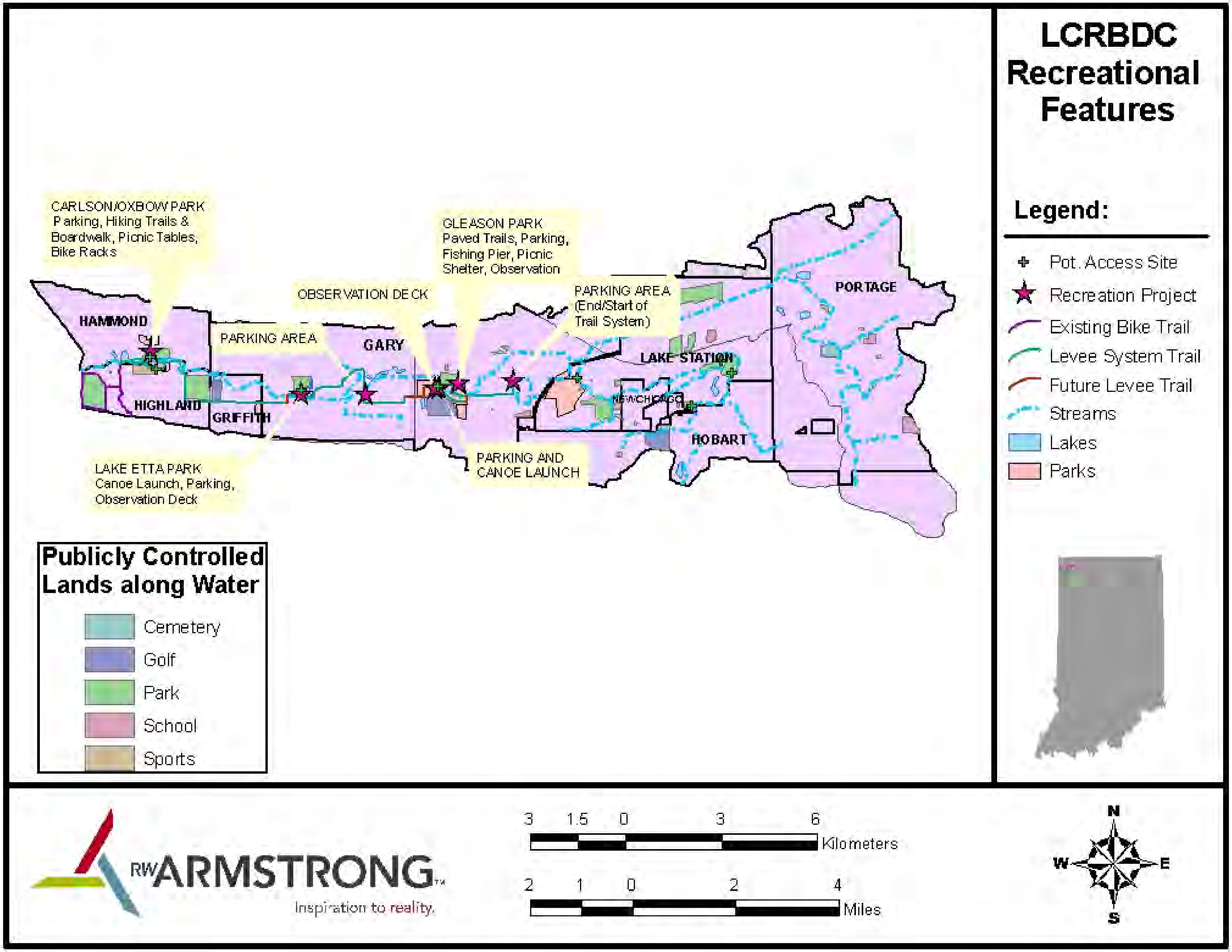


Figure 3.4: Recreational features being included in the LCRBDC project in conjunction with the ACOE

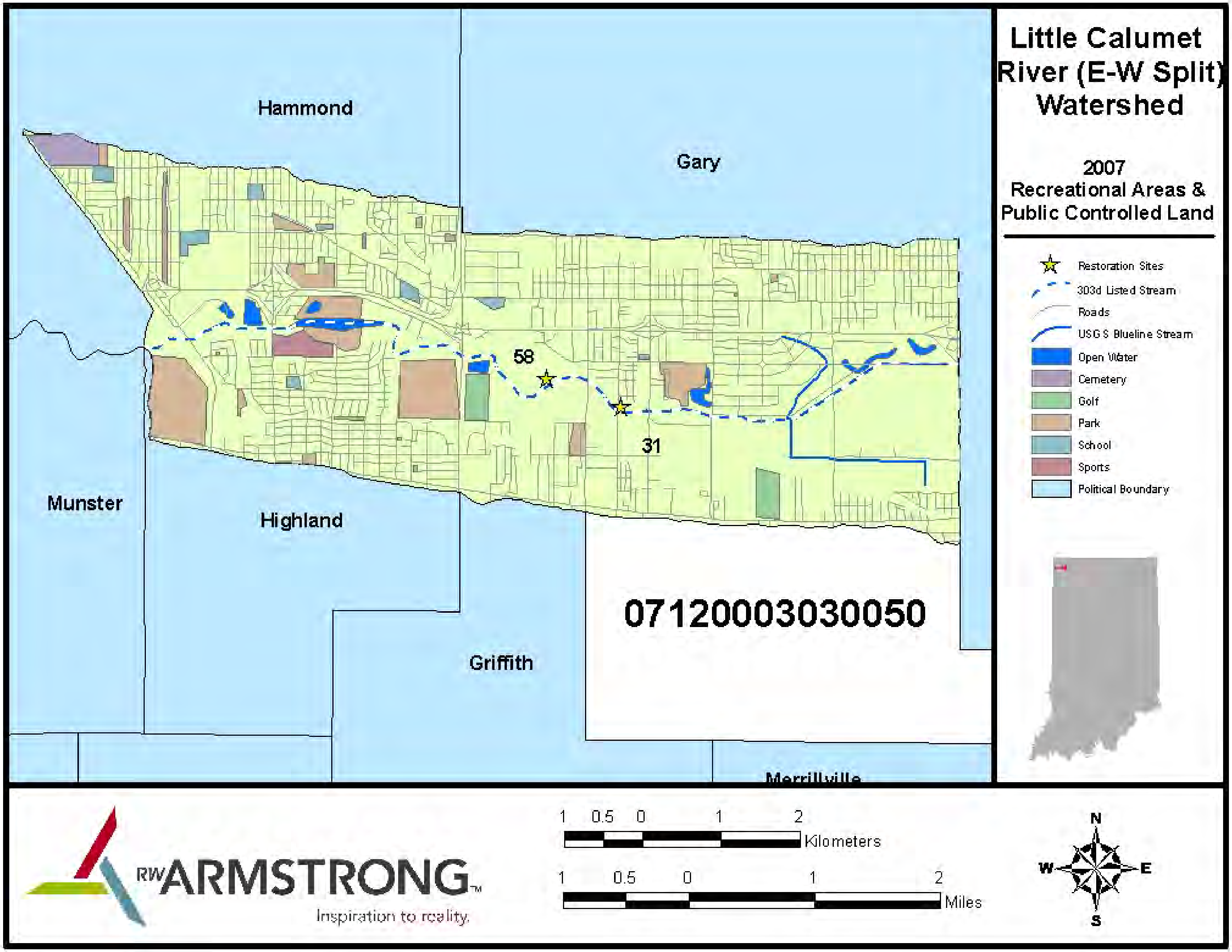


Figure 3.5: Publicly controlled lands for HUC 07120003030050, Little Calumet River E-W Split Watershed.

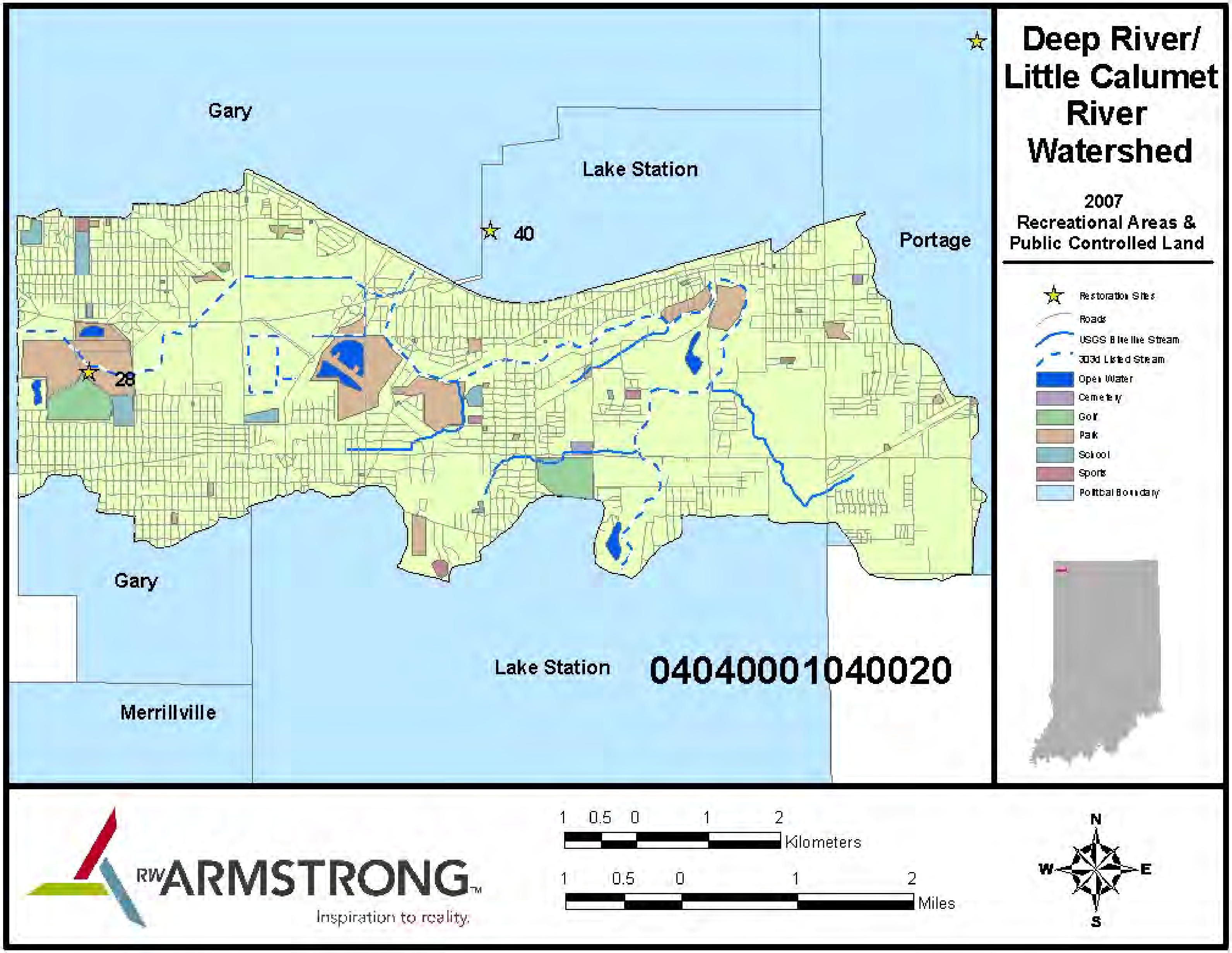


Figure 3.6: Publicly controlled lands for HUC 04040001040020, Little Calumet River and Deep River Watershed.

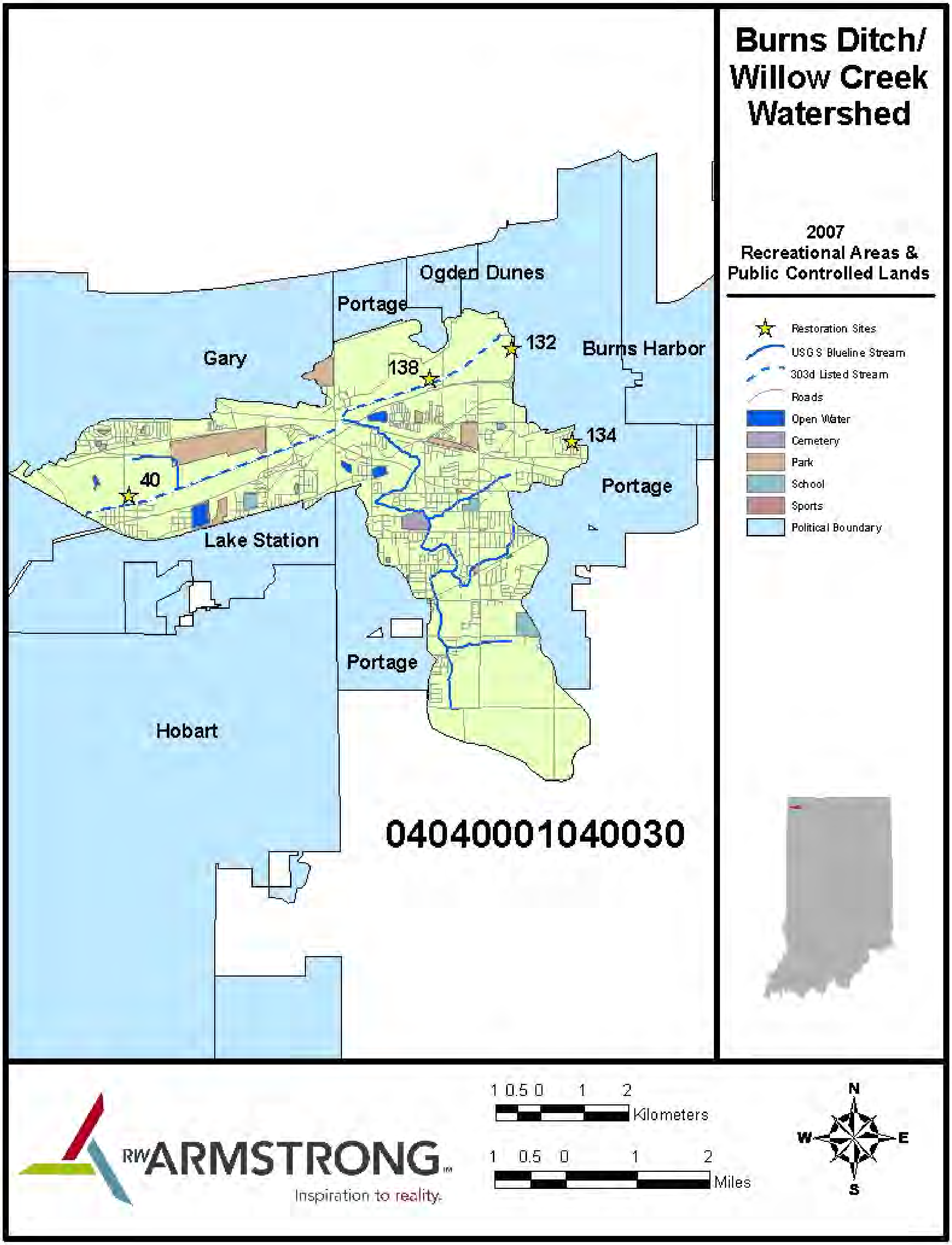


Figure 3.7: Publicly controlled lands in HUC 04040001040030, Burns Ditch and Willow Creek Watershed.

Riparian Buffer Areas

Natural areas currently exist along the river from the western boundary of the study area to approximately the Lake/Porter County Line. The Burns Ditch and Willow Creek watershed has very little natural buffer along the Little Calumet River (Burns Ditch). Figure 3.8 to 3.10 show the natural buffer areas, as delineated using aerial photographs and previously conducted studies including the Gary Green Link Master Plan.

Projects are currently under way that will increase the natural buffer areas in the western portion of the study area, but not in the eastern portion where it is perhaps needed the most. The riparian areas in the western portion of the study area are undergoing changes currently that will increase their size and hopefully their effectiveness. The Army Corp of Engineers (ACOE) is in the process of building a levee system along the Little Calumet River. The East Reach of the ACOE project includes the western portion of this watershed study area. Figure 3.11 shows the levee system that is currently being built by the ACOE. All of the area within the flood control project will remain as natural areas.

Large natural buffers along the river have multiple positive impacts to the water quality. They increase the stability of the slope due to the vegetation that will develop and have deeper root systems than those of crops or summer grass. The effect that floods will have on the local community will decrease in severity due to the water having a place to pool before reaching individual communities and homes. The wildlife habitat in the area will also improve as the non-point source pollution is reduced by slowing down the physical runoff and giving sufficient time for sediments to settle out before reaching the water.

Future Population and Development Trends

Population projections through 2030 show the population decreasing in the western portion of the study area while the eastern portion looks to have population increases, especially in Porter County. Figure 3.12 shows the breakdown of population trends, according to traffic analysis zones, created using population projection data from the Northern Indiana Regional Planning Commission (NIRPC). NIRPC is currently in the process of creating new future population data which will alter these projections. Infrastructure that was expected to be completed, and therefore taken into account when creating these projections was not able to be constructed; resulting in lower population increase projections in some communities.

Comparison of the future population projections with the land use maps in this plan indicates that the areas projected to grow the fastest over the next 2o plus years will be areas that are currently shown as large agricultural tracks. The area shown in HUC 071200030050 that is delineated to increase between 701 to 1,000 and the area in the southern tip of HUC 04040001040030 both average

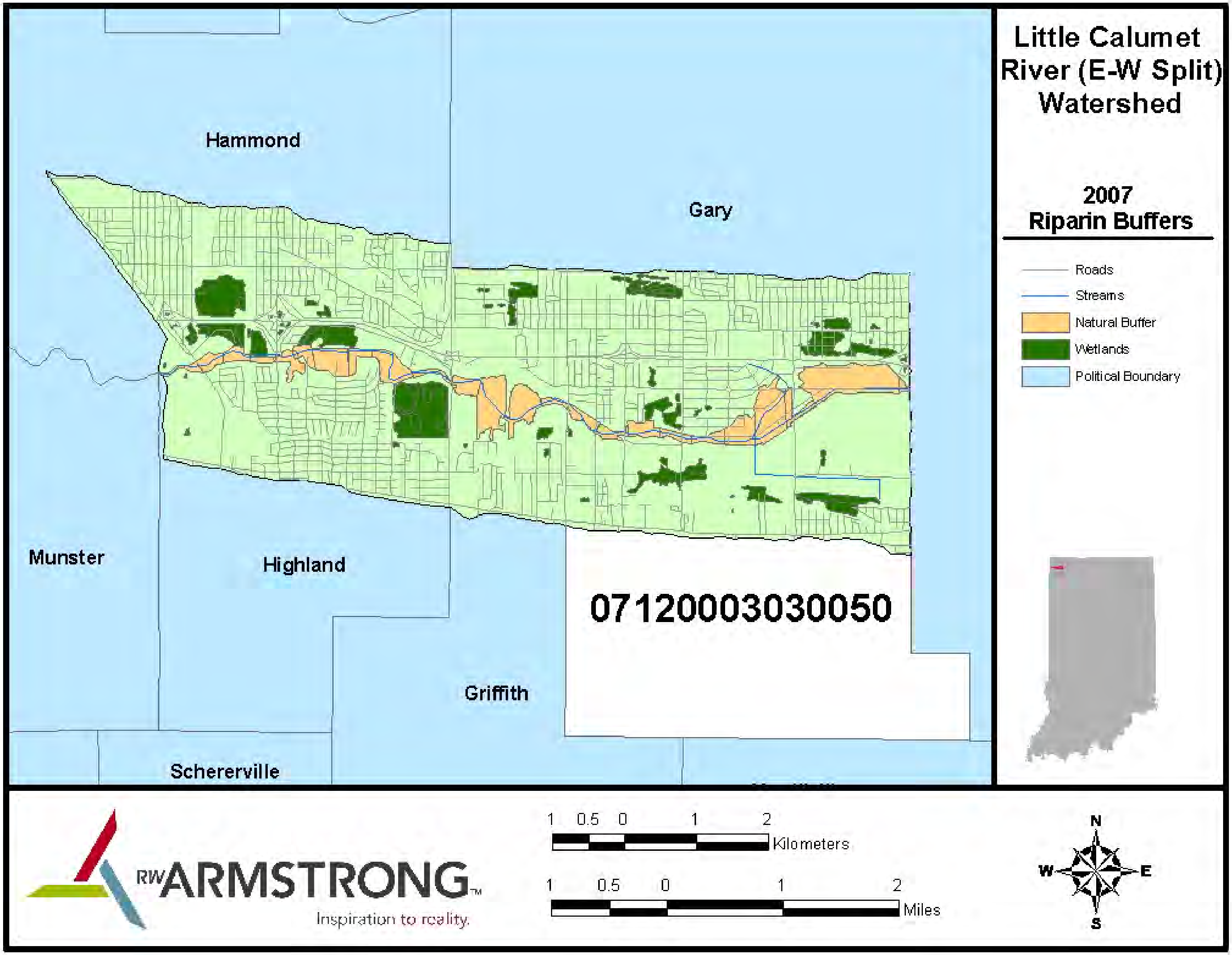


Figure 3.8: Riparian zones located along the Little Calumet River in the E-W Split Watershed, HUC 07120003030050.

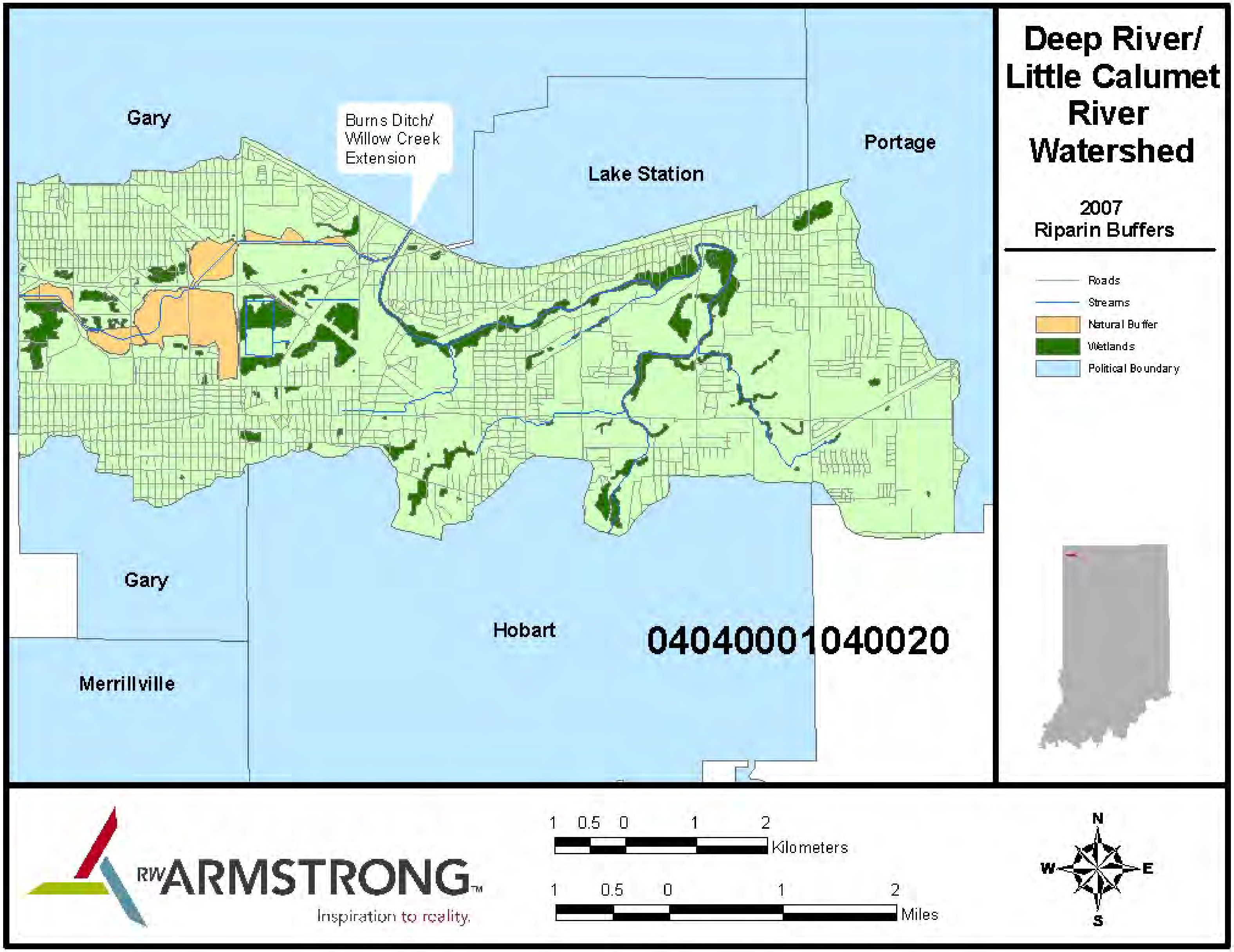


Figure 3.9: Riparian zones located along the Little Calumet River in the Little Calumet & Deep River Watershed, HUC 04040001040020.

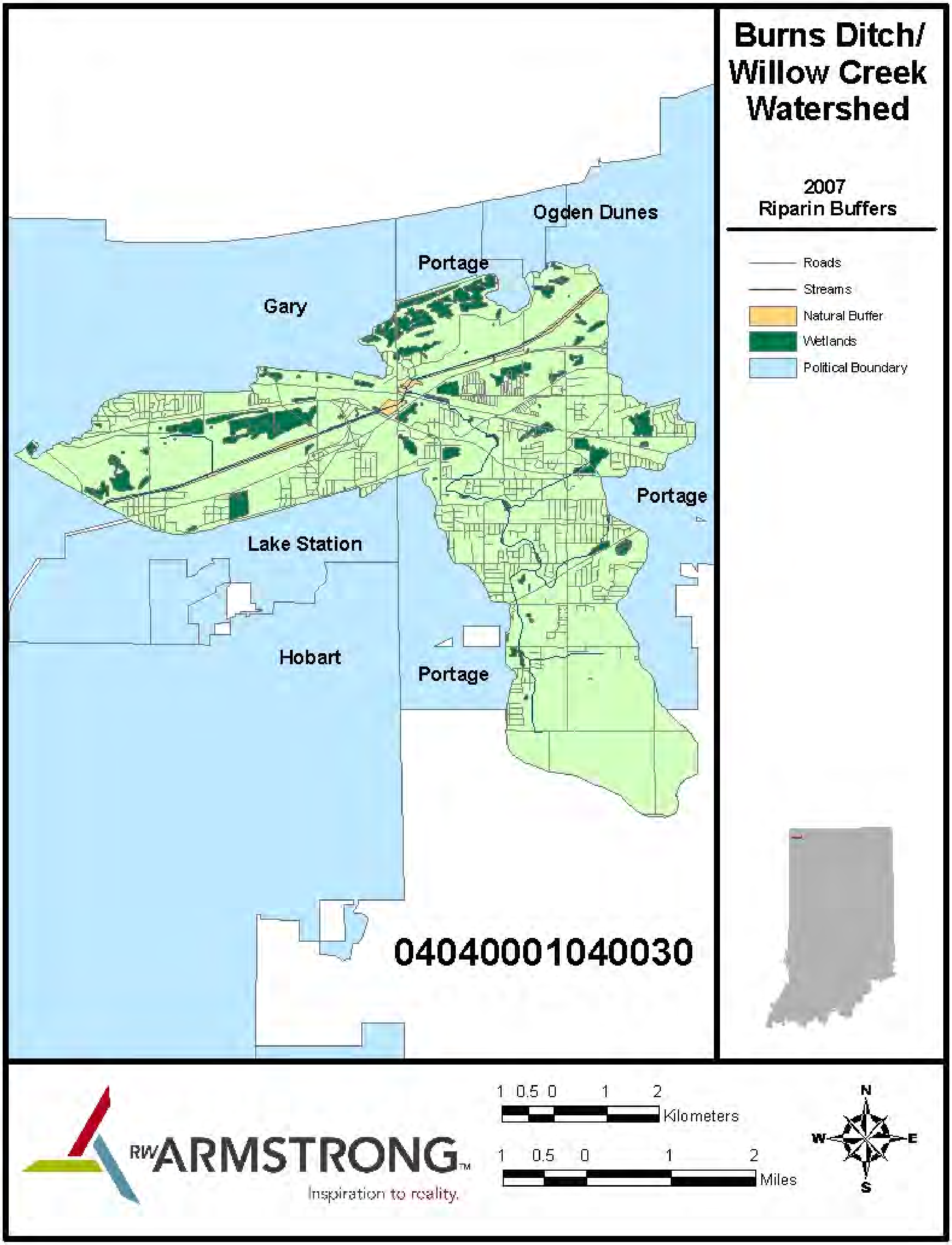


Figure 3.10: Riparian zones located along the Little Calumet River in the Burns River and Willow Creek watershed.

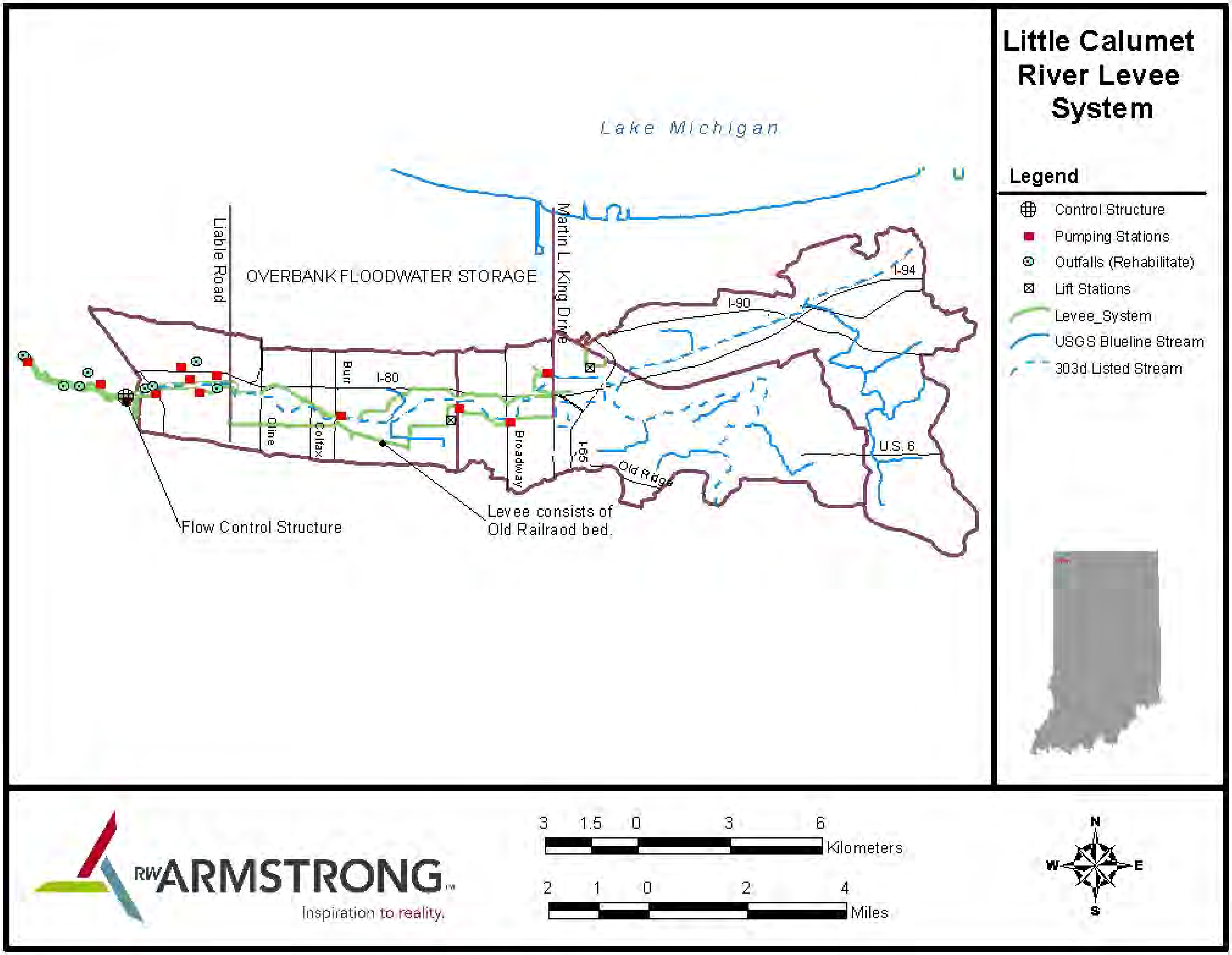


Figure 3.11: ACOE levee system currently being constructed for completion in 2013.

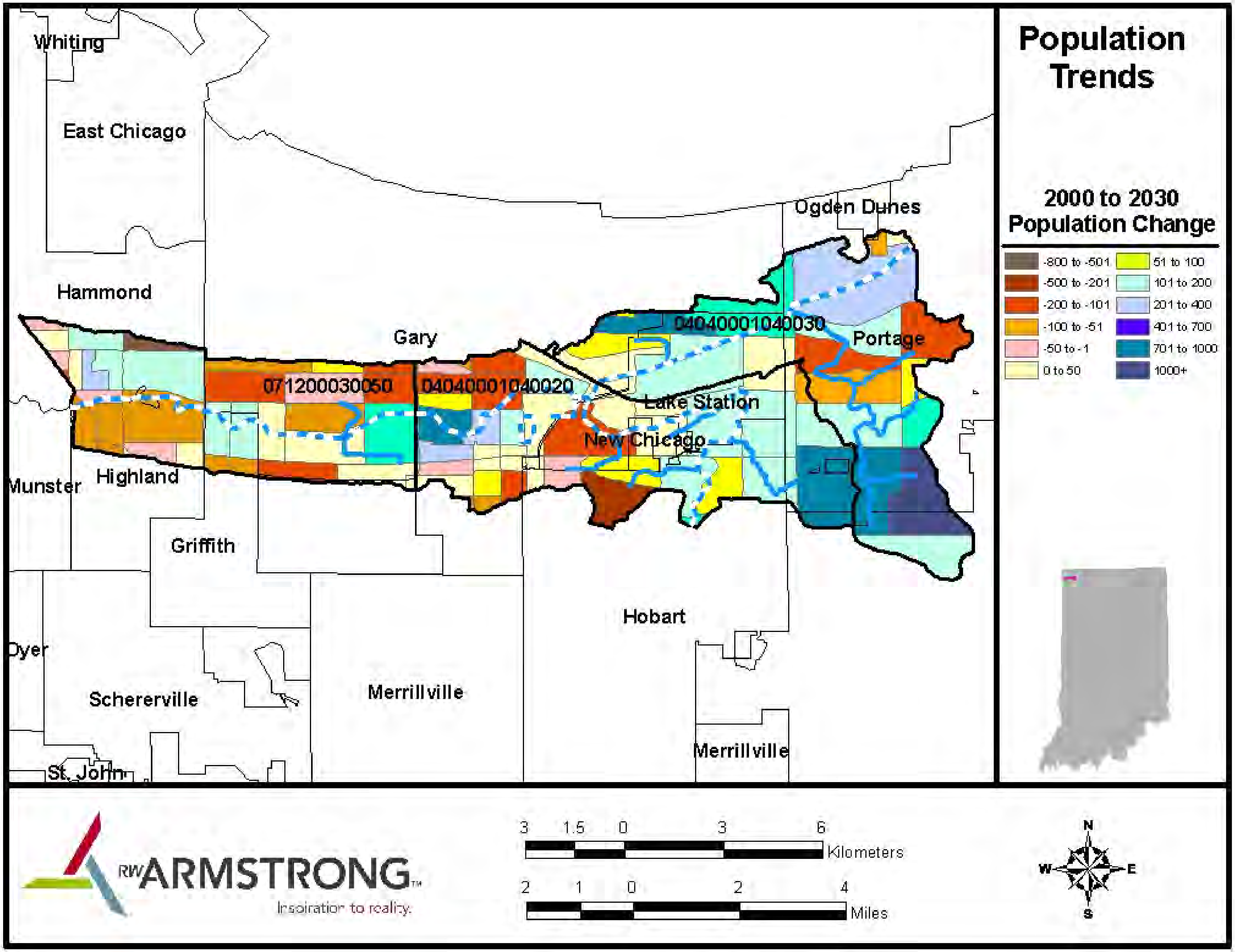


Figure 3.12: Population trends according to 2030 projections from the Northern Indiana Regional Planning Commission.

out to be growing at more than 741 people per square mile. These two areas encompass approximately 3,500 acres and development into Medium Density Urban will result in an increase of nearly 2,000 impervious acres; according to the impervious area factors used for the two land use categories. This development would not only increase the impervious area greatly but would also decrease the agricultural land use in the study area by approximately 50%.

Further development is expected around the interchanges of the Borman Expressway (I-80/I-94) due to the completion of the line of protection of the levee system. It is expected that this will be mostly in the form of commercial property. Other future development includes the current site of the Woodmar Country Club within the City of Hammond which is being developed as commercial property.

An increase in impervious area due to development has the possibility of creating higher total suspended solids (TSS) readings. Increases in development and population lower the pervious area in the watershed; the result of this will be greater water velocities in the Little Calumet River and its tributaries. This increase in water velocity will be due to more runoff entering the water bodies as less will be capable of entering the soil. Increased water velocities are a leading cause of increased TSS readings, as is the effluent produced from wastewater treatment plants which will also be increased due to larger loads being taken to the plants.

Porter and Lake County Legal Drains

All of the Little Calumet River within the three 14- digit HUC watersheds in this study is a legal/regulated drain in Lake and Porter Counties. However, portions of the tributary system, especially Deep River and Willow Creek, are not legal/regulated drains. Figure 3.13 show the legal/regulated drains according to information received from Lake and Porter counties.

Waterbody Use

The 2003 Recreational Use Surveys conducted by GSD as part of their CSO Long Term Control Plan indicated that residents currently access the river at several sites within the city for fishing.

As part of the Little Calumet River Flood Control Project, the U.S. Army Corp of Engineers has constructed trails, canoe ramps, and fishing piers along the Little Calumet River. Figure 3.4 shows the features to be included in the ACOE and LCRBDC project. Other publicly controlled lands in the watershed study area can be seen in Figure 3.5 to 3.7.

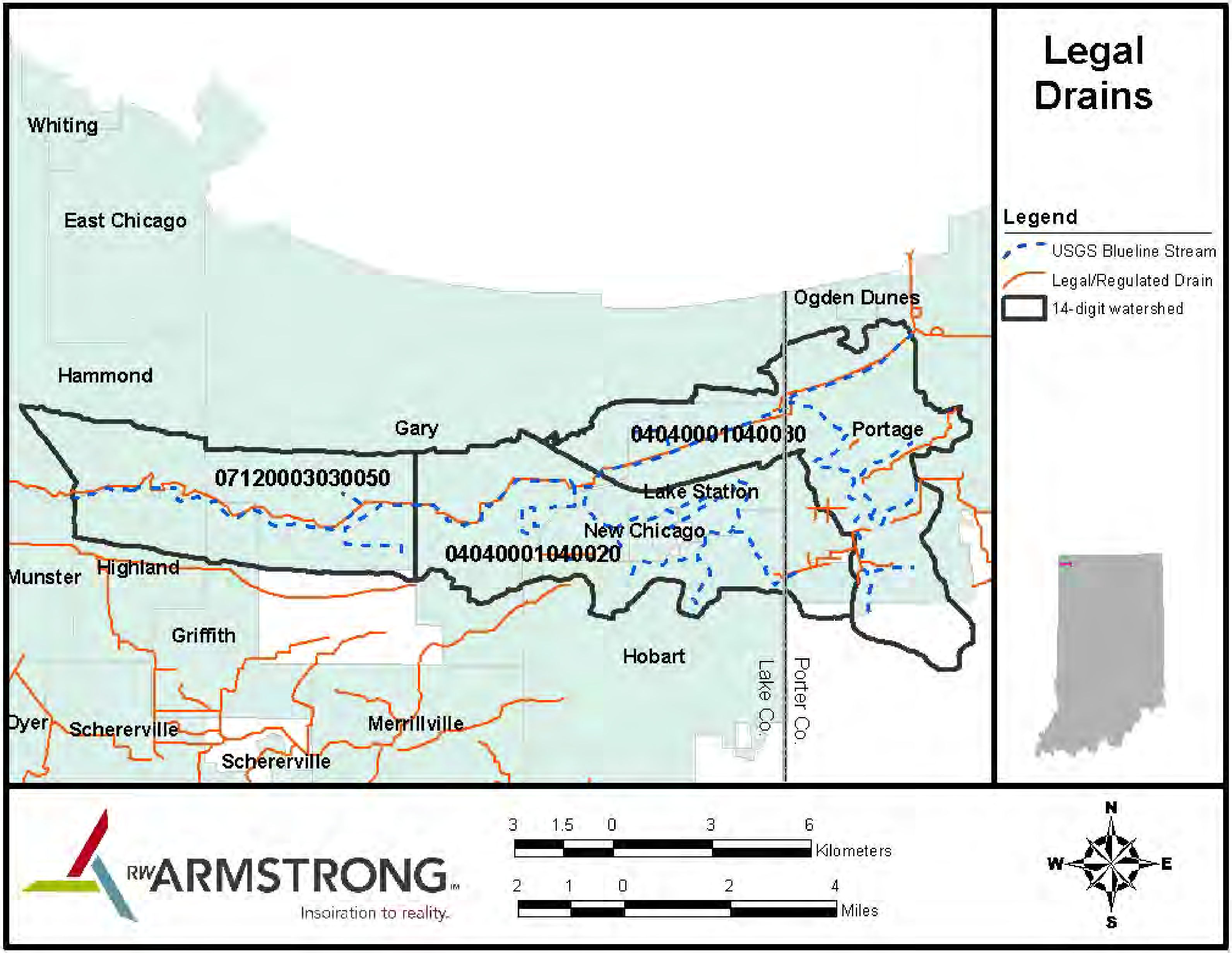


Figure 3.13: Legal/Regulated drains in Lake and Porter Counties.

Section IV: Water Quality Investigation

Designated Uses and Water Quality Standards

The State of Indiana specifies appropriate water uses to be achieved and protected for each water body, as required by the US EPA. Appropriate uses are identified by taking into consideration the use and value of the water body for public water supply; protection of fish, shellfish, and wildlife; and for recreational, agricultural, industrial, and navigational purposes.

According to Indiana Rule 327 IAC 2-1.5, the Little Calumet River is designated for full-body contact recreation and shall be capable of supporting a well-balanced, warm water aquatic community. The West Branch of the Little Calumet River is **not** designated as a Limited Use water or as an Outstanding State Resource Water.

The overall water quality goal for these watersheds, which includes the Little Calumet River, is that all water bodies meet the applicable water quality standards for their designated uses as determined by the State of Indiana, under the provisions of the Clean Water Act.

The following quantitative standards have been set for the Little Calumet River:

1. *E.coli* bacteria, using membrane filter (MF) count, shall not exceed:
    a) One hundred twenty-five (125) per one hundred (100) milliliters as a geometric mean based on not less than five (5) samples equally spaced over a thirty (30) day period.
    b) Two hundred thirty-five (235) per one hundred (100) milliliters in any one (1) sample in a thirty (30) day period.
2. No pH values below six (6.0) or above nine (9.0) except daily fluctuations that exceed pH nine (9.0) and are correlated with photosynthetic activity, shall be permitted.
3. Concentrations of dissolved oxygen shall average at least five (5.0) milligrams per liter per calendar day and shall not be less than four (4.0) milligrams per liter at any time.
4. Total Cyanide is limited to 48,000 micrograms per liter for the protection of human health in non-drinking waters.
5. Temperatures in the river and its tributaries are limited to the following temperatures in degrees Fahrenheit (degrees Celsius):
    a) January 50 (10)
    b) February 50 (10)
    c) March 60 (15.6)
    d) April 70 (21.1)
    e) May 80 (26.7)
    f) June 90 (32.2)

g)	July	90	(32.2)
h)	August	90	(32.2)
i)	September	90	(32.2)
j)	October	78	(25.5)
k)	November	70	(21.1)
l)	December	57	(14.0)

Additional requirements for dissolved oxygen and temperature are in place for the East Branch of the Little Calumet River but are outside the boundaries of this watershed management plan.

Currently, there are no quantitative standards in place for nitrogen and phosphorus levels in this particular category of water body. Existing standards require only that concentrations of nitrogen and phosphorus, either separately or in combination together, cannot be such that they contribute to aquatic plant or algae growth to the extent that they become a nuisance, unsightly, or otherwise impair the designated uses of the water body.

Water Quality Impairments and TMDLs

The West Branch of the Little Calumet River is currently listed for *E.coli* and Cyanide on the Indiana Department of Environmental Management (IDEM) Section 303(d) List of Impaired Water Bodies. A Fish Consumption Advisory is also in effect for the West Branch of the Little Calumet River for PCB's and Mercury. This river has also appeared on the United States Environmental Protection Agency's Indiana List of Impaired Waters for 1998 for Cyanide, *E.coli*, Mercury, PCB's, Pesticides, and Impaired Biotic Communities.

Aquatic ecosystems have suffered from the chronic effects of contaminated sediments and air deposition. In the early and mid-1960s, most streams in northwestern Lake County were affected by pollution. Water quality currently is characterized within the basin by low dissolved oxygen, high biochemical oxygen demand (BOD), pollutant tolerant aquatic biota that has replaced native species in the northern reaches of the basin, and fish consumption advisories. Oil, grease, floating debris and offensive odors have made most portions of the Grand Calumet and Little Calumet rivers unappealing to recreational boaters and fishermen. High bacteria counts also have made them unfit for full body contact. Causes of such pollution include a history of unregulated and poorly regulated discharges from industries and sewage treatment plants, combined sewer overflows, urban runoff carrying pesticides, nutrients and heavy metals, and sedimentation (IDNR 1994).

A Total Maximum Daily Load (TMDL) standard for *E.coli* bacteria has been developed for this watershed. This plan has been crafted to achieve the required pollutant reduction in the TMDL. Based on the 2004 TMDL report, a reduction of approximately 90% in the non-point source loads will be required.

Major causes of water quality impairment in the Little Calumet River watershed include:

- *E.coli* Bacteria.
- Cyanide
- PCBs
- Metals
- Pesticides

E.coli **Pollution**

E.coli is a significant source of pollution in the Little Calumet River. The federal standard set forth to ensure safe use of waters for water supplies and recreation (327 IAC 2-1-6 Section 6(d)) states that *E.coli* bacteria, shall not exceed 125 per 100 milliliters as a geometric mean based on not less than five samples equally spaced over a 30 day period or 235 per 100 milliliters in any one sample in a 30 day period. The bacteria are associated with the intestinal tract of warm blooded animals. The presence of *E.coli* in water is a strong indication of the presence of sewage or animal waste contamination. It may enter the water through combined sewer outlets during rainfalls or other types of precipitation, or it may come from poorly functioning septic systems or spills from lagoons containing animal wastes. *E.coli* is widely used as an indicator of the potential presence of waterborne disease causing (pathogenic) bacteria and viruses because they are easier to detect than these pathogenic organisms. The presence of waterborne disease-causing organisms can lead to outbreaks of such diseases as typhoid fever, dysentery, and cholera.

Cyanide

Hydrogen Cyanide is mainly used to make the compounds needed to make nylon and other synthetic fibers and resins. Other cyanides are used as fertilizers. Cyanide enters the water through the release of discharges from metal finishing industries, iron, and steel mills and organic chemical industries. Cyanide ties up the hemoglobin sites that bind oxygen to red blood cells, resulting in oxygen deprivation. This condition is known as cyanosis and is characterized by blue skin color. Cyanide also causes chronic effects on the thyroid and central nervous system.

PCBs

PCBs are organic chemicals that were once used in capacitors and transformers. PCBs enter water from runoff from landfills and from the discharge of waste chemicals. In 1977, production of PCBs in North America was halted. PCB contamination today is a result of historical waste disposal practices. All water bodies in Indiana are under a fish consumption advisory for PCBs.

Metals

Municipal and industrial discharges and urban runoff are the main sources of metal contamination in surface water. Indiana has stream standards for many heavy metals, but the most common ones in municipal permits are cadmium, chromium, copper, nickel, lead, mercury, and zinc. Point source discharges of metals are controlled through the National Pollution Discharge Elimination System (NPDES) permit process. Non-point sources of metals are controlled through best management practices (BMPs).

Pesticides

Pesticides are used in agricultural and urban/residential settings to kill unwanted plants and animals. Pesticides enter surface waters primarily through non-point source runoff from agricultural lands and urban areas. Pesticide contamination is also due to legacy pesticides that are no longer being used but are still impairing the environment. Pesticides are a significant source of pollution in the Little Calumet-Galien watershed.

Existing Water Quality Data

Water quality data that had been previously gathered and analyzed by governmental agencies and local communities was collected for review. Information that had been generated by the Department of Natural Resources (DNR), United States Geological Survey (USGS), and Indiana Department of Environmental Management (IDEM) for the three 14-digit HUC watersheds was requested and received. The information is limited from these sources due to the fact that most of the water quality data collected in Northwest Indiana is along the Grand Calumet River.

Data that local communities had collected concerning the water quality of the Little Calumet River was also requested and reports were received from the Sanitary District of Hammond and from the Gary Sanitary District (GSD).

Fixed Station Data

Fixed station monitoring by the Indiana Department of Environmental Management (IDEM) in Portage, IN at the Portage Boat Yard Dock was reviewed from 1990 to 2006. Samples were analyzed for Alkalinity, Chlorides, COD, Cyanide, *E.coli*, Hardness, Ammonia, Nitrates, Nitrites, pH, Total Phosphorus

(TP), Total Kjeldahl Nitrogen (TKN), and Total Suspended Solids (TSS). The fixed station data from IDEM that is referenced here can be found in Appendix 6: IDEM Fixed Station Data.

Three additional sampling locations were added along the Little Calumet River/Portage Burns Waterway for sampling in July and August of 2000. These additional locations were at Cline Avenue, Broadway Street, and Ripley Street. The *E.coli* results of the five samples recorded can also be found in Appendix 6: IDEM Fixed Station Data.

<u>*E.coli* Bacteria:</u> Figure 4.1 shows the *E.coli* sampling results from 1996 through 2001, the most recent reading recorded. The highest reading in this time frame was 5,200 cfu/100mL on August 8, 2000. In this time frame, 28 of the 52 readings exceeded the 235 cfu/100mL standard set forth.

Earlier data shows much higher readings in 1990 and 1991. Higher readings also occurred from mid 1997 to mid 1999. The highest recorded reading for *E.coli* was 11,000 cfu/100mL and occurred on January 16, 1991.

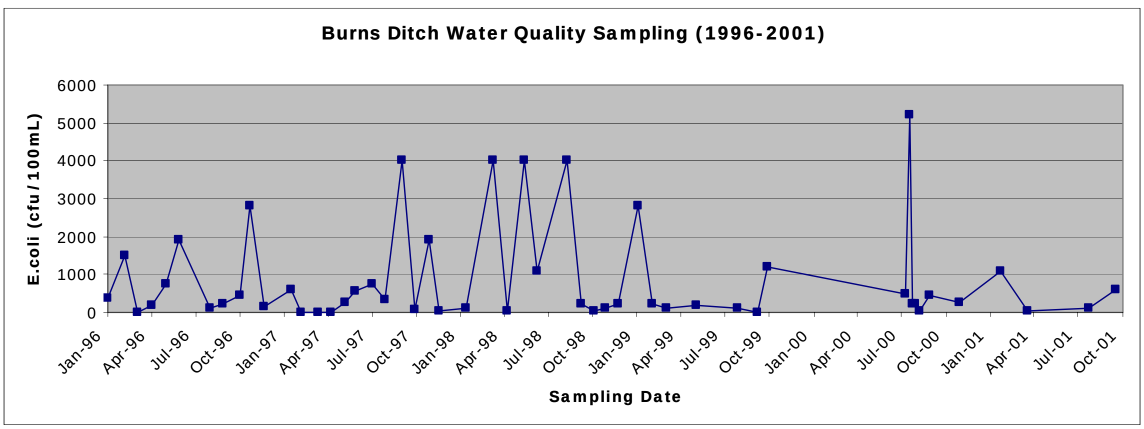


Figure 4.1: Portage Boat Yard fixed *station E. coli* data as recorded by IDEM.

<u>Ammonia (NH_3):</u> The level of Ammonia was determined at the Portage Boat Yard Dock on a monthly basis beginning in January of 1990. Figure 4.2 shows the sampling results from 2000 to 2006. The ammonia levels of the water were consistently around 0.1 mg/L with an average reading of 0.15 mg/L and the high level being found in February 2004 at 0.8 mg/L. This reading was also the high level for the 17 year sampling period. The ammonia levels have been consistent since 1990 with the 17 year average at 0.18 mg/L.

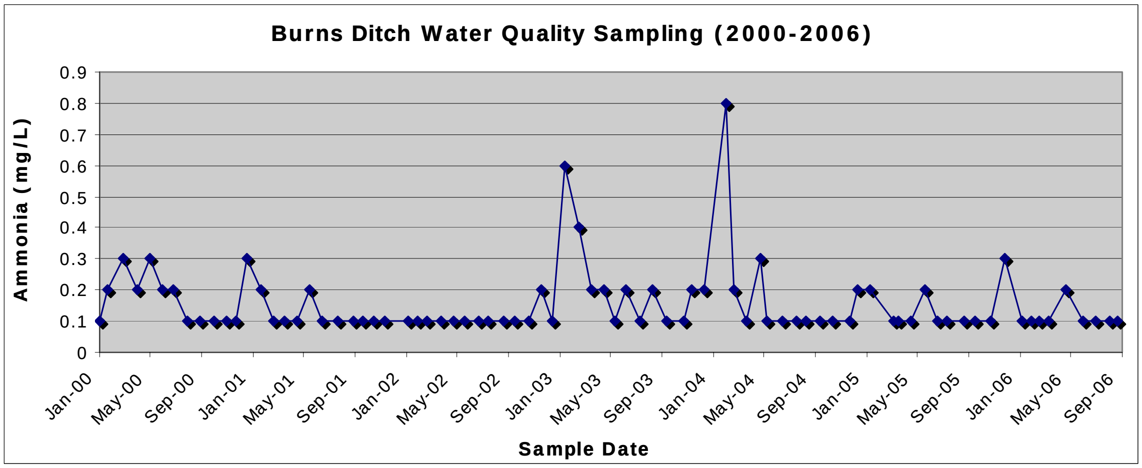


Figure 4.2: Portage Boat Yard fixed station ammonia (NH_3) data as recorded by IDEM.

Nitrogen: The nitrogen sampling results are comprised of the total nitrates and nitrites found each month over the 17 year period. Figure 4.3 shows the sampling data from 2000 to 2006. The high reading was found to be 4.6 mg/L in July 2005.

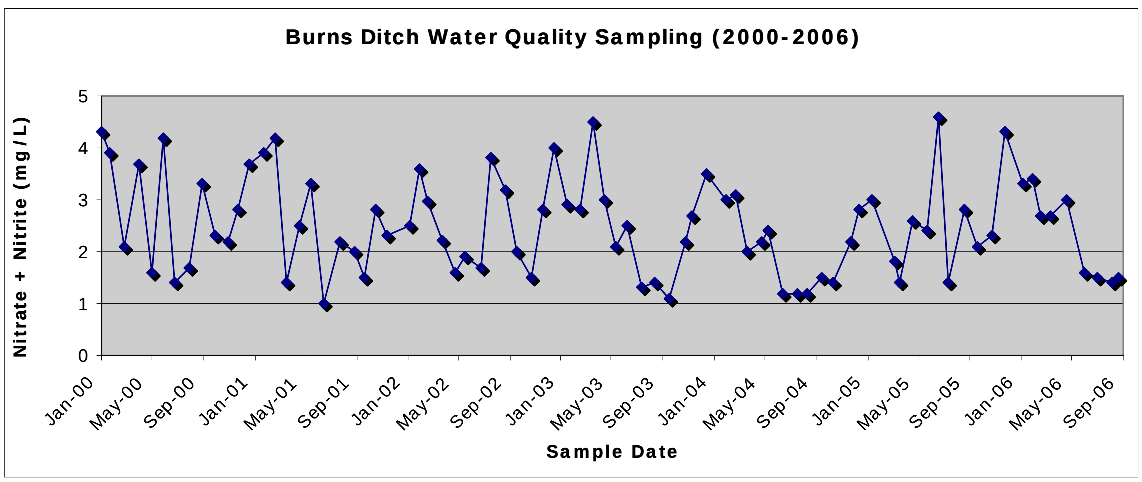


Figure 4.3: Portage Boat Yard fixed station nitrate and nitrite data as recorded by IDEM.

Total Phosphorous: The phosphorous levels can be found in Figure 4.4 for the Portage-Burns Waterway from 2000 to 2006. The levels vary from 0.05 to 0.38 mg/L for the seven (7) year sampling period. This period accurately reflects the overall 17 year trend where the levels vary from 0.05 to 0.45 mg/L. The high reading of 0.45 mg/L was found in November 1990 with the next highest reading being 0.38 mg/L in July 1999 and then again in July 2005, which is reflected in the chart shown.

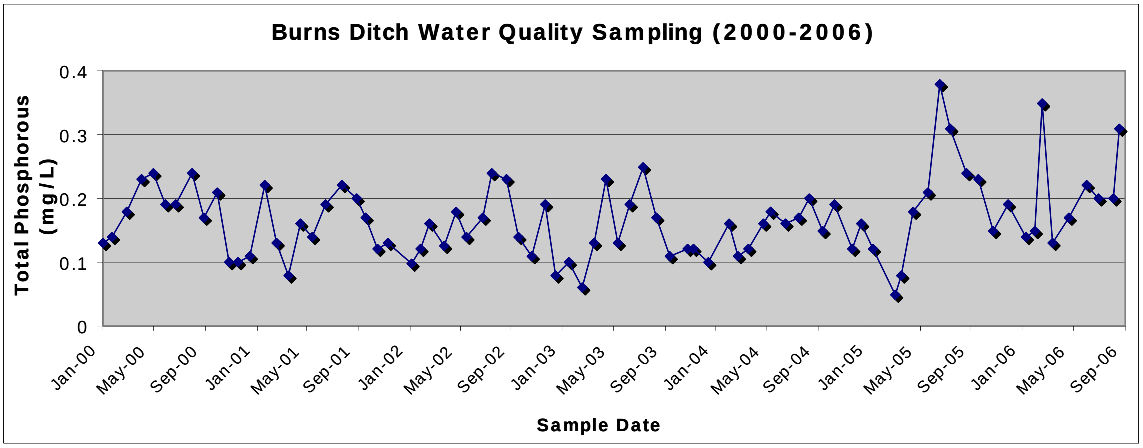


Figure 4.4: Portage Boat Yard fixed station total phosphorus data as recorded by IDEM.

Total Kjeldahl Nitrogen: The results of the water quality sampling conducted for the TKN levels showed a variance of 1.9 mg/L, with the low being 0.4 mg/L. There seems to be no consistent pattern in the TKN levels found. Figure 4.5 shows the results from 2000 through 2006 which accurately reflect the 17 year testing period in the variance shown and that there is no consistent pattern that can be found.

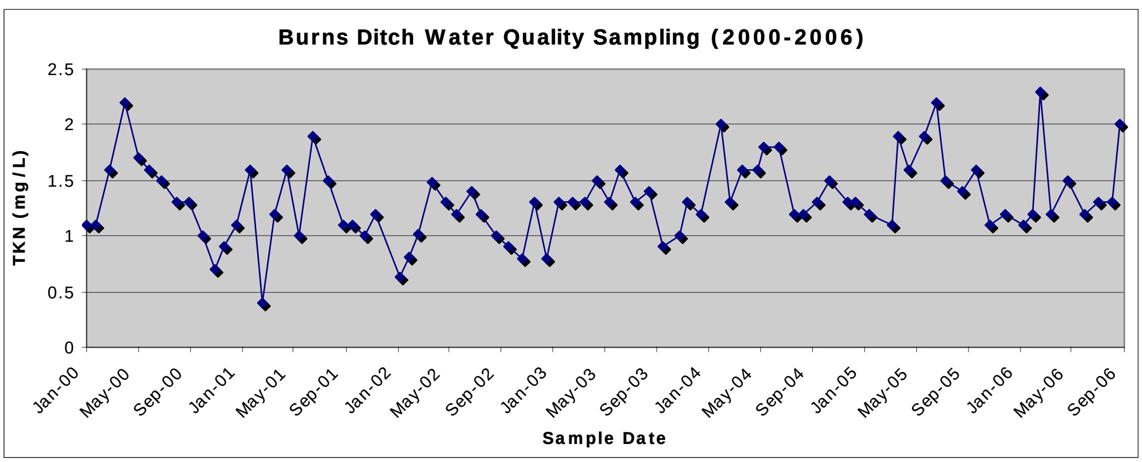


Figure 4.5: Portage Boat Yard fixed station total kjeldahl nitrogen data as recorded by IDEM.

Total Suspended Solids: The water quality sampling results for TSS showed levels that were consistently below 50 mg/L. While majority of the samples were found to be under 50 mg/L there were five samples over the 17 year sampling period that were above 150 mg/L. The first of these was the largest with a value of 240 mg/L. In the seven (7) year sampling period shown in Figure 4.6 there is only one of these spikes. It occurred on March 13, 2006 and was found to be 186 mg/L. The other three spikes all occurred before July 1997.

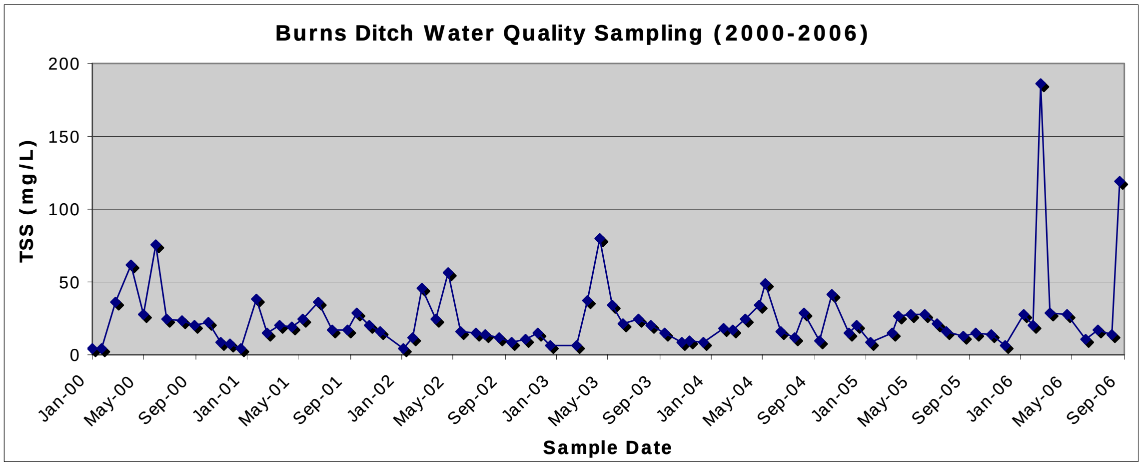


Figure 4.6: Portage Boat Yard fixed station total suspended solids data as recorded by IDEM.

Combined Sewer Overflow Master Plan Phase II – Little Calumet River Sampling Program for the Hammond Sanitary District – November 1995

This study was intended to characterize and model water quality in the Little Calumet River and the impact that Combined Sewer Overflows (CSO's) have on the river for the Hammond Sanitary District. The study was bounded by Cline Avenue on the east and Hohman Avenue on the west. The samples were analyzed for ammonia, *E.coli*, metals, phosphorus, cyanide, nitrates, and other pollutants of concern. Some baseline biological sampling was also conducted. The data collected as part of this study is included in Appendix 8: CSO Master Plan Phase II for the Hammond Sanitary District. Sampling was conducted at seven locations, shown in Figure 4.7, on August 11, 1994, October 8, 1994, and October 31, 1994.

Three of the seven sampling points were within the boundaries of the watershed being studied as part of this planning effort. A fourth point was located just outside of the watershed boundary along Hart Ditch, which flows north from the Munster area.

<u>*E.coli* Bacteria:</u> The *E.coli* concentrations found during this study far exceeded the state standard of 235 cfu/100mL. The lowest concentration recorded in this report was 3,000 cfu/100mL at the Kennedy Avenue sampling site on October 4, 1994. Figure 4.8 shows the *E.coli* concentrations recorded at Hart Ditch and the three sampling locations within the boundaries of our study area. The highest concentration levels were found west of these sites at the Hohman and Calumet sampling locations on October 31 and were recorded as being 260,000 and 400,000 cfu/100mL, respectively. While the highest concentration levels were found west of our watershed it can be seen that Hart Ditch also contributes high concentration levels. The east-west split of the river is just west of Hart Ditch; therefore, these high concentrations have a significant impact on our watershed study area. At the same time the high readings west of Hart Ditch should not affect our study area.

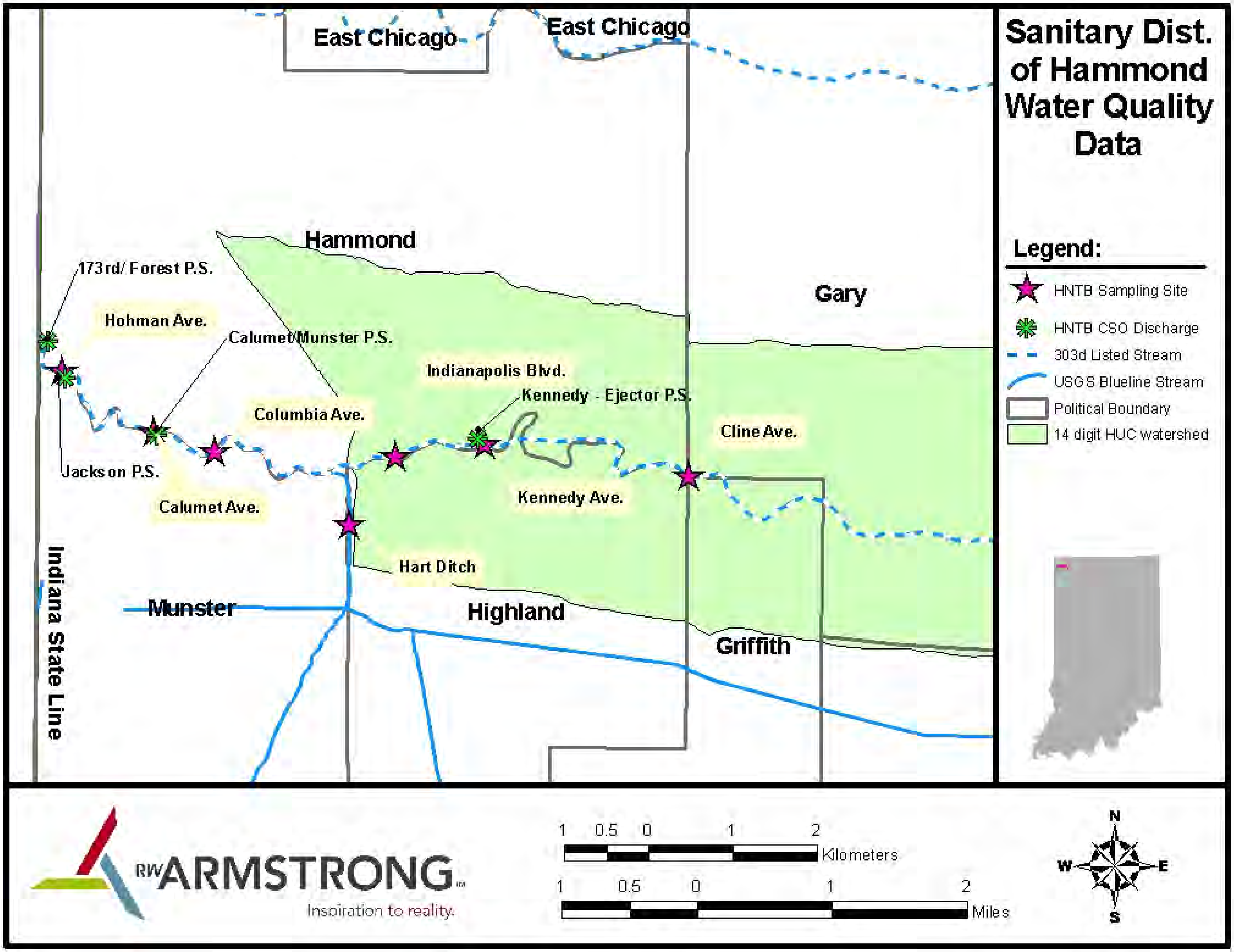


Figure 4.7: HNTB sampling locations for the 1995 Phase II Combined Sewer Overflow Master

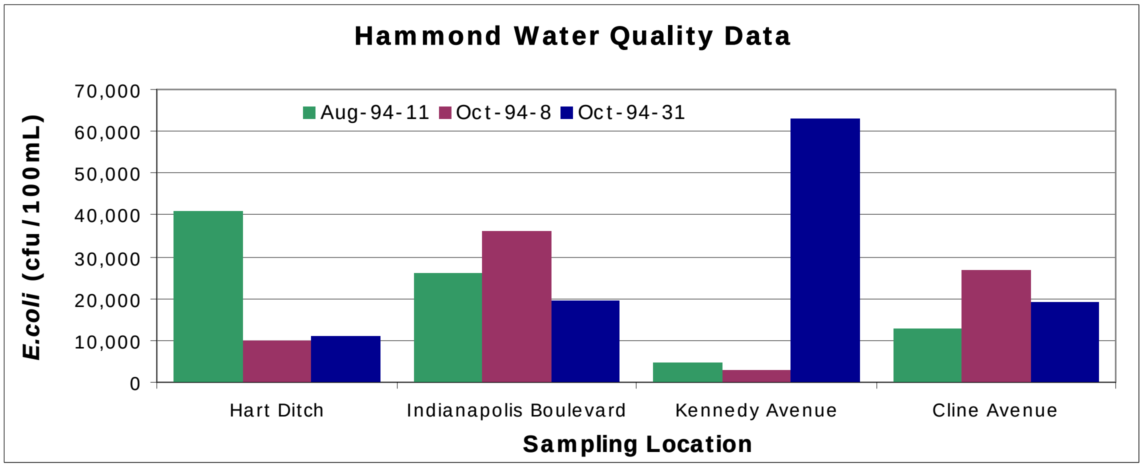


Figure 4.8: Hammond water quality data as recorded in Phase II Combined Sewer Overflow Master by HNTB completed in November 1995 for the Sanitary District of Hammond.

Ammonia: The concentrations of ammonia (NH_3) found during the sampling events ranged from 0.4 to 1.82 mg/L. The high and low value resulted from samples taken at Kennedy Avenue on the October 4th and 31st sampling dates, respectively. Figure 4.9 shows ammonia concentrations for the four sampling locations inside the study area watershed and along Hart Ditch.

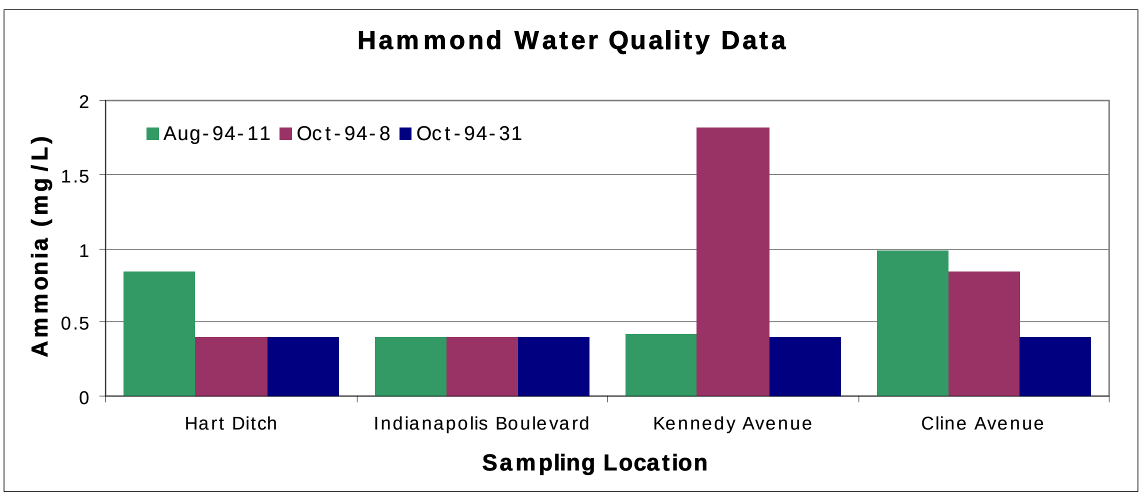


Figure 4.9: Hammond water quality data as recorded in Phase II Combined Sewer Overflow Master by HNTB completed in November 1995 for the Sanitary District of Hammond.

Total Phosphorus: The concentration level of total phosphorus found during the three sampling events was as high as 2.5 mg/L. This is significantly higher than the sampling results recorded by Greeley & Hansen for GSD, the fixed station data recorded by IDEM, and those recorded from the sampling data collected for this study. Figure 4.10 shows the concentration levels recorded by HNTB at the four sampling locations located inside the study area and along Hart Ditch.

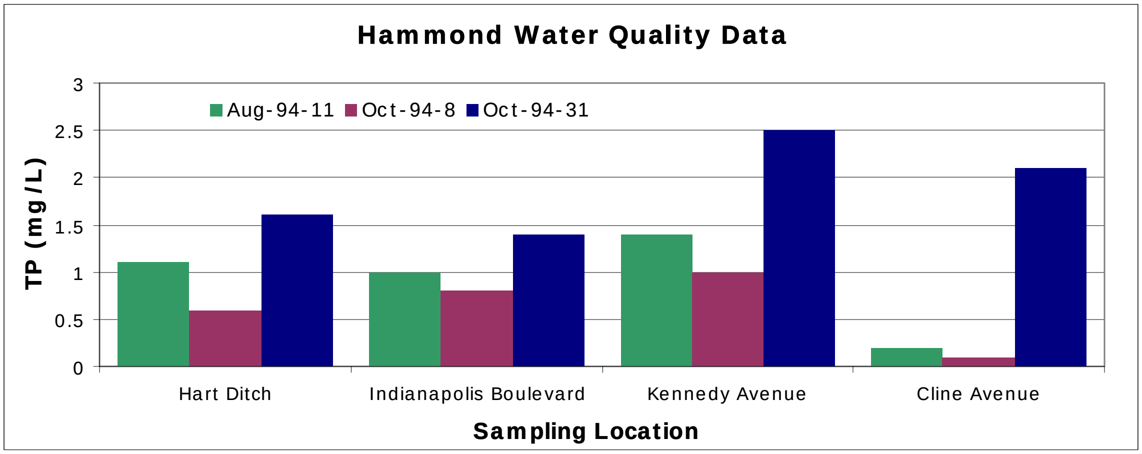


Figure 4.10: Hammond water quality data as recorded in Phase II Combined Sewer Overflow Master by HNTB completed in November 1995 for the Sanitary District of Hammond.

Nitrate: The concentrations of nitrate for the four sampling locations being used for comparison ranged from 0.35 to 9.44 mg/L. The three HNTB sampling locations not shown in Figure 4.11 also fall in this range.

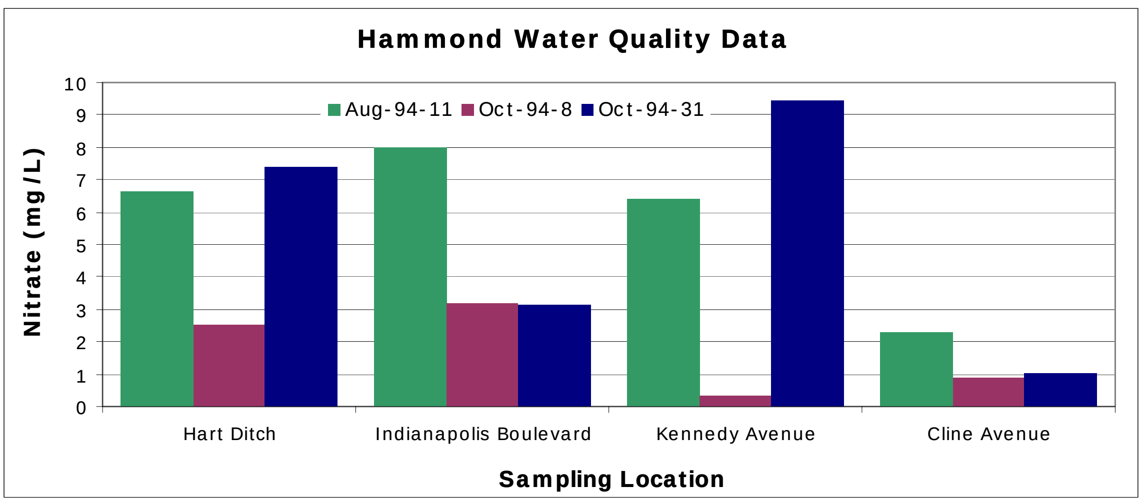


Figure 4.11: Hammond water quality data as recorded in Phase II Combined Sewer Overflow Master by HNTB completed in November 1995 for the Sanitary District of Hammond.

Little Calumet River Stream Reach Characterization and Evaluation Report – October 2002

This study attempted to identify the concentrations of pollutants in the West Branch of the Little Calumet River and in Combined Sewer Overflows (CSO's) during both dry and wet weather for the Gary Sanitary District (GSD). The dry weather samples were taken on April 27, 2001, June 25, 2001, December 11, 2001, and July 2, 2002. There were two wet weather sample taken, the first from September 18-21, 2001 and the second spanning April 27-30, 2002. Each sampling event tested 11 different sties throughout the City of Gary, these locations are shown in Figure 4.12. The samples were analyzed for a number of parameters, including: *E.coli*, Ammonia, Nitrogen, Total Phosphorus (TP), Total Suspended Solids (TSS), and Dissolved Oxygen (DO). Data for the four dry weather sampling events and two wet weather sampling events is included in Appendix 11: GSD Stream Reach Characterization and Evaluation Report.

E. coli Bacteria: The dry weather *E.coli* results collected in this study covered a large range of values. Two of the sample dates showed that all 11 sites met the state standard of 235 cfu/100mL. These two samples took place on April 27, 2001 and December 11, 2001. When comparing this to the dry weather sample taken on June 25, 2001, in which all sites exceeded the state standard, you can see a range in values from 30 to 2,000 cfu/100mL at the Martin Luther King Street Bridge. The fourth dry weather sampling date met the state standard at three (3) of the 11 sites. Figure 4.13 shows the dry weather sampling results.

The wet weather sampling results for *E.coli* bacteria in the Little Calumet River followed the unpredictability of the dry weather results. The first storm event in September 2001 showed large peeks in the *E.coli* concentrations at the Broadway and Martin Luther King Street bridges. These peeks were not found to occur again during the second storm event in April 2002. In order to better understand what may have caused these peeks the CSO data collected during these storm events was looked at, this information is included in Appendix 11: GSD Stream Reach Characterization and Evaluation Report. The CSO events did not account for the spikes in the *E.coli* concentrations during the first storm event. The CSO located directly upstream of the Broadway Street Bridge overflowed during both storm events; however, during the first storm event the high *E.coli* concentrations were recorded starting four (4) hours before the storm while the overflow did not occur until five (5) hours after the start of the storm event. The CSO located before the Martin Luther King Street Bridge did not overflow during either storm event and therefore can not be the cause of the increased concentrations. The wet weather sampling results found at four (4), eight (8), and 12 hours after the start of each storm event are shown in Figure 4.14.

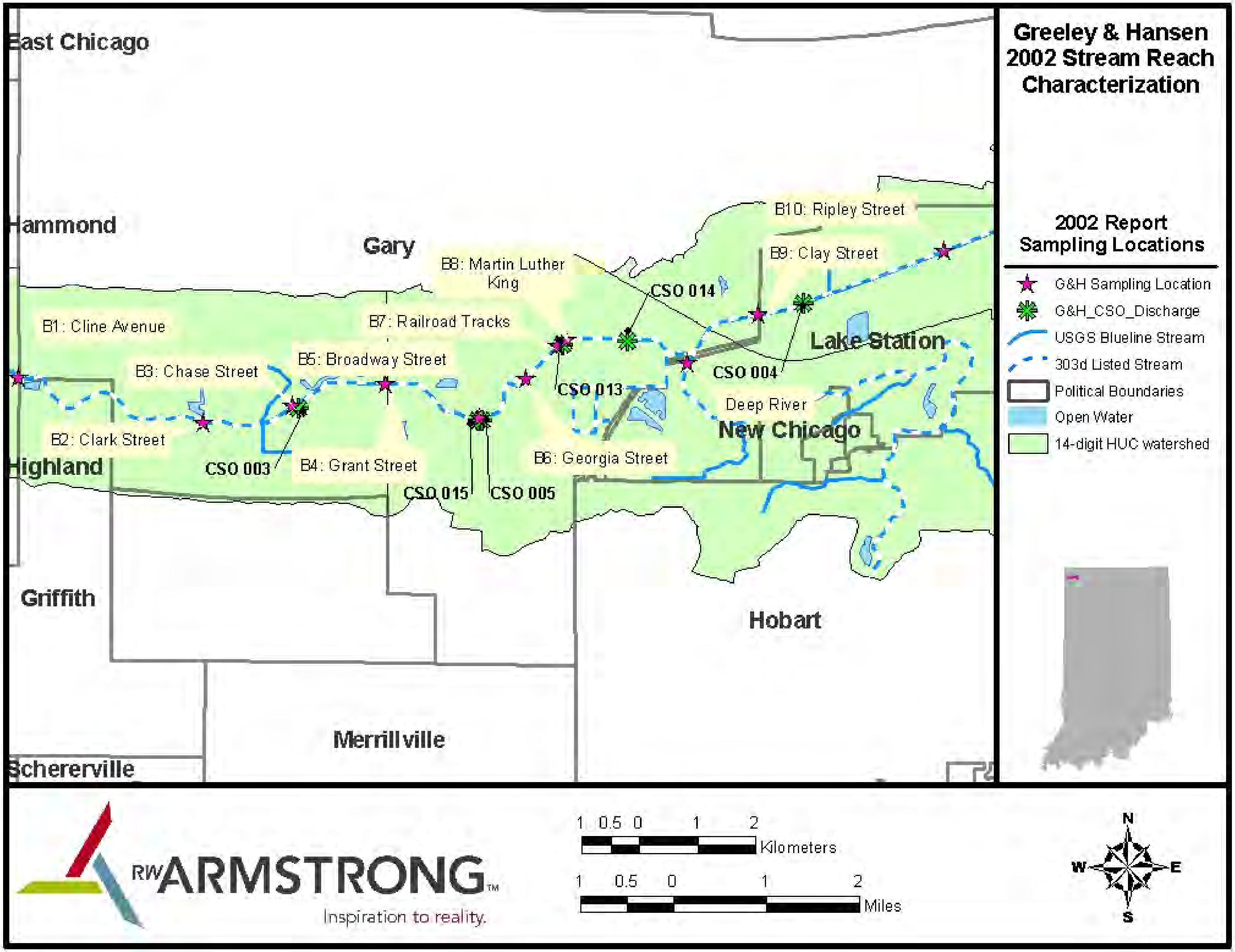


Figure 4.12: Greeley & Hansen sampling locations for the Little Calumet River Stream Reach Characterization and Evaluation Report.

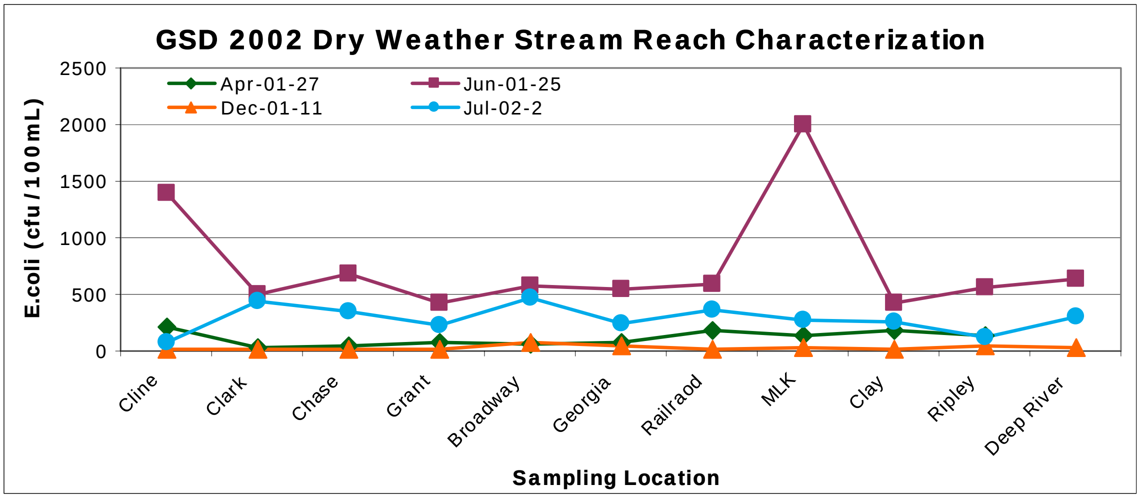


Figure 4.13: Dry weather E.coli concentrations as recorded in Greeley & Hansen's Little Calumet River Stream Reach Characterization and Evaluation Report completed in October 2002 for GSD.

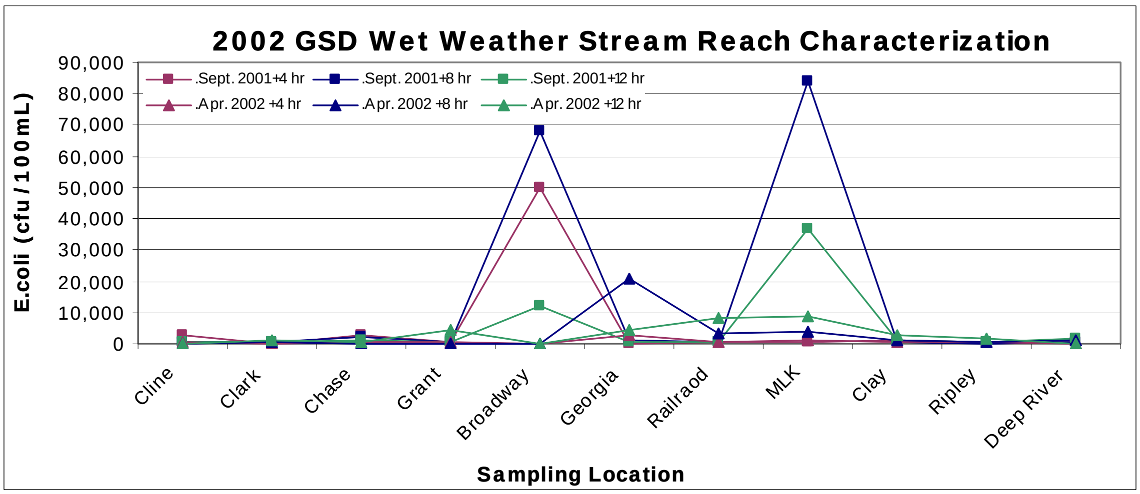


Figure 4.14: Wet weather E.coli concentrations as recorded in Greeley & Hansen's Little Calumet River Stream Reach Characterization and Evaluation Report completed in October 2002 for GSD.

Ammonia (NH_3): The ammonia concentrations were found at each sampling site for the four (4) dry weather events and the two (2) wet weather events. When looking at the dry weather events shown in Figure 4.15 it can be seen that the average ammonia concentration is highest from the Broadway Street Bridge to the Railraod Tracks. The first wet weather event shows higher concentration levels at the Broadway Street and Martin Luther King Street bridges, the same locations and storm event as the high *E.coli* readings. The second wet weather sampling event does not repeat these higher concentration levels as can be seen in Figure 4.16.

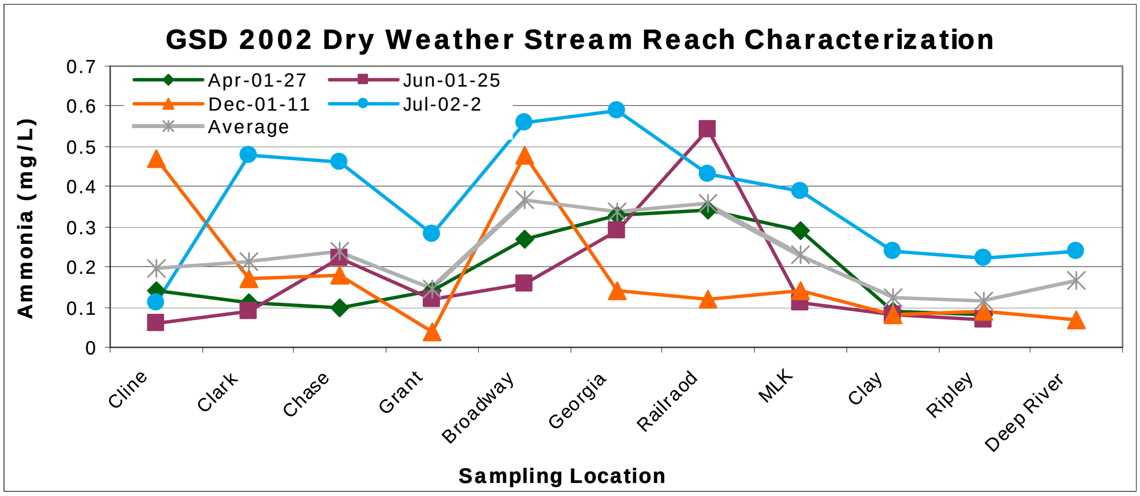


Figure 4.15: Dry weather Ammonia concentrations as reported in Greeley & Hansen's Little Calumet River Stream Reach Characterization and Evaluation completed in October 2002 for GSD.

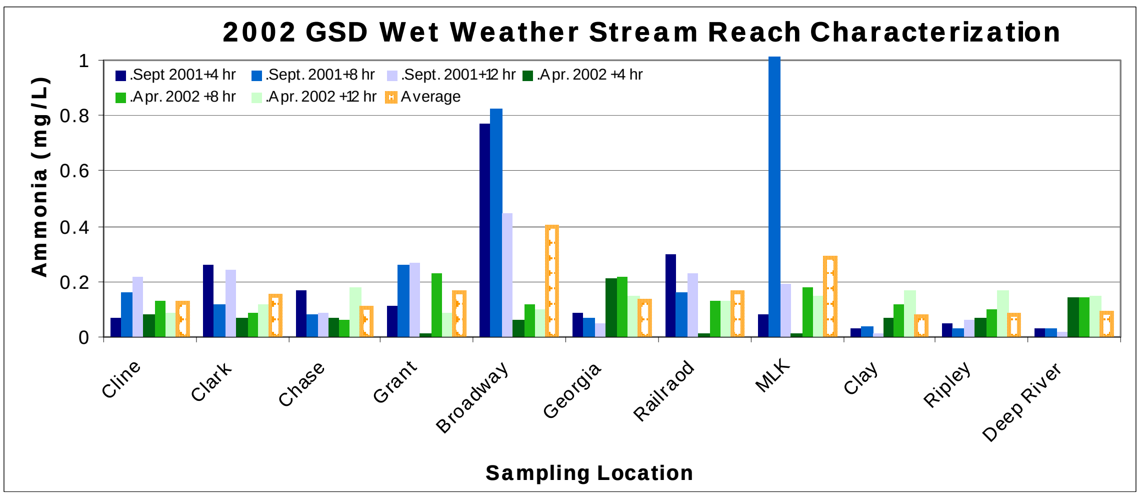


Figure 4.16: Wet weather Ammonia concentrations as reported in Greeley & Hansen's Little Calumet River Stream Reach Characterization and Evaluation completed in October 2002 for GSD.

<u>Total Kjeldahl Nitrogen:</u> Concentrations of TKN found during dry and wet weather sampling events were similar in numbers. Both set of events have an average concentration around two (2) mg/L. Figure 4.17 and 4.18 show the dry and wet weather sampling events concentrations, respectively.

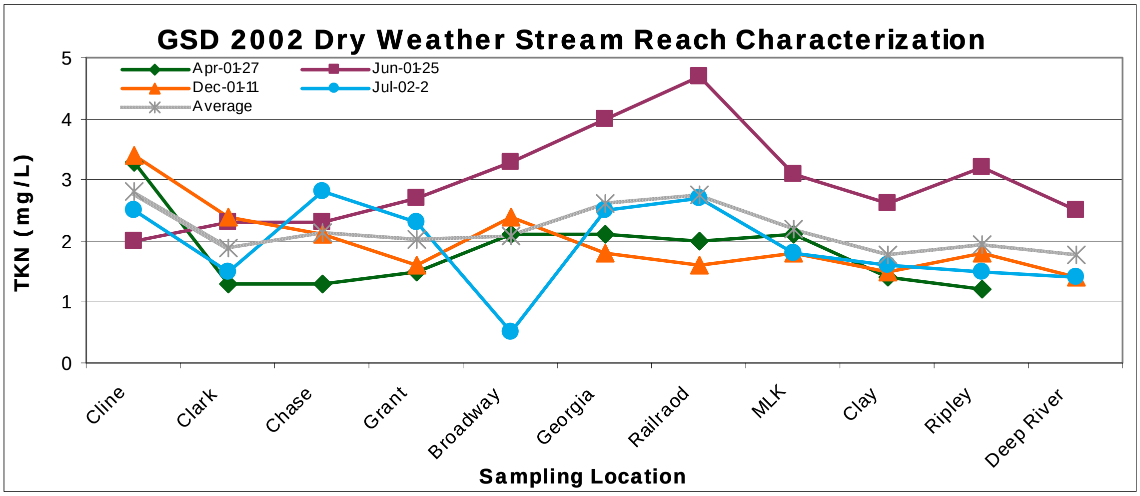


Figure 4.17: Dry weather TKN concentrations as recorded in Greeley & Hansen's Little Calumet River Stream Reach Characterization and Evaluation Report completed in October 2002 for GSD.

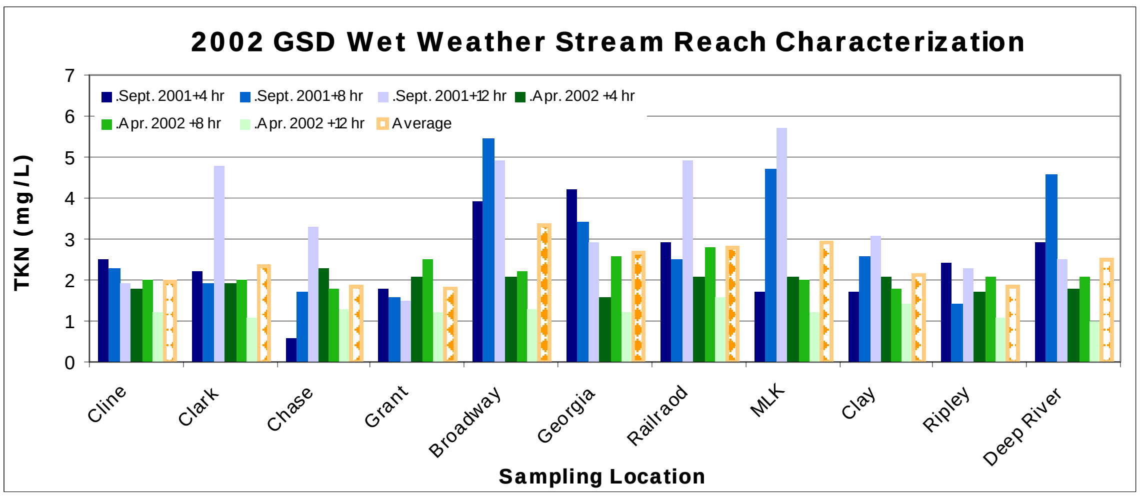


Figure 4.18: Wet weather TKN concentrations as recorded in Greeley & Hansen's Little Calumet River Stream Reach Characterization and Evaluation Report completed in October 2002 for G*SD.*

<u>Total Phosphorus:</u> The concentrations of phosphorus found in both the dry and wet weather samples appeared to be higher in the summer months when compared to the winter samplings. The dry weather samples taken in June 2001 and July 2002 were higher at every location than the concentrations found in April and December 2001, as can be seen in Figure 4.19. The wet weather concentrations followed the same pattern with the September concentrations being higher than the April concentrations for the same time period. This can be seen in Figure 4.20 with the only exception being the first sample taken at Cline Avenue. The concentrations found for the wet weather events are also lower in value than the dry weather events.

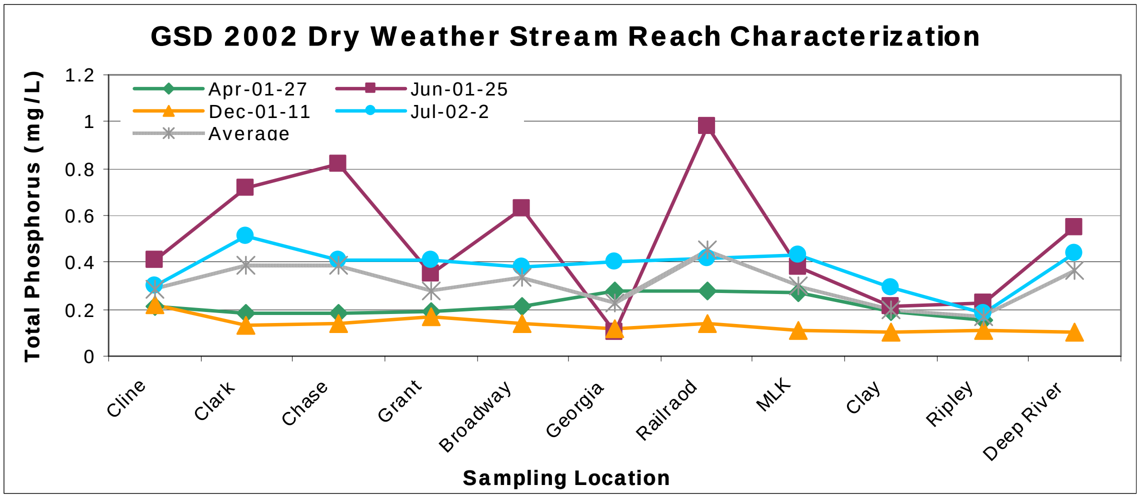


Figure 4.19: Dry weather phosphorus concentrations as recorded in Greeley & Hansen's Little Calumet River Stream Reach Characterization and Evaluation Report completed Oct. 2002 for GSD.

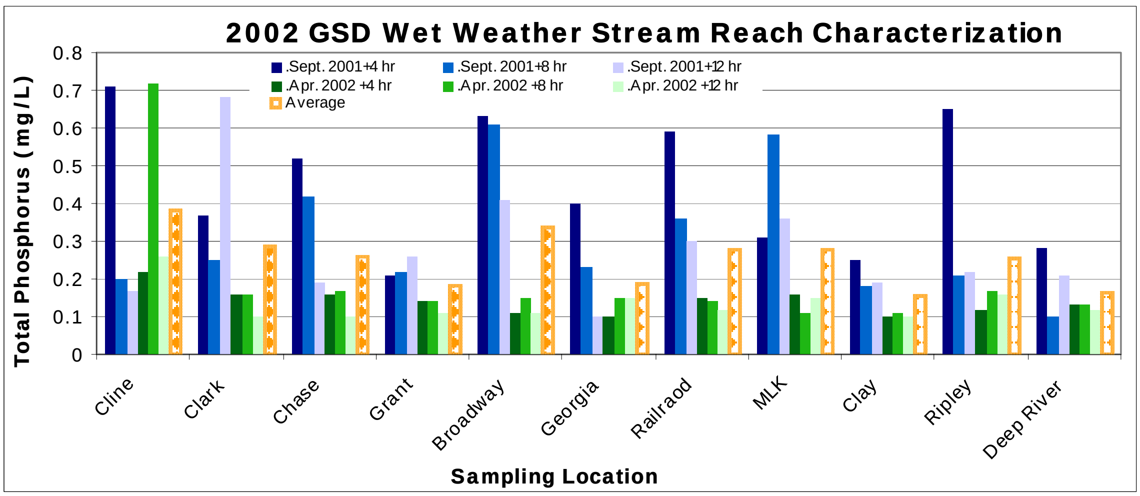


Figure 4.20: Wet weather phosphorus concentrations as recorded in Greeley & Hansen's Little Calumet River Stream Reach Characterization and Evaluation Report completed Oct. 2002 for GSD.

Total Suspended Solids: The concentration levels of suspended solids for the wet weather sampling events are consistently less than those found for the dry weather sampling events. The dry weather events can be seen in Figure 4.21with the average value for each sampling site shown by the gray line. Figure 4.22 shows the wet weather sampling events with the orange column representing the average values for each site.

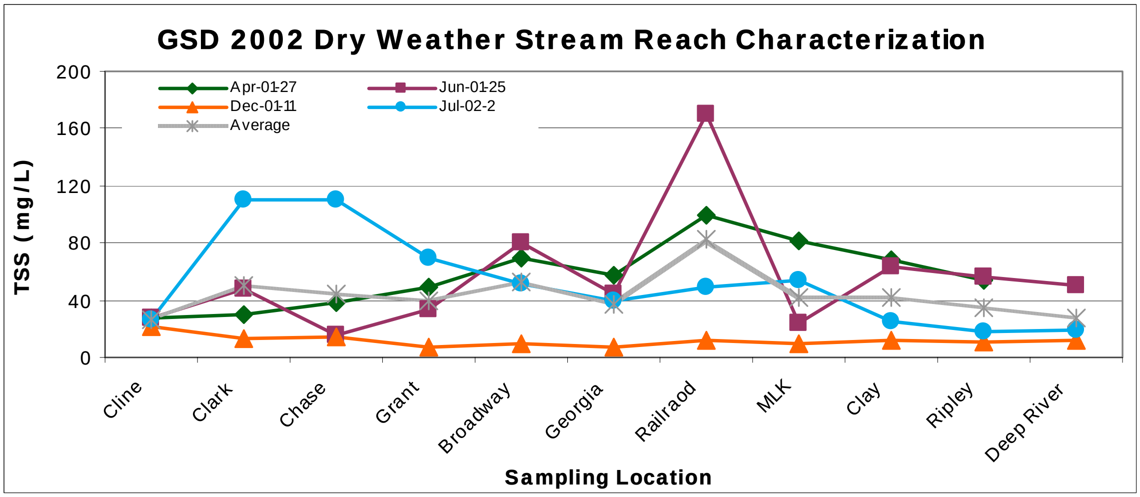


Figure 4.21: Dry weather TSS concentrations as reported in Greeley & Hansen's Little Calumet River Stream Reach Characterization and Evaluation Report completed October 2002 for GSD.

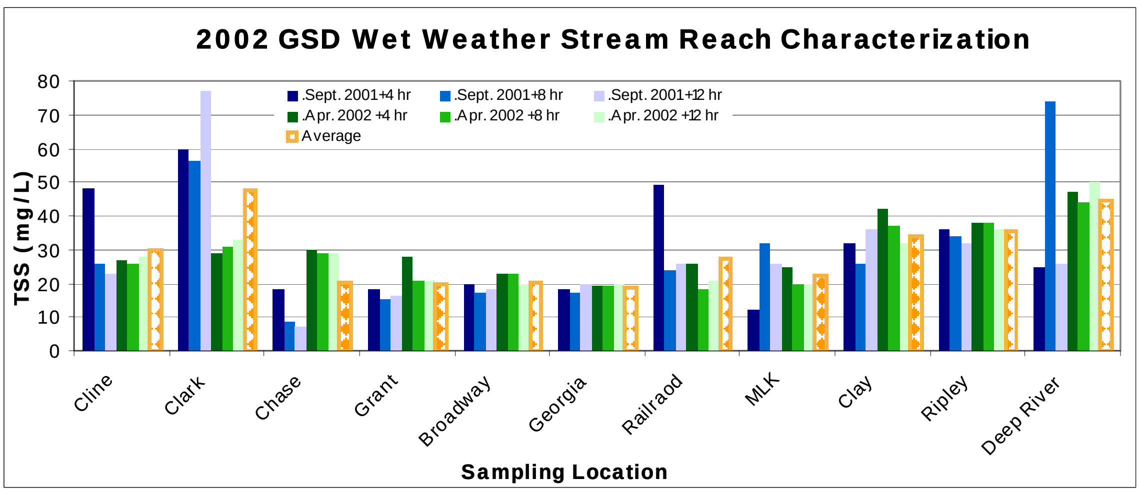


Figure 4.22: Wet weather TSS concentrations as reported in Greeley & Hansen's Little Calumet River Stream Reach Characterization and Evaluation Report completed October 2002 for GSD.

<u>pH Units:</u> The pH levels found during both the dry and wet weather sampling events met the state standard range. Figures 4.23 and 4.24 show the dry and wet weather sampling results, respectively, with the state standard range of a minimum six (6) and a maximum nine (9) being identified on the charts.

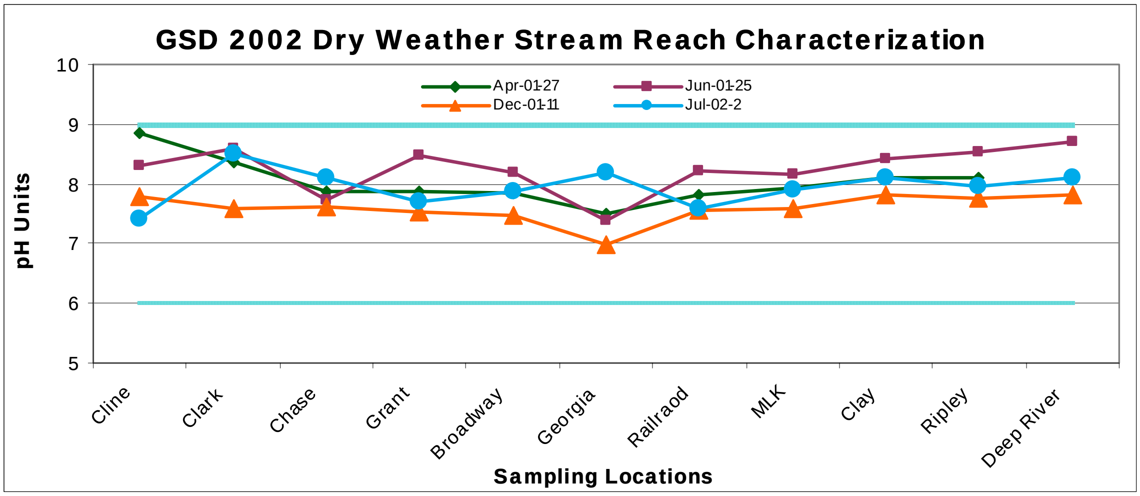


Figure 4.23: Dry weather pH units as recorded in Greeley & Hansen's Little Calumet River Stream Reach Characterization and Evaluation Report completed in October 2002 for GSD.

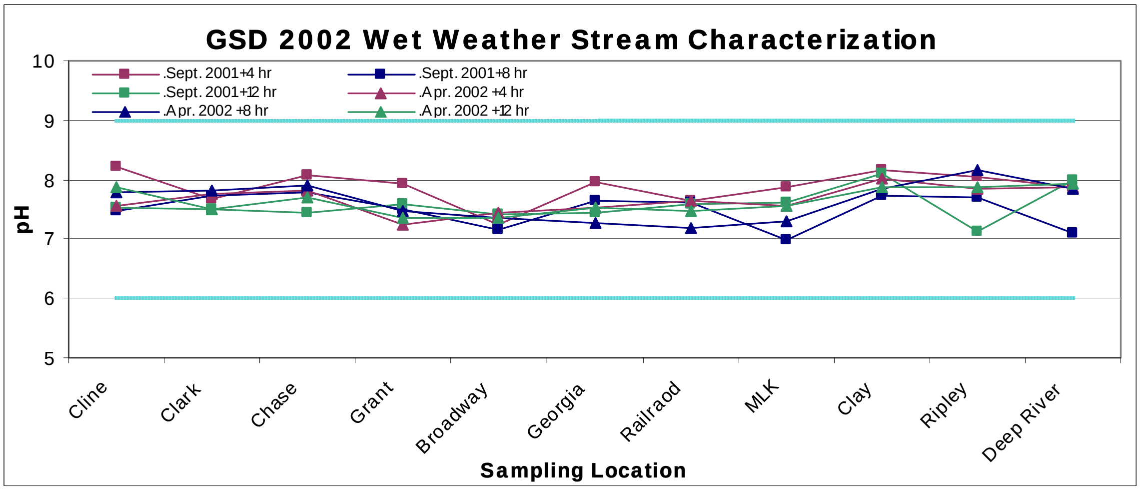


Figure 4.24: Wet weather pH units as recorded in Greeley & Hansen's Little Calumet River Stream Reach Characterization and Evaluation Report completed in October 2002 for GSD.

CDM Study for the Gary Sanitary District – 2003

In 2003 CDM completed a study for the City of Gary in which they conducted sampling at four hour intervals after three separate rain events. There were a total of eight (8) sampling locations; seven (7) along the Little Calumet River and one (1) on Deep River. Sampling locations and how they fit into our watershed study area can been seen in Figure 4.25. The four (4) locations located on the western end were tested at +4 and +8 hours after the storm event while the four on the eastern half were sampled at +8 and +12 hours. The wet weather sampling took place on May 20, June 18 and July 15, 2003. The eight sampling locations were also sampled on May 19, June 10 and June 25, 2003 for dry weather samples. Appendix 12: CDM Study for the Gary Sanitary District contains all of the sampling results.

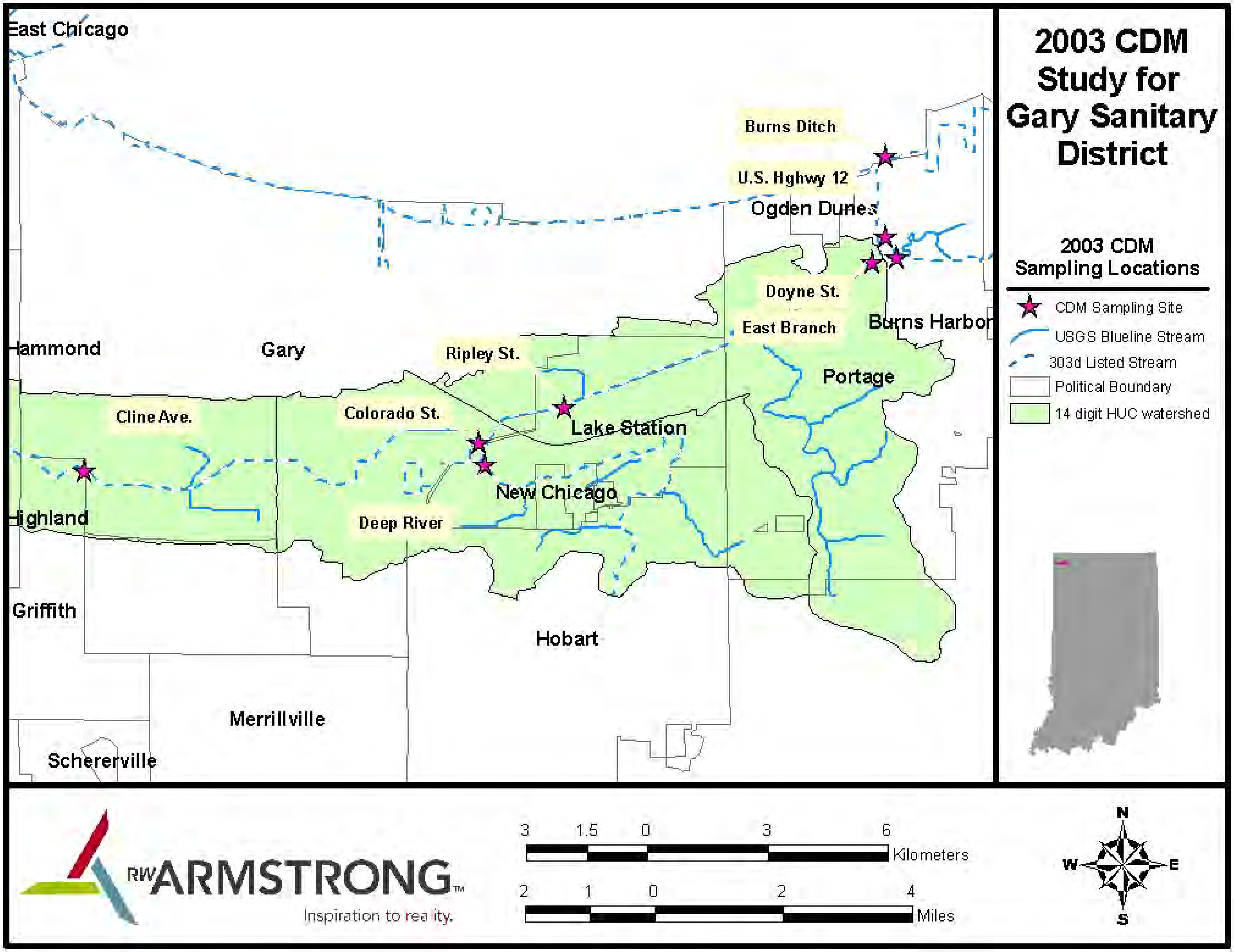


Figure 4.25: CDM sampling locations for the 2003 study completed for the Gary Sanitary District.

E.coli Bacteria: The wet weather sampling results found at the +8 hour storm interval is shown in Figure 4.26; the sampling locations at the far west and east ends met the state standard of 235 cfu per 100 mL. These two locations met the standard for the +8 hour interval; however, neither one met the standards on the other interval sample. The sampling locations at Colorado Street and Ripley Street show elevated levels when compared to the other sampling locations at this sampling interval. This is an accurate reflection of the other sampling intervals results. The large peak shown at the Colorado Street sampling location is similar to the peak found in the sampling results recorded for this study. The Colorado Street peak is also close to the interchange of I-65 and I-80.

The dry weather *E.coli* sampling shows an elevated level along Deep River. Figure 4.27 shows the sampling results for the dry weather sampling events. The Deep River sample is the highest for the May 19th and June 25th sampling dates; however, for the June 10th sampling date it was found to be one of the lowest *E.coli* concentration levels.

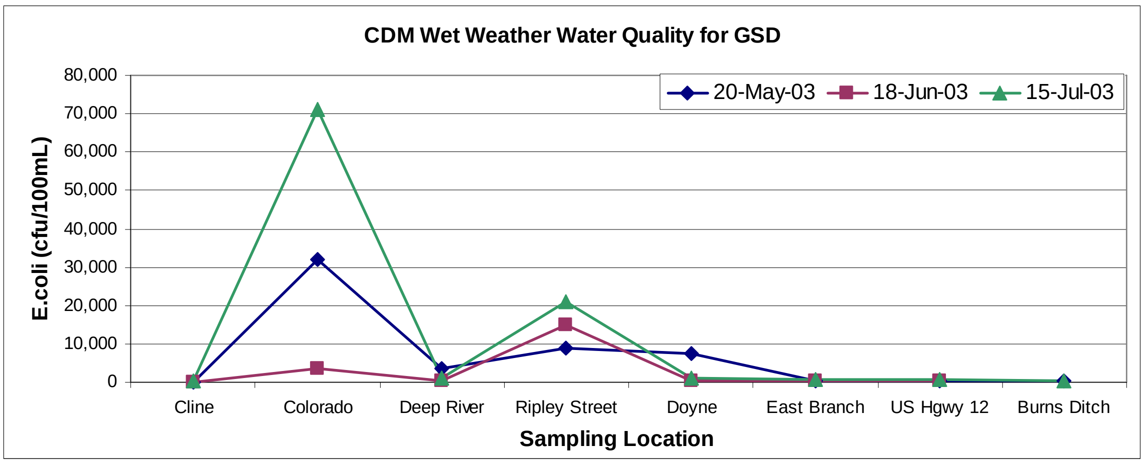


Figure 4.26: Wet weather E.coli sampling results recorded by CDM for the City of Gary.

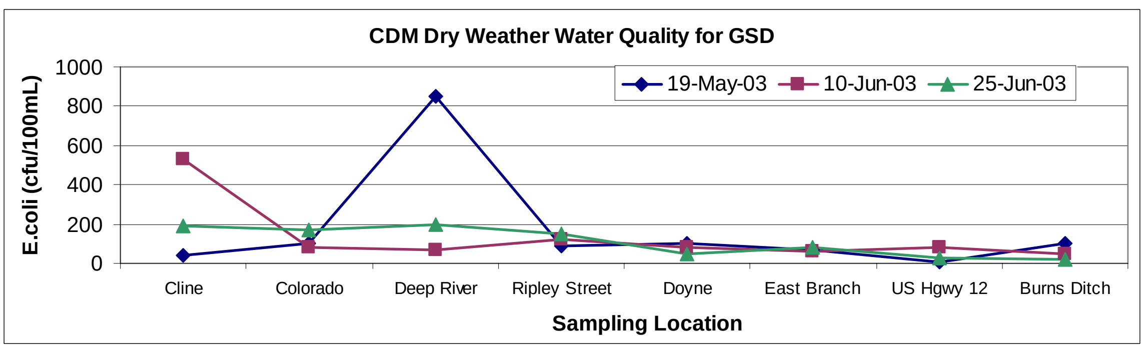


Figure 4.27: Dry weather E.coli sampling results recorded by CDM for the City of Gary.

Total Suspended Solids: Figures 4.28 and 4.29 show the total suspended solids sampling data results for the wet weather and dry weather sampling events, respectively. It can be seen from both sets of data that the western portion of the sampling area covered has higher TSS concentrations than the east. The sampling data recorded for this watershed management plan found the highest TSS concentrations to be around Grant Street which is between the Cline and Colorado Street sampling locations used here by CDM.

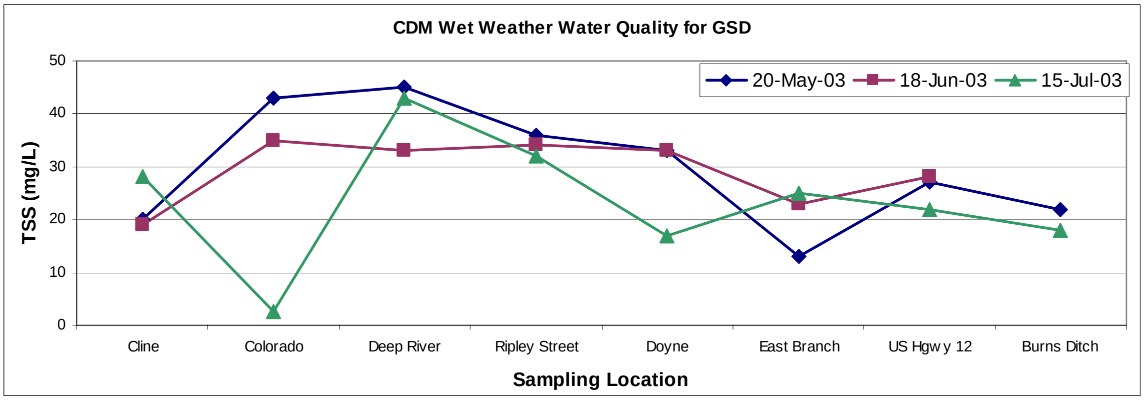


Figure 4.28: Wet weather TSS concentrations recorded by CDM for the City of Gary.

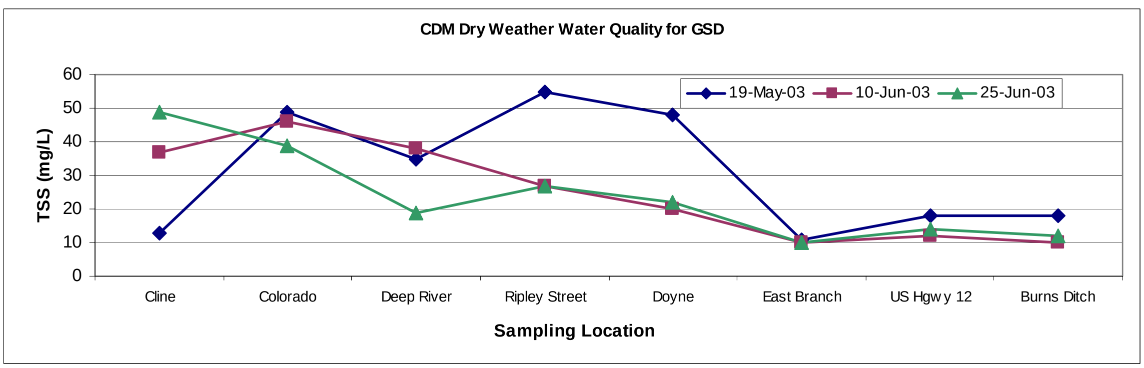


Figure 4.29: Dry weather TSS concentrations recorded by CDM for the City of Gary.

pH: The measured pH values met the state standards on all levels. They were all found to be within the minimum of six and the maximum of nine. Figure 4.30 and 4.31 show the pH values for the wet and dry weather sampling events, respectively. The blue lines represent the state standards for maximum and minimum.

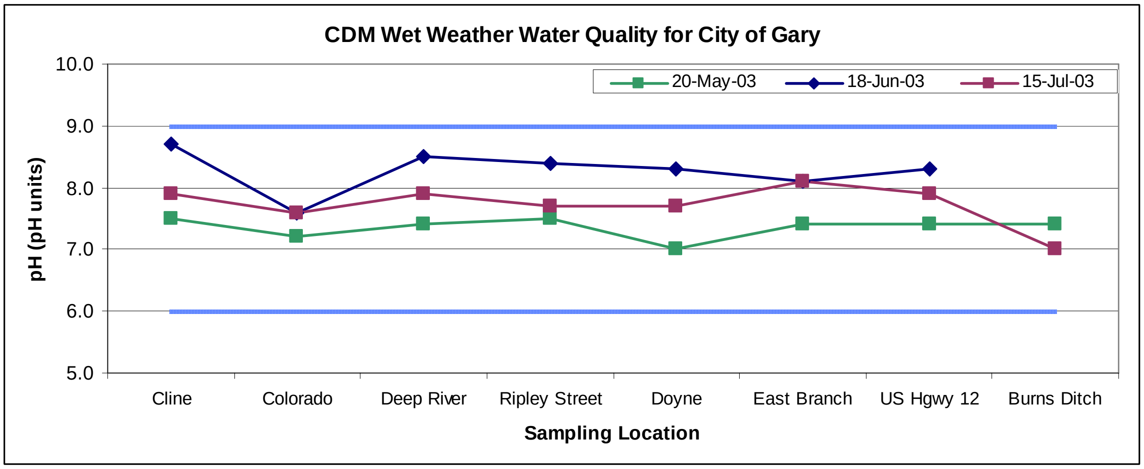


Figure 4.30: Wet weather pH values as recorded by CDM for the Gary Sanitary District.

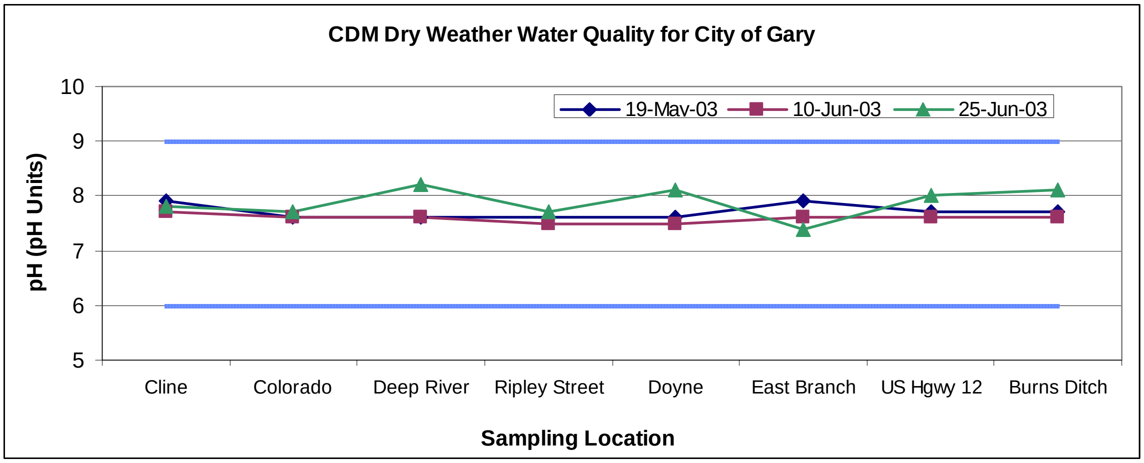


Figure 4.31: Dry weather pH values as recorded by CDM for the Gary Sanitary District.

<u>Sampling Plan</u>

Three sampling alternatives were presented to the Steering Committee on March 14, 2007. They were:

Alternative A

1.) 7 sites w/ grab samples for a full suite of water chemistry and physical parameters:
    - pH, temperature, dissolved oxygen,
    - nitrate+nitrite, organic nitrogen (TKN), ammonia nitrogen,
    - total and dissolved phosphorus,
    - turbidity, conductivity, and discharge (flow).
    - Fecal coliform as *E.coli*
    - Stormflow and baseflow samples collected once at each site.
2.) 40 long-term *E. coli* samplers
    - Samplers stay in via stakes for one month
    - Media removed and rinsed
    - Sub-sample of wash water cultured on Petri dish and enumerated
3.) Water Quality & *E.coli* Public Workshop
    - Focus on interpretation in lay persons terms
    - Public can view samples of bugs and bacteria samples
    - Approve understanding of *E.coli* threat and its status as an indicator organism
    - <u>NOTE:</u> may need approval from IDEM for workshop element to be part of sampling budget

Alternative B

1.) 7 sites w/ grab samples for a full suite of water chemistry and physical parameters:
    - pH, temperature, dissolved oxygen,
    - nitrate+nitrite, organic nitrogen (TKN), ammonia nitrogen,
    - total and dissolved phosphorus,
    - turbidity, conductivity, and discharge (flow).
    - Fecal coliform as *E.coli*
    - Stormflow and baseflow samples collected once at each site.
2.) 90 long-term *E.coli* samplers
    - Samplers stay in via stakes for one month
    - Media removed and rinsed

Sub-sample of wash water cultured on Petri dish and enumerated

Alternative C

1.) 7 sites w/ grab samples for a full suite of water chemistry and physical parameters:
    - pH, temperature, dissolved oxygen,
    - nitrate+nitrite, organic nitrogen (TKN), ammonia nitrogen,
    - total and dissolved phosphorus,
    - turbidity, conductivity, and discharge (flow).
    - Fecal coliform as *E.coli*
    - Stormflow and baseflow samples collected once at each site.
2.) 40 long-term *E.coli* samplers
    - Samplers stay in via stakes for one month
    - Media removed and rinsed
    - Sub-sample of wash water cultured on Petri dish and enumerated
3.) 5 Macroinvertebrate Sites
    - Will require Hester Dendy artificial substrate samplers due to lack of riffle habitat
    - NOTE: species diversity is affected by available habitat, therefore potential knowledge gained related to insect community health (re: surrogate for long-term water quality conditions) is some what limited since Hester Dendy samplers are only left in place a few weeks.

The creation and aim of alternative "A" was to respond to public concerns presented at the first public meeting. Alternative "C" was added based on a suggestion by steering committee members that believed some Macroinvertebrate data would be beneficial.

After much discussion, the Steering Committee selected Alternative "B" with the intent to provide two rounds of long-term *E.coli* samplers. The first round of grab samples and long-term *E.coli* samplers was planned to take place during high flows. The second round was planned for summer when only base flow is likely to be present in the river.

Macroinvertebrate data was to be gathered by the Hoosier River Watch program, though the data may not be as useful as professionally gathered data.

The seven (7) sampling sites are shown in Figure 4.32 with their exact locations and sample streams noted in Table 4.1.

A Quality Assurance Project Plan (QAPP) was submitted to the Indiana Department of Environmental Management (IDEM). The sampling plan was modified through this process to include 42 grab sample sites in lieu of the 90 long term samplers. The approved QAPP is included in Appendix 13: Quality Assurance Project Plan. The sampling sites are described in Appendix 14: Sampling Sites.

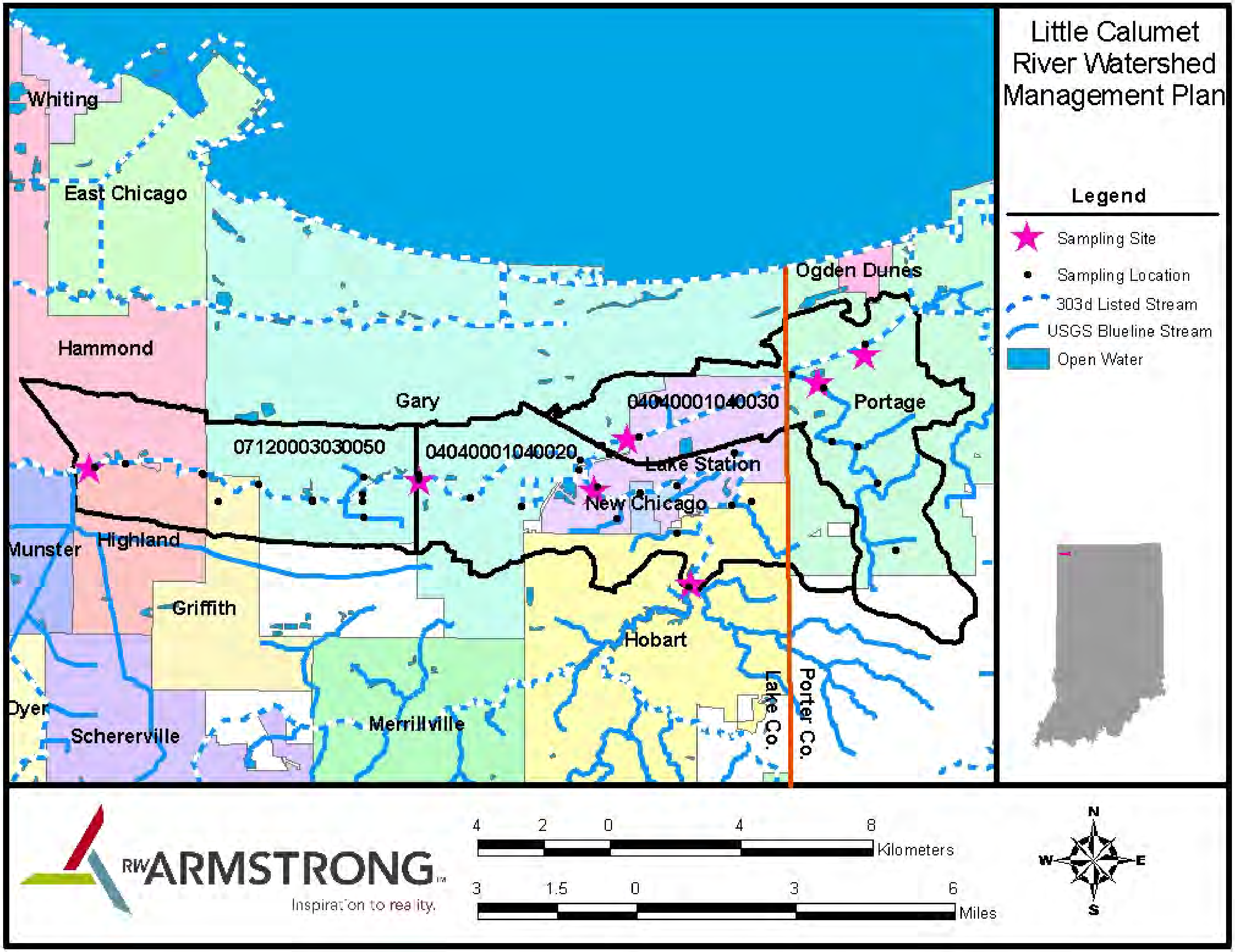


Figure 4.32: Sampling sites proposed and accepted by IDEM for a full suite of nutrient testing parameters.

Sampling Sites	Stream Name	Location	Latitude	Longitude
Site 1	Little Calumet	Indianapolis Blvd.	41.34.06	87.28.28
Site 2	Little Calumet	Grant Street	41.33.56	87.21.20
Site 3	Deep River	Upstream	41.32.14	87.15.18
Site 4	Deep River	Downstream	41.33.47	87.17.27
Site 5	Burns Ditch	Clay Street	41.34.37	87.16.45
Site 6	Willow Creek	Hwy 20	41.35.33	87.12.36
Site 7	Burns Ditch	Downstream	41.36.10	87.11.35

Table 4.1: Little Calumet River Watershed Management Plan sampling site locations.

Sampling Site Contributing Areas

The watershed area that is the focus of this study was divided into five (5) subwatersheds that were delineated by the site to which they drained. Figure 4.33 shows the five subwatersheds that the study area was broken into. The land use was summarized for each of the five (5) subwatersheds in the study area and can be found in Figures 4.34 to 4.38.

Pollutant Load Determination Based on Land Use

Expected pollutant loading rates were calculated based on the current land use summarized for each delineated subwatershed. The two sampling sites that do not have an associated watershed were used as baseline comparison points.

The watershed was separated into five subwatersheds, each contributing to a different sampling site, Sites 2, 4, 5, 6, and 7. Within each specific sampling sites watershed the land use areas were tabulated and the pollutant loads determined using the United States Environmental Protection Agency (U.S. EPA) Region V Watershed Treatment Model (WTM) Version 3.1. The WTM was created in an excel format by the Office of Wetlands, Oceans and Watersheds and can be found and downloaded via the internet on the EPA website.

The drawback to the model used is that it only calculates the Total Nitrogen, Total Phosphorus, Total Suspended Solids and Fecal Coliform. This does not cover the same parameters tested for as part of the water quality testing completed for this plan. The determination of fecal coliform does not allow a direct comparison to the data collected. It is estimated that the *E.coli* bacteria concentrations are about 80% of the fecal coliform concentrations according to the TMDL prepared for the Little Calumet River.

The results of the WTM are shown in Table 4.2

Summary of Calculated Pollutant Loads		TN lb/year	TP lb/year	TSS lb/year	Bacteria billion/year
Sampling Site #2	Total	77634.72505	9626.678867	2215445.901	2881371.093
	Storm	67185.44355	9005.798767	2126249.801	2881371.093
	Non-Storm	10449.2815	620.8801	89196.1	0
Sampling Site #4	Total	49914.49127	6346.572785	1452197.602	1756754.933
	Storm	42668.37327	5838.227985	1403691.302	1756754.933
	Non-Storm	7246.118	508.3448	48506.3	0
Sampling Site #5	Total	46380.93083	5817.501848	1301459.691	1720582.641
	Storm	40444.85283	5441.529848	1254902.291	1720582.641
	Non-Storm	5936.078	375.972	46557.4	0
Sampling Site #6	Total	40357.62145	5327.227418	1200551.513	1310087.86
	Storm	33281.55695	4753.587418	1162953.263	1310087.86
	Non-Storm	7076.0645	573.64	37598.25	0
Sampling Site #7	Total	37165.85372	4686.047654	1139354.857	1175854.182
	Storm	29899.67322	4177.695454	1090435.657	1175854.182
	Non-Storm	7266.1805	508.3522	48919.2	0
TOTAL	Total	251453.6223	31804.02857	7309009.565	8844650.709
	Storm	213479.8998	29216.83947	7038232.315	8844650.709
	Non-Storm	37973.7225	2587.1891	270777.25	0

Table 4.2: Calculated pollutant loadings based on land use in subwatersheds using WTM.

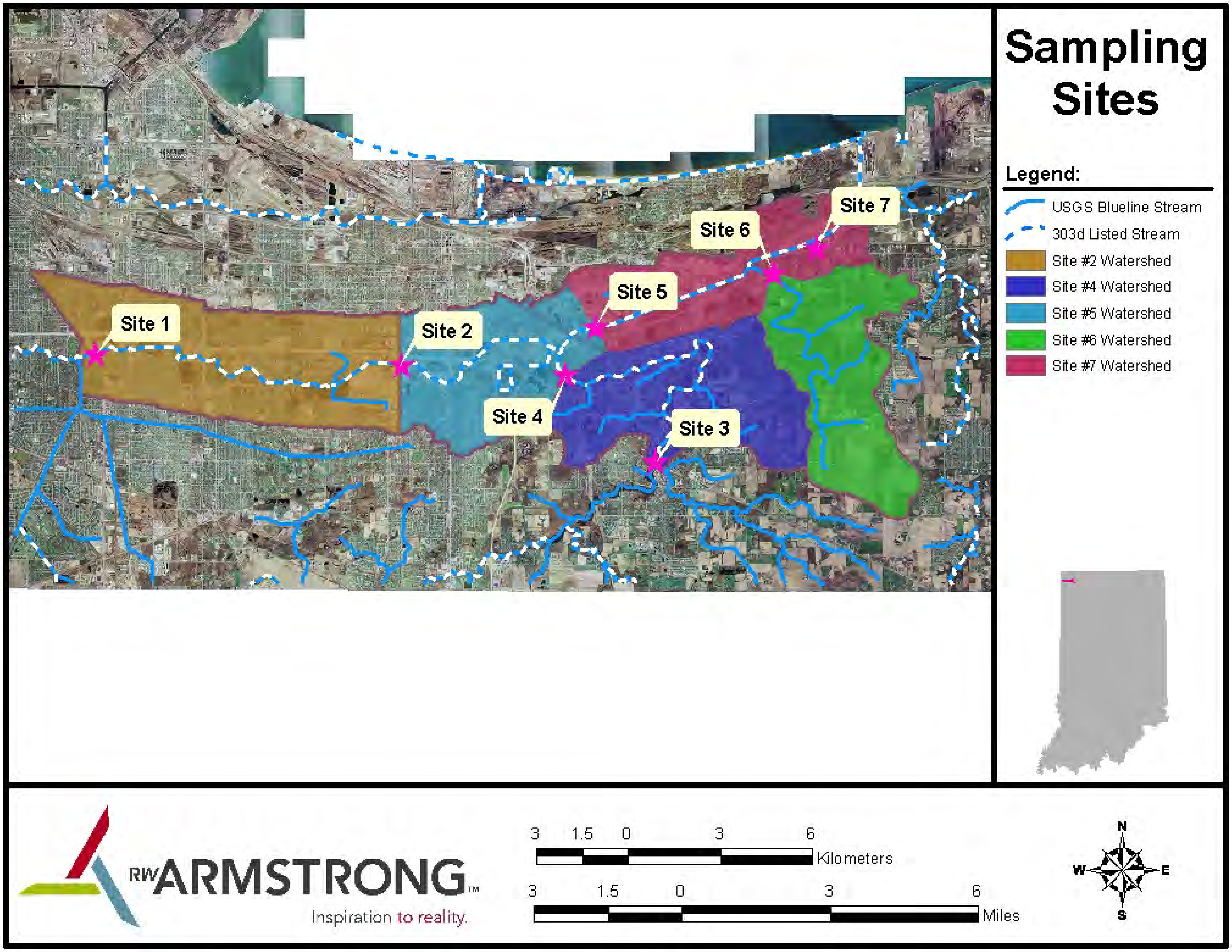


Figure 4.33: Delineation of sampling site watersheds.

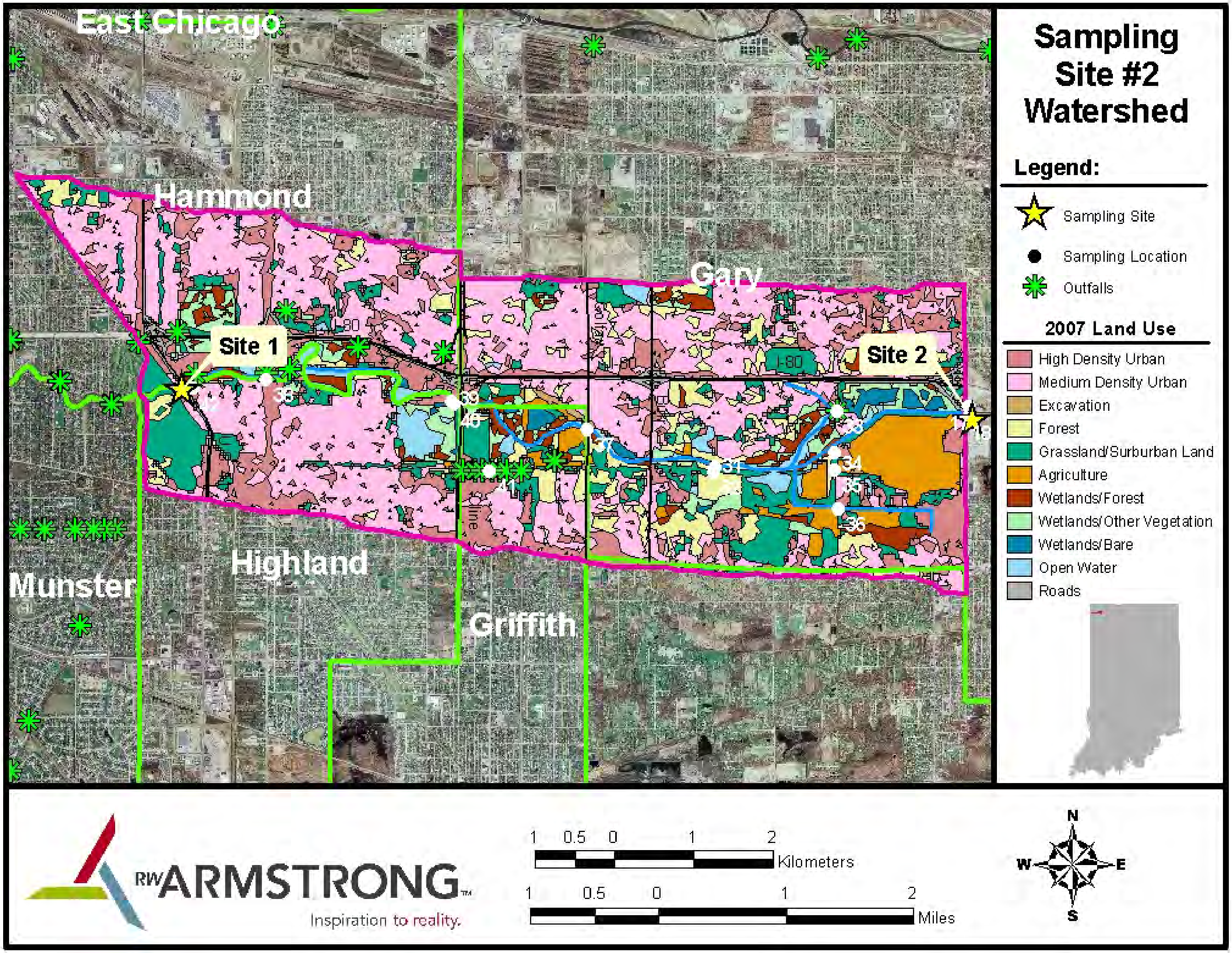


Figure 4.34: Sampling Site 2 subwatershed land use map.

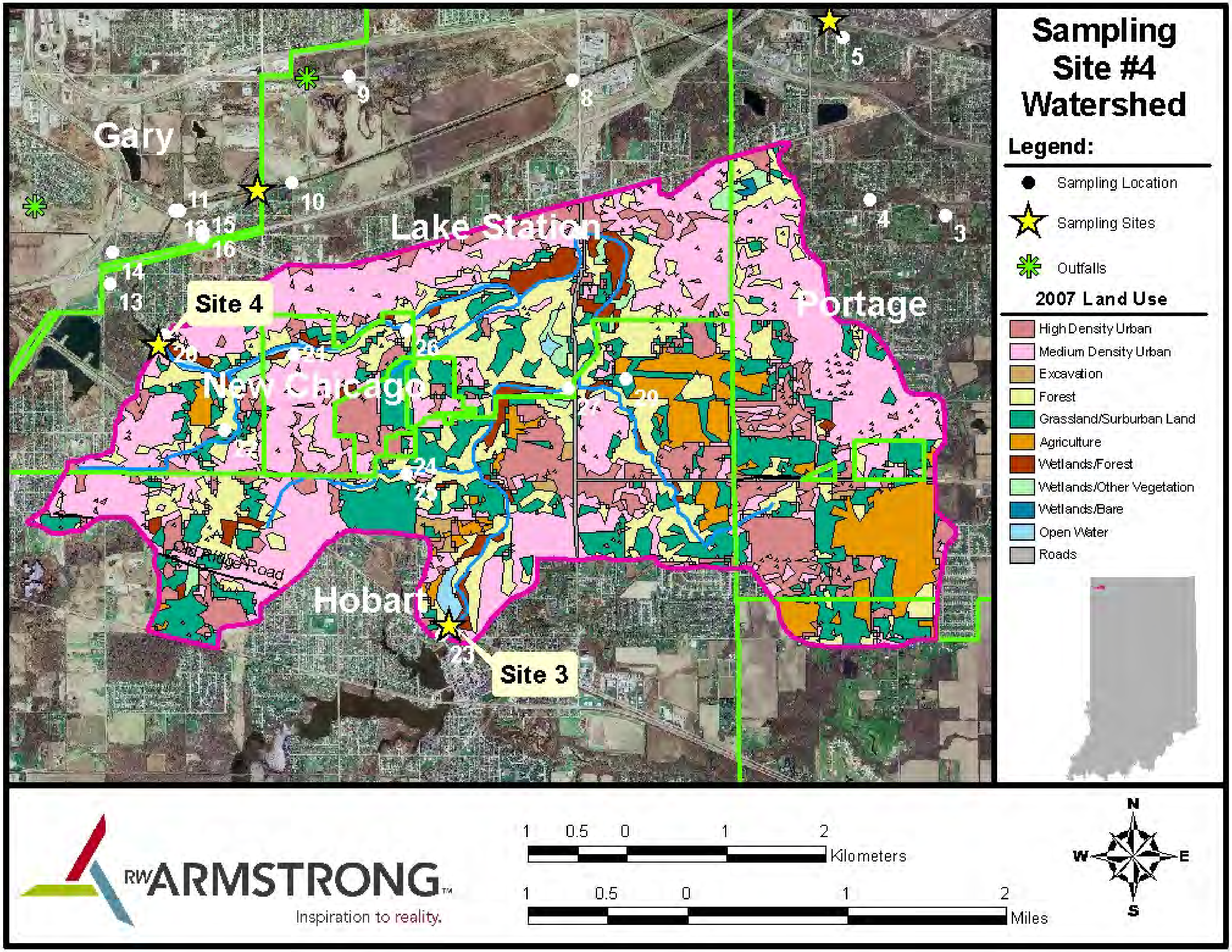


Figure 4.35: Sampling Site 4 subwatershed land use map.

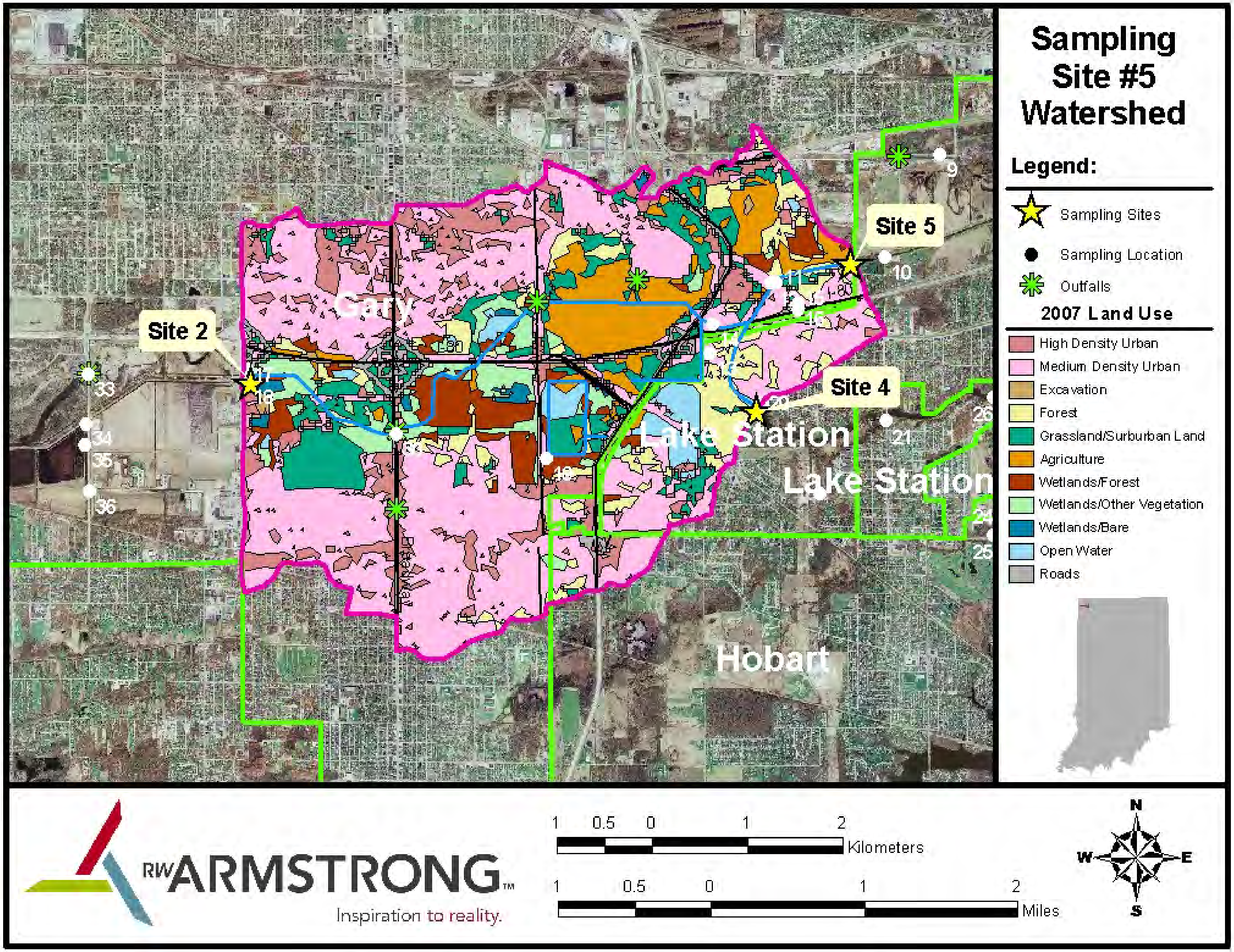


Figure 4.36: Sample Site 5 subwatershed land use map.

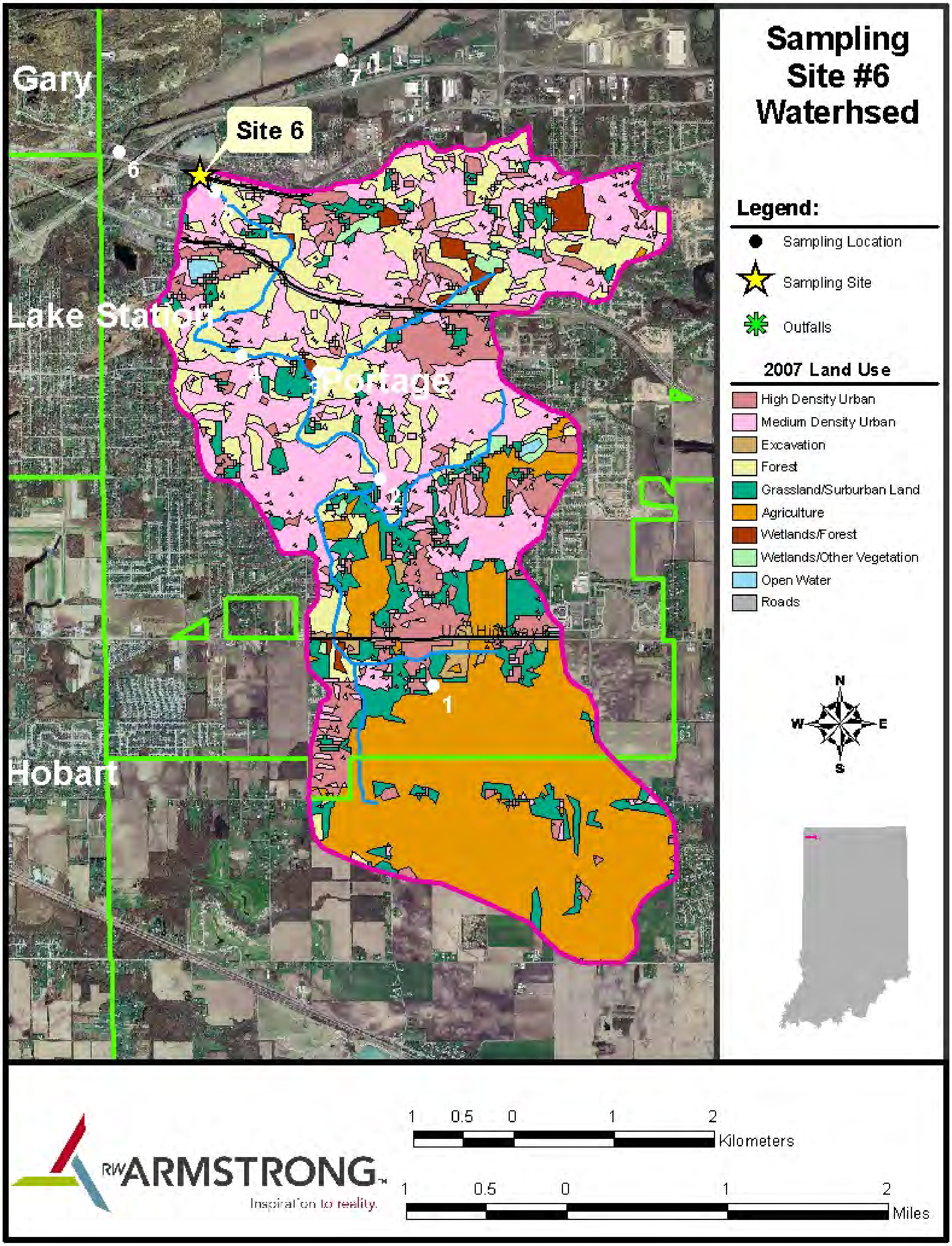


Figure 4.37: Sample Site 6 subwatershed land use map.

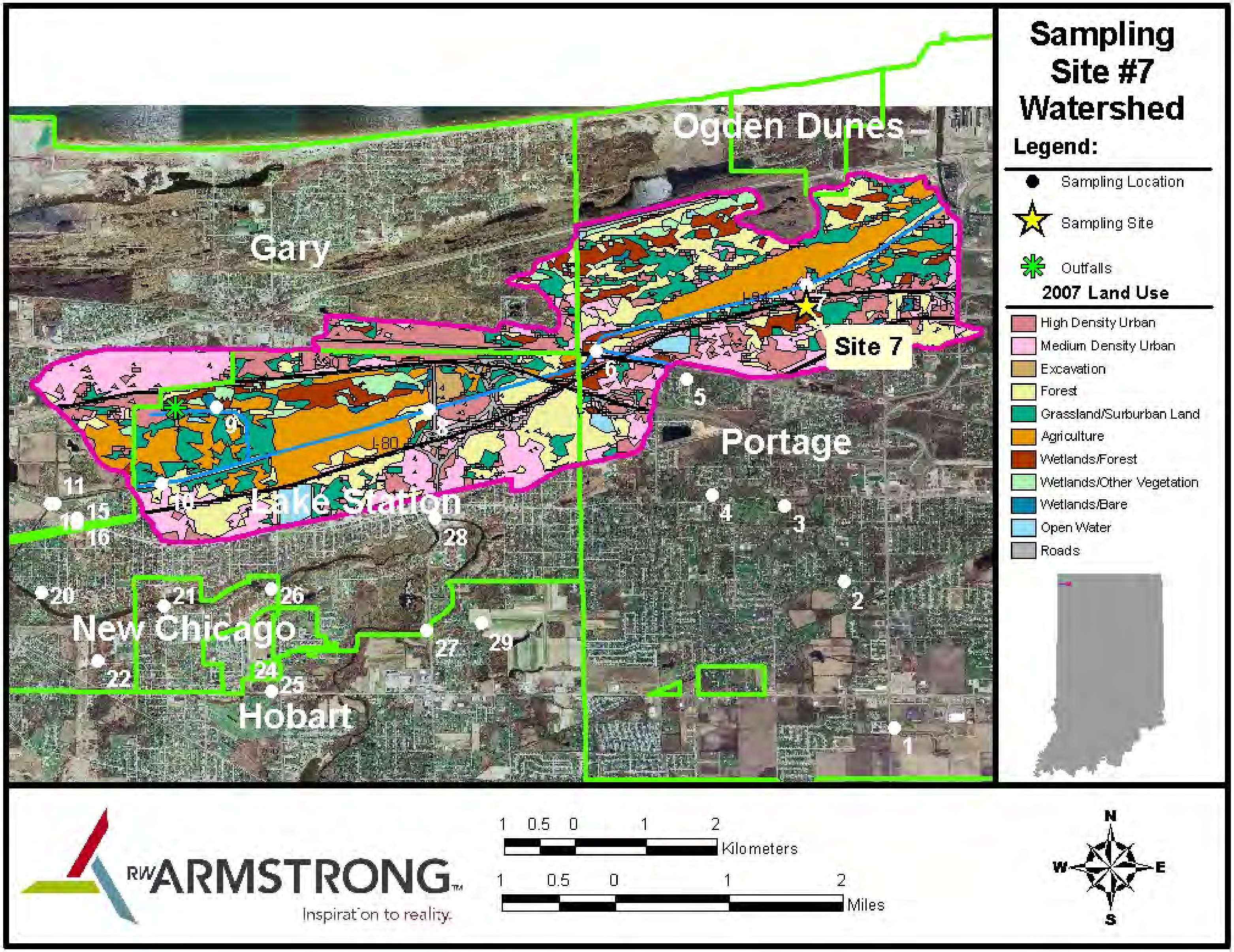


Figure 4.38: Sample Site 7 subwatershed land use map.

Sampling Results

According to the modified QAPP plan, found in Appendix 13: Quality Assurance Project Plan, there were seven (7) sampling sites that were sampled twice, once for storm flow and once for base flow, for the full suite of chemical and physical parameters. The water quality sampling found concentrations of NH_3, NO_3, TP, Ortho-P, TSS, and *E.coli*. The DO and pH levels were also found for each sampling site during both storm and base flow conditions. The sampling results for NH_3, NO_3, TP, Ortho-P, and TSS were converted to yearly loading rates to allow for a direct comparison to the expected yearly loading rates found using the WTM. The results of these water quality samplings, converted to yearly loading rate from concentrations, can be found in Tables 4.3 and 4.4. There were also 42 sampling locations that had four (4) separate grab samples performed to find *E.coli* concentrations in the Little Calumet River and its tributaries. Two grab samples were taken during what was considered to be base flow and two during storm flow to analyze the *E.coli* concentrations. The sampling results for these grab samples can be found in Table 4.5. The sampling sites and location can be seen in Figures 4.34 to 4.38. Fourteen of the 42 sampling locations were on the Little Calumet River itself, while the others were on tributaries including drainage ditches.

One sampling location at the uppermost end of the Little Calumet River (Indianapolis Blvd.) had 100% of its samples exceed the recreational standard for *E.coli*. Since contamination at this upstream site has the potential to negatively affect the entire river, finding and reducing sources of bacteria at this site are of the highest priority.

Other high priority sites include Willow Creek (67% of its samples exceeded the criteria for impairment by *E.coli*), the Little Calumet River at Grant Street (87% of the samples indicated impaired conditions), and a tributary of Deep River at Lake Park Avenue (75% of its samples showed impairment).

Two locations (one site on the lowermost end of the Little Calumet River at the Lake/Porter County Line and a tributary of the Little Calumet River at Three Rivers Park) fully supported their recreational uses. *E.coli* at these locations had a mean of less than 235 cfu/100 ml and no values higher than 576 cfu/100 ml.

Nitrate and phosphorus concentrations on the Little Calumet River were relatively low. A notable exception was at sampling site #1, Indianapolis Boulevard, during base flow conditions. This site had elevated nitrate and extremely high phosphorus values.

Dissolved oxygen levels fell below the state water quality standard (4 mg/l) at four sites during base flow and at two sites during storm flow. The lowest value occurred at Indianapolis Boulevard, indicating again the importance of finding and reducing pollutant sources in this area.

Sampling Site	Base Flow Pollutant Loads from Water Quality Sampling							
	DO (mg/L)	NH_3 (lbs/yr)	NO_3 (lbs/yr)	TP (lbs/yr)	Ortho-P (lbs/yr)	TSS (lbs/yr)	E.coli (cfu/100mL)	pH SU
1*	6.7	2,042	34,708	19,600	11,025	44,916	3,150	7.4
2	3.4	4,900	15,244	708	653	506,325	255	7.6
3**	5.1	17,014	40,833	8,167	5,104	748,598	501	7.9
4	3.3	20,586	37,056	10,705	5,352	1,070,496	61	7.5
5	3.1	14,004	56,014	6,068	4,201	606,821	118	7.5
6	7.6	2,144	3,335	429	357	14,291	927	7.7
7	6.2	24,500	146,998	11,760	10,780	440,993	125	7.5

* Water quality data entering into watershed on Little Calumet River

** Water quality data entering into watershed on Deep River

Table 4.3: Base flow pollutant loads for the seven sampling sites.

Sampling Site	Storm Flow Pollutant Loads from Water Quality Sampling							
	DO (mg/L)	NH_3 (lbs/yr)	NO_3 (lbs/yr)	TP (lbs/yr)	Ortho-P (lbs/yr)	TSS (lbs/yr)	E.coli (cfu/100mL)	pH SU
1*	0.3	104,484	156,725	18,807	15,673	2,455,363	1,820	7.1
2	2.9	125,380	195,036	13,931	12,538	2,228,982	1,320	7.3
3**	6.1	696,557	957,766	121,897	113,190	25,250,184	2,380	7.3
4	4.8	2,107,084	1,158,896	200,173	158,031	20,544,072	1,240	7.4
5	6.0	1,552,747	1,074,979	71,665	59,721	33,443,782	1,760	7.4
6	7.1	115,803	73,138	7,314	6,704	1,432,295	2,900	7.4
7	6.0	1,629,943	1,253,802	275,836	225,684	45,136,881	2,600	7.3

* Water quality data entering into watershed on Little Calumet River

** Water quality data entering into watershed on Deep River

Table 4.4: Storm flow pollutant loads for the seven sampling sites.

Sampling Location	E. coli (cfu/100ml)			
	Dry Weather (7/24/2007)	Wet Weather (8/21/2007)	Wet Weather (9/26/2007)	Dry Weather (10/30/2007)
1		695	2	225
2	1804	3890	0	341
3	448	465	4	190
4	25	1620	0	218
5	396	2570	6	174
6	94	220	2	52
7	2	200	0	3
8	3	1385	2	5
9	1	2775	0	32
10	228	910	6	15
11	207	11130	0	144
12	108	340	2	15
13	56	215	6	1
14	353	415	14	20
15	270	3760	0	46
16	692	2765	0	75
17	119	1010	982	78
18	345	695	0	58
19	1	345	0	428
20	88	310	0	113
21	51	720	0	79
22	111	130	6400	7
23	374	945	8	40
24	505	685	2	77
25	275	565	2540	48
26	68	2285	114	16
27	937	2145	182	445
28	375	1220	56	260
29	158	4120	170	5
30	168	735	6	18
31	5	2310	1030	72
32	72	1610	792	102
33	50	405	882	8
34	71	1065	110	19
35	129	1100	358	27
36	51	755	4	2
37	4	1600	654	92
38	3	4580	2700	79
39	36	4515	62	67
40	9	2375	292	2
41	86	105	2440	44
42	913	2040	3100	586

Table 4.5: E.coli concentrations of grab sample location during both storm and base flow.

Baseline Conclusions

E.coli Bacteria

E.coli bacteria is the major pollutant of concern in this watershed. Significant contributions enter the watershed on the west end where flow from Hart Ditch has been sampled as high as 10,000 cfu/100mL. (HNTB, 2003). These elevated levels can be seen in Figure 4.39 where the x-axis is based on a distance measurement and the point represents the sampling location position along the Little Calumet River. The distance represents how far away from the first sample location, located at Indianapolis Boulevard, each of the 13 subsequent locations is along the Little Calumet River. The sample location immediately downstream of Hart Ditch, distance is zero meters, was the only location to exceed the state standard of 235 cfu/100mL in all four grab samples taken. A horse farm rep0rtedly exists in this western area just south of the Borman Expressway and may be contributing to this reading.

There is a second peak that indicates a possible hotspot around the 18,000 meter mark. This location is downstream of the convergence of Deep River with the Little Calumet River. Figure 4.40 shows the CDM data collected for the Gary Sanitary District in which there are elevated levels of *E.coli* at the same location. The x-axis is based on the same zero point of distance as Figure 4.39, showing the peak happens in the same physical location. A horse farm reportedly exists in this area as well and may be contributing to this reading.

Contributions from the watershed itself, even without CSO discharges, cause the river to exceed the state water quality standards for *E.coli* bacteria. Figure 4.41 visually summarizes the results of the *E.coli* sampling exceedance locations. Of

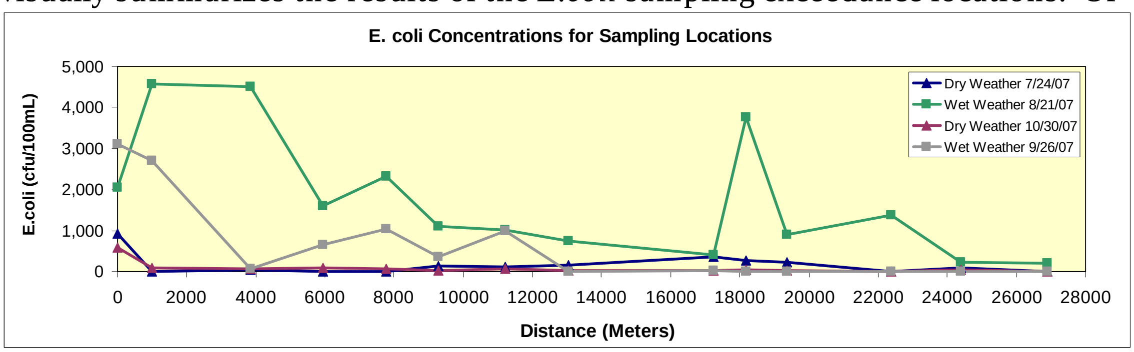


Figure 4.39: E.coli concentrations of sample locations along the Little Calumet River.

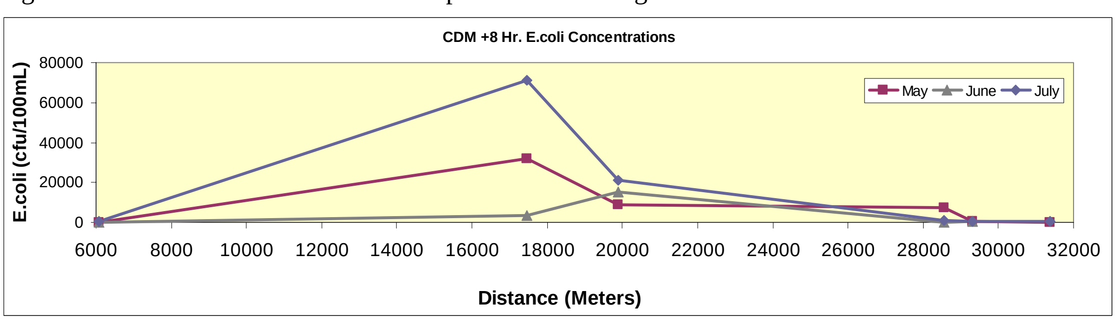


Figure 4.40: E.coli concentrations according to data reported in the 2003 CDM report to GSD.

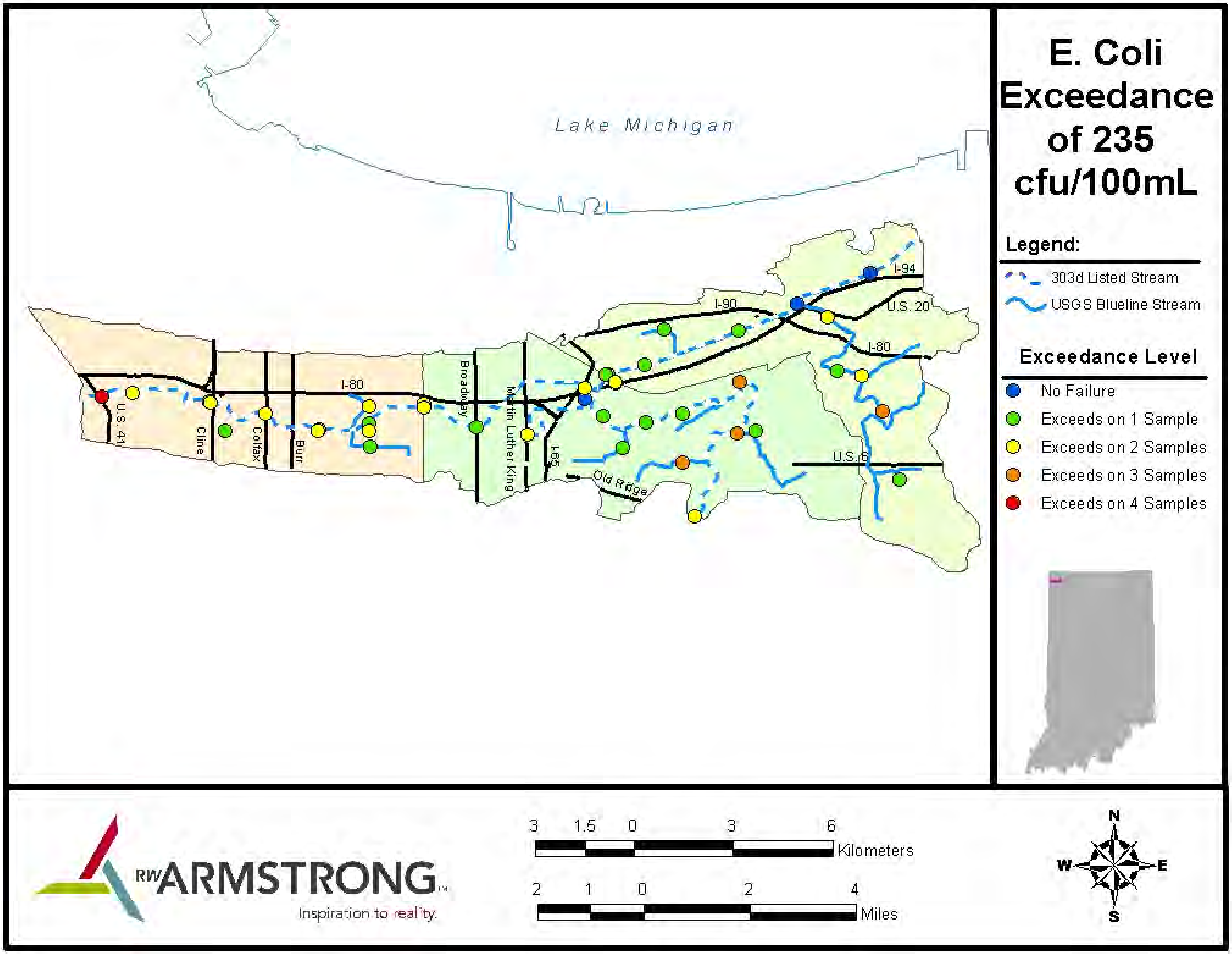


Figure 4.41: Sampling locations E.coli exceedance frequency and location.

the 42 sampling locations, only two never exceeded the 235 cfu/100mL standard. Thirty-nine of the locations met the standard at least once in the four samples and one was consistently above the 235 cfu/100mL mark.

As Figure 4.41 shows, all of the sampling sites that exceeded the 235 cfu/100mL standard more than three times were on tributaries to the Little Calumet River, or just downstream from their confluence with the Little Calumet River. The highest concentration of points exceeding the state standard at two of the four grab samples was located in the western most watershed immediately downstream from Hart Ditch.

Total Nitrogen (TN)
The calculated yearly loading rates for Total Nitrogen at each sampling site found using the Watershed Treatment Model (WTM) were greatly exceeded by the measured loads found during the water quality sampling conducted for this plan. Tables 4.2 to 4.4 show the calculated pollutant loads, measured base flow pollutant loads, and measured storm flow pollutant loads, respectively. When looking at these numbers it can be seen that sample site #7, at the eastern edge of the watershed study area, had the highest values compared to the calculated. The non-storm, or base flow, loads were more than 25 times the calculated while the calculated storm load was exceeded by nearly a factor of 100. This comparison indicates that the sample data may not be reliable. More sampling events are needed to ensure a representative measured load has been found.

High TN loads can be problematic for the aquatic life of the Little Calumet River and its tributaries. TN is very soluble and therefore does not evaporate. Without evaporation being a possibility the only way for nitrates and nitrites to leave surface water is through consumption by plants and animals. The increased consumption of nitrates by aquatic life can potentially lead to the death of the local fish life. The increased presence of nitrates can also lead to a growth in the number of algae blooms along the river and its tributaries. The presence of increases algae blooms can lead to eutrophication which can create significant changes to the ecosystem.

Total Phosphorus (TP)
Total Phosphorus in the measured water quality sample results conducted for this plan exceeded the calculated pollutant loads that were expected when looking at the land use. Sample sites # 2 and 6 were close in yearly loading rates: exceeding the calculated loads by less than a factor of two (2). Sample site #7 was once again the worst site exceeding the calculated loads (Table 4.2) by a factor of 23 for the non-storm or base flow (Table 4.3) and a factor of 66 for the storm flow (Table 4.4).

The presence of TP in surface water is essential for plant life. The water measured quality sampling results exceeding the calculated WTM pollutant loadings can possibly mean that the current loading rate is too high. When phosphorus concentrations are too great in surface water the eutrophication, or reduction in Dissolve Oxygen (DO) is sped up due in an increase in mineral and organic nutrients. One way to visually measure if the TP level is too great is through excess algae bloom.

Total Suspended Solids (TSS)

The measured water quality sample results of the Total Suspended Solids compared to the calculated loads found using the WTM followed the same pattern as the total nitrogen and total phosphorus. Sample site #7 exceeded the calculated storm flow by the greatest factor (over 40). The non-storm or base flow had the greatest exceedance factor at sample site #4, at over 20. The calculated total suspended solids yearly loads, the measured base flow pollutant loads and the measured storm flow pollutant loads can be found in Tables 4.2 to 4.4, respectively.

The presence of increased levels of TSS in a water body has similar effects on the aquatic life that elevated concentrations of TN and TP have. As the concentration of TSS raises a decrease in macroinvertebrate density happens creating a poor environment for fishing. The resulting poor aquatic habitat makes keeping the TSS concentration relatively low important so that the Little Calumet River and its tributaries can maintain recreational features.

Overview

Figures 4.42 and 4.43 show the sites that had the worst base flow and storm flow nutrient loads, respectively. Sites that present problems both in base flow and storm flow are Sites one (1) and four (4). Site 4 is sampling the Deep River and while there do not seem to be *E.coli* bacteria problems, other nutrients are affecting the water quality here. Sampling Site 1 has a number of problems that differentiate between base flow and storm flow.

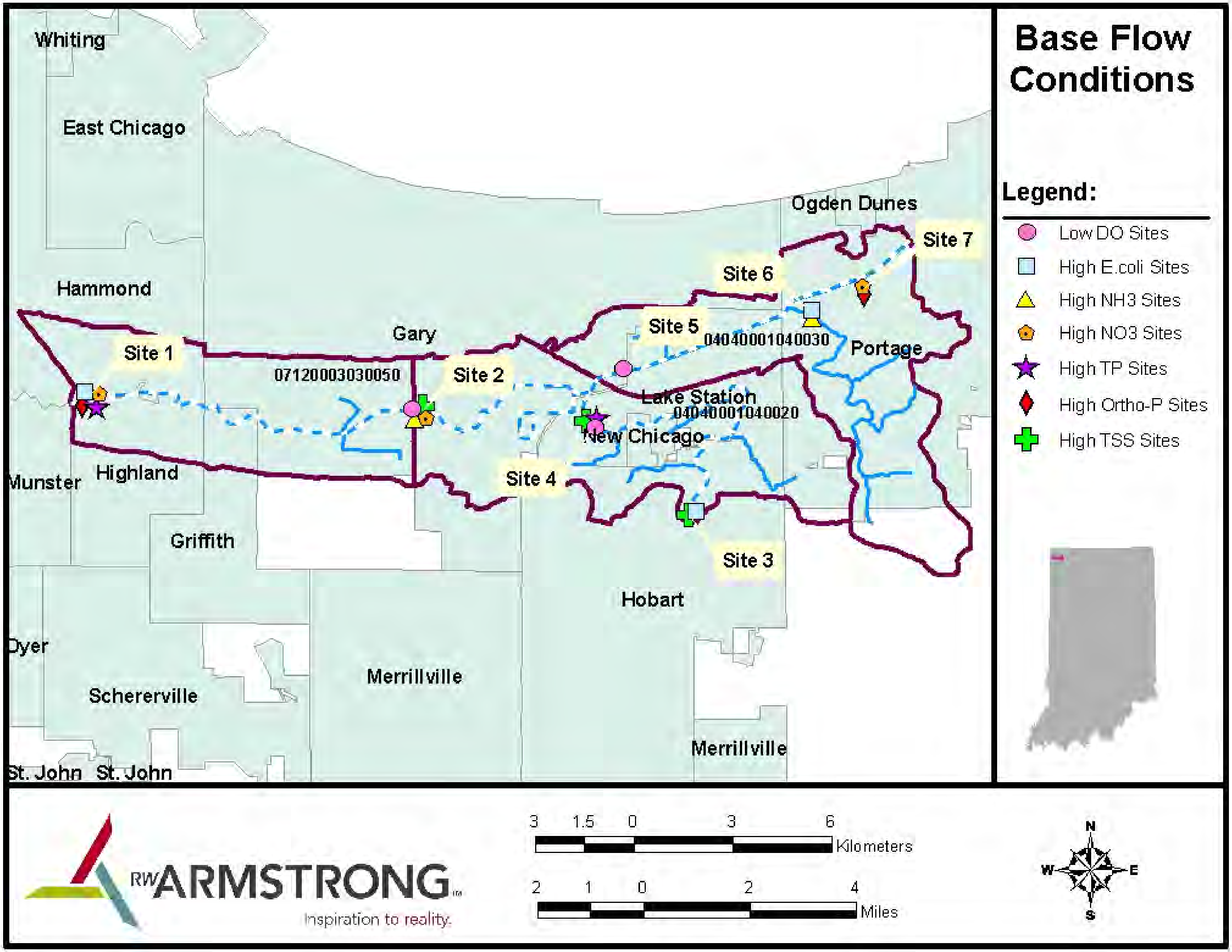


Figure 4.42: Base flow nutrient problems for the Little Calumet River Watershed Management Plan sampling sites.

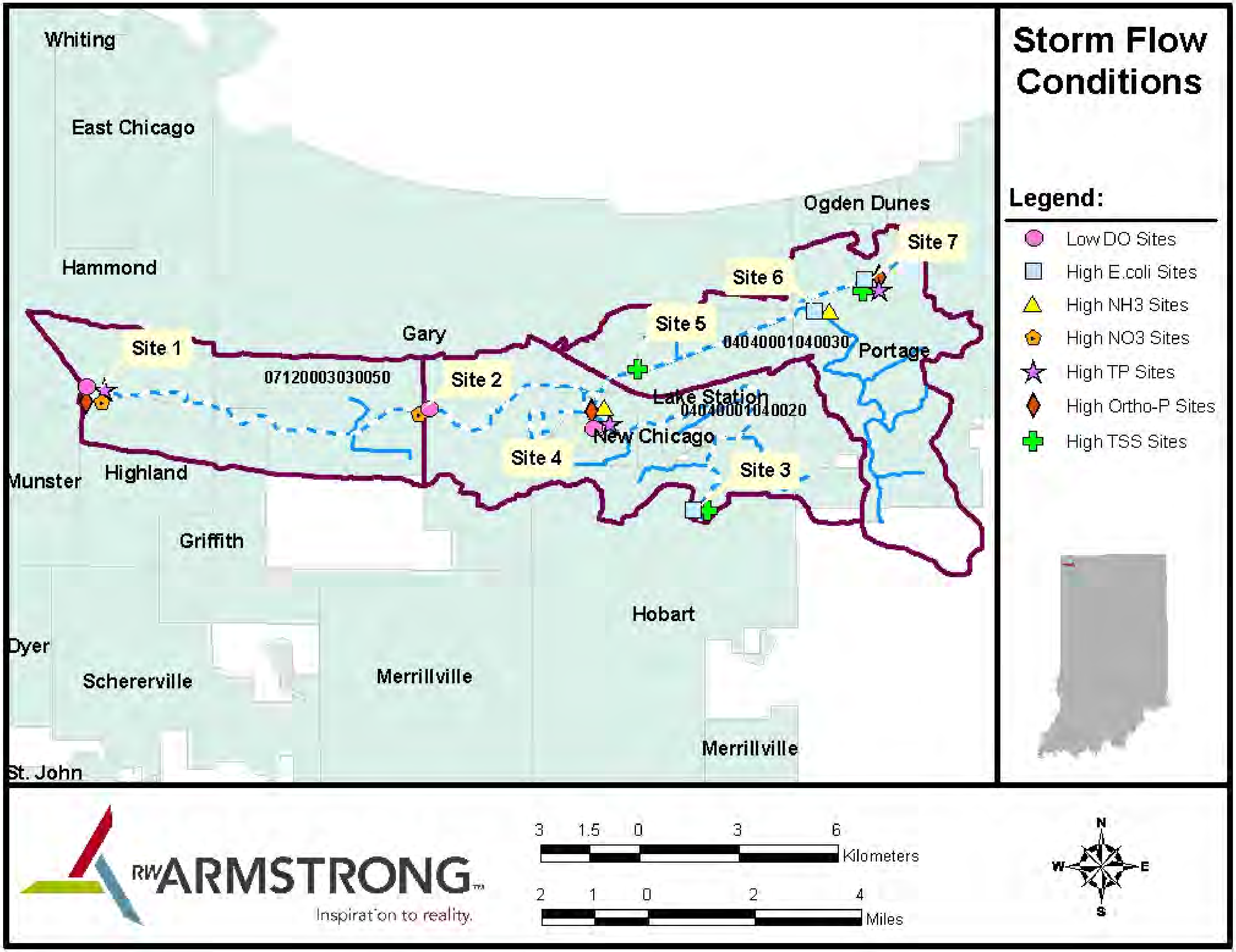


Figure 4.43: Storm flow nutrient loads for the Little Calumet River Watershed Management Plan sampling sites.

Stream Reach Survey

The Stream Reach Survey was conducted on October 31, 2007.

Methods

The Stream Reach Survey was conducted by a two-person team including an aquatic biologist and a plant ecologist. The Environmental Protection Agency's Rapid Biological Protocol (RBP) was conducted at 24 sites along the river (Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.). The RBP scores represent the general habitat quality of a particular stream reach visible to the surveyors from each survey location in either direction. The RBP habitat assessment looks at multiple key features including available cover, sediment deposition, channel flow status, channel sinuosity, bank stability, and riparian vegetative zone. Appendix 15: Rapid Bioassessment Protocols Data Sheets contains a habitat assessment field data sheet that was used to analyze the condition of the stream. RBP scores were recorded at locations where *E. coli* water quality sampling was also conducted to assist in the interpretation of physical factors on *E. coli*. A photo log was also conducted as part of the survey. Photo locations are shown in Figure 4.44 and Appendix 16: Stream Reach Survey Photos contains the photos.

The surveying scientists made every effort to collect habitat information and other scientific observations from as many accessible sites along the river as were possible to reach by car and by foot while respecting private property. The surveying team also canoed a few segments of the river; however, it was impractical to conduct on-stream evaluations in a number of areas given the number of culverts and available launch points. It is the professional judgment of the team that the number of sites assessed provides a comprehensive look at habitat along the Little Calumet River. While conducting formal RBP assessments, the surveying scientists also made observations and field notes regarding the following: invasive species, shoreline erosion, visible pollution hotspots, buffer widths, low-flow/stagnant areas, important natural area, and areas of notable human influence/degradation.

Findings

The Little Calumet River and associated waterways within this watershed have seen significant human alteration. As a result, public perception about the habitat and natural resource value of the stream tends to be negative. The stream reach survey results do not support this perception. In fact, some stretches of the stream provide important habitat and water quality function for this highly urbanized watershed. Other isolated stretches, do however; suffer from some narrow buffers and adjacent land use impacts (Figure 4.48).

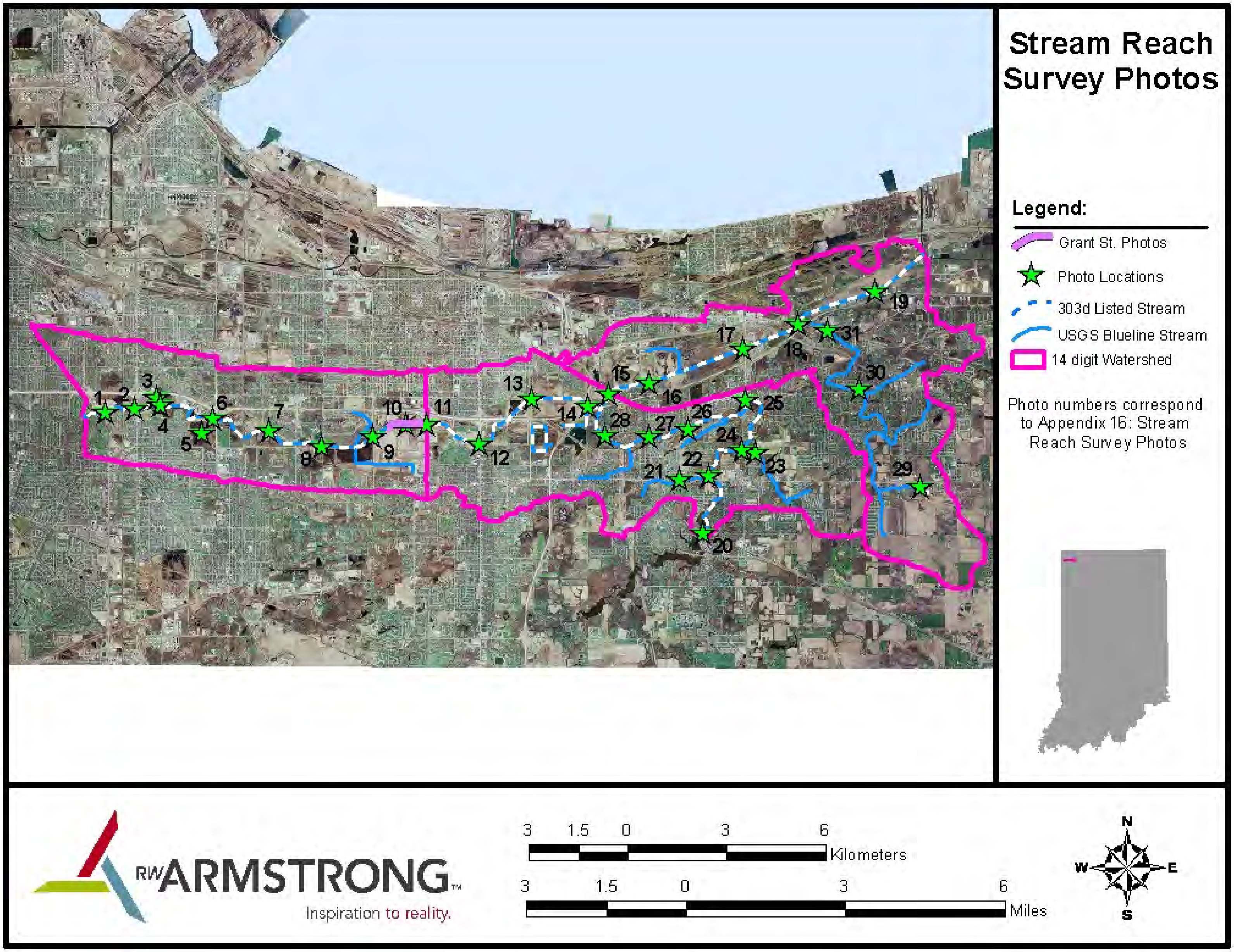


Figure 4.44: Locations of stream reach survey photos.

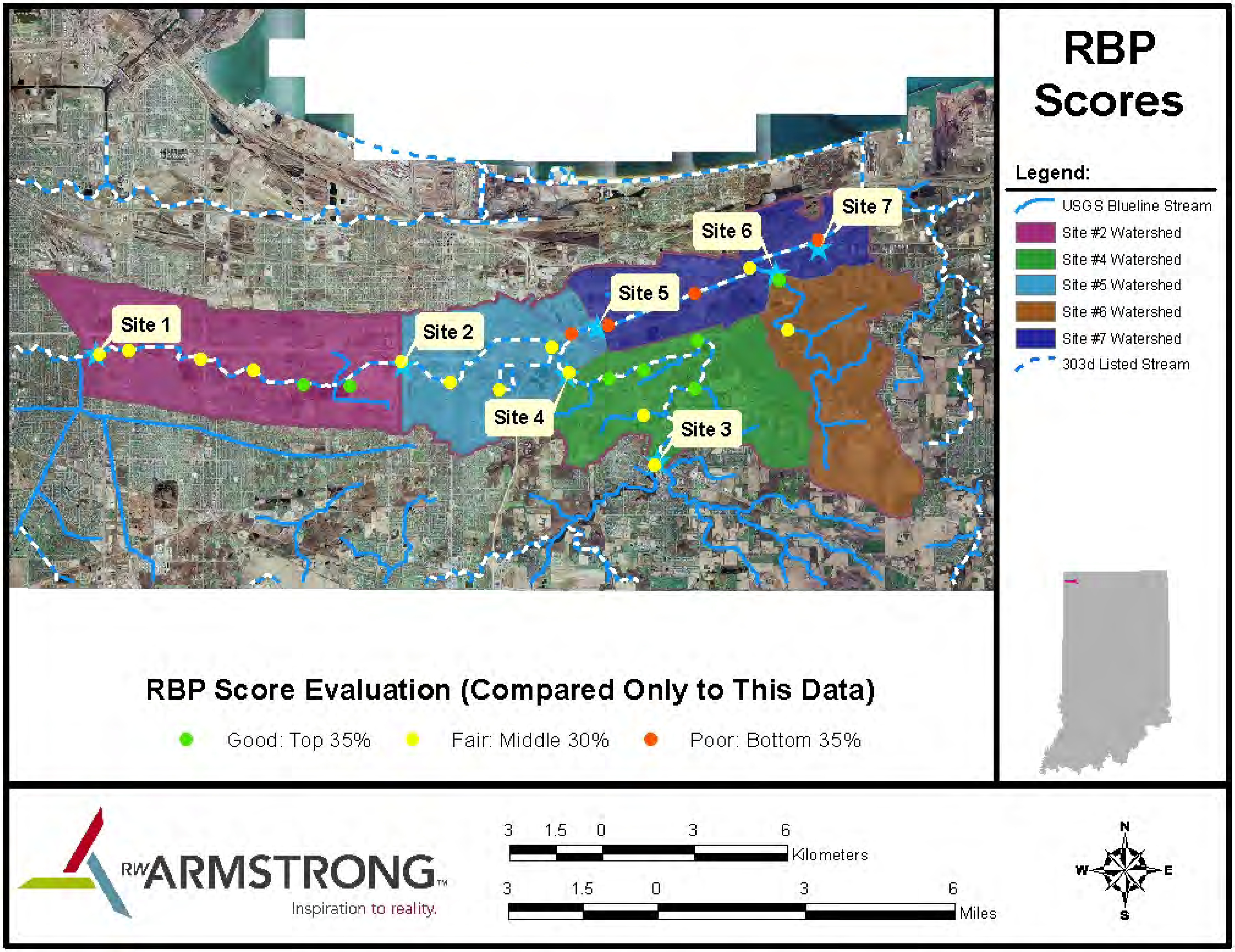


Figure 4.45: RBP scores throughout watershed and their corresponding grade (good, fair, poor)

RBP scores along the Little Calumet River and its tributaries ranged from 44 to 160, with the highest possible score being 200. The total number of sites and their associated scores were divided into three (3) categories based on appropriate breaks in the data set and the judgment of the survey team. Since the watershed study is designed to be a relative comparison of areas that may need protection or restoration, the scores were defined as good, fair, and poor (relative to one another), not necessarily compared to other streams in the state. These conclusions about habitat throughout the project area are shown in Figure 4.45. Data sheets can be found in Appendix 15: Rapid Bioassessment Protocols Data Sheets.

Little Calumet River

The Little Calumet River is for the most part a well buffered stream. Trees and floodplain wetlands line the majority of the stretch of the Little Calumet. The work done by the USACE building levees and creating flood control zones has resulted in a system of wetlands and floodplains that buffer both sides of the Little Calumet along a significant portion of its length. The stream itself is very channelized and turbid. Wood duck boxes have been placed along the stream in areas. Other than the constant roar of traffic, there are many times when you would not think you are in a highly urbanized area.

An important habitat location along the Little Calumet is the heron rookery (Figure 4.46). This large wetland complex contains large trees with numerous, giant heron nests. Other wetland and oxbow complexes along the Little Calumet provide water quality improvement via water filtration and attenuation of floodwaters. Many of these areas also provide habitat for fish, songbirds, and amphibians. Important wetland features are called out on Figure 4.47. Wetland habitat in the area is however negatively impacted by the presence and domination of invasive species. Habitat scores through this stretch ranged from 77 to 120.

Burns Ditch

Burns Ditch represents the most channelized section of the Little Calumet river system. Burns Ditch is a straight line segment of river designed to have a direct route to Lake Michigan. Buffers are minimal in this area as the adjacent land is used for agricultural production. Farming practices occur right up to the edge of the stream bank. Even though it is highly channelized, the waters of Burns Ditch are often hospitable enough for trout and many fishermen fish these waters. Fishermen were observed in this location numerous times throughout the watershed study. A number of marinas are located along Burns Ditch to support the many large boats that travel the waterway to get to Lake Michigan. Habitat scores through this stretch ranged from 44 to 66.

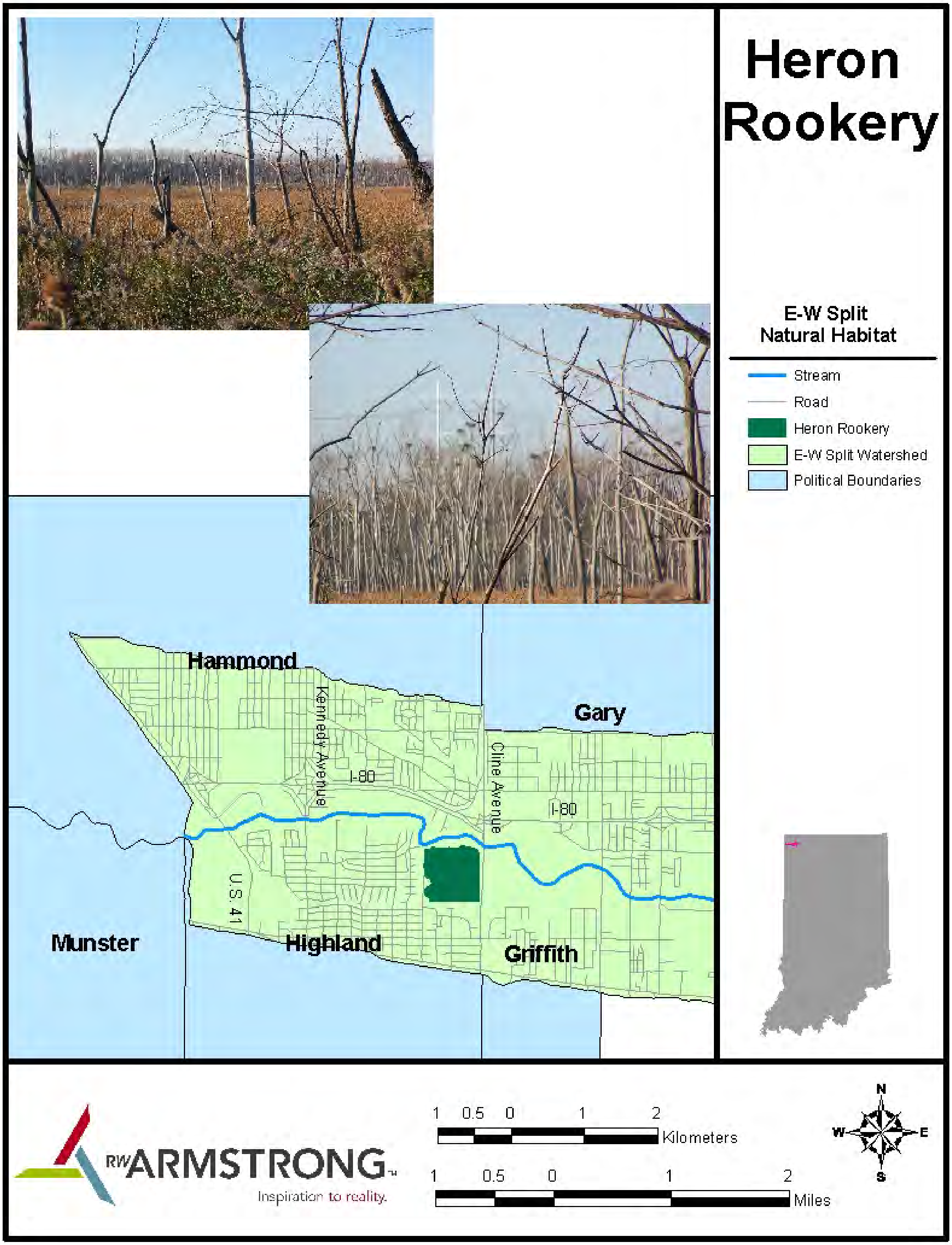


Figure 4.46: Location and condition of Heron Rookery located along Cline Avenue.

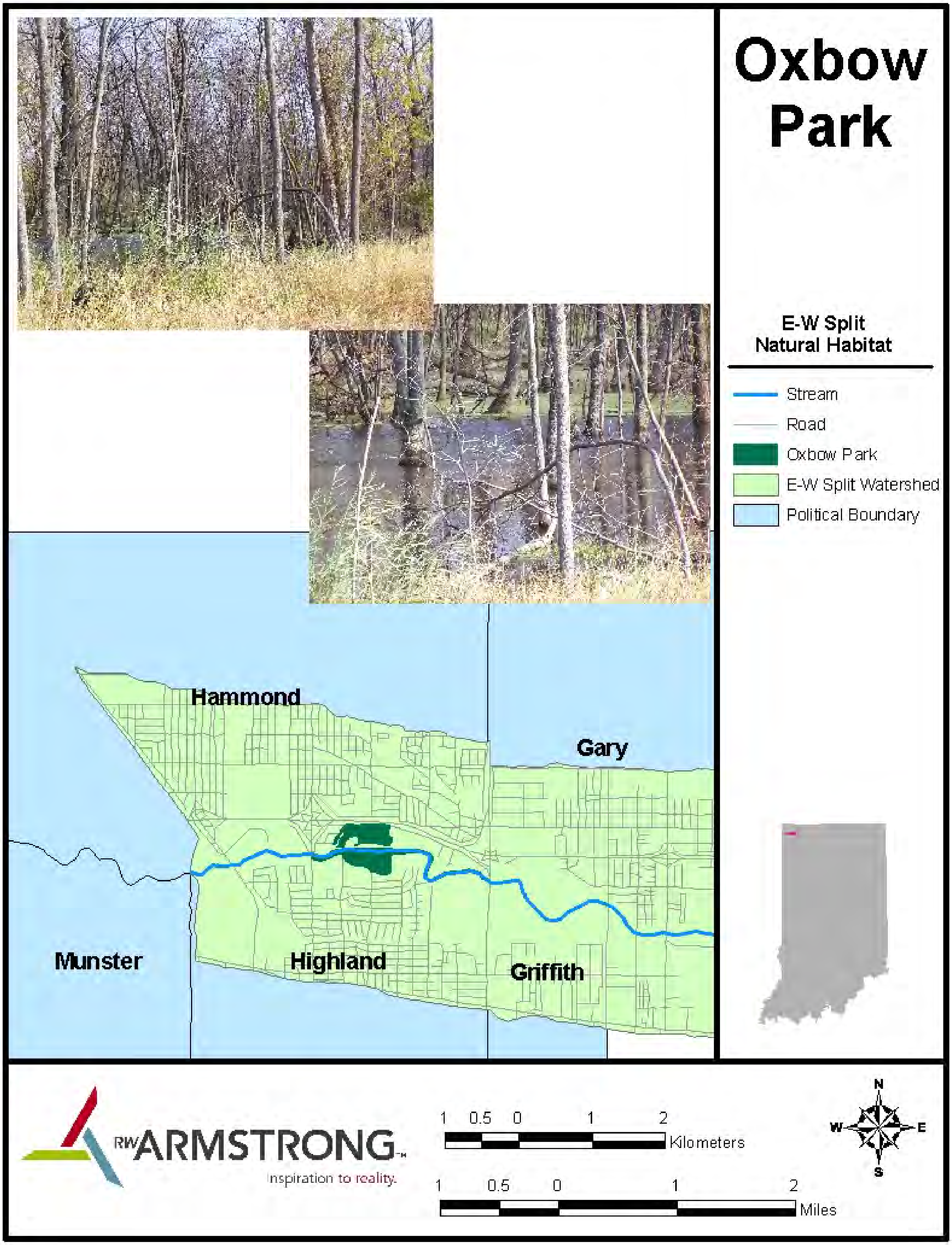


Figure 4.47: Oxbow Park location and wetland photos along the Little Calumet River.

Deep River

Of all the streams surveyed in this watershed, the Deep River provides the best habitat and has retained many of its natural features. Deep River has not been notably channelized and can be characterized as sinuous and complex in its structure. Stream banks are well buffered and large trees stabilize the bank providing shade and cover. Deep River has high recreational value and good fisheries habitat. The surrounding landscape provides good aesthetic value for river users. Habitat scores through this stretch ranged from 107 to 160

Willow Creek

Willow Creek also provides areas of good aquatic and riparian habitat and water quality features relative to other streams in the watershed. It was one of the few stream segments where riffle pool complexes can be found. The water in Willow Creek is much clearer than in other streams/segments inventoried in this survey. Stream cover, along with the riffle/pool complexes provide good habitat for fish and other macroinvertabrates. Habitat scores through this stretch ranged from 123 to 140.

Invasive species

The dominance of invasive species is a problem for habitat diversity throughout the watershed. The primary species of concern is *Phragmites australis*, also known as common reed. It is difficult to call out one location where this species is more of a problem than another. *Phragmites* has out-competed most other plants in the floodplain wetland areas. It lines the miles of roadside ditches and stream banks in the watershed. Its density, spacial distribution, and its likely seedbank strong hold, make whole-sale restoration of floodplain wetlands nearly impossible.

Cattails (*Typha sp.*) are also present and dominate emergent areas throughout the watershed. Cattails may or may not be considered invasive and therefore, can be an ecological concern. Many people consider the plant invasive as it is known to take over an area and limit diversity of other wetland plants; however, unlike the *Phragmites*, some cattails are native to the region. Cattails can provide some habitat value for birds and other animals; although, the biggest concern is the limited food supply value they offer by crowding out other flower and seed producing species. It is important to note that cattails can provide important soil stabilization and nutrient and metals attenuation along shorelines, thus positively affecting water quality.

Cattails are a dominant species of many of the floodplains and wetlands along the Little Calumet. At the location of the heron rookery (Figure 4.46), cattails cover the wetland complex for acres. Other than the trees that house the heron nests, cattails are the only visible species in this area.

High Quality Natural Areas

Aside from the challenges of invasive species, there are ecologically important natural areas within the Little Calumet River Watershed worthy of protection and/or restoration efforts. The first is the above mentioned heron rookery located west of Cline Avenue and south of the Little Calumet River. The rookery is important to all species of heron. The location of these trees in an undeveloped wetland complex allows for undisturbed nesting in close proximity to fishing and feeding areas.

Another natural area is the Cline Oxbow Park. The park contains an oxbow wetland complex where many ducks were observed feeding during the survey/evaluation. In addition to the physical habitat this park provides for wildlife, a diverse array of plant species such as touch-me-nots, sedges, and many others valuable wetland plants are also present. The park caters to visitors by providing several trails and an open shelter house and grill. The somewhat diverse community here is unusual among the wetlands and riparian areas in the watershed.

Across the river, on the south side, is another oxbow wetland complex. This area is not a park, but future planning and some restoration efforts could protect this area and provide a larger, opportunity for area wildlife to thrive, given its proximity to the above noted areas.

“Hotspots”

There are a number of locations where stream banks are non-existent along the Little Calumet River. These areas flow directly into floodplain wetland areas that are part of the USACE levee system. The floodplain wetlands adjacent to the stream are often littered with trash – old tires, plastic shopping bags, plastic pop bottles, and other trash. If volunteers picked up trash in these areas three to four times a year the aesthetics and wildlife safety of these areas could be greatly improved. Such clean-up efforts in these floodplain areas would also reduce the amount of pollution moving through the watershed and toward Lake Michigan.

Areas of limited buffer are also a water quality and erosion concern. These areas are somewhat concentrated along the Burns Ditch segment (Figure 4.48). Cost-share programs to restore buffers in this location are recommended. Given the urban nature of the watershed and its associated pollutant load, increased buffers along commercial and residential properties could result in water quality improvements, as well as improved habitat connectivity.

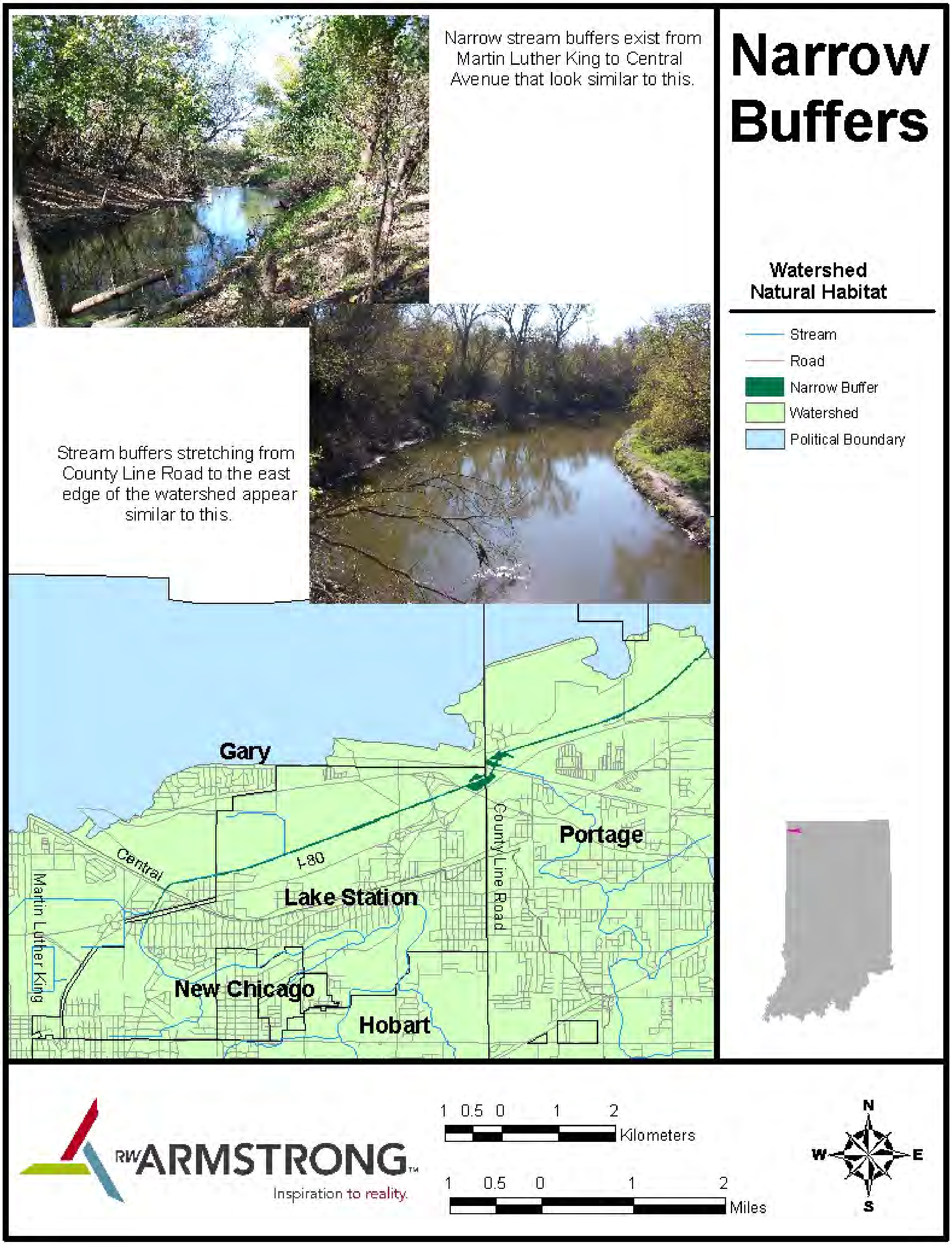


Figure 4.48: Narrow stream buffers from Martin Luther King to Central and County Line to eastern watershed edge.

Section V: Development of Problem Statements and Goals

Draft problem statements centered on the concerns presented by the steering committee were drafted and given to the committee. Input from the meeting participants suggested that Problem Statement No.2 be broken apart into a problem statement for each of the pollutants addressed by this plan. The presented problem statement was "Several non-point source pollutants such as sediment and nutrients are elevated to levels that can impact biological communities and overall river health." The revised problem statements are shown below the concerns identified by the Steering Committee and the public that they correlate to.

Not all of the concerns mentioned by the public and the steering committee participants are addressed by the problem statements and goals presented in this plan. Table 5.1 presents a list of invalid concerns and the reason for not addressing the concerns as part of this watershed management plan.

Invalid Concerns for this Plan	Reasoning
CSOs (discharge & impacts on use)	CSOs are covered by Long Term Control Plans in each community and will be eliminated under those plans. The pollutant loadings from these events cannot be managed by the practices proposed under this plan.
Increase in large rain events	Climatic changes are outside the scope of this plan.
Fishery condition – fish health	Fishery conditions are not singled out in this plan because the health of the fisheries in these watersheds will be improved as the overall water quality is improved.
Flooding concerns	Flooding concerns are outside the scope of this plan and are being addressed by the ACOE Flood Control Project.
Brownfield impacts	This concern, while not addressed specifically, is part of the land use information and pollutant modeling.

Table 5.1: Invalid concerns listed by public and steering committee participants

1. Water Quality Concerns

- Low flow water quality
- Flood control impacts on water quality
- *E.coli* sources
- Sediment loads (TSS) & upstream erosion problems
- Quantity & quality from east reach
- Impact on Lake Michigan

Problem 1: The Little Calumet River and its tributaries regularly exceed the Indiana single sample daily maximum of 235 colonies per 100 milliliters for *Escherichia coli* (*E.coli*) bacteria, thus limiting recreation, impacting downstream waters, and raising health concerns among the public.

Problem 2: Total Suspended Solids levels during high flow conditions are elevated to levels that can impact biological communities.

Problem 3: Nutrient levels that can impact biological communities and overall river health are present during both high and low flow conditions.

2. "Other" Natural Resource Concerns

- Downstream impacts (Lake Michigan)
- Impact of altered hydrology
- Impacts on recreational uses
- Impacts on neighborhood's – aesthetic & habitat
- Preservation of waterways and riparian areas
- Restoration of natural areas/habitat
- Erosion concerns
- Change in Impervious Areas
- Diked Areas in Watershed

Problem 4: Severe hydrologic manipulations have impacted the natural topography of the river and riparian areas resulting in disconnection from historic floodplains and wetlands, as well as the creation of extreme low-flow conditions in the river at certain locations.

3. Public Involvement/Education Needs or Concerns

- Risk communication to community
- *E.coli* communication/education w/ public
- Getting local buy-in or participation
- Watershed Education for the Public
- The public does not understand who is in charge of what
- Connecting People to their Watershed
- Need for Public Workshops
- Educating the Public on Whom to Call with Concerns or for Information
- Interpretation Opportunities

Problem 5: The residents and local leaders in the Little Calumet River Watershed need more information and education on their role in maintaining the overall quality of the watershed.

4. Local Coordination Needs or Concerns

- Coordination w/other watershed projects (DNR 6217 coordination)
- Coordination w/ flood control project
- TMDL coordination
- Septic systems and social issues
- Coordination with planning & zoning
- Communication w/ ACOE
- Development awareness
- Community cooperation and improved uniformity
- Holistic Conservation Planning
- Coordination with other studies and projects
- Map Parks, Land Trusts, and Natural Areas
- Planning tools to assess downstream impacts

Problem 6: A single point of contact is not in place to coordinate resources across political boundaries in the Little Calumet River Watershed.

5. Resource Needs or Concerns (data, financial, people)

- Public access
- Increasing Recreational Uses

Problem 7: Public access to the river is challenging due to the highly developed state of the watershed.

Section VI: Pollutant Sources

Point Sources

Point sources are discharges that enter a water body through or from a well defined point of discharge. Point sources can include storm sewers, CSO's, culverts, ditches, waste water treatment plant discharges, concentrated animal feeding operations, etc.

As stated in Section II, the Watershed Diagnostic Study of the Little Calumet-Galien River Watershed noted no correlation between high pollutant loads detected as part of that effort and any permitted point sources along the Little Calumet River for a variety of pollutants.

Most point source discharges require an National Pollutant Discharge Elimination System (NPDES) permit. The most notable exceptions to this are stormwater discharges in rural areas or small communities. There are currently five (5) active NPDES permits and eight (8) inactive NPDES permits in this plan area. This number does not include un-permitted, illegal discharges that are most likely occurring in the watershed.

The Watershed Restoration Action Strategy for the Little Calumet-Galien Watershed states on page 19 that "Illegal discharges of residential waste water (septic tank effluent) to streams and ditches from straight pipe discharges and old inadequate systems are a problem within the watershed."

Municipal operators of a separate storm sewer system in this plan area are currently required by Rule 13 of the Indiana Department of Environmental Management (IDEM) to track down these illicit discharges and eliminate them.

Combined Sewer Overflows within the LCR Watershed

Combined sewers are a system of pipes designed to carry sanitary sewage and stormwater together in the same pipe. Due to the variable nature of storm water flows and the tremendous capacity required in both the pipes and wastewater treatment facilities to deal with those flows, overflow points were constructed to prevent the system from backing up into buildings and homes connected to the sewers. When the volume of flow in the pipe exceeds the system's capacity, the excess flow is directed out the overflow point and into some form of receiving water or ditch. Construction of this type of system was stopped in Indiana in the 1960s. Current design practices require separate sanitary and stormwater collection and treatment systems.

There are currently eight (8) combined sewer overflows within the three watersheds included in this study. Though often regarded as a source of *E.coli*, CSO's are a point source of many different pollutants. Anything flowing through the sanitary sewers can be released out a CSO under the right flow conditions. These pollutants can include *E.coli*, pathogens, solids, debris, and toxic pollutants including chemicals and heavy metals. Figures 6.1 and 6.2 show the locations of these CSO points.

Other Potential Point Sources

Other potential point sources located within the watershed study area include NPDES permit sites, landfills, industrial sites and super fund sites. Underground storage tanks, junk yards and EPA permitted discharges are also potential point sources of pollutants. The locations of these potential point sources along with other potential sources in and around the watershed study area are shown in Figures 6.3 and 6.4. Appendix 17: Potential Point Sources includes a listing of the locations and other associated information for each site in Lake and Porter County.

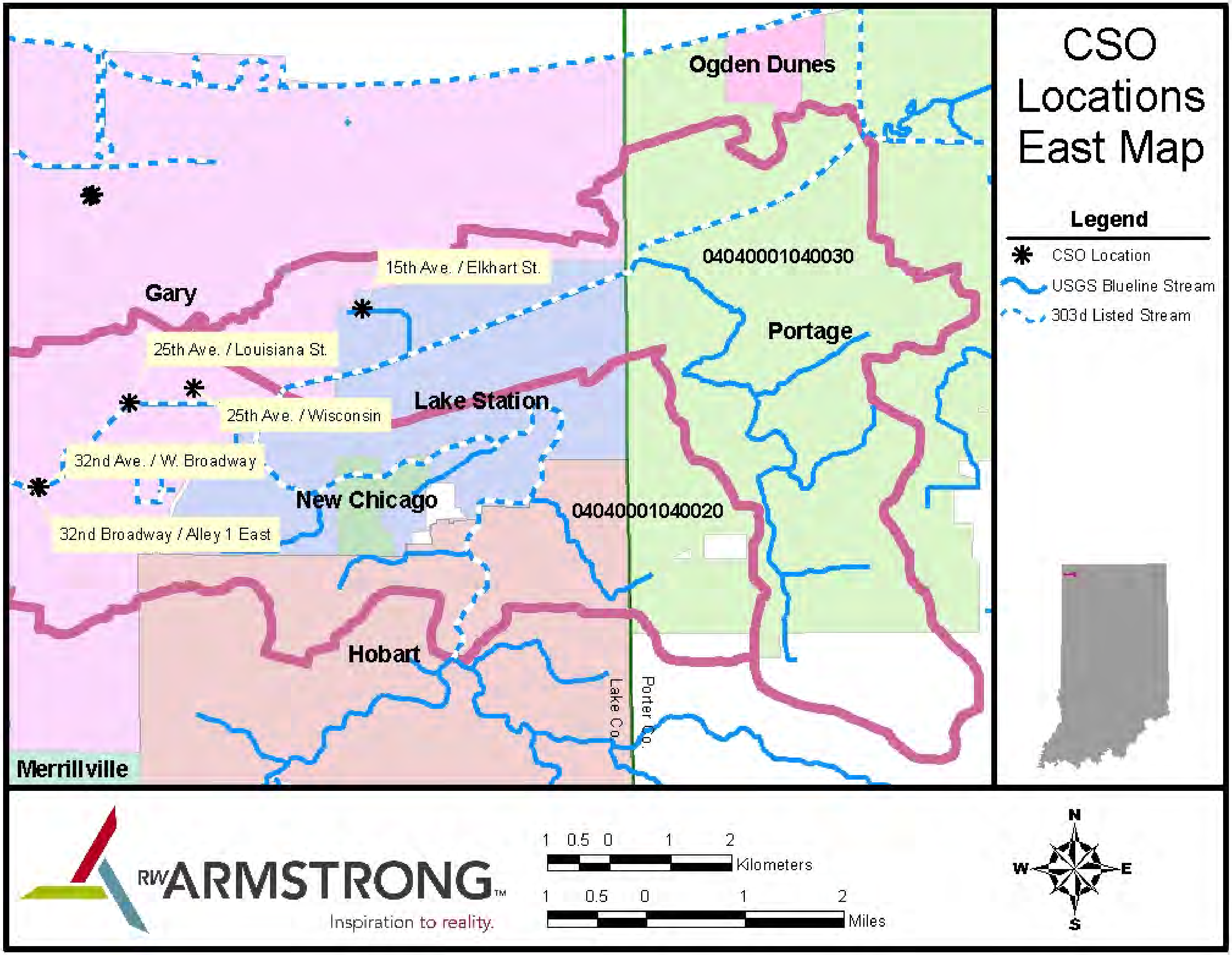


Figure 6.1: Combined Sewer Outfall locations for the eastern portion of the watershed study area.

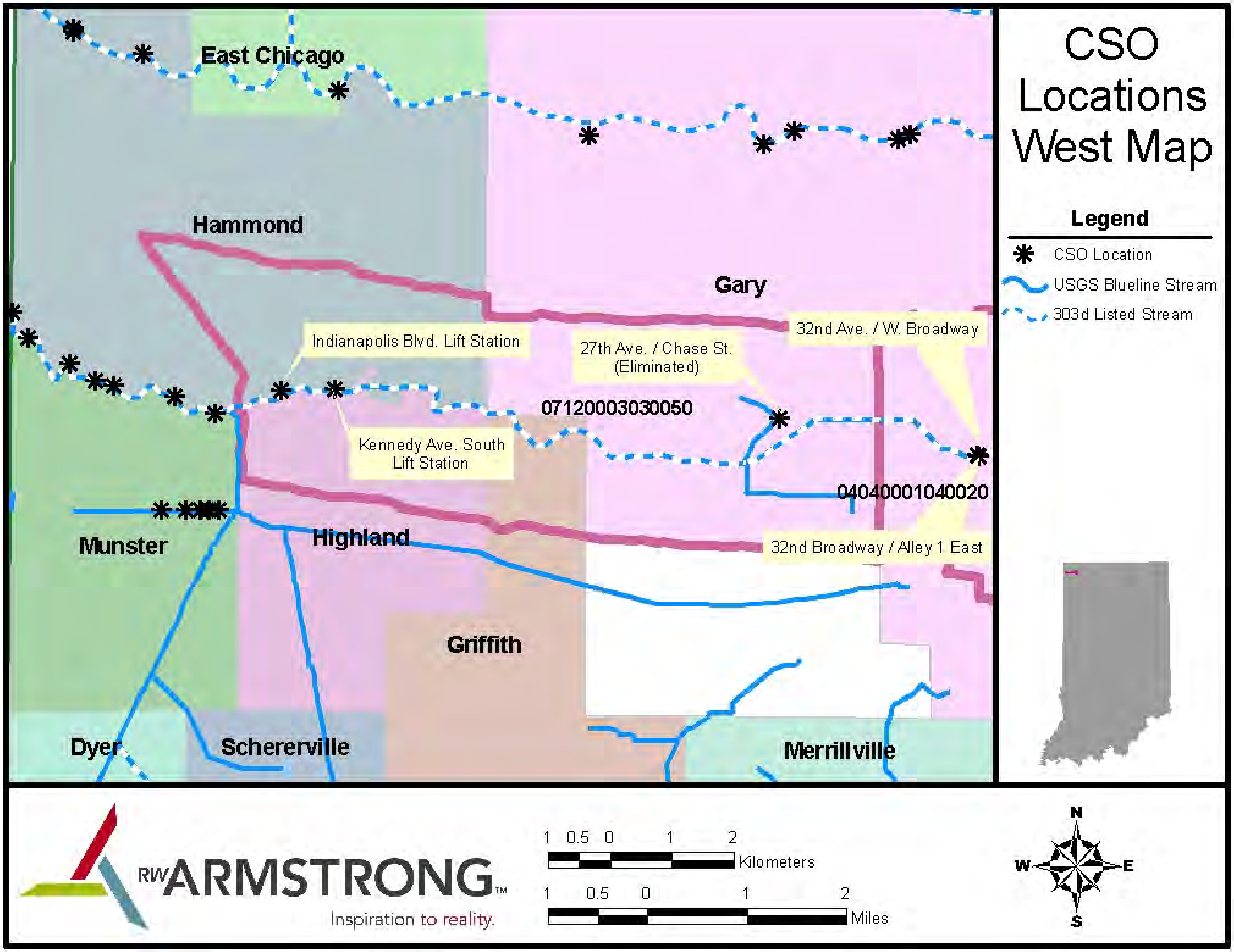


Figure 6.2: Combined Sewer Outfall locations for the western portion of the watershed study area.

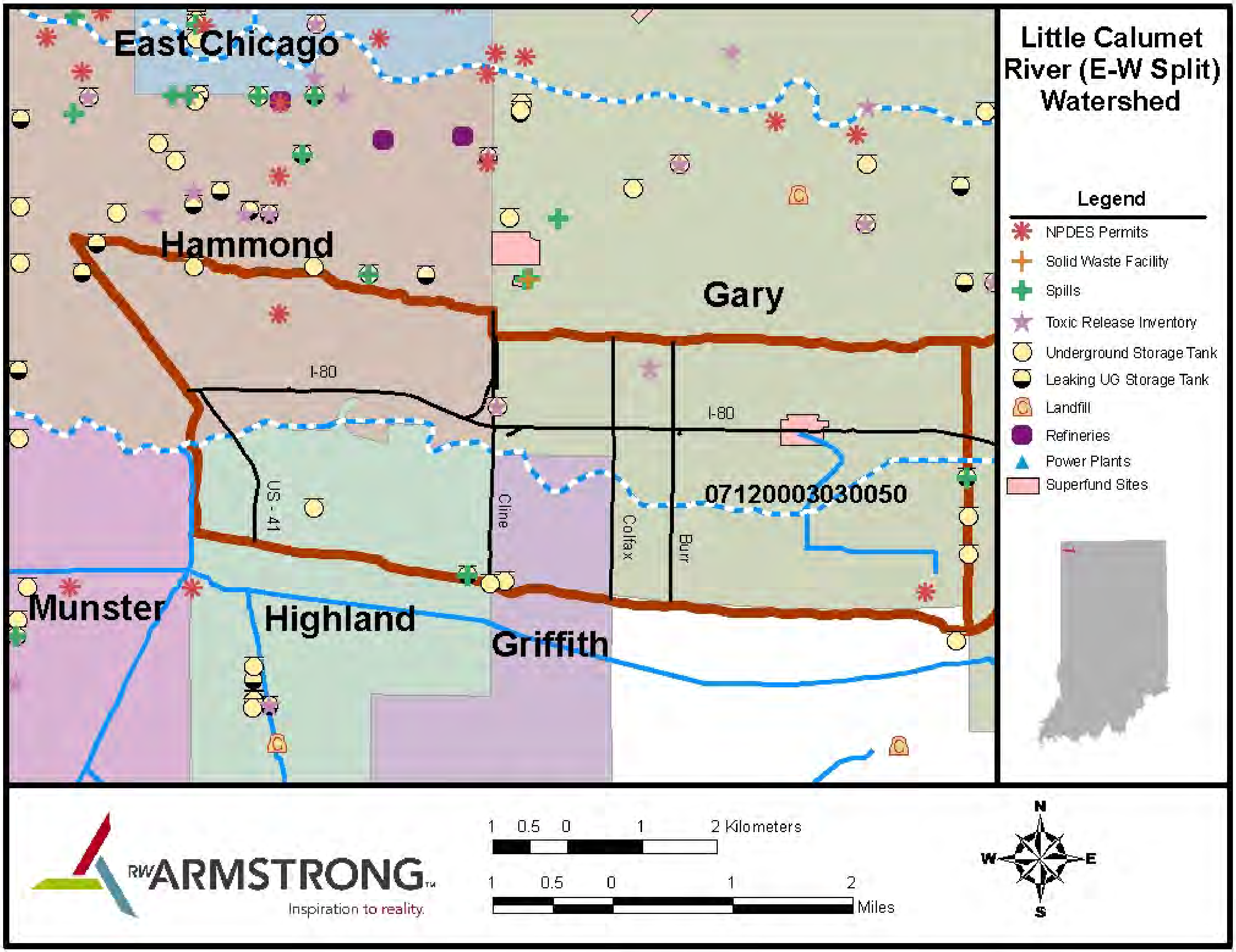


Figure 6.3: Potential point sources for the western portion of the watershed study area.

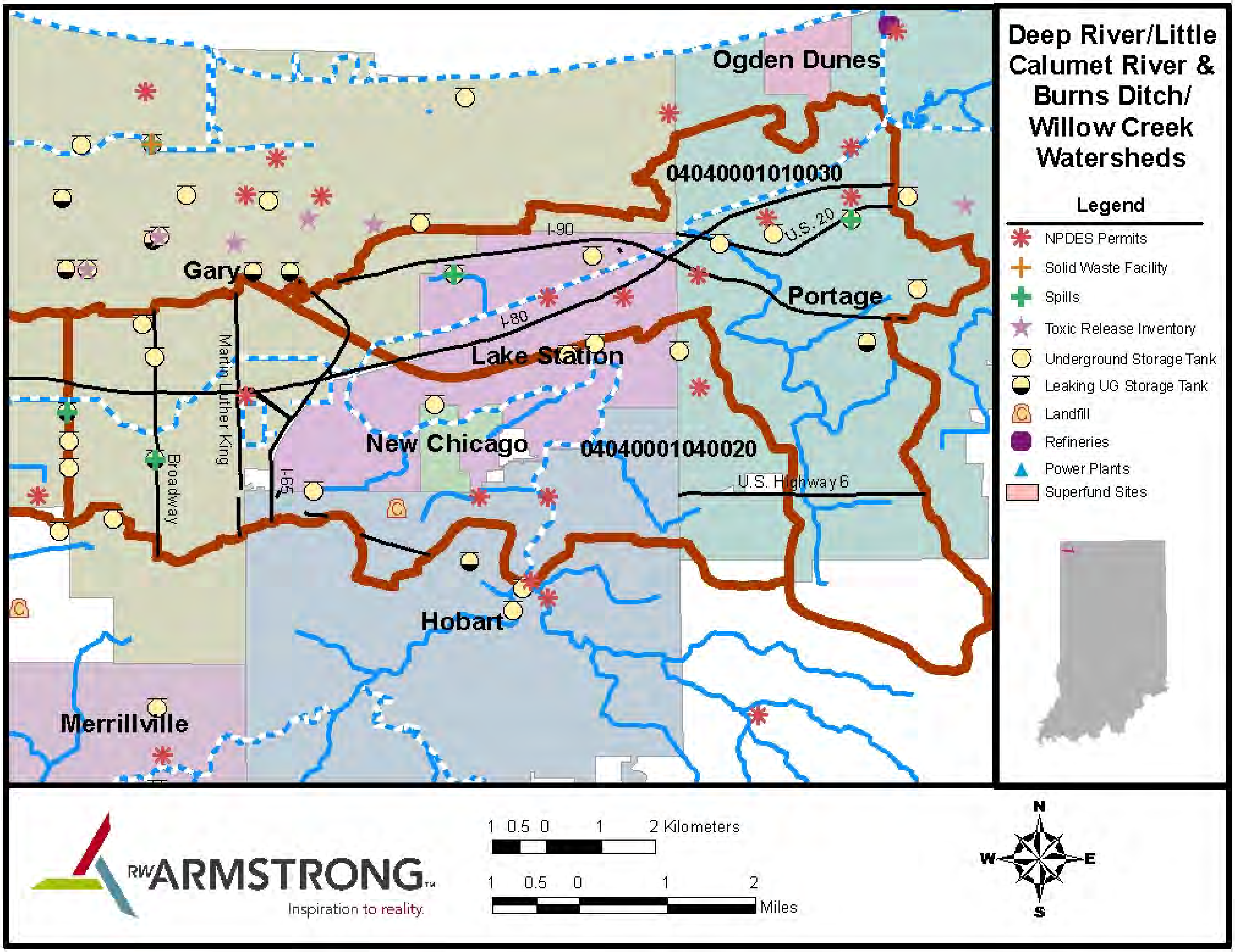


Figure 6.4: Potential point sources for the eastern portion of the watershed study area.

Non-Point Sources

Non-point source pollution refers to pollutants that enter the waterbody through stormwater runoff, contaminated ground water, snowmelt, or atmospheric deposition. These sources tend to be more diffuse in nature and occur at random time intervals depending on weather patterns.

Non-point sources can, in some instances, provide larger pollutant loads than the point sources to the same water body. Sources of pollutants in this category tend to be related to land useage and are more dispersed throughout the watershed. These sources can include roadways, parking areas, failing septic systems, animal wastes, fertilizers, detergents, etc.

With regard to *E.coli* pollution, the Little Calumet and Portage Burns Waterway TMDL for *E.coli* Bacteria discussed in Section II states:

"Based on the modeling and data analyzed, the allowable TMDLs for the Little Calumet – Portage Burns Waterway will require a reduction of over 90 percent in non-point source loads."

Onsite Wastewater Disposal

Because the TMDL states that a 90 percent reduction in non-point source *E.coli* bacteria is needed to meet current water quality standards, an attempt has been made to map existing septic systems within the three watersheds. Both the Lake and Porter County Health Departments were contacted and neither had adequate records to produce a map of active and abandoned septic systems. Once that was determined, a new strategy was developed and the City of Gary's Health Department was contacted. The new strategy was to attempt to map un-sewered areas because the City of Gary had already produced such a map under their Integrated Storm Water Drainage Plan for the Little Calumet River Watershed Study (2003-2004).

While the map attempts to locate un-sewered areas, not all communities were forthcoming with information needed to complete the map shown in Figure 6.5. Even in the areas shown as sewered, there may be enough active and/or abandoned septic systems to be a significant source of *E.coli* and other non-point source pollutants.

The TMDL report sites an Ohio Department of Environmental Quality 2001 study that estimated each failing septic system could generate a daily load of around 1.516 x 10^8 cfu/day. It then states that the non-point source load in the Black Oak area of the City of Gary would indicate 200 to 300 failing septic systems if 100 percent of the loading reached the river. It goes on to say that this scenario is unlikely and other non-point sources must exist in and around the Black Oak area to account for the loading observed in that area of the river.

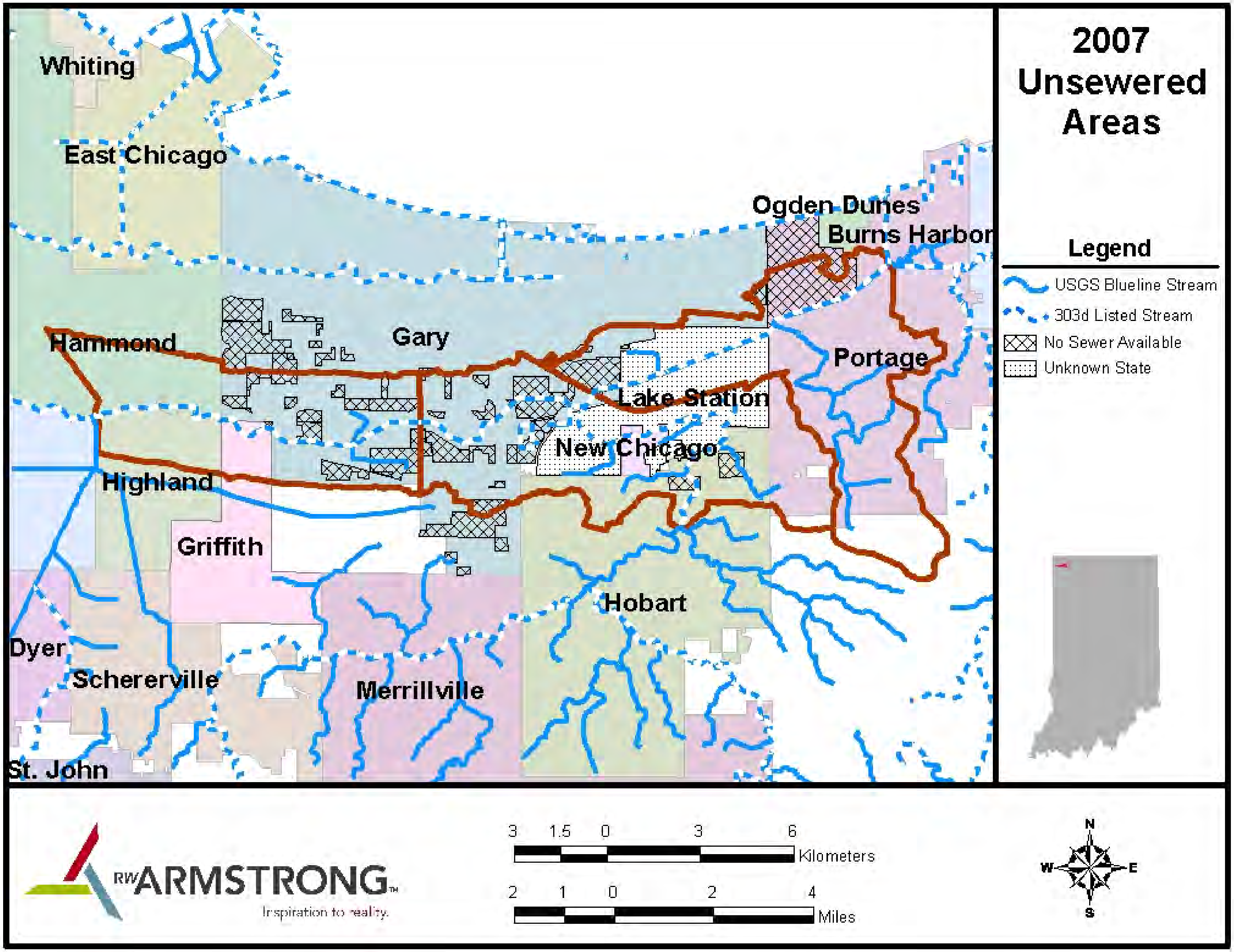


Figure 6.5: Un-sewered areas in the watershed study area according to information received from local sanitary districts.

Urban/Residential
Runoff from urban areas can be the most significant source of non-point source pollution in a watershed. Impervious surfaces can increase the volume of runoff, the rate of run off, and the temperature of runoff.

The additional flow can cause erosion and sedimentation in receiving channels. Impervious areas also allow detergents, auto fluids, deicing chemicals, household wastes, pesticides, fertilizers, animal wastes, and other pollutants to reach receiving waters with little or no filtering, often due to curb and guttered roadways. Atmospheric deposition on impervious surfaces is often washed away with the first rain or snowmelt.

Agriculture/Managed Lands
These lands include areas such as golf courses, agricultural land, and parks where fertilizers, pesticides, animal wastes, and other chemicals may be washed off the land and into receiving waters. Land disturbance in these areas can also lead to pollutant loading in the river.

Land Disturbing Activities
Any type of land-disturbing activity such as clearing, tilling, excavation, filling, grading, or even vegetation degradation can result in increased pollutant loading. Increased erosion by wind and water ultimately reaches waterways.

Natural Areas
While natural areas tend to be a sink for many pollutants, especially nutrients, they can be a significant source of *E.coli* depending on local animal types and populations. The TMDL report for this watershed sites potential bacteria contributions from geese, ducks, deer, beavers, and raccoons. It is interesting to note that the estimated daily bacteria production for each goose, duck, deer, and beaver exceeds the bacteria loading rate of a failing septic system. The bacteria production of each raccoon is slightly below (approximately 18%) the loading produced by each failing septic system.

Pollutant Specific Sources

***E.coli* Sources**
Combined Sewer Overflows are the dominant source of *E.coli* bacteria. Previous testing of CSO discharges discussed earlier in this plan found discharges as high as 5,300,000 cfu/100mL. The locations of these discharges are shown in Figures 6.1 and 6.2. Because each CSO community is required to develop a Long Term Control Plan (LRCP) to eliminate these discharges, they were not considered in

the development of the TMDL discussed previously and do not need to be included in the goals of this plan, at this time.

Animal Life in this watershed, according to the TMDL, could contribute to the *E.coli* impairment in these waters. The TMDL report for this watershed sites potential *E.coli* contributions from geese, ducks, deer, beavers, and raccoons. Population estimates for wildlife in the natural areas in these watersheds would be needed to quantify this contribution. Previously presented land use maps indicate areas where wildlife is most likely concentrated, but wildlife is certainly not limited to these areas. In addition to wildlife, pets and livestock in the watershed are also sources of *E.coli*. The LCRBDC has found horse farms in the flood plains of the river, though most live stock along the Little Calumet River is located east of this study area. Pet waste in the high density and medium density urban areas could also contribute to the problem.

Failing Septic Systems are another source of *E.coli* pollution in this watershed. The quantity and location of septic systems within these watersheds is unknown. The un-sewered areas map, Figure 6.5, does not necessarily indicate that there are no septic systems in the sewered areas. Estimated bacteria release from failing septic systems is unlikely to be the sole source of *E.coli* impairment in this watershed based on estimated bacteria release from these systems.

Contaminated Sediments are also sited in the TMDL as a likely source of *E.coli* pollution. Years of CSO discharges and other sources may have contaminated sediments in and around the channels causing residual *E.coli* contamination during higher flows when these sedimets are agitated. Contaminated sediments may also be contained within storm sewers leading to the channels.

Impervious Areas are sited by the TMDL as likely sources of *E.coli*. Although impervious areas do not produce *E.coli* themselves, they are a conduit for *E.coli* bacteria from other sources to reach the river before they can die off. Runoff carrying *E.coli* from pet wastes, failing septic systems, etc. can be quickly routed to the creeks/rivers in this area via curb and gutter and storm sewer systems. Impervious areas also contribute to thermal pollution by raising the temperature of run off and may be responsible for making the flows more conducive to bacteria survival. Likely locations of impervious areas can be seen on the land use maps (Figure 4.34 to Figure 4.38).

Nitrogen and Phosphorus Sources

Combined Sewer Overflows were shown to be major sources of nitrogen and phosphorus in previously discussed studies on the Little Calumet River. The locations of these discharges are shown in Figures 6.1 and 6.2. Because each CSO community is required to develop a Long Term Control Plan (LRCP) to eliminate these discharges, they do not need to be included in the goals of this plan.

Excessive Fertilizer Application is sited by the Watershed Diagnostic Study of the Little Calumet-Galien River Watershed as a source of nitrogen and phosphorus in this watershed. Managed lands such as golf courses and urban areas are significant sources of excess fertilizer applications. A main source though would be the agricultural land which makes up approximately 12% of this watershed study area.

Animal Life in this watershed, according to the Watershed Diagnostic Study of the Little Calumet-Galien River Watershed, is also a source of nitrogen and phosphorus. Pets and livestock in this watershed are an additional source of nitrogen and phosphorus. The LCRBDC has found horse farms in the flood plains of the river, though most live stock along the Little Calumet River is located east of this study area. Pet waste in the high density and medium density urban areas could also contribute to the problem. Wildlife contributions are most likely limited to bird droppings deposited directly into the waters or on impervious surfaces that carry to flows to the channels without any break in impervious surface connections.

Failing Septic Systems are another source of nitrogen and phosphorus pollution in this watershed according to the Watershed Diagnostic Study of the Little Calumet-Galien River Watershed. The quantity and location of septic systems within these watersheds is unknown. The un-sewered areas map (Figure 6.5) does not necessarily indicate that there are no septic systems in the sewered areas.

Total Suspended Solids

Impervious Areas are a major source of Total Suspended Solids (TSS) in this watershed. Soil erosion and sedimentation are naturally occurring processes in all streams and rivers. However, as impervious areas increase so do runoff volumes and velocities. These increased volumes and velocities often directly relate to additional channel erosion in drainage ditches, streams, and rivers. This erosion in drainage ditches is a constant problem in this watershed due to highly erodible soils, the high ground water table, and almost flat slopes within the ditches themselves. Impervious areas also collect wind deposited sediments as well as deicing salt/sand mixtures that can then be carried directly to waterways, if there is no break in the connection of impervious areas.

Construction Practices within this highly urbanized area are also a source of total suspended solids via soil erosion by wind and water. The large amount of construction work in this watershed due to development, redevelopment, and replacement of aging infrastructure presents ample opportunity for soil erosion if careful planning and execution of preventive measures is not performed. The rural land that that is currently located on the east side of the watershed study area in un-incorporated Porter County will be a source of population growth in the next 20 years. The population and development trends outlined in Section III estimate that this part of Porter County is expected to grow at a rate of 741 people per square mile. Figure 3.12 shows the population change data through the year

2030 for the watershed study area. Those areas that have the greatest changes in number of people are the areas that will be critical to control the construction practices. While many standards are in place for dealing with erosion through storm water runoff, little is done to prevent wind erosion.

Agriculture can also contribute to total suspended solids when care is not taken to prevent soil loss. With current agricultural practices within the watershed study area including land being plowed right up to the edge of ditches; runoff from the land goes straight to the water with no time for any pollutants to settle. While agriculture is not the dominant land use in this watershed, its 4,100 plus acres make up almost 12% of the watershed area. Agriculture still occurs right up to the river between the levee system in places though this is being phased out. Some of these fields have as recently as 2007 been planted with rows perpendicular to the river allowing water carrying sediments and nutrients to flow directly to the river between crop rows.

Section VII: Critical Areas

As previously discussed, the pollutant load calculations for these watersheds showed that the non-point sources within them are producing much greater amounts of the identified pollutants of concern for this plan than national averages for the current land uses would indicate. Therefore, critical areas have been identified based on the results of the stream reach survey, land use mapping, previous sampling and sampling conducted as part of this plan. The input of the steering committee was also taken into consideration for the delineation of critical areas. Figure 7.1 identifies the critical areas within the study area. A note of caution though, the sampling for this plan was very limited and a more extensive sampling program may be needed to confirm these findings and further isolate sources and critical areas.

Watershed 07120003030050

The critical areas identified in the Little Calumet River E-W Split watershed include the areas inside of the levee system currently being built by the Army Corp of Engineers (ACOE) and the natural areas surrounding the system. The area inside of the levee system will be protected from development based on the ownership of the land. The natural areas around the levee system were also identified to be part of the critical area by the steering committee so that structural Best Management Practices (BMPs) could be implemented to treat the water before reaching the levee system.

The natural areas along the Little Calumet River were the only areas to be identified as critical due to the highly urbanized state of this portion of the study area. The heavily populated area generates high pollutant loads but little space to implement structural BMPs.

Watershed 04040001040020

The ACOE levee system continues into the Little Calumet – Deep River Watershed to approximately Martin Luther King Blvd. in the City of Gary. The land within the levee system in this watershed is also included in the identified critical areas. The natural area located to the east of Martin Luther King Blvd. is also identified as being critical. This area includes Three Rivers County Park and Rooster Park inside the Lake Station boundaries.

The natural areas along the Little Calumet River were identified as critical areas due to the highly developed state of this portion of the watershed. The incorporated areas of Gary and Lake Station are both highly developed and leave little opportunity for structural BMPs to be implemented anywhere except current natural areas. The riparian buffer along Deep River was not identified as being critical by the steering committee because since there is currently a natural buffer in good working condition along the water body the committee thought it best to focus the critical area delineation on areas that need improvement or prevention and not on maintaining areas.

The south eastern portion of this 14-digit HUC watershed is located in unincorporated Porter County. This is an area that is expected to see large population growth in the next 20 years, Figure 3.12. With housing developments already being planned and the expectation that more will be built the steering committee has identified this area as being critical so that preventive BMPs can be implemented and ordinances can be enforced.

Watershed 04040001040030

The land along the Portage-Burns Waterway in the Little Calumet – Willow Creek Watershed is mostly in a natural state with industrial sites being located on the northern edge of the watershed boundary. Due to the land use north of the area and the little urbanization along the river a buffer was used on both sides of the river for critical area identification. The critical area around the channelized portion of the Portage-Burns Waterway spans 700 meters to the north and 500 meters to the south. This combines for approximately 3,000 acres for implementation of various structural BMPs.

The unincorporated area in Porter County south of Lute Road is also identified as critical. The reasoning for this area being included in the critical area delineation is the same as the unincorporated area that it is next to in Porter County and is included in the Little Calumet – Deep River Watershed.

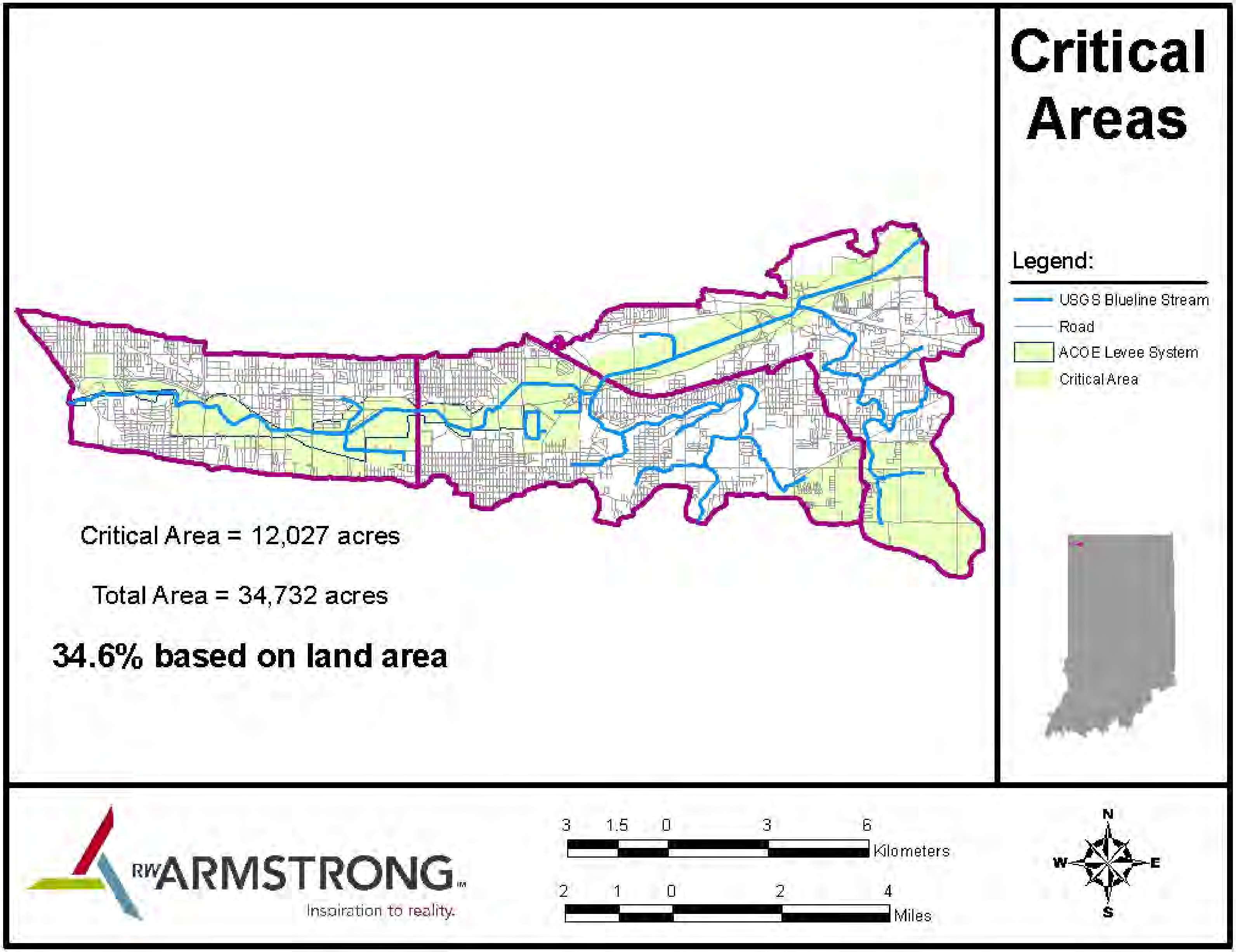


Figure 7.1: Critical areas delineated in the watershed.

Section VIII: Goals and Indicators

To determine the types of remediation projects which would result in the greatest benefit to these watersheds, goals and objectives were developed based on the Concerns and Problem Statements previously discussed. These goals are intended to address each of the specific problem statements presented in Section V.

Problem 1: The Little Calumet River and its tributaries regularly exceed the Indiana single sample daily maximum of 235 colonies per 100 milliliters for *Escherichia coli* (*E. coli*) bacteria, thus limiting recreation, impacting downstream waters and Lake Michigan, and raising health concerns among the public.

Goal 1: Reduce *E. coli* levels in the Little Calumet River by reducing loads to the River to meet beneficial uses.

Baseline Information: The Little Calumet River and its tributaries regularly exceed the Indiana single sample daily maximum of 235 colonies per 100 milliliters for *Escherichia coli* (*E. coli*) bacteria

Short Term Target: Lower *E.coli* levels, during dry weather flows, below 235 cfu/mL with less than 10% exceedance.
Target Date: 2018

Long Term Target: Lower *E.coli* levels below 235 cfu/mL per single sample with less than one (1) exceedance in any 30 day period.
Target Date: 2028

Indicator: *E.coli* sampling results

Problem 2: The calculated Total Suspended Solids (TSS) level during high flow conditions are 8,683 ton/yr which is capable of impacting biological communities and the overall river health. The measured high flow loading rate is nearly eight (8) times higher than the calculated loading.

Goal 2: Reduce sediment loads by source reduction strategies and, in priority subwatersheds, through the use of Best Management Practices (BMPs).

Baseline Information: Land within the ACOE levee system is currently being farmed up to the banks of the Little Calumet River. This practice creates large amounts of sediment draining directly to the river during high flows.

Short Term Target: Reduce the amount of sediment being transported in the Little Calumet River by enacting, implementing, and enforcing ordinances to improve water quality in the subwatersheds.

Target Date: 2013

Long Term Target: Achieve an 80% reduction in sediment loading through the implementation of BMP's to preserve and enhance aquatic habitats in the Little Calumet River and its tributaries. This reduction would lower the calculated load to 1,700 ton/year of TSS in the entire watershed study area.
Target Date: 2018

Indicator: Sampling Results

<u>Problem 3:</u> The calculated nutrient levels during high flow are capable of negatively impacting the biological communities and the overall health of the river. The calculated nutrient loads were found to be 126 ton/year and 16 ton/year for total nitrogen (TN) and total phosphorus (TP), respectively. This is well below the measured levels with TP being 354 ton/year which has negatively affected the river.

Goal 3: Reduce nutrient loads by source reduction strategies and, in priority subwatersheds, through the use of Best Management Practices (BMPs).
Baseline Information: The large amount of impervious surfaces does not allow nutrients to be filtered out before entering the receiving waters.

Short Term Target: Reduce the amount of nutrients being transported in the Little Calumet River through education and outreach efforts and Low Impact Development (LID) ordinances.
Target Date: 2013

Long Term Target: Reduce nutrient loads in the Little Calumet River Watershed through the implementation of BMPs such that the calculated loadings do no exceed 12.7 ton/year of TP and 105 ton/year for TN across the entire watershed. Nutrient levels being reduced to these levels will improve the overall health of the river and positively impact the aquatic habitat that is currently limited but present in the Little Calumet River and its tributaries.
Target Date: 2028

Indicator: Sampling Results

<u>Problem 4:</u> Severe hydrologic manipulations have impacted the natural topography of the river and riparian areas resulting in disconnection from historic floodplains and wetlands, as well as the creation of extreme low-flow conditions in the river at certain locations.

Goal 4: Restore, improve, and/or protect floodplains, wetlands, natural areas, and riparian corridors.

Baseline Information: Many areas exist within these watersheds worth protecting, improving, and/or restoring. These areas can be used to meet other goals within this plan as well.

Short Term Target: Identify and prioritize areas to be protected, improved, and/or restored.
Target Date: 2010

Long Term Target: Protect, restore, and/or improve 2,680 acres of floodplains, wetlands, natural areas, and/or riparian corridors that are currently classified as forest or wetlands.
Target Date: 2018

Indicator: Acres of floodplains, wetlands, natural areas, riparian corridors, and natural conveyances that have been identified, protected, improved, and restored.

Problem 5: The residents and local leaders in the Little Calumet River Watershed need more information and education on their role in maintaining the overall quality of the watershed.

Goal 5: Improve public awareness/knowledge of pollutant loads, sources, and solutions, especially with regard to *E. coli*, and the impacts and risks associated with them.
Baseline Information: An adequate educational outreach program is not in place to inform the residents within these watersheds about their role in maintaining the overall quality of these watersheds.

Short Term Target: Raise awareness of watershed and water quality issues, especially urban storm water management, *E.coli* sources and risks, and septic system maintenance.
Target Date: 2013

Long Term Target: Increase public awareness of and participation in watershed improvement activities.
Target Date: 2018

Indicators: Number of residents participating in educational events.

Problem 6: A single point of contact is not in place to coordinate resources across political boundaries in the Little Calumet River Watershed.

Goal 6: Create an active watershed alliance or conservancy district that facilitates and implements information sharing including ordinances, projects/experiences, and educational materials in a central location.

Baseline Information: No one entity has the ability or authority to cross corporation boundaries in order to better share and collaborate on projects within the local communities. The alliance or conservancy district would also be responsible for allowing a central point to be contacted so that information is easily available.

Short Term Target: Identify the type and extent of entity needed to perform the necessary functions.
Target Date: 2010

Long Term Target: Establish the entity determined above.
Target Date: 2015

Indicator: Establish entity by conducting first formal meeting.

Problem 7: Public access to the river is challenging due to the highly developed state of the watershed.

Goal 7: Increase river corridor connectivity, river navigability, and public access sites and make the public aware of them.

Baseline Information: Public Access Sites are being added as part of the Army Corp of Engineers Flood Control and Recreation Project. The sites as well as other known public access sites are shown in Figure 8.1.

Short Term Target: Identify areas suitable for connectivity improvements and additional public access sites and promote existing sites.
Target Date: 2010

Long Term Target: Increase river connectivity and navigability as well as creating more public access sites along the Little Calumet River and its tributaries. The stakeholders of the Little Calumet River Watershed Management Plan should promote the increased public access sites to the river to the residents of their community.
Target Date:2018

Indicator: Number of connectivity, navigability, and access sites and projects identified, protected, improved, restored, or constructed.

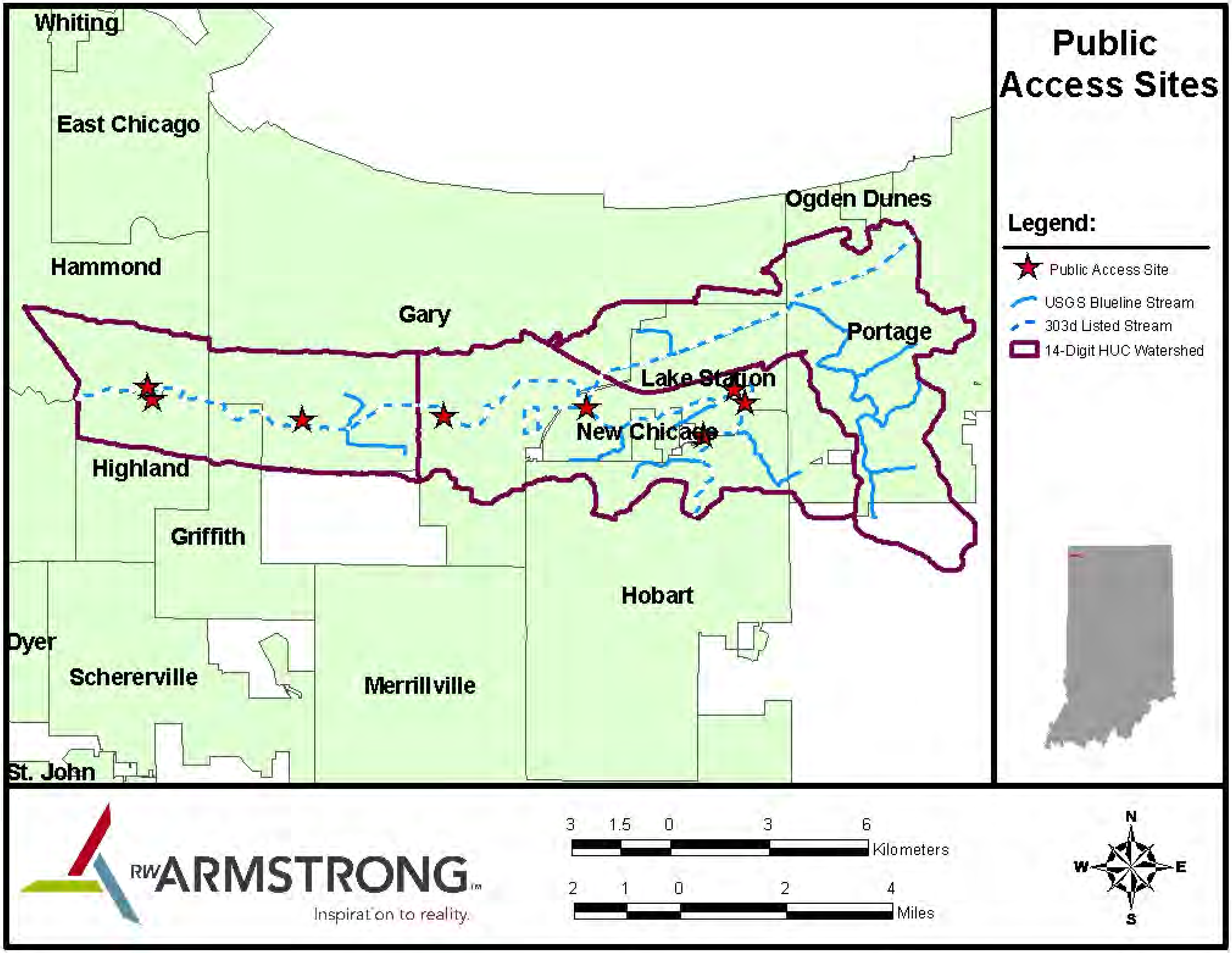


Figure 8.1: Public access sites as identified by NIRPC Greenways and Bluewyas Guide.

Section IX: Implementation and Evaluation

The implementation of the Little Calumet River Watershed Management Plan is designed to take place over the 20 years. This planning horizon is broken down into short, medium, and long range milestones. Each action items is only listed once despite being a measurable item for multiple goals listed. A larger version of the goals and action items presented here can be found in Appendix 18: Action Items.

Goal 1: Reduce *E.coli* levels in the Little Calumet River by reducing loads to the River to meet beneficial uses.			
	Short Term Milestones and Measurable Goals (through 2009)	**Medium Range Milestone and Measurable Goals (through 2013)**	**Long Term Milestones and Measurable Goals (through 2028)**
Action Item 1: Develop pet waste campaign			
	Locate at least three (3) areas where a pet waste educational campaign would be beneficial.	Develop database of all pet stores and begin program to educate customers regarding pet waste disposal.	Conduct 15 educational events in targeted areas to educate public regarding pet waste disposal.
Action Item 2: Develop septic system maintenance program			
	Develop septic maintenance awareness program targeted at homeowners, realtors, and health departments	Complete GIS of known septic systems by determining which buildings have or had septic systems. (Possibly based on construction date and sewer availability at that time.)	Locate, map, and inspect all known septic systems.
	Develop and utilize an existing onsite sewage disposal systems (OSDS) inventory.	Develop and implement policies that require inspection and maintenance of OSDS such as a Point of Sale Ordinance in each municipality in the watershed.	Map results of inspection in a central GIS of the watershed and in each communities GIS.
Action Item 3: Reduce *E.coli* loading from agricultural sources			
	Identify five (5) areas where wildlife and/or livestock have the greatest impact on the river.	Implement a pond/lake management campaign to reduce nuisance wildlife habitat and implement animal waste management practices by completing one (1) improvement project in each of the five (5) areas.	Add a database of areas impacted by nuisance wildlife and animal waste to each municipalities GIS as part of the pond/lake management campaign.
	Locate and map all livestock operations within the watershed.	Contact property owners of all livestock operations to discuss E.coli pollution prevention and animal waste management.	Install natural buffer areas between five (5) largest livestock operations and waterways.
Action Item 4: Reduce *E.coli* loading from urban sources and Install Best Management Practices (BMPs) to reduce E.coli loading to the River			
	Acquire land and funding to restore 400 acres between the levees to wetlands.	Complete restoration of 400 acres of wetlands between the levees.	Complete restoration of 4780 acres of wetlands.
	Identify three (3) municipalities capable of and willing to implement a Rain Garden installation program.	Install 100 Rain Gardens in the three (3) identified municipalities and add three (3) more municipalities to the programs.	Install 300 Rain Gardens in the six (6) identified municipalities and add all remaining municipalities to the programs.

	Develop Green Parking and Green Roofs ordinances in five (5) municipalities within the watershed.	Allow or Install five (5) green roofs or green parking lots within the five (5) municipalities. Develop Green Parking and Green Roofs ordinances in all remaining municipalities withinthe watershed.	Allow or Install twenty (20) green roofs or green parking lots within the watershed.
	Identify at least twenty (20) areas that could utilize infiltration practices such as grassed swales, infiltration basins, infiltration trenches, and bioretention and prioritize them.	Complete installation of three (3) of the twenty (20) infiltration practices.	Complete installation of ten (10) of the twenty (20) infiltration practices.
	Identify ten (10) areas that vegetated buffers would be most beneficial.	Install 500 LF of vegetated buffers in key areas.	Install 2,000 LF of vegetated buffers in key areas.
	Identify at least fifteen (15) locations for retention/detention ponds and begin land acquisition process as needed.	Complete installation of at least three (3) of the fifteen (15) retention/detention ponds.	Complete installation of at least ten (10) of the fifteen (15) retention/detention ponds.
	Identify five (5) municipalities willing to install/require storm water filtration such as bioretention, rain gardens, sand filters, filter strips, catch basin inserts, and storm water filters/separators.	Pass necessary ordinances in five (5) municipalities within the watershed for the installation of these practices and install ten (10) such practices.	Pass necessary ordinances in all municipalities within the watershed for the installation of these practices and install forty (40) such practices.
		As part of the plan update, research *E.coli* treatment strategies and determine which BMPs or other programs are most successful, and add them to the updated report.	Develop and implement an education/training program for system designers, installers and inspectors to attend.
		Implement conservation measures through the use of local ordinances that will reduce the *E.coli* loads generated during high volume stormwater resulting in CSO events	Construct BMPs throughout the watershed that will reduce the *E.coli* loads that are generated by CSO events and other sources.

Goal 2: Reduce sediment loads by source reduction strategies and, in priority subwatersheds, through the use of BMPs.			
	Short Term Milestones and Measurable Goals (through 2009)	**Medium Range Milestone and Measurable Goals (through 2013)**	**Long Term Milestones and Measurable Goals (through 2028)**
Action Item 1: Reduce sediment loads from agricultural land			
	Identify and contact at least ten (10) eligible landowners and discuss benefits of Farm Bill cost-share programs that are specific to their land; as identified in the IN NRCS Field Office Technical Guide.	Develop conservation program targeted at the landowners that agreed to participate in the Farm Bill cost-share program and enroll at least five (5) of the participants.	Continue to identify and contact landowners and enroll at least ten (10) of the participants in the Farm-Bill cost-share program in the conservation program.
Action Item 2: Reduce sediment loads from urban/rural sources.			
	Incorporate 80% TSS reduction standard into ordinances governing new developments in five (5) municipalities in the watershed.	Incorporate 80% TSS reduction standard into ordinances governing new developments in all municipalities in the watershed.	Implement structural practices that reduce the average annual TSS loadings by 80% or reduce the post-development loadings of TSS so that the average annual resulting TSS loadings are

			no greater than predevelopment TSS loadings in all municipalities.
	Identify twenty (20) locations that sediment traps could be installed.	Install five (5) sediment traps in key locations in the watersheds.	Install ten (10) sediment traps in key locations in the watersheds.
	Post Indiana Stormwater Manual and supporting storm water and erosion control ordinances to the websites of each municipality so it is readily available to developers and site planners to utilize.	Develop case studies which highlight innovative BMPs and other effective practices to share with neighboring communities and to present to targeted audiences, including stormwater managers, city engineers, developers and builders.	Create and utilize a GIS based storm water BMP tracking system in all municipalities.
	Review existing land use plans, zoning and ordinances in each municipality to see if there are any barriers to implementing "Smart Growth" principles or LID practices.	Update land use plans, zoning and ordinances to allow for "Smart Growth" and various LID practices in each municipality as needed.	Update land use plans, zoning, and ordinances in each muynicipality to ensure that they allow for "Smart Growth" and various LID practices.
Action Item 3: Reduce sediment loading from marina and recreational boating sources			
	Identify existing and/or proposed marinas and encourage them to participate in Indiana Clean Marina Program.	Establish no-wake zones in all marinas	Establish cost-share program for marinas to stabilize eroding shorelines preferably using vegetative measures where feasible.
	Identify five (5) areas in marinas that would benefit most from shoreline stabilization practices.	Implement measures aimed at stabilizing shorelines in at least two (2) identified areas.	Implement measures aimed at stabilizing shorelines in at least five (5) identified areas and identify five (5) more areas.
Action Item 4: Reduce sediment loading from proposed or existing hydromodification projects			
	Identify at least ten (10) areas that would benefit from channel modification to encourage sedimentaion and reduce erosion.	Complete necessary modeling on five (5) of the proposed channel modification sites to evaluate the effectiveness of the plans.	Complete proposed modifications and install other BMPs as appropriate at a minimum of three (3) of the proposed sites.
	Develop a stream and riparian area restoration work plan that includes ten (10) areas for restoration and/or protection.	Implement the developed stream and riparian area restoration work plan in at least two (2) areas.	Implement the developed stream and riparian area restoration work plan in at least five (5) areas.
Action Item 5: Public and Municipality Involvement			
	Develop LID presentation that can travel and is targeted at specific audiences.	Give presentation to decision makers in all municipalities.	Conduct five (5) training workshops focused on development and the benfits of LID methods.
	Develop LID ordinances or policies to use in multiple jurisdictions	Establish LID ordinances in five (5) municipalities.	Establish LID ordinances in all municipalities.

Goal 3: Reduce nutrient loads by source reduction strategies and, in priority subwatersheds, through the use of Best Management Practices (BMPs)			
	Short Term Milestones and Measurable Goals (through 2009)	**Medium Range Milestone and Measurable Goals (through 2013)**	**Long Term Milestones and Measurable Goals (through 2028)**
Action Item 1: Reduce nutrient loads from Agricultural land			
	Identify and contact at least ten (10) eligible landowners and discuss benefits of Farm Bill cost-share programs that are specific to their	Develop conservation program targeted at the landowners that agreed to participate in the Farm Bill cost-share program and enroll at least five (5)	Continue to identify and contact landowners and enroll at least ten (10) of the participants in the Farm-Bill cost-share program in the

	land; as identified in the IN NRCS Field Office Technical Guide.	of the participants.	conservation program.
Action Item 2: Reduce nutrient loads from urban/rural sources.			
	Identify ten (10) areas that grass lined channels would be most beneficial.	Install 1,000 LF of grass lined channels.	Install 5,000 LF of grass lined channel.
	Identify and develop partnerships with fertilizer manufacturers and distributors.	Develop program to offset cost and provide availability of phosphorus free fertilizer to local communities to be used on household lawns. Implement the program in at least three (3) municipalities.	Continue to make phosphorus free fertilizer available to communities through organization and cooperation with local stores to supply the fertilizer. Implement the program in all municipalities.
Action Item 3: Public and Municipality Involvement			
	Develop managed lands and homeowner outreach strategy that will educate the public about yard maintenance activities.	Conduct five (5) outreach events for homeowners and contact all golf courses within the watershed regarding maintenance activities.	Conduct fifteen (15) outreach events for homeowners and continue to work with all golf courses within the watershed regarding maintenance activities.

Goal 4: Restore, improve, and/or protect floodplains, wetlands, natural areas, and riparian corridors.

	Short Term Milestones and Measurable Goals (through 2009)	Medium Range Milestone and Measurable Goals (through 2013)	Long Term Milestones and Measurable Goals (through 2028)
Action Item 1: Reduce habitat degradation associated with urban/rural areas.			
	Develop and adopt riparian setback ordinances that will aid in future project planning by delineating certain areas as “natural areas” in at least two (2) municipalities.	Develop and adopt riparian setback ordinances that will aid in future project planning by delineating certain areas as “natural areas” in at least five (5) municipalities.	Develop and adopt riparian setback ordinances that will aid in future project planning by delineating certain areas as “natural areas” in all municipalities.
	Develop wetland and riparian protection ordinances in local communities in at least two (2) municipalities.	Develop wetland and riparian protection ordinances in local communities in at least five (5) municipalities.	Develop wetland and riparian protection ordinances in local communities in all municipalities.
Action Item 2: Protect existing wetlands and riparian areas and restore degraded ones			
	Identify twenty (20) priority areas for restoration/mitigation that will have the greatest benefit to water quality and habitat connectivity and funding sources/partnerships to complete them.	Restore/mitigate at least two (2) of the priority areas.	Restore/mitigate at least ten(10) of the priority areas.
	Identify twenty (20) priority areas for protection, the current land owners, and potential funding sources.	Acquire through purchase or conservation easement at least two (2) of the priority areas for protection.	Acquire through purchase or conservation easement at least ten (10) of the priority areas for protection.
	Develop education and outreach material on the importance and function of wetlands and riparian areas to help protect them from adverse public impacts.	Conduct at least five (5) educational events on the importance and function of wetlands and riparian areas.	Conduct at least twenty (20) educational events on the importance and function of wetlands and riparian areas.

Goal 5: Improve public awareness/knowledge of pollutant loads, sources, and solutions, especially with regard to *E.coli*, and the impacts and risks associated with them.			
	Short Term Milestones and Measurable Goals (through 2009)	**Medium Range Milestone and Measurable Goals (through 2013)**	**Long Term Milestones and Measurable Goals (through 2028)**
Action Item 1: Promote positive/healthy locations for reactional purposes.			
	Identify gaps in public access sites and incorporate Coastal Program findings.	Work with the Health Department to increase the number and proper usage of signs regarding the current condition of the water.	Post warnings signs as needed at all public access sites.
Action Item 2: Increase public awareness and knowledge of water condition			
	Develop and implement an Adopt-A-Stream program in all municipalities within the watershed.	Develop and implement a Storm Drain Marking program in all municipalities and mark all storm drains.	Develop volunteer campaigns to involve the public in Reforestation Programs and Wetland Plantings and conduct at least five (5) events.
	Develop Project Wet (Water Education for Teachers) program.	Promote or assist in classroom programs such as Project WET (Water Education for Teachers) and conduct five (5) outdoor activities/workshops	Promote or assist in classroom programs such as Project WET (Water Education for Teachers) and conduct fifteen (15) outdoor activities/workshops
	Develop and conduct Public Service Announcements (PSAs) related to *E.coli* and recreation and develop a campaign to include educational inserts in utility bills.	Conduct five PSAs on at least three (3) local radio and television stations.	Conduct ten PSAs on at least three (3) local radio and television stations.

Goal 6: Create an active watershed alliance or conservancy district that facilitates and implements information sharing including ordinances, projects/experiences, and educational materials in a central location.			
	Short Term Milestones and Measurable Goals (through 2009)	**Medium Range Milestone and Measurable Goals (through 2013)**	**Long Term Milestones and Measurable Goals (through 2028)**
	Determine relevant players in organization and approach them for buy-in. Appoint representation from each group involved.	Host regular meetings of the alliance and develop a communication/outreach strategy to spread a consistent message.	Develop a website through coordination with local agencies.
	Approach public officials with idea and proposed structure to gain buy-in from the local communities and their administrations	Continue to gain support from the new administrations that are part of the various local communities and environmental groups across the watershed study area.	
	Develop organization structure alternatives with input of public officials and develop MOUs between jurisdictions in watershed		
	Coordinate available resources including those provided by NIRPC, IDEM, and the EPA	Develop a contiguous mapping system across political boundaries	Construct and maintain a website that is available for both general public use and municipality use.

Goal 7: Increase river corridor connectivity, river navigability, and public access sites and make the public aware

of them.			
	Short Term Milestones and Measurable Goals (through 2009)	**Medium Range Milestone and Measurable Goals (through 2013)**	**Long Term Milestones and Measurable Goals (through 2028)**
	Incorporate (into public education materials) the finding from the pending Coastal Program study regarding significant gaps in public access on sections of the river	Utilize new Coastal Program data and develop maps and web resources highlighting access sites along the Little Calumet River and its tributaries	Distribute maps and increase knowledge of web resources to general public in the communities along the Little Calumet River and its tributaries
	Identify ten (10) areas that would be most effective in improving connectivity along the river and its tributaries.	Design and construct at least two (2) projects that improve connectivity along the river.	Design and construct at least five (5) projects that improve connectivity along the river.
	Identify ten (10) areas along waterway that create the greatest obstruction in the navigability	Develop long range plan to replace structures obstructing navigability on the river.	Install at least three (3) projects that increase navigability on the river.
	Discuss culvert alternatives with state and federal highway authorities	Implement culvert alternatives as parts of other ongoing projects.	Install at least three (3) projects that increase navigability on the river.
	Identify at least ten (10) areas where a new public access site are possible and would be beneficial.	Acquire land and construct at least one (1) new public access site.	Acquire land and construct at least three (3) new public access site.

Section X: Load Reduction Calculations

The Best Management Practices (BMPs) needed to reach the goals and their long term targets presented in Section VIII were found by modeling the watershed study area. The Watershed Treatment Model (WTM) Version 3.1 produced by the United States Environmental Protection Agency's (EPA) Office of Wetlands, Oceans and Watershed for Region V was used to find the calculated yearly loading rates before and after the implementation of BMPs.

The WTM is comprised of a series of worksheets with data inputs for primary sources, secondary sources, existing management practices, future management practices, and future land use. Other worksheets are included in the model but these were the primary input sheets used for the calculated load reductions.

The primary input data source was the current land use information contained in this plan with a 20 year planning horizon. The only secondary source considered was stream erosion. Existing management included the acreage of wetlands currently in the watershed being considered as natural riparian areas. The future management practices included a variety of structural BMPs as well as some soft practices that would reduce sediment and nutrient loads entering the water body. The future land use consisted of changing undeveloped areas into the wetlands as needed for structural BMPs. Also changed in future land use was the acreage that will be developed into medium density urban in the southern portion of the watershed study area located in Porter County. Appendix 19: Load Reductions contains a detailed breakdown of the data used to find the calculated load reductions in the watershed study area.

The structural BMPs needed to accomplish the long term targets for the seven watershed management goals are presented in Table 10.1. The future management practices are grouped according to their 14-digit HUC watershed with the combined acreage for each BMP being listed at the bottom of the table. The acreage of each BMP type represents the acreage used for the future management practices and is independent from the acreage of the other structural BMPs.

While the structural BMPs are the major source of calculated load reductions to the Little Calumet River and its tributaries, there are also "soft" practices that are to be implemented by the local communities in the watershed study area. However, the WTM could not calculate the load reductions for all of the BMPs in this plan. A list of the practices that should be implemented where appropriate but that could not be included as part of the WTM is shown in Table 10.2.

The resulting load reductions for each HUC 14-digit watershed and the combined total reduction is listed in Table 10.3. Appendix 19: Load Reductions contains the detailed listing of the existing and future loads with the reduction and percentages shown. The only parameters calculated for the WTM are Total Phosphorus, Total Nitrogen, Total Suspended Solids, and Fecal Coliform. The reduction percentage found for the fecal coliform was used to find the new *E.coli* concentrations during dry weather. The new reduced concentrations are listed in Table 10.4 for each of the 42 sampling locations, which tested for *E.coli* alone. This percentage reduction was used because the relationship between fecal coliform concentrations and *E.coli* concentrations is a factor of 80%, with the *E.coli* concentrations being less.

	BMP Type	Acreage
E-W Split Watershed	Infiltration Strip	17
	Wet Pond	200
	Dry Extended Detention Pond	100
	Wetlands	1857
LC & DR Watershed	Infiltration Strip	21
	Wet Pond	200
	Dry Extended Detention Pond	151
	Wetlands	970
WC & BD Watershed	Infiltration Strip	54
	Wet Pond	200
	Dry Extended Detention Pond	256
	Wetlands	1954
COMBINED	Infiltration Strip	92
	Wet Pond	600
	Dry Extended Detention Pond	506
	Wetlands	4780

Table 10.1: Future management practices used for WTM.

NEW CAMPAIGNS/PROGRAMS TO BE IMPLEMENTED	EXISTING CAMPAIGNS/PROGRAMS TO BE UTILIZED	ORDINANCES TO BE CREATED	STRUCTURAL BMPs TO BE IMPLEMENTED
Develop a pet waste educational campaign	Develop a conservation program to follow the Farm Bill cost-share guidelines that are specific to land uses in the watershed	Develop on-site sewage disposal system (OSDS) inventory	Identify, prioritize and schedule retrofit opportunities to reduce CSO impacts
Create a septic maintenance awareness program	Implement an Adopt-A-Stream Program	Create ordinance to prevent septic system failures in watershed study area	Using a program model the effects that will be felt through proposed channel modifications. Implement BMPs to reduce these impacts on the watershed study area
Develop a residential car washing campaign to encourage residents to use car washes or pervious surfaces	Using current zoning restrictions to better control post-construction water quality	Create ordinance to enforce conservation measures to reduce E.coli loads to the river	Wetlands planting via public involvement
Implement a pond/lake management campaign to reduce nuisance wildlife	Develop a conservation management system (CMS) for pasture components through Farm Bill cost-share program	Develop ordinance to require an 80% TSS reduction standard governing new developments	After construction of BMPs require an inspection and maintenance
Review existing land use plans and verify the implementation of "Smart Growth" or LID practices being used	Post the IN Stormwater Manual and supporting documents on municipal websites for easy access by developers and landowners	Develop and adopt a riparian setback ordinance	Conduct fluvial geomorphic assessment to gather more baseline data and utilize practices consistent with NRCS Stream Restoration Design Guidebook
Develop a stream and riparian area restoration work plan	Encourage participation in Indiana Clean Marina Program for new and existing marinas	Use ordinances to control post-construction runoff	To increase filtration implement bioretention and rain gardens, catch basin inserts, sand and organic filters, and vegetated filter strips.
Create a reforestation program for natural areas in the study area	Use a post-construction plan review process to ensure all ordinances are being met or exceeded	Determine key players to the success of an alliance group for the Little Calumet River and its tributaries and gain buy-in	Begin implementing bioengineering practices that were found to be feasible when assessing eroding stream banks and marine shorelines
Develop a LID presentation that can travel and is targeted at specific audiences	Coordinate and train municipalities on good housekeeping strategies and regional Rule 5 enforcement	Create an erosion and sediment control plan to be regulated by building permits	Riparian area restoration/mitigation that will result in the greatest benefit to water quality and habitat connectivity
Find and develop a partnership with the fertilizer industry to make P-free fertilizer available to residents	Develop a nutrient management plan as outlined in the IN NRCS Field Office Technical Guide	Monthly street sweeping and parking lot cleaning requirements in the local communities	To increase infiltration implement grassed swales, infiltration basin, infiltration trench, and porous pavement
Develop a homeowner outreach strategy that will educate the public on yard maintenance activities	Promote NIRPC guidance document for land managers/owners	Regulate building permits to require preservation of natural vegetation	Restore native plant communities in wetlands and riparian areas that are targeted at specific soil types for restoration/mitigation
Outreach material to be developed on the importance and function of wetlands and riparian areas to help protect from adverse impacts	Assimilate an economic study to determine functional value as well as feasibility of existing wetlands	Require storm drain system cleaning	Identify areas along waterway that create the greatest obstructions and hamper navigability
Create a public service announcement (PSA) relating to E.coli and recreational activities to be put in utility bills	Incorporate Coastal Program findings about gaps in public access sites and develop a map showing access points		To reach retention/detention standards implement dry detention ponds, in-line storage, on-lot treatment, stormwater wetlands, or wet ponds.
Map future population trends for each community and compare to those of neighboring communities to find where development ordinances will be needed	Increase awareness of on-going watershed projects and home owner BMPs		Use check dams to control runoff
	Coordinate available resources including those provided by NIRPC, IDEM and the EPA		Implement grass-lined channels to better control runoff and filter out sediments
			Control sediment loads reaching the river through the implementation of brush barriers, sediment traps, and vegetated buffers
			Use innovative BMPs for new site plans including conservation easements, eliminating curb and gutters, green parking, green roofs, LID strategies, narrower residential streets, protection of natural features, redevelopment, riparian/forested buffer, street design and patterns, and urban forestry

Table 10.2: List of BMPs for possible implementation

LOAD REDUCTIONS RESULTING FROM BMP IMPLEMENTATION					
		TN lb/year	TP lb/year	TSS lb/year	Bacteria billion/year
07120003030050	Total	14526	2344	4093108	1164171
	Percentage	18.63%	24.15%	84.61%	39.94%
04040001040020	Total	11538	1627	4353019	870303
	Percentage	12.44%	13.86%	69.45%	25.69%
04040001040030	Total	14653	2543	5552534	1420717
	Percentage	18.10%	24.24%	88.70%	54.63%
COMBINED	Total	40717	6513	13998660	3455191
	Percentage	16.18%	20.40%	80.61%	38.81%

Table 10.3: Load reduction totals and percentage for 14-digit watersheds.

Sampling Location	E. coli (cfu/100ml)			
	Dry Weather (7/24/2007)		Dry Weather (10/30/2007)	
	Sampling Results	38.81% Reduction	Sampling Results	38.81% Reduction
1		0	225	138
2	1804	*1104	341	209
3	448	*274	190	116
4	25	15	218	133
5	396	*242	174	106
6	94	58	52	32
7	2	1	3	2
8	3	2	5	3
9	1	1	32	20
10	228	140	15	9
11	207	127	144	88
12	108	66	15	9
13	56	34	1	1
14	353	216	20	12
15	270	165	46	28
16	692	*423	75	46
17	119	73	78	48
18	345	211	58	35
19	1	1	428	*262
20	88	54	113	69
21	51	31	79	48
22	111	68	7	4
23	374	229	40	24
24	505	*309	77	47
25	275	168	48	29
26	68	42	16	10
27	937	**573	445	**272
28	375	229	260	159
29	158	97	5	3
30	168	103	18	11
31	5	3	72	44
32	72	44	102	62
33	50	31	8	5
34	71	43	19	12
35	129	79	27	17
36	51	31	2	1
37	4	2	92	56
38	3	2	79	48
39	36	22	67	41
40	9	6	2	1
41	86	53	44	27
42	913	**559	586	**359

* Single sample measured load reduction exceeding the 235 cfu/100mL standard.
** Both dry weather measured sample load reduction percentages will be exceeding the 235 cfu/100mL standard.

Table 10.4: Sampling locations dry weather E. coli loads resulting from percentage load reduction.

Section XI: Implementing the Measures

Monitoring Plan

Future monitoring of the watershed will need to include further baseline data collection once the diversion structure is constructed as part of the flood control project. This structure will be located west of Hart Ditch and will divert high flows to the east by limiting the amount of flow that can travel west. This diversion will significantly alter water quantity and quality in the areas covered under this study by diverting storm flows from Hart Ditch through these watersheds. This additional baseline data collection is eligible for 319 grant funding and is targeted to be conducted in 2009.

Water quality sampling will be conducted to determine the status of indicators for the bacteria and nutrients as discussed under Goals #1, #2, and #3. The future sampling plan, including a QAPP, will have to be determined once the new baseline data has been collected and some of the BMP's outlined in this plan have been installed. At a minimum this sampling should include sampling the same seven sites that were sampled during the development of this plan for both base flows and high flows. Additional locations should be added between these locations to clarify pollutant levels and the effectiveness of BMP's in use at that time. Monitoring of indicators for Goals #1, #2, and #3 is planned for five (5) years after the next round of baseline data has been collected and then every five years after that. A consultant or laboratory will most likely be needed for this sampling to ensure uniformity.

At that time, the area, in acres, of floodplains, wetlands, natural areas, riparian corridors identified, protected, improved, and/or restored should be evaluated to determine progress under Goal #4. A public survey should be conducted with a representative sample in each municipality to determine progress under Goal #5. The number of new public access sites and connectivity projects completed should also be tallied at this time to measure the progress under goal #7. These tasks can be performed by the entity that is the end result of Goal #6 with volunteers from each municipality and should be repeated every five (5) years starting in 2014.

Goal	Indicator	Responsible Party	First Report	Second Report	Third Report	Fourth Report
1	E.coli sampling results	Entity from Goal #6	2014	2019	2024	2029
2	TSS sampling results	Entity from Goal #6	2014	2019	2024	2029
3	Nutrient sampling results	Entity from Goal #6	2014	2019	2024	2029
4	Acres identified, protected, improved, and/or restored.	Entity from Goal #6	2014	2019	2024	2029
5	Public survey results	Entity from Goal #6	2014	2019	2024	2029
6	Watershed entity established	Current Steering Committee and Municipalities	2014	N/A	N/A	N/A
7	Number of new public access sites and connectivity project completed.	Entity from Goal #6	2014	2019	2024	2029

Table 11.1: Goals and Indicators for watershed management plan.

Section XII: Evaluating and Adapting the Plan

As discussed in the previous section, the indicators for Goals #1, #2, #3, #4, #5, and #7 will be monitored every five (5) years under this plan by the entity formed under Goal #6. This planned should be evaluated and updated during at least every other monitoring period by the same watershed entity and the stakeholders in the watersheds. This would set the first evaluation of the plan and its goals for no later than 2019. The plan may be evaluated sooner once the entity is formed and begins to address the goals outlined in this plan.

The watershed entity created under Goal #6 will be responsible for coordinating this plan with the existing TMDL and updating this plan as needed.

Section XIII: References and Appendices

References
Appendix 1 – Letter to Stakeholders from Sponsor
Appendix 2 – Steering Committee Issues and Concerns 11-30-07
Appendix 3 – Minutes the First Steering Committee Meeting 11-30-06

Appendix 4 – Minutes the Second Steering Committee Meeting 01-11-07

Appendix 5 – Table of Prioritized Issues from 1st Public Meeting

Appendix 6 – Proposed Sampling Map and Alternatives Table

Appendix 7 – Minutes the Third Steering Committee Meeting 03-14-07

Appendix 8 –
Appendix 9 –

Appendix 10 –

Appendix 11 –

Appendix 12 –

Fact Sheets
Brochures
Grant Application and Contract

Appendix 1

Stakeholders Invitation Letter

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SANITARY DISTRICT
GARY
STORM WATER MANAGEMENT DISTRICT

Mayor Rudolph Clay

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839 Broadway
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You Are Invited!

STAKEHOLDER ADVISORY GROUP MEETING

LITTLE CALUMET RIVER WATERSHED PLANNING INITIATIVE (Western Branch)

Thursday, November 30, 2006, 2 pm
Gary Storm Water Management District
Board Room
3600 West 3rd Avenue
Gary, Indiana 46406

The Gary Storm Water Management District, in coordination with the City of Gary Environmental Affairs Department has been awarded funding from the Indiana Department of Environmental Management Section 319 Program to do a Watershed Management Plan for the West Branch of the Little Calumet River extending from the Indiana/Illinois state line to Burns Ditch, covering three (3) 14-digit hydrologic units code (HUC) watersheds (071200003030050; 04040001040020; and 04040001040030). The firm of R.W. Armstrong has been selected to facilitate and implement the planning process.

Please join us for the first of eight Stakeholder Advisory Group meetings to be held over the next 18 months of this watershed planning initiative. We look forward to your input and assistance in creating a comprehensive watershed plan through water quality assessments, identification of impacts, prioritization of water quality goals, and increased public involvement in the watershed planning process. Our goal for the Western Branch of the Little Calumet River is to meet or exceed the applicable water quality standards as determined by the State of Indiana, under the provision of the Clean Water Act.

If you have further questions, please contact Dorreen Carey, Director, Environmental Affairs, City of Gary, at 219 882 3000.

Appendix 2

Issues Identification

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On November 30, 2006 local stakeholders met for the first time to in a steering committee meeting. During this first meeting a draft mission statement was developed and the following list of concerns formed.

- Downstream Impacts (Lake Michigan)
- Impact of Altered Hydrology
- Fishery Condition – Fish Health
- Coordination w/other Watersheds
  - 6217 Coordination
- Impacts on Recreational Uses
- Low Flow Water Quality
- Risk Commo to Community
- Coordination w/Flood Control Project
  - Impact on Water Quality
- TMDL –E. Coli
  - Communication/Education w/Public
  - Sources
- SCO's
  - Discharge & Impacts on Use
- Septic Systems
  - Social & Source Issues
- Sediment Loads (TSS) & Upstream Erosion Problems
- Impacts on Neighborhood's – Aesthetic & Habitat
- Diversion to Illinois
- Increase in Large Rain Events
- Coordination with Planning & Zoning
- Preservation of Riparian Areas
- Planning Tools to Assess Downstream Impacts
- Restoration of National Areas/Habitat
- Communication w/ACOE
- Development Oversight
- Who's in Charge of What?
- Water Quantity
  - In Stream
  - Flooding
- Quantity & Quality from East Reach

Appendix 3

Steering Committee Meeting Minutes

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PROJECT: Little Calumet River Watershed Management Plan **PROJECT NO.:** 20067150.22

DATE: 1/11/2007

RE:

BY: Zig Resiak

Open 1:13p.m. ~ Doreen Cary opened with introductions:

Jill opened with brief update about the HUC (3) introducing the 11X17 drawing.
Jill recapped through a PowerPoint
Phil commented prior to the PowerPoint that outfalls will not be GPS'd as per IDEM.
Sky, from IDEM, stated that indeed GPS location of MS4 outfalls should not be done under this watershed management plan.
Phil stated that GPS'ing of "other" river geomorphology will occur.
Jenny Orsburn stated that her group is doing some stream bank sampling and would provide Phil with coordinate information instead of GIS.
Jill presented the PowerPoint.
Under draft mission, Jill asked if the group felt comfortable about the mission statement.
Some discussion amongst Ruth Mores and Charlotte Read about Indian Artifacts as a cultural resource was had.
Doreen Carey felt the term "Public Awareness" should be included in the Mission Statement.
Tom Anderson concurred that cultural, as it addresses history, should be inclusive of the Mission Statement.
The term "Public Awareness Solutions" was stricken and replaced with "Improve Public Access and Awareness".
Charlotte mentioned that marinas are a source of pollution & recreation.
Dan Gardner would like to see the wording changed to "Diversion to Illinois."
Doreen & Dan Vicari mentioned that the Chicago Water Reclamation District is interested in what this group is doing.
Doreen wants to see access to the river as an issue.
Herb would like to see the physical parameters being identified as an issue.
Jill had the participants break into groups to do an exercise turning issues into draft goals.
**Team building exercise
**New teams looking at previous goal statements
Group review of modified goal sheets public meeting discussion
A question was raised as to what is the goal of the public meeting
Jill responded 1.) to inform the public of the plan 2.) get their input
Sky stated that a draft of the plan is due in April
Doreen wanted the public meeting in mid-March to facilitate IDEM
Adjourn 3:30p.m.~

v:\merrillville - environmental\projects\gswmd\lcr watershed management plan\steering committee meetings\2007 meetings\01-11-07\minutes 01-11-07.doc

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14:10
Opening remarks/introductions by Phil Gralik
Discussed March 1st meeting & Public comments

- Flooding
- Impact on Lake Michigan
- Watershed Education

Charlotte mentioned that flooding wasn't a part of the 319 Program.

Doreen suggested that we add a layer of the ACDE ponding areas.
The levees start at I65 in Marshalltown runs diagonally to 94 then west to Kennedy Ave.

Water Quantity is an issue and the group wishes to address that with the 319 Grant.

Jason talked about macroinvertabiates
Water Quality/Habitat Quality

Has anyone (DNR?) done a hydrographic survey, fishing survey, bottom survey?

What tests will be run? Jason
Bob has river data from sampling for TMDL'S
Zig, what about SRCERS/what about CSO Communities

Lots of discussion & confusion on sampling
We should;

- Recap objective of 319
- State what sampling is to accomplish
- What can 319 money do
- What is the approach and why

Charlotte asked if we should sample for cyanide. Steve said no.

Steve asked why we are chasing nutrients
Answer; yes because of fertilizers, etc.

Monroe/Portage Planning

Next meeting; Wednesday, April 25th Lake Shore, May 2nd 1:00pm @ NIRPC

Bob 219-680-7803

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Meeting Minutes

PROJECT: Little Calumet River Watershed Management Plan **PROJECT NO.:** 20067150.16

DATE: July 17, 2007

RE: Strategy Planning Meeting

BY: Nicole Sanders

- Meeting Date: July 17, 2007 at 2:00 pm
- Meeting Location: Northern Indiana Regional Planning Commission
- Attendees:

Phil Gralik	R.W. Armstrong
Constance Clay	Save the Dunes Council
Joe Exl	Lake Michigan Coastal Program
Kathy Luther	Northern IN Regional Planning Commission
Steve West	IN Department of Environmental Management
Kevin Breitzke	Porter County
Bob Theodora	United Water
Sky Schelle	IN Department of Environmental Management
Doreen Carey	Gary Department of Environmental Affairs
Spencer Cartwright	Indiana University Northwest
Maurice Joiner	United Water
Lisa	Empower Results
Jill Hoffman	Empower Results
Elizabeth McCloskey	U.S. Fish & Wildlife Service
Dan Gossman	Lake County Surveyor's Office
Gregory White	Lake County Surveyor's Office

- Phil Gralik of R.W. Armstrong opened the meeting and stated the purpose, and then everyone around the table introduced themselves.
- Jill Hoffman of Empower Results began discussing the current status of the project by explaining the change in sampling techniques. There will be "grab" samples taken at 40 sites to help determine possible "hot spots."
- Jill Hoffman continued explanation of the project referencing the map displaying the entire watershed area. The pink stars were identified as locations that would be tested for all nutrients and the black plus signs were locations that only e-coli would

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be tested.

- The 40 “grab” sites will each be tested once a month for the next 3 months. The exact locations of these sites will be dependent on the outfalls. The exact location of the test sites that will be tested for all nutrients will be determined by Greg Bright.

- It was reported that there had been no change in the budget. In order to maximize the budget it was determined that the macros would not be done. With the lack of wildlife present this testing method would not provide the largest amount of information.

- Constance Clay of the Save the Dunes Council asked if the e-coli presence would be used to determine the health of the water.

- Jill Hoffman responded by saying that it would allow them to know more about the conditions of the water and any possible hot spots of pollution.

- Spencer Cartwright of Indiana University Northwest asked if any sample sites would test the water as it flows back into the river from a wetland.

- Jill Hoffman stated that in order for that to be effective you would also need an upstream sample to compare the results to.

- Doreen Carey of the Gary Department of Environmental Affairs asked about the pipe and ditch locations.

- Phil Gralik stated that the pipe locations were based on information contained in city files except for the pipe locations in Hobart were determined by the completion of a GIS survey.

- Doreen Carey stated that the ditch Mr. Cartwright referenced to test the water before it flowed back into the river would need back source tracking.

- Spencer Cartwright said that there was no urban area in the ditch. The water simply ran in and out.

- Phil Gralik turned the direction of conversation back to the map of the land use inventory. The majority of the maps displayed residential area and there were no hot spots identified. He then asked if there were any questions or corrections to what the map indicated.

- Joe Exl of the Lake Michigan Coastal Program asked what all land types were considered to be opened on the inventory map.

- The open areas were stated to include agricultural and natural (uncultivated) land. Phil Gralik then asked if there were any categories that would be beneficial to add to the inventory map.

- Joe Exl suggested that the agricultural land be separated from the open land category.

- Elizabeth McCloskey stated that a majority of the agricultural land was owned by the Little Calumet River Basin Development Commission (LCRBDC) and that the land was rented to farmers. She also stated that the area over by Chase Street was designated for mitigation.

- Joe Exl then asked about the long-term planning for the areas designated as open on the inventory map.

- Elizabeth McCloskey said that she was not sure who owned the area by Interstate-65.

- Doreen Carey referenced the inventory map saying that it needed to be more specific in designating areas; that wetlands should not be included in the open area. Joe Exl agreed with this statement.

- Doreen Carey believed that the areas designated for a certain use need to be noted as such on the inventory map. The areas that are designated as mitigation for the Little Calumet River need to be noted.

- Spencer Cartwright noted that the areas of agriculture could be delineated in the open areas on the inventory map as it stands at this point.

- Doreen Carey stated that the location of levees should be marked on the inventory map. She also stated that the floodplains should be outlined on the map but noted that they will change once the construction of the levees is completed.

- Jill Hoffman noted that wetlands can also be considered wooded areas and that specifying too much becomes difficult.

- Doreen Carey stated that the Green Lake Plan inventoried land use effectively and suggested that plan be checked and compared to the current inventory map in place for this project.

- Kathy Luther of Northern Indiana Regional Planning Commission (NIRPC) said that NIRPC was currently working on a land use plan and that future questions about it could be directed to her.

- Doreen Carey stated the concern for the wetlands and agricultural land to be marked separately.
- Phil Gralik agreed that the levee system needs to be noted on the inventory map and stated that that information would be passed on.
- Joe Exl inquired about putting the MS4 boundaries on the inventory map as a reference point.
- Jill Hoffman stated that the entire watershed area was within the MS4 boundaries and asked if he meant the individual MS4 segment boundaries or the MS4 group as a whole.
- Kevin Breitzke pointed out that the area outside of Portage to the south and east was not included in the MS4 boundaries.
- Elizabeth McCloskey noted that this area will be developed before the completion of the study. She has already reviewed plans for subdivisions in the area.
- Jill Hoffman then focused the meeting back onto the subject of potential hotspots in the area.
- Elizabeth McCloskey stated her concern with the dumpsites over by Chase Street. She was not sure as to the actions taken by the Army Corp of Engineers. In particular the areas of Lyell's Dump and the area north of Chase Street Auto where water pooling was occurring. She pointed out that the auto salvage was built on fill. The location of the auto salvage can be found west of Gary just north of the Little Calumet River.
- Jill Hoffman noted that there will be a list of haz mat sites and areas where questionable practices have been observed.
- Kevin Breitzke noted that the fill under Chase Street Auto was built up 80/90 years ago and everything was used in order to build up the land.
- Elizabeth McCloskey also noted that truck stops were an area of concern for hot spots.
- Doreen Carey noted that the Grant Street problem was outside levee and could possibly be eliminated once the levee system was completed.
- Kathy Luther inquired about marking truck stops and the auto salvage location on the

inventory map for possible hot spots.

- Jill Hoffman stated that it would be easy to add the sites that were registered with IDEM but others would be challenging.
- Doreen Carey asked about a list to show the percentages in the area.
- Phil Gralik stated that a percentage list could be created that noted the land use of the Little Calumet River Watershed Management Plan.
- Kevin Breitzke stated that he supported the levee project but wondered what the effect would be on the surrounding land usage once it was completed.
- Elizabeth McCloskey noted that the levee system was completed all the way to Kennedy Avenue.
- Kevin Breitzke added that while the levee system is almost completed they haven't completed much of the vegetation.
- Phil Gralik added that the flood plains and levee lines could be added but that the levee should remove the flood plain.
- Doreen Carey noted that the flood plain and flood way should be delineated separately.
- Joe Exl noted that the flooding issue should be presented at a public meeting.
- Jill Hoffman agreed but stated that it was not final and that it needed to wait until it was completed.
- Joe Exl commented that the blue stream line needs to be brought to the top layer so as to not loose it under the land use types.
- Phil Gralik answered the concern stating that it was only a draft map and that all issues could be relayed on to him through email or by a phone call.
- Doreen Carey asked about the green area that was noted in the legend as being a golf course; stating that she believed that it was not all golf courses.
- Phil Gralik noted that the golf course area would be verified with the land use registry.
- Elizabeth McCloskey noted that the green area west of Highland consisted of Cabelas

to the north and a park to the south.

- Doreen Carey then pointed out that there should be a separation between golf course lands and parks.

- Doreen Carey stated that she was not sure as to the ditch system in place for the farms located inside of the levee system.

- Elizabeth McCloskey noted that the ditch system in place was not like the one established on the Kankakee River. She also pointed out that upstream there was too much water but she was not sure about the downstream portion.

- Doreen Carey noted that the gardens on Martin Luther King Boulevard could be using river water, which would give a better idea as to the supply.

- At this point in the meeting Phil Gralik steered the direction away from the land use maps and onto the Strategy Development. He began by reviewing what had been covered in the last Steering Committee Meeting.

- Jill Hoffman went through a short PowerPoint presentation where she highlighted the balance between being a people and technical piece. As well as the structure of having a mission, identifying issues, creating goals, and establishing strategies to accomplish goals.

- Jill Hoffman then reviewed a 3-page handout she had provided everyone as well as summarizing the workings of 319.

- The general goals outlined on page 2 of the handout were covered and the direction of the targets was noted as needing to be more refined. An example of reduced loads with a specific target was given. It was noted that three (3) goals had been completed and there were a 12 +/- to go.

- Constance Clay inquired as to the importance of the measurement to determine the goal and strategy. She wondered if the number was something that would be provided to the group or if the group was to establish and provide the number.

- Jill Hoffman noted that due to IDEM requirements there were needed measurements along the way to establish progress. An example was given using filter strips and writing the plan today and measurements of success established later.

- Constance Clay asked how the goals and strategies would be measured if they were so broad. She also inquired into the difference between a strategy and an objective.

- Jill Hoffman clarified saying that strategies and objectives were similar and that you should have accomplished strategies as well as ones to accomplish.

- Jill Hoffman stated that the goals should be the driving force in how things will be planned now and in the future.

- Doreen Carey presented an example using linear feet of filter strips now and to be in place in the future to ensure her understanding and the understanding of the other attendees.

- After the example was confirmed as being the right idea of actions to be taken and the steps necessary Doreen Carey stated her belief that the measurable goals can be used. Such as miles of river bank to be restored or buffer to be placed.

- Jill Hoffman stated that it needed to be a guideline as to how to get what they wanted.

- Doreen Carey stated that it needed to be a way to prioritize the budget so they could get more effect for their money.

- Jill Hoffman wondered if more specifics were needed in the goals and strategies.

- Doreen Carey felt that more specifics were needed.

- Steve West of the Indiana Department of Environmental Management (IDEM) stated that they need to wait and see the test results and find the critical areas before buffers were placed.

- Doreen Carey inquired into the point that she believed that buffers were a good idea to have everywhere.

- Steve West agreed that they were a bonus to have but felt they needed to put everything down and prioritize based on what will give them the biggest bang for their dollar.

- Kevin Breitzke gave an example using the fact that NCRS creates buffers with farmers agreeing because they believe it is best. The buffer established may not be the best solution or location but is what can be done. He then inquired into the establishment of timelines as to when things should be completed.

- Jill Hoffman noted that once the strategies were set they could prioritize and determine who should handle what parts of the goals.

- Once the idea and process of establishing strategies to accomplish goals was established Phil Gralik began reviewing the goals and strategies that were covered in the previous meeting.

- The first goal: Implement BMP's on land leading to waterways to reduce pollutant loads; had clarifications made to state that current meant existing BMPs and that the amount of impervious surfaces was a concern. Jill Hoffman also noted that the public education strategy was too general. What kind of public education would be needed; written, demonstration, reading material, etc?

- The second goal: Identify methods to restore water quality during low flow; had clarifications as to the watershed boundaries for entering and leaving and the statement that the water companies needed to be contacted for the source of inputs.

- The third goal: Promote BMP's to reduce negative impacts of altered hydrology; had no clarifications but Jill Hoffman asked how this was going to be done.

- Jill Hoffman then took control of the meeting once again asking about the public education strategies.

- Kathy Luther noted that people were complaining about water "ponding" in their backyards and that it needs to start basic with what can be expected.

- Kevin Breitzke suggested that the public needs to be informed as to better management practices such as rain gardens.

- Jill Hoffman summarized this saying that they needed to educate people on how to manage water and what are reasonable expectations.

- Kevin Breitzke commented on redevelopment and the need to encourage the use of new technologies in the process. That there may need to be pressure applied to policy makers as far as implementing new requirements.

- Doreen Carey stated a concern to reduce the amount of impervious surfaces.

- Jill Hoffman brought these to a strategy by asking what the mechanisms were to achieve these goals.

- Kevin Breitzke asked about the wells in the region that could be drawing down the groundwater table.

- Doreen Carey stated that the Indiana Department of Transportation (INDOT) had wells throughout the region.

- Joe Exl stated his belief that the wells had a very small negative impact and that they needed to find areas of infiltration.

- Kathy Luther noted that the groundwater table had been lowered but not through the use of wells.

- Phil Gralik stated that it was more a matter of the groundwater not being replenished as it is drawn out.

- Kevin Breitzke went into more depth with this statement saying that the water was moving laterally not vertically. The presence of the very impervious blue clay did not allow the ground water to follow the topography; instead it went where the clay was not located.

- Doreen Carey asked about the groundwater level as affected by everything.

- Kevin Breitzke stated that the top 6 to 8 feet is made up of air and water and that the ground water must flow through this and therefore cools before entering into the stream. As a result of this process the quality of the water entering is better. More downward and lateral movement would prevent flooding.

- Jill Hoffman presented goal 4: Promote BMP's to preserve or improve Riparian Corridors; it was quickly stated by Joe Exl that the "Promote BMP's to" should be removed from the goal statement.

- Kevin Breitzke commented that the education strategy needs to include everyone because you can not predict future developers.

- Kevin Breitzke noted that the target for education should be property owners instead of just developers.

- Jill Hoffman asked the question to the committee as to how to get to these people.

- Doreen Carey suggested the use of BMP presentations.

- Kathy Luther suggested reward programs for those who implement BMPs.

- Joe Exl pointed out that the positives need to be shown through case studies and cost benefit analysis.

- Kathy Luther mentioned the Porter County property overly.

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- Kevin Breitzke suggested that by showing everyone the benefits of BMPs there would be greater benefits.

- Spencer Cartwright brought up the area that composes the dyke system. He pointed out that not everyone can access the area because of the land designation.

- Kevin Breitzke asked how many farmers were approximately along the Little Calumet River.

- Elizabeth McCloskey noted that 190 acres of the land by the river was to go fallow soon.

- Joe Exl suggested a guidance document to Jill Hoffman as a strategy for the goal.

- Spencer Cartwright pointed out that the area inside of the levee can have things done to it because you will not be affecting the public at large when completing them.

- Jill Hoffman then reviewed the goal and the strategies established to accomplish the goal.

- Doreen Carey inquired as to if they were going to specify types of BMPs.

- Joe Exl noted that BMPs will vary so much between uses and regions that the list would be too long.

- Doreen Carey noted her concern that when explaining to the public something needed to be shown so they knew what they were and would understand.

- Sky Schelle of IDEM believed that there needed to be recommended BMPs. He believed that you couldn't tell them exactly but you could provide a list of suggested ones.

- Goal five: Develop and implement plan to protect existing floodplains & wetlands & restore when possible; was presented and was quickly determined that similar ideas should be combined.

- Joe Exl noted the Ducks Unlimited updated their Northwest Indiana website and that it should be referenced for information.

- Kevin Breitzke noted that the ADA completed a survey as well and could also be consulted.

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- Spencer Cartwright identified that some of the wetlands that were identified were not currently working properly. He believes that the problem needs to be identified. He also stated his concern with the fact that there were farms inside the dykes.

- Kevin Breitzke pointed out that before actions were taken the effects on the residents needed to be identified in each case.

- Elizabeth McCloskey stated that actions taken inside the levee system should not harm anyone. The location of 190+ acres that would flood with the 2 year flood was abandoned by the Army Corps of Engineers and has been taken over by the Hulbert Marsh was identified.

- Doreen Carey noted that the Corp refused it but it should be looked at as a reasonable area to create a natural transition. It would provide habitat and help with the water quality.

- Joe Exl added that all of the various stakeholders involved needed to be informed as to the actions to be taken and their long term benefits.

- Goal 6: Accelerate replacement of malfunctioning septic with sewers; was presented by Jill Hoffman.

- Elizabeth McCloskey noted that the cities of Gary and Hammond have been replacing their septic.

- Phil Gralik added in the TMDL reported septic systems as being a major source of e-coli.

- Kathy Luther inquired as to if it was established by test of e-coli or through an elimination process.

- Phil Gralik added that a 2003 study showed many areas as not being sewered and that Hobart still had many septic systems presently.

- Joe Exl inquired about the possible use of e-coli tracking.

- Jill Hoffman noted that while there have been technological advances in the area it was still very expensive.

- Goal 6: Promote understanding/awareness of water quality & natural resource values of river; was presented by Jill Hoffman.

- Doreen Carey commented on outdoor activities that would show the river.
- Elizabeth McCloskey stated that the corps built areas to access the river but the practicality of their use was a question.
- Jill Hoffman inquired about the message that the group wanted to get to the people.
- Doreen Carey stated that people fish in the river and some even kayak.
- Jill Hoffman wondered about the positives of living along the river such as potentially increased property values.
- Doreen Carey noted that the promotion would be tough because many things would have to be stated such that "X is great if not for Y".
- Kathy Luther questioned if there were areas that weren't so bad and could be seen as all positives.
- Doreen Carey noted that Chicago did no clean-up before presenting the river as a recreational use.
- Kevin Breitzke corrected the statement and said that the storm water was diverted elsewhere.
- Constance Clay suggested that the public be made aware of the actions that were taking place to improve the river water quality and appearance.
- Elizabeth McCloskey suggested that steps be taken to incorporate the river back into the everyday lives of people instead of just the river wall.
- Spencer Cartwright pointed out that maps could be placed at well utilized parks showing the way to the levee systems.
- Elizabeth McCloskey pointed out that some organizations were already taking steps to utilize the levees such as the bicycle organization that would have rides on them.
- Doreen Carey suggested that signage be placed instructing residents as to the proper use of the river. Has seen this done in other places and seems to work and promote the use of the recreational areas.

- Goal 7: Foster local participation through regular communication and coordination of educational resources; was presented by Jill Hoffman.
- Kevin Breitzke pointed out that that was one of NIRPC functions. It consists of 52 representatives from 3 counties.
- Doreen Carey suggested a webpage link for the sharing of information and said that the MS 4 group could share information at regional meetings.
- Kevin Breitzke pointed out that not all local communities were active in the MS4 group.
- Kathy Luther stated that one of her goals for the year through NIRPC was to have a meeting of these people to coordinate plans.
- Joe Exl suggested the use of the Indiana Dunes Environmental Learning Center for educational purposes.
- Doreen Carey said there was a good network of people providing information to the public but that many were providing the same knowledge and suggested meetings, such as this one, be used to share the knowledge that everyone was presenting.
- Goal 8: Create sustainable river alliance that can be single point of contact; was presented by Jill Hoffman.
- Doreen Carey said that some kind of organizational body needed to be used. Not just the people that were in the room, but it needed to be part of a larger body.
- Goal 9: Identify way of sharing upcoming development initiatives; was presented by Jill Hoffman.
- Kevin Breitzke said that development was dictated by developers not officials.
- Elizabeth McCloskey made reference to the communities that would be coming in south of Portage.
- Kathy Luther suggested that all counties, cities, etc. share information for development in one place.
- Kevin Breitzke spoke of the City of Valparaiso annexing stuff that the mayor did not know about development of beforehand.

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- Jill Hoffman said that they need to find a way to engage the city and county planners in these actions.
- Doreen Carey said that NIRPC must keep tabs on everything until a separate system can be formed.
- Kevin Breitzke spoke of how it might not work because the communities are in competition with one another.
- Jill Hoffman kept the meeting rolling by previewing the remaining goals.
- Kevin Breitzke was concerned with the communities sharing information because within just Porter County there are 13 different government agencies.
- Goal 12: Integrate other watershed plans/projects & water quality programs; was presented by Jill Hoffman.
- Doreen Carey suggested that plans need to be put together and easy to look at and understand in order to effectively communicate with the public.
- Joe Exl said that they need to provide access and recreational opportunities on river as part of the strategy. This would help accomplish other goal of getting people out onto the river.
- Doreen Carey at this point took over the meeting and began discussion on the river watch testing. She commented that she wanted Joe Exl to be part of the program.
- A discussion on the program to be run by Joe Exl continued and it was established that he would hold a program and teach 10 to 12 people about the information and they would actually learn how to perform the test. They could then conduct the testing while people were riding by on the bike trail.
- Jill Hoffman suggested they have different stations set up to allow people to see different things along the trail.
- Doreen Carey then discussed some of the more interesting trail aspects such as the birds along Chase Street but thought that might be too long of a ride.
- The date for the program was determined to be the 22nd of September, 2007.
- The next meeting for the steering committee was then determined to be held on Thursday, September 27, 2007 at 2:00 pm.

- The meeting concluded at 4:05 pm.

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PROJECT: Little Calumet River Watershed Management Plan **PROJECT NO.:** 20067150.16

DATE: October 11, 2007

RE: Strategy Planning Meeting

BY: Nicole Sanders

- Meeting Date: October 11, 2007 at 2:00 pm
- Meeting Location: Genesis Convention Center
- Attendees:

Phil Gralik	R.W. Armstrong
Nicole Sanders	R.W. Armstrong
Steve West	IN Department of Environmental Management
Sky Schelle	IN Department of Environmental Management
Spencer Cartwright	Indiana University Northwest
Elizabeth McCloskey	U.S. Fish & Wildlife Service
Tom Anderson	Save the Dunes
Erin Crofton	Save the Dunes
Charlotte Read	Save the Dunes
John Bach	Town of Highland
Carolyn Marsh	Sandy Ridge Audubon Society
Debra Hammonds	Golden Recognition, Inc.
Luci Horton	GSD/GSWMD
Joe Eberts	Lake County Parks
Dan Gardner	NIRPC/Little Calumet River Comm.
Jill Hoffman	Empower Results
Doreen Carey	Gary Dept of Environmental Affairs

- Jill Hoffman (Empower Results) started the meeting off with an explanation of the landuse layer and the changes that were made as a result of the last meeting. It was explained that the landuse was generated by IUPUI through the use of an aerial photograph. Explained the maps and what the symbols stood for.

- The map showing the entire watershed was explained as containing:
  - 7 sites – full suite of water quality parameters
  - 5 subwater sheds

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- Site 3 is to see what is coming in

- The coordination of the entire watershed map and the 5 individual watershed maps was explained:
  - Explain coordination of smaller maps w/landuse
  - Green stars = outfalls
  - Black dots = sample locations –e coli only

- The excel spreadsheet showing the water quality data was explained by Jill and where they matched up to the landuse maps:
  - Dissolved oxygen (DO) standard = 5 mg/L
  - Check great lakes system: Tom concerned they have different standard
  - 3 areas below 5 mg/L – cant sustain fish life (sites 2, 4 &5)
  - E-coli standard is 235 cfu/100 ml
  - Pollutant highlighted top 2 or 3 highlighted sites meant they were in top 2 or 3 for pollutant loads: cause for concern
  - Nitrate (NO3) has state standard
  - No Phosphorus (P) standards
  - DO & P are important as well as e-coli
  - Sites 1, 2, 4 & 7 present base flow concerns
  - Sites 1, 4 & 7 present storm flow concerns
  - Both flows show 1, 4 & 7 as being poor

- Jill explained that site 3 was included because the 14 digit watershed below was in the same 11-digit watershed as the study area

- Site 4 is bad partly because of Site 3 problems

- Charlotte Read (Save the Dunes) Asked about the sampling technique

- Phil Gralik (RWA) explained that grab samples were taken instead of long term testing techniques in order to conform to IDEM.

- Elizabeth McCloskey (US Fish and Wildlife Service) asked why site 3 was worse than site 4

- Jill Hoffman (Empower Results) gave a brief explanation why.

- Tom Anderson (Save the Dunes) stated that he thought there were more outfalls than mapped

- Jill Hoffman stated they didn't have the info for all the communities

- Jill Hoffman stated that IDEM wanted grab samples – 2 BF & 2 SF but nothing measuring long term e-coli loads
  - Bigger storm event – Chasing storm upstream. Could be seeing flashes of CSO
  - Locations 1-5 Watershed 6
  - Locations 6-10 Watershed 7
  - Locations 11-19 Watershed 5
  - Locations 20-29 Watershed 4
  - Locations 30 Watershed 5
  - Locations 31-42 Watershed 1

- Jill Hoffman explained the 42 sampling locations on the excel spreadsheet for
  - Dry weather the gray box represents locations that exceed 235 standard (235 cfu/100 mil)
  - On the excel spreadsheet for wet weather the gray box represent 2000 cfu/100ml

- Doreen Carey (Gary Dept of Environmental Affairs) Commented that locations 1-16 e-coli levels were exceeded & locations 1-15 wet weather levels are lower than base flow levels

- Jill Hoffman stated that the 2nd storm event was somewhat like base flow – different level of storm event @ ends of watershed. E-coli does not spread evenly

- Tom Anderson asked if the Gary & Whiting model was reviewed?
  - Standards don't make sense
  - No Standard can be made w/o sequence
  - Dry weather of 1 or 2 cfu/ml makes no sense

- Erin Crofton (Save the Dunes) thought that there was a potential pollutant killing e-coli because upstream does not grow in cfu/ml

- Tom Anderson stated that chlorine discharge kills e-coli

- Jill Hoffman said there were no insects so there was no good measure to test growth and see consistent data

- Charlotte Read asked where the dyke was

- Tom Anderson states the Dyke was @ Martin Luther King west of Kennedy to about site 1

  - Site 1 is right next to Hart Ditch coming from Dyer & IL & has lots of drainage

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points

- Elizabeth McClosky asked about August storm flow
- John Bach (Town of Highland) stated the invert flows east until high point west of Hart Ditch between Munster & Dyer site 1 flows east of Hart Ditch is gen. line.
- Jill Hoffman stated that base flow in this area seems more like a pond
- Jill Hoffman stated that low flow is a big concern because when pollutant sits it creates a big mass
- Doreen Carey asked if Hammond outfalls were creating eastern flow?
- Tom Anderson stated that Site 1 high because of stagnant base flow creates high phosphorous levels
  - Plum Creek input because Phosphorous baseflow is too high
- Jill Hoffman stated that algae begin to bloom when phosphorous reaches 0.03
  - 4.3 is way high
  - Site 1 to site 2
- Dan Gardner asked what drives Phosphorous levels?
- Jill Hoffman answered everything being all organic sources
- Joe Eberts stated 2 golf courses by site 1
- John Bach stated that there were high money developments spending money on fertilizer
- Dan Gardner said site 1 is about the east/west flow point
  - Flat topography
- John Bach said there was no peak just flat
  - Restriction @ state line
- Doreen Carey said contributions cause east flow
- Dan Gardner said that the inputs were complicated
- Doreen Carey asked about the Hammond outfalls
  - Where is east flow line

- Site 1 pollutants are coming from elsewhere (from west)
- Watershed is pollutant but west contributes

- Elizabeth McClosky asked if the Dyer treatment plant drains into Hart Ditch and is ultimately going into site 1?

- John Bach said there were no outfalls given

- Tom Anderson suggested that the flow direction (-,+) be shown
  - Site 1 assuming east flow?

- Jill Hoffman pointed out that locations 26, 29, 27&28 were bad areas and asked about reasons for this
  - Watersed; 5 locations 15 & 16 are bad

- Spencer Cartwright (IUN) said 15 & 16 seem to not match description, (Phil will check into location)

- Phil Gralik said in watershed locations 8&9 are worse then others

- Dan Gardner said location 9 is @ the mitigation bank

- Elizabeth McClosky stated that the ditch should have been closed

- Joe Eberts said that location 9 maybe flowing into wetlands

- Dan Gardner is checking into Lake Station unsewered areas

- Doreen Carey asked who CSO #13 belonged to?

- Phil Gralik said there was no info for Lake Station CSO locations

- Phil Gralik said Site 6 is primarily Portage runoff
  - Locations 2, 4 & 5 were bad for the wet weather flow w/2 being bad in dry flow also
  - Location 1 is fine after collecting agriculture 1 and it is the city use that contaminates it

- Charlotte Read said no CSOs, they must have SSOs possible marinas contributing

- Phil Gralik said only sanitary info was collected

- Spencer Cartwright asked about lawn fertilizers

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- Jill Hoffman said points 11 & 12 were truly 15 & 16

- Tom Anderson said there were trout lines as far as Martin Luther King

- Spencer Cartwright stated that the trend seemed to be that locations 1-15 get lower
    - Spike @ the CSOs and the water cleans itself again. When looking at only in channel numbers

- Dan Gardner said during high flow Deep River flows 3 times that of the Little Calumet River and therefore brings high amounts of pollutants into the Little Calumet

- Jill Hoffman said the raw concentration does not tell story alone

- Dan Gardner said that the Martin Luther King railroad has 2 large culverts forcing water this way and that additional modifications to prevent wetland drainage and yet not cause Gary to flood were needed

- Phil Gralik said that the TMDL report stated e-coli comes from everywhere and that low flow must be reduced 90%

- Tom Anderson asked about septic system contributions?

- Phil Gralik said no one has comprehensive data

- Jill Hoffman asked the committee to communicate info to Phil or Doreen about areas there were septic systems

- Jill Hoffman continued the meeting by stating the 4 problem statements
    - Each problem statement has goals & actions with it
    - Summarized they are:
        - Little Calumet River & tributaries exceed daily maximum of 235 raising health concerns
        - NPS pollution elevate to levels increasing health risk
        - Stormwater hydrology changed wetlands & such
        - Single POC across boundaries

- Dan Gardner said that Ditch flooded Wicker Park golf course
    - Causing large amounts of sediment
    - Lake County Surveyors Office has money for drainage improvement projects

- Jill Hoffman stated:

- o tributaries have significant load bearing
- o Public Education Day to connect people to river will be held from 12 to 4 on Saturday

- Carolyn Marsh (Sand Ridge Audubon Society) stated her concerns that Highland pulled a study grant
  - o Gray Heron changed app because of levee
  - o 110 Gray Heron are nesting in area that was rezoned residential
  - o The area is Cline Street to Griffith Golf Course
  - o It was Zone Commercial wooded area (levee did not disturbed)
  - o Open space rezoned (wetlands old)
  - o Taking out more to west
  - o Afraid this will wipe out the Heron
  - o Try to protect wetlands (open space) or not
  - o People are rezoning
  - o Cabelas flooded and re direction of water flow
  - o Open area wanting to be redeveloped
  - o Indianapolis site 1 only and already disclosing Gray Heron
  - o Must protect community of Great Blue Heron
  - o Must stop developing
  - o Griffith DNR buy property and create wetland
  - o Community rezoned in order to sale & get more $
  - o Recognize that we done want to lose this

- Dan Gardner Golf course not wetland – rezoning will accept additional water gain towards wetlands
  - o Net benefit to public of basin (natural for recreation)
  - o 60% natural
  - o Developer is going to have site retention

- Tom Anderson asked that the flood control & levees be shown because some things can not be done because of levee system

- Doreen Carey said that everything must be restored naturally inside levee but that not everything inside levee system is off limits

- Dan Gardner said that there would be 250 acres returned to wetlands

- Jill Hoffman asked Sky Schelle about BMP that are not MS4 related

- The next meeting was set to be Wednesday November 28th @ 1:00

Meeting Minutes

PROJECT:	Little Calumet River Watershed Management Plan	**PROJECT NO.:**	20067150.16
DATE:	November 28, 2007		
RE:	Strategy Planning Meeting		
BY:	Nicole Sanders		

- Meeting Date: November 28, 2007 @ 1:00 pm
- Meeting Location: Gary Sanitary District
- Attendees:

Phil Gralik	R.W. Armstrong
John Bach	Town of Highland
Sky Schelle	IN Department of Environmental Management
Spencer Cartwright	Indiana University Northwest
Dorreen Carey	Gary Department of Environmental Affairs
Elizabeth McCloskey	U.S. Fish & Wildlife Service
Erin Crofton	Save the Dunes
Charlotte Read	Save the Dunes
Joe Exl	Department of Natural Resources
Greg Bright	Biomonitoring
Mark Gordish	City of Hammond
Debi Hammonds	
Jill Hoffman	Empower Results

- Phil Gralik of RW Armstrong opened the meeting and asked for an overview of how the Stream Reach Survey went.

- Dorreen Carey with the City of Gary updated the committee on the success of the Stream Reach Survey that was held on Saturday, October 13, 2007 along the Little Calumet River in the City of Gary. She stated that there were a number of younger participants and that the activities included a nature walk along the river that allowed the participants to identify different plant and animal species. The list of species to identify was created by Spencer Cartwright with IU Northwest. Other activities included water testing with Joe Exl of Department of Natural Resources and a bike ride along the river.

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- Jill Hoffman of EmPower Results gave more information about the Saturday activity by explaining the game played that allowed participants to roll a weighted die and make their way through an ecological environment. At each station they visited by a roll of the dice they would get a bead to add to the bracelet being created. The weighted die allowed people to see how hard it was to get out of some areas of the river.

- Joe Exl of the Department of Natural Resources updated the water testing portion of the activity saying that there was some life in the river which was good considering the time and location of the sampling.

- Jill Hoffman moved the meeting on by explaining the Habitat Assessment Study that was conducted by Lisa Bihl and Greg Bright. She explained that the RBP map handed out to everyone was color coded to show the locations where the lowest 35% of scores were found and the highest 35% of scores were found. She briefly explained that the scores were based on the Rapid Bioassessment Protcol and referred everyone to the handout they were given that was the scoring sheet. She then handed the meeting over to Greg XXXXX to comment more since he actually conducted the study.

- Greg Bright of Biomonitoring sound that he and Lisa Bihl had found the area to be very pretty and that there was great potential for it to be a great urban waterway. He explained that they canoed the portion of the River stretching fro Grant Street to Chase Street and explored the other sampling locations as much as was possible due to limited accessibility. Greg also said that they put the boat in at Hoxbo Park and found that there was habitat available. His other comments about the Rapid Bioassessment Study and the condition of the river included that some areas were deep to wade in and that portions of the river were ten yards wide while other would be as much as 80 yards wide. There was extreme variance throughout the river in the look and condition.

- Joe Exl of the Department of Natural Resources stated that the RBP was made only for wadeable areas and asked about the comparison to the QHCI. He wanted to put out that the RBP was only for wadeable areas and that that was a drawback but at the same time it would be his preferred method of assessment.

- Greg Bright stated that the study was specifically for non-gradient streams which is certainly the condition of the Little Calumet River in the study area.

- Jill Hoffman brought the committee back to the results of the study saying that the pictures were tagged in GIS and areas called out as positives and negatives so more specific information could be looked at concerning the condition of the river.

- Dorreen Carey of the City of Gary said that Greeley and Hanson had conducted a similar study previously and asked that it be passed on to Jill and Lisa of EmPower Results. The study looked at the habitat along the Little Calumet River within the district of Gary.

- Phil Gralik moved the meeting on to the next agenda item which was to look at Section 5 of the report being created: Development of Problem Statements and Goals.

- Under the list of concerns expressed for **Water Quality Concerns** Charlotte Reed of Save the Dunes asked that if be clarified that the west branch of the river in fact does flow east and effects Lake Michigan.

- As a result of this clarification a suggestions was made to change Problem Statement #1 to include "impacting downstream waters and Lake Michigan".

- Charlotte Reed of Save the Dunes suggested to include the affect that the undiked areas would have on the riparian habitat in the **"Other" Natural Resource Concerns**.

- The list of concerns associated with **Public Involvement/Education Needs or Concerns** was left unchanged.

- The Problem Statement #4 associated with these concerns had discussion concerning the wording and the aim.

    - Charlotte Reed suggested that local leaders be added to the statement and not just residents.
    - Joe Exl believed that the word information needed to be added to the statement and suggested maybe the use of the word stakeholders with the addition of a definition in the beginning of the report.
    - Problem Statement #4 should read: The residents and local leaders (stakeholders) in the Little Calumet River Watershed need more information and education on their role in maintaining the overall quality of the watershed.

- The forth list of concerns detailing the **Local Coordination Needs or Concerns** had discussion for the details and examples given as to the extent of the need.
    - Charlotte Reed suggested that the "social" issues should be "economic" issues when talking about the septic systems.
    - Spencer Cartwright gave an example detailing the lack of the coordination and therefore the need of the local coordination by explaining that the IU Northwest parking lot flooded and the university was told it was strictly

storm water but Spencer believed it was outfall from a CSO. The university had a hard time finding out if it was in fact a CSO and students were walking through the flooded areas in sandals.
    - Dorreen stated that there were storm sewers running down Broadway and that the flooding could be blamed on something else. It is her thought that you can not say it was a CSO and went on to say that there should be a map.

- The fifth and final list of concerns detailed **Resource Need or Concerns (data, financial, people)**. There were no suggestions for the list of concerns but the problem statement #6 associated with it had discussion.

    - Elizabeth McCloskey of the US Fish & Wildlife Service believed that instead of limited it should be stated as challenged for the river access.
    - Dorreen believed that the phrase highly developed was not correct.
    - Jill Hoffman made a comment that maybe physical and social needed to be added to reflect that the ownership changed as you went along the river.
    - Elizabeth McCloskey stated that the name of the project being conducted presently by the LCRBDC was named Flood Control and Recreation because of the cost/benefit ratio. Since this was part of the project that state of the river should be improving as far as navigating it is concerned.
    - Dorreen stated that it is simply the culverts that make it hard to navigate.

- The next section discussed with Section 8: Goals and Indicators which listed the goal and target for the six problem statements developed.

- After reading over the goals associated with Problem Statement #1 it was suggested by Phil Gralik that Goal 1b be moved to Problem Statement #6.

- The goals associated with Problem Statement #2 was discussed with the committee and suggestions included more specifics for Goal 2a and a clarification of the difference between source reduction strategies dealing with a reduction of the use that is contributing to pollutants and best management practices.

    - Sky Schelle of IDEM stated that typically you will have individual goals for sediments and nutrients but if Goal 2b had targets that were specific in the reduction of both that the goal could be combined.

- The goal 3c that coordinates with Problem Statement #3 had a large amount of discussion. The goal currently states: Create an avenue of coordination with the US Army Corps of Engineers.

    - Elizabeth McCloskey stated that the Army Corps would be gone in 2 years and that it would be up to local sponsors to be in coordination with each other regarding projects and improvements.

- Joe Exl believed that Goal 3c could be put into Goals 3a&b as an objective.
- Charlotte Read commented that the LCRBDC was currently lending money to the state of Indiana and suggested that maybe in the repayment of this money it be outlined that it be used for coordination efforts along the Little Calumet River.
- Phil Gralik said that the fate of the LCRBDC was uncertain and that something would need to be arranged that left someone or a committee in charge of signing off on the annual maintenance reports.
- John Bach of the Town of Highland stated that he had been told that it would be up the towns and cities to maintain the levee systems in their districts. The required annual maintenance would have to be put into the local budgets.
- Joe Exl asked that if the maintenance reports would only be concerned with the proper working of the levee systems or if they would also require the districts to keep the system working at a high quality.
- Phil Gralik said that the reports would mostly be concerned with objects such as gate checks and recreational uses not with the quality of water that the system was providing.
- Joe Exl again stated his belief that Goal 3c can be made part of Goals 3a&b.
- Dorreen Carey commented that it wasn't just the Army Corps that the communities needed to have coordination with. There also needed to be coordination of the federal, state and local agencies.
- Joe Exl said that the coordination needing to be on the federal, state, and local levels still did not make it a goal only an objective.

- Sky Schelle asked if what concerns with associated with goal 3b dealing with low flow conditions.

- Phil Gralik said all of the above concerns stated in goal 3a were concerns with low flow because the water becomes stagnant.

- Goal 4 associated with Problem Statement #4 brought about discussion as to the specifics.

  - Charlotte Read wanted agreement that the goal was basically creating a clearing house that all information would go through.
  - Joe Exl suggested that it also include develop and implement and not only share research.
  - Charlotte Read stated that someone must be responsible for the "clearing house"

- When discussing goal 5 associated with Problem Statement #5 Sky Schelle suggested that it be combined with goal 4.
  - Joe Exl suggested that Goal 4 be an objective for Goal 5.

- Phil Gralik suggested that they keep Problem Statements 4 and 5 separate but that they have one goal, Goal 5, and have goal 4 be an objective. The committee agreed with this decision.

- Moving onto Problem Statement #6 brought up the discussion on the condition of public access along the river. The wording of Goal 6 was changed to "Increase public access and continuity along river sites and make the public aware of them" after the following discussion.
  - Dorreen stated that a canoe trip is divided up by many culverts as you move along the river.
  - Dorreen believed that a short term goal need to be created that dealt with the education as to where the longer portions of navigable river was located and a long term goal of making bridges along the river so that the culverts do not interrupt the flow of someone traveling down the river.
  - Charlotte Read said that access sites based on characteristics needed to be put on recreational maps.
  - Dorreen suggested that they needed public access and awareness
  - Phil Gralik said that the public awareness would be an objective of the overall goal of the river continuity.
  - Charlotte Read suggested that the increased public awareness be done using local sponsors.

- Section 9 of the report deals with the **Plan for Implementation and Evaluation.** This section takes each goal and breaks it down into the strategies/action items that can be associated with it.

- Goal 1a: Reduce E. coli loads to the Little Calumet River had action items that the committee felt should be added to it.

  - Joe Exl suggested that home inspection services be added to the point of sale. This would give the future planners a way of know where septic systems were and the condition that they were in.
  - Spencer Cartwright suggested that wetland development be used as a dual purpose for reducing E. coli.

- Goal 2b: Reduce sediment loads and nutrient loads by source reduction strategies had action items and discussion by the committee.

  - Sky Schelle asked if there was an educational component associated with this goal. As an example he used the fact that in the Indianapolis area it was found that a major source of nutrient loads were local homeowners. This knowledge was then presented to the public and ways to reduce the nutrient loads were presented.
  - Jill Hoffman stated that households are a large contributor in all watersheds.

- o Joe Exl asked about showing areas with no Phosphorous around. This results in habitats that are safe.
- o Dorreen Carey asked about continual and expected sources of pollution.
- o Phil Gralik stated that based on the current landuse that the expected pollutant loads had been calculated.
- o Dorreen Carey asked if it would be possible to narrow down problem areas based on E.coli coming from X & Y and Phosphorous coming from X & Y. Coming up with some basis of knowing what the problem is in the watershed. More than point source vs. non-point source pollutants.
- o The last two action items for Goal 2b: Develop LID ordinances or policies to use in multiple jurisdictions and promote/incentivize low impact development(LID) or redevelopment strategies was considered to be too broad by Charlotte Read. She asked if these would be permit issues or exactly how they would be accomplished.
- o Phil Gralik stated that the intent was to work with local municipalities to issue permit requirements that would require certain things to be implemented before building could begin.
- o Charlotte Read then stated that the plan could not do that alone.
- o Joe Exl agreed but said they could create model ordinates to show the plan and work with the municipalities in implementing them.

- Goal 3a: Restore, improve, and/or protect floodplains, wetlands, and riparian corridors had discussion as to the intent of the goal.

  - o Sky Schelle said that some specifics needed o be stated for target restoration
  - o Dorreen Carey said that specific riparian areas within the levee system needed to be identified for restoration.
  - o Charlotte Read asked if you could create habitat within the levee system.
  - o Joe Exl responded saying that you could create habitat.
  - o Elizabeth McCloskey said that the question would be what habitat to restore or create.
  - o Joe Exl asked what restoration could happen and asked what the LCRBDC would find or implement.
  - o Elizabeth McCloskey said that the argument is that there is constantly money falling into the areas to restore habitat unsuccessfully and that mitigation is not happening inside the levee system.
  - o Joe Exl asked about the farm bill switching the area to wetlands.
  - o Dorreen Carey felt that the areas inside and outside of the levee system should be separated for purposed of development.

- Goal 3b: Improve low flow water quality conditions had suggestions for changes to the action items as well as discussion.

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- It was suggested that the "shading" be taken out of the action item to improve in-stream habitat aimed at shading and oxygenation.
- The next item of determine watershed boundaries based on levee system was pointed out to need to look at the storm sewer and other things contributing to the movement of water.
- Joe Exl suggested that the channeled areas of the river need to be undone so that the river can flow free again.
- Charlotte Read said that hydrologic investigations needed to be done on reconnecting the meandering streams to the River.
- Joe Exl said that direct mitigation into the levee would be required costing the area large amounts of money.
- Elizabeth McCloskey said that the river could be constructed to meander however as long as it stayed within the levee system.
- Dorreen Carey said that the area from Chase to Clark Streets created a bayou in the area.
- Joe Exl said that a detail of what is there needs to be created.

- Goal 4 was suggested to be changed to Share, development and implement research, projects/experiences, ordinances, and education materials in a central location. This was all decided to be an objective of Goal 5. The action items assocaiated with Goal 4 will become additional items in Goal 5.

  - The action items of Develop MOUs between jurisdictions, host regular meetings, and construct and maintain a website was suggested to be condensed to one item.

- Goal 6 was suggested to be changed to Increase public access and connectivity sites and make the public aware of them. There were suggestions of added action items as well as discussion with this goal.

  - Charlotte Read suggested that brochures be used to facilitate public awareness and to highlight the public access sites.
  - Dorreen Carey asked if the Blueways/Greenways staffed entity would be picked up by someone else when the LCRBDC completed their work.
  - Joe Exl asked if NIRPC would be taking over or if a co-connection with local ordinances would be the sponsor of the program.
  - Charlotte Read asked about the Marquette watershed plan.
  - Dorreen Carey said that the Marquette will not go beyond the planned time. Also that the 6217 group was to deal with all of the Little Calumet River.
  - Dorreen Carey suggested that maybe sometime the watershed group, the MS4 communities chair people and the 6217 group needed to meet at NIRPC. She also stated that NIRPC had a group that coordinated plans but no one to make sure they were implemented.

  - Joe Exl said that there was a Public Access fund that could be looked at for possible funds to implement BMPs. He suggested that possible funding sources be identified in report so that it was known where to start.

- Phil Gralik next moved the meeting onto Item 5 on the agenda which was to go over the load graphs and identify critical problem areas.

- Greg Bright said that of 4 sampling sites that were above the load there was one that was consistently worse. The western most point was considered to be the worst by him. He said that as they went downstream the numbers seemed to lower. And that the far East end was always under the standards.

- Dorreen Carey said that since the east is always fine with the water sampling that it must not be the unsewered area causing the pollutants.

- Greg Bright said that Willow Creek always had high levels and that this went against what Dorreen just said.

- Mike Gordish with the City of Hammond said that the values could be manipulated based on when the sample was taken and what had recently happened. For example with the major storm event that one of the wet weather data pulls was taken with the City of Hammond discharged a large load because of flooding at the site of Cabelas. The discharge was monitored though and in complete regulations with the EPA.

- Spencer Cartwright said that the tributaries seem to lead to high number values for e.coli loads.

- Greg Bright said that was not always the case that you also had to look at previous events to see if that was the cause not the tributaries themselves.

- Phil Gralik brought the committee back to the subject of the maps and said that there seemed to be two hotspots: one at the far west side and one right after the inclusion of Deep River in the Portage-Burns Waterway.

- Jill Hoffman suggested that the CSO outputs be looked at as possible sources of the high values in those locations.

- Phil Gralik said that Hart Ditch was a problem and that water backed up and became a standing pond and would therefore result in high readings.

- Spencer Cartwright said that both dry and wet weather sampling had high points at the western edge and that this seemed to go against the fact that the ponding would be the issue.

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- Phil Gralik explained that the ponding created high values in what did run through in the dry weather events and that when the wet weather came through all of the water was flushed out and that would explain the wet weather high values.

- Dorreen Carey said that the TMDL report showed that the septic areas were not a problem to be looked at.

- Charlotte Read asked if the storm sewer overflows could be looked at as a possible source of pollutants.

- Greg Bright said that storm sewer discharges do not seem to be very high loading factors.

- Joe Exl said that the critical areas identified by Phil Gralik seemed to be correct and warranted further investigation.

- Joe Exl suggested that other plans be looked at to obtain loads to aim for such as TSS equal to 25 mg/L. He also suggested looking at WATERS (sediments and streams).

- Phil Gralik said that research would be done and that standards would be set out.

- Joe Exl agreed that this would be a good plan and it was agreed that Phil Gralik would put them together and email them out to get input back from committee.

- Joe Exl said that both long term and short term load reduction targets should be set.

- Greg Bright suggested that 576 cfu/100mL be set as the target for e.coli because consistent readings of this with less than 10% exceedance would delist the Little Calumet River.

- Dorreen Carey asked about the Stream Reach Survey again and wondered if it looked at the entire stream or only at the area around the sampling locations. She stated that it was her understanding that the survey was to study the entire stream.

- Jill Hoffman said that the places looked at were those that they could get to but to study the entire area was challenging because of access problems.

- Joe Exl said that looking at everything is not possible that it is financially not capable of being done.

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- Dorreen Carey asked that Phil share the Gary Reach project because they went all through Gary not just to the sampling locations. She then went on to verify that the only areas looked at were those that could be seen from the roads.

- Dorreen Carey asked about how the backsource tracking was going to be done if the entire stream was not going to be looked at. Greeley and Hansen had identified 30 + locations that backsource tracking needed to be completed on. These points would require the backsource tracking to be done by boat.

- It was then stated by the committee that illicit discharge tracking was not funded by 319 for MS4 locations.

- Dorreen Carey responded saying that they were not to sample the discharge but the sources that may be contributing to it. She said that previous work was contracted to find outfalls in Gary and that the backsource tracking was needed to find the source of the pollutants.

- Phil Gralik stated that the intent was to look at the landuse surrounding the area to find possible sources not to physically go and investigate the areas.

- Jill Hoffman said that it would not be funded for people to go out there and look into the sources.

- Phil Gralik moved the meeting along to talk of BMPs, public education and riparian areas. He said that it must be determined where and what to put in place to come up with a model for the watershed.

- Joe Exl said that the areas need to be determined and then the BMPs researched to reach the monitoring goals.

- Dorreen Carey said that CSOs and MS4 monitoring plans were in place and then maybe additional information could be added to those.

- Joe Exl said that IDEM required a 5 year monitoring program and that it would need to be more than just the information collected by the CSO and MS4 programs.

- Jill Hoffman said that IDEM would want the committee to establish monitoring programs separately from what was currently available.

- Dorreen Carey asked who would be identified to monitor the area in the future.

- Joe Exl said that that would be part of the program to be set up and said that there could be possible coordination with local schools and universities or some type of public/private partnership to do the testing.

- Dorreen Carey said that the NRCS has a plan and that could possibly be looked at for monitoring purposes. If nothing else they should be looked at as a possible partner to do the testing.

- Jill Hoffman said that they had to set up a monitoring program of their own.

- Joe Exl said it has to be in plan. That there must be a strategy in place as part of the plan being developed. Every group has to have monitoring plan as part of a Watershed Plan.

- Dorreen Carey said that they needed to know loads as percentages and said that that was something they couldn't create but that the consultants must.

- Joe Exl disagreed and said that the committee must come up with the monitoring program.

- Phil Gralik said that as the consultants they could only show guidance and that a monitoring plan would be looked at but that it was up to the committee to implement the program.

- Joe Exl direction the committee to look at a website that feature a program through the University of Minnesota, diluthstreams.org. He said that the funding was probably started through an old EPA grant and that it is being maintained by a new EPA grant. There was also possibly money being given to the program by the school or a public/private entity.

- Phil Gralik then concluded the meeting and a new meeting date was set for January 10 at 1:30. This meeting time was changed due to a conflict for the Save the Dunes people. The new meeting time is yet to be set.

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Meeting Minutes

PROJECT:	Little Calumet River Watershed Management Plan	**PROJECT NO.:**	20067150.16
DATE:	January 17, 2008		
RE:	Strategy Planning Meeting		
BY:	Nicole Sanders		

- Meeting Date: January 17, 2008 @ 1:00 pm
- Meeting Location: Gary Sanitary District
- Attendees:

Phil Gralik	R.W. Armstrong
Steve West	IN Department of Environmental Management
Dorreen Carey	Gary Department of Environmental Affairs
Elizabeth McCloskey	U.S. Fish & Wildlife Service
John Bach	Town of Highland
Bob Theordorou	GSD/United Water
Sky Schelle	IN Department of Environmental Management
Erin Crofton	Save the Dunes Council
Herb Read	Save the Dunes Council
Tom Anderson	Save the Dunes Council
Dan Vicari	CDM
Charlotte Read	Save the Dunes Council
Jill Hoffman	Empower Results
Mike	Town of Griffith
Bob Helmick	
Dan Gardner	Little Calumet River Dev. Committee
Spencer Cartwright	Indiana University Northwest
Joe Exl	Department of Natural Resources

- Phil Gralik of RW Armstrong opened the meeting and introductions were given around the table.
- The meeting was started with the introduction of Section 8 Goal 1 of the report: **Reduce *E.coli* levels in the Little Calumet River by reducing loads to the River.**

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- Joe Exl of the Department of Natural Resources asked if this meeting was considered to be the drop date for the changing of the goals.

- Dorreen Carey of the City of Gary made her intentions clear that she wanted to have another steering committee meeting before the February 5th IDEM submittal. It is also her intentions to have an additional public meeting after the submittal date to present the work to the public.

- Joe Exl then continued with the questions on the goal that was just introduced for discussion. He asked if the short and long term targets set would have the river meet the beneficial uses.

- Tom Anderson of the Save the Dunes Council asked if the Little Calumet River TMDL previously completed and pollutant targets outlined in it.

- Phil Gralik of RW Armstrong responded saying that they were no target numbers outlined just general percentage decreases with no given date. He also stated that the short term goal of 576 cfu/100mL listed is the standard for delisting the stream.

- Tom Anderson corrected the statement saying that the 576 cfu/100mL will meet the standards for full body contact uses but that in order to have the stream removed from the 303d list the 235 cfu/100mL standard is required.

- Phil Gralik acknowledged this fact and said that the short and long term goals were just numbers to look at dates for now that they can be changed.

- Dan Vicari of CDM noted that the long term control plans for the communities in the watershed have not been approved and that they will result in measures to help reduce the *E.coli* loads once they are approved by IDEM. He also asked if the *E.coli* short term goal was to include the CSO results, which will be affected the most by the long term control plans.

- Phil Gralik noted that the short term goal of the 576 cfu/100mL was only meant for non-point source reductions.

- Tom Anderson agreed with this because of possible future funding sources and the need to meet set goals in order to receive the funding.

- Phil Gralik noted that the base flows will be able to meet the short term standard outlined fairly easily.

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- Charlotte Read of the Save the Dunes Council asked if she short term target of 576 cfu/100mL would conflict with any existing uses set out for the river.
- Dan Vicari asked if this standard was meant for the wet weather flow, the base flow or the average of the flows.
- Phil Gralik noted that the 576 cfu/100mL was meant to be a short term goal for dry weather flow.
- Dan Vicari commented on the writing of the goal to have a 10% exceedance factor of samples to be thrown out.
- Phil Gralik moved onto ways that this standard to be accomplished noting that ultraviolet sanitation be added to pipes letting water into the river through the levee system.
- Jill Hoffman of Empower Results noted the standard ponding and sanitation removal issues.
- John Bach of the Town of Highland noted that the water ponds but that it is continually pumped during a storm event.
- Elizabeth McCloskey of the Save the Dunes Council noted that along the levee the pumps could be retrofitted to help preserve the water quality.
- Phil Gralik said that the gatewells would carry the ultraviolet sanitation devices and that the water would be cleaned in the discharge.
- Jill Hoffman also noted the addition of “soft procedures” to be practiced.
- Phil Gralik commented saying that brochures or public education about how to lower the *E.coli* levels could be added as measurable steps taken to accomplish the goal.
- Tom Anderson asked about how this would be integrated into the MS4 procedures to take place as far as funding goes.
- Joe Exl gave the example of the sewered and unsewered areas being identified as an overlap of the two and how they would be beneficial to both.
- Sky Schelle of the IDEM said that the soft procedures should be kept to educational because the specifics raise more funding issues as far as the public goes but that ordinances to be enacted needed to remain specific.

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- The short and long term target goals was brought to the attention of the committee again and the final agreement was to the short term goal be a standard of 235 cfu/100mL for dry weather. This would be accomplished in 10 years and only for the non-point sources pollutants. The long term goal would be a geometric mean of 125 cfu/100mL. This was acknowledged by Sky Schelle as a good goal because of the delisting requirements.

- Phil Gralik then noted that the specifics for best management practices to be enacted would be outlined later but that it would be expensive.

- The second goal of section 8 of the report was then discussed. The goal states: **Reduce sediment loads by source reduction strategies and, in priority subwatersheds, through the use of Best Management Practices (BMPs).**

- Joe Exl immediately asked about the target levels for the short and long term.

- Phil Gralik said that it was hard to find any information as to reasonable short term goals and what other watershed plans have tried to establish.

- Joe Exl then noted that he felt that 5 year time frame for the short term goals was perhaps to short of a time.

- Elizabeth McCloskey noted that areas for LID practice to be used were dwindling.

- Joe Exl didn’t necessarily agree with that because of the fact that LID practices could be used for roads, bridges, highways and other various construction and not just housing developments and commercial areas.

- Sky Shelle added in that retrofitting areas is also part of LID practices.

- Dan Gardner noted that Wicker Park in Lake County had large sediment deposits during the large storms that occurred in August of 2007. Lake County had some information on this because they had to look at the sediment since it had overloaded the storm system.

- Joe Exl noted that on the LID practices specifics should probably not be noted because of potential of waste management practices along Hart Ditch.

- Herb Read of the Save the Dunes Council noted that in the levee system began being looked at in the 1960s and then asked which areas still needed to be purchased.

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- Dan Gardner noted that wider areas east of Cline Avenue still needed to be purchased by the Corps and a few more ponding areas needed to be as well but that was the only land to still be required.

- At this point there was further discussion as to the change in the placement of the levees from the time when the levee system was initially discussed.

- Once the meeting was brought back to the present topic of the sediment loads Dorreen Carey asked if dredging the river was to be included as part of program.

- Sky Shelle said that IDEM couldn't pay for the river to be dredged but that it could still be included in the report and an outside funding source could be used.

- Joe Exl said that maybe that should be an objective and also that the short term goal could perhaps be measured based on ordinances.

- Jill Hoffman suggested that incentive programs be used as an indicator.

- Charlotte Read asked about the inclusion of buffers along the river.

- Phil Gralik said that vegetated swales inside and outside of the levee system would be beneficial to the water quality.

- Joe Exl noted that they would be both beneficial and overlap with MS4s which would add to the funding sources.

- Dorreen Carey said that things are being done to improve the water quality without ordinances so she didn't want the number of ordinances to be only measurable device for short term goal.

- Sky Shelle noted that the indicator listed as item "g" was actually a measurement and not an indicator as to the quality.

- Joe Exl asked about 25mg/L TSS being used as the target since it had been used in past plans. He was curious as to if this standard would be from a single grab sample during high flow or low flow, in general how would the standard be met. He also noted that maybe just a certain % reduction because it is hard to reach set numbers with recently developed sites.

- The third goal and its associated targets and indicators was then presented to the steering committee by Phil Gralik; **Reduce nutrient loads by source reduction strategies and, in priority subwatersheds, through the use of Best Management Practices (BMPs).**

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- Phil Gralik continued to explain that the goal was parallel with previous goal only dealing with the reduction of nutrients in the water instead of sediments.

- Joe Exl stated that his only concern would be about the phosphorous because it is so hard to kill once it is present in the water.

- Sky Shelle said that the language needed to worded such that it was acknowledged the goal was to put the nutrients back into the ground.

- Sky Shelle also suggested that in order to be uniform in the goals if the short and long term target set for goal 2 are changed to percentage reductions that goal 3 needs to match that format.

- Jill Hoffman agreed with the fact that goal 3 should be changed to percentage reductions as goal 2 will be because the numbers themselves mean nothing to the public. They will be able to understand percentage reductions and see improvements that way.

- Jill Hoffman also asked about the 20 year goal being something that would create an ideal water quality environment or if they wanted it to be something that was attainable given the current state of water.

- Tom Anderson commented on this saying that numbers might be a good goal to have because they are aggressive.

- Once it was decided that the format of goal 3 would match that of goal 2 the meeting continued with discussion of goal 4 :**Restore, improve, and/or protect flooplains, wetlands, natural areas, and riparian corridors.**

- Dan Gardner stated that the area east of I-65 is critical area and that the farmland inside the levee system is going to be restored to natuarl state. The exact acreage was not known but would probably be in the 200 to 300 acre range.

- Herb Read asked a question as to the area upstream of the levee system, not restrictive to the corps area.

- Mike Gulley of the Town of Griffith asked where the long term target goal of 500 acres was coming from. He said that they were currently in negotiations to restore approximately 350 acres to natural areas.

- Joe Exl stated the acreage that would be needed for the sediment reduction targets should be the long term target for this goal.

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- Dan Gardner said that the area inside the levee system will be restored to nice wetlands. They do not want natural areas to develop on their own because of the vegetation that grows naturally, phragmites and cattails.

- Goal 5: **Improve public awareness/knowledge of pollutant loads and sources, especially *E.coli*, and the impacts and risks associated with them.**

- Joe Exl asked if having seven goals was too many. He asked with this goal because of the fact that is it covered by others.

- Elizabeth McCloskey felt that the public awareness factor that is explicit with this goal was covered by the other goals for each of the individual concerns.

- Joe Exl felt that this goal was stuck in because of overlap with awareness of nutrients.

- Jill Hoffman said the only reason to have this be a separate goal is if the intention for the targets is something separate from load reduction.

- Jill Hoffman felt that as long as the intention is only load reduction that the indicators and targets can be listed elsewhere and this goal can be eliminated.

- Dorreen Carey asked about the incorporation of the flooding concerns.

- Dan Gardner made the point that the levee system being built by the corp will only take care of what gets to the water body inside the levee system.

- Herb Read mentioned LID practice upstream is what will ultimately help clean the waters within the levee system.

- Joe Exl said that objectives could be to show types of upstream requirements.

- Jill Hoffman asked if the goal of education was only for pollution reduction or if is was also about risk and ecological education.

- Joe Exl said that he felt that even if there was a risk and ecological education aspect that goals 4 and 7 could easily pick up those points.

- Phil Gralik asked for a final decision about keeping goal 5 and just have the redundancy or expelling the goal for a total of 6 goals.

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- The general concensus was to keep the goal and leave the redundancy because there was no real difference between 6 and 7 goals and there could be other aspects and funding sources as a result of it being a separate goal.

- The introduction of goal 6: **Create an active watershed alliance or conservancy district that implements and facilitates information sharing, including ordinances projects/experiences, and educational materials in a central location.**

- Dorreen Carey asked if the alliance was to facilitate information because everything is under local control and ordinances.

- Phil Gralik mentioned a taxing body such as a conservancy district that is formed by a committee such as the LCRBDC.

- Joe Exl brought up the website of Duluthstreams.org that is a common entity that shows everything within the website covered by the organization. It includes information on ordinances, municipalities and MS4 communities via website links.

- Sky Shelle noted that the indicator would have to be the establishment of the group/entity.

- Phil Gralik acknowledged that but said that what he was going by was how it was to be established that the group/entity had actually been created.

- Joe Exl felt that possible indicators could be watersheds participating or communities involved.

- Dorreen Carey asked about the funding mechanism that would support this entity.

- There was no real answer given for this question posed to the committee it was noted that another taxing body in the districts would not be well received and would have a hard time in the public view.

- Goal 7 was the final goal discussed. **Increase river connectivity and public access sites and make the public aware of them.**

- Joe Exl noted that two years may be too short of a term for the accomplishment of the short term target for the public access sites. At the same time though he noted the benefit that had already been started due to the inclusion of the corps projects and the recreational features being added by that.

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- Herb Read noted the fact that the area has to be attractive for people to look at and want to use other wise no amount of public knowledge will change the attitudes held towards the river system.

- Dorreen Carey pointed out the Blueways Greenways plan mapping out access points that are currently along the Little Calumet River.

- Herb Read asked if the public would recognize what was intended by connectivity wondered if it should maybe be corridor connections.

- Phil Gralik pointed out that is was more than just the corridor that they are looking to connect. It is the river system as a whole and the surrounding land.

- Herb Read suggested that maybe it be changed to say connect to have continuous river corridor.

- Dorreen Carey felt that river or waterway connectivity would be a better phrase.

- Phil Gralik suggested it be changed to say "**increase waterway and navigable connectivity**"

- Herb Ready noted that the the target dates were good because the sooner they were identified and given to the public the better.

- Phil Gralik suggested that maybe the short term goal should be 5 years, 2013, because the committee would be established until 2010 and then they need time to put something in motion.

- Dorreen Carey thought the 2010 goal would be better so that those whose number one concern was flooding would see progress quickly.

- Once the discussion of the goals, indicators and targets was completed the next agenda item began being discussed.

- Mike Gulley asked about the wetlands area creating *E.coli* loads because of the large number of birds and other habitat present.

- Jill Hoffman responded to this saying that it was not the wetlands that created the high loading rates but the fact that when not properly established the rapid in and out of the water in some areas while water is ponding in others draws the birds because of the natural habitat and then their droppings create the high pollutant loads such as *E.coli* loading rates.

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- The next item on the agenda to be discussed with the proposed location of the critical areas throughout the watershed study area.

- Sky Schelle noted that the Deep River area has large critical areas.

- Phil Gralik noted that it was because the area along Deep River and Willow Creek are largely natural and those areas were identified because of the need to preserve them.

- Herb Read noted that the area along Deep River from the Hobart Damn to the confluence with the Little Calumet River needed to be critical area because it was a nice habitat.

- Jill Hoffman noted that it was important that the committee decide if they want to identify the critical areas as those that they want to restore or those they want to protect.

- Sky Schelle noted that they could both be included in the critical areas section and be eligible to receive IDEM funding.

- Joe Exl pointed out to everyone on the committee that the critical areas identified are the only areas where IDEM money can be spent at as part of the grant.

- Jill Hoffman said that the critical areas were where funding could go but you also want them to be areas where fundable BMPs could be incorporated.

- Sky Schelle also wanted to point out that the funding could be used to prevent future pollutant loading problems.

- Tom Anderson used an example to clarify what can be included using a 100 acre wetlands and the ability to protect it.

- Herb Read said that Lake Station and New Chicago both have good wetlands that need to be included so that they can be protected. Also felt that it was very important that the natural area along Deep River be included in the critical areas so that it could be protected.

- Jill Hoffman pointed out that it was in good condition so the critical area would actually be that land area that is adjacent to it because that it what will actually harm the the quality of the wetlands.

- Joe Exl asked a question about the Willow Creek watershed and the condition of the natural areas/wetlands along it.

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- Phil Gralik asked if critical area #3 should be the entire watershed draining to sampling site #2 or if it should just be the area along the river within the levees.

- Jill Hoffman said that they needed to look at where the flood-plains were to be located.

- Phil Gralik said that identifying the entire watershed as the critical area, speaking of watershed # 0712003030050, would allow for all of the areas that need to be converted to wetlands as well as those areas that needed to be protected to ensure the quality of the wetlands.

- Sky Schelle pointed out that an entire 14-digit watershed can not be the critical area. That smaller scale areas needed to be identified by the committee as places to focus funding.

- Phil Gralik suggested that the levee system and then the ponding areas around the levee system be the critical area.

- Dorreen Carey pointed out the existance of one of these ponding areas located north of IUN at harrison and Broadway.

- The Willow Creek Watershed, # 04040001040030, was next discussed for the critical area locations.

- Phil Gralik asked the committee what they felt needed to be shown as critical areas in this watershed.

- Sky Shelle said that the census showed the southern part was going and would continue to grow and that therefore that was a major area.

- Herb Read confirmed with Sky and the rest of the committee that he was talking about the unincorporated portion in Porter county.

- At this point a break was taken and the three aerial shots of the watersheds were looked at by the committee. Each was able to share their knowledge of the area and what was happening at the time that would either be a cause of pollutants or what might be helping to improve the water quality.

- After the break Jill Hoffman brought the committee back to the present task at hand by pointing out that they must decide what they want to be the critical areas. If they wanted to identify lands that were in bad shape and needed to be remediated or if they wanted to identify lands that were currently in a very natural state and maintain the quality of those lands.

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- Phil Gralik confirmed with the group that the critical area in the western most watershed was to be the area inside the levee system because it can be restored.

- Dorreen Carey pointed out that the area east of Martin Luther King also needed to be included in the critical area because it was outside of the levee system but still before the confluence point.

- There was other discussion at this point about houses that would be inside of the line and those that would be right outside of the line. The committee went astray as to what the task at hand really was.

- Jill Hoffman brought the committee back by asking everyone why they were discussing areas and projects that the money from the 319 grant could not be used on.

- Dorreen Carey said that they needed to find preservation areas along stream that other money could be used for as well. And asked if the word critical area was only to refer to those areas that could have BMPs placed that would be a direct result of 319 money.

- Jill Hoffman agreed and said that the first thing was to decide what you wanted to spend that money on. If it was to preserve or to repair areas.

- Phil Gralik went back to the actual locations of the critical areas at once it was decided that they would be areas to be restored. He suggested one be the area between Union and Martin Luther King.

- Dorreen Carey asked why the area was to be so big.

- Elizabeth McCloskey pointed out the impact that high areas could have on the watershed.

- Steve West from IDEM spoke up at this point and said that they could have different names for the different areas so that all areas to be protected and restored could be identified but the only critical areas would be those designated for the IDEM money.

- Jill Hoffman made sure everyone knew that the critical areas name was the only area that the 319 grant from IDEM could fund.

- Dan Gardner said that they pump stations should be included in critical areas so that the IDEM fundable BMPs could be implemented at them.

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- Elizabeth McCloskey asked if the ponding areas were included inside the levee system.

- Dan Gardner answered by saying that they are not inside of the levee system but that the BDC owns easements on the land so that is included.

- The final thought on the western most watershed was to include the levee system and the easement areas.

- The critical areas to be covered in the other watersheds was not discussed at length due to time constraints but ideas were given during the break to look at the aerial photographs.

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Meeting Minutes

PROJECT: Little Calumet River Watershed Management Plan

PROJECT NO.: 20067150.16

DATE: January 30, 2008

RE: Strategy Planning Meeting

BY: Nicole Sanders

- Meeting Date: January 30, 2008 @ 1:00 pm
- Meeting Location: Gary Sanitary District
- Attendees:

Phil Gralik	R.W. Armstrong
Bob Theodorou	GSD/United Water
Jenny Orsburn	IN Dept. of Natural Resources
Debi Hammonds	Golden Recognition
Kass Stone	The Times
Dorreen Carey	City of Gary Environmental Affairs
Sky Schelle	IN Department of Env. Managment
Jeff Jones	Portage Parks
Jill Hoffman	Empower Results
Lisa Bihl	Empower Results
Bob Helmick	RC & D
Dan Gardner	LCR Development Committee
Erik Potter	Post-Tribune
Kathy Luther	NIRPC
Spencer Cortwright	IU Northwest

- Phil Gralik of RW Armstrong opened the meeting and introductions were given around the table.
- The first item on the agenda was to review the critical areas map that was produced as a result of the information given at the January 17, 2008 meeting.
- Phil Gralik reviewed the critical areas locations and how they were delineated, what areas were covered and the distances used. He also reviewed with the committee that 36% of the watershed land area was currently covered by the critical areas mapped.

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- Sky Schelle responded to being asked about percentages allowed to be considered critical areas saying that it depended on what Area 5 felt was appropriate, there was no state standard.

- Phil Gralik added that area outside of the levee system needed to be included in the critical areas listed in order to reduce the loads before they entered the levee system where there were limited practices that could be conducted to reduce the loads.

- Jill Hoffman asked if the critical areas map given as a handout and consequently the 36% of land area number included area outside of the levee system and give enough land to construct wetlands and reduce the loads the necessary amount.

- Phil Gralik said the exact amount of land outside of the levee system was not determined but that it would be used to create detention basin and constructed wetlands so that the water may sit and allow time for the sediments to settle.

- Dorreen Carey asked why the detention ponds and constructed wetlands needed to be outside of the levee system.

- Phil Gralik responded saying that is was due to the fact that there are some things that will not be allowed to be done inside of the levee system due to ACOE restrictions. With this in mind the committee needed to realize that they must treat the water before it enters the levee system.

- Jill Hoffman clarified to everyone, due to some confusion, that what was being said was that the levee system was the delivery method of the pollutants to the water system not the cause of the pollutants.

- Dorreen Carey asked about the critical areas along the tributaries to the Little Calumet River.

- Phil Gralik reminded the steering committee about the conversations from the previous meeting in which it was decided that the tributaries were going to have their natural buffers outlined as restorative or preservation areas and not critical areas. This is due to the funding issues created if everything is called critical with the 319 grant.

- Dorreen Carey wanted to make sure that those areas would be mapped out on the critical areas map but have a different name. Wanted to make sure they were not forgotten.

- Phil Gralik went back to the subject of the levee system and BMPs being placed outside of them adding that an additional reason for the structural BMPs to be placed

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outside of the levee system was that the lifetime of the structures would hopefully be greater. If they are placed inside the levee system a large flood could damage them due to the water sitting for an extended period of time inside of the levee system.

- Dorreen Carey asked if ponds were being proposed between the pump stations and if so noted that the exact locations of the pump stations would be needed and then the areas where ponds could be constructed would have to be identified.

- Bill Helmick of RD &C noted that the National Resources Conservation Services has incentives for the creation of restorative wetlands.

- Dorreen Carey noted that the placement of the intended detention basins and wetlands needed to be researched because as a result of the levee system being built there are areas that are intended to be used for an economic corridor.

- Phil Gralik noted that all of the communities inside of the watershed study area are also MS4 communities and therefore some issues were being addressed by those committees.

- Dorreen Carey asked if the restorative wetlands and detention basins being intended for use as pollutant load reduces in the MS4 communities would be eligible for 319 grant money.

- Sky Schelle noted that it would depend on the features that were to be included in the detention basins and restorative wetlands.

- Phil Gralik confirmed with Sky Schelle that if the features were intended to improve water quality that it would be eligible for 319 grant money.

- Dorreen Carey noted with this confirmation that those should be the only areas and features that should be looked at for this study and the BMPs recommended due to the economic features of the local communities.

- Phil Gralik moved the meeting along to talk about the load reductions that would be the targets for the plan.

- Phil Gralik introduced the pollutant load tables that had the concentrations sampled converted to yearly loads along with the expected yearly loads based on land use. He noted that previously the concentration of 25mg/L was noted as being the target for Total Suspended Solids but that last meeting that had discussed changing the parameters to percentage load reductions.

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- Jill Hoffman noted that the committee needed to decide if they were going to use percentage load reductions or have ideal concentration targets but that either way it needed to be uniform throughout the plan.

- Phil Gralik said that at the last meeting the plan had ideal concentration targets but that the committee had looked at using load reductions but nothing final had been decided.

- Sky Schelle said that IDEM prefers there to be load reductions but concentrations can be the plans target goal and those can be converted to yearly loads.

- Jill Hoffman noted that it was more complex to have concentrations and convert those to yearly loads because you have to look at flows and how much each tributary contributes to change them to load reductions and that is more confusing for the public to grasp.

- Phil Gralik noted that he believe a 30% reduction would be possible using natural vegetation and restoration methods.

- Dorreen Carey asked about the time frame to see the 30% reduction.

- Phil Gralik noted that it would probably be in the 15 to 20 year range for the 30% reduction if that was listed as the long term target percentage.

- Sky Schelle said that in terms of percentage reductions and target years it was just a judgement call that had to be made when the committee asked for confirmation of the time and percentage from him.

- Phil Gralik confirmed with the group then that the long term goal would be a 30% reduction in TSS over a 15 year time frame and that the nutrients would be treated with the same target percentage and time frame.

- Jill Hoffman wanted to confirm that this would be a realistic goal that would be accomplishable and not just a good goal to have to improve the water quality.

- Phil Gralik noted that the calculations had not been completed yet but that they would be completed and if the goal and time frame was not reasonable then they would be changed accordingly.

- Dorreen Carey asked how the public impact would be checked for the reduction percentage that their education would have.

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- Sky Schelle responded saying that you can't count on the public during things that will reduce the loads being delivered to the river. You can't count of the general public to reduce loads being generated.

- Dorreen Carey disagreed and said that you had to give them the sense that what they were doing was contributing to the bettering of the stream. They must believe that what they do matters or they will not do anything.

- Sky Schelle said that IDEM would not hold the watershed plan to the goals set out for the load reductions that the education of people would have. That anything they do will only help with the reductions but they would only count of structural BMPs to measure the progress.

- Jill Hoffman noted that a Burnsville Harbor plan had showed the reductions that LID practices could have on the runoff being generated and that it could be passed on so that an idea could be made as to what to outline for the public and the reductions expected.

- At this point the meeting was turned over to Jill Hoffman of Empower Results so that the next agenda item could be covered. It was the review of the implementation plan and the responsible parties.

- Jill Hoffman explained the handout that she had that listed the Goals that the committee had previously established along with the objectives, or action items, of how to reach those goals. The goals the committee had established were highlighted in blue and those that she had added based on past experience were left white. The handout included boxed as to the priority to establish for each objective and the responsible party for each one.

- The first task set out by Jill Hoffman was to establish what the "Now", "Soon", "Later" and "Never" meant for the priority.

- Bill Helmick felt that the "Now" should mean within one year of the plan being implemented.

- Dorreen Carey commented that the action items don't necessarily have to wait to be started until the plan is approved. That some of the items listed as objectives were currently being done by other committees.

- Jill Hoffman suggested to combine these and say that the "NOW" meant within one year

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- Jenny Orsburn of IN Department of Natural Resources noted that it takes a year to get anything going and thought that maybe there should be year ranges and nothing within the first year.

- Jill Hoffman used this and suggested that the "SOON" be in the 2 to 5 year range and that "LATER" cover anything past the 5 year range.

- It was then established that the "Later" would actually be 5 to 20 years since nothing in the targets went past 20 years.

- A break was taken at this point so that each person could individually go over the spreadsheet and give each objective a priority rating and start thinking about the responsible party aspect of each of them as well.

- Jenny Orsburn asked if it was a good idea to include action items under the goals that are technically the responsibility of the MS4 communities and therefore not eligible for any 319 grant money.

- Sky Schelle responded by saying that it was a good idea because it showed everything that needed to be done in one document and it also let IDEM know that the committee was aware of all of the problems within the watershed study area.

- At this point the committee used the cards that were handed out by Jill Hoffman to vote for their priority ranking for each action item. The members that were voting included Kathy Luther, Dan Gardner, Jenny Orsburn, Dorreen Carey, Bob Theodorou, Bob Helmick and Spencer Cartwright once he arrived.

- The results of the voting can be seen in the handout attached to these meeting minutes. There were a few strategies that had conversation when they were presented. They are listed below with the Goal and strategy they are associated with listed.

- Goal 2: Reduce sediment loads by source reduction strategies and, in priority subwatersheds, through the use of BMPs. Strategy: Use permitting process to control development and projects in sensitive areas.

    - Kathy Luther acquired as to what permitting process this strategy was referring to, if it was to be new permits or existing local permits.

    - Dorreen Carey noted that the point was to protect the adjacent land and that it would therefore be new permits.

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- Phil Gralik said that he felt it would be existing permits that would be better utilized.

- Dorreen Carey stated her opinion that it was to go outside of current permits.

- Kathy Luther noted that there was a difference between using existing and creating new permits and that it needed to be specified.

- Dorreen Carey said that a new local process would be created for the localities to have stricter permitting policies than the state to protect the land.

- Goal 3: Reduce nutrient loads by source reduction strategies and, in priority subwatersheds, through the use of BMPs. Strategy: Promote/incentivize low impact development (LID) or redevelopment strategies.

    - Dan Gardner wanted to note that examples of how this can be done have been previously conducted and that they should be referenced to help the public see the difference.

- Goal 3. Strategy: Develop LID presentation that can travel -ID target audiences

    - Jill Hoffman noted that this was currently being done in Indy and that they were having a large amount of success and good responses with it.

- Goal 3. Strategy: Targeted communications toward municipal parks land and golf courses regarding nutrient management plan.

    - Jeff Jones of Portage Parks noted that the local park departments can't afford fertilizer to put on all of the local parks when prompted for a comment from Jenny Orsburn.

    - Bill Helmick noted though that due to the increase of corn production the amount of fertilizer is going up and that when asked to possibly change the mix to allow the corn to absorb more of the fertilizer and have less waste the fertilizer companies would not agree because they are currently being too successful with the current product and mix.

    - Jenny Orsburn was concerned as to why the committee was focusing on what she saw as being a very small thing because the number of golf courses, those that will actually use the fertilizer, that are in the watershed. She noted that Jeff had said that the parks departments were not using fertilizer because of budgetary reasons.

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- Dorreen Carey said that maybe the locations of the golf courses could be looked at and then compared to the nutrient pollution.
- Jenny Orsburn suggested that maybe the autobon golf courses programs be presented to the local golf courses and encouraged for implementation but as far as identifying action items the load the golf courses contributes is too small.

- Goal 4: Restore, improve and/or protect floodplains, wetlands, natural areas, and riparian corridors. Strategy: Develop guidance document for land managers/owners.
  - Kathy Luther wanted to note that this already existed and that it just needed to be promoted. NIRPC had already created this document.

- Goal 4. Strategy: Engage in economic study of wetlands and floodplains.
  - Spencer Cartwright of IU Northwest noted that the studies that already existed needed to be exploited and that the development of a new one might not be necessary.

- Goal 5: Improve public awareness/knowledge of pollutant loads and sources, especially *E.coli*, and the impacts and risks associated with them. Strategy: Develop watershed signs about recreational assets and risk locations/times not to have contact.
  - Jenny Orsburn questioned if that was something that this group wanted to do. She felt that maybe the strategy needed to be changed to "Develop watershed signs about recreational assets." Dropping off the risk locations/times part since the ultimate goal of the plan was to eliminate the risk.
  - Sky Schelle noted that the contact risk locations and times was something that was under the responsibilities of the health department.
  - Phil Gralik noted that if the public knew the risk better that they would want to improve the condition so they could get more recreational use of the water.
  - Kathy Luther questioned if they *E.coli* loads everything were high thus making it hard to pick certain locations that would be more risky.

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- Jill Hoffman answered saying that in some locations the *E.coli* met the state standards and that those areas needed to be identified better so that the public could use those water bodies.

- Goal 5. Strategy: Develop campaign to include educational inserts in utility bills, etc.

  - Dorreen Carey noted that this was something that could be done by the MS4 communities.

  - Jill Hoffman noted that it was something that could be done now by giving limited direction.

  - Kathy Luther noted that the City of Valparaiso was currently doing a study to see if those notifications actually created any results and that that study could be used as a baseline.

- Goal 5. Strategy: Auto generated email alerts upon CSO discharges.

  - Jenny Orsburn noted that there was currently a list that residents could be put on to be notified as to when CSO discharge events took place.

  - Jill Hoffman suggested that maybe that fact be promoted more so that residents realized they could do that since some of the steering committee members didn't even know the list existed.

  - Dorreen Carey noted that she had saw signs in Portland, OR on the beaches that notified that visitors when a CSO event had taken place and that there was a threat of high *E.coli* concentrations as a result.

  - Kathy Luther suggested the implementation of a reverse 911 system similar to what was in place in the City of Valparaiso.

- Goal 7: Increase river connectivity and public access sites and make people aware of them. Strategy: Coordinate land use planning across planning jurisdictions.

  - Jenny Orsburn informed the committee that the LMCP in coordination with IN DNR was working on a public access map that would be completed in October of 2008.

- Goal 7. Strategy: Determine where there are gaps in public access to significant sections of the river.

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- Jenny Orsburn noted that as part of the plan to identify the access points there would also be a gap anaylsis and a management plan will be written after the October 2008 deadline of the mapping.

- Goal 7. Strategy: Develop informative resources about where hazards are located, how long of a stretch between impediments, and key resources within a given stretch.
  - Dorreen Carey noted that although the Little Calumet River has *E.coli* problems it is still fun to canoe and that you can get in at Chase and go to past Lake Etta (Cline Avenue).
  - Bill Helmick asked if it was difficult to get through Portage.
  - Dorreen Carey resonded saying they got out at Cline because of culverts preventing them from going any further and that it was pretty much impossible to cross Cline with a canoe to get back in the river.

- At this point the list of priority rankings had been completed and a few things were confirmed.

- Jill Hoffman clarified with the group that the strategies were in fact objectives of the goal. They were basically the action items as to how the goal would be accomplished.

- Sky Schelle noted that the committee had some unique stuff in the action items and that it should make a good plan as a result.

- At this point Jill Hoffman moved the group on to review the responsible parties list. She told the committee what she was thinking with each of the categories and opened it up to questions.

- Dorreen Carey noted first that you could not make a consultant the responsible party that someone else had to hire them and therefore be the responsible party.

- Sky Schelle noted that it would still be good to distinguish what more technical help would be needed with.

- Phil Gralik suggested that on the items where there would be more technical help they could double check the boxes to include who would hire the consultant.

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- Kathy Luther noted that the other box was mostly local governments. That the steering committee could promote local ordinances but that it was the local governments that had to enforce and enact them.

- Dorreen Carey said that the entity could take stuff to state legislature and they could give them authority to pass the local ordinances.

- Kathy Luther noted that she could pass along the information as to what the MS4 communities were currently responsible for doing and what additional items they would be charged with the following year.

- Jenny Orsburn noted that some of the items were already currently being done by local sanitary districts.

- Bill Helmick noted that Goal 4 had a large amount of overlap with the soil conservation groups in the area.

- Dan Gardner suggested that the matrix just covered be sent to the communities within the study area that had participated to some extent and force them to give feedback as to what they were doing or would do within the plan.

- Jill Hoffman noted that the plan and some explanation information would be sent to the communities so that they would know what they were looking at.

- Jenny Orsburn suggested that the action items list created by Joe Exl in the matrix format could be sent along with the responsible party matrix.

- Dorreen Carey also wanted the draft report to be sent with the information.

- At this point Phil Gralik reminded the committee that the draft report with all of the checklist items included was due to IDEM on Feb. 5.

- Jill Hoffman noted that they could incorporate the Blueways and Greenways plan after that deadline because it was not a checklist item.

- Kathy Luther asked if the sub-committee listed as a responsible party existed already or if they would be created upon demand.

- Jill Hoffman noted that the intention was for them to created to deal with each specific item as needed.

- Phil Gralik moved the meeting onto the next agenda item which was to create a monitoring plan.

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- Phil Gralik noted that the intention was to monitor the 7 sampling sites with a couple additional locations to get a better baseline set of data. He felt that more baseline data was needed before plan implementation began.

- Bill Helmick asked if they were happy with the results received from the previously conducted sampling.

- Phil Gralik said that they were because it seemed to match the sampling results recorded by previous studies. He also noted that more backsource tracking could probably be used especially along Hart Ditch because with the completion of the flow structure by the ACOE the high flow will now all flow east through the watershed which is currently not the case.

- Sky Schelle noted that monitoring to show implementation should not be conducted before 18 months after start of program.

- Phil Gralik highlighted the point the that completion of the flow structure by the ACOE would change the parameters. That this fact is why he would like to see sampling within 1 year of the flow structure completion because the baseline numbers used for measuring implementation will change.

- Sky Schelle noted that the delisting of a stream for *E.coli* was based on the geometric mean.

- Dan Gardner noted that the flow structure was to completed in the 2008 construction season.

- Phil Gralik noted then that testing could be done in 2009 and then again in 2013 to show the soft practices results and the structural BMPs results.

- Bill Helmick asked why it would take so long for the wetlands to be constructed and begin seeing results, basically why a 5 year sampling and not sooner.

- Jill Hoffman noted that it would take a long time for the effectiveness of the wetlands to be fully reached.

- Dan Garner noted that there would be opportunities before levee system was completed for implementation strategies and once the levee system was completed some things could be done within the levees.

- Jenny Orsburn asked about native plantings and other similar features being conducted inside the levee system.

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- Dan Gardner said that nothing will prohibit improvements to the corp structure.

- Phil Gralik brought the meeting back around to the sampling to be conducted by asking who would be responsible for it.

- Sky Schelle said that it was not fundable by the 319 grant but because of the unique situation with the change in baseline data something might be able to be done

- Jill Hoffman asked about contacting health departments and local sanitary districts for testing. She also noted that it was hard because without being able to show the change in baseline data as a result of the flow structure the committee would not be able to show implementation.

- Bill Helmick noted a grant that was available for storm water districts that was up to $10,000 for testing or monitoring.

- Jenny Orsburn asked about a volunteer monitoring program to be included in the watershed management plan.

- Jill Hoffman estimated that it was about $200 per site per sample for the water quality sampling.

- Dorreen Carey asked if it would be possible for the sanitary districts to test the water.

- Jenny Orsburn asked why they needed to be worried about a lab fee when they had labs located within the watershed study area.

- Jill Hoffman responded saying that the problem was the labs in the area were not equipped to test the water for all of the parameters.

- Phil Gralik noted that the implementation and monitoring plan needed to included the baseline data to be collected within one year of the flow structure completion and then testing to be conducted again in 2013. It was not established who would be responsible for testing the water or paying for the sample to be collected and anaylzed.

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Appendix 4

Sampling Plan Alternatives

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Inspiration to reality.

During the third Steering Committee meeting held on March 14, 2007 three separate sampling plans were developed for review.

Alternative A

1.) 7 sites w/ full suite of water chemistry and physical parameters:
    - pH, temperature, dissolved oxygen,
    - nitrate+nitrite, organic nitrogen (TKN), ammonia nitrogen,
    - total and dissolved phosphorus,
    - turbidity, conductivity, and discharge (flow).
    - Fecal coliform as *E. coli*
    - Stormflow and baseflow samples collected once at each site.
2.) 40 long-term *E. coli* samplers
    - Samplers stay in via stakes for one month
    - Media removed and rinsed
    - Sub-sample of wash water cultured on Petri dish and enumerated
3.) Water Quality & *E. coli* Public Workshop
    - Focus on interpretation in lay persons terms
    - Public can view samples of bugs and bacteria samples
    - Approve understanding of *E. coli* threat and its status as an indicator organism
    - NOTE: may need approval from IDEM for workshop element to be part of sampling budget

Alternative B

1.) 7 sites w/ full suite of water chemistry and physical parameters:
    - pH, temperature, dissolved oxygen,
    - nitrate+nitrite, organic nitrogen (TKN), ammonia nitrogen,
    - total and dissolved phosphorus,
    - turbidity, conductivity, and discharge (flow).
    - Fecal coliform as *E. coli*
    - Stormflow and baseflow samples collected once at each site.
2.) 90 long-term *E. coli* samplers
    - Samplers stay in via stakes for one month
    - Media removed and rinsed
    - Sub-sample of wash water cultured on Petri dish and enumerated

Alternative C

1.) 7 sites w/ full suite of water chemistry and physical parameters:
   - pH, temperature, dissolved oxygen,
   - nitrate+nitrite, organic nitrogen (TKN), ammonia nitrogen,
   - total and dissolved phosphorus,
   - turbidity, conductivity, and discharge (flow).
   - Fecal coliform as *E. coli*
   - Stormflow and baseflow samples collected once at each site.

2.) 40 long-term *E. coli* samplers
   - Samplers stay in via stakes for one month
   - Media removed and rinsed
   - Sub-sample of wash water cultured on Petri dish and enumerated

3.) 5 Macroinvertebrate Sites
   - Will require Hester Dendy artificial substrate samplers due to lack of riffle habitat
   - <u>NOTE:</u> species diversity is affected by available habitat, therefore potential knowledge gained related to insect community health (re: surrogate for long-term water quality conditions) is some what limited since Hester Dendy samplers are only left in place a few weeks.

Appendix 5

Watershed Activity Event

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Inspiration to reality.

The Little Calumet River Awareness Day: Water Quality Education and Outdoor Recreation Event was held at Indiana University Northwest on Saturday, October 13, 2007. The event took place at the North Parking Lot -33rd and Broadway in Gary, Indiana.

Advertisement for the awareness day was conducted via the flyer included in this appendix. A perception survey was handed out at the awareness day to the public participants to gather knowledge from the public. This survey was also conducted in an Indiana University Northwest Environmental Engineering class. A blank copy of this survey can be found after the advertisement flyer with the completed surveys located in the back of the appendix. The summarized results of the survey can also be found in this appendix.

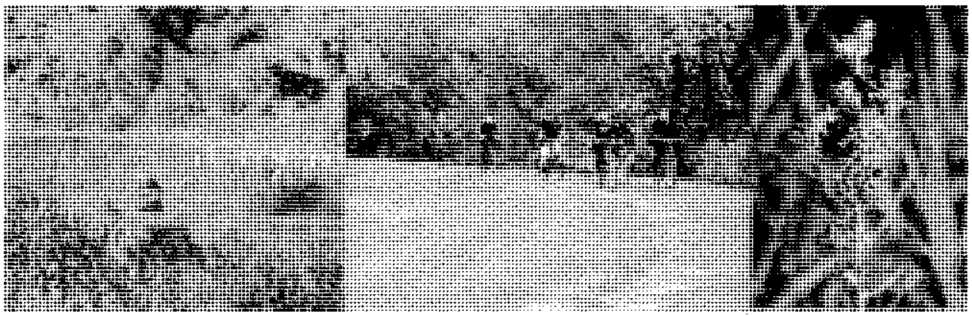
The sign-in sheet from the awareness day is included along with the testing results from the day. Joe Exl conducted chemical monitoring, biological monitoring, and a citizen's qualitative habitat evaluation form. Other events taking place that day included a river walk which included a worksheet that listed native plants that could be found by participants.

As part of the Little Calumet River Awareness Day a public handout was given to participants that listed ways in which they could help the water quality by changing simple tasks around the house. This handout is also included in this appendix.

LITTLE CALUMET RIVER AWARENESS DAY

WATER QUALITY EDUCATION
AND OUTDOOR RECREATION EVENT!

DATE:	**Saturday, October 13, 2007**
TIME:	**Noon – 4:00 p.m.**
LOCATION:	**Indiana University Northwest (IUN)** **North Parking Lot – 33rd and Broadway, Gary, In.** **(Savannah Center (IUN) Room 203/204 -If Raining)**



The Public is invited to participate in fun learning activities

- **Nature Walks Led by a Naturalist**
- **Inter-Active Environmental Learning – Explore How Pollution Travels to our Waterways**
- **Guided Bike Tours on the Little Calumet River Levee Trail (Bring your Bikes)**
- **Riverwatch Water Quality Testing**

HELP PLAN FOR THE FUTURE – The Gary Storm Water Management District has received a grant from the Indiana Department of Environmental Management to develop a Watershed Management Plan for the Western Branch of the Little Calumet River flowing through Gary, Hammond, Munster, Highland, Griffith, Lake Station, Hobart, and Portage. Your input is important. Please fill out the resident survey on the back of this leaflet and return by mail or bring to the River Awareness Day. Thank you. For more information contact:

SANITARY DISTRICT GARY STORM WATER MANAGEMENT DISTRICT

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LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagree ⬭
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagree ⬭
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagree ⬭
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagree ⬭
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagree ⬭
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagree ⬭
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagree ⬭
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagree ⬭
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagree ⬭
The river is an asset/benefit to my community.				
Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagree ⬭
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagree ⬭
I wish the river were cleaner.				
Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagree ⬭
I would support efforts to restore natural areas around the river.				
Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagree ⬭
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagree ⬭
I live in the Little Calumet River Watershed.				
Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagree ⬭
Regarding the river, my biggest concerns are:				

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
I know where the Little Calumet River is located in my community (starts and stops).	14	22	14	9	17
I often or sometimes use the river or areas around the river for recreation.	0	16	6	21	33
I know where I can access the Little Calumet River for fishing or other recreation.	3	14	22	15	22
Better access or signs would increase the likelihood I would use the river.	11	26	17	9	13
I am uncertain if the river is safe for recreation or fishing.	17	16	31	6	6
I assume the river is polluted and I shouldn't get near it.	9	21	30	13	3
I don't think there is anything I can do to improve the water quality in the river.	4	6	29	25	12
The river is as healthy as it can be since it is running though several cities.	2	6	30	18	20
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.	5	12	34	13	12
The river is an asset/benefit to my community.	13	19	29	8	7
Flooding is what I think about most when I hear people talk about the river.	10	26	13	20	7
I wish the river were cleaner.	29	27	18	1	1
I would support efforts to restore natural areas around the river.	26	32	14	2	2
Improving water quality in the river is low on my priority list for things the government should work on.	6	13	20	25	12
I live in the Little Calumet River Watershed.	7	4	33	15	17

**Yellow highlight represents the most popular response for each question.

When asked the question: *"Regarding the river my biggest concerns are:"* the following responses were received.

- IDEM has failed to finish its studies on mercury and other pollutants in the river. I believe IDEM has its interests in protecting industry not the environment. $1.5 million study is not complete and not a priority to IDEM.
- US Steel dumping toxins, etc.
- Sewage runoff into Lake Michigan during periods of high rainfall through the Burns waterway.
- Where are the bike trails in the Black Oak area?
- Flooding in Black Oak
- Fishing and Swimming
- Flooding
- Flooding, fishing, recreation, safety
- Pollution
- Clean it up, make sure it's a healthy ecosystem for animals and people.
- Cleanliness
- Water pollution
- Where is the river?
- Not being clean
- The dangerous effects of the overall scenario of these things.
- Contaminants
- I don't know where it is.
- Can it be effectively used for the community without any consequences?
- Don't care. Sorry.

GARY

LITTLE CALUMET RIVER AWARENESS DAY

River Water Quality & Outdoor Recreation Event! 2007

PRINT NAME	COMPANY	ADDRESS	PHONE	E-MAIL
Quincy Patterson	Provisions			
Aylene Malone	Provisions			
Louis Cleghorn	Provisions			
Amos Williams	provisions			
Elliott Franklin	Provisions			
Mabel Myrick	Volunteer	772 N. Shelby Gary, IN	219-938-8595	mabel.myrick@sbcglobal.net
Ashley White	Goldman Sachs YLIA	5201 Broadway Suite 201	219-981-0661	
Eddie Wilson	YLIA			
Daphney Jones				
Harrie Woodpin				
Chris Gaffney				
Rufus Purnell	RESIDENT	2379 Lincoln ST	219 944-7235	
Marlena Bell	GSD	1341 W 47th Ave	219-883-1029	
Virginia Sewood	GSD	839 Broadway	883 1027 x1915	VIRGINIA@GARYSAN.COM

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GARY

LITTLE CALUMET RIVER AWARENESS DAY

River Water Quality & Outdoor Recreation Event! 2007

PRINT NAME	COMPANY	ADDRESS	PHONE	E-MAIL
Debi Hammonds	GRI	5201 Bdwy	981-0661	goldree7 @ aol.com
Keenan Fisher	YLIA	4341 Pierce	980-0350	big_pimpin_keenan@yahoo.com
Marquis Martin	YLIA	3354 Delware	980-0350	MarquisMartin18@yahoo.com
Navonnia Hooper	YLIA	[redacted]		
Sonicia Ellison	YLIA	4317 W. 19th AVE	944-8503	Jhahatuce@Yahoo.com
Arnesha Archie	YLIA	3701 Johnson St	884-8207	Shontell_takria@yahoo.com
Darsia Wallace	YLIA	330 N. Lake St.	939-9046	Ladi_baller_2006@yahoo.com
Lisa Bitz	EMPOWER RESULTS	on-file	317-891-8820	on-file
Jill Hoffmann	Empower Results	on-file	317-891-8820	on-file
Dorreen Carey	Gary Env. Affairs			dcarey@ci.gary.in.us
Joe Exl	DNR	1600 N. 25 E. Chesterton, IN	219-921-0863	jexl@dnr.in.gov
Kevin Gates	Provisions	5201 Broadway St.	219 614-0748	Mr Kevin Gates yahoo
Anthony Walkers				
[illegible] Williams	GRI	5201 Broadway	219-981-0661	

8

LITTLE CALUMET RIVER AWARENESS DAY

River Water Quality & Outdoor Recreation Event! 2007

PRINT NAME	COMPANY	ADDRESS	PHONE	E-MAIL
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		Gary, IN 46403		
Brenda Henry		2676 Van Buren	883-4168	bscotthenry@aol.com
Khalah Bacote	of Corenda + AL	528 Rhodes Island	886-1979	
Vernon Webbs	Gary Stambeater	3600 W. 3rd Ave	944-0525	vern@greyson.com
Jackie Harris	The 411	1130 Carroll Ln #4	922-8846	GARY411News@aol.com
Isabella Simpson	DMS Untd.	1212 E 49th Ave	887-5947	1Slmyo@aol.com
Yvetta	~~2130 ...~~ Fred-Unicorp	2625 ... St	678-7521	
Yvonne Carson		707 E 40th Ave	512-8341	
Devin Bonner		4037 Virginia St	512-8341	
Jessica Carson		" "	"	
Dorian Newell		" "	"	
Danita Newell		" "	"	
Malachi Moore		349 Pennsylvania St	219/985/9123	trenton-hunt@yahoo.com

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LITTLE CALUMET RIVER AWARENESS DAY

River Water Quality & Outdoor Recreation Event! 2007

PRINT NAME	COMPANY	ADDRESS	PHONE	E-MAIL
Michael Rowe			219-985-9163	

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GARY

LITTLE CALUMET RIVER AWARENESS DAY

River Water Quality & Outdoor Recreation Event! 2007

PRINT NAME	COMPANY	ADDRESS	PHONE	E-MAIL
ERIN ARGYILAN	IUN	3400 W. BROADWAY GARY, IN	219 980 7124	eargyila@iun.edu
[illegible]	IUN	3400 Broadway [illegible]	[illegible]	
Sandra Williams	IUN/Dist. 20s	3050 Sunrise Drive Crown Point	219-661-9258	Bless.ed.Sandy220@aol.com
Charles W. Jackson	G.S.D.	1124 Clinton	219-949-2703	
Alfred [illegible]	Golden Recognition	6710 Birch Pl.	219-938-1899	goldreci@aol.com
Deborah D. Black	Provision	5201 Bdwy	219 980-6100	deb_black@juno.com
Betty Almodovar	City of Gary	839 Bdwy	219. 881. 5075	almodetty@sbcglobal.net
EUGENE SUTKO		3527-44th ST HIGHLAND IN		
CHRIS MEYER	CITY OF GARY	401 BROADWAY	(219) 881 5090	
Mary Mulligan	COG-Env. Affairs	839 Bway #1006 46402	219/882-3000	mmulligan@ci.gary.in.us
Danielle Norwood	YLIA	1061 E 36th Pl.	219-884-8001	
Ms. D. J.	Teacher	P.O. BOX 1772	Gary, IN.	djmercedes7@yahoo.com
Lorraine Mills				
Ed Kruzske				

CHEMICAL MONITORING DATA SHEET (WQI)

Date 10 / 13 / 07 Begin Time 12 : 00 (am/pm) # Adults 2

End Time 1 : 00 (am/pm) # Students 8

Certified Monitors' Names Joe Exl Volunteer ID

Organization Name

Watershed Name Little Calumet - Galien Watershed # 04040001

Stream/River Name West Branch Little Calumet River Site ID
(Please do not abbreviate.) (Above ID numbers are required.)

Current Weather ☐ clear/sunny ☒ overcast ☐ showers ☐ rain (steady) ☐ Storm (heavy)

Weather in Past 48 hrs. ☐ clear/sunny ☐ overcast ☒ showers ☐ rain (steady) ☐ storm (heavy)

WATER QUALITY INDEX (WQI)

You may perform as many of the following tests as you wish; however, at least 6 must be completed to obtain a Total Water Quality Index value. Divide the total of the *Calculation* column by the total of the *Weighting Factor* column to obtain the Water Quality Index rating.

Test Results		*Q-Value*	*Weighting Factor*	*Calculation*
Dissolved Oxygen	mg/ saturation		.18	
***E.* coli**	colonies/ 00m		.17	
pH	units		.12	
B.O.D. 5	mg/		.12	
H_2O Temp Change	change in		.11	
Phosphate	mg/		.11	
Nitrate (NO_3)	mg/		.10	
Turbidity	T s		.09	
TOTALS				

Excellent	90 - 100%	Bad	25 - 49%
Good	70 - 89%	Very Bad	0 - 24%
Medium	50 - 69%		

WATER QUALITY INDEX RATING

Chemical Monitoring Work Sheet

Date 10/13/07

Time 1200 PM

Stream Name and Site ID: West Branch Little Calumet

Air Temp 20 °C

Water Temp 17 °C

Lat °N

Long °W

Current Weather ☐ Clear/Sunny ☒ Overcast ☐ Showers ☐ Rain (Steady) ☐ Storm (Heavy)

Worst Weather in Past 48 hrs ☐ Clear/Sunny ☐ Overcast ☒ Showers ☐ Rain (Steady) ☐ Storm (Heavy)

	Units	Sample 1	Sample 2	Sample 3	Average
Dissolved Oxygen (DO)	% Saturation	51			
	mg/L	5			
Avg DO (original) − DO after 5 days = BOD 5-day (difference)	mg/L				
E. Coli Bacteria *(purple/blue-violet colonies)*	*colonies/*	—			
General Coliforms *(pink/magenta colonies)*	*colonies/m*	—			
pH	*units*	7.0			
Temp at Your Site − Upstream (1 mi) Temp = Temperature Change	°				
Orthophosphate	*mg/*	0.15			
Total Phosphate *(add acid and boil for 30 min)*	*mg/*	—			
Nitrate (NO_3) *(after multiply by 4.4)*	*mg/*	2.2			
Nitrite (NO_2) *(after multiply by 3.3)*	*mg/*	0.5			
Transparency *(from Tube)*	*cm*	17			
Turbidity *(from chart – use in database entry)*	*T*	45			
Ammonia Nitrogen	*mg/*				
Other ______________					
Other ______________					
Other ______________					
Other ______________					

BIOLOGICAL MONITORING DATA SHEET

Date 10 / 13 / 07 (MM DD YY)

Begin Time 12 : 00 (am/pm)
End Time 1 : 00 (am/pm)

Adults 2
Students 8

Certified Monitors' Names Joe Exl
Volunteer ID ______

Organization Name ______

Watershed Name Little Calumet-Galien
Watershed # 04040001

Stream/River Name West Branch Little Calumet River
Site ID ______

Check Methods Used

- ☐ Kick Seine Net (3 times)
- ☒ D-Net (20 jabs or scoops)

Check Habitats Sampled

- ☐ Riffles
- ☐ Leaf Packs
- ☐ Undercut Banks
- ☒ Snags/Vegetation
- ☒ Sediment
- ☐ Other

POLLUTION TOLERANCE INDEX (PTI)

PT GROUP 1 *Intolerant*		PT GROUP 2 *Moderately Intolerant*		PT GROUP 3 *Fairly Tolerant*		PT GROUP 4 *Very Tolerant*	
Stonefly Nymph		Damselfly Nymph		Midges	X	Left-Handed Snail	
Mayfly Nymph		Dragonfly Nymph		Black Fly Larvae		Aquatic Worms	X
Caddis Fly Larvae		Sowbug		Planaria		Blood Midge	X
Dobsonfly Larvae		Scud	X	Leech		Rat-tailed Maggot	
Riffle Beetle		Crane Fly Larvae					
Water Penny		Clams/Mussels					
Right-Handed Snail		Crayfish					
# Of TAXA	Ø	**# Of TAXA**	1	**# Of TAXA**	1	**# Of TAXA**	2
Weighting Factors: (x 4)	Ø	(x 3)	3	(x 2)	2	(x 1)	2

23 or More	Excellent
17 - 22	Good
11 - 16	Fair
10 or Less	Poor

POLLUTION TOLERANCE INDEX RATING
(Add the final index values for each group.)

7 Poor

Other Biological Indicators

- ☐ Native Mussels
- ☐ Zebra Mussels
- ☐ Rusty Crayfish
- ☐ Aquatic Plants
- ______ % Algae Cover
- ______ Diversity Index

Date: 10/13/07

Citizens Qualitative Habitat Evaluation Index

34.5
CQHEI Total

Vol ID: | Site ID: | River and Watershed: West Branch Little Calumet 040400010400020

I. Substrate (Bottom Type) — Score: Ø

a) Size
- [ ] 14 pt — Mostly Large (Fist Size or Bigger)
- [ ] 6 pt — Mostly Small (Smaller Than Fingernail, but Still Coarse, or Bedrock)
- [ ] 10 pt — Mostly Medium (Smaller than Fist, but Bigger than Fingernail)
- [X] 0 pt — Mostly Very Fine (Not Coarse, Sometimes Greasy or Mucky)

b) "Smothering"
Are Fist Size and Larger Pieces Smothered By Sands/Silts?
- [ ] NO 5 pt
- [X] YES 0 pt

Symptoms: Hard to Move Large Pieces, Often Black on Bottom with Few Insects

c) "Silting"
Are Silts and Clays Distributed Throughout Stream?
- [ ] NO 5 pt
- [X] YES 0 pt

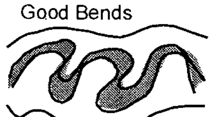
Symptoms: Light Kicking of Bottom Results in Substantial Clouding of Stream for More than a Minute or Two

II. Fish Cover (Hiding Places) - Add 2 Points For Each One Present — Score: 6

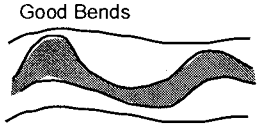
- [ ] 2 pt — Underwater Tree Roots (Large)
- [ ] 2 pt — Boulders
- [X] 2 pt — Downed Trees, Logs, Branches
- [ ] 2 pt — Water Plants
- [ ] 2 pt — Undercut Banks
- [ ] 2 pt — Underwater Tree Rootlets (Fine)
- [ ] 2 pt — Backwaters, Oxbows or Side Channels
- [X] 2 pt — Shallow, Slow Areas for Small Fish
- [ ] 2 pt — Deep Areas (Chest Deep)
- [X] 2 pt — Shrubs, Small Trees that Hang Close Over the Bank

III. Stream Shape and Human Alterations — Score: 9

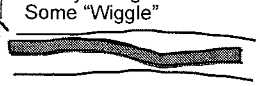
a) "Curviness" or "Sinuousity" of Channel
- [ ] 8 pt — 2 or More Good Bends



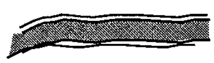
- [ ] 6 pt — 1 or 2 Good Bends



- [X] 3 pt — Mostly Straight Some "Wiggle"



- [ ] 0 pt — Very Straight



b) How Natural Is The Site?
- [ ] 12 pt — Mostly Natural
- [X] 6 pt — Many Man-made Changes, but still some natural conditions left (e.g., trees, meanders)
- [ ] 9 pt — A Few Minor Man-made Changes (e.g., a bridge, some streambank changes)
- [ ] 0 pt — Heavy, Man-made Changes (e.g., leveed or channelized)

IV. Stream Forests & Wetlands (Riparian Area) & Erosion — Score: 11.5

a) Width of Riparian Forest & Wetland - Mostly:
- [ ] 8 pt — Wide (Can't Throw A Rock Through/ Across It)
- [X] 5 pt — Narrow (Can Throw A Rock Through/ Across It)
- [ ] 0 pt — None

b) Land Use - Mostly:
- [X] 5 pt — Forest/Wetland
- [ ] 2 pt — Conservation Tillage
- [ ] 4 pt — Shrubs
- [ ] 1 pt — Suburban
- [ ] 3 pt — Overgrown Fields
- [ ] 1 pt — Row Crop
- [ ] 2 pt — Fenced Pasture
- [ ] 0 pt — Open Pasture
- [ ] 2 pt — Park (Grass)
- [X] 0 pt — Urban/ Industrial

AVG 2.5

c) Bank Erosion - Typically:
- [ ] 4 pt — Stable Hard or Well-Vegetated Banks
- [X] 2 pt — Combination of Stable and Eroding Banks
- [ ] 0 pt — Raw, Collapsing Banks

d) How Much of Stream is Shaded?
- [ ] 3 pt — Mostly
- [X] 2 pt — Partly
- [ ] 0 pt — None

V. Depth & Velocity — Score: 8

a) Deepest Pool is At Least:
- [ ] 8 pt — Chest Deep
- [ ] 4 pt — Knee Deep
- [X] 6 pt — Waist Deep
- [ ] 0 pt — Ankle Deep

b) Check ALL The Flow Types That You See (Add Points):
- [ ] 2 pt — Very Fast: Hard to Stand in the Current
- [X] 1 pt — Moderate: Slowly Takes Objects Downstream
- [ ] 0 pt — None
- [ ] 3 pt — Fast: Quickly Takes Objects Downstream
- [X] 1 pt — Slow: Flow Nearly Absent

VI. Riffles/Runs (Areas Where Current is Fast/Turbulent, Surface May Be Broken) — Score: 0

a) Riffles/Runs Are:
- [ ] 8 pt — Knee Deep or Deeper & Fast
- [ ] 4 pt — Ankle Deep or Less & Slow
- [ ] 6 pt — Ankle/Calf Deep & Fast
- [X] 0 pt — Do Not Exist

b) Riffle/Run Substrates Are:
- [ ] 7 pt — Fist Size or Larger
- [X] 0 pt — Smaller Than Your Fingernails or Do Not Exist
- [ ] 6 pt — Smaller Than Fist Size, but Larger Than Fingernail

What are "native" plants?
Native plants are those that evolved naturally in North America. More specifically, native plants in a particular area, like Indiana, are those that were growing naturally in the area before humans introduced plants from distant places.

Can you find these plants?

- ☐ Showy Sunflower

- ☐ New England Aster

- ☐ White Health Aster

- ☐ Blue Vervain

- ☐ Common Milkweed

- ☐ Evening Primrose

- ☐ Fall Panic Grass

- ☐ Giant foxtail

- ☐ Cattail

- ☐ Giant Reed (Phragmites)

- ☐ Big Blue Stem

- ☐ Goldenrod

- ☐ Yellow Coneflower

- ☐ Boneset

What is a wetland?
Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year. Wetland areas are defined/outlined in the landscape according to three primary criteria: vegetation, soil, and hydrology. Wetlands play an important part in filtering pollutants from water, preventing flooding, and providing homes for wildlife.

What is a CSO?
In a combined sewer system both rainwater runoff and sanitary waste which flows from homes and businesses, are transported in one pipe, to the sewage treatment plant. During heavy rainfalls or sudden snowmelt, the extra flow of water in the sewer system may exceed the capacity of either the pipe or the treatment facility. As a result, part of the combined wastewater flow (carrying bacteria and other pollutants from untreated sewage) may be diverted directly into the Little Calumet River. These events are known as combined sewer overflows or CSO's.

What is a stream buffer?
A natural vegetative boundary between the stream and existing development or farming to help protect the stream by filtering pollutants, providing flood control, preventing streambank erosion, keeping stream waters cool, and providing room for natural movement of the stream channel.

Do you see any of these animals or evidence of animals around?

- ☐ Blue heron
- ☐ Ducks
- ☐ Hawks
- ☐ Song birds
- ☐ Snakes
- ☐ Raccoons
- ☐ Muskrats
- ☐ Ground hogs
- ☐ Fox
- ☐ Coyotes
- ☐ Mink
- ☐ Deer
- ☐ Opossum
- ☐ Beaver
- ☐ Turtles

Residents of Gary, Hammond, Highland, Griffith, Lake Station, New Chicago, Hobart, & Portage ...

We Need Your HELP...

Homes can be a leading source of pollution
Environmental ethics are easy
Learn about what you can do
Participate in your quality of life

A series of small acts can bring big change!

Things to Do Around Your House:

- ✓ Use Phosphorus-free lawn fertilizers
- ✓ Fertilize less – first check soils nutrient levels
- ✓ Pick up pet wastes regularly
- ✓ Keep lawn clippings out of streets and waterways
- ✓ Have your septic tank pumped out
- ✓ Monitor and maintain your septic drainfield
- ✓ Keep household wastes out of storm sewers
- ✓ Collect stormwater from gutters to use in gardens
- ✓ Create flower gardens at the base of downspouts
- ✓ Cover bare ground with plantings
- ✓ Use straw bales or silt fence when doing construction or major landscaping projects
- ✓ Plant beds of native flowers or trees
- ✓ Use Phosphorus-free dishwasher detergent
- ✓ Talk to your neighbors about what you are doing
- ✓ Conserve water use in and around your home. Don't leave faucets or hoses running unnecessarily.

Our Water Quality Depends Upon Your HELP!

Homes can be a leading source of pollution
Environmental ethics are easy
Learn about what you can do
Participate in your quality of life

What's Being Done to HELP the Little Calumet River?

A diverse group of local professionals and volunteers is working to develop an approach to improve water quality in the Little Calumet River. The project includes evaluating the existing condition of the river by looking at water samples, vegetation, current land uses, stormwater discharges, and discussing river issues with local citizens and government officials. The pollutant of greatest concern in the river is bacteria, more specifically *E. coli.*

Common household pollutants such as nutrients like phosphorus and nitrogen are also causing the river to experience algal blooms and low oxygen conditions.

A Watershed Management Plan is being written to help develop ideas to remove pollutants from storm water entering the river and find ways to implement these ideas in each of the communities in the watershed draining to the river. This effort may ultimately lead to the formation of an organization that crosses political boundaries to improve, preserve, and protect the river and the natural areas surrounding it.

For more information or ways to get involved please contact either:

Dorreen Carey, Director
Environmental Affairs
City of Gary
839 Broadway N206
Gary, Indiana 46402
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Luci Horton, Director
Gary Storm Water Mgmt. Dist.
3600 West 3rd Ave.
Gary, Indiana 46402
Phone: (219) 944-0595
Email: luci@garysan.com

Project funded by EPA/IDEM Section 319 Watershed Management Grant & Gary Storm Water Management District

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
The river is an asset/benefit to my community.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I wish the river were cleaner.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I would support efforts to restore natural areas around the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I live in the Little Calumet River Watershed.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Regarding the river, my biggest concerns are:				
polution				

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagree ○

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagree ○

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagree ○

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagree ○

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ● | Strongly Disagree ○

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ● | Strongly Disagree ○

I don't think there is anything I can do to improve the water quality in the river.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ● | Strongly Disagree ○

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagree ○

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ● | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ○

The river is an asset/benefit to my community.

Strongly Agree ● | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ○

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ● | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ○

I wish the river were cleaner.

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagree ○

I would support efforts to restore natural areas around the river.

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagree ○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagree ○

I live in the Little Calumet River Watershed.

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagree ○

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ◯	Agree ◯	Not sure ◯	Disagree ☑	Strongly Disagre◯

I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ◯	Agree ◯	Not sure ◯	Disagree ◯	Strongly Disagre☑

I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ◯	Agree ◯	Not sure ◯	Disagree ◯	Strongly Disagre☑

Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ☑	Agree ◯	Not sure ◯	Disagree ◯	Strongly Disagre◯

I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ◯	Agree ◯	Not sure ☑	Disagree ◯	Strongly Disagre◯

I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ◯	Agree ☑	Not sure ◯	Disagree ◯	Strongly Disagre◯

I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ◯	Agree ◯	Not sure ◯	Disagree ☑	Strongly Disagre◯

The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ◯	Agree ◯	Not sure ◯	Disagree ◯	Strongly Disagre☑

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ◯	Agree ◯	Not sure ◯	Disagree ☑	Strongly Disagre◯

The river is an asset/benefit to my community.				
Strongly Agree ◯	Agree ☑	Not sure ◯	Disagree ◯	Strongly Disagre◯

Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ◯	Agree ◯	Not sure ☑	Disagree ◯	Strongly Disagre◯

I wish the river were cleaner.				
Strongly Agree ☑	Agree ◯	Not sure ◯	Disagree ◯	Strongly Disagre◯

I would support efforts to restore natural areas around the river.				
Strongly Agree ☑	Agree ◯	Not sure ◯	Disagree ◯	Strongly Disagre◯

Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ◯	Agree ◯	Not sure ◯	Disagree ◯	Strongly Disagre☑

I live in the Little Calumet River Watershed.				
Strongly Agree ◯	Agree ◯	Not sure ◯	Disagree ☑	Strongly Disagre◯

Regarding the river, my biggest concerns are:

Flooding

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○

I don't think there is anything I can do to improve the water quality in the river.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○

The river is an asset/benefit to my community.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○

I wish the river were cleaner.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○

I would support efforts to restore natural areas around the river.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○

I live in the Little Calumet River Watershed.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagre
I know where the Little Calumet River is located in my community (starts and stops).	○	●	○	○	○
I often or sometimes use the river or areas around the river for recreation.	○	○	○	●	○
I know where I can access the Little Calumet River for fishing or other recreation.	○	●	○	○	○
Better access or signs would increase the likelihood I would use the river.	○	●	○	○	○
I am uncertain if the river is safe for recreation or fishing.	○	○	●	○	○
I assume the river is polluted and I shouldn't get near it.	○	●	○	○	○
I don't think there is anything I can do to improve the water quality in the river.	○	○	○	●	○
The river is as healthy as it can be since it is running through several cities.	○	○	○	●	○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.	○	●	○	○	○
The river is an asset/benefit to my community.	○	●	○	○	○
Flooding is what I think about most when I hear people talk about the river.	○	○	○	●	○
I wish the river were cleaner.	●	○	○	○	○
I would support efforts to restore natural areas around the river.	●	○	○	○	○
Improving water quality in the river is low on my priority list for things the government should work on.	●	○	○	○	○
I live in the Little Calumet River Watershed.	○	○	○	●	○

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○

I often or sometimes use the river or areas around the river for recreotion.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○

I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○

Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○

I om uncertain if the river is safe for recreation or fishing.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○

I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○

I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○

The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○

The river is an asset/benefit to my community.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○

Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○

I wish the river were cleaner.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○

I would support efforts to restore natural areas around the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○

Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○

I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○

Regarding the river, my biggest concerns are:

The polluted waters.

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
The river is an asset/benefit to my community.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I wish the river were cleaner.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I would support efforts to restore natural areas around the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
Regarding the river, my biggest concerns are:				

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
The river is an asset/benefit to my community.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I wish the river were cleaner.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I would support efforts to restore natural areas around the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I live in the Little Calumet River Watershed.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Regarding the river, my biggest concerns are:				

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
The river is an asset/benefit to my community.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I wish the river were cleaner.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I would support efforts to restore natural areas around the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I live in the Little Calumet River Watershed.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Regarding the river, my biggest concerns are:				

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know where the Little Calumet River is located in my community (starts and stops).	●	○	○	○	○
I often or sometimes use the river or areas around the river for recreation.	○	○	○	●	○
I know where I can access the Little Calumet River for fishing or other recreation.	●	○	○	○	○
Better access or signs would increase the likelihood I would use the river.	○	●	○	○	○
I am uncertain if the river is safe for recreation or fishing.	○	●	○	○	○
I assume the river is polluted and I shouldn't get near it.	○	●	○	○	○
I don't think there is anything I can do to improve the water quality in the river.	○	○	○	●	○
The river is as healthy as it can be since it is running through several cities.	●	○	○	○	○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.	○	○	●	○	○
The river is an asset/benefit to my community.	○	○	○	●	○
Flooding is what I think about most when I hear people talk about the river.	○	○	○	●	○
I wish the river were cleaner.	●	○	○	○	○
I would support efforts to restore natural areas around the river.	●	○	○	○	○
Improving water quality in the river is low on my priority list for things the government should work on.	○	○	○	○	●
I live in the Little Calumet River Watershed.	○	○	○	●	○

Regarding the river, my biggest concerns are:

clean it up, make sure its a healthy ecosystems for animals and people;

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I don't think there is anything I can do to improve the water quality in the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

The river is an asset/benefit to my community.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I wish the river were cleaner.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I would support efforts to restore natural areas around the river.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I live in the Little Calumet River Watershed.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

Regarding the river, my biggest concerns are:

cleanliness

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ✓
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ✓
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ✓
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ○	Agree ○	Not sure ✓	Disagree ○	Strongly Disagree ○
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ○	Agree ✓	Not sure ○	Disagree ○	Strongly Disagree ○
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ○	Not sure ✓	Disagree ○	Strongly Disagree ○
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Not sure ✓	Disagree ○	Strongly Disagree ○
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ○	Agree ○	Not sure ✓	Disagree ○	Strongly Disagree ○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ○	Agree ○	Not sure ✓	Disagree ○	Strongly Disagree ○
The river is an asset/benefit to my community.				
Strongly Agree ○	Agree ○	Not sure ✓	Disagree ○	Strongly Disagree ○
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ○	Agree ○	Not sure ✓	Disagree ○	Strongly Disagree ○
I wish the river were cleaner.				
Strongly Agree ○	Agree ✓	Not sure ○	Disagree ○	Strongly Disagree ○
I would support efforts to restore natural areas around the river.				
Strongly Agree ○	Agree ✓	Not sure ○	Disagree ○	Strongly Disagree ○
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ✓	Strongly Disagree ○
I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ✓

Regarding the river, my biggest concerns are: water pollution

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
The river is an asset/benefit to my community.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
I wish the river were cleaner.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
I would support efforts to restore natural areas around the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
Regarding the river, my biggest concerns are: Where is the river?				

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●
I knaw where I can access the Little Calumet River for fishing or other recreatian.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Nat sure ○	Disagree ○	Strongly Disagre●
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●
The river is an asset/benefit to my community.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●
I wish the river were cleaner.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○
I would support efforts to restore natural areas around the river.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●
I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○
Regarding the river, my biggest concerns are:				
not being clean				

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
The river is an asset/benefit to my community.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I wish the river were cleaner.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I would support efforts to restore natural areas around the river.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

Regarding the river, my biggest concerns are: the dangerous effects of the overall scenario of these things.

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
The river is an asset/benefit to my community.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
I wish the river were cleaner.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I would support efforts to restore natural areas around the river.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○
I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

Regarding the river, my biggest concerns are:

contaminants.

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

I don't think there is anything I can do to improve the water quality in the river.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

The river is an asset/benefit to my community.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

I wish the river were cleaner.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

I would support efforts to restore natural areas around the river.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

I live in the Little Calumet River Watershed.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

Regarding the river, my biggest concerns are:

I dont know where it is.

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I don't think there is anything I can do to improve the water quality in the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

The river is an asset/benefit to my community.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I wish the river were cleaner.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I would support efforts to restore natural areas around the river.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I live in the Little Calumet River Watershed.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

Regarding the river, my biggest concerns are:

Can it be effectively used for the community without any Negative Consequences

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I don't think there is anything I can do to improve the water quality in the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

The river is an asset/benefit to my community.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I wish the river were cleaner.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I would support efforts to restore natural areas around the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I live in the Little Calumet River Watershed.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

Regarding the river, my biggest concerns are:

Don't Care. Sorry

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagre⬭
4	4	2	3	2

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagre⬭
0	4	0	2	8

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagre⬭
0	3	4	3	5

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagre⬭
2	4	3	2	3

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagre⬭
3	3	4	2	1

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagre⬭
4	5	3	3	0

I don't think there is anything I can do to improve the water quality in the river.

Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagre⬭
0	3	1	3	8

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagre⬭
2	1	3	4	4

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagre⬭
2	1	3	4	4

The river is an asset/benefit to my community.

Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagre⬭
2	2	2	4	5

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagre⬭
6	4	1	0	4

I wish the river were cleaner.

Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagre⬭
9	3	0	1	1

I would support efforts to restore natural areas around the river.

Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagre⬭
8	3	0	1	1

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagre⬭
1	2	1	2	6

I live in the Little Calumet River Watershed.

Strongly Agree ⬭	Agree ⬭	Not sure ⬭	Disagree ⬭	Strongly Disagre⬭
4	2	2	2	2

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I don't think there is anything I can do to improve the water quality in the river.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

The river is an asset/benefit to my community.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I wish the river were cleaner.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I would support efforts to restore natural areas around the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I live in the Little Calumet River Watershed.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

Regarding the river, my biggest concerns are: flooding, fishing, recreation safety

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know where the Little Calumet River is located in my community (starts and stops).	○	○	○	○	●
I often or sometimes use the river or areas around the river for recreation.	○	○	○	○	●
I know where I can access the Little Calumet River for fishing or other recreation.	○	○	○	○	●
Better access or signs would increase the likelihood I would use the river.	●	○	○	○	○
I am uncertain if the river is safe for recreation or fishing.	○	○	●	○	○
I assume the river is polluted and I shouldn't get near it.	○	○	●	○	○
I don't think there is anything I can do to improve the water quality in the river.	○	○	●	○	○
The river is as healthy as it can be since it is running through several cities.	○	○	●	○	○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.	○	○	●	○	○
The river is an asset/benefit to my community.	○	●	○	○	○
Flooding is what I think about most when I hear people talk about the river.	○	●	○	○	○
I wish the river were cleaner.	○	○	●	○	○
I would support efforts to restore natural areas around the river.	○	○	●	○	○
Improving water quality in the river is low on my priority list for things the government should work on.	●	○	○	○	○
I live in the Little Calumet River Watershed.	○	○	○	○	●

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○
The river is an asset/benefit to my community.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○
I wish the river were cleaner.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○
I would support efforts to restore natural areas around the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○
I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
Regarding the river, my biggest concerns are:				
Flooding				

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

Statement				
I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
The river is an asset/benefit to my community.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
I wish the river were cleaner.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
I would support efforts to restore natural areas around the river.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●
I live in the Little Calumet River Watershed.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○

Regarding the river, my biggest concerns are:

Fishing and Swimming

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
●	○	○	○	○

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
○	○	○	○	●

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
○	○	○	○	●

Better access or signs would increase the likelihood I would use the river.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
○	○	○	○	●

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
○	○	○	○	●

I assume the river is polluted and I shouldn't get near it.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
●	○	○	○	○

I don't think there is anything I can do to improve the water quality in the river.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
●	○	○	○	○

The river is as healthy as it can be since it is running through several cities.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
○	○	○	○	●

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
○	○	●	○	○

The river is an asset/benefit to my community.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
○	○	○	○	●

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
●	○	○	○	○

I wish the river were cleaner.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
●	○	○	○	○

I would support efforts to restore natural areas around the river.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
●	○	○	○	○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
○	○	○	○	●

I live in the Little Calumet River Watershed.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
●	○	○	○	○

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●
The river is an asset/benefit to my community.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○
I wish the river were cleaner.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○
I would support efforts to restore natural areas around the river.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●
I live in the Little Calumet River Watershed.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○

Regarding the river, my biggest concerns are:

FLOODING IN BLACK OAK

BUTLER

Mr. Robert Kiral
7210 W 25th Ave
Gary IN 46406-2941

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know where the Little Calumet River is located in my community (starts and stops).	●	○	○	○	○
I often or sometimes use the river or areas around the river for recreation.	○	○	○	○	●
I know where I can access the Little Calumet River for fishing or other recreation.	○	○	○	○	●
Better access or signs would increase the likelihood I would use the river.	○	○	○	○	●
I am uncertain if the river is safe for recreation or fishing.	●	○	○	○	○
I assume the river is polluted and I shouldn't get near it.	●	○	○	○	○
I don't think there is anything I can do to improve the water quality in the river.	○	○	○	●	○
The river is as healthy as it can be since it is running through several cities.	○	○	○	○	●
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.	○	○	○	○	●
x The river is an asset/benefit to my community. (Could be an asset to my community)	●	○	○	○	○
Flooding is what I think about most when I hear people talk about the river.	○	○	○	●	○
I wish the river were cleaner.	●	○	○	○	○
I would support efforts to restore natural areas around the river.	●	○	○	○	○
Improving water quality in the river is low on my priority list for things the government should work on.	○	○	○	●	○
I live in the Little Calumet River Watershed.	●	○	○	○	○

Regarding the river, my biggest concerns are: where are the biking trails in the Black Oak area?

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know where the Little Calumet River is located in my community (starts and stops).	○	☒	○	○	○
I often or sometimes use the river or areas around the river for recreation.	○	☒	○	○	○
I know where I can access the Little Calumet River for fishing or other recreation.	○	☒	○	○	○
Better access or signs would increase the likelihood I would use the river.	○	○	○	☒	○
I am uncertain if the river is safe for recreation or fishing.	○	○	☒	○	○
I assume the river is polluted and I shouldn't get near it.	○	○	○	☒	○
I don't think there is anything I can do to improve the water quality in the river.	○	○	☒	○	○
The river is as healthy as it can be since it is running through several cities.	○	○	○	☒	○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.	○	○	○	☒	○
The river is an asset/benefit to my community.	☒	○	○	○	○
Flooding is what I think about most when I hear people talk about the river.	○	○	○	☒	○
I wish the river were cleaner.	☒	○	○	○	○
I would support efforts to restore natural areas around the river.	☒	○	○	○	○
Improving water quality in the river is low on my priority list for things the government should work on.	○	○	○	☒	○
I live in the Little Calumet River Watershed.	○	☒	○	○	○

Regarding the river, my biggest concerns are: SEWAGE RUNOFF INTO LAKE MICHIGAN DURING PERIODS OF HIGH RAINFALL THROUGH THE BURNS WATERWAY.

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I don't think there is anything I can do to improve the water quality in the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

The river is an asset/benefit to my community.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I wish the river were cleaner.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

I would support efforts to restore natural areas around the river.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

I live in the Little Calumet River Watershed.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

Regarding the river, my biggest concerns are:

US Steel dumping [illegible]

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know where the Little Calumet River is located in my community (starts and stops).	○	●	○	○	○
I often or sometimes use the river or areas around the river for recreation.	○	●	○	○	○
I know where I can access the Little Calumet River for fishing or other recreation.	○	○	○	●	○
Better access or signs would increase the likelihood I would use the river.	○	●	○	○	○
I am uncertain if the river is safe for recreation or fishing.	●	○	○	○	○
I assume the river is polluted and I shouldn't get near it.	○	●	○	○	○
I don't think there is anything I can do to improve the water quality in the river.	○	○	○	●	○
The river is as healthy as it can be since it is running through several cities.	○	○	○	○	●
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.	●	○	○	○	○
The river is an asset/benefit to my community.	●	○	○	○	○
Flooding is what I think about most when I hear people talk about the river.	○	○	○	●	○
I wish the river were cleaner.	●	○	○	○	○
I would support efforts to restore natural areas around the river.	●	○	○	○	○
Improving water quality in the river is low on my priority list for things the government should work on.	○	○	○	○	●
I live in the Little Calumet River Watershed.	○	○	●	○	○

Regarding the river, my biggest concerns are:

IDEM HAS FAILED TO FINISH ITS STUDIES ON MERCURY AND OTHER POLLUTANTS IN THE RIVER. I BELIEVE IDEM HAS ITS INTERESTS IN PROTECTING INDUSTRY NOT THE ENVIRONMENT. $1.5 MILLION STUDY IS NOT COMPLETE AND NOT A PRIORITY TO IDEM.

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
The river is an asset/benefit to my community.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I wish the river were cleaner.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I would support efforts to restore natural areas around the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I live in the Little Calumet River Watershed.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
The river is an asset/benefit to my community.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I wish the river were cleaner.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
I would support efforts to restore natural areas around the river.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
Regarding the river, my biggest concerns are:				

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ●

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ●

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ●

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ●

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ○

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre ○

I don't think there is anything I can do to improve the water quality in the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ●

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ●

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ●

The river is an asset/benefit to my community.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre ○

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ●

I wish the river were cleaner.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre ○

I would support efforts to restore natural areas around the river.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre ○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre ○

I live in the Little Calumet River Watershed.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ●

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know where the Little Calumet River is located in my community (starts and stops).	○	○	●	○	○
I often or sometimes use the river or areas around the river for recreation.	○	○	○	●	○
I know where I can access the Little Calumet River for fishing or other recreation.	○	○	●	○	○
Better access or signs would increase the likelihood I would use the river.	○	○	●	○	○
I am uncertain if the river is safe for recreation or fishing.	○	●	○	○	○
I assume the river is polluted and I shouldn't get near it.	○	○	●	○	○
I don't think there is anything I can do to improve the water quality in the river.	○	○	●	○	○
The river is as healthy as it can be since it is running through several cities.	○	○	●	○	○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.	○	○	●	○	○
The river is an asset/benefit to my community.	○	○	●	○	○
Flooding is what I think about most when I hear people talk about the river.	○	●	○	○	○
I wish the river were cleaner.	○	○	●	○	○
I would support efforts to restore natural areas around the river.	○	●	○	○	○
Improving water quality in the river is low on my priority list for things the government should work on.	○	○	○	●	○
I live in the Little Calumet River Watershed.	○	○	○	●	○

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree

I often or sometimes use the river or areas around the river for recreation.

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The river is as healthy as it can be since it is running through several cities.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree

The river is an asset/benefit to my community.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree

I wish the river were cleaner.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree

I would support efforts to restore natural areas around the river.

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Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree

I live in the Little Calumet River Watershed.

Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree

Regarding the river, my biggest concerns are:

FLOODING

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ●
I often or sometimes use the river or areas around the river for recreation.				
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I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ○
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Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre ○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
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Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre ○
I wish the river were cleaner.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre ○
I would support efforts to restore natural areas around the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre ○
Improving water quality in the river is low on my priority list for things the government should work on.				
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Regarding the river, my biggest concerns are:				

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Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○
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Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○
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Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
I wish the river were cleaner.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre○
I would support efforts to restore natural areas around the river.				
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I live in the Little Calumet River Watershed.				
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Regarding the river, my biggest concerns are:				

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

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Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

The river is an asset/benefit to my community.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I wish the river were cleaner.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

I would support efforts to restore natural areas around the river.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I live in the Little Calumet River Watershed.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagre
I know where the Little Calumet River is located in my community (starts and stops).	●	○	○	○	○
I often or sometimes use the river or areas around the river for recreation.	○	○	●	○	○
I know where I can access the Little Calumet River for fishing or other recreation.	○	●	○	○	○
Better access or signs would increase the likelihood I would use the river.	○	○	●	○	○
I am uncertain if the river is safe for recreation or fishing.	○	○	●	○	○
I assume the river is polluted and I shouldn't get near it.	○	○	●	○	○
I don't think there is anything I can do to improve the water quality in the river.	○	○	○	●	○
The river is as healthy as it can be since it is running through several cities.	○	○	○	●	○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.	○	●	○	○	○
The river is an asset/benefit to my community.	○	○	○	●	○
Flooding is what I think about most when I hear people talk about the river.	●	○	○	○	○
I wish the river were cleaner.	●	○	○	○	○
I would support efforts to restore natural areas around the river.	●	○	○	○	○
Improving water quality in the river is low on my priority list for things the government should work on.	●	○	○	○	○
I live in the Little Calumet River Watershed.	○	○	○	●	○

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

Statement				
I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
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Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
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Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
The river is an asset/benefit to my community.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I wish the river were cleaner.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I would support efforts to restore natural areas around the river.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I live in the Little Calumet River Watershed.				
Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree

Regarding the river, my biggest concerns are: N/A

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know where the Little Calumet River is located in my community (starts and stops).	○	○	○	○	●
I often or sometimes use the river or areas around the river for recreation.	○	○	○	○	●
I know where I can access the Little Calumet River for fishing or other recreation.	○	○	○	○	●
Better access or signs would increase the likelihood I would use the river.	○	●	○	○	○
I am uncertain if the river is safe for recreation or fishing.	○	●	○	○	○
I assume the river is polluted and I shouldn't get near it.	○	○	●	○	○
I don't think there is anything I can do to improve the water quality in the river.	○	○	○	●	○
The river is as healthy as it can be since it is running through several cities.	○	○	○	●	○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.	○	○	○	○	●
The river is an asset/benefit to my community.	○	○	●	○	○
Flooding is what I think about most when I hear people talk about the river.	○	○	○	●	○
I wish the river were cleaner.	○	○	●	○	○
I would support efforts to restore natural areas around the river.	○	●	○	○	○
Improving water quality in the river is low on my priority list for things the government should work on.	○	○	○	●	○
I live in the Little Calumet River Watershed.	○	○	●	○	○

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ◯	Agree ◯	Not sure ◯	Disagree ◯	Strongly Disagree ✓

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ◯	Agree ◯	Not sure ◯	Disagree ◯	Strongly Disagree ✓

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ◯	Agree ◯	Not sure ◯	Disagree ◯	Strongly Disagree ✓

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ◯	Agree ◯	Not sure ◯	Disagree ✓	Strongly Disagree ◯

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ◯	Agree ✓	Not sure ◯	Disagree ◯	Strongly Disagree ◯

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ◯	Agree ◯	Not sure ✓	Disagree ◯	Strongly Disagree ◯

I don't think there is anything I can do to improve the water quality in the river.

Strongly Agree ◯	Agree ✓	Not sure ◯	Disagree ◯	Strongly Disagree ◯

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ◯	Agree ◯	Not sure ✓	Disagree ◯	Strongly Disagree ◯

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ◯	Agree ✓	Not sure ◯	Disagree ◯	Strongly Disagree ◯

The river is an asset/benefit to my community.

Strongly Agree ◯	Agree ◯	Not sure ✓	Disagree ◯	Strongly Disagree ◯

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ◯	Agree ◯	Not sure ◯	Disagree ✓	Strongly Disagree ◯

I wish the river were cleaner.

Strongly Agree ◯	Agree ✓	Not sure ◯	Disagree ◯	Strongly Disagree ◯

I would support efforts to restore natural areas around the river.

Strongly Agree ◯	Agree ✓	Not sure ◯	Disagree ◯	Strongly Disagree ◯

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ◯	Agree ✓	Not sure ◯	Disagree ◯	Strongly Disagree ◯

I live in the Little Calumet River Watershed.

Strongly Agree ◯	Agree ◯	Not sure ◯	Disagree ◯	Strongly Disagree ✓

Regarding the river, my biggest concerns are:

I have no concerns about the River

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagre
I know where the Little Calumet River is located in my community (starts and stops).	●	○	○	○	○
I often or sometimes use the river or areas around the river for recreation.	○	○	●	○	○
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I assume the river is polluted and I shouldn't get near it.	○	○	○	●	○
I don't think there is anything I can do to improve the water quality in the river.	○	○	○	○	●
The river is as healthy as it can be since it is running through several cities.	○	○	○	●	○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.	○	○	●	○	○
The river is an asset/benefit to my community.	○	●	○	○	○
Flooding is what I think about most when I hear people talk about the river.	●	○	○	○	○
I wish the river were cleaner.	○	●	○	○	○
I would support efforts to restore natural areas around the river.	●	○	○	○	○
Improving water quality in the river is low on my priority list for things the government should work on.	○	○	○	●	○
I live in the Little Calumet River Watershed.	○	○	●	○	○

Regarding the river, my biggest concerns are:

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I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

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Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

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Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

I don't think there is anything I can do to improve the water quality in the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

The river is an asset/benefit to my community.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

I wish the river were cleaner.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

I would support efforts to restore natural areas around the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

I live in the Little Calumet River Watershed.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
The river is an asset/benefit to my community.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
I wish the river were cleaner.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
I would support efforts to restore natural areas around the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
Regarding the river, my biggest concerns are:				

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
The river is an asset/benefit to my community.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I wish the river were cleaner.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I would support efforts to restore natural areas around the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
Regarding the river, my biggest concerns are:				

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ●
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ●
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ●
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre ○
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ●
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre ○
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre ○
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre ○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre ○
The river is an asset/benefit to my community.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre ○
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre ○
I wish the river were cleaner.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ○
I would support efforts to restore natural areas around the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre ○
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre ○
I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre ●
Regarding the river, my biggest concerns are: I don't know much about the river				

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I don't think there is anything I can do to improve the water quality in the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

The river is an asset/benefit to my community.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I wish the river were cleaner.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I would support efforts to restore natural areas around the river.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I live in the Little Calumet River Watershed.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○
The river is an asset/benefit to my community.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○
I wish the river were cleaner.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
I would support efforts to restore natural areas around the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagre○
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagre○
I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○
Regarding the river, my biggest concerns are:				

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know where the Little Calumet River is located in my community (starts and stops).	○	✓	○	○	○
I often or sometimes use the river or areas around the river for recreation.	○	○	○	✓	○
I know where I can access the Little Calumet River for fishing or other recreation.	○	○	✓	○	○
Better access or signs would increase the likelihood I would use the river.	○	○	✓	○	○
I am uncertain if the river is safe for recreation or fishing.	○	○	✓	○	○
I assume the river is polluted and I shouldn't get near it.	○	○	✓	○	○
I don't think there is anything I can do to improve the water quality in the river.	○	○	✓	○	○
The river is as healthy as it can be since it is running through several cities.	○	○	○	✓	○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.	○	○	○	✓	○
The river is an asset/benefit to my community.	○	✓	○	○	○
Flooding is what I think about most when I hear people talk about the river.	○	○	○	✓	○
I wish the river were cleaner.	○	✓	○	○	○
I would support efforts to restore natural areas around the river.	○	✓	○	○	○
Improving water quality in the river is low on my priority list for things the government should work on.	○	○	○	✓	○
I live in the Little Calumet River Watershed.	○	○	○	○	✓

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagree ○

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ○ | Agree ○ | Not sure ● | Disagree ○ | Strongly Disagree ○

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ○ | Agree ○ | Not sure ● | Disagree ○ | Strongly Disagree ○

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ○ | Agree ○ | Not sure ● | Disagree ○ | Strongly Disagree ○

I don't think there is anything I can do to improve the water quality in the river.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ● | Strongly Disagree ○

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ○ | Agree ○ | Not sure ● | Disagree ○ | Strongly Disagree ○

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ○ | Agree ○ | Not sure ● | Disagree ○ | Strongly Disagree ○

The river is an asset/benefit to my community.

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagree ○

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagree ○

I wish the river were cleaner.

Strongly Agree ○ | Agree ○ | Not sure ● | Disagree ○ | Strongly Disagree ○

I would support efforts to restore natural areas around the river.

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagree ○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○ | Agree ○ | Not sure ● | Disagree ○ | Strongly Disagree ○

I live in the Little Calumet River Watershed.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ● | Strongly Disagree ○

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
The river is an asset/benefit to my community.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I wish the river were cleaner.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I would support efforts to restore natural areas around the river.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
Regarding the river, my biggest concerns are:				

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I don't think there is anything I can do to improve the water quality in the river.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

The river is an asset/benefit to my community.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I wish the river were cleaner.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I would support efforts to restore natural areas around the river.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I live in the Little Calumet River Watershed.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
I often or sometimes use the river or areas around the river for recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
The river is as healthy as it can be since it is running through several cities.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
The river is an asset/benefit to my community.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
I wish the river were cleaner.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I would support efforts to restore natural areas around the river.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

Regarding the river, my biggest concerns are:

Pollution

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ● | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ○

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ●

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagree ○

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ● | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ○

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagree ○

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Strongly Agree ○ | Agree ○ | Not sure ● | Disagree ○ | Strongly Disagree ○

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ○ | Agree ○ | Not sure ● | Disagree ○ | Strongly Disagree ○

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ○ | Agree ○ | Not sure ● | Disagree ○ | Strongly Disagree ○

The river is an asset/benefit to my community.

Strongly Agree ○ | Agree ○ | Not sure ● | Disagree ○ | Strongly Disagree ○

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ● | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagree ○

I wish the river were cleaner.

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagree ○

I would support efforts to restore natural areas around the river.

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagree ○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○ | Agree ○ | Not sure ● | Disagree ○ | Strongly Disagree ○

I live in the Little Calumet River Watershed.

Strongly Agree ○ | Agree ○ | Not sure ● | Disagree ○ | Strongly Disagree ○

Regarding the river, my biggest concerns are:

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Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
Regarding the river, my biggest concerns are:				

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I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

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Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

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Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

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Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

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Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

The river is an asset/benefit to my community.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

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Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

I wish the river were cleaner.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

I would support efforts to restore natural areas around the river.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I live in the Little Calumet River Watershed.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

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I would support efforts to restore natural areas around the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
Regarding the river, my biggest concerns are:				

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What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

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Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

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Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

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Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

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Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

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Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

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Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

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Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I wish the river were cleaner.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I would support efforts to restore natural areas around the river.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I live in the Little Calumet River Watershed.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

Regarding the river, my biggest concerns are:

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Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagre●

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Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○

I wish the river were cleaner.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○

I would support efforts to restore natural areas around the river.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○

Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○

I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagre○

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Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

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Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I live in the Little Calumet River Watershed.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know where the Little Calumet River is located in my community (starts and stops).	○	○	●	○	○
I often or sometimes use the river or areas around the river for recreation.	○	○	○	○	●
I know where I can access the Little Calumet River for fishing or other recreation.	○	○	●	○	○
Better access or signs would increase the likelihood I would use the river.	○	○	○	○	●
I am uncertain if the river is safe for recreation or fishing.	○	○	●	○	○
I assume the river is polluted and I shouldn't get near it.	○	○	●	○	○
I don't think there is anything I can do to improve the water quality in the river.	○	○	●	○	○
The river is as healthy as it can be since it is running through several cities.	○	○	●	○	○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.	○	○	●	○	○
The river is an asset/benefit to my community.	○	○	●	○	○
Flooding is what I think about most when I hear people talk about the river.	○	●	○	○	○
I wish the river were cleaner.	○	○	●	○	○
I would support efforts to restore natural areas around the river.	○	○	●	○	○
Improving water quality in the river is low on my priority list for things the government should work on.	○	○	○	●	○
I live in the Little Calumet River Watershed.	○	○	●	○	○

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Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I know where I can access the Little Calumet River for fishing or other recreation.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
Better access or signs would increase the likelihood I would use the river.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I am uncertain if the river is safe for recreation or fishing.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
I assume the river is polluted and I shouldn't get near it.				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
I don't think there is anything I can do to improve the water quality in the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○
The river is as healthy as it can be since it is running through several cities.				
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Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
The river is an asset/benefit to my community.				
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Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○
I wish the river were cleaner.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I would support efforts to restore natural areas around the river.				
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Improving water quality in the river is low on my priority list for things the government should work on.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●
I live in the Little Calumet River Watershed.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
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Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know where the Little Calumet River is located in my community (starts and stops).				●	
I often or sometimes use the river or areas around the river for recreation.				●	
I know where I can access the Little Calumet River for fishing or other recreation.				●	
Better access or signs would increase the likelihood I would use the river.		●			
I am uncertain if the river is safe for recreation or fishing.		●			
I assume the river is polluted and I shouldn't get near it.			●		
I don't think there is anything I can do to improve the water quality in the river.				●	
The river is as healthy as it can be since it is running through several cities.			●		
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.			●		
The river is an asset/benefit to my community.			●		
Flooding is what I think about most when I hear people talk about the river.		●			
I wish the river were cleaner.		●			
I would support efforts to restore natural areas around the river.		●			
Improving water quality in the river is low on my priority list for things the government should work on.				●	
I live in the Little Calumet River Watershed.					●

Regarding the river, my biggest concerns are:

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What do you know about the Little Calumet River? What does the river mean to you?

I know where the Little Calumet River is located in my community (starts and stops).

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I know where I can access the Little Calumet River for fishing or other recreation.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I don't think there is anything I can do to improve the woter quality in the river.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

The river is an asset/benefit to my community.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

I wish the river were cleaner.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I would support efforts to restore natural areas around the river.

Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○

I live in the Little Calumet River Watershed.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

Regarding the river, my biggest concerns are:

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What do you know about the Little Calumet River? What does the river mean to you?

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I know where the Little Calumet River is located in my community (starts and stops).	○	○	○	●	○
I often or sometimes use the river or areas around the river for recreation.	○	○	○	●	○
I know where I can access the Little Calumet River for fishing or other recreation.	○	○	●	○	○
Better access or signs would increase the likelihood I would use the river.	○	●	○	○	○
I am uncertain if the river is safe for recreation or fishing.	○	●	○	○	○
I assume the river is polluted and I shouldn't get near it.	○	○	●	○	○
I don't think there is anything I can do to improve the water quality in the river.	○	○	●	○	○
The river is as healthy as it can be since it is running through several cities.	○	○	●	○	○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.	○	○	●	○	○
The river is an asset/benefit to my community.	○	○	●	○	○
Flooding is what I think about most when I hear people talk about the river.	○	●	○	○	○
I wish the river were cleaner.	○	○	●	○	○
I would support efforts to restore natural areas around the river.	○	●	○	○	○
Improving water quality in the river is low on my priority list for things the government should work on.	○	○	○	●	○
I live in the Little Calumet River Watershed.	○	○	○	●	○

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know where the Little Calumet River is located in my community (starts and stops).	○	●	○	○	○
I often or sometimes use the river or areas around the river for recreation.	○	○	○	○	●
I know where I can access the Little Calumet River for fishing or other recreation.	○	○	○	○	●
Better access or signs would increase the likelihood I would use the river.	○	○	●	○	○
I am uncertain if the river is safe for recreation or fishing.	●	○	○	○	○
I assume the river is polluted and I shouldn't get near it.	○	●	○	○	○
I don't think there is anything I can do to improve the water quality in the river.	○	○	○	○	●
The river is as healthy as it can be since it is running through several cities.	○	○	○	○	●
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.	○	○	●	○	○
The river is an asset/benefit to my community.	○	●	○	○	○
Flooding is what I think about most when I hear people talk about the river.	○	○	○	●	○
I wish the river were cleaner.	●	○	○	○	○
I would support efforts to restore natural areas around the river.	●	○	○	○	○
Improving water quality in the river is low on my priority list for things the government should work on.	○	●	○	○	○
I live in the Little Calumet River Watershed.	○	○	○	○	●

Regarding the river, my biggest concerns are:

Pollution

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagre
I know where the Little Calumet River is located in my community (starts and stops).	○	○	●	○	○
I often or sometimes use the river or areas around the river for recreation.	○	●	○	○	○
I know where I can access the Little Calumet River for fishing or other recreation.	○	○	●	○	○
Better access or signs would increase the likelihood I would use the river.	○	●	○	○	○
I am uncertain if the river is safe for recreation or fishing.	○	●	○	○	○
I assume the river is polluted and I shouldn't get near it.	○	○	●	○	○
I don't think there is anything I can do to improve the water quality in the river.	○	○	●	○	○
The river is as healthy as it can be since it is running through several cities.	○	○	●	○	○
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.	○	○	●	○	○
The river is an asset/benefit to my community.	○	●	○	○	○
Flooding is what I think about most when I hear people talk about the river.	○	●	○	○	○
I wish the river were cleaner.	○	○	●	○	○
I would support efforts to restore natural areas around the river.	○	●	○	○	○
Improving water quality in the river is low on my priority list for things the government should work on.	○	○	●	○	○
I live in the Little Calumet River Watershed.	○	○	●	○	○

Regarding the river, my biggest concerns are:

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Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○
I wish the river were cleaner.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I would support efforts to restore natural areas around the river.				
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I live in the Little Calumet River Watershed.				
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Strongly Agree ○	Agree ○	Not sure ●	Disagree ○	Strongly Disagree ○
The river is an asset/benefit to my community.				
Strongly Agree ○	Agree ●	Not sure ○	Disagree ○	Strongly Disagree ○
Flooding is what I think about most when I hear people talk about the river.				
Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○
I wish the river were cleaner.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
I would support efforts to restore natural areas around the river.				
Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○
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Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○
I live in the Little Calumet River Watershed. ?				
Strongly Agree ○	Agree ○	Not sure ●	Disagree ~~●~~	Strongly Disagree ○

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Strongly Agree ● | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagre○

I often or sometimes use the river or areas around the river for recreation.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ● | Strongly Disagre○

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Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ● | Strongly Disagre○

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ○ | Agree ○ | Not sure ○ | Disagree ● | Strongly Disagre○

The river is an asset/benefit to my community.

Strongly Agree ○ | Agree ● | Not sure ○ | Disagree ○ | Strongly Disagre○

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I wish the river were cleaner.

Strongly Agree ● | Agree ○ | Not sure ○ | Disagree ○ | Strongly Disagre○

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Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

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Strongly Agree ○	Agree ○	Not sure ○	Disagree ●	Strongly Disagree ○

Better access or signs would increase the likelihood I would use the river.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

I am uncertain if the river is safe for recreation or fishing.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

I assume the river is polluted and I shouldn't get near it.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

I don't think there is anything I can do to improve the water quality in the river.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

The river is as healthy as it can be since it is running through several cities.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

The river is an asset/benefit to my community.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

Flooding is what I think about most when I hear people talk about the river.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

I wish the river were cleaner.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

I would support efforts to restore natural areas around the river.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

Improving water quality in the river is low on my priority list for things the government should work on.

Strongly Agree ●	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ○

I live in the Little Calumet River Watershed.

Strongly Agree ○	Agree ○	Not sure ○	Disagree ○	Strongly Disagree ●

Regarding the river, my biggest concerns are:

LITTLE CALUMET RIVER PERCEPTION AND VALUE COMMUNITY SURVEY

What do you know about the Little Calumet River? What does the river mean to you?

Statement	Strongly Agree	Agree	Not sure	Disagree	Strongly Disagree
I know where the Little Calumet River is located in my community (starts and stops).	○	○	○	●	○
I often or sometimes use the river or areas around the river for recreation.	○	○	○	○	●
I know where I can access the Little Calumet River for fishing or other recreation.	○	○	●	○	○
Better access or signs would increase the likelihood I would use the river.	○	○	○	○	●
I am uncertain if the river is safe for recreation or fishing.	●	○	○	○	○
I assume the river is polluted and I shouldn't get near it.	●	○	○	○	○
I don't think there is anything I can do to improve the water quality in the river.	○	○	●	○	○
The river is as healthy as it can be since it is running through several cities.	○	○	○	○	●
I know that there is a pedestrian/bicycle trail along the top of the Little Calumet River Levee.	○	○	○	●	○
The river is an asset/benefit to my community.	○	○	○	●	○
Flooding is what I think about most when I hear people talk about the river.	○	●	○	○	○
I wish the river were cleaner.	○	●	○	○	○
I would support efforts to restore natural areas around the river.	○	●	○	○	○
Improving water quality in the river is low on my priority list for things the government should work on.	○	●	○	○	○
I live in the Little Calumet River Watershed.	○	○	○	●	○

Regarding the river, my biggest concerns are:

Appendix 6

IDEM Fixed Station Data

RW ARMSTRONG™
Inspiration to reality.

At the beginning of the Little Calumet River Watershed Management Plan study information was requested from various governmental agencies, including the Indiana Department of Environmental Management (IDEM). The requested information included water quality data that was available for the three 14-digit HUC watersheds involved in this study.

The information received from IDEM included fish community assessments and fixed station data that was recorded at the Portage Boat Yard (Lat. 41° 36' 9" Long. -87° 11' 35"). The fixed station data from the Portage Boat Yard is not sampled within the study area being looked at for this report but all of the water that goes through this study drains directly to this point. The information was used to help find overall water quality for the Little Calumet River and its tributaries and not for any BMP assessments.

The following information contains the request letter response from IDEM and the fish community assessment results received. Tables 1-6 show the fixed station data results for *E.coli*, Ammonia, Nitrogen (Nitrates + Nitrites), Total Phosphorus, TKN, and Total Suspended Solids. The figures displayed in the report are shown in Figures 1-6.

There were an additional three sample locations added along the Little Calumet River and Portage-Burns Waterway in the summer of 2000. These locations had *E.coli* samples ran and the results are shown in Figure 7 and the data in Table 7. These additional sample locations were located at approximately the Cline Ave., Broadway Street, and Ripley Street Bridges along the Little Calumet River and Burns Ditch. The conferred with the sampling data compiled for this study and observed from previous studies that the Cline Avenue location was the greatest concern. This information was not included in the report however because the three locations were all sampled only five times in the months of July and August 2000 and they presented no new information to the study.

Request for Information

Indiana Department of Environmental Management
Office of Water Quality-Assessment Branch-Biological Studies Section

REQUESTOR INFORMATION

Jason C. Hignite
Senior Environmental Planner
RW Armstrong
Union Station
300 South Meridian Street
Indianapolis, Indiana 46225-1193
(317) 780-7139
fax (317) 788-0957
www.rwa.com

REQUEST

Area(s) of Interest	Little Calumet River, 07120003030050, 04040001040020, 04040001040030
Information Requested (circle): **Fish Community** **Fish Tissue** **Macroinvertebrate** **Lake**	
Format Requested (there is a charge for all photocopied and electronic materials): **Electronic if possible** **Paper** **Report** **Disk/CD** **Fax** **Office Visit** **Other**	

OFFICE USE ONLY

Request Taken By (inc. phone): Stacey Sobat, 317-308-3191	Date:10/30/06
Request Filled By (inc. phone): Stacey Sobat, 317-308-3191	Date:11/1/06

How was request filled (including where info retrieved from and time spent)?
AIMS queried by HUCs listed above from 1996-2006. Two samples found 00054, 05014. Sent files in Word. Also referenced the Central Corn Belt Plain document which he may check for additional information. Time spent = 30 minutes

Total Cost __NA____ Receipt No.______

Indiana Department of Environmental Management
Office of Water Quality/ Assessment Branch/ Biological Studies Section
Fish Community Assessments

Site Information

SubBasin: Little Calumet-Galien **14 digit HUC:** 04040001040030 **LSite:** LMG040-0001
Site: Little Calumet River **Location:** SR 51 **County:** Lake
Latitude: 41 35 16.339 **Longitude:** -87 14 14.755 **IASNatRegion:** 2B **Topo:** A-32 **Segment:** 2
Ecoregion: Central Corn Belt Plains **DrainageArea (sq.miles):** 167 **Gradient (ft/mile):** 1.33

Sample

SampleNumber: AA01804 **EventID:** 00054 **SampleMediumCollected:** Water + FishComm + FishTiss
SampleDate: 8/29/2000 **SurveyCrewChief:** JWB **SampleTime:** 8:40:00 AM **HydroLabNumber:** 8
WaterFlowType: Pool **WaterAppearance:** Murky **SkyConditions:** Partly **AirTemperature:** 76-85
WindDirection: West (270 degrees) **WindStrength:** Light
DissolvedO2 (mg/l): 2.69 **pH:** 7.59 **WaterTemp (°C):** 24.2 **SpecificConductivity (µS/cm):** 868 **Turbidity (NTU):** 40
SpecialNotes:

ElectrofishingEquipment: Scanoe **Voltage:** 300 **Avg.StreamWidth (m):** 13.4 **DistanceFished (m):** 270
SecondsFished: 2231 **WaterDepthAvg (m):** 0.8 **WaterDepthMax (m):** 1.2 **TimeAtSite:** 4:15
BridgeInReach: **ReachRepresentative:** **WhyReachNotRepresentative:**
SpecialComments: AA01804

Habitat

TotalScore (max100): 45 **SubstrateScore (max20):** 12 **InstreamCoverScore (max20):** 12
ChannelMorphologyScore (max20): 4
RiparianZone&BankErosionScore (max10): 5 **Pool/GlideQualityScore (max12):** 8
Riffle/RunScoreQuality (max8): 0
GradientScore(max10): 4 **%Pool** 0 **%Riffle:** 0 **%Run:** 0 **%Glide:** 100
CanopyCoverPctOpen: 87
SubjectiveRating: 4 **AestheticRating:** 2 **NOTES:**

Fish Community Index of Biotic Integrity (IBI) Information

	Actual Observation	Metric Score		Actual Observation	Metric Score
SpeciesCount:	14	3	**SensitiveSpeciesCount:**		1
Darter/Madtom/SculpinSpeciesCount:	0	0	**%TolerantIndividuals:**	40.4	3
DarterSpeciesCount:		1	**%OmnivoreIndividuals:**	19.9	3
%LargeRiverIndividuals:		0	**%InsectivoreIndividuals:**	63.0	5
%HeadwaterIndividuals:		0	**%PioneerIndividuals:**	27.4	0
SunfishSpeciesCount:	6	5	**%CarnivoreIndividuals:**	15.1	3
CentrarchidaeSpeciesCount:	7	0	**Total #of Individuals(CPUE):**	146	1
MinnowSpeciesCount:	3	0	**CPUElessGizzardShads:**	0	0
SuckerSpeciesCount:		0	**%SimpleLithophilicInd.:**		1
RoundBodySuckerSpeciesCount:		0	**%Ind.withDeformities, ErodedFins,Lesions,&Tumors:**	0.0	5
SalmonidaeSpeciesCount:		1			

TotalIBIScore (min 6=nofish): **32** max=60

Metrics are dependent on Ecoregion and Drainage Area.
Metrics can score a 1, 3, or 5 depending on calibration.

Indiana Department of Environmental Management
Office of Water Quality/ Assessment Branch/ Biological Studies Section
Fish Community Assessments

SampleNumber: AA0180 **EventID:** 00054 **LSite:** LMG040-0001 **County:** Lake
StreamName: Little Calumet River **LocationDescription:** SR 51

Common Name	Individual Fish Count	Deformities	Eroded Fins	Lesions	Tumors	Multiple Anomalies
black crappie	3	0	0	0	0	0
bluegill	13	0	0	0	0	0
bluntnose minnow	10	0	0	0	0	0
brown bullhead	4	0	0	0	0	0
carp	9	0	0	0	0	0
central mudminnow	2	0	0	0	0	0
gizzard shad	5	0	0	0	0	0
goldfish	3	0	0	0	0	0
green sunfish	30	0	0	0	0	0
hybrid sunfish	4	0	0	0	0	0
largemouth bass	18	0	0	0	0	0
orangespotted sunfish	7	0	0	0	0	0
pumpkinseed	27	0	0	0	0	0
round goby	7	0	0	0	0	0
warmouth	4	0	0	0	0	0

Indiana Department of Environmental Management
Office of Water Quality/ Assessment Branch/ Biological Studies Section
Fish Community Assessments

Site Information

SubBasin: Little Calumet-Galien **14 digit HUC:** 04040001040030 **LSite:** LMG040-0008
Site: Willow Cr **Location:** Sunset St **County:** Porter
Latitude: 41 34 4.1627 **Longitude:** -87 11 26.408 **IASNatRegion:** 2B **Topo:** A-32 **Segment:** 3
Ecoregion: Central Corn Belt Plains **DrainageArea (sq.miles):** 8.82 **Gradient (ft/mile):** 3.98

Sample

SampleNumber: AA27029 **EventID:** 05014 **SampleMediumCollected:** FishComm
SampleDate: 6/14/2005 **SurveyCrewChief:** CCM **SampleTime:** 12:22:00 PM **HydroLabNumber:** bss 1
WaterFlowType: Pool **WaterAppearance:** Brown **SkyConditions:** Partly **AirTemperature:** > 86
WindDirection: West (270 degrees) **WindStrength:** Light
DissolvedO2 (mg/l): 4.86 **pH:** 7.58 **WaterTemp (°C):** 21.2 **SpecificConductivity (µS/cm):** 674 **Turbidity (NTU):** 101
SpecialNotes:

ElectrofishingEquipment: Backpack **Voltage:** 300 **Avg.StreamWidth (m):** 5 **DistanceFished (m):** 75
SecondsFished: 664 **WaterDepthAvg (m):** 0.3 **WaterDepthMax (m):** 0.5 **TimeAtSite:**
BridgeInReach: **ReachRepresentative:** **WhyReachNotRepresentative:**
SpecialComments:

Habitat

TotalScore (max100): 37 **SubstrateScore (max20):** 9 **InstreamCoverScore (max20):** 6
ChannelMorphologyScore (max20): 6
RiparianZone&BankErosionScore (max10): 5 **Pool/GlideQualityScore (max12):** 5
Riffle/RunScoreQuality (max8): 0
GradientScore(max10): 6 **%Pool** 10 **%Riffle:** 10 **%Run:** 80 **%Glide:** 0
CanopyCoverPctOpen: 5
SubjectiveRating: 4 **AestheticRating:** 4 **NOTES:**

Fish Community Index of Biotic Integrity (IBI) Information

	Actual Observation	Metric Score		Actual Observation	Metric Score
SpeciesCount:	6	3	**SensitiveSpeciesCount:**	0	1
Darter/Madtom/SculpinSpeciesCount:	0	1	**%TolerantIndividuals:**	85.2	1
DarterSpeciesCount:	0	0	**%OmnivoreIndividuals:**	29.6	3
%LargeRiverIndividuals:	0.0	0	**%InsectivoreIndividuals:**	18.5	1
%HeadwaterIndividuals:	0.0	0	**%PioneerIndividuals:**	74.1	1
SunfishSpeciesCount:	2	3	**%CarnivoreIndividuals:**	0.0	0
CentrarchidaeSpeciesCount:	2	0	**Total #of Individuals(CPUE):**	27	1
MinnowSpeciesCount:	3	5	**CPUElessGizzardShads:**	27	0
SuckerSpeciesCount:	1	0	**%SimpleLithophilicInd.:**	14.8	1
RoundBodySuckerSpeciesCount:	0	0	**%Ind.withDeformities, ErodedFins,Lesions,&Tumors:**	0.0	5
SalmonidaeSpeciesCount:	0	0			

TotalIBIScore (min 6=nofish): **26** max=60

Metrics are dependent on Ecoregion and Drainage Area.
Metrics can score a 1, 3, or 5 depending on calibration.

Indiana Department of Environmental Management
Office of Water Quality/ Assessment Branch/ Biological Studies Section
Fish Community Assessments

SampleNumber: AA2702 **EventID:** 05014 **LSite:** LMG040-0008 **County:** Porter
StreamName: Willow Cr **LocationDescription:** Sunset St

Common Name	Individual Fish Count	Deformities	Eroded Fins	Lesions	Tumors	Multiple Anomalies
bluegill	3	0	0	0	0	0
bluntnose minnow	4	0	0	0	0	0
central stoneroller	1	0	0	0	0	0
creek chub	13	0	0	0	0	0
green sunfish	2	0	0	0	0	0
white sucker	4	0	0	0	0	0

Sample Date	E.coli (CFU/100mL)	Sample Date	E.coli (CFU/100mL)	Sample Date	E.coli (CFU/100mL)
1/24/1990	230	9/8/1993	530	5/28/1997	250
2/28/1990	3,700	9/29/1993	760	6/18/1997	550
3/28/1990	2,100	10/27/1993	270	7/23/1997	750
5/16/1990	350	11/16/1993	320	8/20/1997	340
6/5/1990	1,600	3/2/1994	570	9/24/1997	4,000
7/17/1990	670	3/15/1994	110	10/21/1997	60
8/8/1990	4,700	4/26/1994	50	11/18/1997	1,900
9/19/1990	90	6/1/1994	60	12/9/1997	40
10/2/1990	40	8/31/1994	10	2/4/1998	110
11/28/1990	3,700	10/4/1994	30	4/1/1998	4,000
12/19/1990	430	11/14/1994	240	4/28/1998	40
1/16/1991	11,000	1/18/1995	960	6/3/1998	4,000
2/12/1991	80	3/7/1995	970	6/30/1998	1,100
3/5/1991	1,000	4/25/1995	60	9/1/1998	4,000
4/17/1991	400	5/24/1995	490	9/29/1998	240
5/21/1991	800	6/26/1995	180	10/27/1998	20
6/25/1991	6,500	7/26/1995	340	11/17/1998	130
7/24/1991	610	9/7/1995	100	12/15/1998	210
8/15/1991	2,500	9/26/1995	20	1/26/1999	2,800
9/24/1991	180	10/25/1995	160	2/23/1999	230
10/22/1991	250	11/15/1995	2,200	3/24/1999	120
11/20/1991	4,300	12/21/1995	530	5/26/1999	200
12/18/1991	2,000	1/24/1996	380	8/18/1999	120
2/25/1992	2,200	2/28/1996	1,500	9/29/1999	5
3/26/1992	590	3/26/1996	10	10/19/1999	1,200
4/22/1992	360	4/24/1996	200	7/31/2000	480
6/24/1992	440	5/22/1996	750	8/8/2000	5,200
7/27/1992	140	6/19/1996	1,900	8/15/2000	240
8/24/1992	10	8/21/1996	100	8/22/2000	210
9/22/1992	90	9/18/1996	210	8/29/2000	50
10/20/1992	120	10/23/1996	440	9/20/2000	440
11/16/1992	340	11/13/1996	2,800	11/21/2000	250
12/15/1992	40	12/11/1996	140	2/13/2001	1,100
1/13/1993	390	2/5/1997	590	4/10/2001	38
3/16/1993	560	2/26/1997	3	8/14/2001	96
5/10/1993	30	4/2/1997	1	10/11/2001	610
8/2/1993	70	4/30/1997	10	7/7/2004	340

* Green cells denote data used in figure for report purposes.

Table 1: IDEM *E.coli* fixed station data collected at the Portage Boat Yard

Sample Date	Ammonia (mg/L)	Sample Date	Ammonia (mg/L)	Sample Date	Ammonia (mg/L)	Sample Date	Ammonia (mg/L)
1/24/1990	0.3	8/31/1994	0.1	11/17/1998	0.2	10/9/2002	0.1
2/28/1990	0.3	10/4/1994	0.1	12/15/1998	0.2	11/13/2002	0.1
3/28/1990	0.3	11/14/1994	0.3	1/26/1999	0.2	12/12/2002	0.2
4/25/1990	0.2	1/18/1995	0.1	2/23/1999	0.1	1/8/2003	0.1
5/16/1990	0.3	3/7/1995	0.2	3/24/1999	0.1	2/6/2003	0.6
6/5/1990	0.1	4/25/1995	0.2	4/28/1999	0.2	3/11/2003	0.4
7/17/1990	0.2	5/24/1995	0.2	5/26/1999	0.36	4/9/2003	0.2
8/8/1990	0.2	6/26/1995	0.2	6/29/1999	0.6	5/8/2003	0.2
9/19/1990	0.4	7/26/1995	0.2	7/28/1999	0.2	6/5/2003	0.1
10/2/1990	0.1	9/7/1995	0.2	8/18/1999	0.2	7/1/2003	0.2
11/28/1990	0.1	9/26/1995	0.1	9/29/1999	0.3	8/4/2003	0.1
12/19/1990	0.1	10/25/1995	0.1	10/19/1999	0.3	9/4/2003	0.2
1/16/1991	0.4	11/15/1995	0.1	11/30/1999	0.1	10/7/2003	0.1
2/12/1991	0.1	12/21/1995	0.2	12/28/1999	0.3	11/17/2003	0.1
3/5/1991	0.2	1/24/1996	0.4	8/15/2000	0.1	12/3/2003	0.2
4/17/1991	0.1	2/28/1996	0.3	1/25/2000	0.1	1/5/2004	0.2
5/21/1991	0.3	3/26/1996	0.1	2/14/2000	0.2	2/23/2004	0.8
6/25/1991	0.1	4/24/1996	0.1	3/20/2000	0.3	3/15/2004	0.2
7/24/1991	0.2	5/22/1996	0.3	4/24/2000	0.2	4/12/2004	0.1
8/15/1991	0.3	6/19/1996	0.2	5/24/2000	0.3	5/17/2004	0.3
9/24/1991	0.1	7/17/1996	0.2	6/21/2000	0.2	6/2/2004	0.1
10/22/1991	0.1	8/21/1996	0.2	7/17/2000	0.2	7/7/2004	0.1
11/20/1991	0.2	9/18/1996	0.1	8/22/2000	0.1	8/10/2004	0.1
12/18/1991	0.1	10/23/1996	0.1	9/20/2000	0.1	9/1/2004	0.1
2/25/1992	0.1	11/13/1996	0.4	10/23/2000	0.1	10/5/2004	0.1
3/26/1992	0.1	12/11/1996	0.3	11/21/2000	0.1	11/3/2004	0.1
4/22/1992	0.2	2/5/1997	0.3	12/13/2000	0.1	12/15/2004	0.1
5/19/1992	0.1	2/26/1997	0.1	1/9/2001	0.3	1/3/2005	0.2
6/24/1992	0.2	4/2/1997	0.1	2/13/2001	0.2	2/2/2005	0.2
7/27/1992	0.3	4/30/1997	0.2	3/12/2001	0.1	3/28/2005	0.1
8/24/1992	0.4	5/28/1997	0.3	4/10/2001	0.1	4/11/2005	0.1
9/22/1992	0.1	6/18/1997	0.1	5/9/2001	0.1	5/9/2005	0.1
10/20/1992	0.1	7/23/1997	0.3	6/6/2001	0.2	6/13/2005	0.2
11/16/1992	0.1	8/20/1997	0.1	7/9/2001	0.1	7/12/2005	0.1
12/15/1992	0.2	9/24/1997	0.2	8/14/2001	0.1	8/3/2005	0.1
1/13/1993	0.1	10/21/1997	0.1	9/19/2001	0.1	9/12/2005	0.1
3/16/1993	0.2	11/18/1997	0.1	10/11/2001	0.1	10/11/2005	0.1
4/26/1993	0.2	12/9/1997	0.2	11/7/2001	0.1	11/15/2005	0.1
5/10/1993	0.2	2/4/1998	0.3	12/4/2001	0.1	12/19/2005	0.3
8/2/1993	0.3	3/4/1998	0.2	1/28/2002	0.1	1/30/2006	0.1
9/8/1993	0.2	4/1/1998	0.3	2/19/2002	0.1	2/22/2006	0.1
9/29/1993	0.2	4/28/1998	0.1	3/13/2002	0.1002	3/13/2006	0.1
10/27/1993	0.1	6/3/1998	0.3	4/16/2002	0.1	4/5/2006	0.1
11/16/1993	0.4	6/30/1998	0.3	5/15/2002	0.1	5/15/2006	0.2
3/2/1994	0.6	7/28/1998	0.2	6/10/2002	0.1	6/26/2006	0.1
3/15/1994	0.2	9/1/1998	0.4	7/17/2002	0.1	7/25/2006	0.1
4/26/1994	0.3	9/29/1998	0.1	8/8/2002	0.1	8/28/2006	0.1
6/1/1994	0.4	10/27/1998	0.2	9/12/2002	0.1	9/13/2006	0.1
8/2/1994	0.1						

* Green cells denote data used in figure for report purposes.

Table 2: IDEM Ammonia fixed station data from the Portage Boat Yard.

Sample Date	Nitrogen (mg/L)	Sample Date	Nitrogen (mg/L)	Sample Date	Nitrogen (mg/L)	Sample Date	Nitrogen (mg/L)
1/24/1990	3.7	8/31/1994	5.1	12/15/1998	2.3	12/12/2002	2.8
2/28/1990	4.7	10/4/1994	3.1	1/26/1999	2.7	1/8/2003	4
3/28/1990	2.3	11/14/1994	2.1	2/23/1999	2.5	2/6/2003	2.9
4/25/1990	2.2	1/18/1995	3.6	3/24/1999	2.6	3/11/2003	2.8
5/16/1990	3.1	3/7/1995	2.1	4/28/1999	2	4/9/2003	4.5
6/5/1990	2.1	4/25/1995	1.2	5/26/1999	1.6	5/8/2003	3
7/17/1990	1.4	5/24/1995	1.5	6/29/1999	0.81	6/5/2003	2.1
8/8/1990	0.8	6/26/1995	1.3	7/28/1999	1.9	7/1/2003	2.5
9/19/1990	1.1	7/26/1995	1.2	8/18/1999	3.9	8/4/2003	1.3
10/2/1990	2	9/7/1995	2.7	9/29/1999	1.9	9/4/2003	1.4
11/28/1990	1	9/26/1995	2.9	10/19/1999	1.4	10/7/2003	1.1
12/19/1990	1.6	10/25/1995	1.3	11/30/1999	1.6	11/17/2003	2.2
1/16/1991	2.1	11/15/1995	3.4	12/28/1999	5	12/3/2003	2.7
2/12/1991	2	12/21/1995	2.7	8/15/2000	1.2	1/5/2004	3.5
3/5/1991	2.1	1/24/1996	3.6	1/25/2000	4.3	2/23/2004	3
4/17/1991	1.6	2/28/1996	2.5	2/14/2000	3.9	3/15/2004	3.1
5/21/1991	1.9	3/26/1996	2.8	3/20/2000	2.1	4/12/2004	2
6/25/1991	0.3	4/24/1996	4.2	4/24/2000	3.7	5/17/2004	2.2
7/24/1991	0.7	5/22/1996	2.9	5/24/2000	1.6	6/2/2004	2.4
8/15/1991	1.9	6/19/1996	1.6	6/21/2000	4.2	7/7/2004	1.2
9/24/1991	2.8	7/17/1996	2.6	7/17/2000	1.4	8/10/2004	1.2
10/22/1991	3	8/21/1996	1.6	8/22/2000	1.7	9/1/2004	1.2
11/20/1991	3	9/18/1996	2.2	9/20/2000	3.3	10/5/2004	1.5
12/18/1991	3.6	10/23/1996	1.2	10/23/2000	2.3	11/3/2004	1.4
2/25/1992	3	11/13/1996	2.5	11/21/2000	2.2	12/15/2004	2.2
3/26/1992	2.8	12/11/1996	2.6	12/13/2000	2.8	1/3/2005	2.8
4/22/1992	2.3	2/5/1997	2.1	1/9/2001	3.7	2/2/2005	3
5/19/1992	0.5	2/26/1997	2.2	2/13/2001	3.9	3/28/2005	1.8
6/24/1992	2.2	4/2/1997	1.7	3/12/2001	4.2	4/11/2005	1.4
7/27/1992	1.4	4/30/1997	1.2	4/10/2001	1.4	5/9/2005	2.6
8/24/1992	1.3	5/28/1997	2.9	5/9/2001	2.5	6/13/2005	2.4
9/22/1992	1.4	6/18/1997	2.1	6/6/2001	3.3	7/12/2005	4.6
10/20/1992	1	7/23/1997	1.1	7/9/2001	1	8/3/2005	1.4
11/16/1992	3.2	8/20/1997	1.2	8/14/2001	2.2	9/12/2005	2.8
12/15/1992	2.7	9/24/1997	1.8	9/19/2001	2	10/11/2005	2.1
1/13/1993	2.2	10/21/1997	1.7	10/11/2001	1.5	11/15/2005	2.3
3/16/1993	2.9	11/18/1997	1.4	11/7/2001	2.8	12/19/2005	4.3
4/26/1993	1.7	12/9/1997	2.1	12/4/2001	2.3	1/30/2006	3.3
5/10/1993	1.5	2/4/1998	2.5	1/28/2002	2.5005	2/22/2006	3.4
8/2/1993	1.3	3/4/1998	2.1	2/19/2002	3.5938	3/13/2006	2.7
9/8/1993	1.3	4/1/1998	1.3	3/13/2002	2.9709	4/5/2006	2.7
9/29/1993	1.4	4/28/1998	1.6	4/16/2002	2.2104	5/15/2006	3
10/27/1993	1.1	6/3/1998	2	5/15/2002	1.6	6/26/2006	1.6
11/16/1993	2.1	6/30/1998	0.6	6/10/2002	1.9	7/25/2006	1.5
3/2/1994	1.5	7/28/1998	2.8	7/17/2002	1.7	8/28/2006	1.4
3/15/1994	2.2	9/1/1998	1.8	8/8/2002	3.8	9/13/2006	1.5
4/26/1994	0.8	9/29/1998	3	9/12/2002	3.2		
6/1/1994	0.8	10/27/1998	2.2	10/9/2002	2		
8/2/1994	1.6	11/17/1998	2	11/13/2002	1.5		

*Green cells denote data used in figure for report purposes.

Table 3: IDEM Nitrogen (nitrates + nitrites) fixed station data.

Sample Date	Total Phosphorus (mg/L)	Sample Date	Total Phosphorus (mg/L)	Sample Date	Total Phosphorus (mg/L)	Sample Date	Total Phosphorus (mg/L)
1/24/1990	0.1	8/2/1994	0.13	10/27/1998	0.23	10/9/2002	0.14
2/28/1990	0.12	8/31/1994	0.27	11/17/1998	0.14	11/13/2002	0.11
3/28/1990	0.12	10/4/1994	0.27	12/15/1998	0.15	12/12/2002	0.19
4/25/1990	0.15	11/14/1994	0.15	1/26/1999	0.22	1/8/2003	0.08
5/16/1990	0.17	1/18/1995	0.18	2/23/1999	0.09	2/6/2003	0.1
6/5/1990	0.21	3/7/1995	0.15	3/24/1999	0.09	3/11/2003	0.06
7/17/1990	0.16	4/25/1995	0.05	4/28/1999	0.18	4/9/2003	0.13
8/8/1990	0.18	5/24/1995	0.16	5/26/1999	0.23	5/8/2003	0.23
9/19/1990	0.18	6/26/1995	0.17	6/29/1999	0.23	6/5/2003	0.13
10/2/1990	0.2	7/26/1995	0.18	7/28/1999	0.38	7/1/2003	0.19
11/28/1990	0.45	9/7/1995	0.19	8/18/1999	0.23	8/4/2003	0.25
12/19/1990	0.1	9/26/1995	0.21	9/29/1999	0.26	9/4/2003	0.17
1/16/1991	0.18	10/25/1995	0.2	10/19/1999	0.22	10/7/2003	0.11
2/12/1991	0.05	11/15/1995	0.23	11/30/1999	0.17	11/17/2003	0.12
3/5/1991	0.2	12/21/1995	0.13	8/15/2000	0.24	12/3/2003	0.12
4/17/1991	0.28	1/24/1996	0.15	1/25/2000	0.13	1/5/2004	0.1
5/21/1991	0.14	2/28/1996	0.16	2/14/2000	0.14	2/23/2004	0.16
6/25/1991	0.14	3/26/1996	0.12	3/20/2000	0.18	3/15/2004	0.11
7/24/1991	0.22	4/24/1996	0.21	4/24/2000	0.23	4/12/2004	0.12
8/15/1991	0.32	5/22/1996	0.14	5/24/2000	0.24	5/17/2004	0.16
9/24/1991	0.2	6/19/1996	0.34	6/21/2000	0.19	6/2/2004	0.18
10/22/1991	0.24	7/17/1996	0.21	7/17/2000	0.19	7/7/2004	0.16
11/20/1991	0.26	8/21/1996	0.18	8/22/2000	0.24	8/10/2004	0.17
12/18/1991	0.11	9/18/1996	0.17	9/20/2000	0.17	9/1/2004	0.2
2/25/1992	0.09	10/23/1996	0.14	10/23/2000	0.21	10/5/2004	0.15
3/26/1992	0.08	11/13/1996	0.16	11/21/2000	0.1	11/3/2004	0.19
4/22/1992	0.1	12/11/1996	0.09	12/13/2000	0.1	12/15/2004	0.12
5/19/1992	0.17	2/5/1997	0.15	1/9/2001	0.11	1/3/2005	0.16
6/24/1992	0.21	2/26/1997	0.16	2/13/2001	0.22	2/2/2005	0.12
7/27/1992	0.25	4/2/1997	0.11	3/12/2001	0.13	3/28/2005	0.05
8/24/1992	0.3	4/30/1997	0.13	4/10/2001	0.08	4/11/2005	0.08
9/22/1992	0.15	5/28/1997	0.19	5/9/2001	0.16	5/9/2005	0.18
10/20/1992	0.11	6/18/1997	0.35	6/6/2001	0.14	6/13/2005	0.21
11/16/1992	0.18	7/23/1997	0.21	7/9/2001	0.19	7/12/2005	0.38
12/15/1992	0.09	8/20/1997	0.22	8/14/2001	0.22	8/3/2005	0.31
1/13/1993	0.08	9/24/1997	0.18	9/19/2001	0.2	9/12/2005	0.24
3/16/1993	0.11	10/21/1997	0.21	10/11/2001	0.17	10/11/2005	0.23
4/26/1993	0.16	11/18/1997	0.1	11/7/2001	0.12	11/15/2005	0.15
5/10/1993	0.16	12/9/1997	0.11	12/4/2001	0.13	12/19/2005	0.19
8/2/1993	0.21	2/4/1998	0.11	1/28/2002	0.0981	1/30/2006	0.14
9/8/1993	0.2	3/4/1998	0.09	2/19/2002	0.1212	2/22/2006	0.15
9/29/1993	0.23	4/1/1998	0.19	3/13/2002	0.161	3/13/2006	0.35
10/27/1993	0.18	4/28/1998	0.12	4/16/2002	0.1259	4/5/2006	0.13
11/16/1993	0.15	6/3/1998	0.19	5/15/2002	0.18	5/15/2006	0.17
3/2/1994	0.07	6/30/1998	0.24	6/10/2002	0.14	6/26/2006	0.22
3/15/1994	0.12	7/28/1998	0.24	7/17/2002	0.17	7/25/2006	0.2
4/26/1994	0.06	9/1/1998	0.3	8/8/2002	0.24	8/28/2006	0.2
6/1/1994	0.06	9/29/1998	0.28	9/12/2002	0.23	9/13/2006	0.31

* Green cells denote data used in figure for report purposes.

Table 4: IDEM Total Phosphorus fixed station data for the Portage Boat Yard.

Sample Date	TKN (mg/L)	Sample Date	TKN (mg/L)	Sample Date	TKN (mg/L)	Sample Date	TKN (mg/L)
1/24/1990	1.2	8/31/1994	0.9	11/17/1998	1	10/9/2002	0.9
2/28/1990	1.1	10/4/1994	1.3	12/15/1998	1	11/13/2002	0.8
3/28/1990	1.3	11/14/1994	1.3	1/26/1999	1.5	12/12/2002	1.3
4/25/1990	1.1	1/18/1995	1.3	2/23/1999	1	1/8/2003	0.8
6/5/1990	1.4	3/7/1995	1.2	3/24/1999	1	2/6/2003	1.3
7/17/1990	1.3	4/25/1995	0.9	4/28/1999	1	3/11/2003	1.3
8/8/1990	1.4	5/24/1995	1.2	5/26/1999	1.6	4/9/2003	1.3
9/19/1990	1.4	6/26/1995	1.4	6/29/1999	1	5/8/2003	1.5
10/2/1990	0.9	7/26/1995	1.3	7/28/1999	1	6/5/2003	1.3
11/28/1990	2.2	9/7/1995	1.2	8/18/1999	1.7	7/1/2003	1.6
12/19/1990	0.9	9/26/1995	1.4	9/29/1999	1.4	8/4/2003	1.3
1/16/1991	1.2	10/25/1995	1.3	10/19/1999	1.6	9/4/2003	1.4
2/12/1991	1	11/15/1995	1.5	11/30/1999	1.2	10/7/2003	0.9
3/5/1991	1.5	12/21/1995	0.8	12/28/1999	1.2	11/17/2003	1
4/17/1991	1.7	1/24/1996	1.2	8/15/2000	1.5	12/3/2003	1.3
5/21/1991	1.5	2/28/1996	1.3	1/25/2000	1.1	1/5/2004	1.2
6/25/1991	2.1	3/26/1996	1.1	2/14/2000	1.1	2/23/2004	2
7/24/1991	1.8	4/24/1996	1.8	3/20/2000	1.6	3/15/2004	1.3
8/15/1991	1.8	5/22/1996	1.3	4/24/2000	2.2	4/12/2004	1.6
9/24/1991	1.3	6/19/1996	1.9	5/24/2000	1.7	5/17/2004	1.6
10/22/1991	1.6	7/17/1996	1.4	6/21/2000	1.6	6/2/2004	1.8
11/20/1991	1.6	8/21/1996	1.4	7/17/2000	1.5	7/7/2004	1.8
12/18/1991	1	9/18/1996	1.3	8/22/2000	1.3	8/10/2004	1.2
2/25/1992	0.91	10/23/1996	1	9/20/2000	1.3	9/1/2004	1.2
3/26/1992	0.9	11/13/1996	1.4	10/23/2000	1	10/5/2004	1.3
4/22/1992	1.1	12/11/1996	1.1	11/21/2000	0.7	11/3/2004	1.5
5/19/1992	1.5	2/5/1997	1.1	12/13/2000	0.9	12/15/2004	1.3
6/24/1992	1.7	2/26/1997	1.4	1/9/2001	1.1	1/3/2005	1.3
7/27/1992	1.6	4/2/1997	0.9	2/13/2001	1.6	2/2/2005	1.2
8/24/1992	2.2	4/30/1997	1.4	3/12/2001	0.4	3/28/2005	1.1
9/22/1992	1.4	5/28/1997	1.6	4/10/2001	1.2	4/11/2005	1.9
10/20/1992	1	6/18/1997	1.6	5/9/2001	1.6	5/9/2005	1.6
11/16/1992	1.2	7/23/1997	1.3	6/6/2001	1	6/13/2005	1.9
12/15/1992	1	8/20/1997	1.2	7/9/2001	1.9	7/12/2005	2.2
1/13/1993	0.9	9/24/1997	1.1	8/14/2001	1.5	8/3/2005	1.5
3/16/1993	0.9	10/21/1997	1.1	9/19/2001	1.1	9/12/2005	1.4
4/26/1993	1.4	11/18/1997	0.8	10/11/2001	1.1	10/11/2005	1.6
5/10/1993	1.6	12/9/1997	0.7	11/7/2001	1	11/15/2005	1.1
8/2/1993	1.6	2/4/1998	1	12/4/2001	1.2	12/19/2005	1.2
9/8/1993	1.4	3/4/1998	1	1/28/2002	0.626	1/30/2006	1.1
9/29/1993	2	4/1/1998	1.5	2/19/2002	0.8058	2/22/2006	1.2
10/27/1993	1.1	4/28/1998	1.2	3/13/2002	1.017	3/13/2006	2.3
11/16/1993	1.2	6/3/1998	1.5	4/16/2002	1.4865	4/5/2006	1.2
3/2/1994	1.3	6/30/1998	1.4	5/15/2002	1.3	5/15/2006	1.5
3/15/1994	1	7/28/1998	1.4	6/10/2002	1.2	6/26/2006	1.2
4/26/1994	0.9	9/1/1998	1.7	7/17/2002	1.4	7/25/2006	1.3
6/1/1994	0.8	9/29/1998	1.4	8/8/2002	1.2	8/28/2006	1.3
8/2/1994	0.9	10/27/1998	1.7	9/12/2002	1	9/13/2006	2

* Green cells denote data used in figure for report purposes.

Table 5: IDEM TKN fixed station data from the Portage Boat Yard.

Sample Date	TSS (mg/L)	Sample Date	TSS (mg/L)	Sample Date	TSS (mg/L)	Sample Date	TSS (mg/L)
1/24/1990	11	8/31/1994	30	11/17/1998	18	10/9/2002	9
2/28/1990	24	10/4/1994	32	12/15/1998	16	11/13/2002	11
3/28/1990	32	11/14/1994	32	1/26/1999	44	12/12/2002	15
4/25/1990	31	1/18/1995	30	2/23/1999	10	1/8/2003	6
5/16/1990	69	3/7/1995	47	3/24/1999	29	3/11/2003	6
6/5/1990	28	4/25/1995	24	4/28/1999	58	4/9/2003	37
7/17/1990	24	5/24/1995	33	5/26/1999	21	5/8/2003	80
8/8/1990	36	6/26/1995	22	6/29/1999	15	6/5/2003	34
9/19/1990	23	7/26/1995	18	7/28/1999	19	7/1/2003	21
10/2/1990	31	9/7/1995	12	8/18/1999	18	8/4/2003	24
11/28/1990	240	9/26/1995	20	9/29/1999	16	9/4/2003	20
12/19/1990	30	10/25/1995	24	10/19/1999	21	10/7/2003	15
1/16/1991	14	11/15/1995	34	11/30/1999	7	11/17/2003	9
2/12/1991	21	12/21/1995	6	12/28/1999	5	12/3/2003	10
3/5/1991	92	1/24/1996	13	8/15/2000	23	1/5/2004	8
4/17/1991	184	2/28/1996	18	1/25/2000	4	2/23/2004	18
5/21/1991	44	3/26/1996	20	2/14/2000	4	3/15/2004	17
6/25/1991	28	4/24/1996	64	3/20/2000	36	4/12/2004	25
7/24/1991	25	5/22/1996	27	4/24/2000	62	5/17/2004	34
8/15/1991	19	6/19/1996	158	5/24/2000	28	6/2/2004	49
9/24/1991	38	7/17/1996	18	6/21/2000	76	7/7/2004	16
10/22/1991	15	8/21/1996	22	7/17/2000	25	8/10/2004	12
11/20/1991	86	9/18/1996	21	8/22/2000	23	9/1/2004	29
12/18/1991	8	10/23/1996	19	9/20/2000	20	10/5/2004	10
2/25/1992	26	11/13/1996	9	10/23/2000	22	11/3/2004	41
3/26/1992	19	12/11/1996	8	11/21/2000	8	12/15/2004	15
4/22/1992	34	2/5/1997	22	12/13/2000	7	1/3/2005	20
5/19/1992	31	2/26/1997	44	1/9/2001	4	2/2/2005	8
6/24/1992	32	4/2/1997	28	2/13/2001	38	3/28/2005	15
7/27/1992	40	4/30/1997	30	3/12/2001	15	4/11/2005	27
8/24/1992	41	5/28/1997	58	4/10/2001	20	5/9/2005	28
9/22/1992	33	6/18/1997	198	5/9/2001	19	6/13/2005	28
10/20/1992	20	7/23/1997	49	6/6/2001	25	7/12/2005	21
11/16/1992	15	8/20/1997	67	7/9/2001	36	8/3/2005	16
12/15/1992	10	9/24/1997	34	8/14/2001	17	9/12/2005	13
1/13/1993	9	10/21/1997	47	9/19/2001	17	10/11/2005	15
3/16/1993	24	11/18/1997	5	10/11/2001	29	11/15/2005	14
5/10/1993	21	12/9/1997	4	11/7/2001	20	12/19/2005	6
8/2/1993	20	2/4/1998	14	12/4/2001	16	1/30/2006	28
9/8/1993	48	3/4/1998	18	1/28/2002	4	2/22/2006	20
9/29/1993	70	4/1/1998	72	2/19/2002	12	3/13/2006	186
10/27/1993	41	4/28/1998	31	3/13/2002	46	4/5/2006	29
11/16/1993	47	6/3/1998	34	4/16/2002	25	5/15/2006	28
3/2/1994	10	6/30/1998	47	5/15/2002	56	6/26/2006	11
3/15/1994	28	7/28/1998	30	6/10/2002	16	7/25/2006	17
4/26/1994	11	9/1/1998	23	7/17/2002	15	8/28/2006	14
6/1/1994	20	9/29/1998	24	8/8/2002	14	9/13/2006	119
8/2/1994	20	10/27/1998	17	9/12/2002	12		

* Green cells denote data used in figure for report purposes.

Table 6: IDEM Total Suspended Solids fixed station data from the Portage Boat Yard.

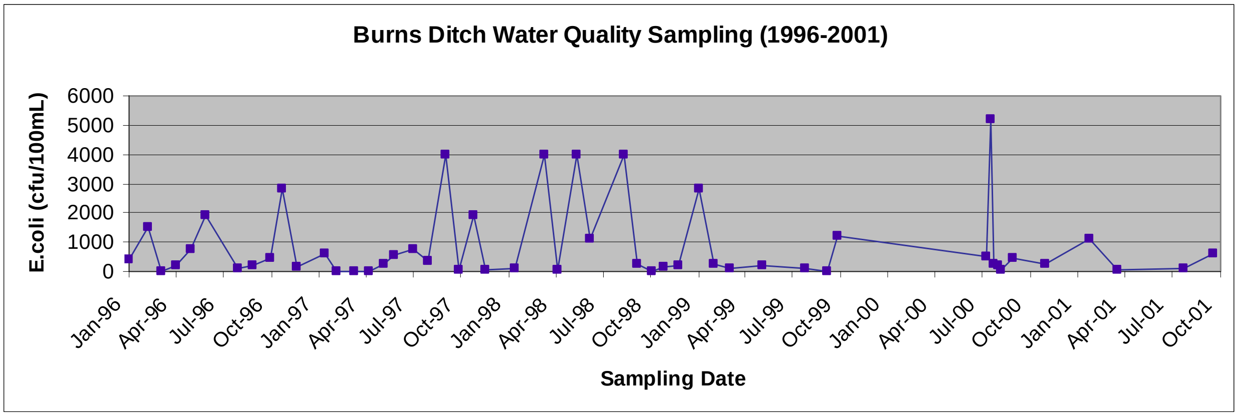


Figure 1: *E.coli* sampling results as recorded by IDEM at the Portage Boat Yard.

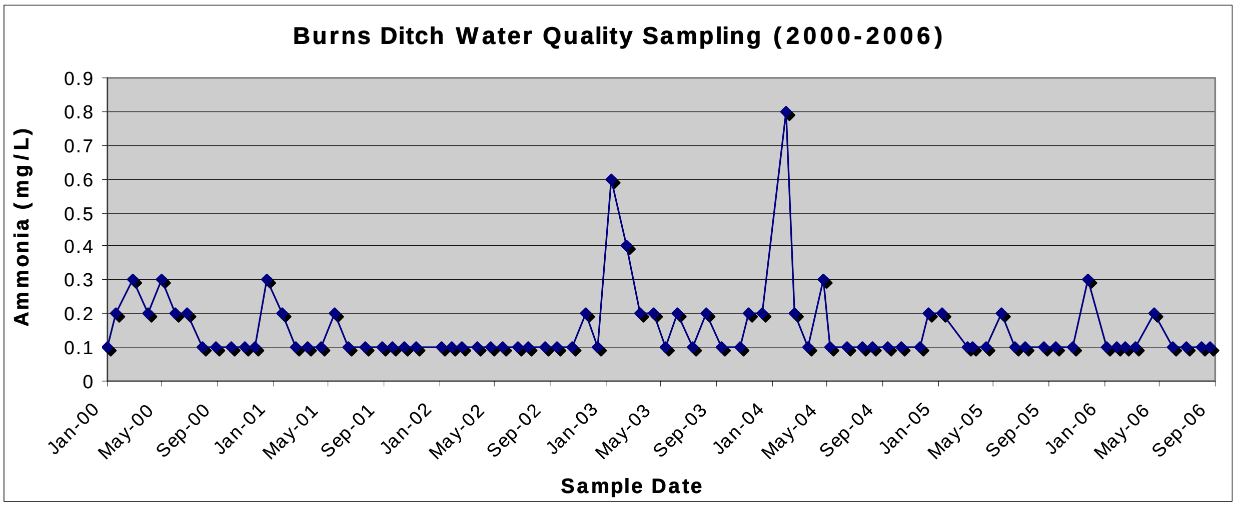


Figure 2: Ammonia sampling results as recorded by IDEM at the Portage Boat Yard.

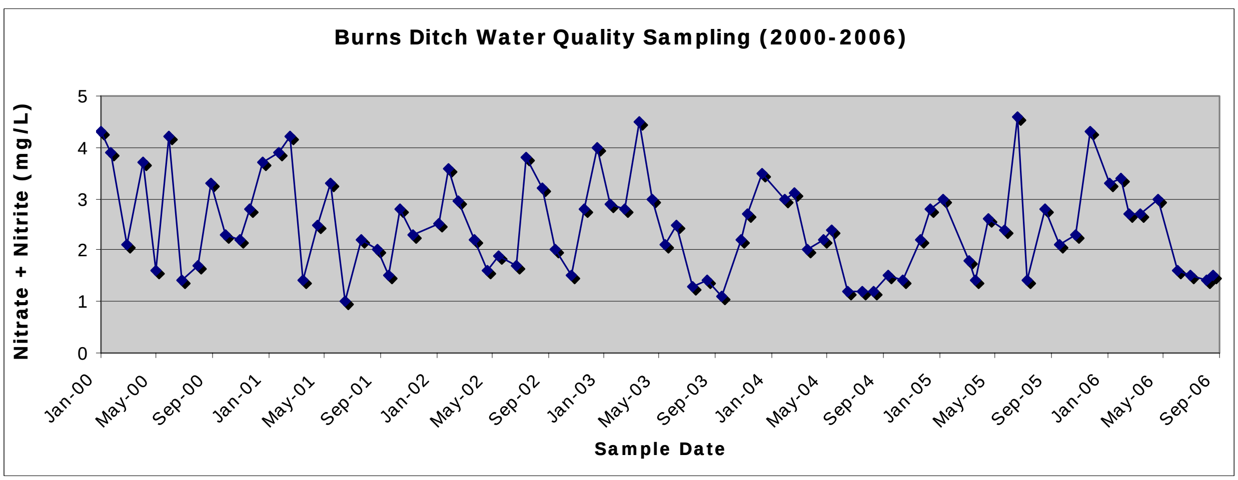


Figure 3: Nitrogen sampling results as recorded by IDEM at the Portage Boat Yard.

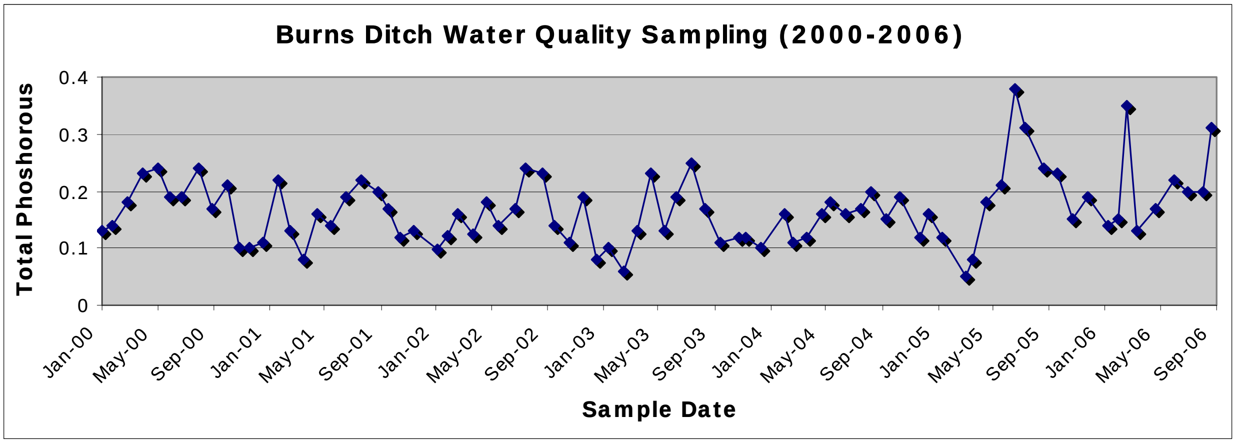


Figure 4: Total Phosphorus sample results as recorded by IDEM at the Portage Boat Yard.

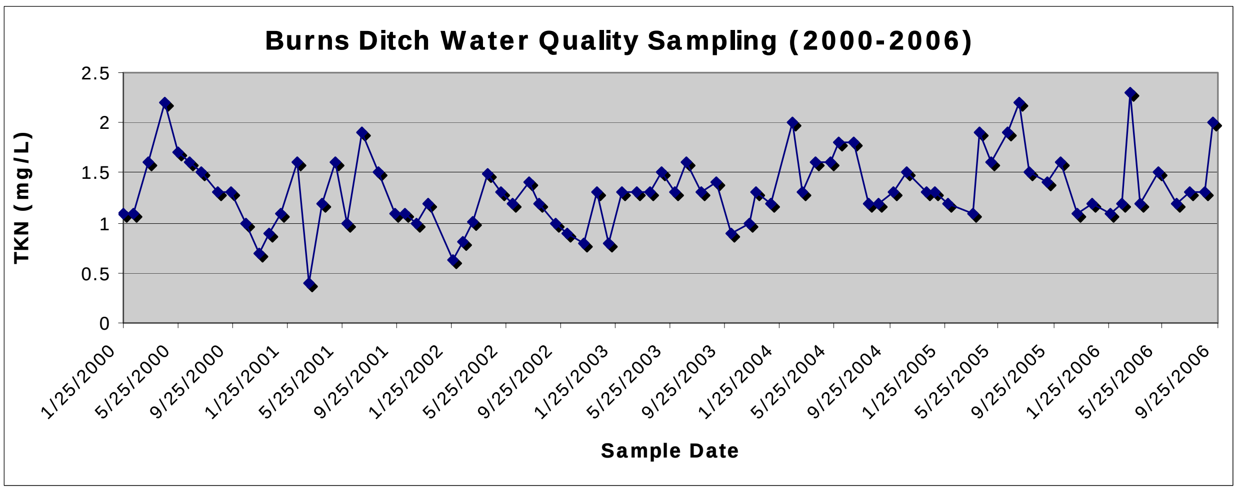


Figure 5: Total Kjeldahl Nitrogen sample results as recorded by IDEM at the Portage Boat Yard.

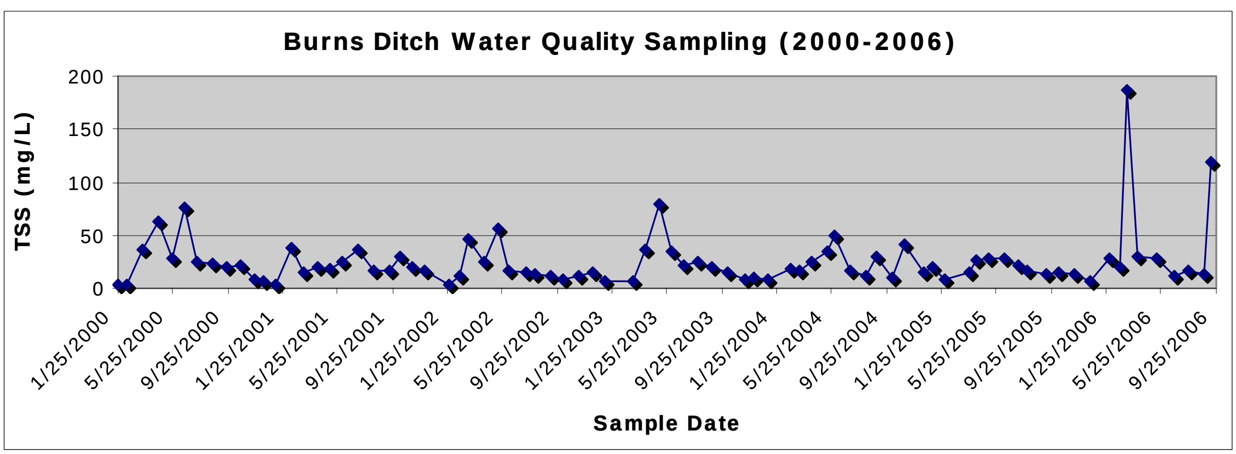


Figure 6: Total Suspended Solids sample results as recorded by IDEM at the Portage Boat Yard.

Project Name	Stream Name	Description	HUC to 14	E.coli (cfu/100mL)
2000 E Coli	Burns Ditch	SR 51 bridge, north of I-94, Exit 15, Lake Station	4040001040030	270
2000 E Coli	Burns Ditch	SR 51 bridge, north of I-94, Exit 15, Lake Station	4040001040030	980.4
2000 E Coli	Burns Ditch	SR 51 bridge, north of I-94, Exit 15, Lake Station	4040001040030	2420
2000 E Coli	Burns Ditch	SR 51 bridge, north of I-94, Exit 15, Lake Station	4040001040030	201.4
2000 E Coli	Burns Ditch	SR 51 bridge, north of I-94, Exit 15, Lake Station	4040001040030	387.3
2000 E Coli	Little Calumet River	SR 53 bridge, S of Exit 10 I-80	4040001040020	9.7
2000 E Coli	Little Calumet River	SR 53 bridge, S of Exit 10 I-80	4040001040020	1203.3
2000 E Coli	Little Calumet River	SR 53 bridge, S of Exit 10 I-80	4040001040020	1413.6
2000 E Coli	Little Calumet River	SR 53 bridge, S of Exit 10 I-80	4040001040020	101.7
2000 E Coli	Little Calumet River	SR 53 bridge, S of Exit 10 I-80	4040001040020	107.6
2000 E Coli	Little Calumet River	SR 912 S Bound, S of I-80-95 Exit 5, Highland	7120003030050	3654
2000 E Coli	Little Calumet River	SR 912 S Bound, S of I-80-95 Exit 5, Highland	7120003030050	770.1
2000 E Coli	Little Calumet River	SR 912 S Bound, S of I-80-95 Exit 5, Highland	7120003030050	1986.28
2000 E Coli	Little Calumet River	SR 912 S Bound, S of I-80-95 Exit 5, Highland	7120003030050	2420
2000 E Coli	Little Calumet River	SR 912 S Bound, S of I-80-95 Exit 5, Highland	7120003030050	5475

Table 7: IDEM sample results for locations along the Little Calumet river in the Summer of 2000.

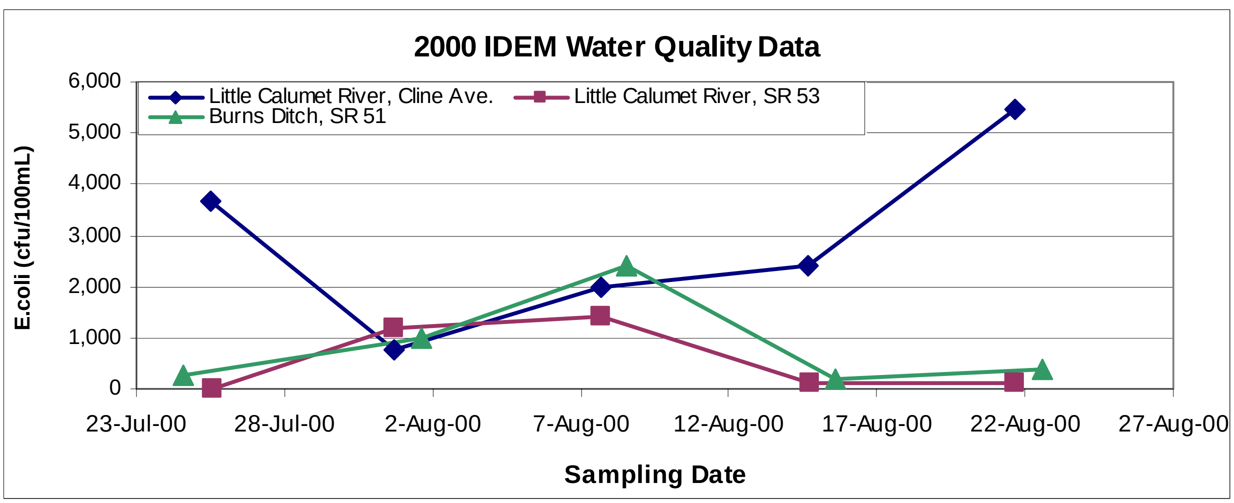


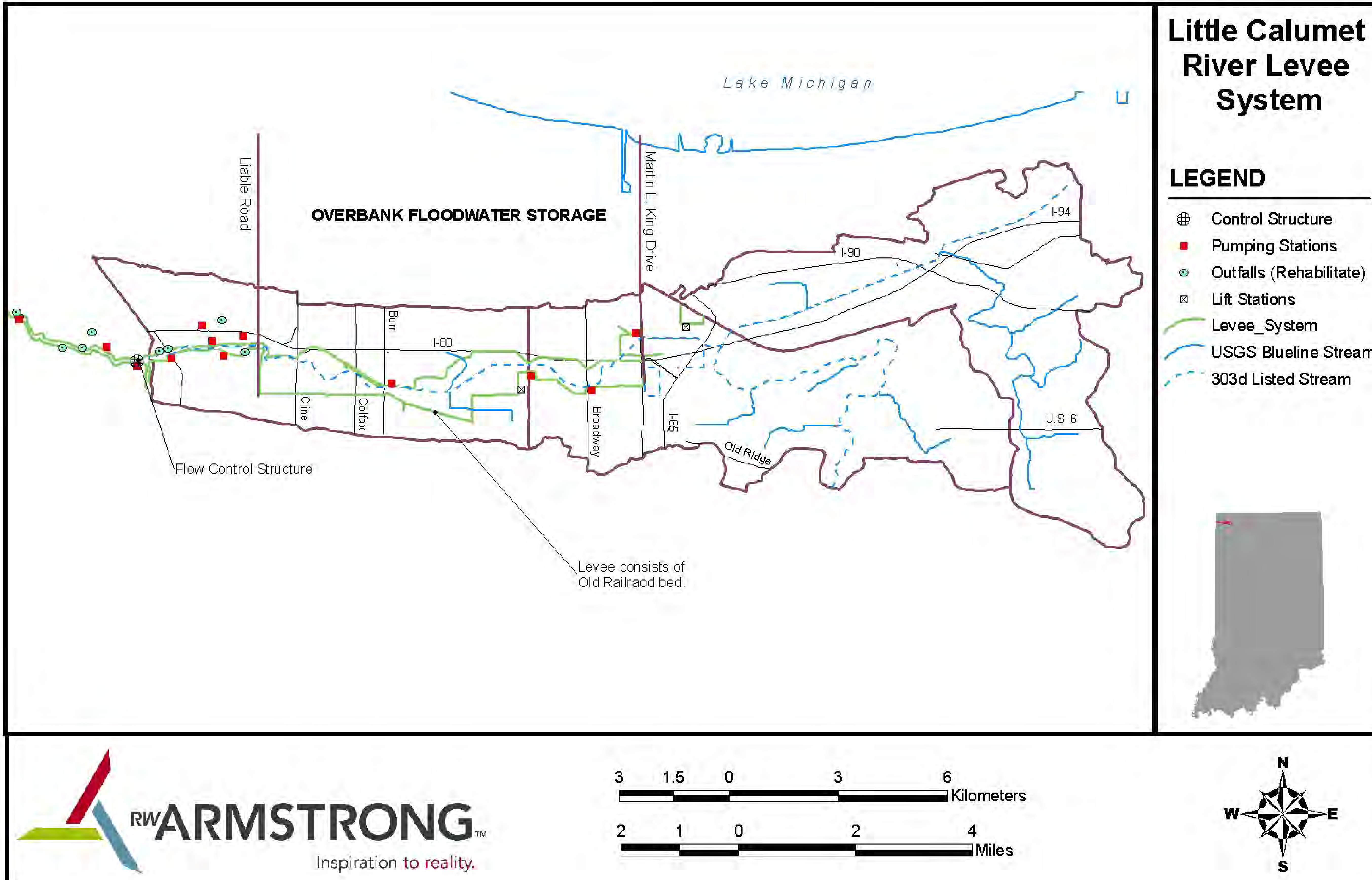
Figure 7: IDEM sample results for *E.coli* found at three additional sampling locations.

Appendix 7

ACOE Levee System

RW ARMSTRONG™
Inspiration to reality.

Little Calumet River Levee System



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Appendix 8

CSO Master Plan Phase II for the Hammond Sanitary District

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Inspiration to reality.

In November of 1995 HNTB completed the Combined Sewer Overflow Master Plan Phase II for the Sanitary District of Hammond as part of their Little Calumet River Sampling Program. The study was conducted in order to characterize and model the water quality in the Little Calumet River through the area covered by the district and to find the impact that combined sewer overflows (CSOs) have on the river. The study conducted grab samples at seven (7) locations during three (3) sampling events. The sampling locations are identified in Figure 1, of these seven locations three are located inside of the study area being looked at for the Little Calumet River Watershed Management Plan and a fourth point is located along Hart Ditch which is approximately the dividing point for the east-west split of the river.

The grab samples taken were tested for a number of parameters; including *E.coli*, ammonia, nitrate, and total phosphorous. These four sampling parameters overlapped with the parameters being tested for as part of the Little Calumet River Watershed Management Plan. Figures 2 to 5 graphically show the sampling results found for these four overlapping parameters. The six (6) tables shown at the end of the appendix present the sampling data results found by HNTB during the three sampling events. Each sampling event has a table showing the sampling location water quality results as well as the water quality results for the CSO discharges, locations shown in Figure 1.

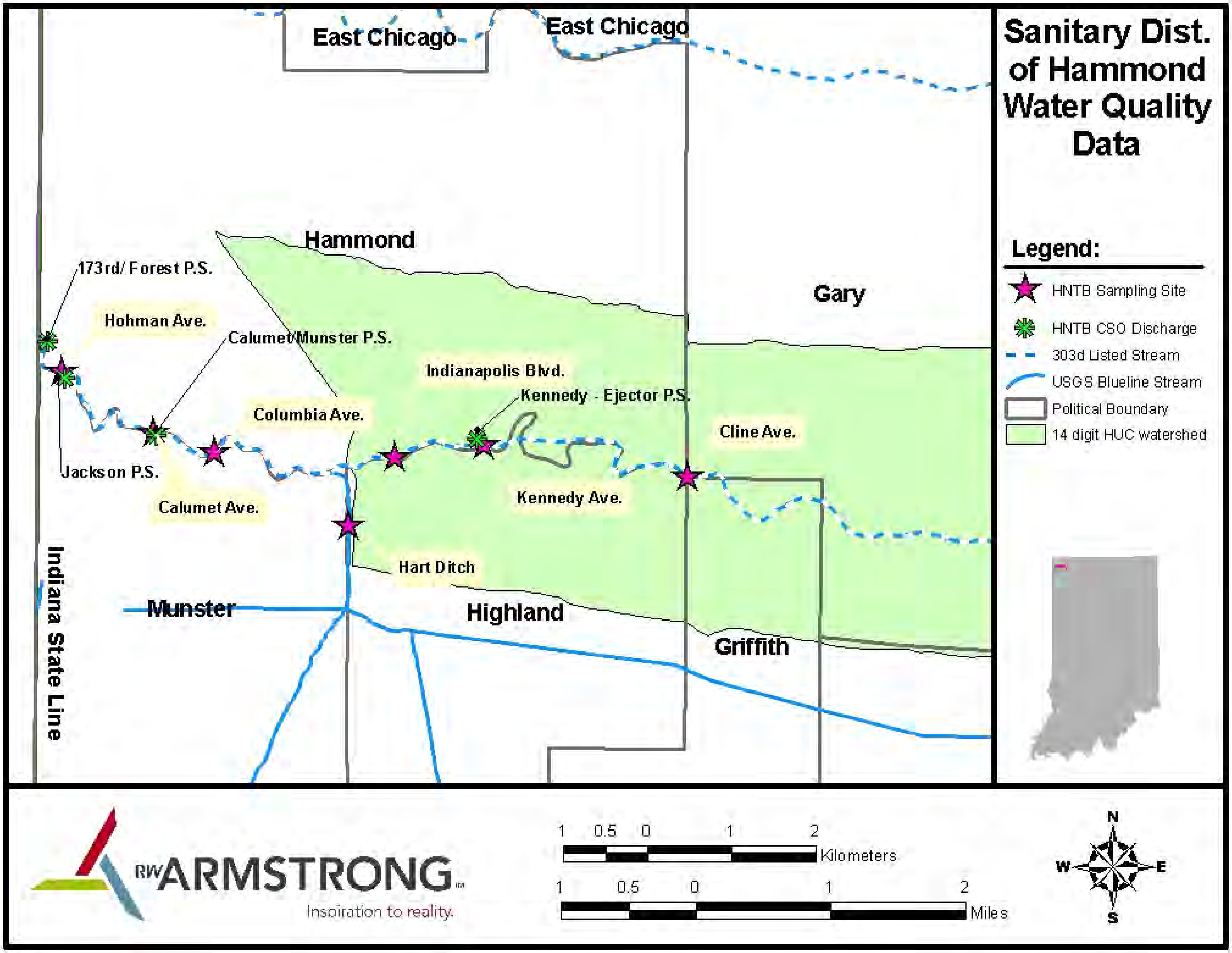


Figure 1: HNTB sampling sites and CSO discharge monitoring points.

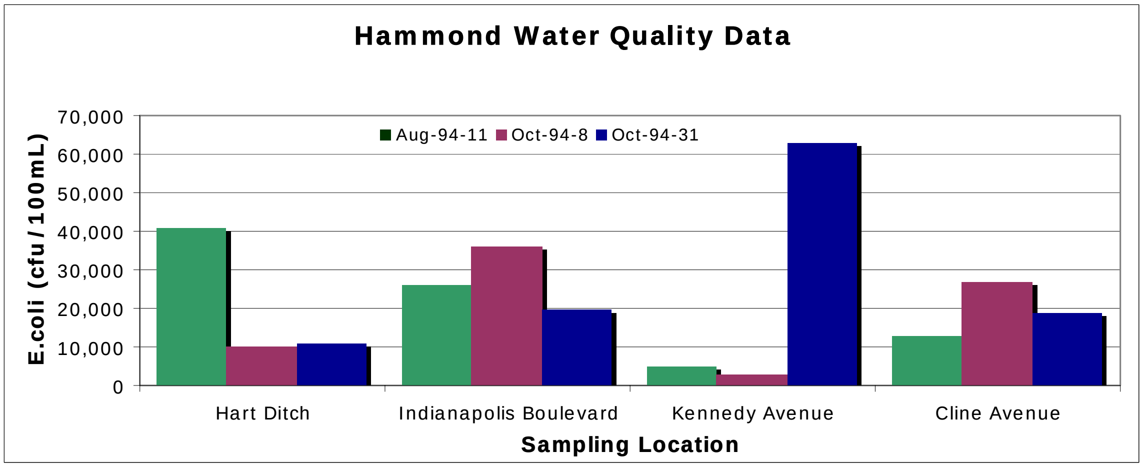


Figure 2: *E.coli* sampling results for HNTB's November 1995 study.

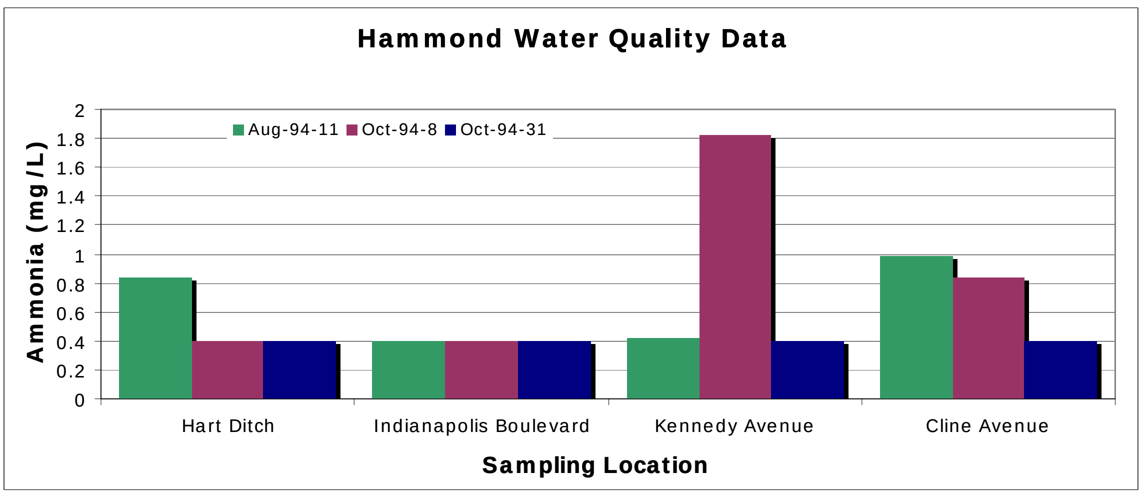


Figure 3: Ammonia sampling results for HNTB's November 1995 study.

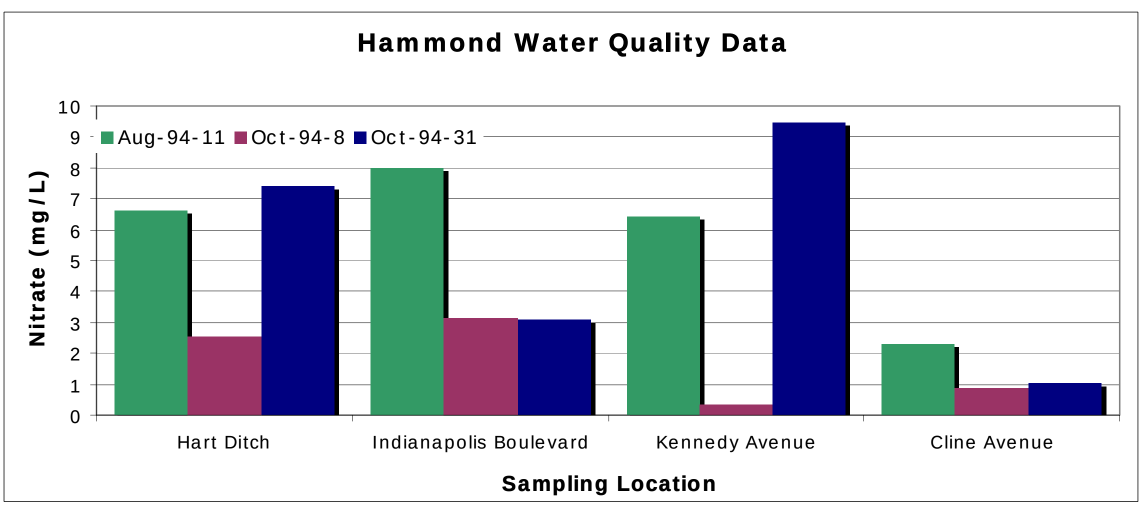


Figure 4: Nitrate sampling results for HNTB's November 1995 study.

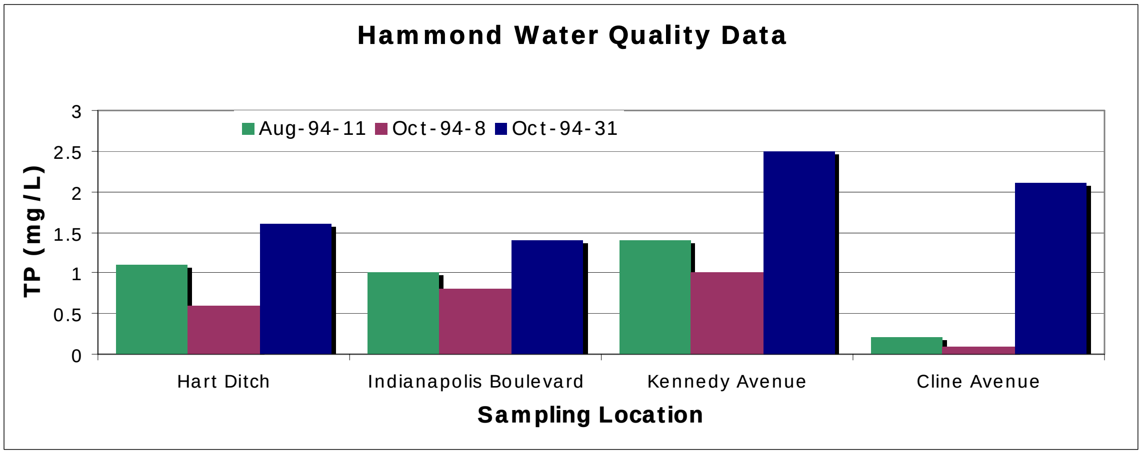


Figure 5: Total Phosphorous sampling results for HNTB's November 1995 study.

TABLE 11
WATER QUALITY MONITORING STATION GRAB SAMPLING DATA - STORM EVENT NO. 1
LITTLE CALUMET RIVER SAMPLING

CSO MASTER PLAN - PHASE II
SANITARY DISTRICT OF HAMMOND, INDIANA

Station	Location	Sample Time	Ammonia	Chloride	Total Cyanide	Fats, Oil & Grease	Fluoride	Nitrate	Sulfate	Total Phenolics	Total Phosphate	Hardness	Organic Nitrogen
LC-WQ-1	Cline Ave	01:45 AM	0.98	137	<0.50	4.0	2.54	2.3	91	<1.0	0.2	270	0.84
LC-WQ-2	Kennedy Ave	02:00 AM	0.42	145	<0.50	<1.0	1.44	6.4	121	<1.0	1.4	340	1.12
LC-WQ-3	Indianapolis Blvd	01:50 AM	<0.40	175	<0.50	<1.0	3.10	7.98	113	<1.0	1.0	330	0.82
LC-WQ-4	Hart Ditch	02:30 AM	0.84	185	<0.50	<1.0	3.04	6.64	107	<1.0	1.1	320	0.28
LC-WQ-5	Columbia Ave	02:10 AM	<0.40	178	<0.50	<1.0	3.10	8.59	116	<1.0	0.9	320	0.96
LC-WQ-6	Calumet Ave	01:45 AM	0.56	171	<0.50	<1.0	2.86	9.27	122	<1.0	1.5	330	1.54
LC-WQ-7	Hohman Ave	02:30 AM	0.84	147	<0.50	<1.0	1.61	6.89	126	<1.0	1.4	330	0.28

Station	Location	Sample Time	E. Coli #col/100ml	Fecal Coli #col/100ml	Chlorophyll -A (ug/L)
LC-WQ-1	Cline Ave	01:45 AM	13,000	20,000	7.37
LC-WQ-2	Kennedy Ave	02:00 AM	4,750	9,950	0.30
LC-WQ-3	Indianapolis Blvd	01:50 AM	26,000	49,000	2.60
LC-WQ-4	Hart Ditch	02:30 AM	41,000	65,000	2.09
LC-WQ-5	Columbia Ave	02:10 AM	33,000	36,000	4.57
LC-WQ-6	Calumet Ave	01:45 AM	9,200	30,000	0.35
LC-WQ-7	Hohman Ave	02:30 AM	9,000	33,000	2.53

Station	Location	Sample Time	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Copper	Nickel	Zinc	Molybdenum
LC-WQ-1	Cline Ave	01:45 AM	<0.01	<0.10	<0.02	<0.10	<0.10	<0.0003	<0.005	<0.20	<0.10	<0.10	<0.10	<0.20
LC-WQ-2	Kennedy Ave	02:00 AM	<0.01	<0.10	<0.02	<0.10	<0.10	<0.0003	<0.005	<0.20	<0.10	<0.10	<0.10	<0.20
LC-WQ-3	Indianapolis Blvd	01:50 AM	<0.01	<0.10	<0.02	<0.10	<0.10	<0.0003	<0.005	<0.20	<0.10	<0.10	<0.10	<0.20
LC-WQ-4	Hart Ditch	02:30 AM	<0.01	<0.10	<0.02	<0.10	<0.10	<0.0003	<0.005	<0.20	<0.10	<0.10	<0.10	<0.20
LC-WQ-5	Columbia Ave	02:10 AM	<0.01	<0.10	<0.02	<0.10	<0.10	<0.0003	<0.005	<0.20	<0.10	<0.10	<0.10	<0.20
LC-WQ-6	Calumet Ave	01:45 AM	<0.01	<0.10	<0.02	<0.10	<0.10	<0.0003	<0.005	<0.20	<0.10	<0.10	<0.10	<0.20
LC-WQ-7	Hohman Ave	02:30 AM	<0.01	<0.10	<0.02	<0.10	<0.10	<0.0003	<0.005	<0.20	<0.10	<0.10	<0.10	<0.20

Notes:
1. Storm Event No. 1 occurred on August 11, 1994. 1.04 inches of rain fell from 5:45 PM, Aug 10 to 4:15 AM, Aug 11.
2. All of the above information is summerized from EMT, INC. laboratory reports.
3. All results are expressed as ppm unless otherwise indicated.
4. Metal concentrations represent total concentration of various forms of each metal.
5. Results expressed with "<" symbol indicate that the concentrations are below Method Detection Limits.

11/22/95

TABLE 22
WATER QUALITY MONITORING STATION GRAB SAMPLING DATA - STORM EVENT NO. 2
LITTLE CALUMET RIVER SAMPLING
CSO MASTER PLAN - PHASE II
SANITARY DISTRICT OF HAMMOND, INDIANA

Station	Location	Sample Time	Ammonia	Chloride	Total Cyanide	Fats, Oil & Grease	Fluoride	Nitrate	Sulfate	Total Dissolved Solids	Total Phenolics	Total Phosphate	pH	Hardness	Organic Nitrogen
LC-WQ-1	Cline Ave	06:30 PM	0.84	142	<0.50	<2.00	0.94	0.88	86	42	<1.00	0.1	7.56	180	0.98
LC-WQ-2	Kennedy Ave	06:15 PM	1.82	49	<0.50	2.0	<0.50	0.35	47	180	<1.00	1.0	6.62	41	17.78
LC-WQ-3	Indianapolis Blvd	06:15 PM	<0.40	56	<0.50	<2.00	0.97	3.16	56	250	<1.00	0.8	6.91	100	2.54
LC-WQ-4	Hart Ditch	06:30 PM	<0.40	46	<0.50	<2.00	0.69	2.54	42	187	<1.00	0.6	7.22	130	1.56
LC-WQ-5	Columbia Ave	07:30 PM	1.96	90	<0.50	8.0	1.26	3.96	87	385	<1.00	0.6	7.23	230	3.64
LC-WQ-6	Calumet Ave	07:00 PM	0.56	92	<0.50	5.8	1.69	4.38	91	397	<1.00	0.8	7.24	230	1.05
LC-WQ-7	Hohman Ave	06:20 PM	1.54	51	<0.50	2.3	0.8	0.67	52	208	<1.00	0.7	6.95	87	1.96

Station	Location	Sample Time	E. Coli #col/100ml	Fecal Coli #col/100ml	Chlorophyll -A (ug/L)
LC-WQ-1	Cline Ave	06:30 PM	27,000	35,000	4.77
LC-WQ-2	Kennedy Ave	06:15 PM	3,000	12,250	0.47
LC-WQ-3	Indianapolis Blvd	06:15 PM	36,000	38,000	0.19
LC-WQ-4	Hart Ditch	06:30 PM	10,000	20,000	3.93
LC-WQ-5	Columbia Ave	07:30 PM	50,000	78,000	9.92
LC-WQ-6	Calumet Ave	07:00 PM	30,000	170,000	10.11
LC-WQ-7	Hohman Ave	06:20 PM	>80,000	>60,000	0.66

Station	Location	Sample Time	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Molybdenum	Silver	Copper	Nickel	Zinc	Toxic Metals: Antimony	Toxic Metals: Beryllium	Toxic Metals: Thallium
LC-WQ-1	Cline Ave	06:30 PM	<0.200	<0.10	<0.02	<0.10	<0.20	<0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	<0.10			
LC-WQ-2	Kennedy Ave	06:15 PM	<0.200	0.10	<0.20	<0.10	<0.20	<0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	0.10			
LC-WQ-3	Indianapolis Blvd	06:15 PM	<0.200	<0.10	<0.20	<0.10	<0.20	<0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	0.11	<0.200		
LC-WQ-4	Hart Ditch	06:30 PM	<0.200	<0.10	<0.02	<0.10	<0.20	<0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	0.17			
LC-WQ-5	Columbia Ave	07:30 PM	<0.200	<0.10	<0.20	<0.10	<0.20	<0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	0.15			
LC-WQ-6	Calumet Ave	07:00 PM	<0.200	<0.10	<0.20	0.24	<0.20	<0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	0.25			
LC-WQ-7	Hohman Ave	06:20 PM	<0.200	<0.10	<0.02	<0.10	<0.20	<0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	0.2	<0.200	<0.200	<0.200

Notes:
1. Storm Event No. 2 occurred on October 6, 1994. 1.06 inches of rain fell from 1:00 PM to 8:30 PM.
2. All of the above information is summerized from EMT, INC. laboratory reports.
3. All results are expressed as ppm unless otherwise indicated.
4. Metal concentrations represent total concentration of various forms of each metal.
5. E Coli and Fecal Coli results expressed with a ">" symbol indicate that the number of colonies were too high for the selected dilution rate.
6. Results expressed with "<" symbol indicate that the concentrations are below Method Detection Limits.
7. Toxic Metal sampling was only done at Hohman Ave, LC-WQ-7. Antimony sample taken at Indianapolis Blvd was not required in project scope.

TABLE 35
WATER QUALITY MONITORING STATION GRAB SAMPLING DATA - STORM EVENT NO. 3
LITTLE CALUMET RIVER SAMPLING

CSO MASTER PLAN - PHASE II

SANITARY DISTRICT OF HAMMOND, INDIANA

Station	Location	Sampling Time	Ammonia	Chloride	Total Cyanide	Fats, Oil & Grease	Fluoride	Nitrate	Sulfate	Total Dissolved Solids	Total Phenolics	Total Phosphate	Hardness	Organic Nitrogen
LC-WQ-1	Cline Ave	02:00 PM	<0.40	145	<0.50	<2.00	1.16	1.04	101	56	<1.00	2.1	270	1.98
LC-WQ-2	Kennedy Ave	02:30 PM	<0.40	162	<0.50	4.00	2.85	9.44	142	674	<1.00	2.5	340	2.40
LC-WQ-3	Indianapolis Blvd	02:30 PM	<0.40	139	<0.50	<2.00	1.92	3.11	97	531	<1.00	1.4	260	2.26
LC-WQ-4	Hart Ditch	02:45 PM	<0.40	100	<0.50	<2.00	1.69	7.38	65	370	<1.00	1.6	220	3.38
LC-WQ-5	Columbia Ave	02:55 PM	<0.40	149	<0.50	<2.00	2.54	6.03	114	629	<1.00	1.6	310	2.26
LC-WQ-6	Calumet Ave	02:50 PM	0.70	151	<0.50	<2.00	3.50	4.99	110	572	<1.00	3.0	240	3.22
LC-WQ-7	Hohman Ave	03:00 PM	1.26	80	<0.50	6.00	1.76	2.02	65	328	<1.00	2.6	200	4.06

Station	Location	Sampling Time	E. Coli #col/100ml	Fecal Coli #col/100ml	Chlorophyll -A (ug/L)
LC-WQ-1	Cline Ave	02:00 PM	19,000	2,000	21.70
LC-WQ-2	Kennedy Ave	02:30 PM	63,000	53,000	35.13
LC-WQ-3	Indianapolis Blvd	02:30 PM	19,500	34,000	12.92
LC-WQ-4	Hart Ditch	02:45 PM	11,000	10,000	14.98
LC-WQ-5	Columbia Ave	02:55 PM	45,000	39,000	23.77
LC-WQ-6	Calumet Ave	02:50 PM	400,000	470,000	11.88
LC-WQ-7	Hohman Ave	03:00 PM	260,000	550,000	9.82

Station	Location	Sampling Time	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Molybdenum	Silver	Copper	Nickel	Zinc
LC-WQ-1	Cline Ave	02:00 PM	<0.200	<0.10	<0.02	<0.10	<0.20	<0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	<0.10
LC-WQ-2	Kennedy Ave	02:30 PM	<0.200	<0.10	<0.02	<0.10	<0.20	0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	<0.10
LC-WQ-3	Indianapolis Blvd	02:30 PM	<0.200	<0.10	<0.02	<0.10	<0.20	<0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	<0.10
LC-WQ-4	Hart Ditch	02:45 PM	<0.200	<0.10	<0.02	<0.10	<0.20	<0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	0.14
LC-WQ-5	Columbia Ave	02:55 PM	<0.200	<0.10	<0.02	<0.10	<0.20	<0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	0.16
LC-WQ-6	Calumet Ave	02:50 PM	<0.200	<0.10	<0.02	<0.10	<0.20	<0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	<0.10
LC-WQ-7	Hohman Ave	03:00 PM	<0.200	<0.10	<0.02	<0.10	<0.20	0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	0.17

Notes:
1. Storm Event No. 3 occurred on October 31, 1994. 2.24 inches of rain fell from 12:30 AM, Oct 31 to 7:30 AM, Nov 1.
2. All of the above information is summerized from EMT, INC. laboratory reports.
3. All results are expressed as ppm unless otherwise indicated.
4. Metal concentrations represent total concentration of various forms of each metal.
5. Results expressed with "<" symbol indicate that the concentrations are below Method Detection Limits.
6. E. Coli and Fecal Coli samples were diluted to be able to read a large number of colonies.

TABLE 14
CSO DISCHARGE GRAB SAMPLING DATA - STORM EVENT NO. 1
LITTLE CALUMET RIVER SAMPLING
CSO MASTER PLAN - PHASE II
SANITARY DISTRICT OF HAMMOND, INDIANA

Station	Location	Sampling Time	Ammonia	Chloride	Total Cyanide	Fats, Oil & Grease	Fluoride	Nitrate	Sulfate	Total Phenolics	Total Phosphate	Hardness	Organic Nitrogen
LC-CSO-1	Kennedy - Ejector P.S.	02:00 AM	4.62	47	<0.50	50	<0.50	<0.20	31	<1.0	1.5	130	3.22
LC-CSO-2	Calumet / Munster P.S.	02:20 AM	2.66	37	<0.50	26	<0.50	<0.20	25	<1.0	1.3	89	146.34
LC-CSO-3	Jackson P.S.	01:45 AM	3.22	84	<0.50	312	<0.50	<0.20	39	<1.0	1.6	220	3.5
LC-CSO-4	173 rd / Forest P.S.	02:00 AM	2.94	37	<0.50	<1.0	0.52	<0.20	29	<1.0	0.6	180	0.14

Station	Location	Sampling Time	E. Coli #col/100ml	Fecal Coli #col/100ml	Chlorophyll -A (ug/L)
LC-CSO-1	Kennedy - Ejector P.S.	02:00 AM	>80,000	>60,000	7.31
LC-CSO-2	Calumet / Munster P.S.	02:20 AM	>80,000	>60,000	0.35
LC-CSO-3	Jackson P.S.	01:45 AM	>80,000	>60,000	3.65
LC-CSO-4	173 rd / Forest P.S.	02:00 AM	6,500	86,000	0.22

Station	Location	Sampling Time	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Copper	Nickel	Zinc	olybdenu
LC-CSO-1	Kennedy - Ejector P.S.	02:00 AM	<0.01	<0.10	<0.02	<0.10	<0.10	<0.0003	<0.005	<0.20	<0.1	<0.1	0.24	<0.2
LC-CSO-2	Calumet / Munster P.S.	02:20 AM	<0.01	<0.10	<0.02	<0.10	<0.10	<0.0003	<0.005	<0.20	<0.1	<0.1	0.14	<0.2
LC-CSO-3	Jackson P.S.	01:45 AM	<0.01	<0.10	<0.02	<0.10	<0.10	<0.0003	<0.005	<0.20	<0.1	<0.1	0.17	<0.2
LC-CSO-4	173 rd / Forest P.S.	02:00 AM	<0.01	<0.10	<0.02	<0.10	<0.10	<0.0003	<0.005	<0.20	<0.1	<0.1	<0.1	<0.2

Notes:
1. Storm Event No. 1 occurred on August 11,1994. 1.04 inches of rain fell from 5:45 PM, Aug 10 to 4:15 AM, Aug 11.
I All of the above information is summarized from EMI, INC laboratory reports.
2. All results are expressed as ppm unless otherwise indicated.
3. Metal concentrations represent total concentration of various forms of each metal.
4. E Coli and Fecal Coli results expressed with a ">" symbol indicate that the number of colonies were too high for the selected dilution rate.
5. Results expressed with "<" symbol indicate that the concentrations are below Method Detection Limits.

Table 27

TABLE 2?

CSO ? CHARGE GRAB S? PLING ?ATA - S? RM EVE? NO. ?

LITTLE CAL? ET RI? R SAMP NG

CSO MA R PLA? PHASE II

SANITARY DIST ? OF H? MOND, I? IANA

1/22/95

Station	Location	Sample Time	Ammonia	Chloride	Total Cyanide	Fats, Oil & Grease	Fluoride	Nitrate	Sulfate	Total Dissolved Solids	Total Phenolics	Total Phosphate	pH	Hardness	Organic Nitrogen
LC-CSO-1	Kennedy - Ejector P.S.	06:44 PM	3.08	24	<0.50	28	<0.50	<0.20	23	88	<1.00	0.9	6.92	81	2.66
LC-CSO-2	Calumet / Munster P.S.	06:36 PM	2.80	21	<0.50	140	<0.50	<0.20	29	124	<1.00	0.9	6.77	73	4.20
LC-CSO-3	Jackson P.S.	05:58 PM	1.54	14	<0.50	8.2	<0.50	0.25	12	57	<1.00	0.6	6.88	60	0.84
LC-CSO-4	173 rd / Forest P.S.	06:38 PM	3.92	30	<0.50	3.5	<0.50	<0.20	17	106	<1.00	1.0	6.95	81	3.92

Station	Location	Sample Time	E Coli #col/100ml	Fecal Coli #col/100ml	Chlorophyll -A (ug/L)
LC-CSO-1	Kennedy - Ejector P.S.	06:44 PM	16,000	>60,000	3.37
LC-CSO-2	Calumet / Munster P.S.	06:36 PM	>80,000	>60,000	4.68
LC-CSO-3	Jackson P.S.	05:58 PM	>80,000	>60,000	12.17
LC-CSO-4	173 rd / Forest P.S.	06:38 PM	>80,000	>60,000	0.14

Station	Location	Sample Time	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Molybdenum	Silver	Copper	Nickel	Zinc	Toxic Metals		
															Antimony	Beryllium	Thallium
LC-CSO-1	Kennedy - Ejector P.S.	06:44 PM	<0.200	<0.10	<0.20	<0.10	<0.20	<0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	0.20	<0.200	<0.200	<0.200
LC-CSO-2	Calumet / Munster P.S.	06:36 PM	<0.200	<0.10	<0.02	<0.10	<0.20	<0.0003	0.200	<0.20	<0.20	<0.10	<0.10	0.20	<0.200	<0.200	<0.200
LC-CSO-3	Jackson P.S.	05:58 PM	<0.200	<0.10	<0.02	<0.10	<0.20	<0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	0.19	<0.200	<0.200	<0.200
LC-CSO-4	173 rd / Forest P.S.	06:38 PM	<0.200	<0.10	<0.02	<0.10	<0.20	<0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	0.25	<0.200	<0.200	<0.200

Notes:
1. Storm Event No. 2 occurred on October 6,1994. 1.06 inches of rain fell from 1:00 PM to 6:30 PM.
2. All of the above information is summerized from EMT, INC. laboratory reports.
3. All results are expressed as ppm unless otherwise indicated.
4. Metal concentrations represent total concentration of various forms of each metal.
5. E Coli and Fecal Coli results expressed with ">" symbol indicate that the number of colonies were too high for the selected dilution rate.
6. Results expressed with "<" symbol indicate that the concentrations are below Method Detection Limits.

TABLE 40
CSO DISCHARGE GRAB SAMPLING DATA - STORM EVENT NO. 3
LITTLE CALUMET RIVER SAMPLING
CSO MASTER PLAN - PHASE II
SANITARY DISTRICT OF HAMMOND, INDIANA

Station	Location	Sample Time	Ammonia	Chloride	Total Cyanide	Fats, Oil & Grease	Fluoride	Nitrate	Sulfate	Total Dissolved Solids	Total Phenolics	Total Phosphate	Hardness	Organic Nitrogen
LC-CSO-1	Kennedy - Ejector P.S.	01:00 PM	2.10	15	<0.50	14.0	<0.50	<0.20	16	131	<1.00	2.3	140	4.20
LC-CSO-2	Calumet / Munster P.S.	12:50 PM	5.74	69	<0.50	11.0	<0.50	<0.20	56	301	<1.00	2.8	160	6.26
LC-CSO-3	Jackson P.S.	01:25 PM	3.92	43	<0.50	7.0	<0.50	<0.20	38	139	<1.00	3.2	130	6.88
LC-CSO-4	173 rd / Forest P.S.	01:10 PM	4.48	31	<0.50	6.0	<0.50	<0.20	37	192	<1.00	2.0	110	4.62

Station	Location	Sample Time	E. Coli #col/100ml	Fecal Coli #col/100ml	Chlorophyll -A (ug/L)
LC-CSO-1	Kennedy - Ejector P.S.	01:00 PM	480,000	550,000	0.90
LC-CSO-2	Calumet / Munster P.S.	12:50 PM	2,600,000	3,500,000	11.88
LC-CSO-3	Jackson P.S.	01:25 PM	3,600,000	2,500,000	0.70
LC-CSO-4	173 rd / Forest P.S.	01:10 PM	5,300,000	4,900,000	0.30

Station	Location	Sample Time	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Molybdenum	Silver	Copper	Nickel	Zinc
LC-CSO-1	Kennedy - Ejector P.S.	01:00 PM	<0.200	0.14	<0.02	<0.10	<0.20	0.0011	<0.200	<0.20	<0.20	0.10	<0.10	0.90
LC-CSO-2	Calumet / Munster P.S.	12:50 PM	<0.200	<0.10	<0.02	<0.10	<0.20	<0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	0.17
LC-CSO-3	Jackson P.S.	01:25 PM	<0.200	<0.10	<0.02	<0.10	<0.20	0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	0.22
LC-CSO-4	173 rd / Forest P.S.	01:10 PM	<0.200	<0.10	<0.02	<0.10	<0.20	<0.0003	<0.200	<0.20	<0.20	<0.10	<0.10	0.19

Notes:
1. Storm Event No. 3 occurred on October 31,1994. 2.24 inches of rain fell from 12:30 AM, Oct 31 to 7:30 AM, Nov 1.
2. All of the above information is summerized from EMT, INC. laboratory reports.
3. All results are expressed as ppm unless otherwise indicated.
4. Metal concentrations represent total concentration of various forms of each metal.
5. Results expressed with "<" symbol indicate that the concentrations are below Method Detection Limits.
6. Toxic metal samples are collected only at Kennedy Ejector Pump Station.
7. E. Coli and Fecal Coli samples were diluted to be able to read a large number of colonies.

Appendix 9

Gary Green Link Master Plan

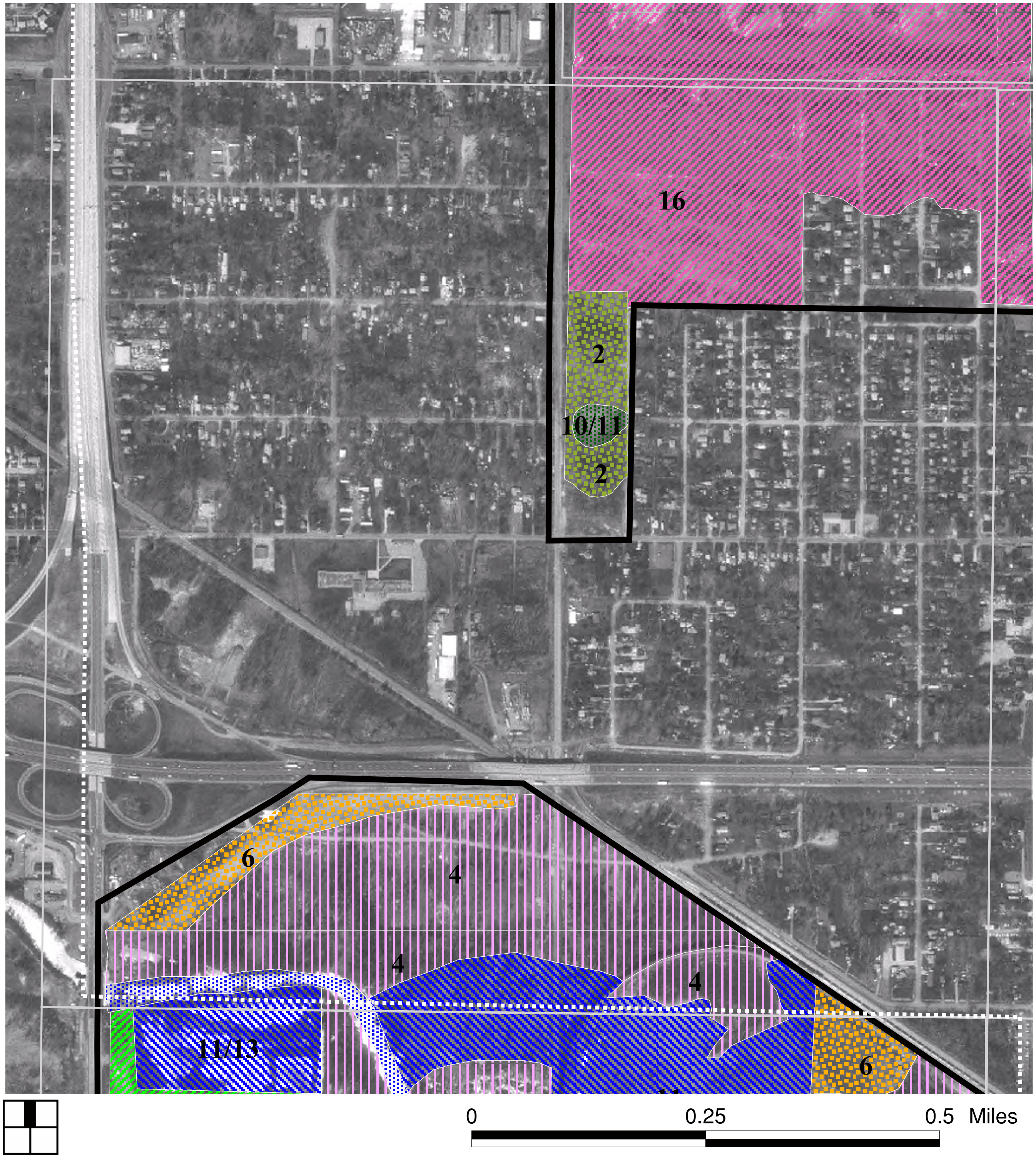
RW ARMSTRONG™
Inspiration to reality.

The Gary Green Link Master Plan was completed in February 2005 by Wolff Clements and Associates, Ltd. in association with Applied Ecological Services, Inc., Urban Words, Ltd., McElroy Associates, Inc., and Ambriz Graphic Design. The study was conducted through a grant from Indiana Department of Natural Resources, Lake Michigan Coastal Program, and Great Lakes Coastal Restoration Grants Program.

The objective of the study was to find a natural resources greenway around the City of Gary through the use of public process. The ring around the city would connect the Grand Calumet River, Little Calumet River and the Lake Michigan shoreline. Relevant objectives of this project were to:

- Identify, protect, and restore globally significant natural resources
- Identify, protect, and restore other locally significant natural resources, natural areas, and open spaces
- Extend the green corridor that is already part of the Indiana Dunes National Lakeshore and other protected public lands
- Provide recreational opportunity as a bicycle/pedestrian multi-use trail

As part of this study a detailed land inventory map was created following the proposed ring around the city to connect the Little Calumet River, Grand Calumet River and the Lake Michigan shoreline. This land use inventory map was used to assist in determining areas of natural buffers and riparian areas along the corridor being looked at in the Little Calumet River Watershed Management Plan. The following maps are those that cover the area overlapping between the two studies.



Legend

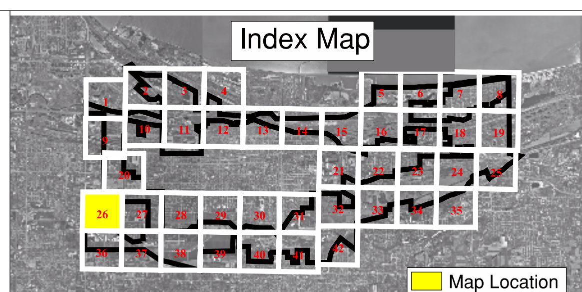
Field Base Map - 26

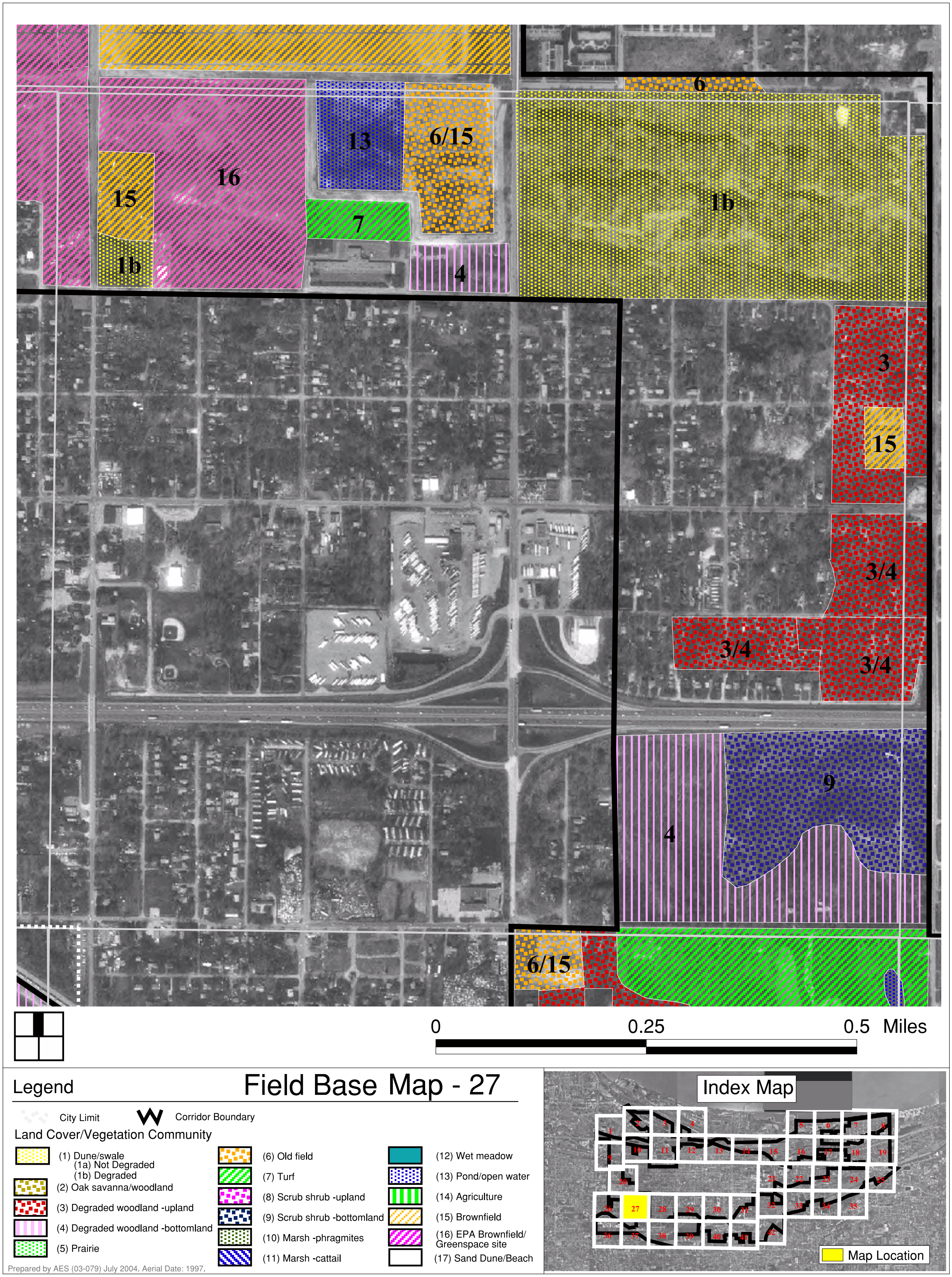
City Limit — Corridor Boundary

Land Cover/Vegetation Community

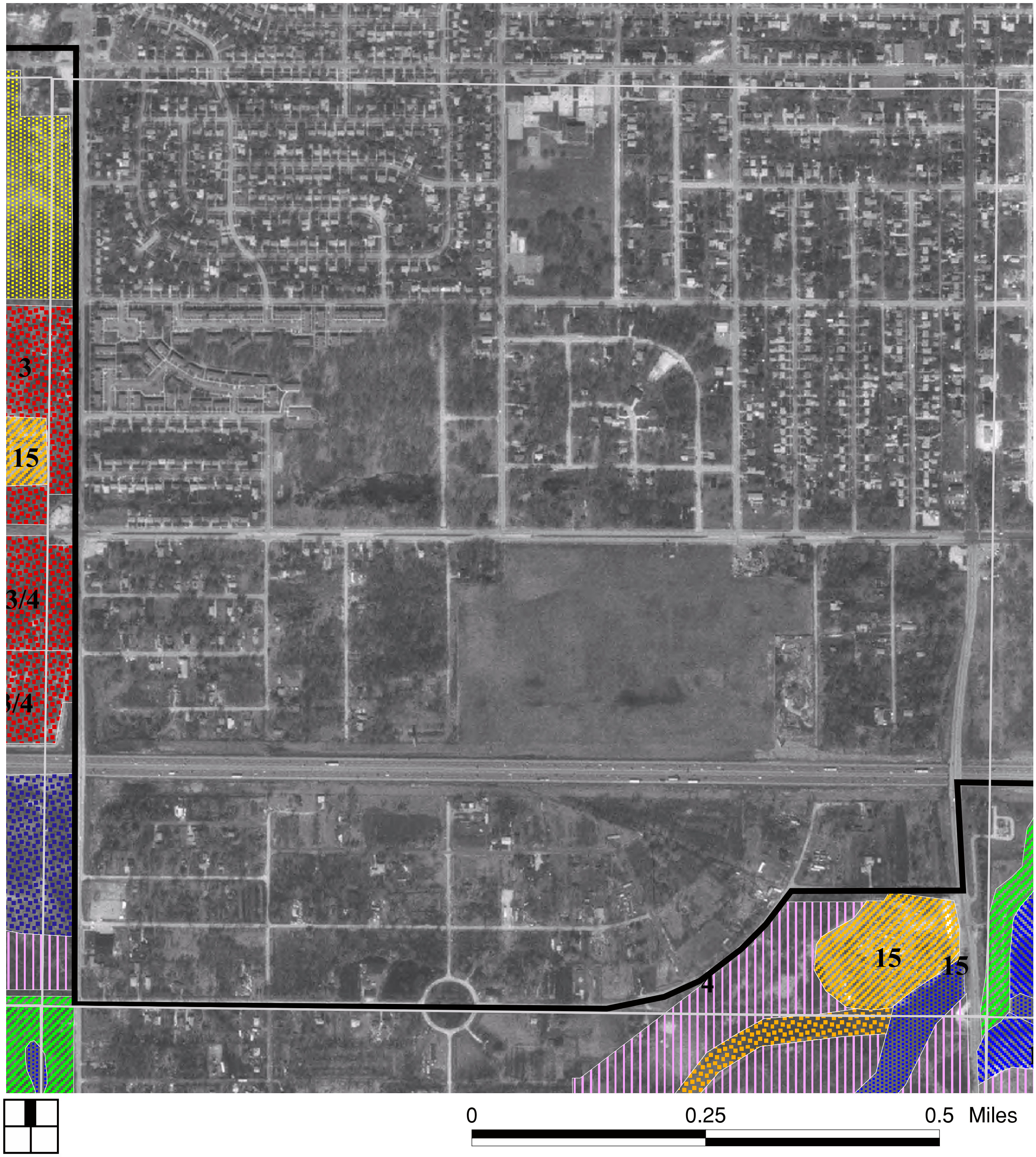
- (1) Dune/swale
  - (1a) Not Degraded
  - (1b) Degraded
- (2) Oak savanna/woodland
- (3) Degraded woodland -upland
- (4) Degraded woodland -bottomland
- (5) Prairie
- (6) Old field
- (7) Turf
- (8) Scrub shrub -upland
- (9) Scrub shrub -bottomland
- (10) Marsh -phragmites
- (11) Marsh -cattail
- (12) Wet meadow
- (13) Pond/open water
- (14) Agriculture
- (15) Brownfield
- (16) EPA Brownfield/ Greenspace site
- (17) Sand Dune/Beach

Prepared by AES (03-079) July 2004. Aerial Date: 1997.





6
13
6/15
16
15
1b
7
1b
4
3
15
3/4
3/4
3/4
9
4
6/15
0
0.25
0.5 Miles
Legend
Field Base Map - 27
City Limit
Corridor Boundary
Land Cover/Vegetation Community
(1) Dune/swale
(1a) Not Degraded
(1b) Degraded
(2) Oak savanna/woodland
(3) Degraded woodland -upland
(4) Degraded woodland -bottomland
(5) Prairie
(6) Old field
(7) Turf
(8) Scrub shrub -upland
(9) Scrub shrub -bottomland
(10) Marsh -phragmites
(11) Marsh -cattail
(12) Wet meadow
(13) Pond/open water
(14) Agriculture
(15) Brownfield
(16) EPA Brownfield/ Greenspace site
(17) Sand Dune/Beach
Prepared by AES (03-079) July 2004. Aerial Date: 1997.
Index Map
Map Location



Legend

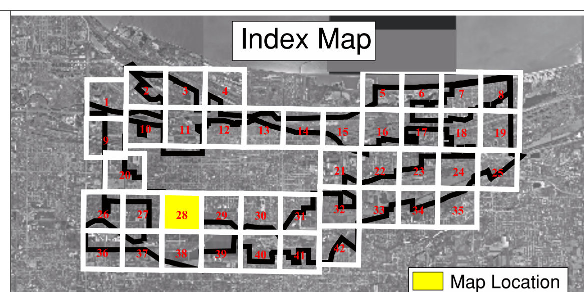
Field Base Map - 28

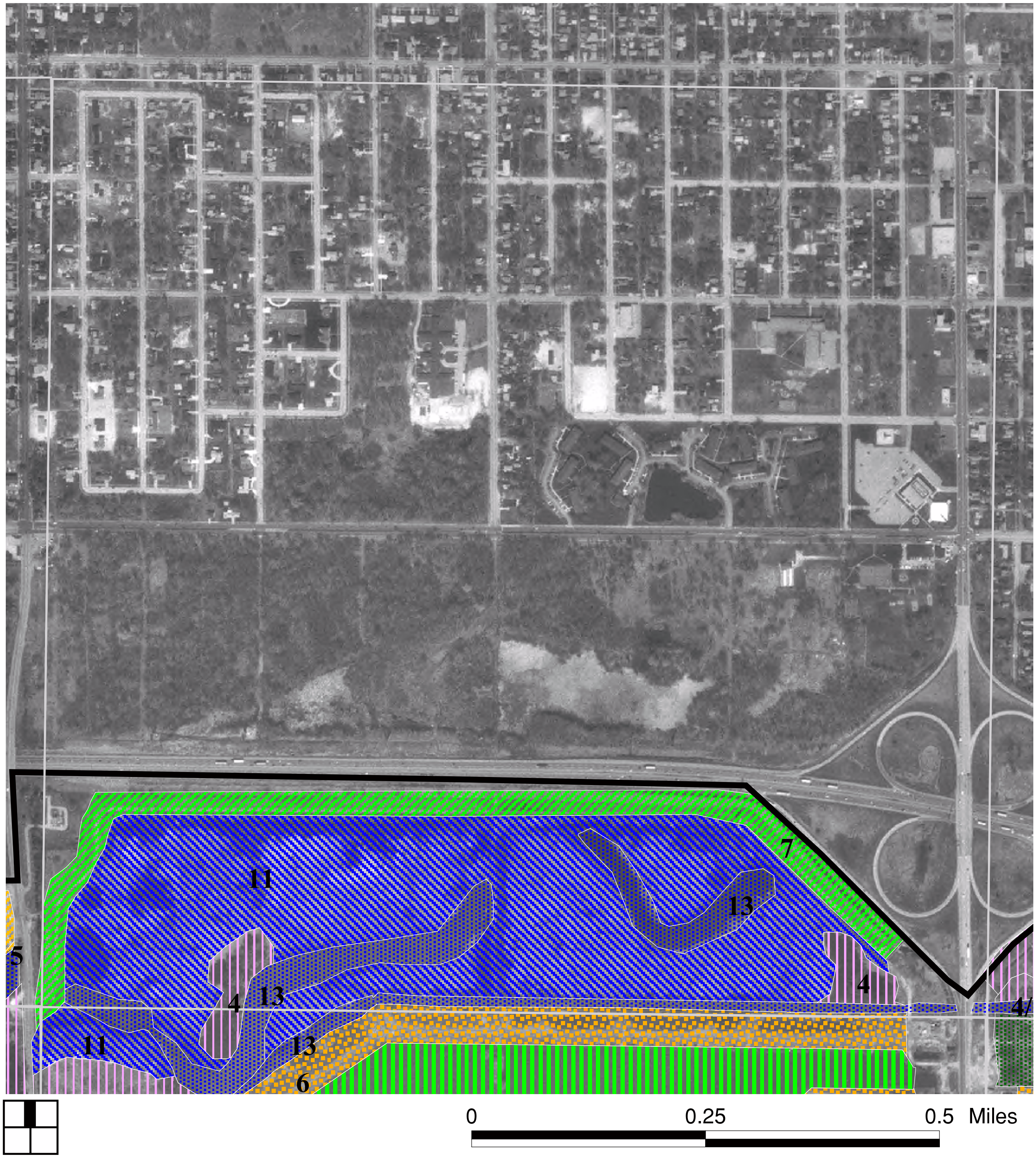
City Limit
Corridor Boundary

Land Cover/Vegetation Community

- (1) Dune/swale
  - (1a) Not Degraded
  - (1b) Degraded
- (2) Oak savanna/woodland
- (3) Degraded woodland -upland
- (4) Degraded woodland -bottomland
- (5) Prairie
- (6) Old field
- (7) Turf
- (8) Scrub shrub -upland
- (9) Scrub shrub -bottomland
- (10) Marsh -phragmites
- (11) Marsh -cattail
- (12) Wet meadow
- (13) Pond/open water
- (14) Agriculture
- (15) Brownfield
- (16) EPA Brownfield/ Greenspace site
- (17) Sand Dune/Beach

Prepared by AES (03-079) July 2004. Aerial Date: 1997.





Legend

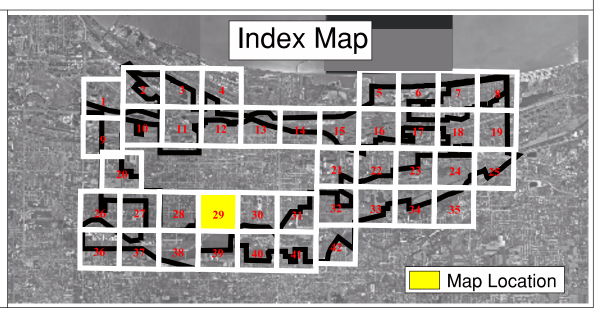
Field Base Map - 29

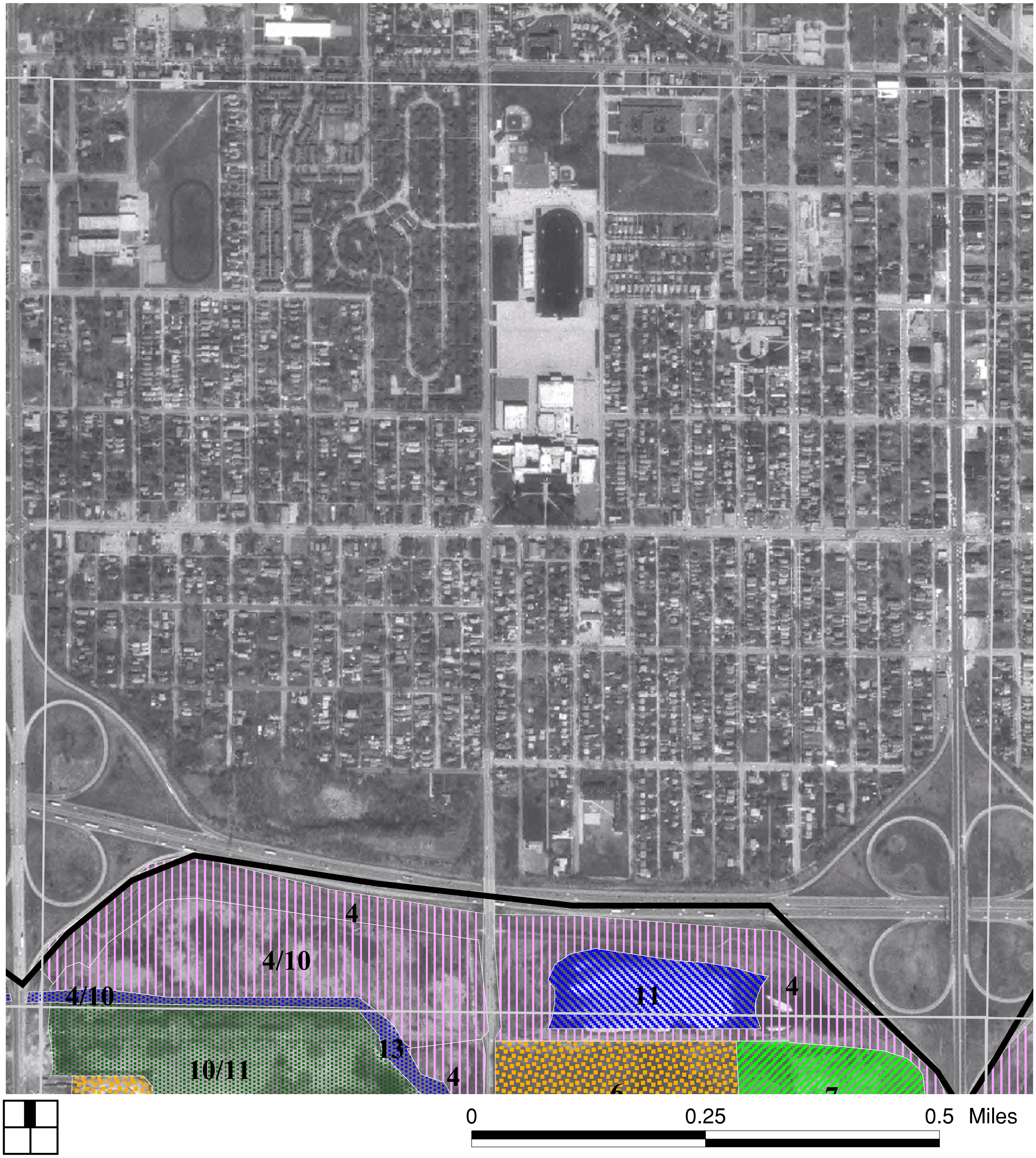
City Limit
Corridor Boundary

Land Cover/Vegetation Community

(1) Dune/swale
(1a) Not Degraded
(1b) Degraded
(2) Oak savanna/woodland
(3) Degraded woodland -upland
(4) Degraded woodland -bottomland
(5) Prairie
(6) Old field
(7) Turf
(8) Scrub shrub -upland
(9) Scrub shrub -bottomland
(10) Marsh -phragmites
(11) Marsh -cattail
(12) Wet meadow
(13) Pond/open water
(14) Agriculture
(15) Brownfield
(16) EPA Brownfield/ Greenspace site
(17) Sand Dune/Beach

Prepared by AES (03-079) July 2004. Aerial Date: 1997.





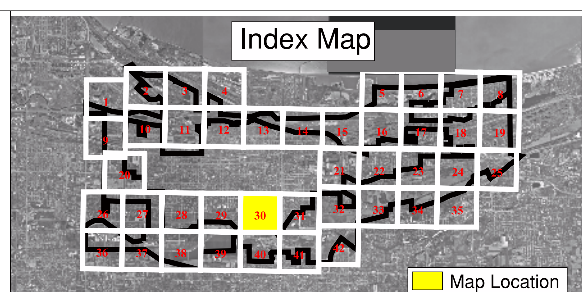
Legend

Field Base Map - 30

City Limit
Corridor Boundary

Land Cover/Vegetation Community

(1) Dune/swale
(1a) Not Degraded
(1b) Degraded
(2) Oak savanna/woodland
(3) Degraded woodland -upland
(4) Degraded woodland -bottomland
(5) Prairie
(6) Old field
(7) Turf
(8) Scrub shrub -upland
(9) Scrub shrub -bottomland
(10) Marsh -phragmites
(11) Marsh -cattail
(12) Wet meadow
(13) Pond/open water
(14) Agriculture
(15) Brownfield
(16) EPA Brownfield/ Greenspace site
(17) Sand Dune/Beach



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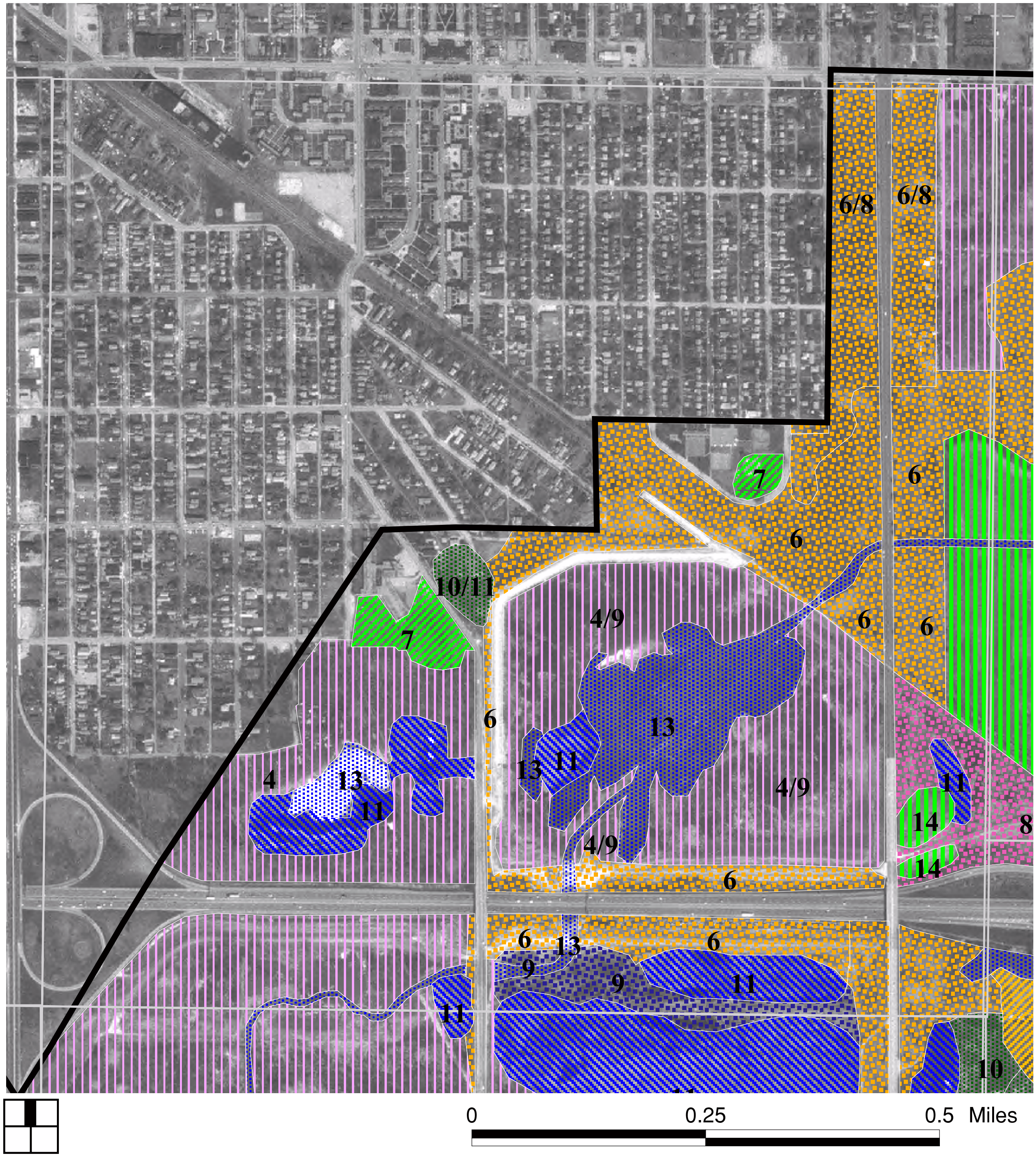


Legend

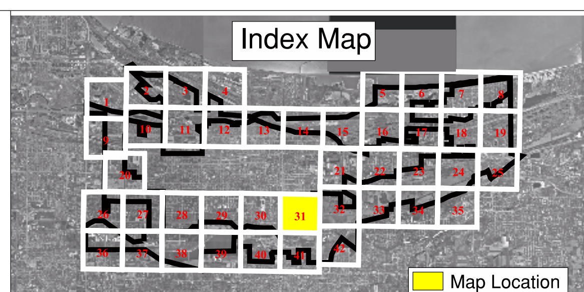
Field Base Map - 31

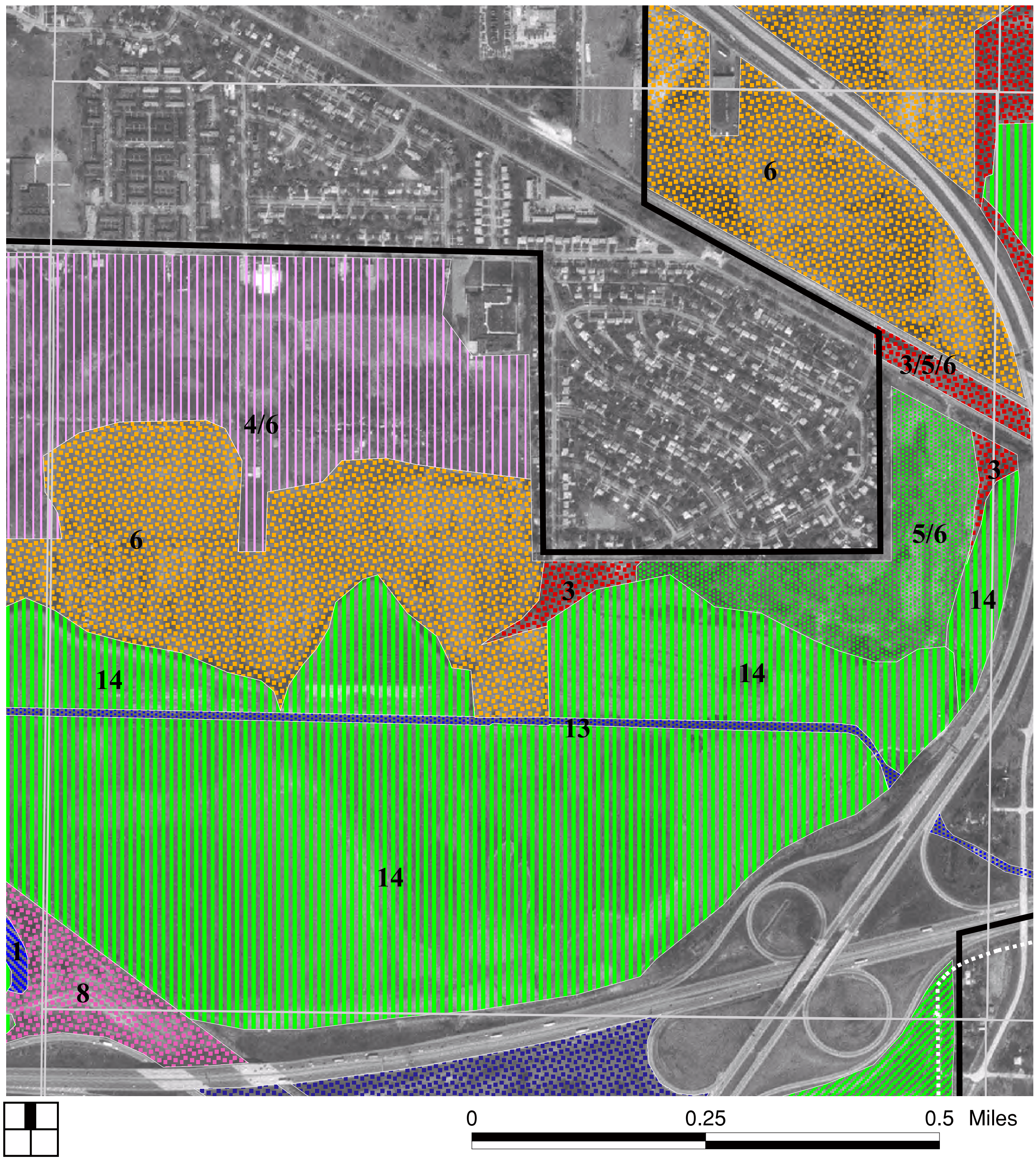
City Limit
Corridor Boundary

Land Cover/Vegetation Community

- (1) Dune/swale
  - (1a) Not Degraded
  - (1b) Degraded
- (2) Oak savanna/woodland
- (3) Degraded woodland -upland
- (4) Degraded woodland -bottomland
- (5) Prairie
- (6) Old field
- (7) Turf
- (8) Scrub shrub -upland
- (9) Scrub shrub -bottomland
- (10) Marsh -phragmites
- (11) Marsh -cattail
- (12) Wet meadow
- (13) Pond/open water
- (14) Agriculture
- (15) Brownfield
- (16) EPA Brownfield/ Greenspace site
- (17) Sand Dune/Beach

Prepared by AES (03-079) July 2004. Aerial Date: 1997.





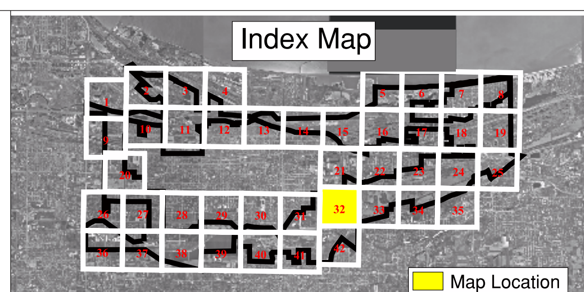
Field Base Map - 32

Legend

City Limit — Corridor Boundary

Land Cover/Vegetation Community

- (1) Dune/swale
  - (1a) Not Degraded
  - (1b) Degraded
- (2) Oak savanna/woodland
- (3) Degraded woodland -upland
- (4) Degraded woodland -bottomland
- (5) Prairie
- (6) Old field
- (7) Turf
- (8) Scrub shrub -upland
- (9) Scrub shrub -bottomland
- (10) Marsh -phragmites
- (11) Marsh -cattail
- (12) Wet meadow
- (13) Pond/open water
- (14) Agriculture
- (15) Brownfield
- (16) EPA Brownfield/ Greenspace site
- (17) Sand Dune/Beach



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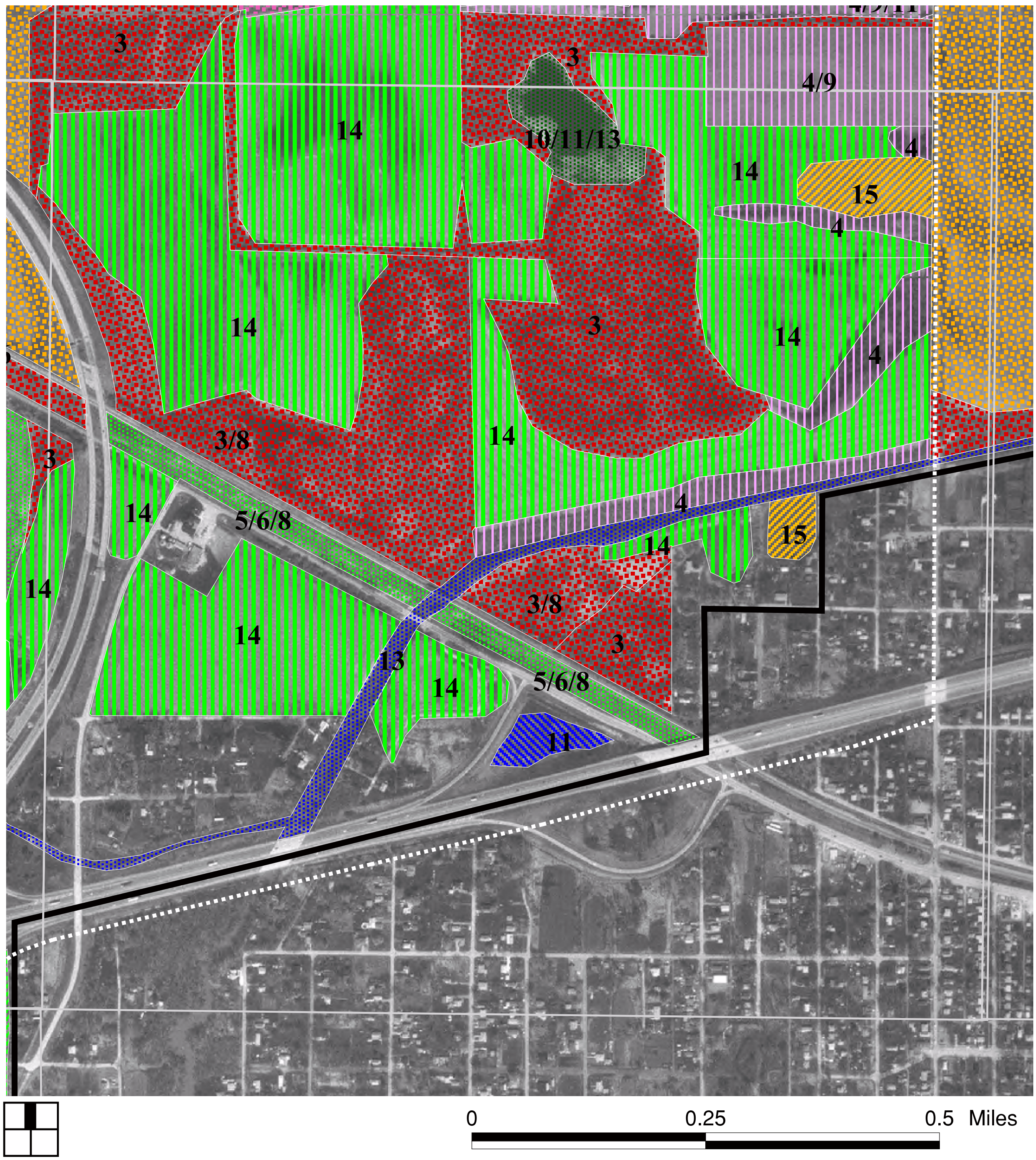

Legend

Field Base Map - 33

City Limit
Corridor Boundary

Land Cover/Vegetation Community

(1) Dune/swale
(1a) Not Degraded
(1b) Degraded
(2) Oak savanna/woodland
(3) Degraded woodland -upland
(4) Degraded woodland -bottomland
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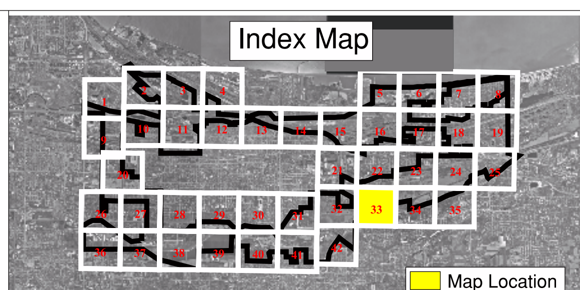
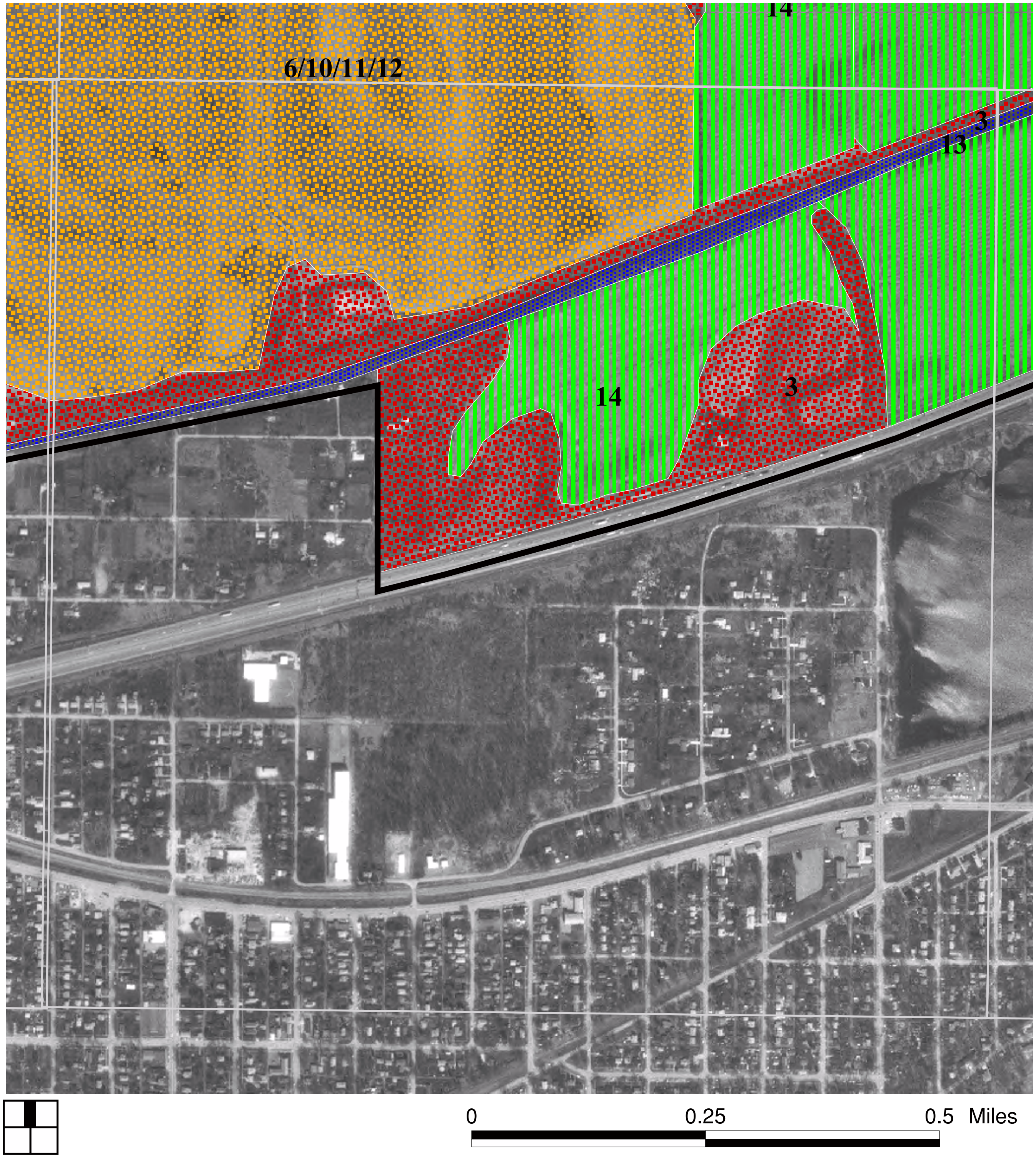
(13) Pond/open water
(14) Agriculture
(15) Brownfield
(16) EPA Brownfield/ Greenspace site
(17) Sand Dune/Beach

Prepared by AES (03-079) July 2004. Aerial Date: 1997.





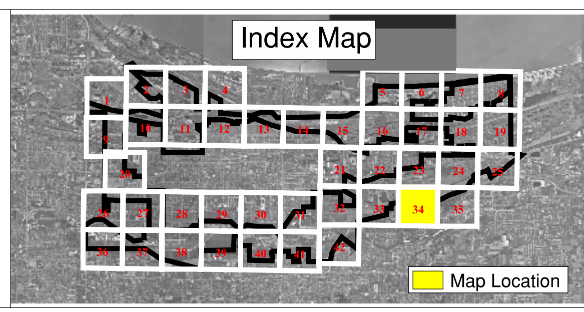
Legend

Field Base Map - 34

City Limit
Corridor Boundary

Land Cover/Vegetation Community

(1) Dune/swale
(1a) Not Degraded
(1b) Degraded
(2) Oak savanna/woodland
(3) Degraded woodland -upland
(4) Degraded woodland -bottomland
(5) Prairie
(6) Old field
(7) Turf
(8) Scrub shrub -upland
(9) Scrub shrub -bottomland
(10) Marsh -phragmites
(11) Marsh -cattail
(12) Wet meadow
(13) Pond/open water
(14) Agriculture
(15) Brownfield
(16) EPA Brownfield/ Greenspace site
(17) Sand Dune/Beach



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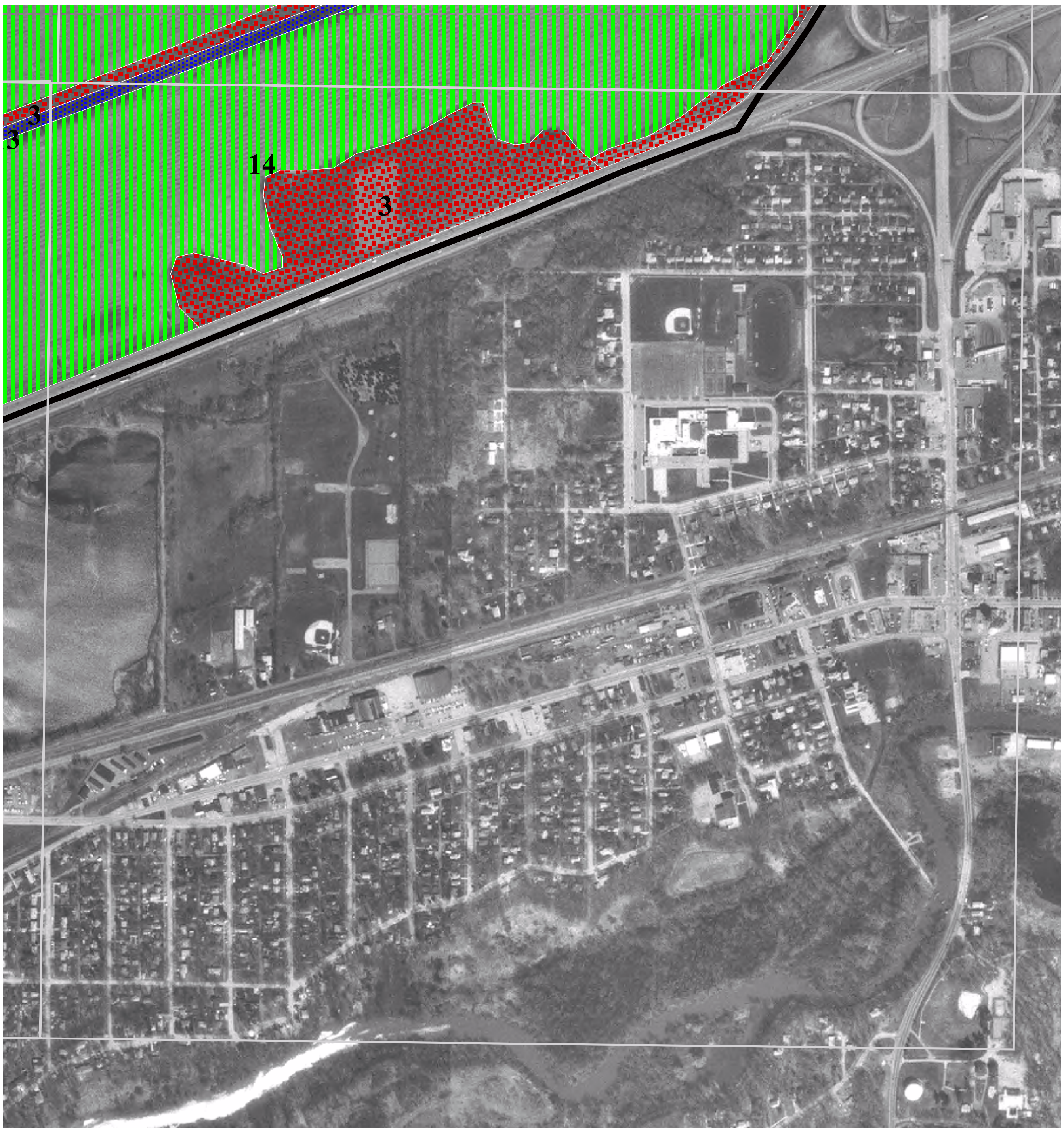


0 0.25 0.5 Miles

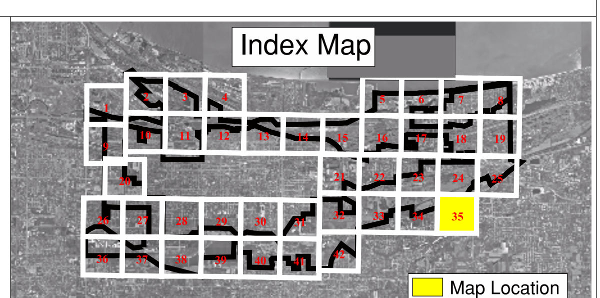
Legend

Field Base Map - 35

City Limit
Corridor Boundary

Land Cover/Vegetation Community

- (1) Dune/swale
  - (1a) Not Degraded
  - (1b) Degraded
- (2) Oak savanna/woodland
- (3) Degraded woodland -upland
- (4) Degraded woodland -bottomland
- (5) Prairie
- (6) Old field
- (7) Turf
- (8) Scrub shrub -upland
- (9) Scrub shrub -bottomland
- (10) Marsh -phragmites
- (11) Marsh -cattail
- (12) Wet meadow
- (13) Pond/open water
- (14) Agriculture
- (15) Brownfield
- (16) EPA Brownfield/ Greenspace site
- (17) Sand Dune/Beach



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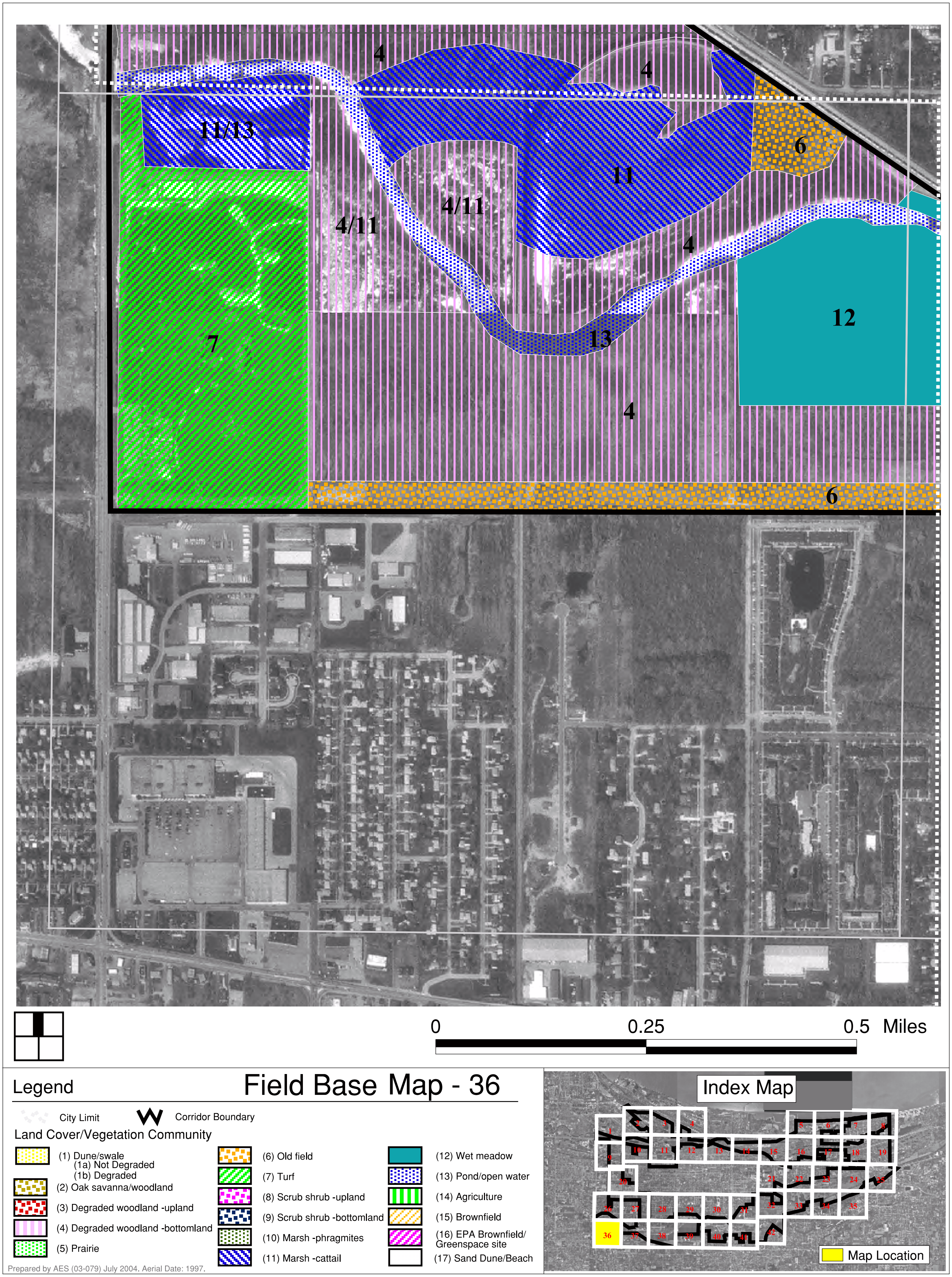
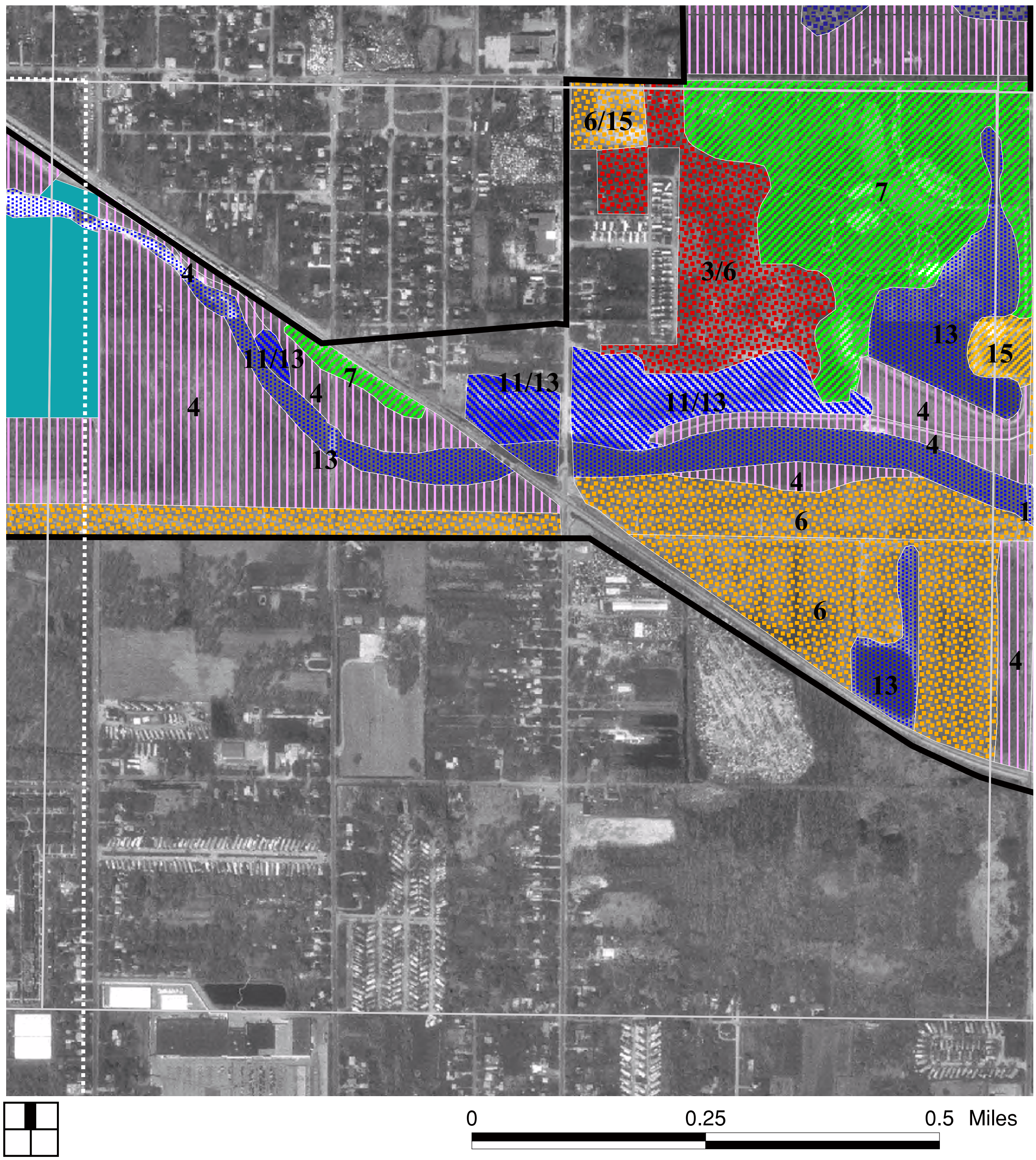

4
4
11/13
6
11
4/11
4/11
4
12
7
13
4
6
0
0.25
0.5 Miles
Legend
Field Base Map - 36
City Limit
Corridor Boundary
Land Cover/Vegetation Community
(1) Dune/swale
(1a) Not Degraded
(1b) Degraded
(2) Oak savanna/woodland
(3) Degraded woodland -upland
(4) Degraded woodland -bottomland
(5) Prairie
(6) Old field
(7) Turf
(8) Scrub shrub -upland
(9) Scrub shrub -bottomland
(10) Marsh -phragmites
(11) Marsh -cattail
(12) Wet meadow
(13) Pond/open water
(14) Agriculture
(15) Brownfield
(16) EPA Brownfield/ Greenspace site
(17) Sand Dune/Beach
Prepared by AES (03-079) July 2004. Aerial Date: 1997.
Index Map
Map Location



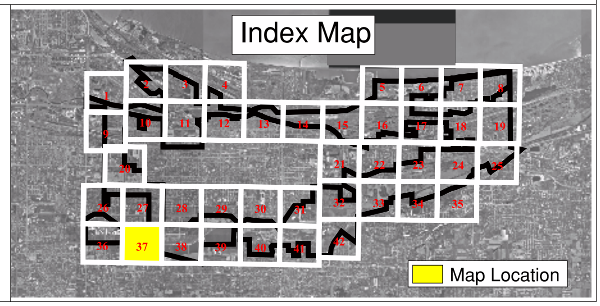
Legend

Field Base Map - 37

City Limit
Corridor Boundary

Land Cover/Vegetation Community

- (1) Dune/swale
  - (1a) Not Degraded
  - (1b) Degraded
- (2) Oak savanna/woodland
- (3) Degraded woodland -upland
- (4) Degraded woodland -bottomland
- (5) Prairie
- (6) Old field
- (7) Turf
- (8) Scrub shrub -upland
- (9) Scrub shrub -bottomland
- (10) Marsh -phragmites
- (11) Marsh -cattail
- (12) Wet meadow
- (13) Pond/open water
- (14) Agriculture
- (15) Brownfield
- (16) EPA Brownfield/ Greenspace site
- (17) Sand Dune/Beach



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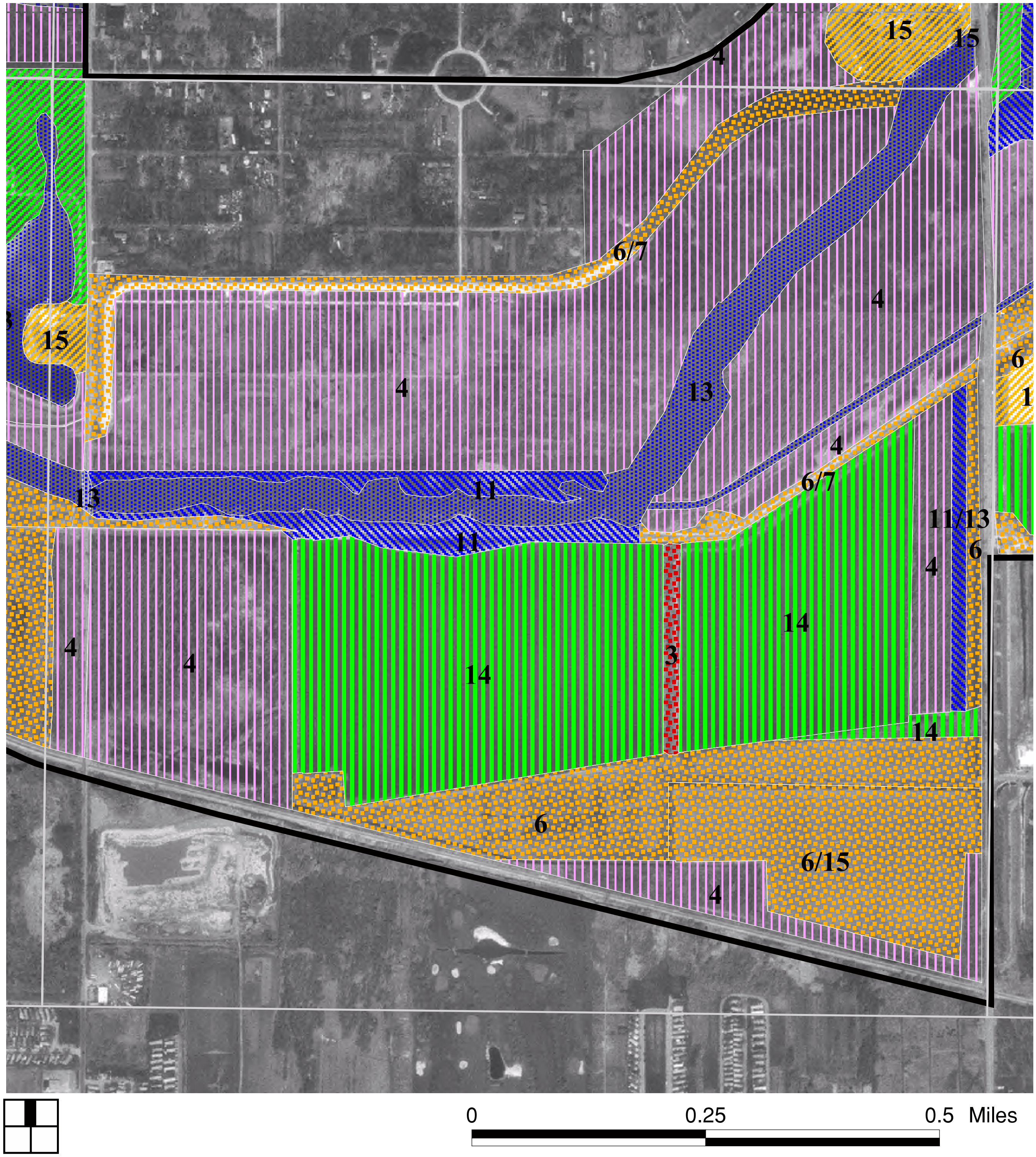


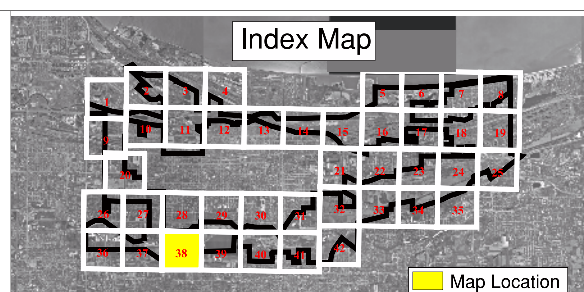
Legend

Field Base Map - 38

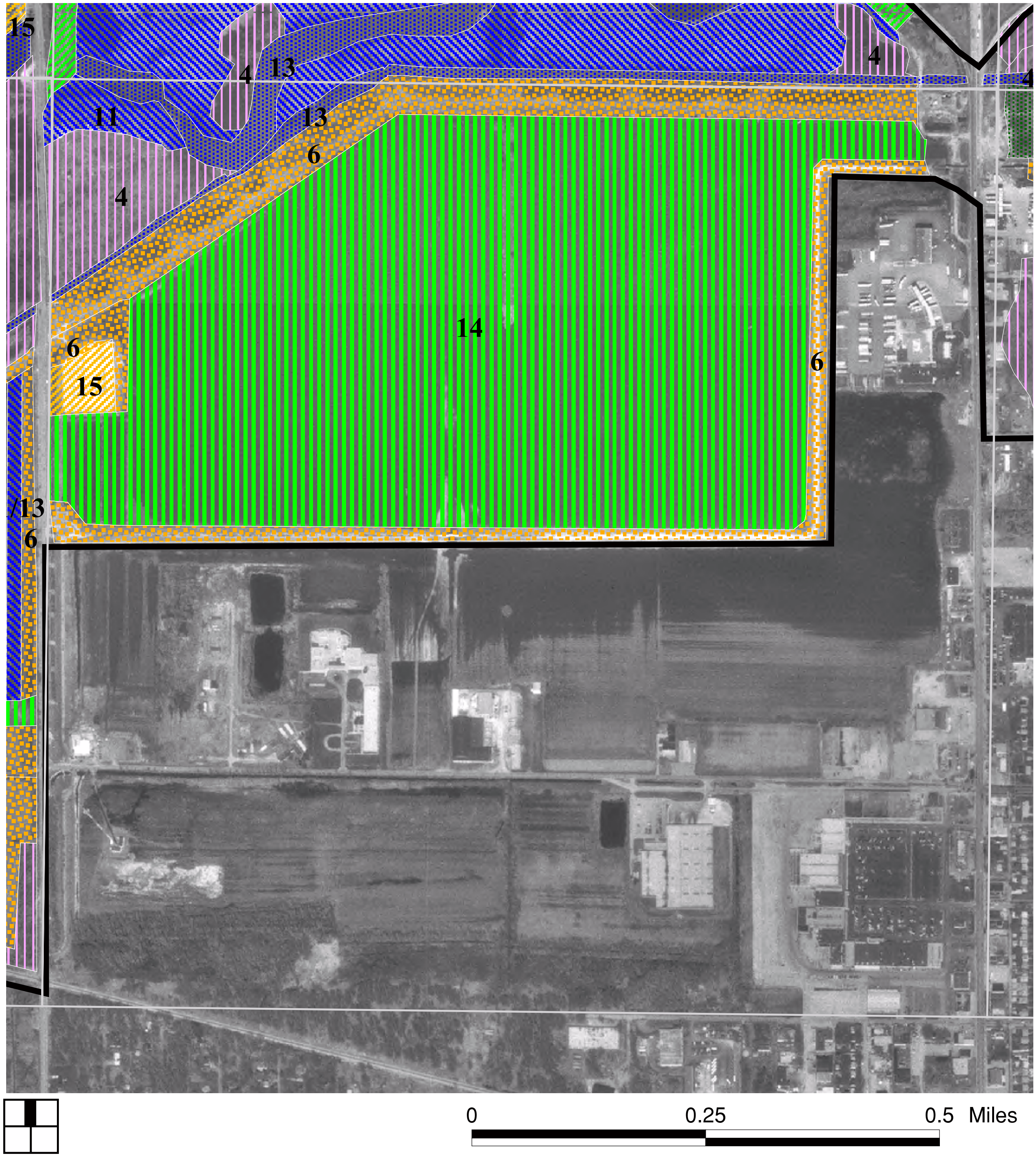
City Limit
Corridor Boundary

Land Cover/Vegetation Community

(1) Dune/swale
(1a) Not Degraded
(1b) Degraded
(2) Oak savanna/woodland
(3) Degraded woodland -upland
(4) Degraded woodland -bottomland
(5) Prairie
(6) Old field
(7) Turf
(8) Scrub shrub -upland
(9) Scrub shrub -bottomland
(10) Marsh -phragmites
(11) Marsh -cattail
(12) Wet meadow
(13) Pond/open water
(14) Agriculture
(15) Brownfield
(16) EPA Brownfield/ Greenspace site
(17) Sand Dune/Beach



Prepared by AES (03-079) July 2004. Aerial Date: 1997.



Legend

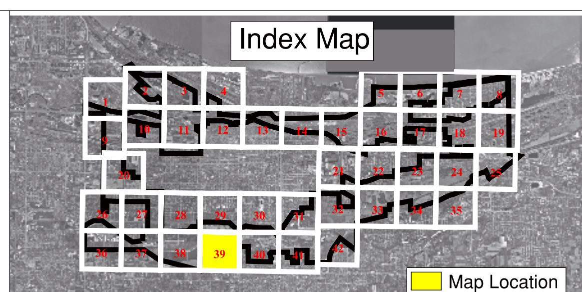
Field Base Map - 39

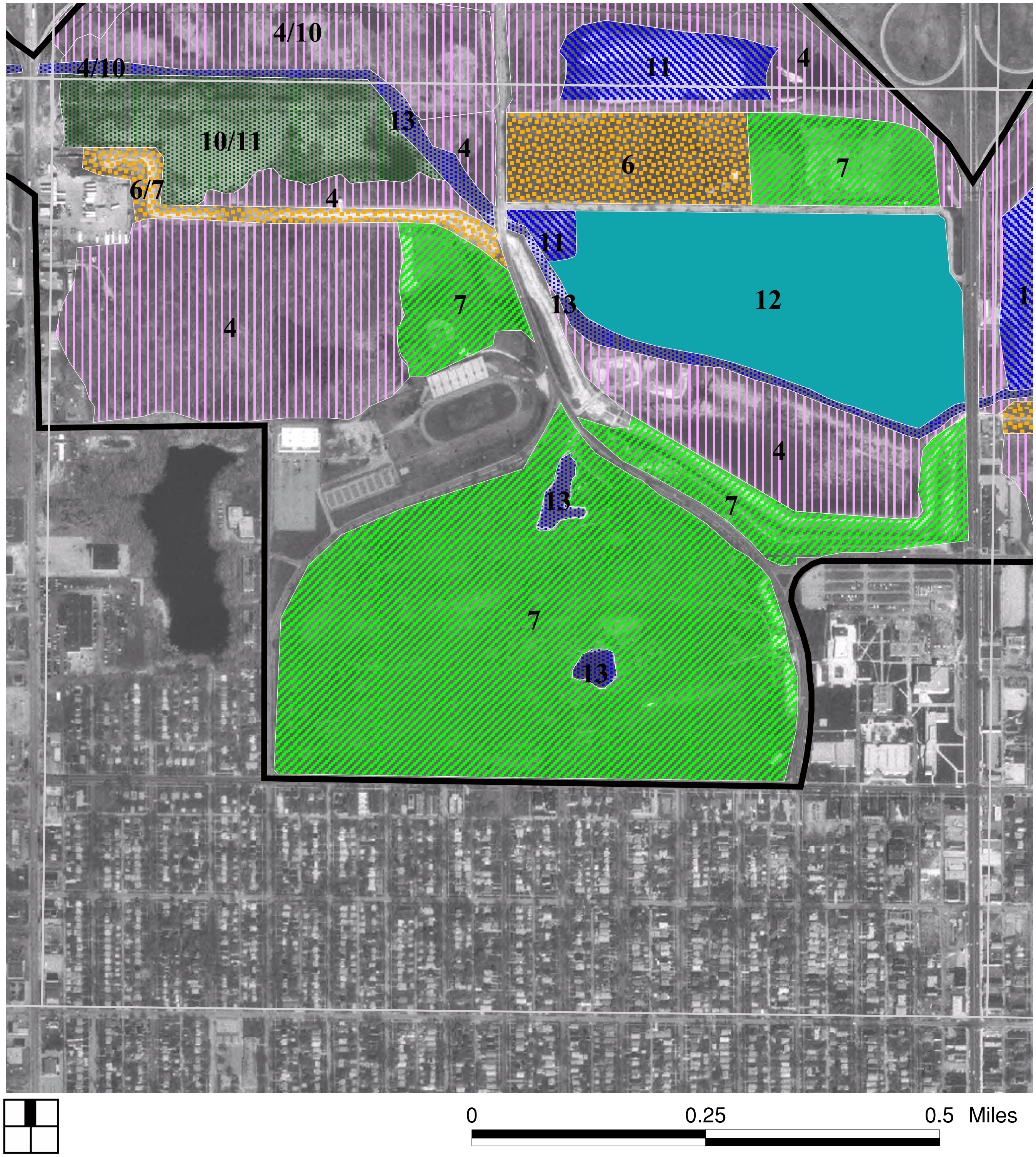
City Limit
Corridor Boundary

Land Cover/Vegetation Community

- (1) Dune/swale
  - (1a) Not Degraded
  - (1b) Degraded
- (2) Oak savanna/woodland
- (3) Degraded woodland -upland
- (4) Degraded woodland -bottomland
- (5) Prairie
- (6) Old field
- (7) Turf
- (8) Scrub shrub -upland
- (9) Scrub shrub -bottomland
- (10) Marsh -phragmites
- (11) Marsh -cattail
- (12) Wet meadow
- (13) Pond/open water
- (14) Agriculture
- (15) Brownfield
- (16) EPA Brownfield/ Greenspace site
- (17) Sand Dune/Beach

Prepared by AES (03-079) July 2004. Aerial Date: 1997.





Legend

Field Base Map - 40

City Limit

Corridor Boundary

Land Cover/Vegetation Community

(1) Dune/swale
(1a) Not Degraded
(1b) Degraded

(2) Oak savanna/woodland

(3) Degraded woodland -upland

(4) Degraded woodland -bottomland

(5) Prairie

(6) Old field

(7) Turf

(8) Scrub shrub -upland

(9) Scrub shrub -bottomland

(10) Marsh -phragmites

(11) Marsh -cattail

(12) Wet meadow

(13) Pond/open water

(14) Agriculture

(15) Brownfield

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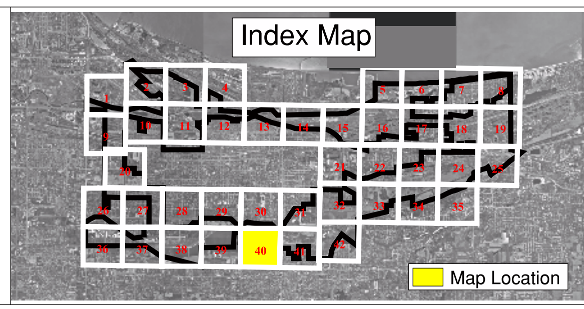

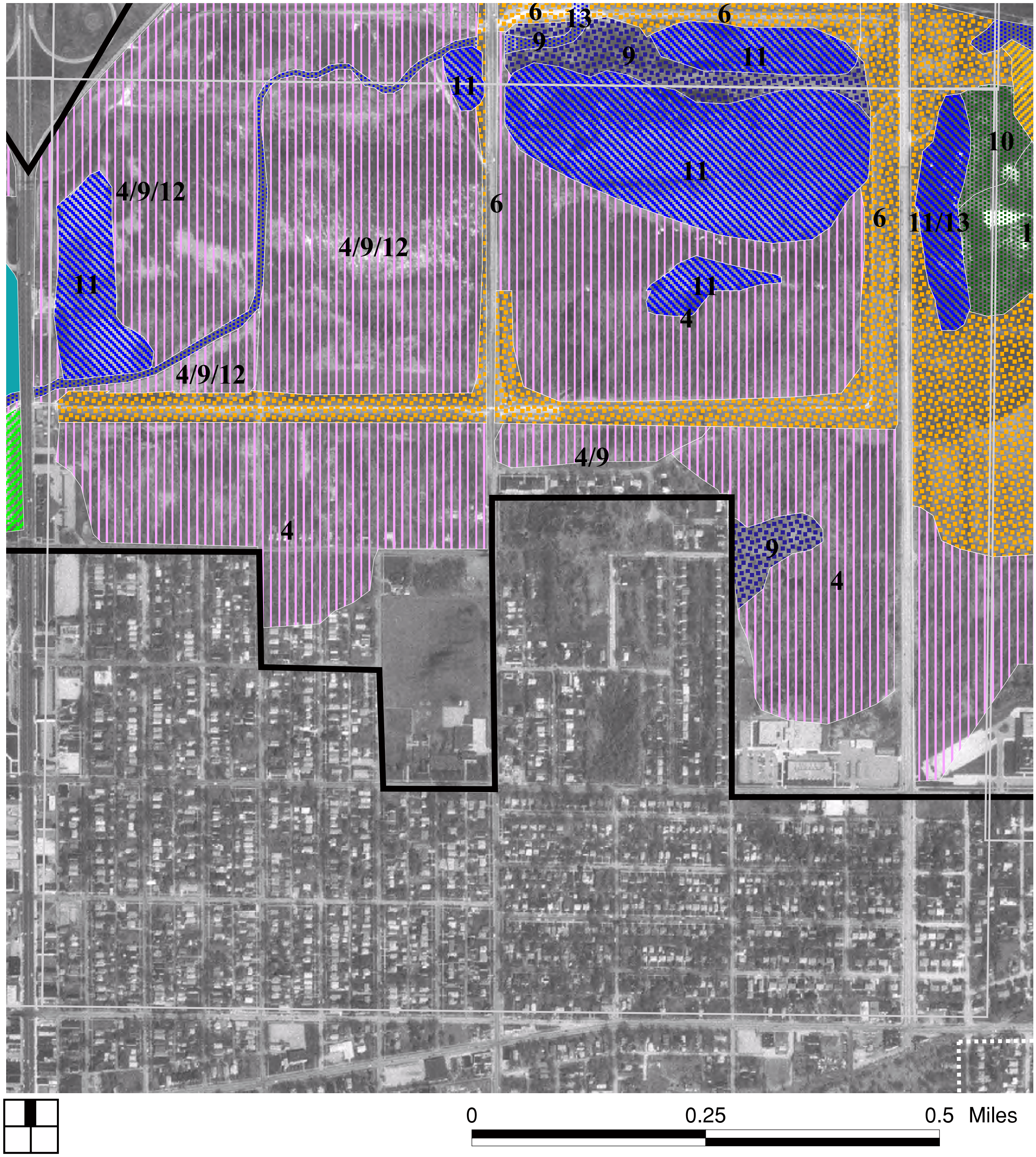

Field Base Map - 41

Legend

City Limit
Corridor Boundary

Land Cover/Vegetation Community

- (1) Dune/swale
  - (1a) Not Degraded
  - (1b) Degraded
- (2) Oak savanna/woodland
- (3) Degraded woodland -upland
- (4) Degraded woodland -bottomland
- (5) Prairie
- (6) Old field
- (7) Turf
- (8) Scrub shrub -upland
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- (15) Brownfield
- (16) EPA Brownfield/ Greenspace site
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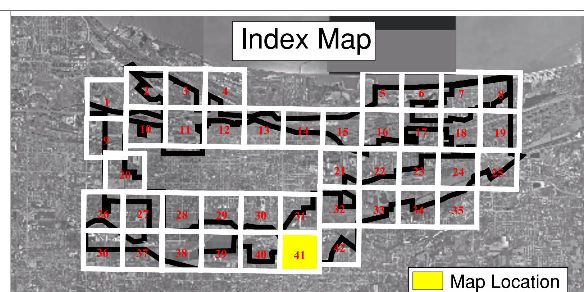
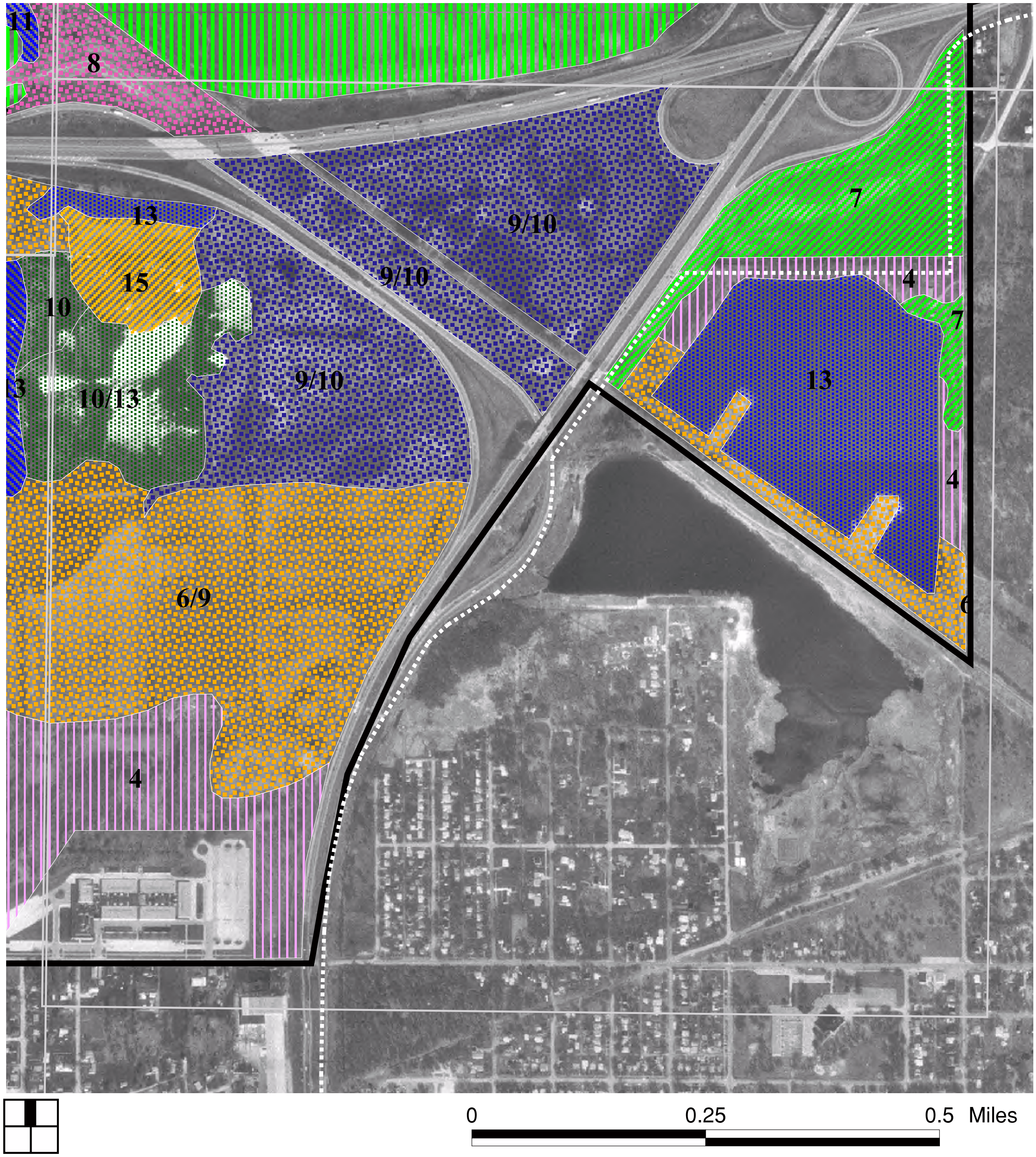


Prepared by AES (03-079) July 2004. Aerial Date: 1997.



Legend

Field Base Map - 42

City Limit

Corridor Boundary

Land Cover/Vegetation Community

(1) Dune/swale
(1a) Not Degraded
(1b) Degraded
(2) Oak savanna/woodland
(3) Degraded woodland -upland
(4) Degraded woodland -bottomland
(5) Prairie
(6) Old field
(7) Turf
(8) Scrub shrub -upland
(9) Scrub shrub -bottomland
(10) Marsh -phragmites
(11) Marsh -cattail
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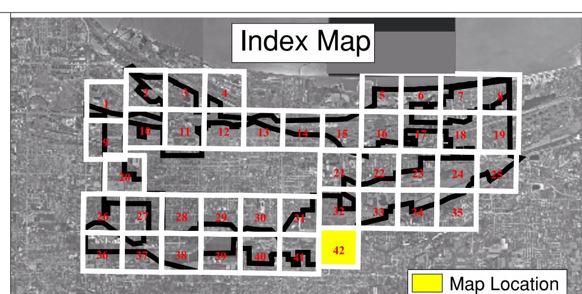
(13) Pond/open water
(14) Agriculture
(15) Brownfield
(16) EPA Brownfield/ Greenspace site
(17) Sand Dune/Beach

Prepared by AES (03-079) July 2004. Aerial Date: 1997.



Scientific Name	Common Name	Status	Present in Corridor
Asclepias meadii	Mead's milkweed	FT	No
Cirsium pitcheri	Pitcher's thistle	FT	Yes
Haliaeetus leucocephalus	Bald eagle	FT	No
Lycaeides melissa samuelis	Karner blue butterfly	FE	Yes
Myotis sodalis	Indiana bat	FE	No
Chlidonias niger	Black tern	FC, SE	Unknown
Emydoidea blandingii	Blanding's turtle	FC, SE	Yes
Agalinis skinneriana	Pale false foxglove	FC, SE	Yes
Cirsium hillii	Hill's thistle	FC, SE	Yes
Eleocharis wolfii	Wolf's spike rush	FC, SR	Yes
Rhus aromatica arenaria	Beach (fragrant) sumac	FC, ST	Yes
Scirpus hallii	Hall's bulrush	FC, SE	Yes
Talinum rugospermum	Prairie fame-flower	FC, ST	Yes

Federal: FE = endangered; FT = threatened; FC = Species-at-Risk, under consideration for FE/FT listing.
State: SE = endangered; ST = threatened; SR = rare.

Table 1. Federally threatened and endangered species potentially present in the Corridor.

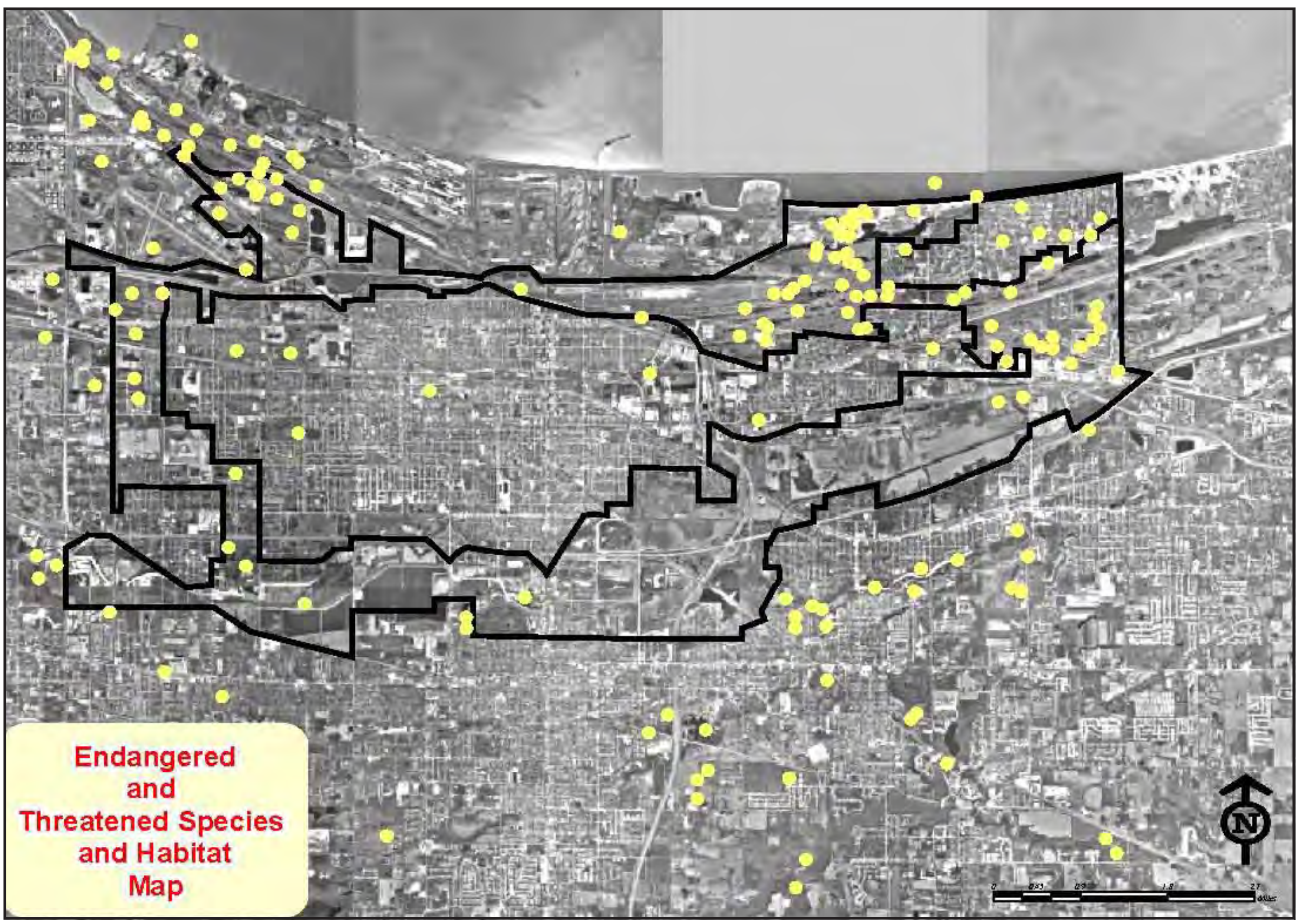


Figure 1. Endangered and Threatened Species and Habitat Map showing the locations of endangered and threatened species in the vicinity of the Gary Green Link.
(Applied Ecological Services)

Appendix 10

NIRPC Watershed Management Framework Plan

RW ARMSTRONG™
Inspiration to reality.

APPENDIX VII - Endangered and Threatened Species Found in Northwest Indiana

ENDANGERED, THREATENED AND RARE SPECIES DOCUMENTED FROM LAKE COUNTY, INDIANA

SPECIES NAME	COMMON NAME	STATE	FED	SRANK	GRANK
VASCULAR PLANT					
AGALINIS AURICULATA	EARLEAF FOXGLOVE	SE	**	S1	G3
AGALINIS SKINNERIANA	PALE FALSE FOXGLOVE	SE	**	S1	G3
AMELANCHIER HUMILIS	RUNNING SERVICEBERRY	SE	**	S1	G5
ANDROSACE OCCIDENTALIS	WESTERN ROCKJASMINE	ST	**	S2	G5
ARALIA HISPIDA	BRISTLY SARSAPARILLA	SE	**	S1	G5
ARCTOSTAPHYLOS UVA-URSI	BEARBERRY	SR	**	S2	G5
ARENARIA STRICTA	MICHAUX'S STITCHWORT	SR	**	S2	G5
ARETHUSA BULBOSA	SWAMP-PINK	SX	**	SX	G4
ARISTIDA INTERMEDIA	SLIM-SPIKE THREE-AWN GRASS	SR	**	S2	G?
ARISTIDA TUBERCULOSA	SEABEACH NEEDLEGRASS	SR	**	S2	G5
ARMORACIA AQUATICA	LAKE CRESS	SE	**	S1	G4?
ASCLEPIAS MEADII	MEAD'S MILKWEED	SRE	LT	SX	G2
ASTER BOREALIS	RUSHLIKE ASTER	SR	**	S2	G5
ASTER FURCATUS	FORKED ASTER	SR	**	S2	G3
ASTER SERICEUS	WESTERN SILVERY ASTER	SR	**	S2	G5
AUREOLARIA GRANDIFLORA VAR PULCHRA	LARGE-FLOWER FALSE-FOXGLOVE	SX	**	SX	G4G5T?
BETULA POPULIFOLIA	GRAY BIRCH	SX	**	SX	G5
BIDENS BECKII	BECK WATER-MARIGOLD	SE	**	S1	G4G5T4
BOTRYCHIUM MATRICARIIFOLIUM	CHAMOMILE GRAPE-FERN	ST	**	S2	G5
BOTRYCHIUM SIMPLEX	LEAST GRAPE-FERN	SE	**	S1	G5
BUCHNERA AMERICANA	BLUEHEARTS	SE	**	S1	G5?
CAREX AUREA	GOLDEN-FRUITED SEDGE	SR	**	S2	G5
CAREX BEBBII	BEBB'S SEDGE	ST	**	S2	G5
CAREX BRUNNESCENS	BROWNISH SEDGE	SE	**	S1	G5
CAREX CONOIDEA	PRAIRIE GRAY SEDGE	SE	**	S1	G4
CAREX CRAWEI	CRAWE SEDGE	ST	**	S2	G5
CAREX EBURNEA	EBONY SEDGE	SR	**	S2	G5
CAREX GARBERI	ELK SEDGE	ST	**	S2	G4
CAREX LIMOSA	MUD SEDGE	SE	**	S1	G5
CAREX RICHARDSONII	RICHARDSON SEDGE	SE	**	S1	G4
CEANOTHUS HERBACEUS	PRAIRIE REDROOT	SX	**	SX	G5
CIRSIUM HILLII	HILL'S THISTLE	SE	**	S1	G3
CIRSIUM PITCHERI	DUNE THISTLE	ST	LT	S2	G3
CLINTONIA BOREALIS	CLINTON LILY	SE	**	S1	G5
COELOGLOSSUM VIRIDE VAR VIRESCENS	LONG-BRACT GREEN ORCHIS	ST	**	S2	G5T5
CORNUS AMOMUM SSP AMOMUM	SILKY DOGWOOD	SE	**	S1	G5T?
CORNUS CANADENSIS	BUNCHBERRY	SE	**	S1	G5
CORNUS RUGOSA	ROUNDLEAF DOGWOOD	SR	**	S2	G5
CORYDALIS SEMPERVIRENS	PALE CORYDALIS	SE	**	S1	G4G5
CYPERUS DENTATUS	TOOTHED SEDGE	SE	**	S1	G4
CYPRIPEDIUM CALCEOLUS VAR PARVIFLORUM	SMALL YELLOW LADY'S-SLIPPER	SR	**	S2	G5
CYPRIPEDIUM CANDIDUM	SMALL WHITE LADY'S-SLIPPER	SR	**	S2	G4

STATE: SX=extirpated, SE=endangered, ST=threatened, SR=rare, SSC=special concern, WL=watch list, SG=significant,** no status but rarity warrants concern

FEDERAL: LE=endangered, LT=threatened, LELT=different listings for specific ranges of species, PE=proposed endangered, PT=proposed threatened, E/SA=appearance similar to LE species, **=not listed

APPENDIX VII - Endangered and Threatened Species Found in Northwest Indiana

ENDANGERED, THREATENED AND RARE SPECIES DOCUMENTED FROM LAKE COUNTY, INDIANA

SPECIES NAME	COMMON NAME	STATE	FED	SRANK	GRANK
DIERVILLA LONICERA	NORTHERN BUSH-HONEYSUCKLE	SR	**	S2	G5
DROSERA INTERMEDIA	SPOON-LEAVED SUNDEW	SR	**	S2	G5
ELEOCHARIS GENICULATA	CAPITATE SPIKE-RUSH	ST	**	S2	G5
ELEOCHARIS MELANOCARPA	BLACK-FRUITED SPIKE-RUSH	ST	**	S2	G4
ELEOCHARIS WOLFII	WOLF SPIKERUSH	SR	**	S2	G4
EQUISETUM VARIEGATUM	VARIEGATED HORSETAIL	SE	**	S1	G5
ERIOPHORUM ANGUSTIFOLIUM	NARROW-LEAVED COTTON-GRASS	SR	**	S2	G5
ERIOPHORUM GRACILE	SLENDER COTTON-GRASS	ST	**	S2	G5
GENTIANA PUBERULENTA	DOWNY GENTIAN	ST	**	S2	G4G5
GERANIUM BICKNELLII	BICKNELL NORTHERN CRANE'S-BILL	SE	**	S1	G5
GLYCERIA BOREALIS	SMALL FLOATING MANNA-GRASS	SE	**	S1	G5
HUDSONIA TOMENTOSA	SAND-HEATHER	ST	**	S2	G5
JUGLANS CINEREA	BUTTERNUT	WL	**	S3	G3G4
JUNCUS BALTICUS VAR LITTORALIS	BALTIC RUSH	SR	**	S2	G5T5
JUNCUS PELOCARPUS	BROWN-FRUITED RUSH	ST	**	S2	G5
JUNCUS SCIRPOIDES	SCIRPUS-LIKE RUSH	ST	**	S2	G5
JUNIPERUS COMMUNIS	GROUND JUNIPER	SR	**	S2	G5
LATHYRUS MARITIMUS VAR GLABER	BEACH PEAVINE	SE	**	S1	G5T4T5
LATHYRUS VENOSUS	SMOOTH VEINY PEA	ST	**	S2	G5
LECHEA STRICTA	UPRIGHT PINWEED	SX	**	SX	G4?
LINNAEA BOREALIS	TWINFLOWER	SX	**	SX	G5
LINUM SULCATUM	GROOVED YELLOW FLAX	SR	**	S2	G5
LUDWIGIA SPHAEROCARPA	GLOBE-FRUITED FALSE-LOOSESTRIFE	SE	**	S1	G5
LYCOPODIELLA INUNDATA	NORTHERN BOG CLUBMOSS	SE	**	S1	G5
MALAXIS UNIFOLIA	GREEN ADDER'S-MOUTH	SE	**	S1	G5
MELAMPYRUM LINEARE	AMERICAN COW-WHEAT	SR	**	S2	G5
MIKANIA SCANDENS	CLIMBING HEMPWEED	SE	**	S1	G5
MYOSOTIS LAXA	SMALLER FORGET-ME-NOT	SE	**	S1	G5
MYRIOPHYLLUM VERTICILLATUM	WHORLED WATER-MILFOIL	ST	**	S2	G5
OENOTHERA PERENNIS	SMALL SUNDROPS	ST	**	S2	G5
OROBANCHE FASCICULATA	CLUSTERED BROOMRAPE	SE	**	S1	G4
PANICUM BOREALE	NORTHERN WITCHGRASS	SR	**	S2	G5
PANICUM LEIBERGII	LEIBERG'S WITCHGRASS	ST	**	S2	G5
PERIDERIDIA AMERICANA	EASTERN EULOPHUS	SE	**	S1	G4
PINUS BANKSIANA	JACK PINE	SR	**	S2	G5
PINUS STROBUS	EASTERN WHITE PINE	SR	**	S2	G5
PLANTAGO CORDATA	HEART-LEAVED PLANTAIN	SE	**	S1	G4
PLATANTHERA CILIARIS	YELLOW-FRINGE ORCHIS	SE	**	S1	G5
PLATANTHERA HOOKERI	HOOKER ORCHIS	SX	**	SX	G5
PLATANTHERA HYPERBOREA	LEAFY NORTHERN GREEN ORCHIS	ST	**	S2	G5
PLATANTHERA LEUCOPHAEA	PRAIRIE WHITE-FRINGED ORCHID	SE	LT	S1	G2
PLATANTHERA PSYCODES	SMALL PURPLE-FRINGE ORCHIS	SR	**	S2	G5
POLYGONELLA ARTICULATA	EASTERN JOINTWEED	SR	**	S2	G5

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SPECIES NAME	COMMON NAME	STATE	FED	SRANK	GRANK
POLYGONUM CAREYI	CAREY'S SMARTWEED	ST	**	S2	G4
POLYTAENIA NUTTALLII	PRAIRIE PARSLEY	SE	**	S1	G5
POPULUS BALSAMIFERA	BALSAM POPLAR	SX	**	SX	G5
POTAMOGETON PULCHER	SPOTTED PONDWEED	SE	**	S1	G5
POTAMOGETON PUSILLUS	SLENDER PONDWEED	SR	**	S2	G5
POTAMOGETON RICHARDSONII	REDHEADGRASS	ST	**	S2	G5
POTAMOGETON ROBBINSII	FLATLEAF PONDWEED	ST	**	S2	G5
POTAMOGETON STRICTIFOLIUS	STRAIGHT-LEAF PONDWEED	SE	**	S1	G5
POTENTILLA ANSERINA	SILVERWEED	ST	**	S2	G5
PRENANTHES ASPERA	ROUGH RATTLESNAKE-ROOT	SR	**	S2	G4?
PRUNUS PENSYLVANICA	FIRE CHERRY	SR	**	S2	G5
PYROLA SECUNDA	ONE-SIDED WINTERGREEN	SX	**	SX	G5
RHUS AROMATICA VAR ARENARIA	BEACH SUMAC	ST	**	S2	G5T3Q
RHYNCHOSPORA GLOBULARIS VAR RECOGNITA	GLOBE BEAKED-RUSH	SE	**	S1	G5T5?
RHYNCHOSPORA MACROSTACHYA	TALL BEAKED-RUSH	SR	**	S2	G4
RUBUS SETOSUS	SMALL BRISTLEBERRY	SE	**	S1	G5
SALIX CORDATA	HEARTLEAF WILLOW	ST	**	S2	G5
SATUREJA GLABELLA VAR ANGUSTIFOLIA	CALAMINT	SE	**	S1	G5
SCIRPUS HALLII	HALL'S BULRUSH	SE	**	S1	G2
SCIRPUS SMITHII	SMITH'S BULRUSH	SE	**	S1	G5?
SCIRPUS SUBTERMINALIS	WATER BULRUSH	SR	**	S2	G4G5
SCLERIA RETICULARIS	RETICULATED NUTRUSH	ST	**	S2	G3G4
SELAGINELLA APODA	MEADOW SPIKE-MOSS	SE	**	S1	G5
SELAGINELLA RUPESTRIS	LEDGE SPIKE-MOSS	ST	**	S2	G5
SHEPHERDIA CANADENSIS	CANADA BUFFALO-BERRY	SE	**	S1	G5
SISYRINCHIUM MONTANUM	STRICT BLUE-EYED-GRASS	SE	**	S1	G5
SOLIDAGO PTARMICOIDES	PRAIRIE GOLDENROD	SR	**	S2	G5
SOLIDAGO SIMPLEX VAR GILLMANII	STICKY GOLDENROD	ST	**	S2	G5T3?
SPIRANTHES LUCIDA	SHINING LADIES'-TRESSES	SR	**	S2	G5
SPIRANTHES MAGNICAMPORUM	GREAT PLAINS LADIES'-TRESSES	SE	**	S1	G4
STROPHOSTYLES LEIOSPERMA	SLICK-SEED WILD-BEAN	ST	**	S2	G5
TALINUM RUGOSPERMUM	PRAIRIE FAME-FLOWER	ST	**	S2	G3?
THUJA OCCIDENTALIS	NORTHERN WHITE CEDAR	SE	**	S1	G5
TOFIELDIA GLUTINOSA	FALSE ASPHODEL	SR	**	S2	G5
TRICHOSTEMA DICHOTOMUM	FORKED BLUECURL	SR	**	S2	G5
TRIGLOCHIN PALUSTRE	MARSH ARROW-GRASS	ST	**	S2	G5
UTRICULARIA CORNUTA	HORNED BLADDERWORT	ST	**	S2	G5
UTRICULARIA MINOR	LESSER BLADDERWORT	SE	**	S1	G5
UTRICULARIA PURPUREA	PURPLE BLADDERWORT	SR	**	S2	G5
UTRICULARIA RESUPINATA	NORTHEASTERN BLADDERWORT	SX	**	SX	G4
UTRICULARIA SUBULATA	ZIGZAG BLADDERWORT	ST	**	S2	G5
VIBURNUM OPULUS VAR AMERICANUM	HIGHBUSH-CRANBERRY	SE	**	S1	G5T5
VIOLA PEDATIFIDA	PRAIRIE VIOLET	ST	**	S2	G5

STATE: SX=extirpated, SE=endangered, ST=threatened, SR=rare, SSC=special concern, WL=watch list, SG=significant,** no status but rarity warrants concern

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SPECIES NAME	COMMON NAME	STATE	FED	SRANK	GRANK
ZANNICHELLIA PALUSTRIS	HORNED PONDWEED	SE	**	S1	G5
ARTHROPODA: INSECTA: ODONATA (DRAGONFLIES; DAMSELFLIES)					
SOMATOCHLORA HINEANA	OHIO EMERALD DRAGONFLY	SX	LE	SX	G2G3
ARTHROPODA: INSECTA: HOMOPTERA (CICADAS; HOPPERS; SCALES; APHIDS)					
PRAIRIANA KANSANA	A LEAFHOPPER	ST	**	S1	G?
ARTHROPODA: INSECTA: COLEOPTERA (BEETLES)					
NICROPHORUS AMERICANUS	AMERICAN BURYING BEETLE	SX	LE	SH	G1
ARTHROPODA: INSECTA: LEPIDOPTERA (BUTTERFLIES; SKIPPERS)					
ATRYTONOPSIS HIANNA	DUSTED SKIPPER	ST	**	S2S3	G4G5
BOLORIA SELENE MYRINA	SILVER-BORDERED FRITILLARY	**	**	S2S3	G5T5
ERYNNIS MARTIALIS	MOTTLED DUSKYWING	ST	**	S3	G4
EUCHLOE OLYMPIA	OLYMPIA MARBLEWING	ST	**	S2	G4
EUPHYDRYAS PHAETON	BALTIMORE	**	**	S2S4	G4
EUPHYES BIMACULA	TWO-SPOTTED SKIPPER	SR	**	S2	G4
GLAUCOPSYCHE LYGDAMUS COUPERI	SILVERY BLUE	SE	**	S1	G5T4
HESPERIA LEONARDUS	LEONARDUS SKIPPER	SR	**	S2	G4
HESPERIA OTTOE	OTTOE SKIPPER	SE	**	S1	G3G4
LYCAEIDES MELISSA SAMUELIS	KARNER BLUE BUTTERFLY	SE	LE	S1	G5T2
LYCAENA HELLOIDES	PURPLISH COPPER	**	**	S2S4	G5
LYCAENA XANTHOIDES	GREAT COPPER	WL	**	S?	G5
POANES VIATOR VIATOR	BIG BROAD-WINGED SKIPPER	SR	**	S2	G5T4
PROBLEMA BYSSUS	BUNCHGRASS SKIPPER	SR	**	S2	G3G4
SPEYERIA IDALIA	REGAL FRITILLARY	SE	**	S1	G3
ARTHROPODA: INSECTA: LEPIDOPTERA (MOTHS)					
METARRANTHIS APICIARIA	BARRENS METARRANTHIS MOTH	WL	**	SH	GU
PAPAIPEMA BEERIANA	BLAZING STAR STEM BORER	**	**	S?	G3
PAPAIPEMA LEUCOSTIGMA	COLUMBINE BORER	WL	**	S?	G4
PAPAIPEMA SILPHII	SILPHIUM BORER MOTH	**	**	S?	G3G4
SCHINIA GLORIOSA	GLORIUS FLOWER MOTH	WL	**	SU	G4
SCHINIA INDIANA	PHLOX MOTH	SE	**	S1	GU
FISH					
ACIPENSER FULVESCENS	LAKE STURGEON	SE	**	S1	G3
NOTROPIS ARIOMMUS	POPEYE SHINER	SX	**	SX	G3
AMPHIBIANS					
AMBYSTOMA LATERALE	BLUE-SPOTTED SALAMANDER	SSC	**	S2	G5
NECTURUS MACULOSUS	MUDPUPPY	SSC	**	S2	G5

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ENDANGERED, THREATENED AND RARE SPECIES DOCUMENTED FROM LAKE COUNTY, INDIANA

SPECIES NAME	COMMON NAME	STATE	FED	SRANK	GRANK
RANA PIPIENS	NORTHERN LEOPARD FROG	SSC	**	S2	G5
REPTILES					
CLEMMYS GUTTATA	SPOTTED TURTLE	SE	**	S2	G5
EMYDOIDEA BLANDINGII	BLANDING'S TURTLE	SE	**	S2	G4
LIOCHLOROPHIS VERNALIS	SMOOTH GREEN SNAKE	SE	**	S2	G5
OPHISAURUS ATTENUATUS	SLENDER GLASS LIZARD	**	**	S2	G5
SISTRURUS CATENATUS CATENATUS	EASTERN MASSASAUGA	SE	**	S2	G3G4T3T4
TERRAPENE ORNATA	ORNATE BOX TURTLE	SE	**	S2	G5
THAMNOPHIS PROXIMUS	WESTERN RIBBON SNAKE	SSC	**	S3	G5
BIRDS					
ACCIPITER COOPERII	COOPER'S HAWK	**	**	S3B,SZN	G5
AMMODRAMUS HENSLOWII	HENSLOW'S SPARROW	SE	**	S3B,SZN	G4
ANAS CLYPEATA	NORTHERN SHOVELER	**	**	SHB,SAN	G5
ARDEA ALBA	GREAT EGRET	SSC	**	S1B,SZN	G5
ARDEA HERODIAS	GREAT BLUE HERON	**	**	S4B,SZN	G5
BARTRAMIA LONGICAUDA	UPLAND SANDPIPER	SE	**	S3B	G5
BOTAURUS LENTIGINOSUS	AMERICAN BITTERN	SE	**	S2B	G4
BUTEO LINEATUS	RED-SHOULDERED HAWK	SSC	**	S3	G5
CERTHIA AMERICANA	BROWN CREEPER	**	**	S2B,SZN	G5
CHARADRIUS MELODUS	PIPING PLOVER	SE	LE	SXB,SAN	G3
CHLIDONIAS NIGER	BLACK TERN	SE	**	S1B,SZN	G4
CISTOTHORUS PALUSTRIS	MARSH WREN	SE	**	S3B,SZN	G5
CISTOTHORUS PLATENSIS	SEDGE WREN	SE	**	S3B,SZN	G5
EMPIDONAX MINIMUS	LEAST FLYCATCHER	**	**	S3B	G5
EUPHAGUS CYANOCEPHALUS	BREWER'S BLACKBIRD	**	**	SHB,S1N	G5
FALCO PEREGRINUS	PEREGRINE FALCON	SE	E(S/A)	S2B,SZN	G4
IXOBRYCHUS EXILIS	LEAST BITTERN	SE	**	S3B	G5
LANIUS LUDOVICIANUS	LOGGERHEAD SHRIKE	SE	**	S3B,SZN	G5
NYCTANASSA VIOLACEA	YELLOW-CROWNED NIGHT-HERON	SE	**	S2B	G5
NYCTICORAX NYCTICORAX	BLACK-CROWNED NIGHT-HERON	SE	**	S1B,SAN	G5
PHALAROPUS TRICOLOR	WILSON'S PHALAROPE	SX	**	SHB,SZN	G5
RALLUS ELEGANS	KING RAIL	SE	**	S1B,SZN	G4G5
RALLUS LIMICOLA	VIRGINIA RAIL	SSC	**	S3B,SZN	G5
TYTO ALBA	BARN OWL	SE	**	S2	G5
XANTHOCEPHALUS XANTHOCEPHALUS	YELLOW-HEADED BLACKBIRD	SE	**	S1B	G5
MAMMALS					
LUTRA CANADENSIS	NORTHERN RIVER OTTER	SE	**	S?	G5
SPERMOPHILUS FRANKLINII	FRANKLIN'S GROUND SQUIRREL	SE	**	S2	G5
TAXIDEA TAXUS	AMERICAN BADGER	SE	**	S2	G5

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APPENDIX VII - Endangered and Threatened Species Found in Northwest Indiana

ENDANGERED, THREATENED AND RARE SPECIES DOCUMENTED FROM LAKE COUNTY, INDIANA

SPECIES NAME	COMMON NAME	STATE	FED	SRANK	GRANK
HIGH QUALITY NATURAL COMMUNITY					
FOREST - FLOODPLAIN WET	WET FLOODPLAIN FOREST	SG	**	S3	G3?
FOREST - FLOODPLAIN WET-MESIC	WET-MESIC FLOODPLAIN FOREST	SG	**	S3	G3?
FOREST - UPLAND DRY	DRY UPLAND FOREST	SG	**	S4	G4
FOREST - UPLAND DRY-MESIC	DRY-MESIC UPLAND FOREST	SG	**	S4	G4
FOREST - UPLAND MESIC	MESIC UPLAND FOREST	SG	**	S3	G3?
LAKE - POND	POND	SG	**	S?	
PRAIRIE - DRY-MESIC	DRY-MESIC PRAIRIE	SG	**	S2	G3
PRAIRIE - MESIC	MESIC PRAIRIE	SG	**	S2	G2
PRAIRIE - SAND DRY	DRY SAND PRAIRIE	SG	**	S2	G3
PRAIRIE - SAND DRY-MESIC	DRY-MESIC SAND PRAIRIE	SG	**	S3	G3
PRAIRIE - SAND MESIC	MESIC SAND PRAIRIE	SG	**		
PRAIRIE - SAND WET	WET SAND PRAIRIE	SG	**	S3	G3
PRAIRIE - SAND WET-MESIC	WET-MESIC SAND PRAIRIE	SG	**	S2	G1?
PRIMARY - DUNE LAKE	FOREDUNE	SG	**	S1	G3
SAVANNA - MESIC	MESIC SAVANNA	SG	**		
SAVANNA - SAND DRY	DRY SAND SAVANNA	SG	**	S2	G2?
SAVANNA - SAND DRY-MESIC	DRY-MESIC SAND SAVANNA	SG	**	S2S3	G2?
SAVANNA - SAND MESIC	MESIC SAND SAVANNA	SG	**		
WETLAND - FEN	FEN	SG	**	S3	G3
WETLAND - MARSH	MARSH	SG	**	S4	GU
WETLAND - MEADOW SEDGE	SEDGE MEADOW	SG	**	S1	G3?
WETLAND - PANNE	PANNE	SG	**	S1	G2
WETLAND - SWAMP SHRUB	SHRUB SWAMP	SG	**	S2	GU
OTHER FEATURE OF SIGNIFICANCE					
MIGRATORY BIRD CONCENTRATION SITE	MIGRATORY BIRD CONCENTRATION SITE	SG	**		

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SPECIES NAME	COMMON NAME	STATE	FED	SRANK	GRANK
VASCULAR PLANT					
ACTAEA RUBRA	RED BANEBERRY	SR	**	S2	G5
AMELANCHIER HUMILIS	RUNNING SERVICEBERRY	SE	**	S1	G5
ARABIS GLABRA	TOWER-MUSTARD	ST	**	S2	G5
ARALIA HISPIDA	BRISTLY SARSAPARILLA	SE	**	S1	G5
ARCTOSTAPHYLOS UVA-URSI	BEARBERRY	SR	**	S2	G5
ARENARIA STRICTA	MICHAUX'S STITCHWORT	SR	**	S2	G5
ARISTIDA INTERMEDIA	SLIM-SPIKE THREE-AWN GRASS	SR	**	S2	G?
ARISTIDA TUBERCULOSA	SEABEACH NEEDLEGRASS	SR	**	S2	G5
ASTER BOREALIS	RUSHLIKE ASTER	SR	**	S2	G5
ASTER FURCATUS	FORKED ASTER	SR	**	S2	G3
ASTER SERICEUS	WESTERN SILVERY ASTER	SR	**	S2	G5
BETULA POPULIFOLIA	GRAY BIRCH	SX	**	SX	G5
BOTRYCHIUM MATRICARIIFOLIUM	CHAMOMILE GRAPE-FERN	ST	**	S2	G5
BOTRYCHIUM MULTIFIDUM VAR INTERMEDIUM	LEATHERY GRAPE-FERN	SX	**	SX	G5T4?
BUCHNERA AMERICANA	BLUEHEARTS	SE	**	S1	G5?
CAREX ATHERODES	AWNED SEDGE	SE	**	S1	G5
CAREX ATLANTICA SSP CAPILLACEA	HOWE SEDGE	SE	**	S1	G5T5?
CAREX AUREA	GOLDEN-FRUITED SEDGE	SR	**	S2	G5
CAREX BRUNNESCENS	BROWNISH SEDGE	SE	**	S1	G5
CAREX CONOIDEA	PRAIRIE GRAY SEDGE	SE	**	S1	G4
CAREX DEBILIS VAR RUDGEI	WHITE-EDGE SEDGE	ST	**	S2	G5T5
CAREX EBURNEA	EBONY SEDGE	SR	**	S2	G5
CAREX FLAVA	YELLOW SEDGE	ST	**	S2	G5
CAREX FOLLICULATA	LONG SEDGE	ST	**	S2	G4G5
CAREX GARBERI	ELK SEDGE	ST	**	S2	G4
CAREX LEPTONERVIA	FINELY-NERVED SEDGE	SE	**	S1	G4
CAREX LIMOSA	MUD SEDGE	SE	**	S1	G5
CAREX PEDUNCULATA	LONGSTALK SEDGE	SR	**	S2	G5
CAREX SEORSA	WEAK STELLATE SEDGE	SR	**	S2	G4
CHIMAPHILA UMBELLATA SSP CISATLANTICA	PIPSISSEWA	ST	**	S2	G5T5
CHRYSOSPLENIUM AMERICANUM	AMERICAN GOLDEN-SAXIFRAGE	ST	**	S2	G5
CIRCAEA ALPINA	SMALL ENCHANTER'S NIGHTSHADE	SX	**	SX	G5
CIRSIUM HILLII	HILL'S THISTLE	SE	**	S1	G3
CIRSIUM PITCHERI	DUNE THISTLE	ST	LT	S2	G3
CLINTONIA BOREALIS	CLINTON LILY	SE	**	S1	G5
COELOGLOSSUM VIRIDE VAR VIRESCENS	LONG-BRACT GREEN ORCHIS	ST	**	S2	G5T5
CORNUS AMOMUM SSP AMOMUM	SILKY DOGWOOD	SE	**	S1	G5T?
CORNUS CANADENSIS	BUNCHBERRY	SE	**	S1	G5
CORNUS RUGOSA	ROUNDLEAF DOGWOOD	SR	**	S2	G5
CYPERUS HOUGHTONII	HOUGHTON'S NUTSEDGE	SR	**	S2	G4?
CYPRIPEDIUM CALCEOLUS VAR PARVIFLORUM	SMALL YELLOW LADY'S-SLIPPER	SR	**	S2	G5
CYPRIPEDIUM CANDIDUM	SMALL WHITE LADY'S-SLIPPER	SR	**	S2	G4

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DIERVILLA LONICERA	NORTHERN BUSH-HONEYSUCKLE	SR	**	S2	G5
DROSERA INTERMEDIA	SPOON-LEAVED SUNDEW	SR	**	S2	G5
DRYOPTERIS CLINTONIANA	CLINTON WOODFERN	SX	**	SX	G5
ELEOCHARIS GENICULATA	CAPITATE SPIKE-RUSH	ST	**	S2	G5
ELEOCHARIS MELANOCARPA	BLACK-FRUITED SPIKE-RUSH	ST	**	S2	G4
ELEOCHARIS MICROCARPA	SMALL-FRUITED SPIKE-RUSH	SE	**	S1	G5
ELEOCHARIS ROBBINSII	ROBBINS SPIKERUSH	SR	**	S2	G4G5
ERIOCAULON AQUATICUM	PIPEWORT	SE	**	S1	G5
ERIOPHORUM ANGUSTIFOLIUM	NARROW-LEAVED COTTON-GRASS	SR	**	S2	G5
FIMBRISTYLIS PUBERULA	CAROLINA FIMBRY	SE	**	S1	G5
FUIRENA PUMILA	DWARF UMBRELLA-SEDGE	ST	**	S2	G4
GENTIANA ALBA	YELLOW GENTIAN	SR	**	S2	G4
GENTIANA PUBERULENTA	DOWNY GENTIAN	ST	**	S2	G4G5
GERANIUM BICKNELLII	BICKNELL NORTHERN CRANE'S-BILL	SE	**	S1	G5
HUDSONIA TOMENTOSA	SAND-HEATHER	ST	**	S2	G5
HYPERICUM ADPRESSUM	CREEPING ST. JOHN'S-WORT	SE	**	S1	G2G3
HYPERICUM PYRAMIDATUM	GREAT ST. JOHN'S-WORT	SE	**	S1	G4
JUGLANS CINEREA	BUTTERNUT	WL	**	S3	G3G4
JUNCUS ARTICULATUS	JOINTED RUSH	SE	**	S1	G5
JUNCUS BALTICUS VAR LITTORALIS	BALTIC RUSH	SR	**	S2	G5T5
JUNCUS MILITARIS	BAYONET RUSH	SE	**	S1	G4
JUNCUS PELOCARPUS	BROWN-FRUITED RUSH	ST	**	S2	G5
JUNCUS SCIRPOIDES	SCIRPUS-LIKE RUSH	ST	**	S2	G5
JUNIPERUS COMMUNIS	GROUND JUNIPER	SR	**	S2	G5
LATHYRUS MARITIMUS VAR GLABER	BEACH PEAVINE	SE	**	S1	G5T4T5
LATHYRUS OCHROLEUCUS	PALE VETCHLING PEAVINE	SE	**	S1	G4G5
LATHYRUS VENOSUS	SMOOTH VEINY PEA	ST	**	S2	G5
LECHEA STRICTA	UPRIGHT PINWEED	SX	**	SX	G4?
LEMNA VALDIVIANA	PALE DUCKWEED	SX	**	SX	G5
LINNAEA BOREALIS	TWINFLOWER	SX	**	SX	G5
LUDWIGIA SPHAEROCARPA	GLOBE-FRUITED FALSE-LOOSESTRIFE	SE	**	S1	G5
LYCOPODIELLA INUNDATA	NORTHERN BOG CLUBMOSS	SE	**	S1	G5
LYCOPODIELLA SUBAPPRESSA	NORTHERN APPRESSED BOG CLUBMOSS	SE	**	S1	G2
LYCOPODIUM HICKEYI	HICKEY'S CLUBMOSS	SR	**	S2	G5
LYCOPODIUM OBSCURUM	TREE CLUBMOSS	SR	**	S2	G5
LYCOPODIUM TRISTACHYUM	DEEP-ROOT CLUBMOSS	ST	**	S2	G5
MELAMPYRUM LINEARE	AMERICAN COW-WHEAT	SR	**	S2	G5
MIKANIA SCANDENS	CLIMBING HEMPWEED	SE	**	S1	G5
MILIUM EFFUSUM	TALL MILLET-GRASS	SR	**	S2	G5
MYOSOTIS LAXA	SMALLER FORGET-ME-NOT	SE	**	S1	G5
OROBANCHE FASCICULATA	CLUSTERED BROOMRAPE	SE	**	S1	G4
ORYZOPSIS ASPERIFOLIA	WHITE-GRAINED MOUNTAIN-RICEGRASS	SE	**	S1	G5
ORYZOPSIS PUNGENS	SLENDER MOUNTAIN-RICEGRASS	SX	**	SX	G5

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ORYZOPSIS RACEMOSA	BLACK-FRUIT MOUNTAIN-RICEGRASS	ST	**	S2	G5
PANICUM BOREALE	NORTHERN WITCHGRASS	SR	**	S2	G5
PANICUM COLUMBIANUM	HEMLOCK PANIC-GRASS	SR	**	S2	G5
PANICUM LEIBERGII	LEIBERG'S WITCHGRASS	ST	**	S2	G5
PANICUM MATTAMUSKEETENSE	A PANIC-GRASS	SX	**	SX	G?
PANICUM VERRUCOSUM	WARTY PANIC-GRASS	ST	**	S2	G4
PINUS BANKSIANA	JACK PINE	SR	**	S2	G5
PINUS STROBUS	EASTERN WHITE PINE	SR	**	S2	G5
PLANTAGO CORDATA	HEART-LEAVED PLANTAIN	SE	**	S1	G4
PLATANTHERA CILIARIS	YELLOW-FRINGE ORCHIS	SE	**	S1	G5
PLATANTHERA HOOKERI	HOOKER ORCHIS	SX	**	SX	G5
PLATANTHERA HYPERBOREA	LEAFY NORTHERN GREEN ORCHIS	ST	**	S2	G5
PLATANTHERA PSYCODES	SMALL PURPLE-FRINGE ORCHIS	SR	**	S2	G5
POA ALSODES	GROVE MEADOW GRASS	SR	**	S2	G4G5
POA PALUDIGENA	BOG BLUEGRASS	WL	**	S3	G3
POLYGALA PAUCIFOLIA	GAY-WING MILKWORT	SE	**	S1	G5
POLYGONELLA ARTICULATA	EASTERN JOINTWEED	SR	**	S2	G5
POLYGONUM CAREYI	CAREY'S SMARTWEED	ST	**	S2	G4
POLYGONUM HYDROPIPEROIDES VAR OPELOUSANUM	NORTHEASTERN SMARTWEED	ST	**	S2	G5
POPULUS BALSAMIFERA	BALSAM POPLAR	SX	**	SX	G5
POTAMOGETON RICHARDSONII	REDHEADGRASS	ST	**	S2	G5
POTAMOGETON VASEYI	VASEY'S PONDWEED	SE	**	S1	G4
POTENTILLA ANSERINA	SILVERWEED	ST	**	S2	G5
PRUNUS PENSYLVANICA	FIRE CHERRY	SR	**	S2	G5
PSILOCARYA NITENS	SHORT-BEAKED BALD-RUSH	SX	**	SX	G4
PSILOCARYA SCIRPOIDES	LONG-BEAKED BALDRUSH	ST	**	S2	G4
PYROLA ROTUNDIFOLIA VAR AMERICANA	AMERICAN WINTERGREEN	SR	**	S2	G5
PYROLA SECUNDA	ONE-SIDED WINTERGREEN	SX	**	SX	G5
RHUS AROMATICA VAR ARENARIA	BEACH SUMAC	ST	**	S2	G5T3Q
RHYNCHOSPORA GLOBULARIS VAR RECOGNITA	GLOBE BEAKED-RUSH	SE	**	S1	G5T5?
RHYNCHOSPORA MACROSTACHYA	TALL BEAKED-RUSH	SR	**	S2	G4
SALIX CORDATA	HEARTLEAF WILLOW	ST	**	S2	G5
SCIRPUS EXPANSUS	BULRUSH	SE	**	S1	G4
SCIRPUS HALLII	HALL'S BULRUSH	SE	**	S1	G2
SCIRPUS PURSHIANUS	WEAKSTALK BULRUSH	SE	**	S1	G4G5
SCIRPUS SMITHII	SMITH'S BULRUSH	SE	**	S1	G5?
SCIRPUS SUBTERMINALIS	WATER BULRUSH	SR	**	S2	G4G5
SCIRPUS TORREYI	TORREY'S BULRUSH	SE	**	S1	G5?
SCLERIA RETICULARIS	RETICULATED NUTRUSH	ST	**	S2	G3G4
SELAGINELLA RUPESTRIS	LEDGE SPIKE-MOSS	ST	**	S2	G5
SISYRINCHIUM MONTANUM	STRICT BLUE-EYED-GRASS	SE	**	S1	G5
SOLIDAGO PTARMICOIDES	PRAIRIE GOLDENROD	SR	**	S2	G5

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SOLIDAGO SIMPLEX VAR GILLMANII	STICKY GOLDENROD	ST	**	S2	G5T3?
SORBUS DECORA	NORTHERN MOUNTAIN-ASH	SX	**	SX	G4G5
SPARGANIUM ANDROCLADUM	BRANCHING BUR-REED	ST	**	S2	G4G5
SPIRANTHES LUCIDA	SHINING LADIES'-TRESSES	SR	**	S2	G5
STIPA AVENACEA	BLACKSEED NEEDLEGRASS	ST	**	S2	G5
TALINUM RUGOSPERMUM	PRAIRIE FAME-FLOWER	ST	**	S2	G3?
THALICTRUM PUBESCENS	TALL MEADOWRUE	ST	**	S2	G5
THUJA OCCIDENTALIS	NORTHERN WHITE CEDAR	SE	**	S1	G5
TRICHOSTEMA DICHOTOMUM	FORKED BLUECURL	SR	**	S2	G5
TRILLIUM CERNUUM VAR MACRANTHUM	NODDING TRILLIUM	SE	**	S1	G5T4
UTRICULARIA CORNUTA	HORNED BLADDERWORT	ST	**	S2	G5
UTRICULARIA MINOR	LESSER BLADDERWORT	SE	**	S1	G5
UTRICULARIA PURPUREA	PURPLE BLADDERWORT	SR	**	S2	G5
UTRICULARIA SUBULATA	ZIGZAG BLADDERWORT	ST	**	S2	G5
VACCINIUM OXYCOCCOS	SMALL CRANBERRY	ST	**	S2	G5
VALERIANELLA CHENOPODIIFOLIA	GOOSE-FOOT CORN-SALAD	SE	**	S1	G5
VERONICA ANAGALLIS-AQUATICA	BROOK-PIMPERNELL	ST	**	S2	G5
VIBURNUM OPULUS VAR AMERICANUM	HIGHBUSH-CRANBERRY	SE	**	S1	G5T5
VIOLA PRIMULIFOLIA	PRIMROSE-LEAF VIOLET	SR	**	S2	G5
WOODWARDIA AREOLATA	NETTED CHAINFERN	SR	**	S2	G5
XYRIS DIFFORMIS	CAROLINA YELLOW-EYED GRASS	ST	**	S2	G5
ARTHROPODA: INSECTA: ODONATA (DRAGONFLIES; DAMSELFLIES)					
SYMPETRUM SEMICINCTUM	BAND-WINGED MEADOWFLY	**	**	S2S3	G5
ARTHROPODA: INSECTA: COLEOPTERA (BEETLES)					
NICROPHORUS AMERICANUS	AMERICAN BURYING BEETLE	SX	LE	SH	G1
ARTHROPODA: INSECTA: LEPIDOPTERA (BUTTERFLIES; SKIPPERS)					
CALLOPHRYS IRUS	FROSTED ELFIN	SR	**	S2	G3G4
ERYNNIS MARTIALIS	MOTTLED DUSKYWING	ST	**	S3	G4
EUCHLOE OLYMPIA	OLYMPIA MARBLEWING	ST	**	S2	G4
HESPERIA LEONARDUS	LEONARDUS SKIPPER	SR	**	S2	G4
LYCAEIDES MELISSA SAMUELIS	KARNER BLUE BUTTERFLY	SE	LE	S1	G5T2
POANES VIATOR VIATOR	BIG BROAD-WINGED SKIPPER	SR	**	S2	G5T4
PROBLEMA BYSSUS	BUNCHGRASS SKIPPER	SR	**	S2	G3G4
ARTHROPODA: INSECTA: LEPIDOPTERA (MOTHS)					
SCHINIA INDIANA	PHLOX MOTH	SE	**	S1	GU
FISH					
ACIPENSER FULVESCENS	LAKE STURGEON	SE	**	S1	G3

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AMPHIBIANS					
AMBYSTOMA LATERALE	BLUE-SPOTTED SALAMANDER	SSC	**	S2	G5
HEMIDACTYLIUM SCUTATUM	FOUR-TOED SALAMANDER	SE	**	S2	G5
NECTURUS MACULOSUS	MUDPUPPY	SSC	**	S2	G5
RANA PIPIENS	NORTHERN LEOPARD FROG	SSC	**	S2	G5
REPTILES					
CLEMMYS GUTTATA	SPOTTED TURTLE	SE	**	S2	G5
CLONOPHIS KIRTLANDII	KIRTLAND'S SNAKE	SE	**	S2	G2
EMYDOIDEA BLANDINGII	BLANDING'S TURTLE	SE	**	S2	G4
LIOCHLOROPHIS VERNALIS	SMOOTH GREEN SNAKE	SE	**	S2	G5
OPHISAURUS ATTENUATUS	SLENDER GLASS LIZARD	**	**	S2	G5
SISTRURUS CATENATUS CATENATUS	EASTERN MASSASAUGA	SE	**	S2	G3G4T3T4
THAMNOPHIS BUTLERI	BUTLER'S GARTER SNAKE	SE	**	S1	G4
THAMNOPHIS PROXIMUS	WESTERN RIBBON SNAKE	SSC	**	S3	G5
BIRDS					
AMMODRAMUS HENSLOWII	HENSLOW'S SPARROW	SE	**	S3B,SZN	G4
ARDEA ALBA	GREAT EGRET	SSC	**	S1B,SZN	G5
ARDEA HERODIAS	GREAT BLUE HERON	**	**	S4B,SZN	G5
ASIO OTUS	LONG-EARED OWL	**	**	S2	G5
BARTRAMIA LONGICAUDA	UPLAND SANDPIPER	SE	**	S3B	G5
BOTAURUS LENTIGINOSUS	AMERICAN BITTERN	SE	**	S2B	G4
BUTEO LINEATUS	RED-SHOULDERED HAWK	SSC	**	S3	G5
BUTEO PLATYPTERUS	BROAD-WINGED HAWK	SSC	**	S3B,SRFN	G5
CIRCUS CYANEUS	NORTHERN HARRIER	SE	**	S2	G5
CISTOTHORUS PALUSTRIS	MARSH WREN	SE	**	S3B,SZN	G5
CISTOTHORUS PLATENSIS	SEDGE WREN	SE	**	S3B,SZN	G5
DENDROICA CERULEA	CERULEAN WARBLER	SSC	**	S3B	G4
FALCO PEREGRINUS	PEREGRINE FALCON	SE	E(S/A)	S2B,SZN	G4
IXOBRYCHUS EXILIS	LEAST BITTERN	SE	**	S3B	G5
LANIUS LUDOVICIANUS	LOGGERHEAD SHRIKE	SE	**	S3B,SZN	G5
MNIOTILTA VARIA	BLACK-AND-WHITE WARBLER	SSC	**	S1S2B	G5
NYCTICORAX NYCTICORAX	BLACK-CROWNED NIGHT-HERON	SE	**	S1B,SAN	G5
RALLUS ELEGANS	KING RAIL	SE	**	S1B,SZN	G4G5
RALLUS LIMICOLA	VIRGINIA RAIL	SSC	**	S3B,SZN	G5
STURNELLA NEGLECTA	WESTERN MEADOWLARK	SSC	**	S2B	G5
VERMIVORA CHRYSOPTERA	GOLDEN-WINGED WARBLER	SE	**	S1B	G4
WILSONIA CANADENSIS	CANADA WARBLER	**	**	S2B	G5
WILSONIA CITRINA	HOODED WARBLER	SSC	**	S3B	G5
MAMMALS					

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APPENDIX VII - Endangered and Threatened Species Found in Northwest Indiana

ENDANGERED, THREATENED AND RARE SPECIES DOCUMENTED FROM PORTER COUNTY, INDIANA

SPECIES NAME	COMMON NAME	STATE	FED	SRANK	GRANK
SPERMOPHILUS FRANKLINII	FRANKLIN'S GROUND SQUIRREL	SE	**	S2	G5
TAXIDEA TAXUS	AMERICAN BADGER	SE	**	S2	G5
HIGH QUALITY NATURAL COMMUNITY					
FOREST - UPLAND DRY	DRY UPLAND FOREST	SG	**	S4	G4
FOREST - UPLAND DRY-MESIC	DRY-MESIC UPLAND FOREST	SG	**	S4	G4
FOREST - UPLAND MESIC	MESIC UPLAND FOREST	SG	**	S3	G3?
LAKE - LAKE	LAKE	SG	**	S2	
LAKE - POND	POND	SG	**	S?	
PRAIRIE - DRY-MESIC	DRY-MESIC PRAIRIE	SG	**	S2	G3
PRAIRIE - MESIC	MESIC PRAIRIE	SG	**	S2	G2
PRAIRIE - SAND DRY	DRY SAND PRAIRIE	SG	**	S2	G3
PRAIRIE - SAND DRY-MESIC	DRY-MESIC SAND PRAIRIE	SG	**	S3	G3
PRAIRIE - SAND WET-MESIC	WET-MESIC SAND PRAIRIE	SG	**	S2	G1?
PRAIRIE - WET	WET PRAIRIE	SG	**	S1	G3
PRIMARY - DUNE LAKE	FOREDUNE	SG	**	S1	G3
SAVANNA - SAND DRY	DRY SAND SAVANNA	SG	**	S2	G2?
SAVANNA - SAND DRY-MESIC	DRY-MESIC SAND SAVANNA	SG	**	S2S3	G2?
WETLAND - FEN	FEN	SG	**	S3	G3
WETLAND - FEN FORESTED	FORESTED FEN	SG	**	S1	G3
WETLAND - MARSH	MARSH	SG	**	S4	GU
WETLAND - MEADOW SEDGE	SEDGE MEADOW	SG	**	S1	G3?
WETLAND - PANNE	PANNE	SG	**	S1	G2
WETLAND - SWAMP SHRUB	SHRUB SWAMP	SG	**	S2	GU

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APPENDIX VII - Endangered and Threatened Species Found in Northwest Indiana

ENDANGERED, THREATENED AND RARE SPECIES DOCUMENTED FROM LAPORTE COUNTY, INDIANA

SPECIES NAME	COMMON NAME	STATE	FED	SRANK	GRANK
VASCULAR PLANT					
ANDROMEDA GLAUCOPHYLLA	BOG ROSEMARY	SR	**	S2	G5
ARABIS GLABRA	TOWER-MUSTARD	ST	**	S2	G5
ARALIA HISPIDA	BRISTLY SARSAPARILLA	SE	**	S1	G5
ARCTOSTAPHYLOS UVA-URSI	BEARBERRY	SR	**	S2	G5
ARENARIA STRICTA	MICHAUX'S STITCHWORT	SR	**	S2	G5
ARISTIDA INTERMEDIA	SLIM-SPIKE THREE-AWN GRASS	SR	**	S2	G?
ARISTIDA TUBERCULOSA	SEABEACH NEEDLEGRASS	SR	**	S2	G5
ASTER BOREALIS	RUSHLIKE ASTER	SR	**	S2	G5
BETULA POPULIFOLIA	GRAY BIRCH	SX	**	SX	G5
BIDENS BECKII	BECK WATER-MARIGOLD	SE	**	S1	G4G5T4
CALLA PALUSTRIS	WILD CALLA	SE	**	S1	G5
CAREX ARCTATA	BLACK SEDGE	SE	**	S1	G5?
CAREX ATHERODES	AWNED SEDGE	SE	**	S1	G5
CAREX ATLANTICA SSP CAPILLACEA	HOWE SEDGE	SE	**	S1	G5T5?
CAREX CHORDORRHIZA	CREEPING SEDGE	SE	**	S1	G5
CAREX DEBILIS VAR RUDGEI	WHITE-EDGE SEDGE	ST	**	S2	G5T5
CAREX ECHINATA	LITTLE PRICKLY SEDGE	SE	**	S1	G5
CAREX FLAVA	YELLOW SEDGE	ST	**	S2	G5
CAREX FOLLICULATA	LONG SEDGE	ST	**	S2	G4G5
CAREX LEPTONERVIA	FINELY-NERVED SEDGE	SE	**	S1	G4
CAREX LIMOSA	MUD SEDGE	SE	**	S1	G5
CAREX PEDUNCULATA	LONGSTALK SEDGE	SR	**	S2	G5
CAREX SCABRATA	ROUGH SEDGE	SE	**	S1	G5
CAREX SEORSA	WEAK STELLATE SEDGE	SR	**	S2	G4
CAREX SPARGANIOIDES VAR CEPHALOIDEA	THINLEAF SEDGE	ST	**	S2	G5
CHRYSOSPLENIUM AMERICANUM	AMERICAN GOLDEN-SAXIFRAGE	ST	**	S2	G5
CIRCAEA ALPINA	SMALL ENCHANTER'S NIGHTSHADE	SX	**	SX	G5
CONIOSELINUM CHINENSE	HEMLOCK PARSLEY	SE	**	S1	G5
CORNUS RUGOSA	ROUNDLEAF DOGWOOD	SR	**	S2	G5
CORYDALIS SEMPERVIRENS	PALE CORYDALIS	SE	**	S1	G4G5
CYPERUS DENTATUS	TOOTHED SEDGE	SE	**	S1	G4
CYPRIPEDIUM CALCEOLUS VAR PARVIFLORUM	SMALL YELLOW LADY'S-SLIPPER	SR	**	S2	G5
CYPRIPEDIUM CANDIDUM	SMALL WHITE LADY'S-SLIPPER	SR	**	S2	G4
DESCHAMPSIA CESPITOSA	TUFTED HAIRGRASS	SR	**	S2	G5
DIERVILLA LONICERA	NORTHERN BUSH-HONEYSUCKLE	SR	**	S2	G5
DROSERA INTERMEDIA	SPOON-LEAVED SUNDEW	SR	**	S2	G5
DRYOPTERIS CLINTONIANA	CLINTON WOODFERN	SX	**	SX	G5
ELEOCHARIS MELANOCARPA	BLACK-FRUITED SPIKE-RUSH	ST	**	S2	G4
EQUISETUM VARIEGATUM	VARIEGATED HORSETAIL	SE	**	S1	G5
ERIOCAULON AQUATICUM	PIPEWORT	SE	**	S1	G5
ERIOPHORUM ANGUSTIFOLIUM	NARROW-LEAVED COTTON-GRASS	SR	**	S2	G5
ERIOPHORUM SPISSUM	DENSE COTTON-GRASS	SX	**	SX	G5T5

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ENDANGERED, THREATENED AND RARE SPECIES DOCUMENTED FROM LAPORTE COUNTY, INDIANA

SPECIES NAME	COMMON NAME	STATE	FED	SRANK	GRANK
ERIOPHORUM VIRIDICARINATUM	GREEN-KEELED COTTON-GRASS	SR	**	S2	G5
FRAGARIA VESCA VAR AMERICANA	WOODLAND STRAWBERRY	SE	**	S1	G5T?
GENTIANA PUBERULENTA	DOWNY GENTIAN	ST	**	S2	G4G5
GERANIUM ROBERTIANUM	HERB-ROBERT	ST	**	S2	G5
JUNCUS BALTICUS VAR LITTORALIS	BALTIC RUSH	SR	**	S2	G5T5
JUNCUS PELOCARPUS	BROWN-FRUITED RUSH	ST	**	S2	G5
JUNCUS SCIRPOIDES	SCIRPUS-LIKE RUSH	ST	**	S2	G5
JUNIPERUS COMMUNIS	GROUND JUNIPER	SR	**	S2	G5
LATHYRUS MARITIMUS VAR GLABER	BEACH PEAVINE	SE	**	S1	G5T4T5
LATHYRUS VENOSUS	SMOOTH VEINY PEA	ST	**	S2	G5
LONICERA CANADENSIS	AMERICAN FLY-HONEYSUCKLE	SX	**	SX	G5
LUZULA ACUMINATA	HAIRY WOODRUSH	SE	**	S1	G5
LYCOPODIELLA INUNDATA	NORTHERN BOG CLUBMOSS	SE	**	S1	G5
LYCOPODIUM HICKEYI	HICKEY'S CLUBMOSS	SR	**	S2	G5
LYCOPODIUM OBSCURUM	TREE CLUBMOSS	SR	**	S2	G5
LYCOPODIUM TRISTACHYUM	DEEP-ROOT CLUBMOSS	ST	**	S2	G5
MALAXIS UNIFOLIA	GREEN ADDER'S-MOUTH	SE	**	S1	G5
MATTEUCCIA STRUTHIOPTERIS	OSTRICH FERN	SR	**	S2	G5
MELAMPYRUM LINEARE	AMERICAN COW-WHEAT	SR	**	S2	G5
MILIUM EFFUSUM	TALL MILLET-GRASS	SR	**	S2	G5
MYRIOPHYLLUM PINNATUM	CUTLEAF WATER-MILFOIL	SE	**	S1	G5
OENOTHERA PERENNIS	SMALL SUNDROPS	ST	**	S2	G5
ORYZOPSIS ASPERIFOLIA	WHITE-GRAINED MOUNTAIN-RICEGRASS	SE	**	S1	G5
ORYZOPSIS PUNGENS	SLENDER MOUNTAIN-RICEGRASS	SX	**	SX	G5
PANICUM BOREALE	NORTHERN WITCHGRASS	SR	**	S2	G5
PANICUM LEIBERGII	LEIBERG'S WITCHGRASS	ST	**	S2	G5
PANICUM VERRUCOSUM	WARTY PANIC-GRASS	ST	**	S2	G4
PINUS BANKSIANA	JACK PINE	SR	**	S2	G5
PINUS STROBUS	EASTERN WHITE PINE	SR	**	S2	G5
PLATANTHERA CILIARIS	YELLOW-FRINGE ORCHIS	SE	**	S1	G5
PLATANTHERA HYPERBOREA	LEAFY NORTHERN GREEN ORCHIS	ST	**	S2	G5
PLATANTHERA LEUCOPHAEA	PRAIRIE WHITE-FRINGED ORCHID	SE	LT	S1	G2
PLATANTHERA PSYCODES	SMALL PURPLE-FRINGE ORCHIS	SR	**	S2	G5
POA ALSODES	GROVE MEADOW GRASS	SR	**	S2	G4G5
POA PALUDIGENA	BOG BLUEGRASS	WL	**	S3	G3
POLYGONELLA ARTICULATA	EASTERN JOINTWEED	SR	**	S2	G5
POLYGONUM CAREYI	CAREY'S SMARTWEED	ST	**	S2	G4
POLYGONUM CILINODE	FRINGED BLACK BINDWEED	SE	**	S1	G5
POLYTAENIA NUTTALLII	PRAIRIE PARSLEY	SE	**	S1	G5
POTAMOGETON EPIHYDRUS	NUTTALL PONDWEED	SE	**	S1	G5
POTAMOGETON FRIESII	FRIES' PONDWEED	SE	**	S1	G4
POTAMOGETON PUSILLUS	SLENDER PONDWEED	SR	**	S2	G5
POTAMOGETON ROBBINSII	FLATLEAF PONDWEED	ST	**	S2	G5

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SPECIES NAME	COMMON NAME	STATE	FED	SRANK	GRANK
POTENTILLA ANSERINA	SILVERWEED	ST	**	S2	G5
PRENANTHES ASPERA	ROUGH RATTLESNAKE-ROOT	SR	**	S2	G4?
PRUNUS PENSYLVANICA	FIRE CHERRY	SR	**	S2	G5
PSILOCARYA SCIRPOIDES	LONG-BEAKED BALDRUSH	ST	**	S2	G4
PYROLA ROTUNDIFOLIA VAR AMERICANA	AMERICAN WINTERGREEN	SR	**	S2	G5
PYROLA SECUNDA	ONE-SIDED WINTERGREEN	SX	**	SX	G5
RHYNCHOSPORA GLOBULARIS VAR RECOGNITA	GLOBE BEAKED-RUSH	SE	**	S1	G5T5?
RUBUS ALUMNUS	A BRAMBLE	SX	**	SX	G5
SATUREJA GLABELLA VAR ANGUSTIFOLIA	CALAMINT	SE	**	S1	G5
SCHEUCHZERIA PALUSTRIS SSP AMERICANA	AMERICAN SCHEUCHZERIA	SE	**	S1	G5T5
SILENE REGIA	ROYAL CATCHFLY	ST	**	S2	G3
SISYRINCHIUM MONTANUM	STRICT BLUE-EYED-GRASS	SE	**	S1	G5
SOLIDAGO SIMPLEX VAR GILLMANII	STICKY GOLDENROD	ST	**	S2	G5T3?
SORBUS DECORA	NORTHERN MOUNTAIN-ASH	SX	**	SX	G4G5
SPARGANIUM ANDROCLADUM	BRANCHING BUR-REED	ST	**	S2	G4G5
SPIRANTHES LUCIDA	SHINING LADIES'-TRESSES	SR	**	S2	G5
STIPA AVENACEA	BLACKSEED NEEDLEGRASS	ST	**	S2	G5
TOFIELDIA GLUTINOSA	FALSE ASPHODEL	SR	**	S2	G5
TRIGLOCHIN PALUSTRE	MARSH ARROW-GRASS	ST	**	S2	G5
UTRICULARIA GEMINISCAPA	HIDDEN-FRUITED BLADDERWORT	SE	**	S1	G4G5
UTRICULARIA MINOR	LESSER BLADDERWORT	SE	**	S1	G5
VACCINIUM OXYCOCCOS	SMALL CRANBERRY	ST	**	S2	G5
VALERIANA EDULIS	HAIRY VALERIAN	SE	**	S1	G5
VALERIANA ULIGINOSA	MARSH VALERIAN	SE	**	S1	G4Q
VALERIANELLA CHENOPODIIFOLIA	GOOSE-FOOT CORN-SALAD	SE	**	S1	G5
XYRIS DIFFORMIS	CAROLINA YELLOW-EYED GRASS	ST	**	S2	G5
ZIGADENUS ELEGANS VAR GLAUCUS	WHITE CAMAS	SR	**	S2	G5T4T5
MOLLUSCA: GASTROPODA					
LYMNAEA STAGNALIS	SWAMP LYMNAEA	SSC	**	S2	G5
ARTHROPODA: INSECTA: ODONATA (DRAGONFLIES; DAMSELFLIES)					
AESHNA MUTATA	SPATTERDOCK DARNER	**	**	S1S2	G3G4
SYMPETRUM SEMICINCTUM	BAND-WINGED MEADOWFLY	**	**	S2S3	G5
ARTHROPODA: INSECTA: LEPIDOPTERA (BUTTERFLIES; SKIPPERS)					
EUPHYDRYAS PHAETON	BALTIMORE	**	**	S2S4	G4
NEONYMPHA MITCHELLII MITCHELLII	MITCHELL'S SATYR	SE	LE	S1	G2T2
FISH					
ACIPENSER FULVESCENS	LAKE STURGEON	SE	**	S1	G3

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SPECIES NAME	COMMON NAME	STATE	FED	SRANK	GRANK
AMPHIBIANS					
RANA PIPIENS	NORTHERN LEOPARD FROG	SSC	**	S2	G5
REPTILES					
CLEMMYS GUTTATA	SPOTTED TURTLE	SE	**	S2	G5
CLONOPHIS KIRTLANDII	KIRTLAND'S SNAKE	SE	**	S2	G2
EMYDOIDEA BLANDINGII	BLANDING'S TURTLE	SE	**	S2	G4
LIOCHLOROPHIS VERNALIS	SMOOTH GREEN SNAKE	SE	**	S2	G5
SISTRURUS CATENATUS CATENATUS	EASTERN MASSASAUGA	SE	**	S2	G3G4T3T4
TERRAPENE ORNATA	ORNATE BOX TURTLE	SE	**	S2	G5
BIRDS					
ACCIPITER COOPERII	COOPER'S HAWK	**	**	S3B,SZN	G5
ARDEA HERODIAS	GREAT BLUE HERON	**	**	S4B,SZN	G5
BARTRAMIA LONGICAUDA	UPLAND SANDPIPER	SE	**	S3B	G5
BOTAURUS LENTIGINOSUS	AMERICAN BITTERN	SE	**	S2B	G4
BUTEO LINEATUS	RED-SHOULDERED HAWK	SSC	**	S3	G5
BUTEO PLATYPTERUS	BROAD-WINGED HAWK	SSC	**	S3B,SRFN	G5
CERTHIA AMERICANA	BROWN CREEPER	**	**	S2B,SZN	G5
CHLIDONIAS NIGER	BLACK TERN	SE	**	S1B,SZN	G4
CIRCUS CYANEUS	NORTHERN HARRIER	SE	**	S2	G5
CISTOTHORUS PALUSTRIS	MARSH WREN	SE	**	S3B,SZN	G5
CISTOTHORUS PLATENSIS	SEDGE WREN	SE	**	S3B,SZN	G5
DENDROICA CERULEA	CERULEAN WARBLER	SSC	**	S3B	G4
FALCO PEREGRINUS	PEREGRINE FALCON	SE	E(S/A)	S2B,SZN	G4
IXOBRYCHUS EXILIS	LEAST BITTERN	SE	**	S3B	G5
LANIUS LUDOVICIANUS	LOGGERHEAD SHRIKE	SE	**	S3B,SZN	G5
NYCTICORAX NYCTICORAX	BLACK-CROWNED NIGHT-HERON	SE	**	S1B,SAN	G5
PHALACROCORAX AURITUS	DOUBLE-CRESTED CORMORANT	SX	**	SHB,SZN	G5
RALLUS LIMICOLA	VIRGINIA RAIL	SSC	**	S3B,SZN	G5
STURNELLA NEGLECTA	WESTERN MEADOWLARK	SSC	**	S2B	G5
XANTHOCEPHALUS XANTHOCEPHALUS	YELLOW-HEADED BLACKBIRD	SE	**	S1B	G5
MAMMALS					
CONDYLURA CRISTATA	STAR-NOSED MOLE	SSC	**	S2?	G5
LYNX RUFUS	BOBCAT	SE	**	S1	G5
MUSTELA NIVALIS	LEAST WEASEL	SSC	**	S2?	G5
MYOTIS SODALIS	INDIANA BAT OR SOCIAL MYOTIS	SE	LE	S1	G2
SPERMOPHILUS FRANKLINII	FRANKLIN'S GROUND SQUIRREL	SE	**	S2	G5
TAXIDEA TAXUS	AMERICAN BADGER	SE	**	S2	G5
HIGH QUALITY NATURAL COMMUNITY					
FOREST - FLATWOODS BOREAL	BOREAL FLATWOODS	SG	**	S2	G2?

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ENDANGERED, THREATENED AND RARE SPECIES DOCUMENTED FROM LAPORTE COUNTY, INDIANA

SPECIES NAME	COMMON NAME	STATE	FED	SRANK	GRANK
FOREST - FLOODPLAIN WET-MESIC	WET-MESIC FLOODPLAIN FOREST	SG	**	S3	G3?
FOREST - UPLAND DRY	DRY UPLAND FOREST	SG	**	S4	G4
FOREST - UPLAND DRY-MESIC	DRY-MESIC UPLAND FOREST	SG	**	S4	G4
FOREST - UPLAND MESIC	MESIC UPLAND FOREST	SG	**	S3	G3?
LAKE - LAKE	LAKE	SG	**	S2	
PRAIRIE - DRY-MESIC	DRY-MESIC PRAIRIE	SG	**	S2	G3
PRAIRIE - MESIC	MESIC PRAIRIE	SG	**	S2	G2
PRAIRIE - SAND DRY	DRY SAND PRAIRIE	SG	**	S2	G3
PRAIRIE - SAND DRY-MESIC	DRY-MESIC SAND PRAIRIE	SG	**	S3	G3
PRAIRIE - SAND WET-MESIC	WET-MESIC SAND PRAIRIE	SG	**	S2	G1?
PRAIRIE - WET	WET PRAIRIE	SG	**	S1	G3
WETLAND - BOG ACID	ACID BOG	SG	**	S2	G3
WETLAND - BOG CIRCUMNEUTRAL	CIRCUMNEUTRAL BOG	SG	**	S3	G3
WETLAND - FEN	FEN	SG	**	S3	G3
WETLAND - FEN FORESTED	FORESTED FEN	SG	**	S1	G3
WETLAND - MARSH	MARSH	SG	**	S4	GU
WETLAND - MEADOW SEDGE	SEDGE MEADOW	SG	**	S1	G3?
WETLAND - SEEP CIRCUMNEUTRAL	CIRCUMNEUTRAL SEEP	SG	**	S1	GU
WETLAND - SWAMP SHRUB	SHRUB SWAMP	SG	**	S2	GU

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Appendix 11

GSD Stream Reach Characterization and Evaluation Report

RW ARMSTRONG™
Inspiration to reality.

The Little Calumet River Stream Reach Characterization and Evaluation Report completed in October 2002 by Greeley & Hansen was used to identify the concentration of pollutants in the combined sewer overflows (CSOs) and in dry and wet weather in the West Branch of the Little Calumet River. The study area for this report stretched from Cline Avenue to Ripley Street with an additional sampling location on Deep River. Figure 1 shows the eleven (11) locations used for dry and wet weather sampling as well as the CSO discharge points.

Figures 2 to 13 graphically show the sampling results of the parameters that overlapped with the sampling conducted as part of this Little Calumet River Watershed Management Plan. These six (6) parameters are only a small portion of the constituents that were sampled for as part of this 2002 study. The tables included at the end of this appendix are those taken directly from the 2002 report by Greeley and Hansen for the Gary Sanitary District.

Each water quality sampling location (11 total) has a table presenting the dry weather sampling results and two tables showing the wet weather sampling results. There are also tables showing the CSO discharge parameters for each wet weather event sampled. These are also shown by each location having a table for both events.

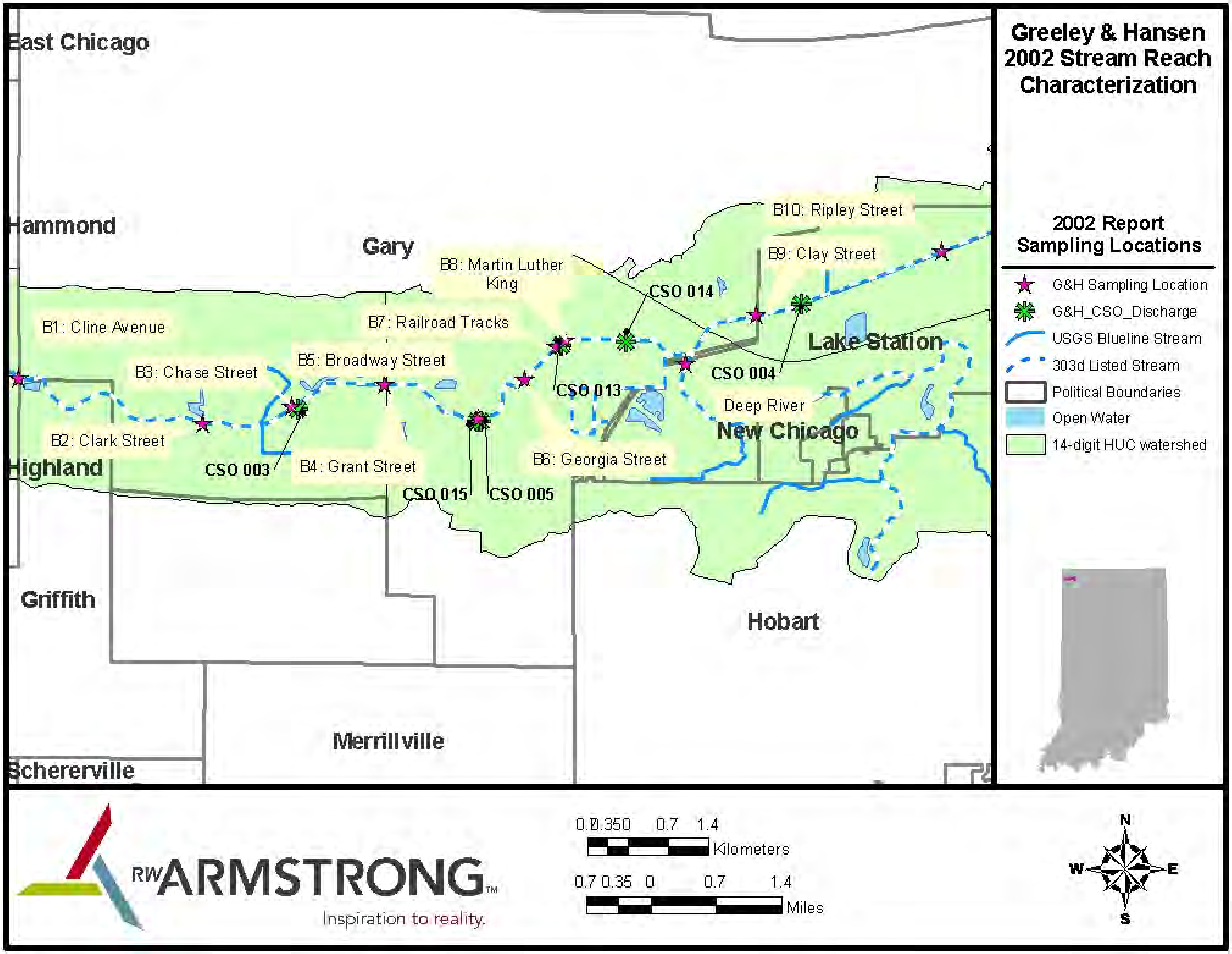

Figure 1: Greeley and Hansen sampling locations located along the Little Calumet River.

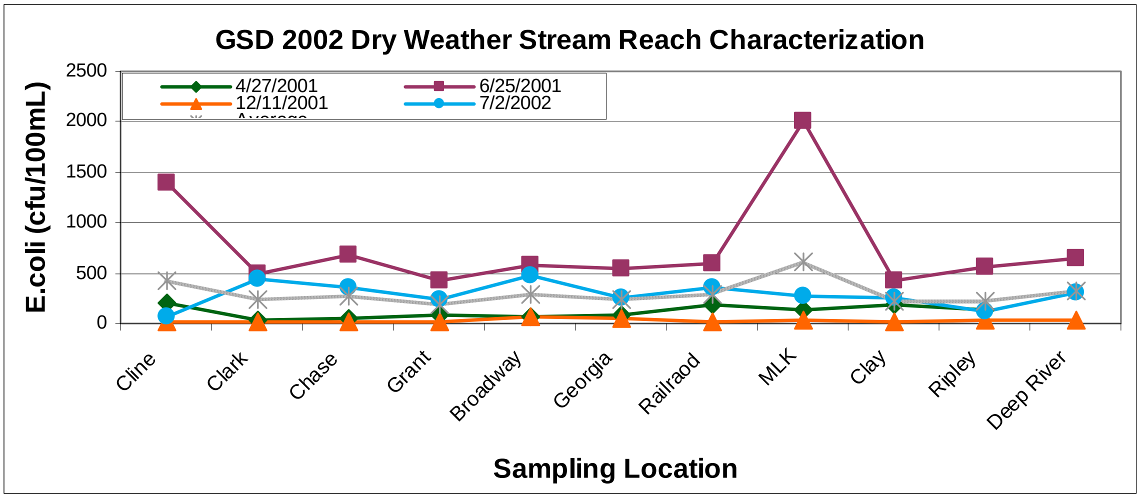

Figure 2: *E.coli* dry weather sampling results from 2002 study by Greeley and Hansen.

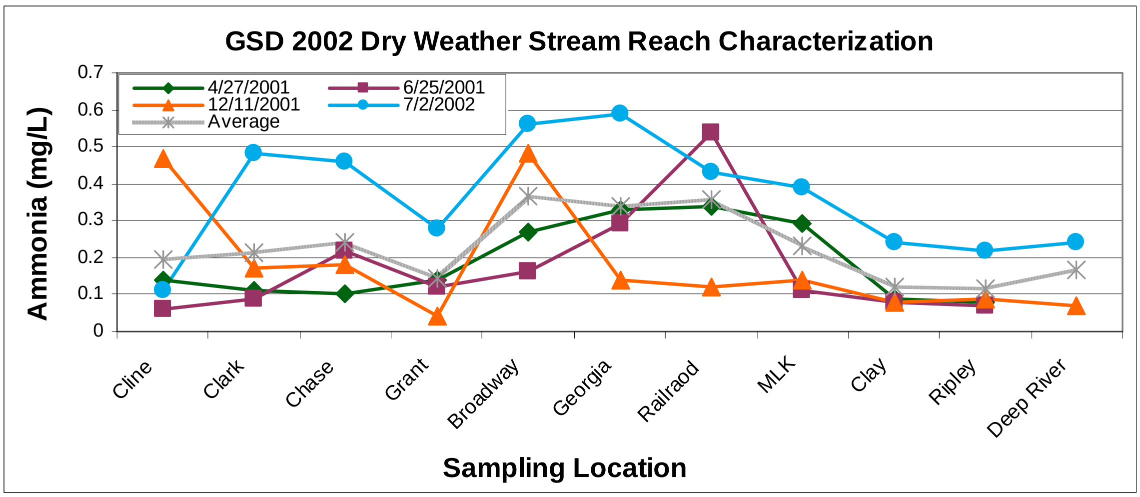

Figure 3: Ammonia dry weather sampling results from 2002 study by Greeley and Hansen.

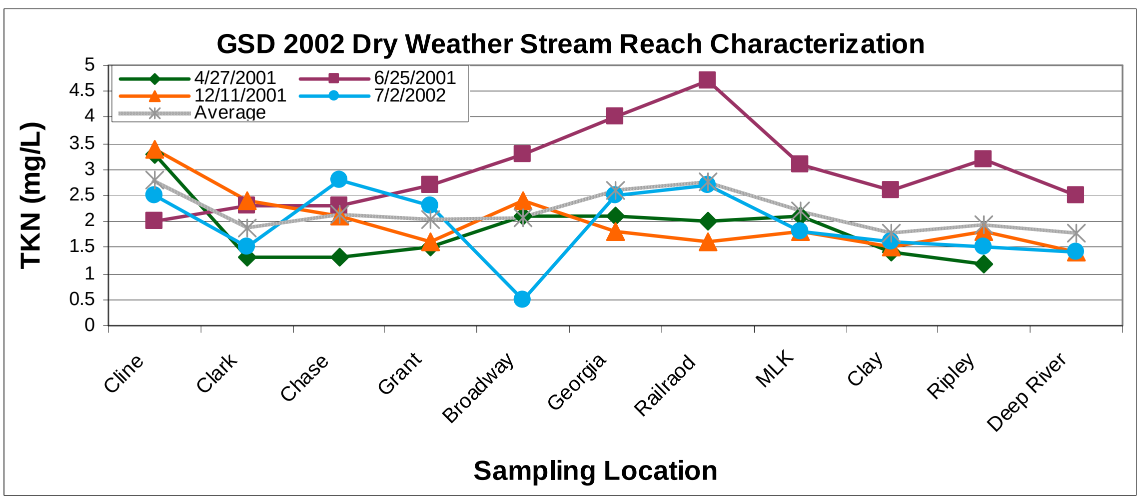

Figure 4: TKN dry weather sampling results from 2002 study by Greeley and Hansen.

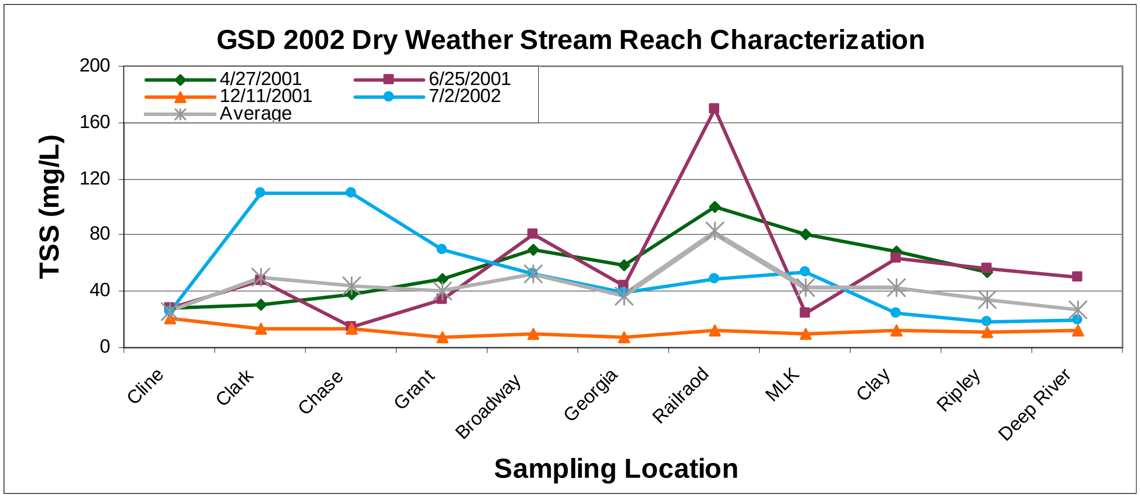

Figure 5: TSS dry weather sampling results from 2002 study by Greeley and Hansen.

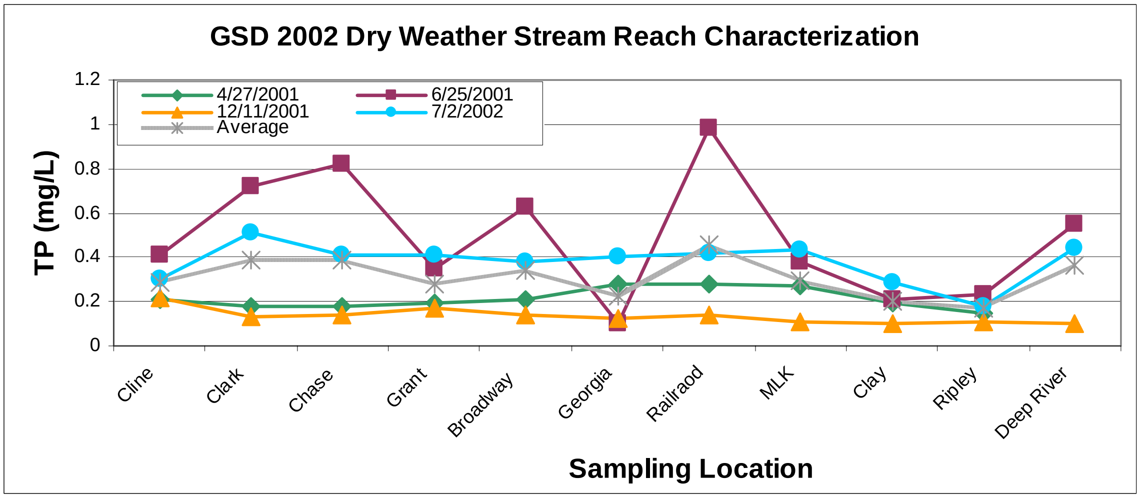

Figure 6: TP dry weather sampling results from 2002 study by Greeley and Hansen.

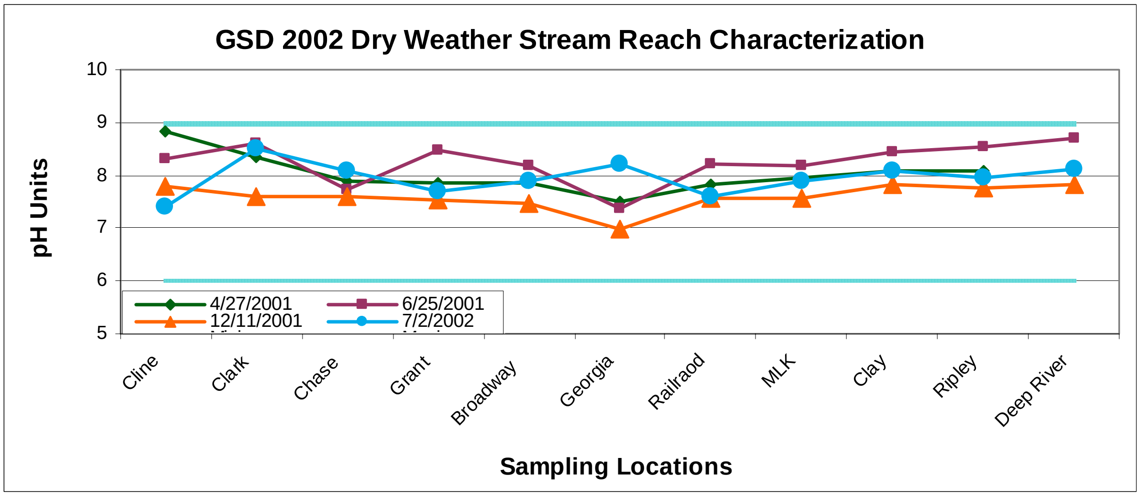

Figure 7: pH units dry weather sampling results from 2002 study by Greeley and Hansen.

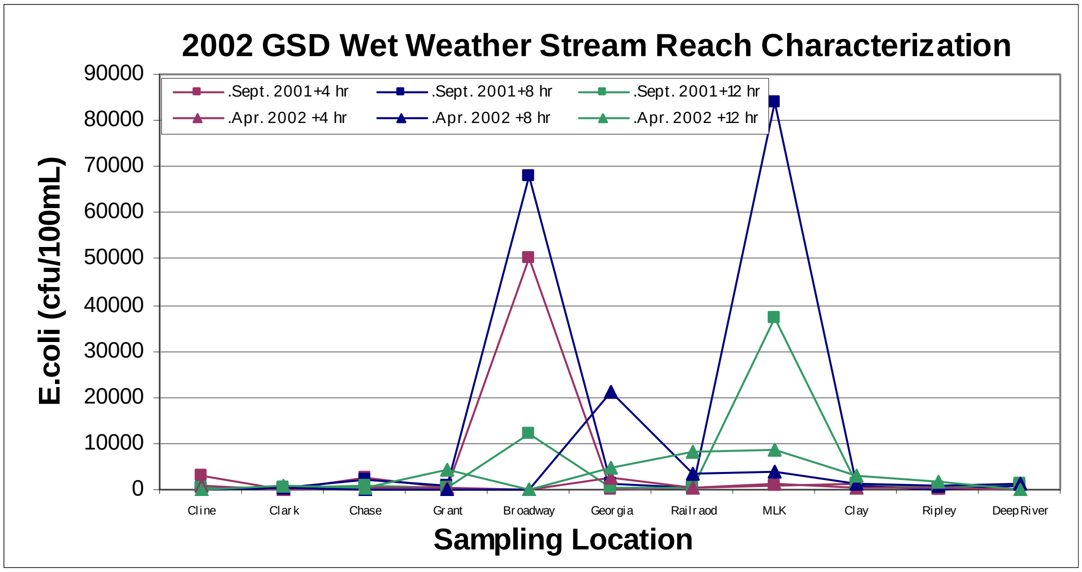

Figure 8: *E.coli* wet weather sampling results from 2002 study by Greeley and Hansen.

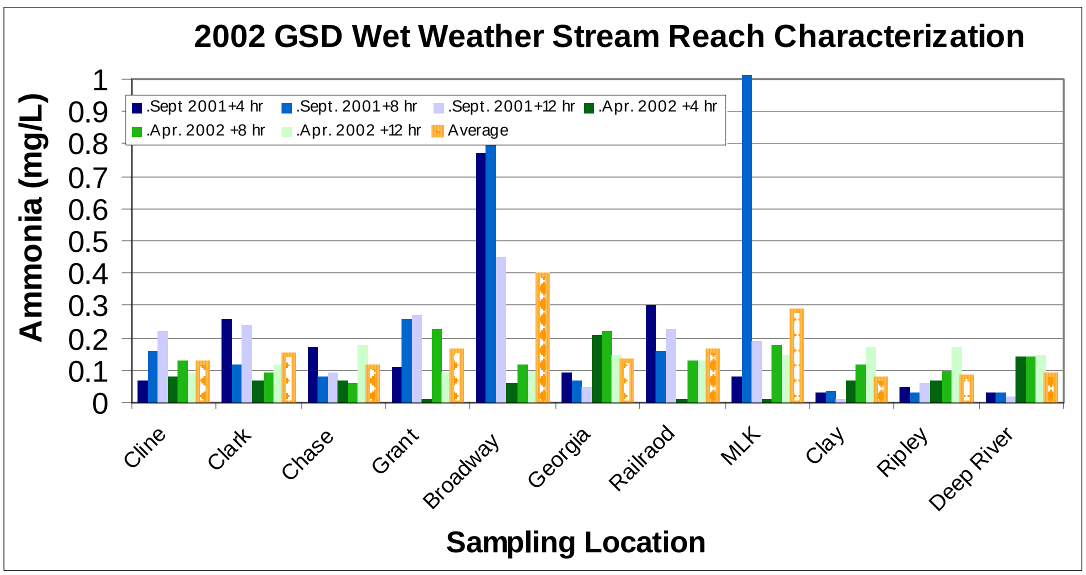

Figure 9: Ammonia wet weather sampling results from 2002 study by Greeley and Hansen.

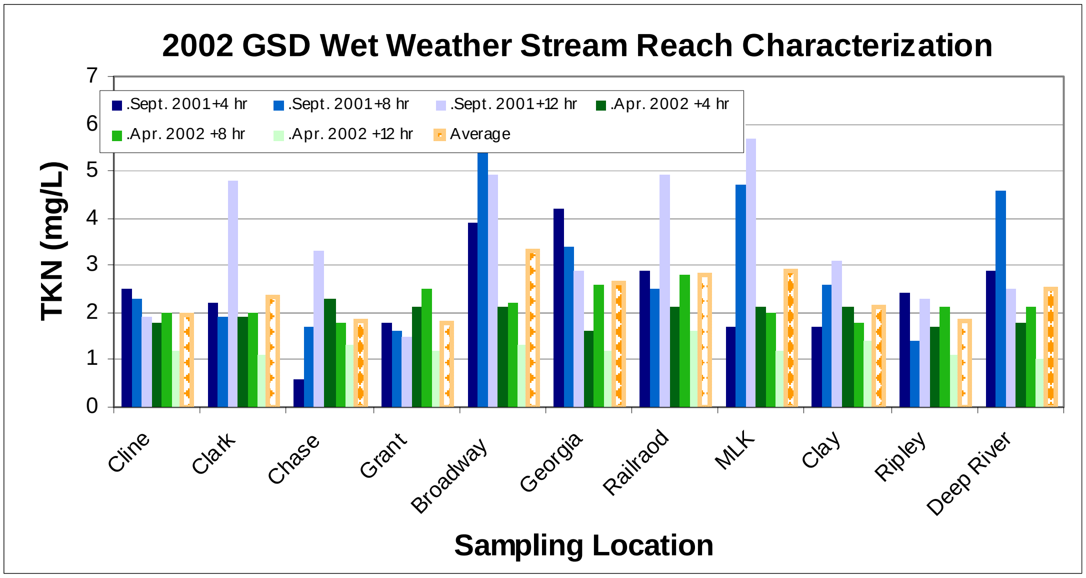

Figure 10: TKN wet weather sampling results from 2002 study by Greeley and Hansen.

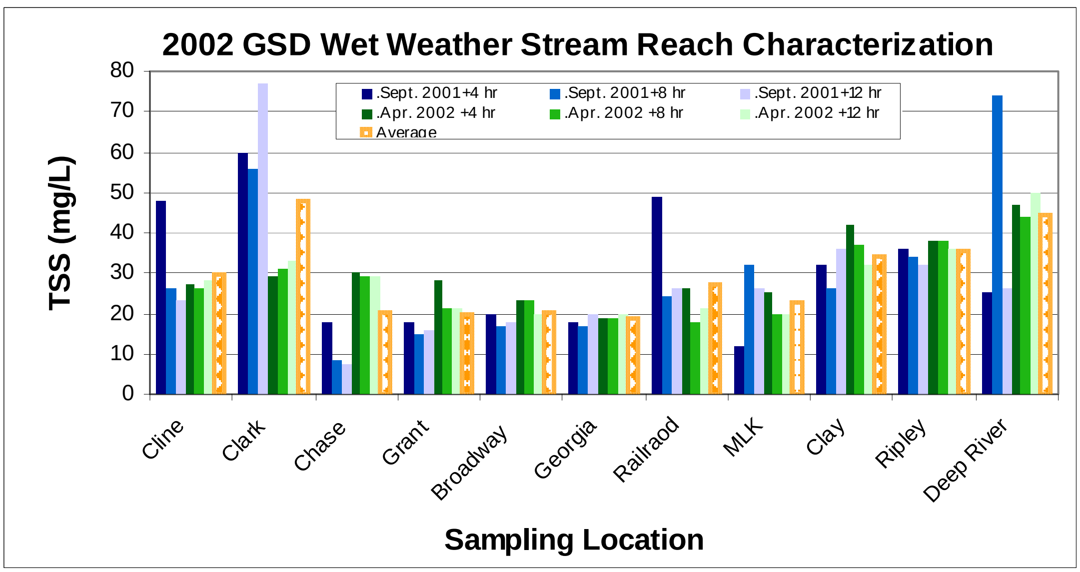

Figure 11: TSS wet weather sampling results from 2002 study by Greeley and Hansen.

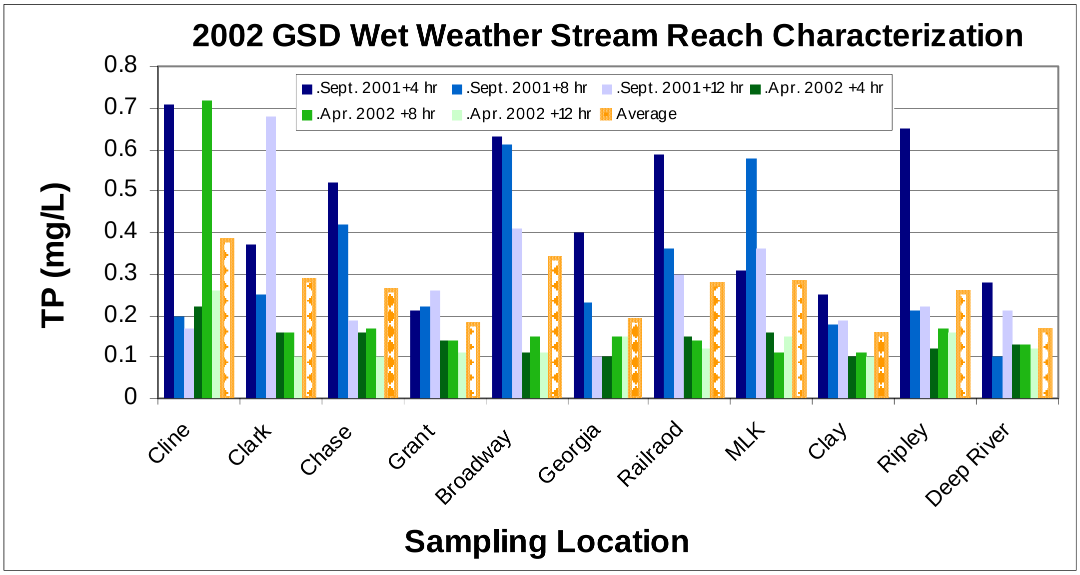

Figure 12: TP wet weather sampling results from 2002 study by Greeley and Hansen.

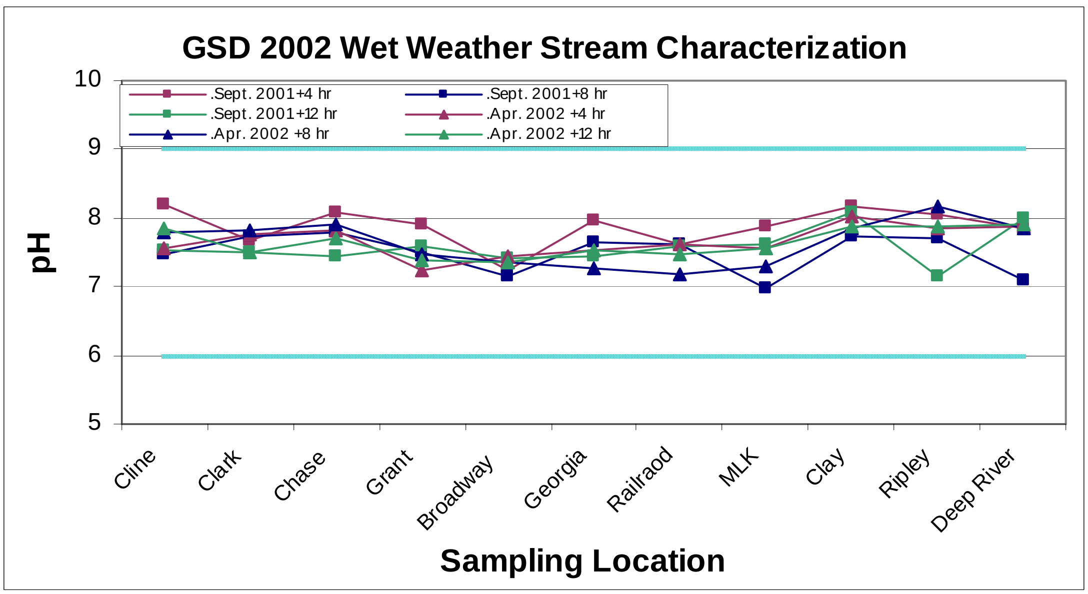

Figure 13: pH units wet weather sampling results from 2002 study by Greeley and Hansen.

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TABLE 3-6
Cline Avenue Bridge (B1)
Dry Weather Analyses

PARAMETER	SAMPLE DATE				Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	WATER QUALITY LIMITS	
	April 27, 2001	June 25, 2001	December 11, 2001	July 2, 2002					Acute	Chronic
CONVENTIONALS										
E-coli (CFU / 100mL)	210	1400	20	70	142	1400	20	10	235	235
Oil and Grease	<2.0	<2.0	<2.0	<2.0	0.0	0.0	0.0	2.0	-	-
Ammonia (NH_3), as N	0.14	0.06	0.47	0.11	0.14	0.47	0.06	0.01	1.2	0.27
Carbonaceous Biochemical Oxygen Demand (CBOD)	18	14	7.2	7.7	11	18	7.2	2.0	-	-
Chemical Oxygen Demand (COD)	70	60	50	40	54	70	40	20	-	-
Chloride	170	140	110	118	133	170	110	10	860	230
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.022	0.0052
Fluoride, (F)	2.66	1.32	2.43	4.64	2.51	4.64	1.32	0.10	12	3.4
Hardness, Total as $CaCO_3$	300	310	290	300	300	310	290	2.0	-	-
Nitrogen, Total Kjeldahl as N (TKN)	3.3	2.0	3.4	2.5	2.7	3.4	2.0	0.50	-	-
Phosphorus, Total	0.21	0.41	0.22	0.3	0.27	0.41	0.21	0.10	-	-
Solids, Total Dissolved (TDS)	650	550	480	520	547	650	480	10	-	-
Solids, Total Suspended (TSS)	28	28	21	26	26	28	21	2.0	-	-
Solids, Total Volatile Suspended (TVSS)	23	10	8.0	11.0	12	23	8.0	1.0	-	-
Sulfate (SO_4)	140	80	82	86	94	140	80	5.0	-	-
pH (pH units)	8.84	8.30	7.80	7.40	8.07	8.84	7.40	0.01	6<=pH<=9	6<=pH<=9
METALS										
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.34	0.15
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	0.00	0.00	0.00	0.02	0.34	0.15
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0186	0.0066
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0175	0.0060
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	5.0	0.24
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.59	0.21
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.046	0.027
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.044	0.026
Iron (Fe), Total Recoverable	0.29	1.18	2.08	0.76	0.86	2.08	0.29	0.05	-	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	-	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0017	0.00091
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0014	0.00077
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.151
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.150
Zinc (Zn), Total Recoverable	<0.01	0.01	0.03	0.03	0.02	0.03	0.01	0.01	0.35	0.35
Zinc (Zn), Dissolved	0.02	<0.01	0.01	<0.01	0.01	0.02	0.01	0.01	0.34	0.34
PESTICIDES										
Heptachlor	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Aldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.15	-	-
alpha-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
beta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
delta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
gamma-BHC (Lindane)	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	0.5
Chlordane	ND	ND	ND	ND	0.00	0.00	0.00	2.50	-	0.00025
4,4'-DDD	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Heptachlor Epoxide	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
4,4'-DDE	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
4,4'-DDT	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	0.000011
Dieldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.24	0.0000065
Endosulfan I	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Endosulfan II	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Endosulfan Sulfate	ND	ND	ND	ND	0.00	0.00	0.00	0.10	-	-
Endrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.086	0.036

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

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Gary, Indiana

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TABLE 3-7
Clark Street Bridge (B2)
Dry Weather Analyses

PARAMETER	SAMPLE DATE				Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	WATER QUALITY LIMITS	
	April 27, 2001	June 25, 2001	December 11, 2001	July 2, 2002					Acute	Chronic
CONVENTIONALS										
E-coli (CFU / 100mL)	30	500	10	440	90	500	10	10	235	235
Oil and Grease	<2.0	<2.0	<2.0	<2.0	0.0	0.0	0.0	2.0	-	-
Ammonia (NH_3), as N	0.11	0.09	0.17	0.48	0.17	0.48	0.09	0.01	1.2	0.27
Carbonaceous Biochemical Oxygen Demand (CBOD)	6.0	14	3.6	8.2	7.1	14	3.6	2.0	-	-
Chemical Oxygen Demand (COD)	50	90	40	80	62	90	40	20	-	-
Chloride	170	160	100	155	143	170	100	10	860	230
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.022	0.0052
Fluoride, (F)	1.72	1.11	1.77	3.38	1.84	3.38	1.11	0.10	12	3.4
Hardness, Total as $CaCO_3$	360	370	340	410	369	410	340	2.0	-	-
Nitrogen, Total Kjeldahl as N (TKN)	1.3	2.3	2.4	1.5	1.8	2.4	1.3	0.50	-	-
Phosphorus, Total	0.18	0.72	0.13	0.51	0.30	0.72	0.13	0.10	-	-
Solids, Total Dissolved (TDS)	690	620	500	610	601	690	500	10	-	-
Solids, Total Suspended (TSS)	30	48	13	110	38	110	13	2.0	-	-
Solids, Total Volatile Suspended (TVSS)	12	24	10	25	16	25	10	1.0	-	-
Sulfate (SO_4)	120	91	82		96	120	82	5.0	-	-
pH (pH units)	8.36	8.59	7.60	8.50	8.25	8.59	7.60	0.01	6<=pH<=9	6<=pH<=9
METALS										
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.34	0.15
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	0.00	0.00	0.00	0.02	0.34	0.15
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0186	0.0066
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0175	0.0060
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	5.0	0.24
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.59	0.21
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.046	0.027
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.044	0.026
Iron (Fe), Total Recoverable	1.08	1.65	1.24	3.75	1.70	3.75	1.08	0.05	-	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	-	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0017	0.00091
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0014	0.00077
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.151
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.150
Zinc (Zn), Total Recoverable	<0.01	0.01	0.02	0.04	0.02	0.04	0.01	0.01	0.35	0.35
Zinc (Zn), Dissolved	0.01	<0.01	0.01	0.07	0.02	0.07	0.01	0.01	0.34	0.34
PESTICIDES										
Heptachlor	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Aldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.15	-	-
alpha-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
beta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
delta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
gamma-BHC (Lindane)	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	0.5
Chlordane	ND	ND	ND	ND	0.00	0.00	0.00	2.50	-	0.00025
4,4'-DDD	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Heptachlor Epoxide	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
4,4'-DDE	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
4,4'-DDT	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	0.000011
Dieldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.24	0.0000065
Endosulfan I	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Endosulfan II	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Endosulfan Sulfate	ND	ND	ND	ND	0.00	0.00	0.00	0.10	-	-
Endrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.086	0.036

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

Bridge_Dry_Events.xls
Clark

GARY SANITARY DISTRICT
Gary, Indiana

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TABLE 3-8
Chase Street Bridge (B3)
Dry Weather Analyses

PARAMETER	SAMPLE DATE				Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	WATER QUALITY LIMITS	
	April 27, 2001	June 25, 2001	December 11, 2001	July 2, 2002					Acute	Chronic
CONVENTIONALS										
E-coli (CFU / 100mL)	50	680	10	350	104	680	10	10	235	235
Oil and Grease	<2.0	<2.0	<2.0	<2.0	0.0	0.0	0.0	2.0	-	-
Ammonia (NH_3), as N	0.10	0.22	0.18	0.46	0.21	0.46	0.10	0.01	1.2	0.27
Carbonaceous Biochemical Oxygen Demand (CBOD)	<2.0	9.5	3.2	7.4	4.3	9.5	1.5	2.0	-	-
Chemical Oxygen Demand (COD)	60	80	50	80	66	80	50	20	-	-
Chloride	160	140	110	212	151	212	110	10	860	230
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.022	0.0052
Fluoride, (F)	1.24	1.40	1.74	3.36	1.78	3.36	1.24	0.10	12	3.4
Hardness, Total as $CaCO_3$	350	340	350	350	347	350	340	2.0	-	-
Nitrogen, Total Kjeldahl as N (TKN)	1.3	2.3	2.1	2.8	2.0	2.8	1.3	0.50	-	-
Phosphorus, Total	0.18	0.82	0.14	0.41	0.30	0.82	0.14	0.10	-	-
Solids, Total Dissolved (TDS)	680	580	510	620	594	680	510	10	-	-
Solids, Total Suspended (TSS)	38	15	14	110	31	110	14	2.0	-	-
Solids, Total Volatile Suspended (TVSS)	9.6	8.0	6.4	26	11	26	6.4	1.0	-	-
Sulfate (SO_4)	100	47	76		71	100	47	5.0	-	-
pH (pH units)	7.88	7.73	7.61	8.10	7.83	8.10	7.61	0.01	6<=pH<=9	6<=pH<=9
METALS										
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.34	0.15
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	0.00	0.00	0.00	0.02	0.34	0.15
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0186	0.0066
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0175	0.0060
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	5.0	0.24
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.59	0.21
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.046	0.027
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.044	0.026
Iron (Fe), Total Recoverable	1.22	1.02	1.28	3.67	1.55	3.67	1.02	0.05	-	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	0.08	0.02	0.08	0.01	0.05	-	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0017	0.00091
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0014	0.00077
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.151
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.150
Zinc (Zn), Total Recoverable	<0.01	<0.01	0.03	0.05	0.01	0.05	0.01	0.01	0.35	0.35
Zinc (Zn), Dissolved	<0.01	<0.01	0.04	0.02	0.01	0.04	0.01	0.01	0.34	0.34
PESTICIDES										
Heptachlor	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Aldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.15	-	-
alpha-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
beta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
delta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
gamma-BHC (Lindane)	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	0.5
Chlordane	ND	ND	ND	ND	0.00	0.00	0.00	2.50	-	0.00025
4,4'-DDD	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Heptachlor Epoxide	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
4,4'-DDE	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
4,4'-DDT	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	0.000011
Dieldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.24	0.0000065
Endosulfan I	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Endosulfan II	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Endosulfan Sulfate	ND	ND	ND	ND	0.00	0.00	0.00	0.10	-	-
Endrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.086	0.036

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

Bridge_Dry_Events.xls
Chase

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-9
Grant Street Bridge (B4)
Dry Weather Analyses

PARAMETER	SAMPLE DATE				Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	WATER QUALITY LIMITS	
	April 27, 2001	June 25, 2001	December 11, 2001	July 2, 2002					Acute	Chronic
CONVENTIONALS										
E-coli (CFU / 100mL)	80	420	10	230	94	420	10	10	235	235
Oil and Grease	<2.0	<2.0	<2.0	<2.0	0.0	0.0	0.0	2.0	-	-
Ammonia (NH_3), as N	0.14	0.12	0.04	0.28	0.12	0.28	0.04	0.01	1.2	0.27
Carbonaceous Biochemical Oxygen Demand (CBOD)	<2.0	17	4.6	6.9	5.3	17	1.5	2.0	-	-
Chemical Oxygen Demand (COD)	60	80	50	70	64	80	50	20	-	-
Chloride	150	140	110	158	138	158	110	10	860	230
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.022	0.0052
Fluoride, (F)	1.14	1.40	1.76	3.66	1.79	3.66	1.14	0.10	12	3.4
Hardness, Total as $CaCO_3$	360	310	320	380	341	380	310	2.0	-	-
Nitrogen, Total Kjeldahl as N (TKN)	1.5	2.7	1.6	2.3	2.0	2.7	1.5	0.50	-	-
Phosphorus, Total	0.19	0.35	0.17	0.41	0.26	0.41	0.17	0.10	-	-
Solids, Total Dissolved (TDS)	660	560	530	630	593	660	530	10	-	-
Solids, Total Suspended (TSS)	49	34	7.2	69	30	69	7.2	2.0	-	-
Solids, Total Volatile Suspended (TVSS)	13	19	2.0	19	10	19	2.0	1.0	-	-
Sulfate (SO_4)	94	65	82		79	94	65	5.0	-	-
pH (pH units)	7.87	8.48	7.54	7.70	7.89	8.48	7.54	0.01	6<=pH<=9	6<=pH<=9
METALS										
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.34	0.15
Arsenic (As), Dissolved	<0.02	<0.02	0.02	<0.02	0.01	0.02	0.01	0.02	0.34	0.15
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0186	0.0066
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0175	0.0060
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	5.0	0.24
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.59	0.21
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.046	0.027
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.044	0.026
Iron (Fe), Total Recoverable	1.92	0.98	0.79	2.76	1.42	2.76	0.79	0.05	-	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	-	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0017	0.00091
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0014	0.00077
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.151
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.150
Zinc (Zn), Total Recoverable	0.02	0.01	<0.01	0.05	0.02	0.05	0.01	0.01	0.35	0.35
Zinc (Zn), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.34	0.34
PESTICIDES										
Heptachlor	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Aldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.15	-	-
alpha-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
beta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
delta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
gamma-BHC (Lindane)	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	0.5
Chlordane	ND	ND	ND	ND	0.00	0.00	0.00	2.50	-	0.00025
4,4'-DDD	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Heptachlor Epoxide	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
4,4'-DDE	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
4,4'-DDT	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	0.000011
Dieldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.24	0.0000065
Endosulfan I	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Endosulfan II	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Endosulfan Sulfate	ND	ND	ND	ND	0.00	0.00	0.00	0.10	-	-
Endrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.086	0.036

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

Bridge_Dry_Events.xls
Grant

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-10
Broadway Street Bridge (B5)
Dry Weather Analyses

PARAMETER	SAMPLE DATE				Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	WATER QUALITY LIMITS	
	April 27, 2001	June 25, 2001	December 11, 2001	July 2, 2002					Acute	Chronic
CONVENTIONALS										
E-coli (CFU / 100mL)	60	580	70	470	184	580	60	10	235	235
Oil and Grease	<2.0	<2.0	<2.0	<2.0	0.0	0.0	0.0	2.0	-	-
Ammonia (NH_3), as N	0.27	0.16	0.48	0.56	0.33	0.56	0.16	0.01	1.2	0.27
Carbonaceous Biochemical Oxygen Demand (CBOD)	<2.0	15	2.2	9.8	4.7	15	1.5	2.0	-	-
Chemical Oxygen Demand (COD)	70	90	40	60	62	90	40	20	-	-
Chloride	160	420	130	248	216	420	130	10	860	230
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.022	0.0052
Fluoride, (F)	1.13	1.36	1.55	3.54	1.70	3.54	1.13	0.10	12	3.4
Hardness, Total as $CaCO_3$	370	340	360	390	365	390	340	2.0	-	-
Nitrogen, Total Kjeldahl as N (TKN)	2.1	3.3	2.4	<0.50	1.6	3.3	0.38	0.50	-	-
Phosphorus, Total	0.21	0.63	0.14	0.38	0.29	0.63	0.14	0.10	-	-
Solids, Total Dissolved (TDS)	700	580	610	660	636	700	580	10	-	-
Solids, Total Suspended (TSS)	69	80	9.6	52	41	80	9.6	2.0	-	-
Solids, Total Volatile Suspended (TVSS)	17	58	2.8	18	15	58	2.8	1.0	-	-
Sulfate (SO_4)	120	73	100		96	120	73	5.0	-	-
pH (pH units)	7.85	8.19	7.47	7.88	7.84	8.19	7.47	0.01	6<=pH<=9	6<=pH<=9
METALS										
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.34	0.15
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	0.00	0.00	0.00	0.02	0.34	0.15
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0186	0.0066
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0175	0.0060
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	5.0	0.24
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.59	0.21
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.046	0.027
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.044	0.026
Iron (Fe), Total Recoverable	3.09	1.38	1.31	2.05	1.84	3.09	1.31	0.05	-	-
Iron (Fe), Dissolved	0.08	<0.05	<0.05	<0.05	0.02	0.08	0.01	0.05	-	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0017	0.00091
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0014	0.00077
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.151
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.150
Zinc (Zn), Total Recoverable	0.03	0.01	0.03	0.04	0.02	0.04	0.01	0.01	0.35	0.35
Zinc (Zn), Dissolved	0.02	<0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.34	0.34
PESTICIDES										
Heptachlor	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Aldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.15	-	-
alpha-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
beta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
delta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
gamma-BHC (Lindane)	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	0.5
Chlordane	ND	ND	ND	ND	0.00	0.00	0.00	2.50	-	0.00025
4,4'-DDD	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Heptachlor Epoxide	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
4,4'-DDE	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
4,4'-DDT	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	0.000011
Dieldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.24	0.0000065
Endosulfan I	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Endosulfan II	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Endosulfan Sulfate	ND	ND	ND	ND	0.00	0.00	0.00	0.10	-	-
Endrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.086	0.036

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

Bridge_Dry_Events.xls
Broadway

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-11
Georgia Street Bridge (B6)
Dry Weather Analyses

PARAMETER	SAMPLE DATE				Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	WATER QUALITY LIMITS	
	April 27, 2001	June 25, 2001	December 11, 2001	July 2, 2002					Acute	Chronic
CONVENTIONALS										
E-coli (CFU / 100mL)	80	540	50	250	152	540	50	10	235	235
Oil and Grease	<2.0	<2.0	<2.0	<2.0	0.0	0.0	0.0	2.0	-	-
Ammonia (NH_3), as N	0.33	0.29	0.14	0.59	0.30	0.59	0.14	0.01	1.2	0.27
Carbonaceous Biochemical Oxygen Demand (CBOD)	4.8	22	2.4	6.8	6.4	22	2.4	2.0	-	-
Chemical Oxygen Demand (COD)	70	90	50	60	66	90	50	20	-	-
Chloride	160	170	130	174	157	174	130	10	860	230
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	0.040	<0.005	0.003	0.040	0.001	0.005	0.022	0.0052
Fluoride, (F)	1.02	1.24	1.58	3.69	1.65	3.69	1.02	0.10	12	3.4
Hardness, Total as $CaCO_3$	380	310	350	370	351	380	310	2.0	-	-
Nitrogen, Total Kjeldahl as N (TKN)	2.1	4.0	1.8	2.5	2.5	4.0	1.8	0.50	-	-
Phosphorus, Total	0.28	<0.10	0.12	0.40	0.18	0.40	0.08	0.10	-	-
Solids, Total Dissolved (TDS)	710	670	590	680	661	710	590	10	-	-
Solids, Total Suspended (TSS)	58	44	6.8	39	29	58	6.8	2.0	-	-
Solids, Total Volatile Suspended (TVSS)	13	28	4.0	13	12	28	4.0	1.0	-	-
Sulfate (SO_4)	110	96	92		99	110	92	5.0	-	-
pH (pH units)	7.50	7.38	6.99	8.20	7.51	8.20	6.99	0.01	6<=pH<=9	6<=pH<=9
METALS										
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	0.01	0.004	0.01	0.003	0.01	0.34	0.15
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	0.00	0.00	0.00	0.02	0.34	0.15
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0186	0.0066
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0175	0.0060
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	5.0	0.24
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.59	0.21
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.046	0.027
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	0.01	0.004	0.01	0.003	0.01	0.044	0.026
Iron (Fe), Total Recoverable	2.59	1.37	1.16	1.58	1.60	2.59	1.16	0.05	-	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	-	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0017	0.00091
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0014	0.00077
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.151
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.150
Zinc (Zn), Total Recoverable	0.02	0.03	0.01	0.04	0.02	0.04	0.01	0.01	0.35	0.35
Zinc (Zn), Dissolved	0.01	0.02	<0.01	0.21	0.02	0.21	0.01	0.01	0.34	0.34
PESTICIDES										
Heptachlor	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Aldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.15	-	-
alpha-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
beta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
delta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
gamma-BHC (Lindane)	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	0.5
Chlordane	ND	ND	ND	ND	0.00	0.00	0.00	2.50	-	0.00025
4,4'-DDD	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Heptachlor Epoxide	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
4,4'-DDE	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
4,4'-DDT	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	0.000011
Dieldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.24	0.0000065
Endosulfan I	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Endosulfan II	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Endosulfan Sulfate	ND	ND	ND	ND	0.00	0.00	0.00	0.10	-	-
Endrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.086	0.036

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

GARY SANITARY DISTRICT
Gary, Indiana

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TABLE 3-12
Railroad Tracks Bridge (B7)
Dry Weather Analyses

PARAMETER	SAMPLE DATE				Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	WATER QUALITY LIMITS	
	April 27, 2001	June 25, 2001	December 11, 2001	July 2, 2002					Acute	Chronic
CONVENTIONALS										
E-coli (CFU / 100mL)	180	590	20	360	166	590	20	10	235	235
Oil and Grease	<2.0	<2.0	2.3	<2.0	0.7	2.3	0.5	2.0	-	-
Ammonia (NH_3), as N	0.34	0.54	0.12	0.43	0.31	0.54	0.12	0.01	1.2	0.27
Carbonaceous Biochemical Oxygen Demand (CBOD)	3.0	28	3.8	8.0	7.1	28	3.0	2.0	-	-
Chemical Oxygen Demand (COD)	80	130	50	70	78	130	50	20	-	-
Chloride	190	170	160	243	188	243	160	10	860	230
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.022	0.0052
Fluoride, (F)	0.86	1.17	1.48	3.52	1.51	3.52	0.86	0.10	12	3.4
Hardness, Total as $CaCO_3$	380	300	370	360	351	380	300	2.0	-	-
Nitrogen, Total Kjeldahl as N (TKN)	2.0	4.7	1.6	2.7	2.5	4.7	1.6	0.50	-	-
Phosphorus, Total	0.28	0.98	0.14	0.42	0.36	0.98	0.14	0.10	-	-
Solids, Total Dissolved (TDS)	720	570	330	660	547	720	330	10	-	-
Solids, Total Suspended (TSS)	100	170	12	49	56	170	12	2.0	-	-
Solids, Total Volatile Suspended (TVSS)	23	100	6.4	17	22	100	6.4	1.0	-	-
Sulfate (SO_4)	110	46	83		75	110	46	5.0	-	-
pH (pH units)	7.82	8.22	7.57	7.60	7.80	8.22	7.57	0.01	6<=pH<=9	6<=pH<=9
METALS										
Arsenic (As), Total Recoverable	<0.01	<0.01	0.01	<0.01	0.004	0.01	0.003	0.01	0.34	0.15
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	0.00	0.00	0.00	0.02	0.34	0.15
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0186	0.0066
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0175	0.0060
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	0.01	0.004	0.01	0.003	0.01	5.0	0.24
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.59	0.21
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.046	0.027
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.044	0.026
Iron (Fe), Total Recoverable	4.09	1.37	1.39	1.79	1.93	4.09	1.37	0.05	-	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	-	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0017	0.00091
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0014	0.00077
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	0.01	0.004	0.01	0.003	0.01	1.35	0.151
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.150
Zinc (Zn), Total Recoverable	0.04	<0.01	0.02	0.03	0.02	0.04	0.01	0.01	0.35	0.35
Zinc (Zn), Dissolved	<0.01	<0.01	<0.01	0.03	0.005	0.03	0.003	0.01	0.34	0.34
PESTICIDES										
Heptachlor	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Aldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.15	-	-
alpha-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
beta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
delta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
gamma-BHC (Lindane)	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	0.5
Chlordane	ND	ND	ND	ND	0.00	0.00	0.00	2.50	-	0.00025
4,4'-DDD	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Heptachlor Epoxide	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
4,4'-DDE	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
4,4'-DDT	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	0.000011
Dieldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.24	0.0000065
Endosulfan I	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Endosulfan II	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Endosulfan Sulfate	ND	ND	ND	ND	0.00	0.00	0.00	0.10	-	-
Endrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.086	0.036

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

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TABLE 3-13
Martin Luther King Drive Bridge (B8)
Dry Weather Analyses

PARAMETER	SAMPLE DATE				Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	WATER QUALITY LIMITS	
	April 27, 2001	June 25, 2001	December 11, 2001	July 2, 2002					Acute	Chronic
CONVENTIONALS										
E-coli (CFU / 100mL)	130	2000	30	280	216	2000	30	10	235	235
Oil and Grease	<2.0	<2.0	2.1	<2.0	0.7	2.1	0.5	2.0	-	-
Ammonia (NH_3), as N	0.29	0.11	0.14	0.39	0.20	0.39	0.11	0.01	1.2	0.27
Carbonaceous Biochemical Oxygen Demand (CBOD)	2.0	14	2.2	7.3	4.6	14	2.0	2.0	-	-
Chemical Oxygen Demand (COD)	80	80	50	70	69	80	50	20	-	-
Chloride	170	320	130	159	183	320	130	10	860	230
Cyanide, Weak Acid Dissociable (WAD)	<0.005	0.006	<0.005	<0.005	0.002	0.006	0.001	0.005	0.022	0.0052
Fluoride, (F)	1.16	1.27	1.45	3.62	1.67	3.62	1.16	0.10	12	3.4
Hardness, Total as $CaCO_3$	390	320	350	360	354	390	320	2.0	-	-
Nitrogen, Total Kjeldahl as N (TKN)	2.1	3.1	1.8	1.8	2.1	3.1	1.8	0.50	-	-
Phosphorus, Total	0.27	0.38	0.11	0.43	0.26	0.43	0.11	0.10	-	-
Solids, Total Dissolved (TDS)	750	610	600	640	647	750	600	10	-	-
Solids, Total Suspended (TSS)	81	24	10	54	32	81	10	2.0	-	-
Solids, Total Volatile Suspended (TVSS)	68	17	5.2	18	18	68	5.2	1.0	-	-
Sulfate (SO_4)	100	51	89		77	100	51	5.0	-	-
pH (pH units)	7.94	8.17	7.58	7.90	7.89	8.17	7.58	0.01	6<=pH<=9	6<=pH<=9
METALS										
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	0.01	0.004	0.01	0.003	0.01	0.34	0.15
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	0.00	0.00	0.00	0.02	0.34	0.15
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0186	0.0066
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0175	0.0060
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	5.0	0.24
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.59	0.21
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.046	0.027
Copper (Cu), Dissolved	<0.01	0.01	<0.01	<0.01	0.004	0.01	0.003	0.01	0.044	0.026
Iron (Fe), Total Recoverable	3.86	1.24	1.16	1.93	1.81	3.86	1.16	0.05	-	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	-	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0017	0.00091
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0014	0.00077
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.151
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.150
Zinc (Zn), Total Recoverable	0.04	<0.01	0.03	0.02	0.02	0.04	0.01	0.01	0.35	0.35
Zinc (Zn), Dissolved	0.01	<0.01	0.02	0.11	0.02	0.11	0.01	0.01	0.34	0.34
PESTICIDES										
Heptachlor	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Aldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.15	-	-
alpha-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
beta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
delta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
gamma-BHC (Lindane)	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	0.5
Chlordane	ND	ND	ND	ND	0.00	0.00	0.00	2.50	-	0.00025
4,4'-DDD	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Heptachlor Epoxide	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
4,4'-DDE	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
4,4'-DDT	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	0.000011
Dieldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.24	0.0000065
Endosulfan I	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Endosulfan II	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Endosulfan Sulfate	ND	ND	ND	ND	0.00	0.00	0.00	0.10	-	-
Endrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.086	0.036

NOTES:

All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.

[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".

[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.

[3]The minimum value may be equal to a calculated "V" value.

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TABLE 3-14
Clay Street Bridge (B9)
Dry Weather Analyses

PARAMETER	SAMPLE DATE				Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	WATER QUALITY LIMITS	
	April 27, 2001	June 25, 2001	December 11, 2001	July 2, 2002					Acute	Chronic
CONVENTIONALS										
E-coli (CFU / 100mL)	180	420	20	260	141	420	20	10	235	235
Oil and Grease	<2.0	<2.0	<2.0	<2.0	0.0	0.0	0.0	2.0	-	-
Ammonia (NH_3), as N	0.09	0.08	0.08	0.24	0.11	0.24	0.08	0.01	1.2	0.27
Carbonaceous Biochemical Oxygen Demand (CBOD)	2.6	16	2.6	4.0	4.6	16	2.6	2.0	-	-
Chemical Oxygen Demand (COD)	60	80	40	40	53	80	40	20	-	-
Chloride	130	100	93	111	108	130	93	10	860	230
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.022	0.0052
Fluoride, (F)	0.53	0.40	0.51	1.3	0.61	1.3	0.40	0.10	12	3.4
Hardness, Total as $CaCO_3$	390	290	330	370	343	390	290	2.0	-	-
Nitrogen, Total Kjeldahl as N (TKN)	1.4	2.6	1.5	1.6	1.7	2.6	1.4	0.50	-	-
Phosphorus, Total	0.19	0.21	<0.10	0.29	0.17	0.29	0.08	0.10	-	-
Solids, Total Dissolved (TDS)	610	450	510	500	514	610	450	10	-	-
Solids, Total Suspended (TSS)	68	64	12	25	34	68	12	2.0	-	-
Solids, Total Volatile Suspended (TVSS)	15	22	8.0	7.4	12	22	7.4	1.0	-	-
Sulfate (SO_4)	110	86	96		97	110	86	5.0	-	-
pH (pH units)	8.10	8.43	7.82	8.10	8.11	8.43	7.82	0.01	6<=pH<=9	6<=pH<=9
METALS										
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.34	0.15
Arsenic (As), Dissolved	<0.02	<0.02	0.02	<0.02	0.01	0.02	0.01	0.02	0.34	0.15
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0186	0.0066
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0175	0.0060
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	5.0	0.24
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.59	0.21
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.046	0.027
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.044	0.026
Iron (Fe), Total Recoverable	1.93	2.02	1.00	0.83	1.34	2.02	0.83	0.05	-	-
Iron (Fe), Dissolved	<0.05	<0.05	0.07	<0.05	0.02	0.07	0.01	0.05	-	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0017	0.00091
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0014	0.00077
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.151
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.150
Zinc (Zn), Total Recoverable	0.01	0.01	<0.01	0.02	0.01	0.02	0.01	0.01	0.35	0.35
Zinc (Zn), Dissolved	<0.01	<0.01	0.01	0.05	0.01	0.05	0.01	0.01	0.34	0.34
PESTICIDES										
Heptachlor	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Aldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.15	-	-
alpha-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
beta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
delta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
gamma-BHC (Lindane)	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	0.5
Chlordane	ND	ND	ND	ND	0.00	0.00	0.00	2.50	-	0.00025
4,4'-DDD	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Heptachlor Epoxide	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
4,4'-DDE	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
4,4'-DDT	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	0.000011
Dieldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.24	0.0000065
Endosulfan I	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Endosulfan II	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Endosulfan Sulfate	ND	ND	ND	ND	0.00	0.00	0.00	0.10	-	-
Endrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.086	0.036

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

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TABLE 3-15
Ripley Street Bridge (B10)
Dry Weather Analyses

PARAMETER	SAMPLE DATE April 27, 2001	June 25, 2001	December 11, 2001	July 2, 2002	Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	WATER QUALITY LIMITS Acute	Chronic
CONVENTIONALS										
E-coli (CFU / 100mL)	140	560	40	120	139	560	40	10	235	235
Oil and Grease	<2.0	<2.0	2.0	<2.0	0.7	2.0	0.5	2.0	-	-
Ammonia (NH_3), as N	0.08	0.07	0.09	0.22	0.10	0.22	0.07	0.01	1.2	0.27
Carbonaceous Biochemical Oxygen Demand (CBOD)	2.4	19	2.8	4.5	4.9	19	2.4	2.0	-	-
Chemical Oxygen Demand (COD)	50	90	50	40	55	90	40	20	-	-
Chloride	130	100	93	195	124	195	93	10	860	230
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.022	0.0052
Fluoride, (F)	0.55	0.40	0.53	1.22	0.61	1.22	0.40	0.10	12	3.4
Hardness, Total as $CaCO_3$	380	340	400	330	361	400	330	2.0	-	-
Nitrogen, Total Kjeldahl as N (TKN)	1.2	3.2	1.8	1.5	1.8	3.2	1.2	0.50	-	-
Phosphorus, Total	0.15	0.23	0.11	0.18	0.16	0.23	0.11	0.10	-	-
Solids, Total Dissolved (TDS)	590	530	530	530	544	590	530	10	-	-
Solids, Total Suspended (TSS)	54	56	11	18	28	56	11	2.0	-	-
Solids, Total Volatile Suspended (TVSS)	12	23	6.4	6.8	10	23	6.4	1.0	-	-
Sulfate (SO_4)	110	85	100		98	110	85	5.0	-	-
pH (pH units)	8.10	8.53	7.77	7.96	8.09	8.53	7.77	0.01	6<=pH<=9	6<=pH<=9
METALS										
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.34	0.15
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	0.00	0.00	0.00	0.02	0.34	0.15
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0186	0.0066
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0175	0.0060
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	5.0	0.24
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.59	0.21
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.046	0.027
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.044	0.026
Iron (Fe), Total Recoverable	1.78	1.42	0.87	0.77	1.14	1.78	0.77	0.05	-	-
Iron (Fe), Dissolved	<0.05	<0.05	0.05	<0.05	0.02	0.05	0.01	0.05	-	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0017	0.00091
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0014	0.00077
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.151
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.150
Zinc (Zn), Total Recoverable	0.02	0.02	0.01	0.03	0.02	0.03	0.01	0.01	0.35	0.35
Zinc (Zn), Dissolved	0.02	<0.01	0.01	0.04	0.02	0.04	0.01	0.01	0.34	0.34
PESTICIDES										
Heptachlor	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Aldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.15	-	-
alpha-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
beta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
delta-BHC	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
gamma-BHC (Lindane)	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	0.5
Chlordane	ND	ND	ND	ND	0.00	0.00	0.00	2.50	-	0.00025
4,4'-DDD	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Heptachlor Epoxide	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
4,4'-DDE	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
4,4'-DDT	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	0.000011
Dieldrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.24	0.0000065
Endosulfan I	ND	ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Endosulfan II	ND	ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Endosulfan Sulfate	ND	ND	ND	ND	0.00	0.00	0.00	0.10	-	-
Endrin	ND	ND	ND	ND	0.00	0.00	0.00	0.05	0.086	0.036

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-16
Deep River
Dry Weather Analyses

PARAMETER	SAMPLE DATE				Geometric Mean[2,3]	Maximum Value[3]	Minimum Value[3,4]	Detection Limit	WATER QUALITY LIMITS	
	April 27, 2001[1]	June 25, 2001	December 11, 2001	July 2, 2002					Acute	Chronic
CONVENTIONALS										
E-coli (CFU / 100mL)		640	30	310	181	640	30	10	235	235
Oil and Grease		<2.0	<2.0	<2.0	0.0	0.0	0.0	2.0	-	-
Ammonia (NH_3), as N		0.19	0.07	0.24	0.15	0.24	0.07	0.01	1.2	0.27
Carbonaceous Biochemical Oxygen Demand (CBOD)		13	2.4	2.4	4.2	13	2.4	2.0	-	-
Chemical Oxygen Demand (COD)		80	40	30	46	80	30	20	-	-
Chloride		98	80	63	79	98	63	10	860	230
Cyanide, Weak Acid Dissociable (WAD)		<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.022	0.0052
Fluoride, (F)		0.39	0.32	0.19	0.29	0.39	0.19	0.10	12	3.4
Hardness, Total as $CaCO_3$		300	350	300	316	350	300	2.0	-	-
Nitrogen, Total Kjeldahl as N (TKN)		2.5	1.4	1.4	1.7	2.5	1.4	0.50	-	-
Phosphorus, Total		0.55	<0.10	0.44	0.25	0.55	0.07	0.10	-	-
Solids, Total Dissolved (TDS)		470	470	420	453	470	420	10	-	-
Solids, Total Suspended (TSS)		50	12	19	23	50	12	2.0	-	-
Solids, Total Volatile Suspended (TVSS)		22	5.6	5.6	8.8	22	5.6	1.0	-	-
Sulfate (SO_4)		72	96		83	96	72	5.0	-	-
pH (pH units)		8.70	7.82	8.11	8.20	8.70	7.82	0.01	6<=pH<=9	6<=pH<=9
METALS										
Arsenic (As), Total Recoverable		<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.34	0.15
Arsenic (As), Dissolved		<0.02	<0.02	<0.02	0.00	0.00	0.00	0.02	0.34	0.15
Cadmium (Cd), Total Recoverable		<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0186	0.0066
Cadmium (Cd), Dissolved		<0.005	<0.005	<0.005	0.000	0.000	0.000	0.005	0.0175	0.0060
Chromium (Cr), Total Recoverable		<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	5.0	0.24
Chromium (Cr), Dissolved		<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.59	0.21
Copper (Cu), Total Recoverable		<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.046	0.027
Copper (Cu), Dissolved		0.01	<0.01	<0.01	0.005	0.01	0.003	0.01	0.044	0.026
Iron (Fe), Total Recoverable		1.16	1.09	0.82	1.01	1.16	0.82	0.05	-	-
Iron (Fe), Dissolved		<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	-	-
Lead (Pb), Total Recoverable		<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Lead (Pb), Dissolved		<0.05	<0.05	<0.05	0.00	0.00	0.00	0.05	0.60	0.032
Mercury (Hg), Total Recoverable		<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0017	0.00091
Mercury (Hg), Dissolved		<0.0002	<0.0002	<0.0002	0.0000	0.0000	0.0000	0.0002	0.0014	0.00077
Nickel (Ni), Total Recoverable		<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.151
Nickel (Ni), Dissolved		<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	1.35	0.150
Zinc (Zn), Total Recoverable		<0.01	<0.01	0.02	0.01	0.02	0.003	0.01	0.35	0.35
Zinc (Zn), Dissolved		<0.01	<0.01	<0.01	0.00	0.00	0.00	0.01	0.34	0.34
PESTICIDES										
Heptachlor		ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Aldrin		ND	ND	ND	0.00	0.00	0.00	0.15	-	-
alpha-BHC		ND	ND	ND	0.00	0.00	0.00	0.03	-	-
beta-BHC		ND	ND	ND	0.00	0.00	0.00	0.05	-	-
delta-BHC		ND	ND	ND	0.00	0.00	0.00	0.03	-	-
gamma-BHC (Lindane)		ND	ND	ND	0.00	0.00	0.00	0.03	-	0.5
Chlordane		ND	ND	ND	0.00	0.00	0.00	2.50	-	0.00025
4,4'-DDD		ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Heptachlor Epoxide		ND	ND	ND	0.00	0.00	0.00	0.03	-	-
4,4'-DDE		ND	ND	ND	0.00	0.00	0.00	0.05	-	-
4,4'-DDT		ND	ND	ND	0.00	0.00	0.00	0.05	-	0.000011
Dieldrin		ND	ND	ND	0.00	0.00	0.00	0.05	0.24	0.0000065
Endosulfan I		ND	ND	ND	0.00	0.00	0.00	0.03	-	-
Endosulfan II		ND	ND	ND	0.00	0.00	0.00	0.05	-	-
Endosulfan Sulfate		ND	ND	ND	0.00	0.00	0.00	0.10	-	-
Endrin		ND	ND	ND	0.00	0.00	0.00	0.05	0.086	0.036

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]The Deep River was not sampled during the April 27, 2001, event. Subsequently, data from the remaining three events were used to calculate the geometric mean, maximum and minimum values.
[2]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[3]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[4]The minimum value may be equal to a calculated "V" value.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-22
Cline Avenue Bridge (B1)
First Wet Weather Sample Event
September 18 - 21, 2001

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric	Maximum	Minimum	Detection	Acute Water
SAMPLE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Mean[1,2]	Value[2]	Value[2,3]	Limit	Quality Limit
PARAMETER																					
CONVENTIONALS																					
E-coli (CFU / 100mL)	1200	200	2900	400	300	1000	400	300	800	1700	3100	700	1400	900	1000	1300	828	3100	200	100	235
Oil and Grease	<2.0	<2.0	<2.0	2.2	<2.0	2.3	<2.0	<2.0	<2.0	3.0	2.6	<2.0	<2.0				0.9	3.0	0.6	2.0	-
Ammonia (NH_3), as N	0.17	0.10	0.07	0.16	0.22	0.21	0.22	0.23	0.25	0.26	0.52	0.44	0.70	0.32	0.11	0.13	0.22	0.70	0.07	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	8.0	4.7	12	6.7	8.0	12	10	5.1	2.8	16	2.6	4.3	2.7	3.7	12	9.0	6.4	16.0	2.6	2.0	-
Chemical Oxygen Demand (COD)	60	50	70	50	40	50	50	30	40	40	40	40	50				46	70	30	20	-
Chloride	99	100	110	91	90	92	90	100	96	110	94	94	96				97	110	90	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	0.007	0.006	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.002	0.008	0.001	0.005	0.022
Fluoride, (F)	2.42	1.91	1.83	1.84	1.81	1.60	2.07	2.36	2.70	2.64	2.02	2.13	2.21				2.09	2.70	1.60	0.10	12
Hardness, Total as $CaCO_3$	240	230	300	230	190	190	160	180	50	190	190	210	220				186.5	300.0	50.0	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	2.8	2.1	2.5	2.3	1.9	4.6	2.7	1.8	1.9	1.9	<0.50	2.1	2.7	1.8	2.1	1.8	2.05	4.60	0.47	0.50	-
Phosphorus, Total	0.31	0.21	0.71	0.20	0.17	0.25	0.23	2.8	0.16	0.63	<0.10	<0.10	0.11				0.26	2.80	0.08	0.10	-
Solids, Total Dissolved (TDS)	530	480	470	420	410	460	410	400	460	410	460	470	450				447	530	400	10	-
Solids, Total Suspended (TSS)	33	27	48	26	23	32	21	19	20	15	17	20	28				24.1	48.0	15.0	2.0	-
Solids, Total Volatile Suspended (TVSS)	14	11	17	10	10	8.0	11	7.2	8.4	4.8	8.0	12	11				9.7	17.0	4.8	1.0	-
Sulfate (SO_4)	56	56	79	58	59	78	54	71	49	52	56	58	73				61	79	49	10	-
pH (pH units)	8.00	8.15	8.21	7.48	7.53	7.36	7.36	7.5	7.42	7.64	7.42	7.43	7.41	7.48	7.61	7.50	7.59	8.21	7.36	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	0.93	0.81	1.68	0.86	0.57	1.01	0.73	0.69	0.64	0.56	0.51	0.68	0.72				0.76	1.68	0.51	0.05	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	0.0002	<0.0002	<0.0002	<0.0002				0.0001	0.0002	0.0001	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01				0.001	0.01	0.001	0.01	1.15
Zinc (Zn), Total Recoverable	0.03	0.03	0.04	0.04	0.02	0.04	0.03	<0.01	<0.01	<0.01	<0.01	0.01	0.02				0.02	0.04	0.01	0.01	0.30
Zinc (Zn), Dissolved	<0.01	0.01	0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01				0.005	0.02	0.003	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-23
Clark Street Bridge (B2)
First Wet Weather Sample Event
September 18 - 21, 2001

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	Acute Water Quality Limit
SAMPLE NO. / PARAMETER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16					
CONVENTIONALS																					
E-coli (CFU / 100mL)	<100	100	200	600	500	1800	300	500	200	100	300	200	200	200	100	200	243	1800	94	100	235
Oil and Grease	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.7	<2.0	<2.0	2.1	<2.0	<2.0	<2.0				0.4	2.7	0.3	2.0	-
Ammonia (NH_3), as N	0.15	0.16	0.26	0.12	0.24	0.09	0.24	0.27	0.17	0.21	0.44	0.26	0.14	0.17	0.17	0.12	0.19	0.44	0.09	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	6.6	12	4.3	5.1	7.6	3.2	61	5.4	3.8	2.8	11	7.7	<2.0	2.9	9.8	10	6.3	61.0	1.9	2.0	-
Chemical Oxygen Demand (COD)	100	100	60	100	100	80	70	60	50	50	60	60	50				70	100	50	20	-
Chloride	120	120	120	130	120	100	150	110	120	110	110	100	100				115	150	100	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	0.006	0.012	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.002	0.012	0.001	0.005	0.022
Fluoride, (F)	1.78	1.63	1.63	1.49	1.34	1.28	1.44	1.49	1.86	1.68	1.44	1.59	1.54				1.54	1.86	1.28	0.10	12
Hardness, Total as $CaCO_3$	280	310	310	320	350	330	310	310	310	270	280	280	300				303.8	350.0	270.0	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	2.4	3.1	2.2	1.9	4.8	1.9	2.0	2.8	2.6	1.9	3.2	4.3	1.5	2.0	2.1	1.7	2.39	4.80	1.50	0.50	-
Phosphorus, Total	0.16	1.3	0.37	0.25	0.68	0.43	0.22	0.38	<0.10	0.24	0.74	0.12	<0.10				0.28	1.30	0.08	0.10	-
Solids, Total Dissolved (TDS)	520	540	490	580	500	510	550	530	560	540	510	510	520				527	580	490	10	-
Solids, Total Suspended (TSS)	70	85	60	56	77	26	100	85	58	43	66	32	27				55.6	100.0	26.0	2.0	-
Solids, Total Volatile Suspended (TVSS)	23	39	18	16	42	13	69	49	29	12	29	13	12				23.7	69.0	12.0	1.0	-
Sulfate (SO_4)	56	65	72	86	72	42	73	77	72	82	66	58	67				67	86	42	5.0	-
pH (pH units)	7.50	7.86	7.68	7.74	7.51	7.59	7.59	7.50	7.51	7.27	7.41	7.50	7.63	7.61	7.78	7.60	7.58	7.86	7.27	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	2.67	2.79	2.52	2.26	1.56	0.99	1.90	2.29	1.86	1.66	2.08	1.22	1.17				1.83	2.79	0.99	0.05	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.005	0.06	0.004	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Zinc (Zn), Total Recoverable	0.03	0.03	0.03	0.02	0.02	0.02	0.03	0.03	0.02	0.02	0.03	0.06	0.01				0.02	0.06	0.01	0.01	0.30
Zinc (Zn), Dissolved	<0.01	<0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.002	0.01	0.002	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-24
Chase Street Bridge (B3)
First Wet Weather Sample Event
September 18 - 21, 2001

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	Acute Water Quality Limit
SAMPLE NO. / PARAMETER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16					
CONVENTIONALS																					
E-coli (CFU / 100mL)	200	100	2600	2200	1000	2700	600	500	500	800	200	900	600	100	100	100	460	2700	100	100	235
Oil and Grease	2.5	3.5	2.0	<2.0	2.5	<2.0	3.5	2.8	4.0	2.6	2.7	<2.0	<2.0				2.3	4.0	1.4	2.0	-
Ammonia (NH_3), as N	0.04	0.11	0.17	0.08	0.09	0.04	0.28	0.26	0.27	0.29	0.34	0.07	0.14	0.14	0.14	0.09	0.13	0.34	0.04	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	3.5	3.5	6.1	<3.0	4.1	3.9	4.1	5.4	4.6	14	14	4.3	4.1	3.3	5.5	6.9	4.9	14.0	1.9	2.0	-
Chemical Oxygen Demand (COD)	50	50	60	60	40	60	60	60	90	110	60	90	60				63	110	40	20	-
Chloride				120	120	110	110	100	120	93	110	110	89				108	120	89	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	0.008	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.001	0.008	0.001	0.005	0.022
Fluoride, (F)	1.45	1.31	1.25	1.33	1.22	1.14	1.52	1.01	0.95	0.74	1.07	1.09	1.18				1.16	1.52	0.74	0.10	12
Hardness, Total as $CaCO_3$	340	340	380	340	340	330	300	320	300	300	290	300	300				320.6	380.0	290.0	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	1.8	1.8	0.58	1.7	3.3	1.1	4.9	1.6	2.7	1.8	0.65	2.5	1.9	1.8	1.8	2.0	1.76	4.90	0.58	0.50	-
Phosphorus, Total	0.66	0.89	0.52	0.42	0.19	0.31	0.20	0.38	0.48	0.13	0.25	0.23	0.15				0.32	0.89	0.13	0.10	-
Solids, Total Dissolved (TDS)	520	540	530	580	610	500	520	530	520	510	510	530	530				532	610	500	10	-
Solids, Total Suspended (TSS)	15	7.2	18	8.4	7.2	12	120	110	54	43	47	16	28				24.1	120.0	7.2	2.0	-
Solids, Total Volatile Suspended (TVSS)	9.6	3.6	10	4.8	6.4	7.2	72	63	23	10	14	10	11				12.1	72.0	3.6	1.0	-
Sulfate (SO_4)	48	47	50	40	55	12	72	12	6.8	75	12	11	66				29	75	7	10	-
pH (pH units)	7.68	7.76	8.08	7.78	7.45	7.35	7.58	7.50	7.46	7.31	7.43	7.51	7.66	7.60	7.63	7.70	7.59	8.08	7.31	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.005				0.0005	0.006	0.0004	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	0.49	0.40	0.38	0.35	0.28	1.02	1.81	1.75	1.66	1.73	2.19	0.68	1.10				0.84	2.19	0.28	0.05	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Zinc (Zn), Total Recoverable	<0.01	0.03	0.04	0.01	<0.01	<0.01	0.03	0.03	0.02	0.02	0.03	0.04	0.01				0.02	0.04	0.01	0.01	0.30
Zinc (Zn), Dissolved	<0.01	0.02	0.01	0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01				0.01	0.02	0.004	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:

All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.

[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".

[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.

[3]The minimum value may be equal to a calculated "V" value.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-25
Grant Street Bridge (B4)
First Wet Weather Sample Event
September 18 - 21, 2001

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	Acute Water Quality Limit
SAMPLE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16					
PARAMETER																					
CONVENTIONALS																					
E-coli (CFU / 100mL)	300	500	500	700	600	900	200	500	300	200	100	400	300	100	100	100	286	900	100	100	235
Oil and Grease	<2.0	<2.0	<2.0	2.0	2.6	3.2	3.1	<2.0	<2.0	2.1	<2.0	<2.0	<2.0				1.2	3.2	0.8	2.0	-
Ammonia (NH_3), as N	0.22	0.18	0.11	0.26	0.27	0.22	0.09	0.27	0.16	0.05	0.45	0.06	0.02	0.11	0.02	0.02	0.11	0.45	0.02	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	6.5	4.7	5.5	4.3	3.9	4.5	9.7	6.5	4.4	9.6	2.4	4.3	<2.0	2.5	9.3	6.1	4.8	9.7	1.9	2.0	-
Chemical Oxygen Demand (COD)	100	90	50	60	40	60	60	70	80	70	60	60	50				64	100	40	20	-
Chloride	95	92	100	69	79	80	110	110	98	110	110	110	110				97	110	69	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	0.007	0.01	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.002	0.010	0.001	0.005	0.022
Fluoride, (F)	1.06	0.92	0.93	0.96	0.90	0.86	0.50	1.03	0.99	1.03	0.99	1.07	1.08				0.93	1.08	0.50	0.10	12
Hardness, Total as $CaCO_3$	260	250	230	160	190	200	240	250	250	250	270	280	320				238.9	320.0	160.0	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	2.0	1.8	1.8	1.6	1.5	4.3	2.0	2.3	2.4	2.2	2.1	3.1	1.5	1.7	1.9	1.8	2.04	4.30	1.50	0.50	-
Phosphorus, Total	0.22	0.24	0.21	0.22	0.26	0.23	0.27	0.28	0.21	0.22	<0.10	<0.10	<0.10				0.18	0.28	0.08	0.10	-
Solids, Total Dissolved (TDS)	430	420	400	270	330	380	440	440	470	520	500	500	480				423	520	270	10	-
Solids, Total Suspended (TSS)	13	13	18	15	16	15	160	66	83	41	37	26	20				28.3	160.0	13.0	2.0	-
Solids, Total Volatile Suspended (TVSS)	7.6	5.2	1.6	5.6	8.4	8.0	110	35	56	17	13	12	9.6				12.2	110.0	1.6	1.0	-
Sulfate (SO_4)	34	32	34	22	27	32	38	46	46	43	37	41	43				36	46	22	5.0	-
pH (pH units)	7.80	7.47	7.92	7.50	7.58	7.60	7.74	7.64	7.62	7.47	7.43	7.11	7.83	7.75	7.91	7.70	7.63	7.92	7.11	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	0.68	0.68	0.64	0.72	0.71	0.97	1.76	1.68	1.49	1.31	1.47	0.80	0.60				0.96	1.76	0.60	0.05	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Zinc (Zn), Total Recoverable	0.02	0.02	0.02	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.02	<0.01				0.02	0.04	0.01	0.01	0.30
Zinc (Zn), Dissolved	<0.01	<0.01	0.01	0.02	0.02	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01				0.01	0.02	0.004	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-26
Broadway Street Bridge (B5)
First Wet Weather Sample Event
September 18 - 21, 2001

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	Acute Water Quality Limit
SAMPLE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16					
PARAMETER																					
CONVENTIONALS																					
E-coli (CFU / 100mL)	41000	67000	50000	68000	12000	11000	4100	1500	1000	1000	1000	1100	12000	1100	2300	2000	5389	68000	1000	100	235
Oil and Grease	2.8	<2.0	3.3	4.5	2.4	3.5	3.5	2.1	5.5	<2.0	-	<2.0	<2.0				2.3	5.5	1.2	2.0	-
Ammonia (NH_3), as N	1.0	1.0	0.77	0.87	0.45	0.36	0.63	0.38	0.36	0.44	0.64	0.08	1.1	0.19	0.15	<0.01	0.35	1.10	0.01	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	15	24	22	16	5.7	4.3	14	67	9.1	15	14	2.7	83	2.7	15	7.1	12.5	83.0	2.7	2.0	-
Chemical Oxygen Demand (COD)	130	150	120	90	60	80	60	110	100	120	80	90	150				99	150	60	20	-
Chloride	110	100	120	70	110	100	120	120	120	120	120	130	110				110	130	70	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.001	0.006	0.001	0.005	0.022
Fluoride, (F)	1.02	0.90	0.92	0.74	0.74	0.72	1.26	2.70	1.35	2.52	2.47	2.61	2.62				1.38	2.70	0.72	0.10	12
Hardness, Total as $CaCO_3$	240	240	250	160	280	260	290	340	290	280	260	270	260				259.8	340.0	160.0	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	4.9	9.8	3.9	5.5	4.9	2.3	2.9	4.9	3.8	4.1	4.6	1.8	6.0	2.3	1.4	1.8	3.58	9.80	1.40	0.50	-
Phosphorus, Total	0.85	1.1	0.63	0.61	0.41	0.40	1.3	0.85	0.45	0.57	0.37	<0.10	0.40				0.52	1.30	0.09	0.10	-
Solids, Total Dissolved (TDS)	460	400	460	260	480	450	490	500	490	600	480	510	470				458	600	260	10	-
Solids, Total Suspended (TSS)	93	190	20	17	18	19	22	160	70	18	37	18	220				42.2	220.0	17.0	2.0	-
Solids, Total Volatile Suspended (TVSS)	76	160	18	14	10	16	13	140	56	11	31	9.2	190				31.5	190.0	9.2	1.0	-
Sulfate (SO_4)	42	28	30	21	42	43	40	44	42	43	33	37	27				35	44	21	10	-
pH (pH units)	8.12	8.12	7.24	7.15	7.41	7.52	7.58	7.40	7.43	7.34	7.39	8.04	7.46	7.52	7.63	7.40	7.54	8.12	7.15	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005				0.0005	0.006	0.0004	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.001	0.01	0.001	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	1.08	0.96	0.64	0.53	0.72	0.75	1.14	3.04	0.93	1.02	0.90	0.71	0.76				0.91	3.04	0.53	0.05	-
Iron (Fe), Dissolved	0.09	0.12	0.09	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.03	0.12	0.02	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.02	0.01	<0.01	<0.01	<0.01	<0.01	0.01				0.01	0.02	0.004	0.01	1.15
Zinc (Zn), Total Recoverable	0.04	0.05	0.03	0.04	0.01	<0.01	0.02	0.08	0.01	0.02	0.01	<0.01	<0.01				0.02	0.08	0.01	0.01	0.30
Zinc (Zn), Dissolved	<0.01	0.01	0.02	0.03	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.01	0.03	0.003	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-27
Georgia Street Bridge (B6)
First Wet Weather Sample Event
September 18 - 21, 2001

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric	Maximum	Minimum	Detection	Acute Water
SAMPLE NO. / PARAMETER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Mean[1,2]	Value[2]	Value[2,3]	Limit	Quality Limit
CONVENTIONALS																					
E-coli (CFU / 100mL)	100	200	200	1300	400	300	400	300	600	200	100	1000	200	200	1100	700	337	1300	100	100	235
Oil and Grease	<2.0	<2.0	<2.0	<2.0	<2.0	2.6	4.4	<2.0	2.1	<2.0	<2.0	<2.0	<2.0				0.7	4.4	0.5	2.0	-
Ammonia (NH_3), as N	0.03	0.21	0.09	0.07	0.05	0.03	0.36	0.19	0.26	0.18	0.37	0.35	0.43	0.26	0.22	0.37	0.16	0.43	0.03	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	6.5	8.0	14	7.3	9.6	10	8.3	10	46	6.6	6.9	4.7	6.3	10	11	8.6	9.2	46.0	4.7	2.0	-
Chemical Oxygen Demand (COD)	110	110	90	70	70	70	90	180	90	70	60	60	80				84	180	60	20	-
Chloride	120	120	130	130	130	130	140	120	160	110	170	140	140				133	170	110	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	0.017	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.001	0.017	0.001	0.005	0.022
Fluoride, (F)	1.10	0.96	0.95	0.69	0.67	0.63	0.77	0.95	1.38	1.36	1.36	1.42	0.84				0.97	1.42	0.63	0.10	12
Hardness, Total as $CaCO_3$	250	310	290	280	280	270	280	280	280	270	270	280	280				278.2	310.0	250.0	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	2.0	2.5	4.2	3.4	2.9	5.2	2.6	3.1	4.0	2.3	4.0	2.5	4.2	3.1	3.1	2.7	3.13	5.20	2.00	0.50	-
Phosphorus, Total	0.24	0.24	0.40	0.23	<0.10	0.34	0.38	0.50	0.25	0.26	0.19	0.31	0.23				0.26	0.50	0.09	0.10	-
Solids, Total Dissolved (TDS)	510	520	490	510	570	540	550	560	600	480	560	520	580				537	600	480	10	-
Solids, Total Suspended (TSS)	15	17	18	17	20	22	21	47	130	540	11	14	16				27.8	540.0	11.0	2.0	-
Solids, Total Volatile Suspended (TVSS)	5.6	12	11	12	11	14	2.0	28	100	450	8.0	7.2	10				15.0	450.0	2.0	1.0	-
Sulfate (SO_4)	45	34	26	33	36	33	38	32	29	37	32	29	33				33	45	26	10	-
pH (pH units)	7.71	8.21	7.97	7.64	7.43	7.63	7.58	7.44	7.29	7.23	7.33	7.57	7.49	7.47	7.60	7.40	7.56	8.21	7.23	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.005				0.0005	0.006	0.0004	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	0.71	0.83	0.68	0.74	0.84	0.87	0.89	0.79	2.02	0.86	0.76	1.03	0.83				0.87	2.02	0.68	0.05	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.005	0.09	0.004	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0003	<0.0002				0.00002	0.0003	0.00002	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.001	0.02	0.001	0.01	1.15
Zinc (Zn), Total Recoverable	0.01	0.03	0.03	<0.01	0.03	<0.01	0.03	<0.01	0.02	0.02	0.02	0.02	0.02				0.02	0.03	0.01	0.01	0.30
Zinc (Zn), Dissolved	<0.01	<0.01	0.02	<0.01	0.02	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.004	0.02	0.002	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-28
Railroad Tracks Bridge (B7)
First Wet Weather Sample Event
September 18 - 21, 2001

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric	Maximum	Minimum	Detection	Acute Water
SAMPLE NO. / PARAMETER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Mean[1, 2]	Value[2]	Value[2, 3]	Limit	Quality Limit
CONVENTIONALS																					
E-coli (CFU / 100mL)	400	200	400	600	300	300	1700	500	200	400	100	100	200	100	100	200	261	1700	100	100	235
Oil and Grease	<2.0	<2.0	2.0	2.0	<2.0	2.3	<2.0	<2.0	2.0	<2.0	2.6	<2.0	<2.0				1.1	2.6	0.8	2.0	-
Ammonia (NH_3), as N	0.15	0.29	0.30	0.16	0.23	0.22	0.42	0.22	0.20	0.27	0.24	0.30	0.32	<0.01	0.05	0.04	0.16	0.42	0.01	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	12	5.7	10	5.3	6.7	6.6	6.6	4.8	3.2	3.6	6.6	3.9	7.6	8.5	4.3	5.5	5.9	12.0	3.2	2.0	-
Chemical Oxygen Demand (COD)	140	120	130	80	80	70	60	60	50	50	70	100	70				79	140	50	20	-
Chloride	120	120	130	130	130	130	110	130	130	130	130	110	120				124	130	110	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	0.007	0.011	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.005				0.002	0.011	0.002	0.005	0.022
Fluoride, (F)	0.91	0.91	1.0	0.93	0.91	0.88	0.72	0.99	0.37	0.61	0.92	0.96	0.93				0.82	1.00	0.37	0.10	12
Hardness, Total as $CaCO_3$	290	290	300	270	300	290	300	300	300	270	270	290	280				288.2	300.0	270.0	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	5.8	2.9	2.9	2.5	4.9	3.2	2.8	2.4	2.1	2.9	4.3	2.4	3.8	1.6	1.9	1.1	2.74	5.80	1.10	0.50	-
Phosphorus, Total	0.86	0.86	0.59	0.36	0.30	0.34	0.31	0.35	1.5	<0.10	0.10	0.26	0.34				0.37	1.50	0.09	0.10	-
Solids, Total Dissolved (TDS)	530	520	500	470	560	550	530	520	530	500	510	520	510				519	560	470	10	-
Solids, Total Suspended (TSS)	110	83	49	24	26	43	22	16	12	14	23	19	44				29.6	110.0	12.0	2.0	-
Solids, Total Volatile Suspended (TVSS)	54	36	24	11	16	20	11	12	8.0	5.2	21	14	17				16.0	54.0	5.2	1.0	-
Sulfate (SO_4)	32	28	32	46	44	38	11	37	38	33	34	32	32				32	46	11	10	-
pH (pH units)	7.65	7.97	7.63	7.62	7.58	7.55	7.68	7.44	7.45	7.49	7.46	7.75	7.65	7.60	7.65	7.45	7.60	7.97	7.44	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.001	0.006	0.001	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	3.84	2.67	1.48	1.12	1.84	1.78	1.32	1.30	1.26	1.35	1.43	1.16	3.07				1.68	3.84	1.12	0.05	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01				0.002	0.01	0.002	0.01	1.15
Zinc (Zn), Total Recoverable	0.03	0.05	0.04	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02				0.02	0.05	0.01	0.01	0.30
Zinc (Zn), Dissolved	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01				0.002	0.02	0.002	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-29
Martin Luther King Drive Bridge (B8)
First Wet Weather Sample Event
September 18 - 21, 2001

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric Mean[1, 2]	Maximum Value[2]	Minimum Value[2, 3]	Detection Limit	Acute Water Quality Limit
SAMPLE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16					
PARAMETER																					
CONVENTIONALS																					
E-coli (CFU / 100mL)	200	300	800	84000	37000	65000	42000	21000	14000	8100	7000	2700	2500	600	500	900	4273	84000	200	100	235
Oil and Grease	2.4	<2.0	<2.0	5.1	<2.0	2.9	2.0	<2.0	<2.0	2.0	<2.0	<2.0	<2.0				1.2	5.1	0.8	2.0	-
Ammonia (NH_3), as N	0.14	0.14	0.08	1.1	0.19	0.64	0.48	0.27	0.26	0.24	0.28	0.10	0.18	0.17	0.09	0.03	0.19	1.10	0.03	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	3.5	3.1	9.2	15	6.7	9.5	7.4	5.8	4.8	5.0	7.2	5.5	5.3	6.1	4.3	10	6.2	15.0	3.1	2.0	-
Chemical Oxygen Demand (COD)	100	100	60	130	60	60	60	60	60	60	60	50	60				68	130	50	20	-
Chloride	120	120	140	40	130	85	100	100	92	130	140	130	120				107	140	40	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	0.009	0.007	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.002	0.009	0.001	0.005	0.022
Fluoride, (F)	0.97	0.91	0.90	0.85	0.82	0.80	0.50	0.69	0.64	0.85	0.81	0.85	0.85				0.79	0.97	0.50	0.10	12
Hardness, Total as $CaCO_3$	260	280	250	70	260	210	200	240	250	250	270	270	260				225.8	280.0	70.0	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	1.6	1.8	1.7	4.7	5.7	3.5	3.1	2.4	2.3	2.3	3.9	1.7	1.7	2.6	1.7	1.8	2.44	5.70	1.60	0.50	-
Phosphorus, Total	0.28	0.30	0.31	0.58	0.36	0.43	0.51	0.48	0.46	0.43	0.25	0.19	0.18				0.34	0.58	0.18	0.10	-
Solids, Total Dissolved (TDS)	500	510	500	140	550	380	400	450	510	490	530	550	470				440	550	140	10	-
Solids, Total Suspended (TSS)	9.6	11	12	32	26	16	14	16	13	16	17	18	14				15.6	32.0	9.6	2.0	-
Solids, Total Volatile Suspended (TVSS)	7.6	9.2	8.8	24	17	13	12	8.0	8.8	9.6	12	14	10				11.2	24.0	7.6	1.0	-
Sulfate (SO_4)	30	50	27	15	32	29	32	32	29	36	34	33	32				31	50	15	10	-
pH (pH units)	8.15	7.44	7.87	6.99	7.61	7.31	7.20	7.40	7.26	7.35	7.38	8.16	8.18	7.68	8.30	8.05	7.64	8.30	6.99	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006				0.0005	0.006	0.0004	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.001	0.01	0.001	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	0.78	0.81	0.81	0.91	2.15	0.78	0.89	1.27	1.27	1.39	1.28	1.27	1.06				1.08	2.15	0.78	0.05	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	0.11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.005	0.11	0.004	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Zinc (Zn), Total Recoverable	<0.01	0.03	0.02	0.06	0.02	0.02	0.03	0.02	0.02	0.01	0.02	<0.01	0.02				0.02	0.06	0.01	0.01	0.30
Zinc (Zn), Dissolved	<0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01				0.004	0.03	0.002	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-30
Clay Street Bridge (B9)
First Wet Weather Sample Event
September 18 - 21, 2001

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric	Maximum	Minimum	Detection	Acute Water
SAMPLE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Mean[1,2]	Value[2]	Value[2,3]	Limit	Quality Limit
PARAMETER																					
CONVENTIONALS																					
E-coli (CFU / 100mL)	200	500	1100	800	1100	1300	500	600	600	300	200	700	300	700	500	<100	485	1300	94	100	235
Oil and Grease	<2.0	2.5	<2.0	2.2	2.9	2.9	<2.0	<2.0	<2.0	3.5	<2.0	<2.0	<2.0				1.3	3.5	0.8	2.0	-
Ammonia (NH_3), as N	0.03	0.05	0.03	0.04	<0.01	<0.01	0.02	0.02	0.03	<0.01	0.01	0.02	<0.01	0.30	0.26	0.29	0.03	0.30	0.01	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	4.1	3.7	3.7	4.5	8.0	4.5	4.4	3.4	2.6	<2.0	6.5	4.3	2.7	4.5	4.3	3.8	4.0	8.0	1.9	2.0	-
Chemical Oxygen Demand (COD)	80	80	70	30	50	50	20	50	60	50	50	40	50				49	80	20	20	-
Chloride	52	64	63	63	78	78	64	55	75	72	74	69	64				67	78	52	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	0.007	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.001	0.007	0.001	0.005	0.022
Fluoride, (F)	0.48	0.47	0.46	0.47	0.45	0.44	0.33	0.30	0.35	0.41	0.35	0.38	0.38				0.40	0.48	0.30	0.10	12
Hardness, Total as $CaCO_3$	270	250	250	250	250	250	250	250	260	270	260	260	250				255.3	270.0	250.0	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	1.7	1.6	1.7	2.6	3.1	3.2	3.9	2.2	1.6	1.6	2.4	2.4	2.2	3.4	2.4	2.0	2.28	3.90	1.60	0.50	-
Phosphorus, Total	0.18	0.18	0.25	0.18	0.19	0.22	0.17	0.19	<0.10	<0.10	0.14	0.12	<0.10				0.15	0.25	0.08	0.10	-
Solids, Total Dissolved (TDS)	400	380	400	440	410	420	410	440	430	430	430	420	430				418	440	380	10	-
Solids, Total Suspended (TSS)	35	38	32	26	36	38	35	39	41	43	46	42	39				37.3	46.0	26.0	2.0	-
Solids, Total Volatile Suspended (TVSS)	12	12	9.2	8.4	11	12	11	13	13	14	13	14	14				11.9	14.0	8.4	1.0	-
Sulfate (SO_4)	49	61	48	60	65	52	59	60	62	55	78	59	49				58	78	48	10	-
pH (pH units)	8.12	8.14	8.17	7.74	8.09	7.94	7.80	7.99	7.87	7.76	7.89	8.07	8.11	7.90	8.13	7.84	7.97	8.17	7.74	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01				0.001	0.01	0.001	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	1.29	1.22	1.19	0.94	1.26	1.21	1.19	1.33	1.32	1.45	1.34	1.30	1.20				1.24	1.45	0.94	0.05	-
Iron (Fe), Dissolved	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.005	0.05	0.004	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Zinc (Zn), Total Recoverable	<0.01	<0.01	<0.01	<0.01	0.01	0.01	<0.01	0.01	0.02	0.02	0.02	0.02	0.01				0.01	0.02	0.01	0.01	0.30
Zinc (Zn), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

Bridge_Wet_Event_1.xls
Clay

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-31
Ripley Street Bridge (B10)
First Wet Weather Sample Event
September 18 - 21, 2001

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric	Maximum	Minimum	Detection	Acute Water
SAMPLE NO. / PARAMETER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Mean[1,2]	Value[2]	Value[2,3]	Limit	Quality Limit
CONVENTIONALS																					
E-coli (CFU / 100mL)	500	300	300	100	600	1100	1400	1000	700	300	500	200	300	200	200	400	399	1400	100	100	235
Oil and Grease	<2.0	<2.0	4.3	2.1	2.0	2.9	3.3	<2.0	<2.0	<2.0	<2.0	5.2	<2.0				1.6	5.2	0.9	2.0	-
Ammonia (NH_3), as N	0.02	0.04	0.05	0.03	0.06	0.03	0.07	0.04	0.09	0.02	0.09	0.01	0.02	<0.01	0.01	0.06	0.03	0.09	0.01	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	3.3	3.7	9.7	4.1	3.7	3.5	3.7	4.8	4.0	<2.0	<2.0	3.5	2.5	4.3	5.7	10	3.9	10.0	1.8	2.0	-
Chemical Oxygen Demand (COD)	50	70	70	40	50	60	90	40	30	40	40	70	40				51	90	30	20	-
Chloride	60	61	68	66	75	76	65	68	73	70	61	76	55				67	76	55	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.007	0.000	0.005	0.022
Fluoride, (F)	0.40	0.40	0.40	0.39	0.37	0.36	0.31	0.27	0.28	0.26	0.27	0.31	0.29				0.33	0.40	0.26	0.10	12
Hardness, Total as $CaCO_3$	260	250	250	270	260	260	240	240	260	260	250	250	260				254.5	270.0	240.0	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	1.7	1.8	2.4	1.4	2.3	1.4	1.3	0.98	1.5	2.3	2.2	2.7	1.9	1.7	1.5	1.7	1.74	2.70	0.98	0.50	-
Phosphorus, Total	0.18	0.80	0.65	0.21	0.22	0.25	<0.10	0.17	0.18	<0.10	<0.10	<0.10	0.10				0.17	0.80	0.07	0.10	-
Solids, Total Dissolved (TDS)	390	390	450	450	380	420	400	400	430	440	440	410	400				415	450	380	10	-
Solids, Total Suspended (TSS)	29	40	36	34	32	28	24	25	36	31	36	28	27				30.9	40.0	24.0	2.0	-
Solids, Total Volatile Suspended (TVSS)	13	15	12	11	8.4	9.6	6.0	8.4	12	12	12	10	11				10.5	15.0	6.0	1.0	-
Sulfate (SO_4)	50	52	52	62	68	14	11	56	130	59	63	11	54				42	130	11	10	-
pH (pH units)	8.12	8.12	8.05	7.71	7.14	7.94	7.91	7.80	7.82	7.77	7.66	8.10	8.02	7.95	8.29	7.97	7.89	8.29	7.14	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	0.95	1.23	1.16	1.13	1.03	1.01	0.84	0.82	1.09	0.96	1.01	0.87	0.91				0.99	1.23	0.82	0.05	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Zinc (Zn), Total Recoverable	<0.01	<0.01	0.02	0.02	0.01	0.03	<0.01	0.01	0.02	0.02	0.02	0.02	0.01				0.01	0.03	0.01	0.01	0.30
Zinc (Zn), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

Bridge_Wet_Event_1.xls
Ripley

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-32
Deep River
First Wet Weather Sample Event
September 18 - 21, 2001

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	Acute Water Quality Limit
SAMPLE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16					
PARAMETER																					
CONVENTIONALS																					
E-coli (CFU / 100mL)	300	100	800	700	1500	500	400	300	400	900	800	200	100	200	100	100	327	1500	100	100	235
Oil and Grease	<2.0	2.0	<2.0	<2.0	<2.0	3.0	<2.0	<2.0	2.3	2.7	<2.0	<2.0	<2.0				0.94	3.0	0.62	2.0	-
Ammonia (NH_3), as N	<0.01	0.03	0.03	0.03	0.02	0.01	0.01	0.02	<0.01	0.01	0.02	0.05	0.14	0.02	0.04	0.07	0.02	0.14	0.01	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	2.7	3.3	9.5	4.1	4.5	4.6	3.2	4.2	4.4	2.6	16	3.9	5.5	4.5	4.5	4.8	4.6	16	2.6	2.0	-
Chemical Oxygen Demand (COD)	80	40	50	60	50	20	50	40	40	40	40	80	40				46	80	20	20	-
Chloride	61	62	65	63	62	63	63	76	70	61	61	61	60				64	76	60	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	0.006	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.001	0.006	0.001	0.005	0.022
Fluoride, (F)	0.39	0.47	0.52	0.49	0.47	0.46	0.67	0.92	0.41	0.38	0.38	0.42	0.39				0.47	0.92	0.38	0.25	12
Hardness, Total as $CaCO_3$	260	270	260	290	260	250	240	250	250	250	260	280	260				260	290	240	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	2.0	2.2	2.9	4.6	2.5	2.1	1.4	1.1	1.4	2.1	2.3	1.6	2.4	1.7	1.5	<0.50	1.8	4.6	0.47	0.50	-
Phosphorus, Total	0.27	0.19	0.28	<0.10	0.21	0.15	<0.10	0.16	0.15	0.14	0.14	0.16	0.14				0.16	0.28	0.08	0.10	-
Solids, Total Dissolved (TDS)	420	400	370	360	360	430	390	430	430	440	430	400	400				404	440	360	10	-
Solids, Total Suspended (TSS)	30	34	25	74	26	33	32	36	41	31	34	40	49				36	74	25	2.0	-
Solids, Total Volatile Suspended (TVSS)	11	12	9.2	19	10	11	8.0	14	14	10	13	16	14				12	19	8	1.0	-
Sulfate (SO_4)	48	48	47	60	70	11	50	56	53	55	62	61	51				48	70	11	10	-
pH (pH units)	8.29	8.08	7.86	7.10	7.99	7.78	7.93	8.08	7.87	7.75	7.83	8.12	8.20	8.03	8.07	7.97	7.93	8.29	7.10	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	1.24	1.06	1.38	0.45	0.79	1.05	1.01	1.14	1.28	0.97	1.02	1.09	1.64				1.04	1.64	0.45	0.05	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01				0.001	0.02	0.001	0.01	1.15
Zinc (Zn), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.01	0.01				0.003	0.01	0.002	0.01	0.30
Zinc (Zn), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-33
Cline Avenue Bridge (B1)
Second Wet Weather Sample Event
April 27 - 30, 2002

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	Acute Water Quality Limit
SAMPLE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16					
PARAMETER																					
CONVENTIONALS																					
E-coli (CFU / 100mL)	500	200	700	200	100	500	500	4500	5000	3100	3400	3100	3000	2200	1300	1300	1068	5000	100	100	235
Oil and Grease	2.4	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.6	<2.0	2.7	<2.0				0.7	2.7	0.5	2.0	-
Ammonia (NH_3), as N	0.07	0.08	0.08	0.13	0.09	0.17	0.70	0.16	0.12	0.12	0.14	0.14	0.16	0.08	0.08	0.08	0.12	0.70	0.07	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	6.4	6.1	6.3	4.3	4.7	4.1	5.0	6.2	6.3	6.3	4.5	6.9	5.0	2.6	4.1	6.4	5.2	6.9	2.6	2.0	-
Chemical Oxygen Demand (COD)	40	40	40	40	70	50	40	30	40	40	40	70	60				45	70	30	20	-
Chloride	100	100	100	100	100	110	130	93	130	49	97	74	50				91	130	49	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.0005	0.010	0.0004	0.005	0.022
Fluoride, (F)	3.76	3.16	3.80	3.64	3.68	3.58	3.73	3.37	3.66	3.61	3.64	3.68	3.60				3.60	3.80	3.16	0.25	12
Hardness, Total as $CaCO_3$[4]	290	300	300	300	320	310	350	330	300	270	260	240	240				291	350	240	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	1.8	1.9	1.8	2.0	1.2	1.5	1.5	1.4	0.90	1.7	1.7	1.8	2.7				1.7	2.7	0.90	0.50	-
Phosphorus, Total	0.15	0.16	0.22	0.72	0.26	0.21	0.15	0.16	0.23	0.17	0.12	0.17	1.7	1.6	1.8	1.8	0.24	1.7	0.12	0.10	-
Solids, Total Dissolved (TDS)	540	540	510	510	520	540	560	550	510	470	470	430	400				502	560	400	10	-
Solids, Total Suspended (TSS)	22	23	27	26	28	33	31	35	29	33	32	39	45				30	45	22	1.0	-
Solids, Total Volatile Suspended (TVSS)	5.4	5.4	6.6	5.6	5.6	8.0	6.8	5.2	5.8	7.0	6.6	6.8	8.4				6.3	8.4	5.2	1.0	-
Sulfate (SO_4)	110	84	91	110	78	100	82	100	89	95	90	120	84				94	120	78	10	-
pH (pH units)	7.34	7.81	7.55	7.79	7.86	7.67	7.13	7.87	7.75	7.77	7.62	7.64	7.79	7.69	7.69	7.68	7.66	7.87	7.13	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.001	0.01	0.00	0.01	0.037
Iron (Fe), Total Recoverable	1.30	1.21	1.27	1.23	1.35	1.29	1.32	1.18	1.37	1.30	1.60	1.72	2.61				1.41	2.61	1.18	0.05	-
Iron (Fe), Dissolved	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.10				0.01	0.10	0.01	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Zinc (Zn), Total Recoverable	0.02	0.01	0.02	<0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.01	0.02	0.02				0.02	0.02	0.01	0.01	0.30
Zinc (Zn), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.001	0.01	0.001	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.
[4]The original analysis for Sample No. 8 yielded a concentration of 520 mg/L. A second analysis conducted beyond the sample holding time yielded a concentration of 330 mg/L. Based on a comparison of the original sample analyses to the resampled analyte, and the fact that the resampled analyte result corresponds with previous analyses, the resampled analyte result was used in this geometric mean calculation.

GARY SANITARY DISTRICT
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Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-34
Clark Street Bridge (B2)
Second Wet Weather Sample Event
April 27 - 30, 2002

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	Acute Water Quality Limit
SAMPLE NO. / PARAMETER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16					
CONVENTIONALS																					
E-coli (CFU / 100mL)	100	300	100	300	900	500	600	1300	600	1300	1400	1900	1200	500	900	1000	609	1900	100	100	235
Oil and Grease	2.8	2.3	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0				0.4	2.8	0.3	2.0	-
Ammonia (NH_3), as N	<0.01	0.06	0.07	0.09	0.12	0.17	0.13	0.15	0.13	0.13	0.12	0.14	0.14	0.18	0.09	0.11	0.10	0.18	0.01	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	6.4	7.6	6.3	6.2	3.6	3.2	4.0	6.0	5.9	4.0	4.6	4.9	6.0	2.9	4.8	6.5	5.0	7.6	2.9	2.0	-
Chemical Oxygen Demand (COD)[4]	50	50	40	40	50	30	40	30	50	50	50	40	40				42	50	30	20	-
Chloride	120	120	120	120	120	110	120	130	100	61	130	130	40				104	130	40	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	<0.005	0.017	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.001	0.017	0.0004	0.005	0.022
Fluoride, (F)	3.04	3.12	3.24	3.31	2.95	2.95	2.87	2.77	3.09	3.04	3.12	3.01	3.21				3.05	3.31	2.77	0.25	12
Hardness, Total as $CaCO_3$	310	340	300	310	320	350	300	310	290	320	320	280	300				311	350	280	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	2.2	1.9	1.9	2.0	1.1	1.3	1.2	1.3	0.81	0.60	1.8	2.0	1.8	<0.50	1.7	1.7	1.4	2.2	0.47	0.50	-
Phosphorus, Total	0.16	0.15	0.16	0.16	<0.10	0.18	0.13	0.16	0.18	0.22	0.24	0.17	0.17				0.16	0.24	0.09	0.10	-
Solids, Total Dissolved (TDS)[5]	590	560	570	570	520	540	500	510	610	570	700	510	480				554	700	480	10	-
Solids, Total Suspended (TSS)	42	37	29	31	33	37	31	35	32	33	35	30	30				33	42	29	1.0	-
Solids, Total Volatile Suspended (TVSS)	9.6	8.0	7.4	7.8	7.4	8.0	6.6	7.6	7.5	6.8	6.4	6.2	7.0				7.4	9.6	6.2	1.0	-
Sulfate (SO_4)	130	180	230	120	88	69	90	110	94	110	92	91	100				110	230	69	10	-
pH (pH units)	7.70	7.81	7.75	7.81	7.50	7.17	7.32	7.84	7.71	7.59	7.66	7.66	7.66	7.36	7.59	7.56	7.60	7.84	7.17	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	1.96	1.65	1.57	1.29	1.12	1.51	0.94	1.44	1.50	1.48	1.71	1.56	1.54				1.46	1.96	0.94	0.05	-
Iron (Fe), Dissolved	0.49	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	<0.05				0.01	0.49	0.008	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Zinc (Zn), Total Recoverable	0.04	0.03	0.02	0.01	0.02	0.02	0.02	0.02	0.04	0.02	0.03	0.03	0.03				0.02	0.04	0.01	0.01	0.30
Zinc (Zn), Dissolved	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.05	<0.01	<0.01	0.01	0.01	<0.01				0.01	0.05	0.004	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.
[4]The original analysis for Sample No. 11 yielded a concentration of 190 mg/L. A second analysis conducted beyond the sample holding time yielded a concentration of 50 mg/L. Based on a comparison of the original sample analyses to the resampled analyte, and the fact that the resampled analyte result corresponds with previous analyses, the resampled analyte result was used in this geometric mean calculation.
[5]The original analysis for Sample No. 1 yielded a concentration of 11,000 mg/L. A second analysis conducted beyond the sample holding time yielded a concentration of 590 mg/L. Based on a comparison of the original sample analyses to the resampled analyte, and the fact that the resampled analyte result corresponds with previous analyses, the resampled analyte result was used in this geometric mean calculation.

GARY SANITARY DISTRICT
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Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-35
Chase Street Bridge (B3)
Second Wet Weather Sample Event
April 27 - 30, 2002

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric	Maximum	Minimum	Detection	Acute Water
SAMPLE NO. / PARAMETER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Mean[1,2]	Value[2]	Value[2,3]	Limit	Quality Limit
CONVENTIONALS																					
E-coli (CFU / 100mL)	300	200	400	200	600	200	200	1300	700	1500	1100	1800	1600	800	800	1600	623	1800	200	100	235
Oil and Grease	<2.0	3.7	<2.0	2.3	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	<2.0	<2.0	2.5				1.0	3.7	0.6	2.0	-
Ammonia (NH_3), as N	<0.01	0.05	0.07	0.06	0.18	0.19	0.17	0.15	0.15	0.18	0.16	0.19	0.17	0.15	0.10	0.13	0.11	0.19	0.01	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	6.7	7.7	6.2	6.3	3.4	3.7	4.0	6.7	4.5	4.7	4.4	4.8	4.9	<2.0	4.4	4.2	4.7	7.7	1.9	2.0	-
Chemical Oxygen Demand (COD)	50	40	50	40	50	70	60	60	50	50	70	60	70				54	70	40	20	-
Chloride	120	120	120	120	120	110	120	49	100	110	120	47	97				100	120	47	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.022
Fluoride, (F)	3.39	3.30	3.32	3.26	3.31	3.21	3.15	3.32	3.15	3.09	3.21	3.15	3.25				3.24	3.39	3.09	0.25	12
Hardness, Total as $CaCO_3$	350	400	330	330	320	290	330	320	320	330	260	240	270				312	400	240	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	2.2	1.7	2.3	1.8	1.3	1.1	1.3	<0.50	0.67	0.63	2.4	2.2	1.9	1.6	1.9	1.7	1.4	2.4	0.47	0.50	-
Phosphorus, Total	0.10	<0.10	0.16	0.17	0.10	0.18	0.16	0.16	0.20	0.15	0.17	0.23	0.16				0.15	0.23	0.09	0.10	-
Solids, Total Dissolved (TDS)	590	620	560	560	550	540	540	520	560	540	570	500	470				546	620	470	10	-
Solids, Total Suspended (TSS)	44	39	30	29	29	38	33	33	32	33	35	32	29				33	44	29	1.0	-
Solids, Total Volatile Suspended (TVSS)	10	8.8	9.0	7.4	6.4	7.2	6.4	7.2	6.6	7.0	6.8	6.0	6.2				7.2	10	6.0	1.0	-
Sulfate (SO_4)[4,5,6]	100	96	120	67	82	88	91	94	94	120	160	94	100				98	160	67	10	-
pH (pH units)	7.94	7.87	7.82	7.91	7.70	7.49	7.35	7.82	7.65	7.39	6.96	7.59	8.16	7.34	7.68	7.60	7.64	8.16	6.96	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	1.80	1.60	1.55	1.29	1.58	1.82	1.52	1.48	1.53	1.66	1.78	1.70	1.51				1.59	1.82	1.29	0.05	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Zinc (Zn), Total Recoverable	0.04	0.02	0.03	0.01	0.03	0.02	0.03	0.03	0.04	0.03	0.04	0.03	0.03				0.03	0.04	0.01	0.01	0.30
Zinc (Zn), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.02	0.04	0.01	<0.01				0.01	0.04	0.003	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.
[4]The original analysis for Sample No. 7 yielded a concentration of 230 mg/L. A second analysis conducted beyond the sample holding time yielded a concentration of 91 mg/L. Based on a comparison of the original sample analyses to the resampled analyte, and the fact that the resampled analyte result corresponds with previous analyses, the resampled analyte result was used in this geometric mean calculation.
[5]The original analysis for Sample No. 8 yielded a concentration of 220 mg/L. A second analysis conducted beyond the sample holding time yielded a concentration of 94 mg/L. Based on a comparison of the original sample analyses to the resampled analyte, and the fact that the resampled analyte result corresponds with previous analyses, the resampled analyte result was used in this geometric mean calculation.
[6]The original analysis for Sample No. 9 yielded a concentration of 230 mg/L. A second analysis conducted beyond the sample holding time yielded a concentration of 94 mg/L. Based on a comparison of the original sample analyses to the resampled analyte, and the fact that the resampled analyte result corresponds with previous analyses, the resampled analyte result was used in this geometric mean calculation.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-36
Grant Street Bridge (B4)
Second Wet Weather Sample Event
April 27 - 30, 2002

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	Acute Water Quality Limit
SAMPLE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16					
PARAMETER																					
CONVENTIONALS																					
E-coli (CFU / 100mL)	200	200	300	100	4200	300	600	300	400	200	400	900	780	900	700	500	439	4200	100	100	235
Oil and Grease	<2.0	<2.0	<2.0	2.6	<2.0	<2.0	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0				0.4	2.6	0.3	2.0	-
Ammonia (NH_3), as N	<0.01	<0.01	<0.01	0.23	0.09	0.11	0.18	0.31	0.32	0.08	0.09	0.10	0.11	0.07	0.07	0.09	0.07	0.32	0.01	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	7.3	8.9	7.3	5.9	4.6	5.0	4.3	6.4	4.5	7.5	4.6	3.6	5.0	4.8	4.8	5.5	5.5	8.9	3.6	2.0	-
Chemical Oxygen Demand (COD)	60	50	40	50	50	50	40	50	50	50	40	40	50				47	60	40	20	-
Chloride	120	120	120	100	110	100	110	160	110	130	68	110	110				111	160	68	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.022
Fluoride, (F)	2.65	2.81	2.81	2.70	2.62	2.76	2.65	2.65	2.60	2.53	2.62	2.59	2.67				2.66	2.81	2.53	0.25	12
Hardness, Total as $CaCO_3$	340	310	320	420	410	370	390	350	370	320	300	300	290				343	420	290	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	2.1	2.2	2.1	2.5	1.2	1.2	1.2	0.69	0.87	0.79	1.9	1.5	1.7	1.4	1.8	1.9	1.5	2.5	0.69	0.50	-
Phosphorus, Total	0.18	0.15	0.14	0.14	0.11	0.50	0.12	0.14	0.14	0.14	0.17	0.13	0.14				0.15	0.50	0.11	0.10	-
Solids, Total Dissolved (TDS)	590	610	540	680	620	600	600	580	590	540	650	550	540				590	680	540	10	-
Solids, Total Suspended (TSS)	43	32	28	21	21	24	28	41	42	38	38	29	28				31	43	21	1.0	-
Solids, Total Volatile Suspended (TVSS)	11	8.6	9.4	6.0	5.6	6.6	7.2	9.8	8.2	9.4	7.8	5.8	6.8				7.7	11	5.6	1.0	-
Sulfate (SO_4)	190	200	230	190	100	96	150	170	120	67	100	150	98				135	230	67	10	-
pH (pH units)	7.38	7.34	7.25	7.47	7.37	7.11	7.39	7.50	7.31	7.88	7.81	7.86	7.59	7.78	7.66	7.69	7.52	7.88	7.11	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	1.68	1.07	0.95	0.95	0.92	1.07	1.07	1.55	1.53	1.51	1.57	1.27	1.60				1.26	1.68	0.92	0.05	-
Iron (Fe), Dissolved	0.09	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.005	0.09	0.004	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Zinc (Zn), Total Recoverable	0.03	0.02	0.03	0.03	0.02	0.05	0.03	0.03	0.03	0.03	0.04	0.03	0.05				0.03	0.05	0.02	0.01	0.30
Zinc (Zn), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	<0.01	0.02	<0.01	<0.01	<0.01	0.01	0.01				0.01	0.04	0.003	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-37
Broadway Street Bridge (B5)
Second Wet Weather Sample Event
April 27 - 30, 2002

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric	Maximum	Minimum	Detection	Acute Water
SAMPLE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Mean[1,2]	Value[2]	Value[2,3]	Limit	Quality Limit
PARAMETER																					
CONVENTIONALS																					
E-coli (CFU / 100mL)	100	100	100	200	200	200	500	400	300	300	100	560	820	600	600	900	287	900	100	100	235
Oil and Grease	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0				0.0	0.0	0.0	2.0	-
Ammonia (NH_3), as N	0.01	0.28	0.06	0.12	0.10	0.14	0.16	0.16	0.27	0.16	0.10	0.14	0.17	0.12	0.08	0.10	0.11	0.28	0.01	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	8.7	7.2	5.8	6.8	5.9	4.0	5.5	7.0	5.6	6.5	5.3	3.8	4.5	3.2	2.8	5.6	5.3	8.7	2.8	2.0	-
Chemical Oxygen Demand (COD)	50	50	40	50	50	50	60	50	50	40	50	50	50				49	60	40	20	-
Chloride	120	130	120	120	110	110	70	130	170	74	56	200	85				109	200	56	10	860
Cyanide, Weak Acid Dissociable (WAD)	0.022	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.0005	0.022	0.0004	0.005	0.022
Fluoride, (F)	2.52	2.33	2.31	2.26	2.33	2.31	2.26	2.28	2.20	2.28	2.26	2.33	2.34				2.31	2.52	2.20	0.25	12
Hardness, Total as $CaCO_3$	340	330	320	320	390	390	370	380	360	240	330	260	250				325	390	240	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	2.0	2.4	2.1	2.2	1.3	1.3	1.7	0.64	0.83	1.7	0.61	2.1	1.3	1.8	1.6	1.4	1.5	2.4	0.61	0.50	-
Phosphorus, Total	0.13	<0.10	0.11	0.15	0.11	0.11	<0.10	0.13	3.5	0.14	0.13	0.26	0.13				0.16	3.5	0.08	0.10	-
Solids, Total Dissolved (TDS)	570	570	560	550	680	660	590	620	680	550	550	580	520				589	680	520	10	-
Solids, Total Suspended (TSS)	34	28	23	23	20	21	22	25	30	34	29	27	31				26	34	20	1.0	-
Solids, Total Volatile Suspended (TVSS)	9.4	8.6	6.6	7.2	6.0	6.8	6.6	7.0	8.0	7.0	5.8	6.2	7.8				7.1	9.4	5.8	1.0	-
Sulfate (SO_4)	110	93	93	85	130	99	160	140	150	84	110	170	100				114	170	84	10	-
pH (pH units)	7.28	7.83	7.44	7.36	7.36	7.07	7.60	7.71	7.58	7.80	7.86	7.67	7.35	7.76	7.60	7.58	7.55	7.86	7.07	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.001	0.03	0.001	0.01	0.037
Iron (Fe), Total Recoverable	1.39	1.20	0.97	1.06	0.97	1.00	1.03	1.16	1.30	1.39	1.40	1.25	1.34				1.18	1.40	0.97	0.05	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Zinc (Zn), Total Recoverable	0.07	0.04	0.02	0.03	0.03	0.02	0.05	0.03	0.04	0.04	0.03	0.03	0.03				0.03	0.07	0.02	0.01	0.30
Zinc (Zn), Dissolved	<0.01	0.02	<0.01	0.04	0.02	0.02	0.03	0.01	<0.01	<0.01	0.01	0.02	0.02				0.01	0.04	0.01	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-38
Georgia Street Bridge (B6)
Second Wet Weather Sample Event
April 27 - 30, 2002

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric	Maximum	Minimum	Detection	Acute Water
SAMPLE NO. / PARAMETER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Mean[1,2]	Value[2]	Value[2,3]	Limit	Quality Limit
CONVENTIONALS																					
E-coli (CFU / 100mL)	400	600	2800	21000	4600	4200	900	700	1300	600	600	460	560	400	200	600	1000	21000	200	100	235
Oil and Grease	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.1	<2.0	<2.0	2.1	<2.0	<2.0				0.4	2.1	0.3	2.0	-
Ammonia (NH_3), as N	<0.01	<0.01	0.21	0.22	0.15	0.20	0.20	0.12	0.22	0.19	0.10	0.10	0.23	0.06	0.10	0.09	0.10	0.23	0.01	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	8.1	8.1	8.4	9.9	5.5	4.6	5.2	6.3	5.1	5.3	3.9	5.1	4.6	5.0	4.8	6.1	5.8	9.9	3.9	2.0	-
Chemical Oxygen Demand (COD)	60	50	50	50	60	60	50	40	40	60	40	40	40				49	60	40	20	-
Chloride[4]	120	120	120	120	130	120	100	83	120	97	110	110	65				107	130	65	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005				0.0005	0.005	0.0004	0.005	0.022
Fluoride, (F)	2.10	2.18	2.12	2.09	2.20	2.24	2.18	2.12	2.29	2.33	2.38	2.44	2.37				2.23	2.44	2.09	0.25	12
Hardness, Total as $CaCO_3$	330	340	300	320	360	380	380	370	360	310	310	320	300				336	380	300	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	1.8	2.1	1.6	2.6	1.2	<0.50	1.2	0.74	0.52	1.5	1.6	0.68	2.0	0.99	1.4	1.4	1.2	2.6	0.47	0.50	-
Phosphorus, Total	0.13	0.13	<0.10	0.15	0.15	<0.10	0.12	0.12	0.10	<0.10	0.13	0.13	0.13				0.11	0.15	0.08	0.10	-
Solids, Total Dissolved (TDS)	590	580	560	590	600	650	610	600	590	600	550	570	660				595	660	550	10	-
Solids, Total Suspended (TSS)	28	26	19	19	20	18	18	18	21	24	25	20	19				21	28	18	1.0	-
Solids, Total Volatile Suspended (TVSS)	7.2	8.2	7.3	7.8	6.6	6.2	5.2	4.8	6.4	7.0	6.4	5.2	4.8				6.3	8.2	4.8	1.0	-
Sulfate (SO_4)	140	130	130	120	83	110	140	130	94	86	78	120	90				109	140	78	10	-
pH (pH units)	7.50	7.52	7.54	7.28	7.52	7.34	7.53	7.44	7.24	7.68	7.78	7.18	7.81	7.73	7.57	7.76	7.52	7.81	7.18	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	1.09	1.01	0.80	0.74	0.84	0.89	0.86	0.81	0.96	0.98	1.02	1.20	0.95				0.93	1.20	0.74	0.05	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Zinc (Zn), Total Recoverable	0.02	0.04	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.01	0.03	0.02	0.05				0.03	0.05	0.01	0.01	0.30
Zinc (Zn), Dissolved	<0.01	0.02	0.01	0.02	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03				0.01	0.03	0.005	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.
[4]The original analysis for Sample No. 12 yielded a concentration of 210 mg/L. A second analysis conducted beyond the sample holding time yielded a concentration of 110 mg/L. Based on a comparison of the original sample analyses to the resampled analyte, and the fact that the resampled analyte result corresponds with previous analyses, the resampled analyte result was used in this geometric mean calculation.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-39
Railroad Tracks Bridge (B7)
Second Wet Weather Sample Event
April 27 - 30, 2002

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	Acute Water Quality Limit
SAMPLE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16					
PARAMETER																					
CONVENTIONALS																					
E-coli (CFU / 100mL)	300	400	300	3300	8100	2200	1100	900	900	800	300	360	300	300	100	100	576	8100	100	100	235
Oil and Grease	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0				0.0	0.0	0.0	2.0	-
Ammonia (NH_3), as N	<0.01	<0.01	<0.01	0.13	0.13	0.09	0.08	0.04	0.06	0.05	0.16	0.10	0.14	0.05	0.02	0.06	0.05	0.16	0.01	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	7.8	9.5	8.0	6.9	5.3	4.7	5.2	7.2	5.6	5.9	7.0	4.4	5.4	6.6	4.0	4.7	6.0	9.5	4.0	2.0	-
Chemical Oxygen Demand (COD)	50	50	60	40	90	70	50	50	60	40	50	50	50				53	90	40	20	-
Chloride[4]	120	120	130	120	280	130	110	130	120	150	100	110	110				128	280	100	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.022
Fluoride, (F)	2.18	2.26	2.26	2.24	2.24	2.18	2.18	2.14	2.18	2.18	2.20	2.18	2.24				2.20	2.26	2.14	0.25	12
Hardness, Total as $CaCO_3$	360	330	300	310	330	360	380	380	320	320	260	310	250				321	380	250	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	2.2	2.7	2.1	2.8	1.6	2.7	1.4	2.8	1.9	1.7	0.67	1.7	1.9				1.7	2.8	0.47	0.50	-
Phosphorus, Total	<0.10	0.10	0.15	0.14	0.12	0.13	0.11	0.16	0.11	0.14	<0.10	0.11	<0.10	<0.50	1.6	1.7	0.11	0.16	0.08	0.10	-
Solids, Total Dissolved (TDS)	560	560	580	580	580	640	650	600	620	590	590	580	560				591	650	560	10	-
Solids, Total Suspended (TSS)	29	28	26	18	21	21	18	19	17	20	21	20	15				21	29	15	1.0	-
Solids, Total Volatile Suspended (TVSS)	10	10	9.0	6.4	6.8	8.8	6.4	7.6	4.4	6.2	7.0	5.2	4.4				6.9	10	4.4	1.0	-
Sulfate (SO_4)	92	85	86	58	85	85	150	110	140	86	97	98	110				96	150	58	10	-
pH (pH units)	7.80	8.10	7.63	7.17	7.46	7.48	7.46	7.84	7.66	7.68	7.33	7.08	7.54	7.52	7.65	7.71	7.57	8.10	7.08	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	0.007	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.0005	0.007	0.0004	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	1.13	1.13	0.92	0.81	0.88	0.90	0.87	0.85	0.72	0.90	0.92	1.07	0.80				0.91	1.13	0.72	0.05	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05				0.005	0.05	0.004	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Zinc (Zn), Total Recoverable	0.01	0.01	0.03	0.03	0.02	0.02	0.03	0.02	0.03	0.02	0.02	0.02	0.01				0.02	0.03	0.01	0.01	0.30
Zinc (Zn), Dissolved	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.01				0.003	0.01	0.002	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.
[4]The original analysis for Sample No. 5 yielded a concentration of 660 mg/L. A second analysis conducted beyond the sample holding time yielded a concentration of 280 mg/L. Based on a comparison of the original sample analyses to the resampled analyte, and the fact that the resampled analyte result corresponds with previous analyses, the resampled analyte result was used in this geometric mean calculation.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-40
Martin Luther King Drive Bridge (B8)
Second Wet Weather Sample Event
April 27 - 30, 2002

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric	Maximum	Minimum	Detection	Acute Water
SAMPLE NO. / PARAMETER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Mean[1,2]	Value[2]	Value[2,3]	Limit	Quality Limit
CONVENTIONALS																					
E-coli (CFU / 100mL)	200	1200	1100	4100	8600	5700	4100	800	900	500	500	160	380	100	300	300	786	8600	100	100	235
Oil and Grease	<2.0	<2.0	2.2	<2.0	<2.0	<2.0	<2.0	<2.0	2.4	<2.0	<2.0	<2.0	<2.0				0.4	2.4	0.3	2.0	-
Ammonia (NH_3), as N	<0.01	0.01	<0.01	0.18	0.15	0.16	0.15	0.12	0.09	0.14	0.13	0.13	0.08	0.08	0.06	0.10	0.07	0.18	0.01	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	7.9	8.1	8.6	8.2	5.0	5.5	4.6	6.6	6.5	5.0	6.1	6.2	5.1	4.2	3.6	4.9	5.8	8.6	3.6	2.0	-
Chemical Oxygen Demand (COD)	50	40	50	50	50	70	50	50	50	40	40	50	40				48	70	40	20	-
Chloride[4]	120	120	120	120	130	130	120	110	64	94	170	110	44				107	170	44	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.022
Fluoride, (F)	2.05	2.05	2.09	2.03	2.12	2.03	2.05	2.07	1.99	2.09	2.12	2.12	2.18				2.08	2.18	1.99	0.25	12
Hardness, Total as $CaCO_3$	340	320	310	320	330	340	380	360	360	340	350	320	330				338	380	310	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	2.2	2.4	2.1	2.0	1.2	1.4	1.2	0.70	0.83	1.6	1.9	1.7	2.0	0.87	1.3	1.6	1.5	2.4	0.70	0.50	-
Phosphorus, Total	0.12	0.12	0.16	0.11	0.15	0.17	0.16	<0.10	0.13	0.13	0.11	0.12	0.10				0.13	0.17	0.09	0.10	-
Solids, Total Dissolved (TDS)	570	600	590	550	590	600	630	610	600	580	590	570	550				587	630	550	10	-
Solids, Total Suspended (TSS)	33	30	25	20	20	24	19	17	15	19	21	19	16				21	33	15	1.0	-
Solids, Total Volatile Suspended (TVSS)	12	10	11	7.0	7.0	9.0	7.6	6.2	5.0	6.4	7.2	5.6	5.6				7.4	12	5.0	1.0	-
Sulfate (SO_4)	160	120	120	86	91	71	96	97	120	83	73	120	81				99	160	71	10	-
pH (pH units)	7.76	7.60	7.56	7.29	7.57	7.75	7.69	7.88	7.71	7.61	7.39	7.66	8.29	7.91	7.67	7.72	7.69	8.29	7.29	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	1.12	1.09	0.96	0.77	0.87	0.90	0.84	0.82	0.75	0.90	0.86	0.91	0.77				0.88	1.12	0.75	0.05	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.00002	0.0002	0.00002	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Zinc (Zn), Total Recoverable	0.01	0.01	0.04	0.03	0.03	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02				0.02	0.04	0.01	0.01	0.30
Zinc (Zn), Dissolved	0.02	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.002	0.03	0.002	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.
[4]The original analysis for Sample No. 8 yielded a concentration of 210 mg/L. A second analysis conducted beyond the sample holding time yielded a concentration of 110 mg/L. Based on a comparison of the original sample analyses to the resampled analyte, and the fact that the resampled analyte result corresponds with previous analyses, the resampled analyte result was used in this geometric mean calculation.

Bridge_Wet_Event_2.xls
MLK

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-41
Clay Street Bridge (B9)
Second Wet Weather Sample Event
April 27 - 30, 2002

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric	Maximum	Minimum	Detection	Acute Water
SAMPLE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Mean[1,2]	Value[2]	Value[2,3]	Limit	Quality Limit
PARAMETER																					
CONVENTIONALS																					
E-coli (CFU / 100mL)	300	300	400	1100	3000	1200	800	900	200	300	100	200	320	300	300	400	431	3000	100	100	235
Oil and Grease	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.2	2.3				0.4	2.3	0.3	2.0	-
Ammonia (NH_3), as N	0.09	0.11	0.07	0.12	0.17	0.13	0.13	0.15	0.12	0.10	0.12	0.13	0.19	0.18	0.15	0.15	0.13	0.19	0.07	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	6.3	7.8	4.7	5.4	5.0	4.1	4.0	7.2	5.1	3.9	3.6	4.2	4.0	4.3	2.7	5.6	4.7	7.8	2.7	2.0	-
Chemical Oxygen Demand (COD)	60	40	40	30	50	40	50	60	50	50	40	50	60				47	60	30	20	-
Chloride	86	87	84	86	83	80	60	98	92	61	66	66	61				77	98	60	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	0.008	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.0005	0.008	0.0004	0.005	0.022
Fluoride, (F)	1.98	0.72	1.94	1.96	1.98	1.90	1.90	1.82	1.87	1.90	1.93	1.90	1.99				1.78	1.99	0.72	0.25	12
Hardness, Total as $CaCO_3$	300	290	290	280	300	290	290	250	280	290	260	240	240				276	300	240	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	2.1	2.0	2.1	1.8	1.4	1.8	1.2	0.60	0.72	1.3	0.92	2.2	2.0	2.2	0.68	1.5	1.4	2.2	0.60	0.50	-
Phosphorus, Total	0.17	<0.10	<0.10	0.11	<0.10	0.16	<0.10	<0.10	0.13	<0.10	<0.10	<0.10	0.13				0.06	0.17	0.04	0.10	-
Solids, Total Dissolved (TDS)	440	460	420	440	440	440	470	450	440	430	440	460	420				442	470	420	10	-
Solids, Total Suspended (TSS)	44	42	42	37	32	32	32	31	29	31	37	35	44				36	44	29	1.0	-
Solids, Total Volatile Suspended (TVSS)	8.6	8.6	8.6	8.8	6.4	6.4	7.4	6.6	5.6	6.8	8.0	5.3	7.6				7.2	8.8	5.3	1.0	-
Sulfate (SO_4)[4]	99	80	93	100	56	50	96	76	130	49	56	87	99				79	130	49	10	-
pH (pH units)	7.92	8.10	8.02	7.85	7.87	7.87	7.50	7.95	7.81	7.93	7.96	7.82	7.91	7.95	7.91	7.83	7.89	8.10	7.50	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	1.93	1.78	1.83	1.66	1.41	1.68	1.41	1.37	1.38	1.43	1.58	1.57	1.94				1.60	1.94	1.37	0.05	-
Iron (Fe), Dissolved	<0.05	<0.05	0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.01	0.05	0.01	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	0.0007	0.0003	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.00005	0.0007	0.00003	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Zinc (Zn), Total Recoverable	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0.03	0.01				0.02	0.03	0.01	0.01	0.30
Zinc (Zn), Dissolved	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.001	0.01	0.001	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.
[4]The original analysis for Sample No. 8 yielded a concentration of 210 mg/L. A second analysis conducted beyond the sample holding time yielded a concentration of 76 mg/L. Based on a comparison of the original sample analyses to the resampled analyte, and the fact that the resampled analyte result corresponds with previous analyses, the resampled analyte result was used in this geometric mean calculation.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-42
Ripley Street Bridge (B10)
Second Wet Weather Sample Event
April 27 - 30, 2002

FROM START OF STORM, HOURS / SAMPLE NO. / PARAMETER	-4 / 1	0 / 2	4 / 3	8 / 4	12 / 5	16 / 6	20 / 7	24 / 8	28 / 9	32 / 10	36 / 11	44 / 12	52 / 13	60 / 14	68 / 15	72 / 16	Geometric Mean[1,2]	Maximum Value[2]	Minimum Value[2,3]	Detection Limit	Acute Water Quality Limit
CONVENTIONALS																					
E-coli (CFU / 100mL)	400	500	300	700	1700	1800	700	900	300	300	100	200	220	200	200	300	397	1800	100	100	235
Oil and Grease	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	2.1	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0				0.2	2.1	0.2	2.0	-
Ammonia (NH_3), as N	0.07	0.08	0.07	0.10	0.17	0.15	0.17	0.12	0.12	0.12	0.11	0.13	0.20	0.19	0.16	0.15	0.13	0.20	0.07	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	6.8	5.3	6.0	7.2	4.2	4.0	6.0	5.8	5.1	4.7	4.0	4.7	4.0	5.9	4.3	4.4	5.1	7.2	4.0	2.0	-
Chemical Oxygen Demand (COD)	40	40	30	50	50	50	50	50	50	40	40	60	60				46	60	30	20	-
Chloride	87	87	87	100	87	87	74	75	120	66	82	80	76				84	120	66	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.022
Fluoride, (F)	0.67	0.68	0.68	0.66	0.68	0.66	0.67	0.61	0.56	0.55	0.57	0.58	0.58				0.62	0.68	0.55	0.25	12
Hardness, Total as $CaCO_3$	270	280	290	290	290	290	310	280	300	270	260	300	270				284	310	260	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	1.6	2.4	1.7	2.1	1.1	1.9	1.4	0.92	0.75	0.67	1.8	1.5	2.3	2.1	1.9	2.0	1.5	2.4	0.67	0.50	-
Phosphorus, Total	0.11	0.12	0.12	0.17	0.16	<0.10	0.15	0.13	0.14	0.10	0.12	0.11	0.15				0.13	0.17	0.09	0.10	-
Solids, Total Dissolved (TDS)	460	440	450	470	450	480	470	470	470	460	460	450	470				461	480	440	10	-
Solids, Total Suspended (TSS)	49	40	38	38	36	32	41	32	31	33	35	38	40				37	49	31	1.0	-
Solids, Total Volatile Suspended (TVSS)	9.2	8.4	8.8	7.8	5.8	5.4	12	6.6	7.2	7.2	4.2	7.4	6.6				7.2	12	4.2	1.0	-
Sulfate (SO_4)	78	73	69	86	40	56	73	150	140	59	52	87	120				78	150	40	10	-
pH (pH units)	7.84	7.89	7.84	8.16	7.87	7.69	7.76	7.89	7.66	7.72	7.33	7.85	7.91	7.88	7.54	7.78	7.79	8.16	7.33	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	2.11	1.70	1.77	1.70	1.58	1.45	1.68	1.37	1.31	1.50	1.62	1.67	1.83				1.63	2.11	1.31	0.05	-
Iron (Fe), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Zinc (Zn), Total Recoverable	0.07	0.06	0.02	0.02	0.02	0.02	0.03	0.02	0.01	0.02	0.04	0.02	0.03				0.03	0.07	0.01	0.01	0.30
Zinc (Zn), Dissolved	0.03	0.02	<0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.02				0.01	0.03	0.005	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND								
																	0.00	0.00	0.00	0.05	0.086

NOTES:
All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.
[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".
[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.
[3]The minimum value may be equal to a calculated "V" value.

GARY SANITARY DISTRICT
Gary, Indiana

Little Calumet River
Stream Reach Characterization and Evaluation Report

TABLE 3-43
Deep River
Second Wet Weather Sample Event
April 27 - 30, 2002

FROM START OF STORM, HOURS	-4	0	4	8	12	16	20	24	28	32	36	44	52	60	68	72	Geometric	Maximum	Minimum	Detection	Acute Water
SAMPLE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Mean[1,2]	Value[2]	Value[2,3]	Limit	Quality Limit
PARAMETER																					
CONVENTIONALS																					
E-coli (CFU / 100mL)	100	300	100	1100	200	200	300	900	100	200	200	180	1200	300	500	500	289	1200	100	100	235
Oil and Grease	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0				0.0	0.0	0.0	2.0	-
Ammonia (NH_3), as N	0.10	0.13	0.14	0.14	0.15	0.15	0.17	0.07	0.09	0.12	0.13	0.13	0.21	0.19	0.17	0.15	0.14	0.21	0.07	0.01	3.7
Carbonaceous Biochemical Oxygen Demand	5.2	5.3	6.1	4.8	5.1	2.8	3.8	6.0	3.8	4.6	4.3	5.0	2.7	4.4	4.1	4.1	4.4	6.1	2.7	2.0	-
Chemical Oxygen Demand (COD)	40	50	60	60	50	50	50	60	50	50	50	50	50				51	60	40	20	-
Chloride[4]	69	70	77	91	70	75	140	96	83	43	55	80	74				76	140	43	10	860
Cyanide, Weak Acid Dissociable (WAD)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.022
Fluoride, (F)	0.18	0.19	0.17	0.17	0.18	0.17	0.17	0.16	0.16	0.17	0.18	0.18	0.18				0.17	0.19	0.16	0.25	12
Hardness, Total as $CaCO_3$	270	260	280	260	290	270	260	290	240	270	270	280	250				268	290	240	2.0	-
Nitrogen, Total Kjeldahl as N (TKN)	2.2	2.2	1.8	2.1	1.0	0.72	1.0	0.53	1.4	1.5	1.7	2.6	2.2	1.9	2.1	2.0	1.6	2.6	0.53	0.50	-
Phosphorus, Total	0.11	0.11	0.13	0.13	0.12	0.16	<0.10	0.13	0.13	<0.10	<0.10	0.11	0.15				0.11	0.16	0.08	0.10	-
Solids, Total Dissolved (TDS)	420	410	400	420	410	410	400	410	390	400	440	420	440				413	440	390	10	-
Solids, Total Suspended (TSS)	52	49	47	44	50	34	29	30	32	36	45	40	35				39	52	29	1.0	-
Solids, Total Volatile Suspended (TVSS)	8.5	9.2	8.6	7.6	7.0	6.8	5.4	5.2	6.6	7.2	7.6	6.8	6.6				7.1	9.2	5.2	1.0	-
Sulfate (SO_4)	60	57	62	60	37	55	53	70	52	54	55	79	80				58	80	37	10	-
pH (pH units)	7.91	7.92	7.87	7.84	7.92	7.78	7.87	7.96	7.77	7.84	7.88	7.53	7.92	7.89	7.89	7.75	7.85	7.96	7.53	0.01	6<=pH<=9
METALS																					
Arsenic (As), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.34
Arsenic (As), Dissolved	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				0.00	0.00	0.00	0.02	0.34
Cadmium (Cd), Total Recoverable	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0150
Cadmium (Cd), Dissolved	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005				0.000	0.000	0.000	0.005	0.0142
Chromium (Cr), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	4.3
Chromium (Cr), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.36
Copper (Cu), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.038
Copper (Cu), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	0.037
Iron (Fe), Total Recoverable	2.35	2.11	2.10	2.08	2.17	1.97	1.45	1.47	1.55	1.76	1.92	1.79	1.70				1.86	2.35	1.45	0.05	-
Iron (Fe), Dissolved	0.06	0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.01	0.10	0.01	0.05	-
Lead (Pb), Total Recoverable	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Lead (Pb), Dissolved	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				0.00	0.00	0.00	0.05	0.47
Mercury (Hg), Total Recoverable	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0017
Mercury (Hg), Dissolved	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002				0.0000	0.0000	0.0000	0.0002	0.0014
Nickel (Ni), Total Recoverable	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Nickel (Ni), Dissolved	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.00	0.00	0.00	0.01	1.15
Zinc (Zn), Total Recoverable	0.02	0.02	0.06	0.02	0.02	0.02	0.01	0.02	0.02	0.01	0.02	0.02	<0.01				0.02	0.06	0.01	0.01	0.30
Zinc (Zn), Dissolved	0.03	0.02	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				0.004	0.03	0.002	0.01	0.29
PESTICIDES																					
Heptachlor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Aldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
alpha-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
beta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
delta-BHC	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
gamma-BHC (Lindane)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Chlordane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	2.50	-
4,4'-DDD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Heptachlor Epoxide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Dieldrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.24
Endosulfan I	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan II	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	-
Endosulfan Sulfate	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.10	-
Endrin	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND				0.00	0.00	0.00	0.05	0.086

NOTES:

All conventional parameters and metals are listed in milligrams per liter unless otherwise noted. All pesticides are listed in micrograms per liter.

[1]Geometric mean calculated using method identified in 327 IAC 5-2-11.4 (a)(8)(C) in which samples with concentrations below the detection limit are assigned the value "V".

[2]If all sample concentrations for a parameter are below the detection limit, then the geometric mean, maximum value and minimum value are equal to zero.

[3]The minimum value may be equal to a calculated "V" value.

[4]The original analysis for Sample No. 7 yielded a concentration of 540 mg/L. A second analysis conducted beyond the sample holding time yielded a concentration of 140 mg/L. Based on a comparison of the original sample analyses to the resampled analyte, and the fact that the resampled analyte result corresponds with previous analyses, the resampled analyte result was used in this geometric mean calculation.

Appendix 12

CDM Study for Gary Sanitary District

RW ARMSTRONG™
Inspiration to reality.

In 2003 CDM completed a study for the Gary Sanitary District outlining water quality data along the Little Calumet River. The study conducted sampling at a total of eight (8) locations, seven (7) of which were along the Little Calumet River and the other located along Deep River. Figure 1 shows the location of these sampling results. Each location was tested a total of six (6) times, three for dry weather and three for wet weather.

The parameters being tested were limited in scope for this study. Those parameters that overlapped with the sampling conducted as part of this watershed plan can be seen in Figures 2 to 7. The tables created by CDM to show the concentration levels found in the various sampling events are shown after the figures. One table represents the dry weather results and the other the wet weather results for each of the eight sampling locations.

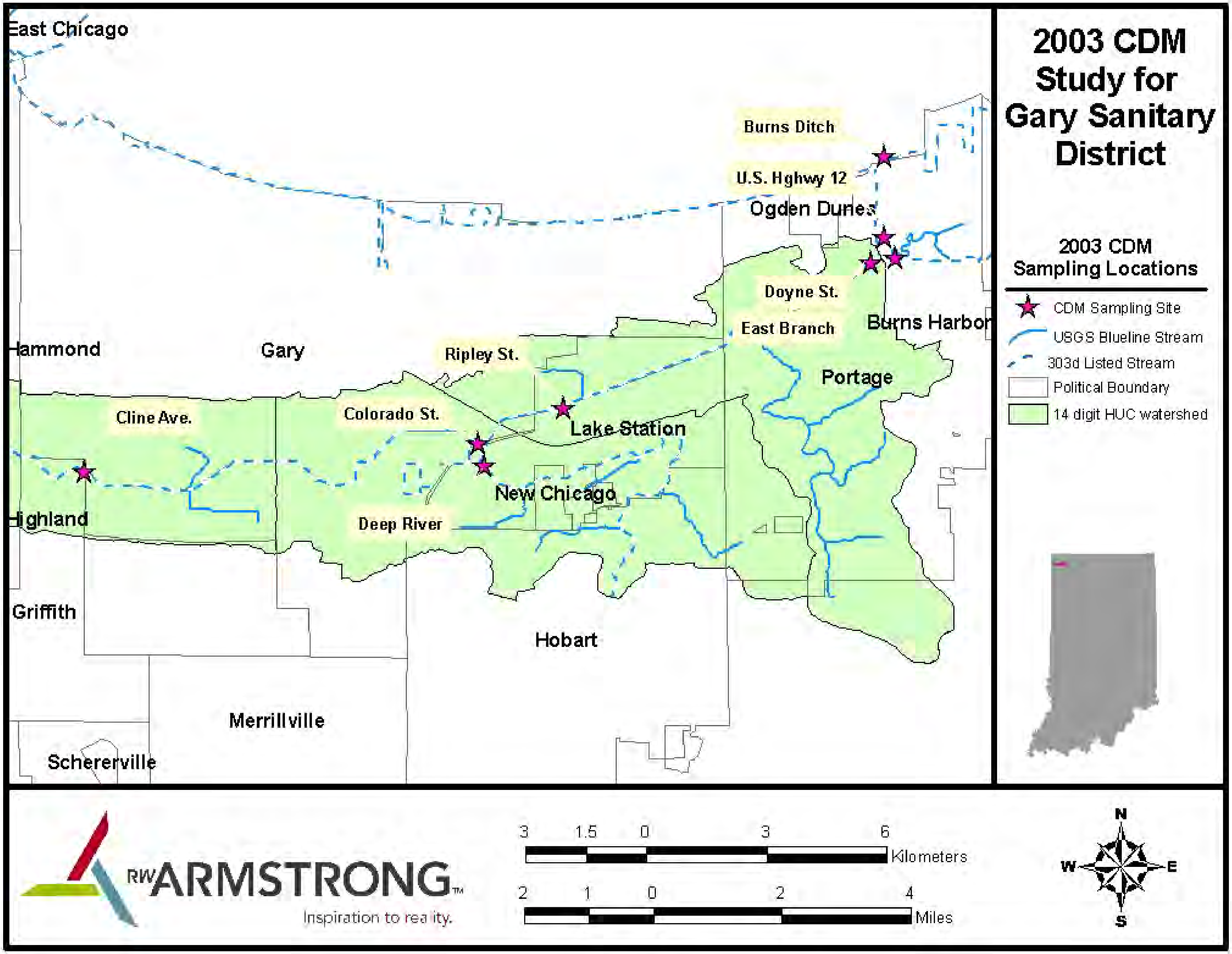

Figure 1: CDM sampling locations for the 2003 report compiled for the Gary Sanitary District.

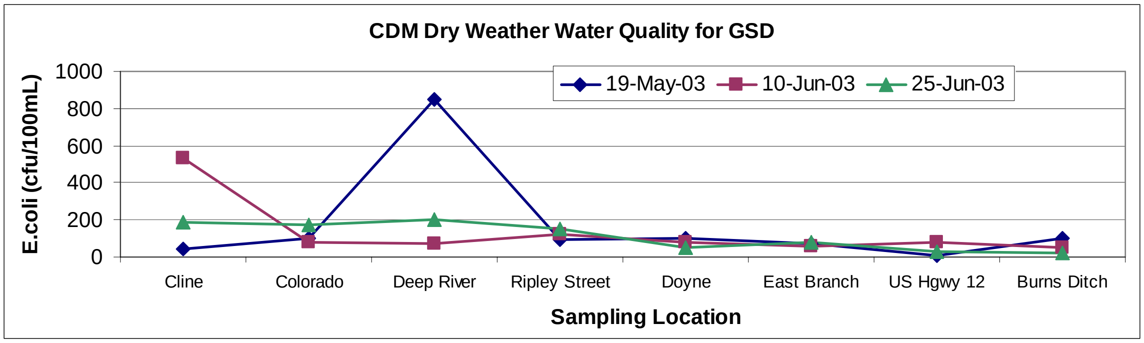

Figure 2: *E.coli* dry weather sampling results from the 2003 report by CDM.

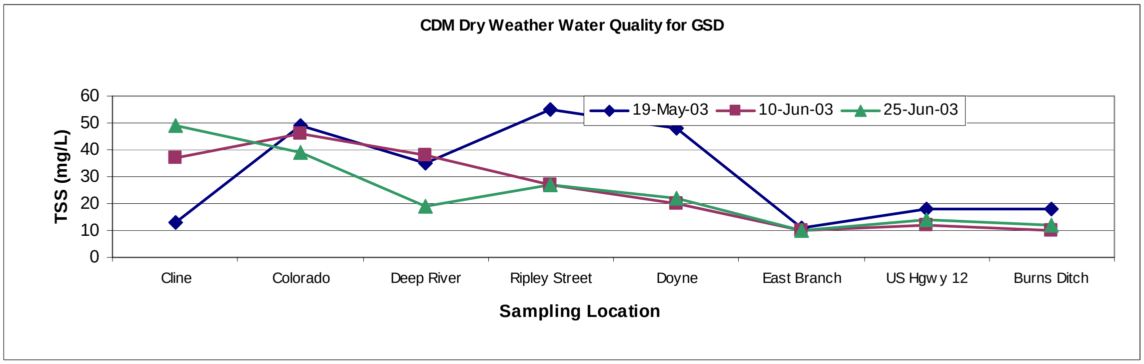

Figure 3: TSS dry weather sampling results from the 2003 report by CDM.

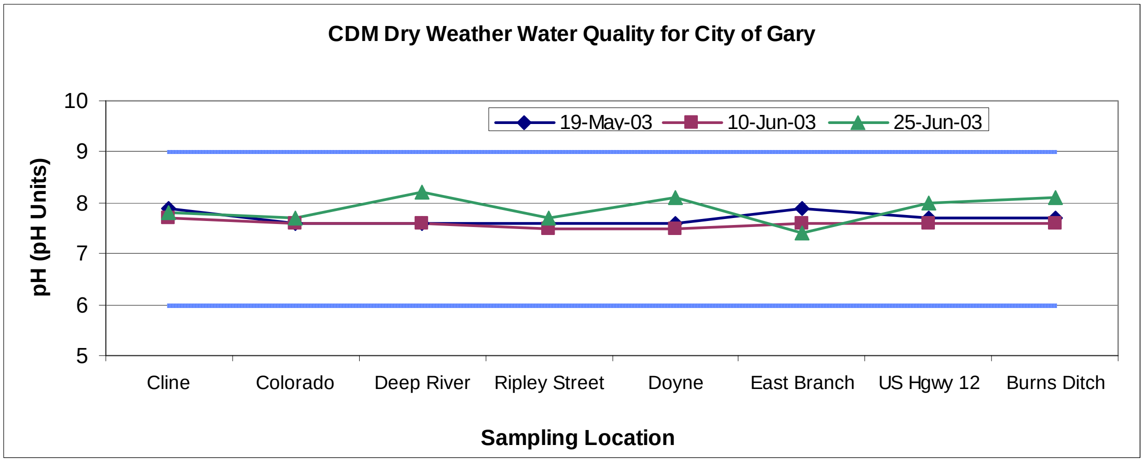

Figure 4: pH units for dry weather sampling from the 2003 report by CDM.

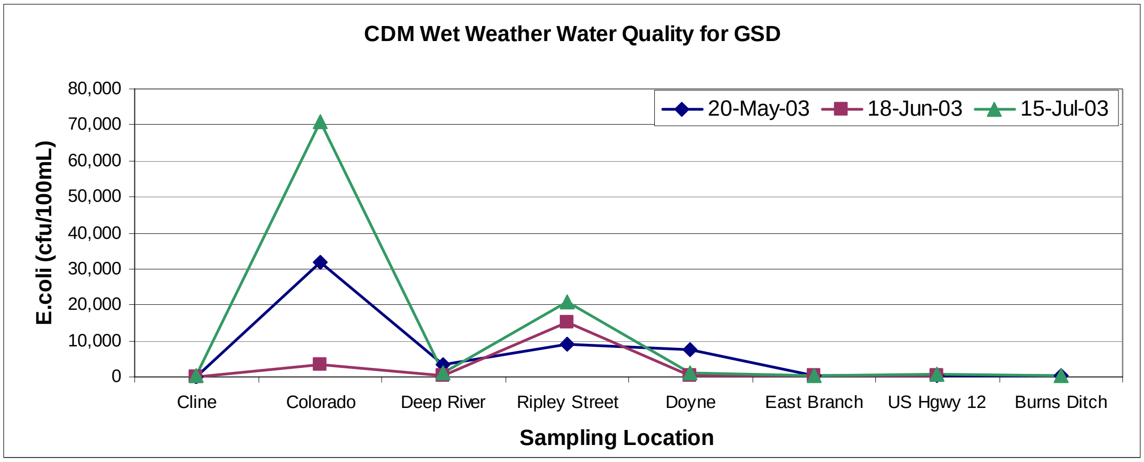

Figure 5: *E.coli* wet weather sampling results from the 2003 study by CDM.

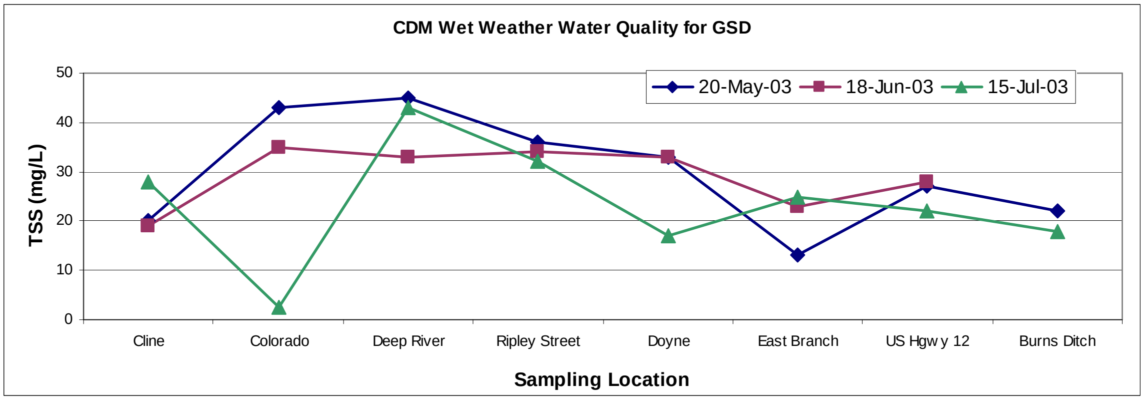

Figure 6: TSS wet weather sampling results from the 2003 study by CDM.

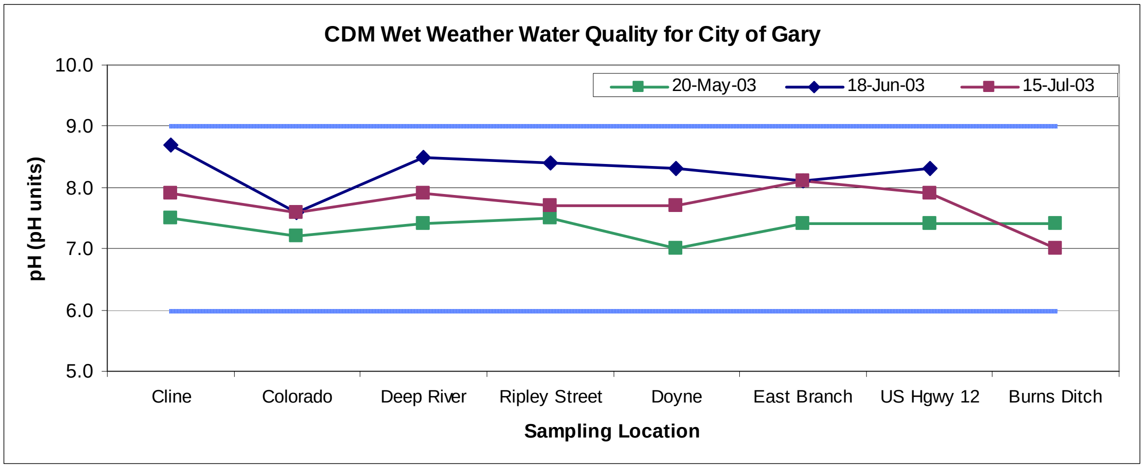

Figure 7: pH units for the wet weather sampling for the 2003 study by CDM.

DRY WEATHER

Analyte	Runits	Date	Site #1 Cline Av	Site #2 Colorado Av	Site #3 Deep River	Site #3A Ripley St	Site #4 Doyne	Site #5 East Branch	Site #6 US 12	Site #7 Burns Ditch
E-Coli	cfu/100ml	05/19/03	40	100	850	90	100	70	10	100
* Yellow highlight represents		06/10/03	530	80	70	120	80	60	80	50
E.coli exceedance samples		06/25/03	190	170	200	150	50	80	30	20
Biochemical Oxygen Demand	mg/L	05/19/03	< 2.0	3.7	< 2.0	2.8	2.8	< 2.0	< 2.0	2.6
		06/10/03	5	4.7	3.5	5.3	3.5	< 2.0	< 2.0	3.2
		06/25/03	7.1	5.6	5.3	4.4	5.3	< 2.0	2.3	2.6
Specific Conductance	µmhos/cm	05/19/03	890	830	790	860	860	620	710	720
		06/10/03	1,200	1,000	880	990	1,000	610	730	680
		06/25/03	930	960	900	1000	1000	510	630	650
Total Suspended Solids	mg/L	05/19/03	13	49	35	55	48	11	18	18
		06/10/03	37	46	38	27	20	10	12	10
		06/25/03	49	39	19	27	22	10	14	12
pH	pH units	05/19/03	7.9	7.6	7.6	7.6	7.6	7.9	7.7	7.7
		06/10/03	7.7	7.6	7.6	7.5	7.5	7.6	7.6	7.6
		06/25/03	7.8	7.7	8.2	7.7	8.1	7.4	8.0	8.1
Dissolved Oxygen	mg/L	05/19/03	8.3	6.6	6.6	7.2	6.3	7.4	7.3	7.4
		06/10/03	8.4	7.9	8.4	7.4	8.4	8.7	8.3	8.4
		06/25/03	11.0	5.8	6.6	7.0	11.5	7.9	8.7	8.4
Water Depth*	ft	05/19/03	2.0	1.5	***1.5***	4.6	2.8	9.0	10.4	***10.0***
Bold , ***Italics*** are estimates		06/10/03	2.0	1.5	***1.5***	3.4	3.7	7.6	7.4	***8.0***
		06/25/03	***2.0***	***1.5***	***1.5***	***3.4***	***3.7***	***7.6***	***7.4***	***8.0***
Water Velocity*	ft/sec	05/19/03	0.0	2.8	***1.0***	2.5	1.1	1.8	1.8	***1.5***
Bold , ***Italics*** are estimates		06/10/03	0.0	1.7	***1.0***	1.0	0.4	1.7	0.8	***1.5***
		06/25/03	0.0	***1.7***	***1.0***	***1.0***	***0.4***	***1.7***	***0.8***	***1.5***

WET WEATHER

Analyte	Runits	CollectionDate	Event	Site #1 Cline Av +4 hours*	Site #1 Cline Av +8 hours	Site #2 Colorado Av +4 hours	Site #2 Colorado Av +8 hours	Site #3 Deep River +4 hours	Site #3 Deep River +8 hours	Site #3A Ripley St +4 hours	Site #3A Ripley St +8 hours	Site #4 Doyne +8 hours	Site #4 Doyne +12 hours	Site #5 East Branch +8 hours	Site #5 East Branch +12 hours	Site #6 US 12 +8 hours	Site #6 US 12 +12 hours	Site #7 Burns Ditch +8 hours	Site #7 Burns Ditch +12 hours
E-Coli	cfu/100ml	20-May-03	WW #1	240	170	25,000	32,000	57,000	3,600	5,200	9,000	7,400	4,500	270	160	410	5,400	190	1,100
* Yellow highlights represent *E.coli* exceedance samples.		18-Jun-03	WW #2	70	120	160,000	3400	250	380	58,000	15,000	230	200	440	400	310	200	No Sample	
		15-Jul-03	WW #3	460	460	12,000	71000	790	1100	11,000	21,000	1100	10000	550	300	700	8900	450	990
				***-+5 on 05/20/2003 event**															
Biochemical Oxygen Demand	mg/L	20-May-03	WW #1	4	4	4.6	4.9	4	2.2	4.6	3.1	3.4	6.7	< 2.0	< 2.0	2.2	2.5	< 2.0	2.2
		18-Jun-03	WW #2	5.5	3.7	13	3.1	5.2	2.8	7.0	6.1	2.5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	No Sample	
		15-Jul-03	WW #3	<2.0	4.4	<2.0	2.6	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Specific Conductance	µmhos/cm	20-May-03	WW #1	920	920	820	770	750	750	800	810	800	830	620	630	740	720	720	730
		18-Jun-03	WW #2	1300	1300	850	990	890	900	980	930	1000	1000	530	570	740	1000	No Sample	
		15-Jul-03	WW #3	760	760	690	700	720	690	700	670	750	710	560	600	680	640	640	650
Total Suspended Solids	mg/L	20-May-03	WW #1	23	20	45	43	48	45	50	36	33	30	13	16	27	25	22	23
		18-Jun-03	WW #2	16	19	39	35	110	33	25	34	33	26	23	20	28	26	No Sample	
		15-Jul-03	WW #3	20	28	6.0	25	43	43	31	32	17	23	25	26	22	33	18	31
pH	pH units	20-May-03	WW #1	7.5	7.5	7.1	7.2	7.4	7.4	7.3	7.5	7.0	7.4	7.4	7.8	7.4	7.5	7.4	7.3
		18-Jun-03	WW #2	8.6	8.7	7.8	7.6	7.9	8.5	7.8	8.4	8.3	7.5	8.1	8.1	8.3	8.2	No Sample	
		15-Jul-03	WW #3	7.8	7.9	7	7.6	7.6	7.9	8	7.7	7.7	7.7	8.1	8.0	7.9	7.9	7.0	7.7
Dissolved Oxygen	mg/L	20-May-03	WW #1	7.6	7.5	5.7	5.5	6.9	6.6	5.5	5.5	5.5	6.4	6.9	7.4	6.1	6.7	6.5	6.6
		18-Jun-03	WW #2	12.2	12.1	4.8	6.4	7.1	7.1	5.9	6.4	7.3	6.3	6.8	6.8	7.0	6.8	No Sample	
		15-Jul-03	WW #3	7.8	8.9	5.2	5.3	7.2	7.5	5.4	5.2	6.4	5.7	6.9	7.2	6.3	6.3	7.1	6.7
Water Depth*	ft	20-May-03	WW #1	2.0	2.0	1.8	1.8	***1.5***	***1.5***	4.5	4.5	4.5	4.6	9.2	9.0	10.5	10.4	***10.0***	***10.0***
Bold, ***Italics*** are estimates		18-Jun-03	WW #2	2.1	2.2	1.5	1.5	***1.5***	***1.5***	4.0	3.7	3.8	3.8	7.9	7.8	8.0	8.0	***8.0***	***8.0***
		15-Jul-03	WW #3	***3.0***	***3.0***	***3.0***	***3.0***	***2.0***	***2.0***	***5.0***	***5.0***	***5.0***	***5.0***	***10.0***	***10.0***	***10***	***10***	***10***	***10***
Water Velocity*	ft/sec	20-May-03	WW #1	0.0	0.0	2.6	2.6	***1.0***	***1.0***	2.5	2.5	1.0	0.8	1.8	1.8	2.0	2.0	***2.0***	***2.0***
Bold, ***Italics*** are estimates		18-Jun-03	WW #2	0.0	0.0	2.3	2.3	***1.0***	***1.0***	1.5	1.6	0.1	0.1	1.9	1.7	1.2	1.1	***1.5***	***1.5***
		15-Jul-03	WW #3	***0.0***	***0.0***	***3.0***	***3.0***	***1.0***	***1.0***	***2.0***	***2.0***	***0.0***	***0.0***	***0.5***	***0.5***	***0.5***	***0.5***	***0***	***0***

Appendix 13

Quality Assurance Project Plan

RW ARMSTRONG

Inspiration to reality.

QUALITY ASSURANCE PROJECT PLAN
FOR
Little Calumet River Watershed Monitoring
ARN: 6-01

Prepared by

Greg R. Bright
Commonwealth Biomonitoring, Inc.
8061 Windham Lake Drive
Indianapolis, Indiana 46214

Prepared for

Indiana Department of Environmental Management
Office of Water Management
Watershed Management Section

Gary Storm Water District	R.W. Armstrong	Empower Results
3600 West 3rd Avenue	8300 Broadway	1939 Rockford Rd.
Gary, IN 46406	Merrillville, IN 46410	Indianapolis IN 46229
219-881-5280	219-738-2258	317-891-8820

June 2007

Water Quality Data Manager	______________ Greg Bright	________ Date
Watershed Communicator	______________ Jill Hoffmann	________ Date
Watershed Coordinator	______________ Phil Gralik	________ Date
QA Project Manager	______________ Betty Ratcliff	________ Date
NPS / TMDL Section Chief	______________ Andrew Pelloso	________ Date
Planning Branch Chief	______________ Marylou Renshaw	________ Date

Copies of the QAPP have been distributed to Greg Bright, Jill Hoffmann, Phil Gralik, and Betty Ratcliff, all of whom have responsibility for implementation of various tasks in the project.

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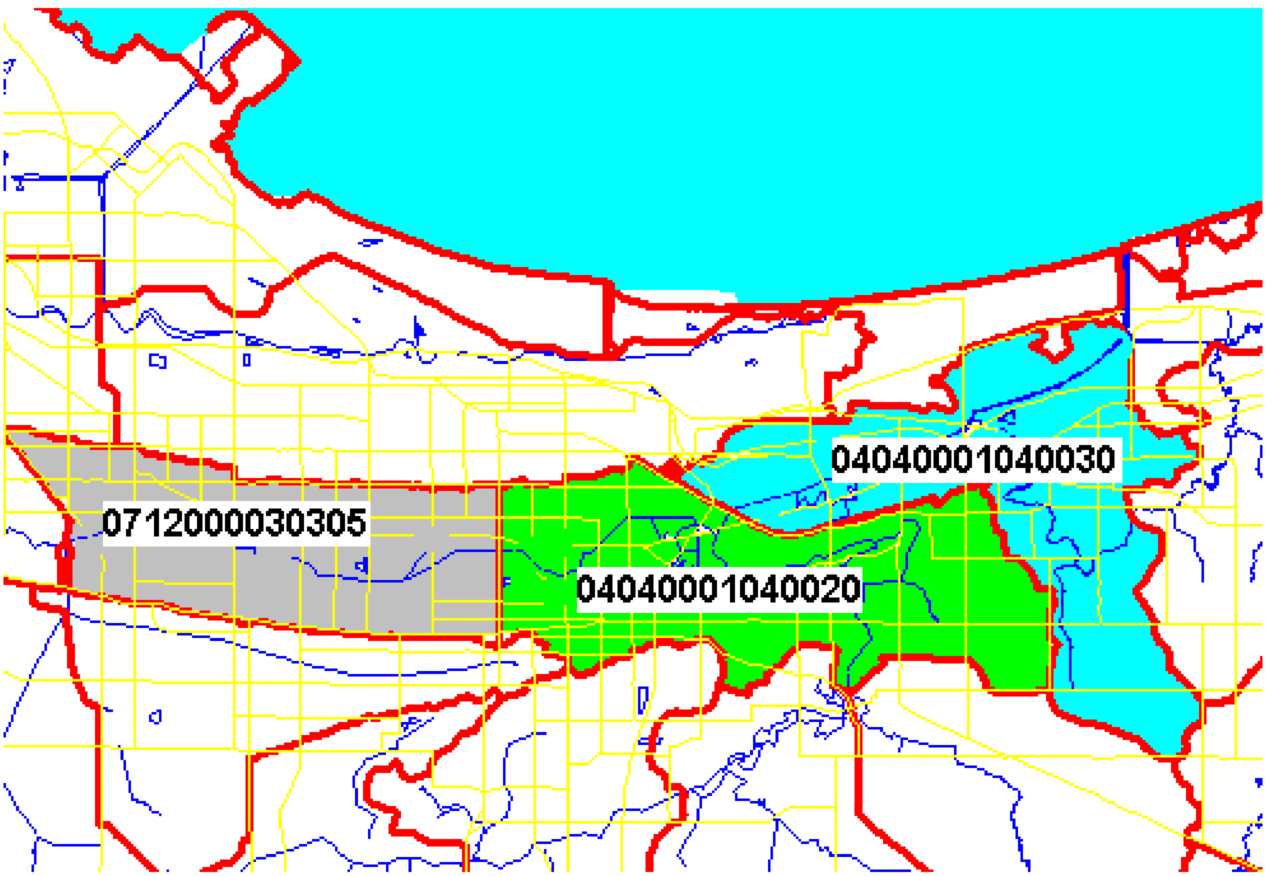
1.0 INTRODUCTION

The Gary Storm Water Management District has received a 319 water quality grant from the Indiana Department of Environmental Management (IDEM) and the United States Environmental Protection Agency (USEPA). The purpose of the grant is to prepare a watershed management plan for three 14-digit subwatersheds in the Little Calumet River basin (Fig. 1). One of the tasks in the project is to monitor water quality using biological and chemical methods and use the information to make decisions that may be used to help prepare the watershed management plan. This document presents a quality assurance plan for monitoring.

Figure 1. The 3 sub-watersheds to be studied



2.0 PROJECT DESCRIPTION

2.1 General Overview:

The water quality assessment will use water chemistry at seven sites within the watershed. In addition, because the Little Calumet River is on the Indiana impaired waterbodies list because of E.coli contamination, E.coli will be monitored at 40 additional sites to attempt to track down important sources. The information will be used to diagnose water quality problems and propose solutions.

2.2 Project Objectives:

The objectives of this project are to characterize the biological and chemical integrity of three 14-digit subwatersheds (07120000303050, 04040001040020, and 0410400001040030) and to make recommendations to solve any identified problems.

E. coli are a bacteriological indicator of potential human health effects associated with whole body contact in water. Analysis of *E. coli* concentrations at various sites within the watersheds during warm weather will help determine human health risk and potentially help locate problem sources of bacteria.

2.3 Sampling Design:

The overall experimental design is to sample basic water chemistry and bacteria to answer the following questions:

What is the overall ecological health of the watersheds?
Where are the E.coli originating?
What can be done to make the identified problems better?

Parameter	When	Where	Why
Basic water chemistry	low/hi flow 2 times	Little Cal 7 sites	Provide instream data near various urban inputs
E. coli in water	low/hi flow 4 times	Outfalls/ Streams 40 sites	Provide instream data near various urban inputs

Table 1 shows a summary of the types of measurements to be collected as part of this study.

Table 1. Chemical and biological parameters to be measured at each site

Chemical Measurements

Nitrogen (nitrates+nitrites), total phosphorus, total suspended solids, pH, temperature, conductivity, dissolved oxygen, stream flow. These parameters will be measured at 7 sites. Measurements will be made twice during 2007. One event will be immediately following a storm.

E. coli Measurements

E. coli will be measured at 40 sites, including storm sewer outfalls. Samples at these sites will be collected four times during 2007. One event will be immediately following a storm.

Parameter	Method	Detection Limit	Holding Time	Site
pH	SM 4500 H+	0.1 SU	N/A	Field
Temperature	Thermocouple	0.1 degree	N/A	Field
Conductivity	SM 2510 A	1 uS	N/A	Field
Dissolved oxygen	SM 4500 O G	0.1 mg/l	N/A	Field
NO2+NO3	SM 4500 NO3	0.5 mg/l	28 days	Lab
Total P	SM 4500 P F	0.03 mg/l	2 days	Lab
TSS	SM 2540 B	1 mg/l	7 days	Lab
E.coli	SM 9223 B	1 / 100ml	6 hrs	Lab
Flow	USGS guage [Deep River] [Burns Ditch]	N/A	N/A	N/A

2.4 Project Timetable:

The project will be conducted during 2007 with a final report to be available for inclusion in the watershed management plan by February 1, 2008.

QAPP approved	June 2007
Chemical Sampling	June and September 2007
E.coli Sampling	June, July, August, and September 2007
Data Analysis	September 2007
Final Report	January 2008

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

The Project Manager (Greg R. Bright, Commonwealth Biomonitoring) is responsible for biological quality assurance, management of the project field logistics, the collection, analysis, and interpretation of biological data, and writing the biological report. A copy of the lab's Standard Operating Procedures is attached in the Appendix. Greg Bright will also be responsible for chemistry quality assurance and laboratory chemical analysis. A copy of the lab's Standard Operating Procedures for the required chemical analysis is attached in the Appendix.

Dr. Melody Myers-Kinzie (Commonwealth Biomonitoring) is responsible for chemistry analysis.

The Watershed Communicator (Jill Hoffmann, Empower Results) is responsible for using the data to help local stakeholders make decisions about prioritizing identified problems and solutions.

The Watershed Coordinator (Phil Gralik, R.W. Armstrong) is responsible for coordinating the project with Commonwealth Biomonitoring, IDEM, and the Gary Storm Water District.

The IDEM quality assurance coordinator (Betty Ratcliff) is responsible for oversight of the quality assurance portion of the grant.

The IDEM grant project manager (Skye Schelle) is responsible for oversight of the grant schedule, including water quality monitoring and reporting.

4.0 DATA QUALITY OBJECTIVES

4.1 Accuracy/Bias

Accuracy and bias in bacteriological and chemical analyses are dependent on maintenance of standard procedures for sample processing, labeling, and chemistry laboratory procedures.

For the laboratory chemical measurements, we expect accuracies within 10% of the true value, based on previous results obtained by laboratories participating in performance evaluations.

Bias is evaluated by the use of field and laboratory blanks. One field blank will be used for each sampling event.

4.2 Precision

Precision of the laboratory chemical analyses is expected to result in chemical recoveries of 90 to 110%. Precision will be measured by analyzing the results of duplicate samples collected in the field and measuring the relative percent difference. There will be one duplicate collected per sampling event for chemical analysis. For each 40 *E. coli* sample events, there will be 3 duplicate samples.

4.3 Completeness

The "completeness" objective for biological and chemical measurements in this project is 90%. Since there are 14 samples planned for chemical analysis, the objective is to obtain 13 valid chemical samples. For E. coli, the number of samples to be collected is 160. Therefore the "completeness" objective for E.coli is 144 valid samples.

4.4 Representativeness

The samples collected for chemical and biological analysis should be representative of the ecological health of the site where the sample is collected. To assure representativeness, all samples will be collected on the same day, using the same collection technique. The sites that have been selected for analysis represent the entire watershed.

4.5 Comparability

Comparability is ensured through the use of identical sampling and analysis techniques at each sample site. This also assures that the results may be compared to historical samples of water quality collected in the watersheds by IDEM that use similar techniques.

5.0 FIELD PROCEDURES

Chemical sampling will consist of grab samples collected from pooled areas. High density plastic containers will be used to collect all chemical samples. Samples for nitrogen and phosphorus analysis will be preserved with sulfuric acid. All samples will be placed on ice for transport to the lab.

<u>Chemistry</u>

Field chemistry measurements will be made using appropriate field meters.

E.Coli

Sampling and analysis will be carried out by Commonwealth Biomonitoring. Grab samples will be collected in pre-sterilized jars. The standard operating procedure for *E. coli* analysis in water is found in Appendix 3.

Sample conditions

For chemical sampling at the seven "base" sites, one set of samples will be collected during dry weather (no significant rain within the prior 7 days) during late summer. One sample will be collected during wet weather (at least 0.3 inches of rain within the previous 24 hours) during early spring.

6.0 LABORATORY PROCEDURES

Laboratory Chemistry

Water quality parameters will be measured in the laboratory, using standard operating procedures outlined in Appendix 3.

7.0 CUSTODY PROCEDURES

Sample custody will begin with the crew chief and samples are to remain in the custody of the field team until the samples are returned to the appropriate laboratory shipping and receiving room for entering into the sample tracking system. A chain-of-custody form will be completed for all samples. This form will include the sample date, sample time, sample site, and ther name of the person collecting the sample. An example chain-of-custody form is attached in Appendix 5.

All sample sites will be assigned a designated number. Sites will be consecutively numbered and all standardized data forms generated from a site will be indexed and computerized according to that number.

Containers will be preserved, labeled, and placed in a sealed cooler for transport to the laboratory. Samples will be retained in the laboratory under chain-of-custody procedures. Samples will be inspected for leakage or damage from transport weekly. Loss of fluid preservatives for community samples will be replaced.

All raw data (including data forms, logbooks, etc.) are retained by the Project Manager (Greg Bright) in an organized fashion and archived for future reference.

8.0 CALIBRATION PROCEDURES AND FREQUENCY

Instrument calibration is needed for dissolved oxygen and pH. These instruments will be calibrated daily during each field survey. Records of the calibration will be kept in the field logbook.

9.0 PREVENTATIVE MAINTENANCE

The field crew leader is responsible for maintaining all files for all field equipment. Individual team members may be given responsibility for different equipment and its deployment in the field.

A list of critical spare parts that should always accompany field sampling surveys to minimize downtime follows:

- All equipment required in Standard Operating Procedures.
- Extra sample containers
- Extra batteries
- QAPP

10.0 DATA REDUCTION, REVIEW AND REPORTING

10.1 Raw Data

Field data will be recorded as it is taken. Laboratory data will be recorded on laboratory bench sheets

10.2 Data Reduction

Data will be transcribed to a Microsoft Access format.

10.3 Data Review

All chemical data will be checked for completeness before leaving a site. Data sheets from each site are checked by the field crew leader to verify accuracy and completeness.

10.4 Data Reporting

Chemical data will be reported in mg/l. E.coli data will be reported in MPN/100 ml.

The final report will be organized as a scientific document and shall contain the following sections:

- Table of Contents
- Table of Tables
- Tables of Figures
- Executive Summary
- Introduction
- Methods and Materials
- Results
- Quality Assurance

A final report of the data will be submitted electronically to IDEM in an Access Database format.

11.0 QUALITY CONTROL PROCEDURES

Field chemistry quality control procedures include the analysis of duplicate samples at ten percent of all sample sites.

Laboratory quality control procedures include the analysis of spikes, duplicates, and method blanks every tenth sample (see Appendix 3).

12.0 DATA QUALITY ASSESSMENT

Specific procedures for assessment of precision and accuracy on a routine basis are outlined and described in section 4.0. The data will be evaluated after each sampling event to assure that the data quality objectives are being met. If data fall outside the project goals of the Data Quality Objectives in Section Four, the laboratory will take corrective action, as stated in Section Fourteen. Data falling outside the data quality objectives will be flagged as follows:

R: Rejected
J: Estimated
Q: One or more of the QC checks or criteria was out of control
H: The analysis for this parameter was performed out of the holding time.
  Results will be estimated or rejected on the basis of the following:
    Estimated at less than 1.5 x the holding time
    Rejected at greater than 1.5 x the holding time
D: Relative percent difference was above acceptable control limits.
  Results will be estimated or rejected on the basis of the following:
    Estimated at less than 2 x RPD
    Rejected at greater than 2x RPD
B: Parameter found in field or lab blank.
  Results will be estimated or rejected on the basis of the following:
    Estimated at less than 10 x the blank contamination.

Rejected at greater than 10 x the blank contamination.

U: Results are above the Method Detection Limit but below the reporting limit. Results will be estimated.

13.0 PERFORMANCE AND SYSTEMS AUDITS

Internal performance and system audits required to monitor the capability and performance of the laboratories will be conducted on appropriate log sheets, data sheets, verification sheets, and calibration equipment log sheets at each site in the field and after each of the two sampling seasons after all data have been collected.. All laboratory audits will be conducted by the Project Manager.

14.0 CORRECTIVE ACTION

If water chemistry analyses fall outside the objectives listed in Section Four or if field blanks indicate contamination, the lab or field personnel will not analyze any additional samples until a cause for the discrepancy has been identified. Sample results collected during this time will not be discarded but will be identified as potentially suspect.

15.0 QUALITY ASSURANCE REPORTS

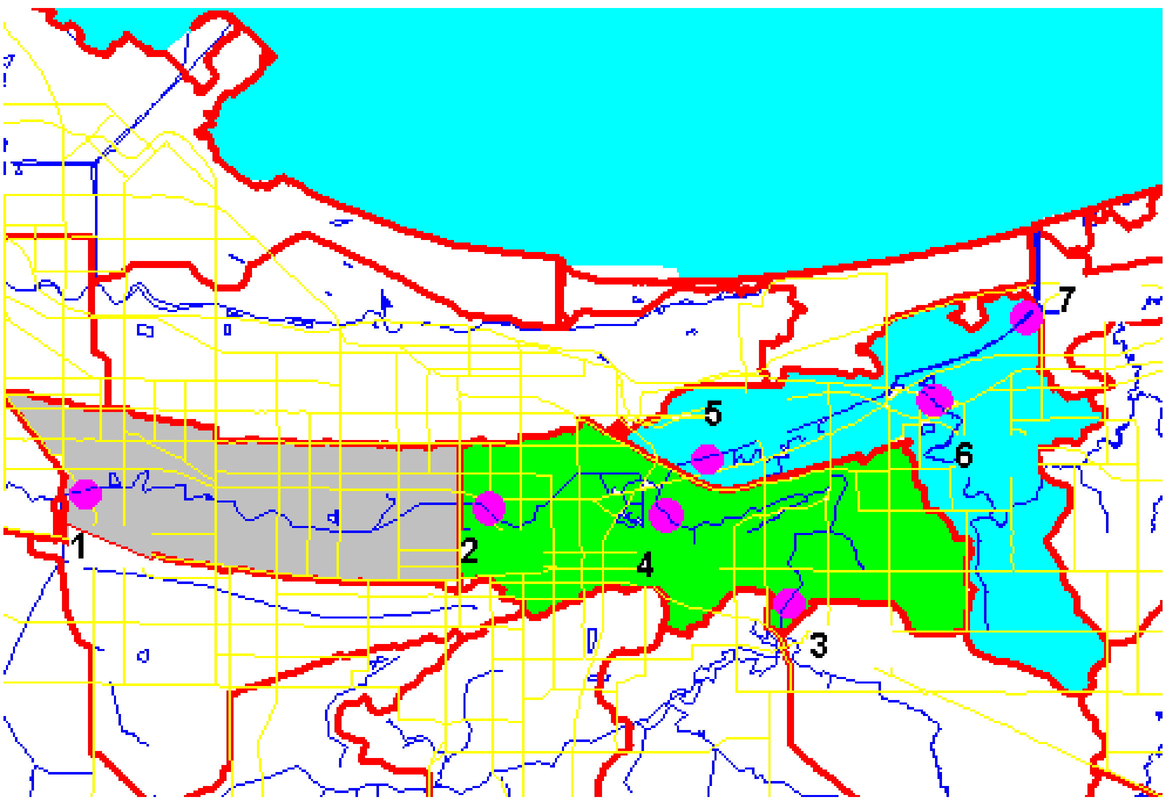
A quality assurance report will be prepared by the project coordinator and will include all pertinent information relating to measurement data accuracy, precision, and completeness, as outlined in the Standard Operating Procedures and this Quality Assurance Program Plan.

REFERENCES CITED

1. Standard Methods for the Examination of Water and Wastewater, 18th Edition, Edited by Arnold E. Greenberg, Lenore S. Clesceri, and Andrew D. Lewis, 1992.

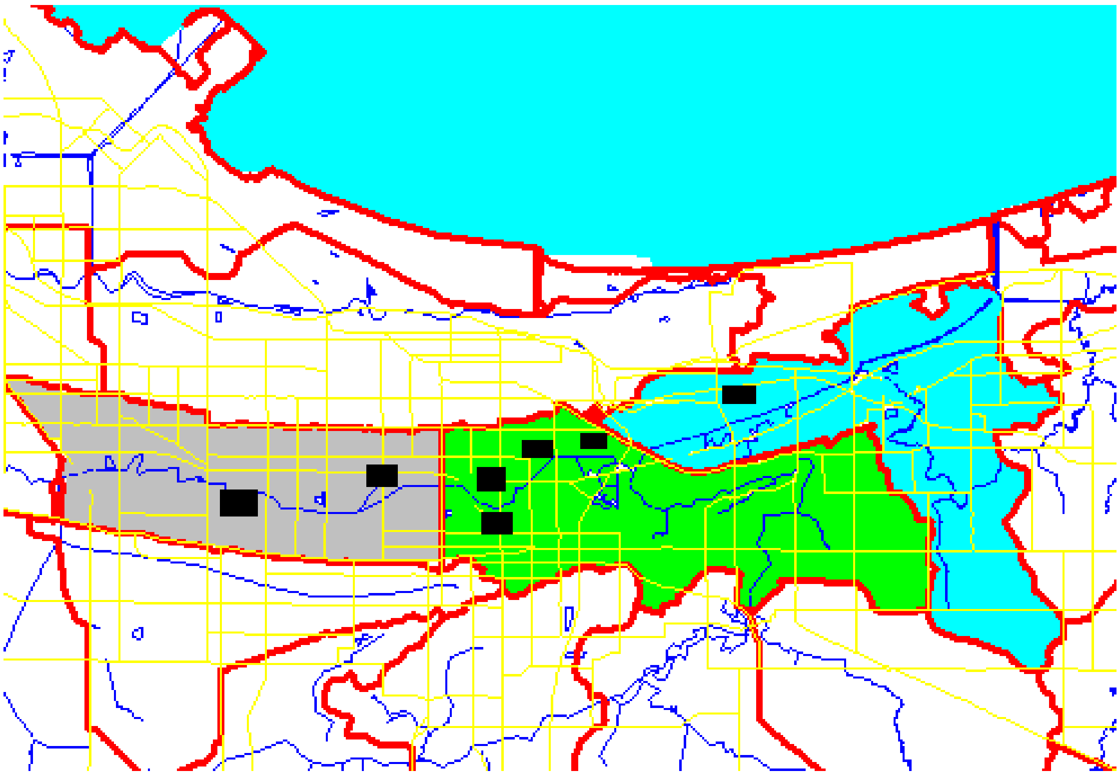
APPENDIX 1. - "Base" Sampling Sites for Chemistry

	Latitude	Longitude
1 Little Calumet River upstream	41.34.06	87.28.28
2 Little Calumet River above Deep River	41.33.56	87.21.20
3 Deep River upstream	41.32.14	87.15.18
4 Deep River downstream	41.33.47	87.17.27
5 Little Calumet River below Deep River	41.34.37	87.16.45
6 Willow Creek near mouth	41.35.34	87.12.45
7 Little Calumet River above Burns Harbor	41.36.10	87.11.35



Additional Storm Sewer Outfall Sites

Multiple outfalls are present within each box. Latitude and Longitude values of individual outfalls will be assigned at sampling and reported in the final report



APPENDIX 2 - Standard Operating Procedures for Laboratory Water Chemistry

Total Suspended Solids
Nitrogen (Nitrate + Nitrite)
Total Phosphorus
E. coli

Total Suspended Solids (TSS)

Reference

Standard Method 18th Edition for the Examination of Water and Wastewater, 2540; A.

Sample Handling and Preservation

Samples are to be collected without any preservatives being added to them.

Apparatus and Materials

Analytical Balance
Drying Oven
Desiccator
Vacuum pump
Connection Tubing
Baking pans used in drying oven
Pre-weighed paper filters, with trays
Suction Flask
Membrane Filter
Membrane Filter Funnel
Clamp
Metal or Plastic tweezers

Reagents

Deionzied Water

Procedures

Assemble the suctioning apparatus to filtering apparatus.

Place the membrane filter inside the suction flask

On the TSS record sheet write down the pre-weighed filter number and weight in the correct spaces provided. Place that filter on top of the membrane filter, then place the membrane funnel and clamp the funnel down to the suction flask.

Shake the sample to have a representative sample.

Pour off 100 ml of sample into the filtering apparatus

Pump air out of the filtering appratus.

Rinse the sides of the beaker with deionzied water getting all particles off the walls of the beaker. Pour that into the membrane funnel with the rest of the sample. Once the sample has gone through the pre-weighed filter, rinse the funnel for any remaining particles.

After all water has been suctioned through the pre-weighed filter, turn off air manifold valve. Release the clamp. Remove the membrane funnel. Use the tweezers to remove the pre-weighed filter and place that filter in its original tray.

Before placing the next clean pre-weighed filter on the membrane filter, remember to clean the membrane funnel before the next sample is analyzed.

Place the tray in a baking pan that can be placed in the drying oven once the baking pan is full or all of the samples have been analyzed.

Weigh the filter after drying. Calculate TSS as the dry weight of the filter after drying minus then original weight of the filter.

Detection Limit

1 mg/l

Quality Assurance/Quality Control

There should be a duplicate analyzed every tenth sample.

Nitrogen (Nitrate + Nitrite)

1) Scope

This procedure uses cadmium reduction and a colorimetric technique to determine nitrite plus nitrate nitrogen.

2) Reference

Standard Methods 4500 NO3

3) Sample Handling and Preservation

Samples are to be collected with sulfuric acid in a pre-preserved bottle.

9.4 Apparatus and Materials

1) Colorimeter

9.5 Reagents

1) Hach Nitraver 3 and Nitrover 6 reagents

9.6 Procedures

1) Shake the sample container to get a well mixed sample

2) Pour off 5 ml. Add one packet each of Hach Nitraver 3 and Nitraver 6 reagents.

3) Allow color to develop for 30 minutes.

4) Place sample in a colorimeter. Measure absorbance at 540 nm.

5) Determine sample concentration by graphical interpolation.

7) Detection Limit - 0.5 mg/l

8) Quality Assurance/Quality Control

Duplicate every tenth sample. A method blank is analyzed every tenth sample and method blank spike proceeding method blank, should be analyzed every tenth sample. Also a sample spike is to be analyzed with each batch. If a batch does not contain 10 samples, a method blank and method spike blank is to be analyzed along with that batch.

Total Phosphorus

1) Scope

This procedure uses sample digestion, ascorbic acid, and a colorimetric technique to determine total phosphorus.

2) Reference

Standard Methods 4500 P F

3) Sample Handling and Preservation

Samples are to be collected with sulfuric acid in a pre-preserved bottle.

4) Apparatus and Materials

1) Colorimeter
2) Hot Block

5) Reagents

1) Deionzed Water
2) Nitric Acid
3) Hanna Phosphate Reagent (HI 93713-0)

6) Procedures

1) Shake the sample container to get a well mixed sample

2) Take the well-mixed sample and pour 50 mL into the digestion cups.

3) Add 1.5 mL of concentrated nitric acid into the sample.

4) Heat in the hot block at sample temperature of 95°C until sample is approximately 5 ml.

5) Remove samples from the hot block and allow sample to cool. Bring the sample volume back up to 50mL with DI water.

6) Once sample has been digested, pour off 10 ml. Add one packet of Hanna phosphate reagent.

7) Allow color to develop for 30 minutes.

8) Place sample in a colorimeter. Measure absorbance at 660 nm.

9) Determine sample concentration by graphical interpolation.

7) Detection Limit - 0.03 mg/l

8) Quality Assurance/Quality Control

Duplicate every tenth sample. A method blank is analyzed every tenth sample and method blank spike proceeding method blank, should be analyzed every tenth sample. Also a sample spike is to be analyzed with each batch. If a batch does not contain 10 samples, a method blank and method spike blank is to be analyzed along with that batch.

Appendix 3. Bacteriological Analysis - E. coli

Location

This procedure is performed in the bacteriological laboratory of Commonwealth Biomonigoring

Purpose

This method is used to determine the number of colonies of Escherichia coli (E. coli) in environmental samples.

Scope

This procedure uses the m-coliblue technique with filtration

Reference

Standard Methods 20th Edition – Method 9223 B

Sample Handling and Preservation

Samples are to be collected in a sterile bottle provide by the lab.

Apparatus and Materials

Petri Dishes
Filter Assembly
Incubator

Reagents

m-coliblue

Procedures

Filter 100 ml sample through sterilized filter apparatus. Remove filter and place in Petri Dish with m-coliblue media. Incubate at thirty-seven degrees C for 24 hours. Count the number of colonies present and record on the attached data sheet.

Quality Assurance/Quality Control

A blank sample is analyzed with every batch, to provide assurance of a contamination
free
work area for that day. Duplicates are analyzed every tenth sample.

BACTERIOLOGICAL DATA
m-Coliblue Procedure

SAMPLE DATE | SAMPLE TIME

ANALYSIS DATE | ANALYSIS TIME

TYPE OF SAMPLE

DILUTIONS USED

SITE NUMBER	RED COLONIES	BLUE COLONIES	TOTAL COLONIES
	non-E. coli	E. coli	Total coliforms
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			

APPENDIX 4. CHAIN OF CUSTODY FORM

Commonwealth Biomonitoring, Inc
8061 Windham Lake Drive
Indianapolis, IN 46214
317-297-7713

CLIENT NAME: Gary Storm Water Utility
PURPOSE OF SAMPLE: Water quality monitoring
SAMPLE IDENTIFICATION NUMBERS:
DESCRIPTION: ____
DATE SAMPLE COLLECTED: ____
NAME OF PERSON COLLECTING SAMPLE:______________________________
VOLUME OF SAMPLE: ______________________________
SAMPLE CONTAINER:______________________________
NUMBER OF CONTAINERS:_________________________
SAMPLE STORAGE:_________________________________
PRESERVATIVES:___________________________________

Relinquished by:____

Date:_____________________________ Time:________________________

Received by:____

Date:_____________________________ Time:________________________

Relinquished by:____

Date:_____________________________ Time:________________________

Received by:____

Date:_____________________________ Time:________________________

COMMENTS:

Appendix 14

Sampling Sites

The approved Quality Assurance Project Plan (QAPP) included seven (7) sampling sites that would be tested for the full suite of parameters a total of two times. One sample was to be taken during high flow and one during low flow. Along with the seven sampling sites an additional 42 sampling locations were identified to be tested a total of four times for *E.coli* bacteria. Two of these samples were taken during high flow and two during low flow.

The seven sampling site locations are listed in Table 1 with the latitude and longitude given as well as the sample stream. The geographical locations are shown in Figure 1 along with the sampling locations. Table 2 lists the latitude and longitude locations of the 42 sampling locations with a general description of what is being tested listed.

The sampling results for the sampling sites and locations are shown in Tables 3 to 5 for both dry and wet weather.

Sampling Sites	Stream Name	Location	Latitude	Longitude
Site 1	Little Calumet	Indianapolis Blvd.	41.34.06	87.28.28
Site 2	Little Calumet	Grant Street	41.33.56	87.21.20
Site 3	Deep River	Upstream	41.32.14	87.15.18
Site 4	Deep River	Downstream	41.33.47	87.17.27
Site 5	Burns Ditch	Clay Street	41.34.37	87.16.45
Site 6	Willow Creek	Hwy 20	41.35.33	87.12.36
Site 7	Burns Ditch	Downstream	41.36.10	87.11.35

Table 1: Seven sampling site descriptions.

Location	Latitude	Longitude	Stream Name
1	41.32.47	87.10.55	Willow Cr.
2	41.33.54	87.11.18	Willow Cr.
3	41.34.29	87.11.45	tributary
4	41.34.34	87.12.18	Willow Cr.
5	41.35.27	87.12.30	Willow Cr.
6	41.35.40	87.13.11	Burns Ditch
7	41.36.10	87.11.35	Burns Ditch
8	41.35.13	87.14.28	Burns Ditch
9	41.35.14	87.16.05	tributary
10	41.34.39	87.16.30	Burns Ditch
11	41.34.30	87.17.19	tributary
12	41.34.30	87.17.21	tributary
13	41.34.06	87.17.49	tributary
14	41.34.16	87.17.48	Little Calumet
15	41.34.21	87.19.09	Little Calumet
16	41.34.23	87.19.09	CSO 013
17	41.34.00	87.21.19	Little Calumet
18	41.33.56	87.21.19	Storm Sewer
19	41.33.30	87.19.03	tributary
20	41.33.49	87.17.25	Deep River
21	41.33.43	87.16.29	Deep River
22	41.33.18	87.16.59	tributary
23	41.32.11	87.15.24	Deep River
24	41.33.04	87.15.40	Deep River
25	41.33.04	87.15.40	tributary
26	41.33.51	87.15.40	Deep River
27	41.33.32	87.14.29	Deep River
28	41.34.23	87.14.25	Deep River
29	41.33.35	87.14.04	tributary
30	41.33.38	87.20.11	Little Calumet
31	41.33.35	87.23.37	Little Calumet
32	41.33.33	87.23.38	tributary
33	41.33.58	87.22.31	tributary
34	41.33.41	87.22.32	tributary
35	41.33.34	87.22.32	Little Calumet
36	41.33.18	87.22.30	tributary
37	41.33.50	87.24.47	Little Calumet
38	41.34.10	87.27.42	Little Calumet
39	41.34.01	87.26.01	Little Calumet
40	41.34.00	87.26.00	tributary
41	41.33.33	87.25.40	tributary
42	41.34.06	87.28.22	Little Calumet

Table 2: Sampling locations descriptions.

Sampling Site	Base Flow Pollutant Concentrations								
	FLOW (cfs)	E.coli (cfu/100mL)	pH SU	DO (mg/L)	NH_3 (mg/L)	NO_3 (mg/L)	TP (mg/L)	Ortho-P (mg/L)	TSS (mg/L)
1*	2.0	3,150	7.4	6.7	0.5	8.5	4.8	2.7	11.0
2	2.7	255	7.6	3.4	0.9	2.8	0.13	0.12	93.0
3**	17.0	501	7.9	5.1	0.5	1.2	0.24	0.15	22.0
4	20.6	61	7.5	3.3	0.5	0.9	0.26	0.13	26.0
5	23.3	118	7.5	3.1	0.3	1.2	0.13	0.09	13.0
6	1.2	927	7.7	7.6	0.9	1.4	0.18	0.15	6.0
7	24.5	125	7.5	6.2	0.5	3.0	0.24	0.22	9.0

* Water quality data entering into watershed on Little Calumet River

** Water quality data entering into watershed on Deep River

Table 3: Sampling site base flow pollutant concentrations.

Sampling Site	Storm Flow Pollutant Concentrations								
	FLOW (cfs)	E.coli (cfu/100mL)	pH SU	DO (mg/L)	NH_3 (mg/L)	NO_3 (mg/L)	TP (mg/L)	Ortho-P (mg/L)	TSS (mg/L)
1*	52	1,820	7.1	0.3	1.0	1.5	0.2	0.2	23.5
2	70	1,320	7.3	2.9	0.9	1.4	0.10	0.09	16.0
3**	435	2,380	7.3	6.1	0.8	1.1	0.14	0.13	29.0
4	526	1,240	7.4	4.8	2.0	1.1	0.19	0.15	19.5
5	597	1,760	7.4	6.0	1.3	0.9	0.06	0.05	28.0
6	30	2,900	7.4	7.1	1.9	1.2	0.12	0.11	23.5
7	626	2,600	7.3	6.0	1.3	1.0	0.22	0.18	36.0

* Water quality data entering into watershed on Little Calumet River

** Water quality data entering into watershed on Deep River

Table 4: Sampling site storm flow pollutant concentrations.

Sampling Location	Wet Weather Event		Dry Weather Event	
	21-Aug-07	26-Sep-07	24-Jul-07	30-Oct-07
1	695	2		225
2	3890	0	1804	341
3	465	4	448	190
4	1620	0	25	218
5	2570	6	396	174
6	220	2	94	52
7	200	0	2	3
8	1385	2	3	5
9	2775	0	1	32
10	910	6	228	15
11	11130	0	207	144
12	340	2	108	15
13	215	6	56	1
14	415	14	353	20
15	3760	0	270	46
16	2765	0	692	75
17	1010	982	119	78
18	695	0	345	58
19	345	0	1	428
20	310	0	88	113
21	720	0	51	79
22	130	6400	111	7
23	945	8	374	40
24	685	2	505	77
25	565	2540	275	48
26	2285	114	68	16
27	2145	182	937	445
28	1220	56	375	260
29	4120	170	158	5
30	735	6	168	18
31	2310	1030	5	72
32	1610	792	72	102
33	405	882	50	8
34	1065	110	71	19
35	1100	358	129	27
36	755	4	51	2
37	1600	654	4	92
38	4580	2700	3	79
39	4515	62	36	67
40	2375	292	9	2
41	105	2440	86	44
42	2040	3100	913	586

Table 5: Sampling location *E.coli* concentrations.

Appendix 15

Rapid Bioassessment Protocols (RBP) Data Sheets

RW ARMSTRONG™
Inspiration to reality.

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Little Cal	LOCATION #42 Indpls Ave
STATION # ______ RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY LBihl	DATE 10/30 TIME ______ AM PM — REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble *or other stable habitat* and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; *root mats* and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	*Majority of pools large-deep; very few shallow.*	*Shallow pools much* more prevalent than deep pools.	*Majority of pools small-*shallow or pools absent.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal		Suboptimal		Marginal		Poor	
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.		Some channelization present, usually in areas of bridge abutments; *evidence of past* channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.		Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.		Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.	
SCORE 13	20 19 18 17 16		15 14 13 12 11		10 9 8 7 6		5 4 3 2 1 0	
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)		The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.		The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.		Channel straight; waterway has been channelized for a long distance.	
SCORE 4	20 19 18 17 16		15 14 13 12 11		10 9 8 7 6		5 4 3 2 1 0	
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.		Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.		Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.		Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.	
SCORE 7 (LB)	Left Bank	10 9	8 7 6		5 4 3		2 1 0	
SCORE 7 (RB)	Right Bank	10 9	8 7 6		5 4 3		2 1 0	
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.		70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.		50-70% of the streambank surfaces *covered by vegetation;* disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.		Less than 50% of the streambank surfaces *covered by vegetation;* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.	
SCORE 6 (LB)	Left Bank	10 9	8 7 6		5 4 3		2 1 0	
SCORE 6 (RB)	Right Bank	10 9	8 7 6		5 4 3		2 1 0	
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.		Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.		Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.		Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.	
SCORE 9 (LB)	Left Bank	10 9	8 7 6		5 4 3		2 1 0	
SCORE 9 (RB)	Right Bank	10 9	8 7 6		5 4 3		2 1 0	

Total Score 104

2

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME L Cal	LOCATION Kennedy Ave #38
STATION # ________ RIVERMILE ________	STREAM CLASS
LAT ________ LONG ________	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY LBihl	DATE 10/30 TIME AM PM — REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble *or other stable* habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; *root mats* and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	*Majority of pools large-deep; very few shallow.*	*Shallow pools much* more prevalent than deep pools.	*Majority of pools small-*shallow or pools absent.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods..	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 4 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 96

6

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME L. CAL	LOCATION Cline Ave #40
STATION # ___ RIVERMILE ___	STREAM CLASS
LAT ___ LONG ___	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY LBihl	DATE 10/30 TIME ___ AM PM — REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	*Majority of pools large-deep; very few shallow.*	*Shallow pools much more prevalent than deep pools.*	*Majority of pools small-shallow or pools absent.*
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the *available channel; or* <25% of channel substrate is exposed.	Water fills 25-75% of the *available channel, and/or* riffle substrates are mostly exposed.	Very little water in *channel and mostly* present as standing pools.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; *evidence of past* channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods..	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 3 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces *covered by vegetation;* disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces *covered by vegetation:* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 3 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 77

10

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Lt Cal	LOCATION Colfax #37
STATION # ______ RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY L BIHL	DATE 10/30 TIME ______ AM PM — REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	*Majority of pools large-deep; very few shallow.*	*Shallow pools much* more prevalent than deep pools.	*Majority of pools small-*shallow or pools absent.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
***5. Channel Flow* Status**	Water reaches base of *both lower banks*, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; *evidence of past* channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
SCORE 13	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.					
SCORE 9	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
SCORE 5 (LB)	Left Bank			10	9	8		7		6	5		4		3	2		1		0	
SCORE 7 (RB)	Right Bank			10	9	8		7		6	5		4		3	2		1		0	
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces *covered by vegetation;* disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces *covered by vegetation;* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
SCORE 4 (LB)	Left Bank			10	9	8		7		6	5		4		3	2		1		0	
SCORE 8 (RB)	Right Bank			10	9	8		7		6	5		4		3	2		1		0	
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.					
SCORE 2 (LB)	Left Bank			10	9	8		7		6	5		4		3	2		1		0	
SCORE 10 (RB)	Right Bank			10	9	8		7		6	5		4		3	2		1		0	

Total Score 112

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME L Cal	LOCATION Clark St #31
STATION # ______ RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY L Bith	DATE 10/30 TIME ______ AM PM — REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	*Majority of pools large-deep; very few shallow.*	*Shallow pools much more prevalent than deep pools.*	*Majority of pools small-shallow or pools absent.*
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Condition Category: Suboptimal	Condition Category: Marginal	Condition Category: Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; *evidence of past* channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native *vegetation, including* trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces *covered by vegetation;* disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces *covered by vegetation;* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 132

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME L CAL		LOCATION CHASE & #35	
STATION #	RIVERMILE	STREAM CLASS	
LAT	LONG	RIVER BASIN	
STOREET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY L BIHL		DATE 10/30 TIME AM PM	REASON FOR SURVEY WXMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; *evidence of past* channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods..	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces *covered by vegetation;* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 134

16

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME LTL CAL	LOCATION GRANT ST #17
STATION # ______ RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY L BIHL	DATE 10/30 TIME 6 AM PM — REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	*Majority of pools large-deep; very few shallow.*	*Shallow pools much more prevalent than deep pools.*	*Majority of pools small-shallow or pools absent.*
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods..	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 89

17

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME L. CAL	LOCATION BROADWAY #30
STATION # ________ RIVERMILE ________	STREAM CLASS
LAT ________ LONG ________	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY L. Bihl	DATE 10/30 TIME ________ AM PM — REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Condition Category: Suboptimal	Condition Category: Marginal	Condition Category: Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; *evidence of past* channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods..	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces *covered by vegetation;* disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces *covered by vegetation;* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 114

22

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME L CAL	LOCATION MLK #19
STATION # ______ RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY L BIHL	DATE 10/30 TIME ______ AM PM / REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; *evidence of past* channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods..	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 3 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces *covered by vegetation;* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 90

24

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME LCAL	LOCATION SITE #14
STATION # ______ RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY LBIHL	DATE 10/20 TIME ______ AM PM — REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	*Majority of pools large-deep; very few shallow.*	*Shallow pools much* more prevalent than deep pools.	*Majority of pools small-*shallow or pools absent.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; *evidence of past* channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces *covered by vegetation;* disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces *covered by vegetation;* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 4 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 4 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 92

25

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Burns Ditch	LOCATION #12
STATION # ______ RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY L Bihl	DATE 10/30 TIME ______ AM PM / REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 4 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 1 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 55

26

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Burns Ditch	LOCATION Green Site 10 Clay St
STATION # ________ RIVERMILE ________	STREAM CLASS
LAT ________ LONG ________	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY L Biehl	DATE 10/30 TIME ______ AM PM — REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

BD = LC + DR

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; *evidence of past* channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream *length 3 to 4 times* longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream *length 1 to 2 times* longer than if it was in a straight line.	The bends in the stream increase the stream *length 1 to 2 times* longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods..	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces *covered by vegetation;* disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces *covered by vegetation;* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 3 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 44

30

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Burns Ditch	LOCATION Greg #8 US 51
STATION # ______ RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY L Biehl	DATE 10/30 TIME ______ AM PM — REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	*Majority of pools large-deep; very few shallow.*	*Shallow pools much more prevalent than deep pools.*	*Majority of pools small-shallow or pools absent.*
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Condition Category: Suboptimal	Condition Category: Marginal	Condition Category: Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 4 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 65

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Burns Ditch	LOCATION GPEG #6
STATION # ______ RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY L Biehl	DATE 10/30 TIME ______ AM PM / REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Condition Category: Suboptimal	Condition Category: Marginal	Condition Category: Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 6	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 1 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 1 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 78

35

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME BURNS DITCH	LOCATION GREG #7
STATION # ________ RIVERMILE ________	STREAM CLASS
LAT ________ LONG ________	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY L BIHL	DATE 10/30 TIME ________ AM PM — REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 5	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 2	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 1	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 3	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; *evidence of past* channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces *covered by vegetation;* disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces *covered by vegetation;* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 3 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone *<6 meters: little or no* riparian vegetation due to human activities.
SCORE 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 66

42

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Deep River	LOCATION Liverpool rd #20
STATION # ______ RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY L Bihl	DATE 10/31 TIME ______ AM PM / REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; *evidence of past* channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be *extensive; embankments* or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with *gabion or cement;* over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or *minimal; little* potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of *erosion mostly healed* over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has *areas of erosion;* high erosion potential during floods..	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces *covered by vegetation;* disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces *covered by vegetation;* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 5 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 2 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 120

43

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Deep River	LOCATION DeKalb Greg #21
STATION # ________ RIVERMILE ________	STREAM CLASS
LAT ________ LONG ________	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY LBihl	DATE 10/31 TIME ______ AM PM — REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	*Majority of pools large-deep; very few shallow.*	*Shallow pools much* more prevalent than deep pools.	*Majority of pools small-*shallow or pools absent.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Condition Category: Suboptimal	Condition Category: Marginal	Condition Category: Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods..	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great *extent; more than one-*half of the potential plant stubble height remaining.	50-70% of the streambank surfaces *covered by vegetation;* disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces *covered by vegetation;* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 *meters: little or no* riparian vegetation due to human activities.
SCORE 2 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 135

44

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Deep River	LOCATION Greg #26 Grand Blvd	
STATION # ______ RIVERMILE ______	STREAM CLASS	
LAT ______ LONG ______	RIVER BASIN	
STOREТ #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY L Bihl	DATE 10/31 TIME ______ AM PM	REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	*Majority of pools large-deep; very few shallow.*	*Shallow pools much more prevalent than deep pools.*	*Majority of pools small-shallow or pools absent.*
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of *both lower banks, and* minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; *evidence of past* channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length *3 to 4 times* longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream *length 1 to 2 times* longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods..	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces *covered by vegetation;* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not *impacted zone.*	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 160

4/5

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Deep River	LOCATION Central Ave Greg #28
STATION # ______ RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY L Bihl	DATE 10/31 TIME ______ AM PM — REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 14	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Condition Category: Suboptimal	Condition Category: Marginal	Condition Category: Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; *evidence of past* channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods..	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces *covered by vegetation;* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 3 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 3 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 132

47

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Deep River	LOCATION Greg #27 Ripley St SR51
STATION #______ RIVERMILE______	STREAM CLASS C
LAT______ LONG______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY L Bihl	DATE 10/31 TIME ______ AM PM — REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	*Majority of pools large-deep; very few shallow.*	*Shallow pools much more prevalent than deep pools.*	*Majority of pools small-shallow or pools absent.*
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 19	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; *evidence of past* channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods..	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces *covered by vegetation;* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 4 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 4 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

RB - not much bank

Total Score 139

48

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Willow Ck	LOCATION Greg #5	
STATION # ______ RIVERMILE ______	STREAM CLASS	
LAT ______ LONG ______	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY L Bihr	DATE 10/31 TIME ______ AM PM	REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	*Majority of pools large-deep; very few shallow.*	*Shallow pools much more prevalent than deep pools.*	*Majority of pools small-shallow or pools absent.*
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Condition Category: Suboptimal	Condition Category: Marginal	Condition Category: Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; *evidence of past* channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream *length 3 to 4 times* longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream *length 1 to 2 times* longer than if it was in a straight line.	The bends in the stream increase the stream *length 1 to 2 times* longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 17	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces *covered by vegetation;* disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces *covered by vegetation;* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 7 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 7 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 140

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Willow Crk	LOCATION Willow Greg #4
STATION # ______ RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY LBitz	DATE 10/31 TIME AM PM — REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 12	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	*Majority of pools large-deep; very few shallow.*	*Shallow pools much more prevalent than deep pools.*	*Majority of pools small-shallow or pools absent.*
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; *evidence of past* channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 15	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces *covered by vegetation;* disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces *covered by vegetation;* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 5 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 123

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

Ridge Rd / 37th
No map

STREAM NAME Deep River	LOCATION Deep R Grey #24
STATION # ______ RIVERMILE ______	STREAM CLASS
LAT ______ LONG ______	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY LBIHL	DATE 10/31 TIME ______ AM PM / REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	*Majority of pools large-deep; very few shallow.*	*Shallow pools much more prevalent than deep pools.*	*Majority of pools small-shallow or pools absent.*
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; *evidence of past* channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream *length 3 to 4 times* longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream *length 1 to 2 times* longer than if it was in a straight line.	The bends in the stream increase the stream *length 1 to 2 times* longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods..	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces *covered by vegetation;* disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces *covered by vegetation;* disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 8 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 8 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 115

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME Deep River	LOCATION #23 Greg Lake George
STATION # ____ RIVERMILE ____	STREAM CLASS
LAT ____ LONG ____	RIVER BASIN
STORET #	AGENCY
INVESTIGATORS	
FORM COMPLETED BY L Bill	DATE 10/31 TIME ____ AM PM — REASON FOR SURVEY WMP

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 11	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	*Majority of pools large-deep; very few shallow.*	*Shallow pools much more prevalent than deep pools.*	*Majority of pools small-shallow or pools absent.*
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 18	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 13	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 8	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods..	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 6 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 6 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 1 (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE 1 (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Total Score 107

Appendix 16

Stream Reach Survey Photos

RW ARMSTRONG™
Inspiration to reality.

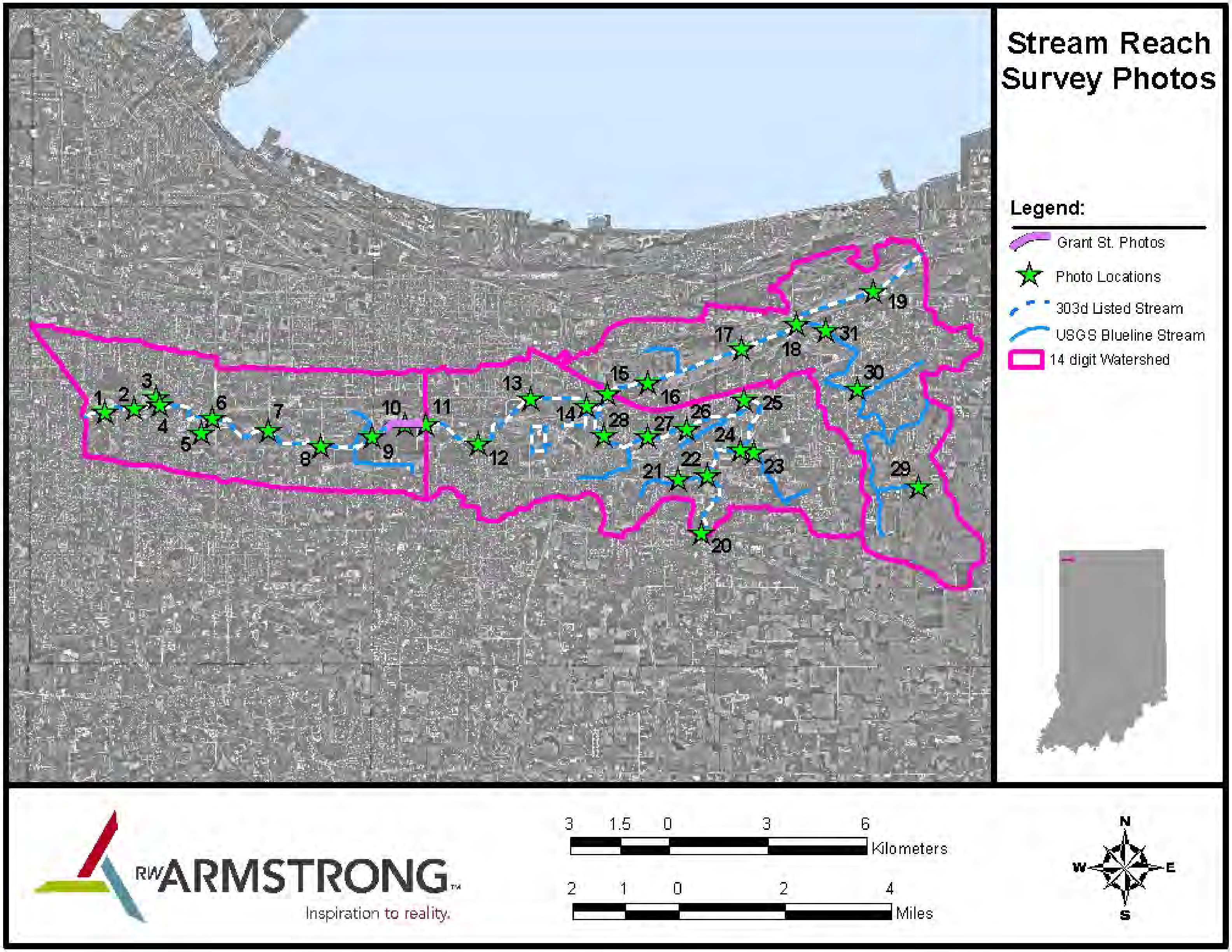


Figure 1: Stream Reach Survey photo locations as they fit into the watershed study area.

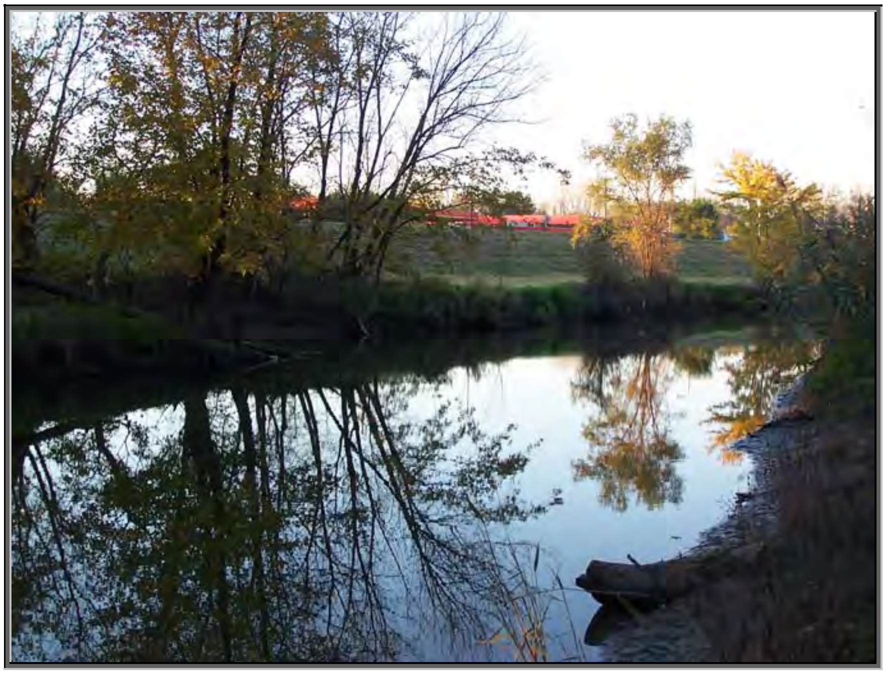


Figure 2 (Stream Reach Survey Location 1): Little Calumet River at sampling location 42 on far west side of watershed located at approximately the intersection of U.S. Highway 41 and Interstate 80.

Figure 3 (SRS Location 1): Sampling Location 42 showing the forest buffer and decent flood-plain that is present at this location.

Figure 4 (SRS Location 2): Combined spill overflow structures at sampling location 38 that drain directly into the Little Calumet River without any type of treatment.

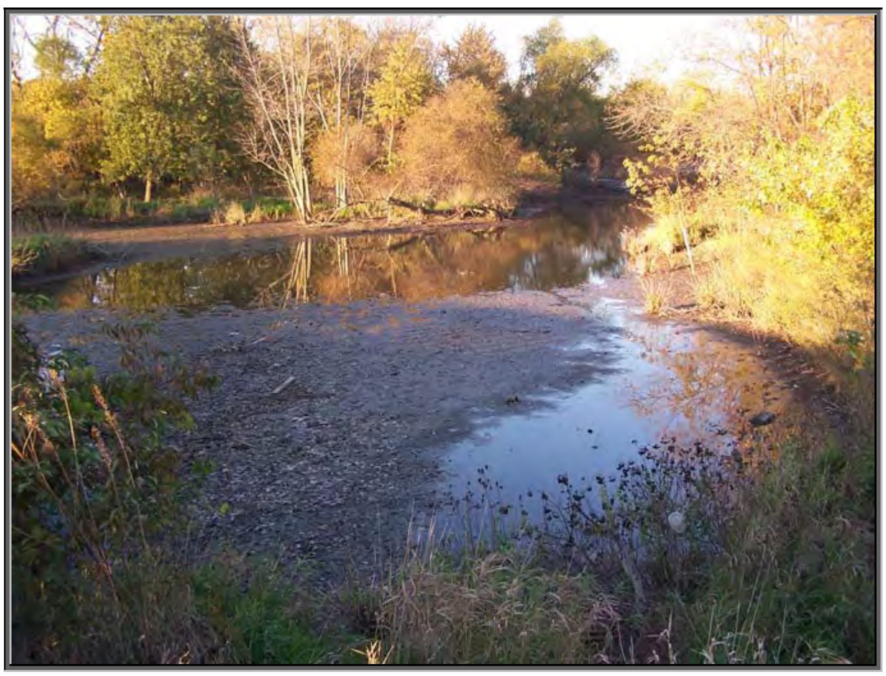


Figure 5 (SRS Location 2): Little Calumet River at sampling location 38 located approximately at the intersection of Kennedy Ave. and Interstate 80 in Hammond, Indiana.

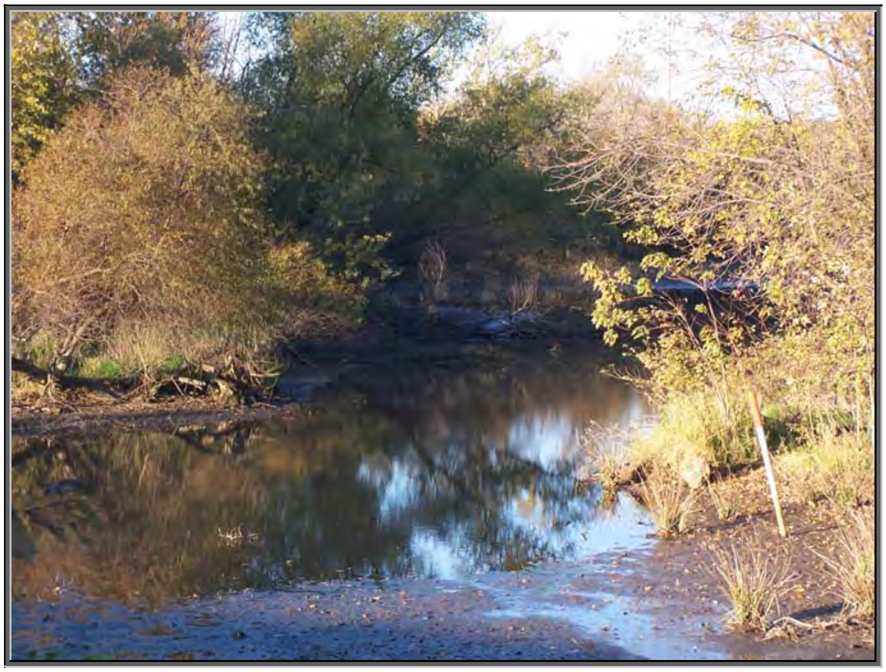


Figure 6 (SRS Location 2): Sampling location 38 along the Little Calumet River in Hammond, Indiana.

Figure 7 (SRS Location 6): Sample location 39 along the Little Calumet River located approximately at the intersection of Cline Avenue and Interstate 80 in Highland, Indiana.

Figure 8 (SRS Location 6): Minimal buffer present at sample location 39 as evidenced by the adjacent land-use shown.

Figure 9 (SRS Location 6): Steep bank at sample location 39 along Little Calumet River.

Figure 10 (SRS Location 6): Degraded storm outfall structure into the Little Calumet River. The bank at this location also seems to be eroding.

Figure 11 (SRS Location 6): Natural vegetation present at sample location 39 that provides limited natural buffer for the Little Calumet River.

Figure 12 (SRS Location 5): Heron Rookery located in Highland, Indiana on the south side of the Little Calumet River.

Figure 13 (SRS Location 5): The Heron Rookery is located along Highway 912, Cline Avenue, and the Little Calumet River, just south of Interstate 80.

Figure 14 (SRS Location 5): A large number of cattails can be found in the Heron Rookery, helping the land to act as a natural wetland.

Figure 15 (SRS Location 5): The Heron Rookery contains phragmites as well as cattails, making it an ideal place for Herons and other wildlife.

Figure 16 (SRS Location 5): Phragmites and cattails presents in the Heron Rookery located at Cline Avenue south of Interstate 80.

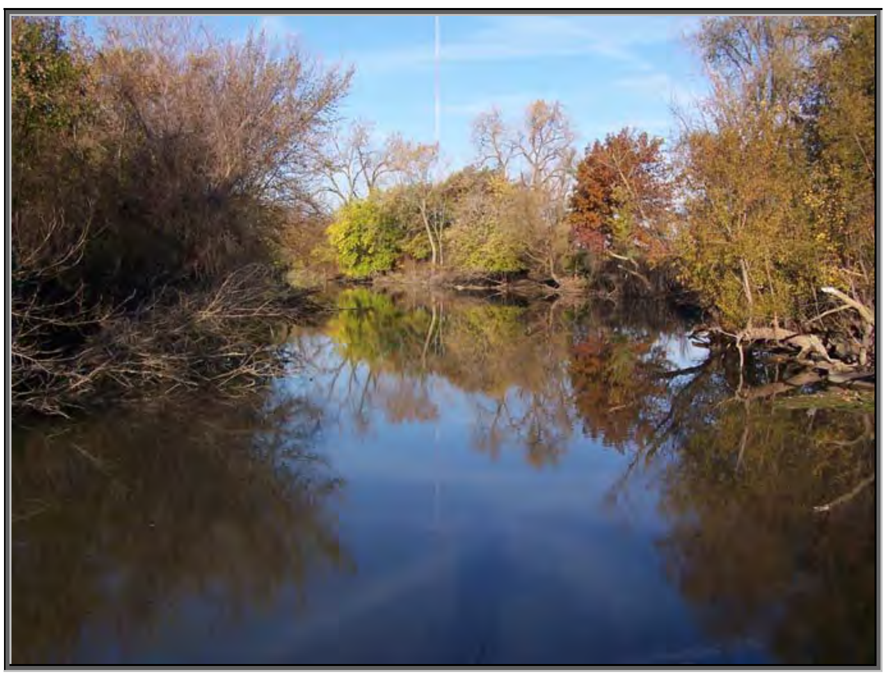


Figure 17 (SRS Location 7): Sampling location 37 located approximately at the intersection of Colfax and Black Oak in Griffith, Indiana.

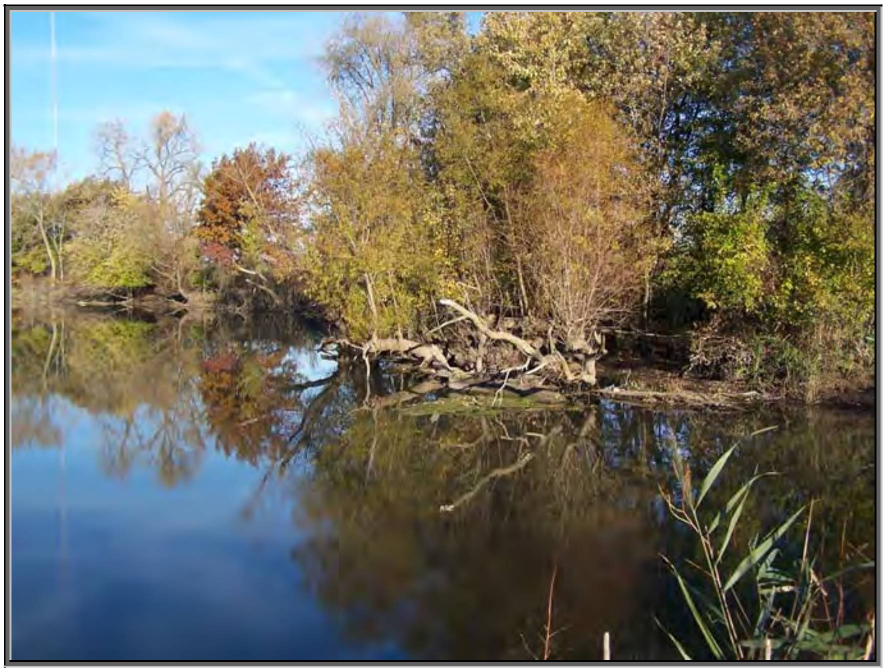


Figure 18 (SRS Location 7): Wetlands at sampling location 37 that extend into Gary, Indiana.

Figure 19 (SRS Location 7): Natural habitat present as you look downstream at sample location 37.

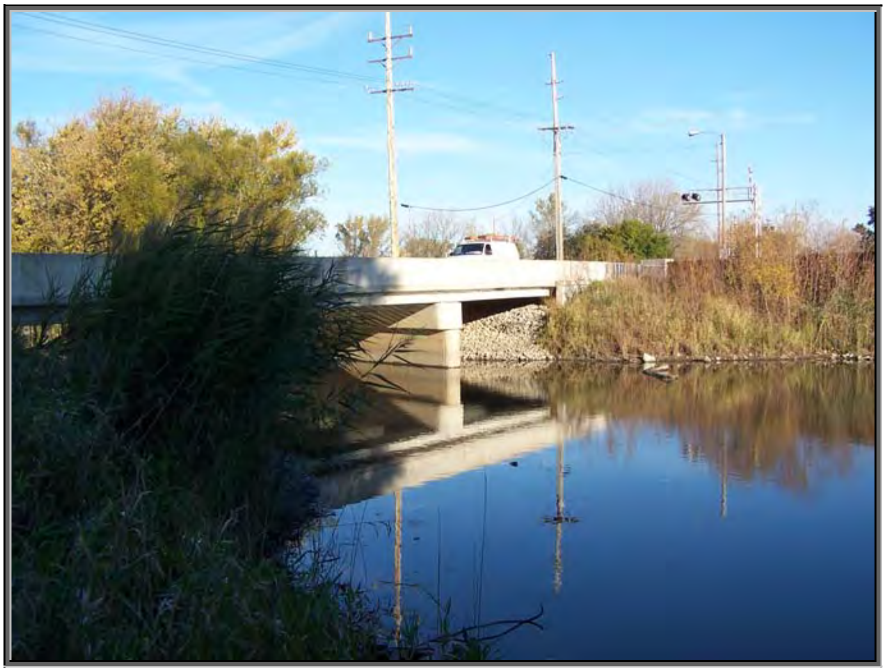


Figure 20 (SRS Location 7): Colfax Street bridge over the Little Calumet River.

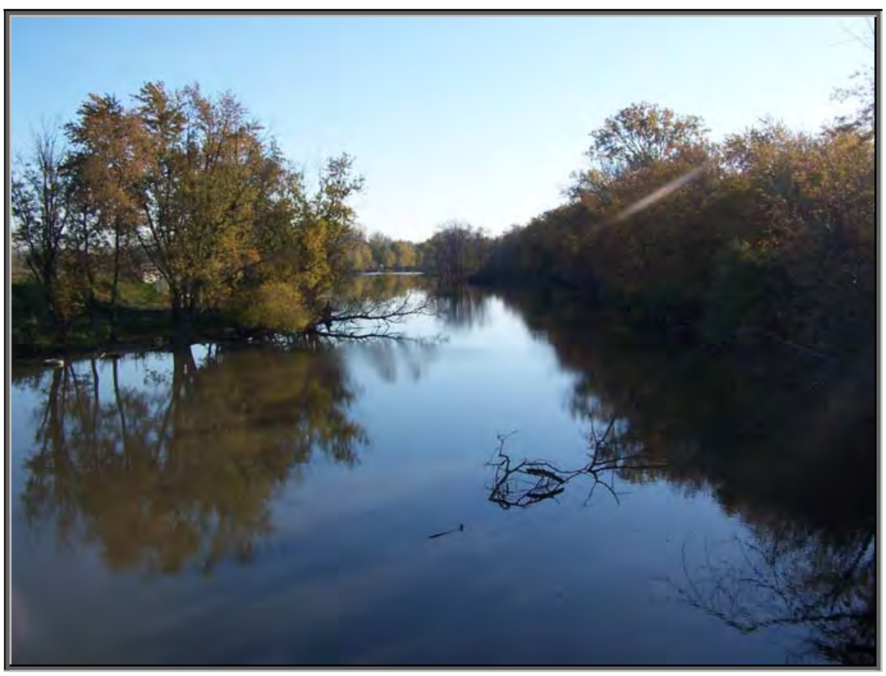


Figure 21 (SRS Location 8): Little Calumet River at sampling location 31 at approximately Clark and Riverside in Gary, Indiana.

Figure 22 (SRS Location 8): There are no banks located along this portion of the stream because it is located in a flood control area.

Figure 23 (SRS Location 8): Wetlands present around sample location 31 between Ralston and Chase Streets on the south bank of the Little Calumet River.

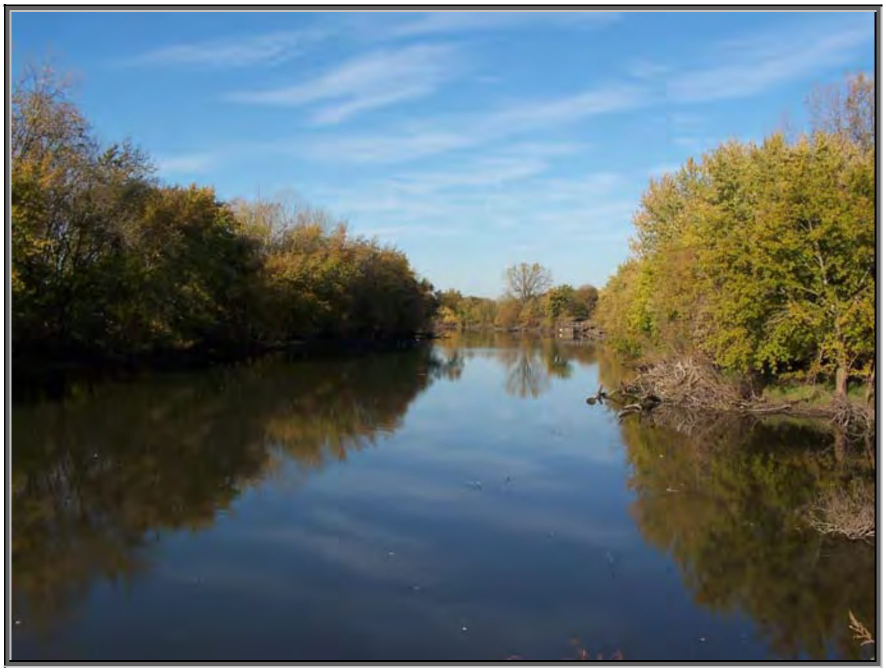


Figure 24 (SRS Location 8): Downstream image of sample location 31 showing the natural state of the banks still present.

Figure 25 (SRS Location 8): River has free flowing movement around Clark Street. No development has been made along the banks of the river or in the natural flood zones.

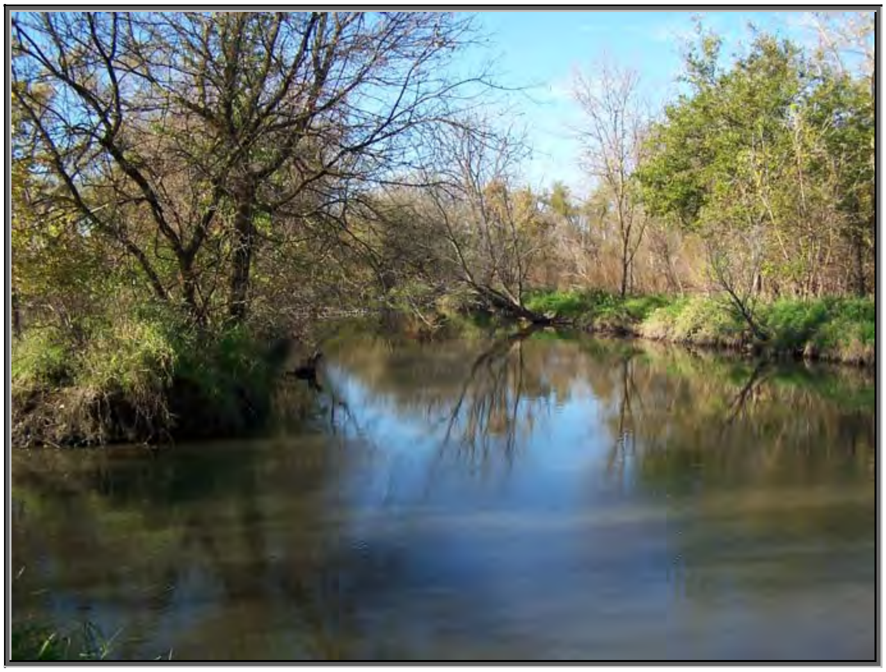


Figure 26 (SRS Location 9): Sampling location 35 is located along Chase Street testing the water of a tributary.

Figure 27 (SRS Location 9): Sampling location 35 is located on the eastern edge of the wetlands running along the south bank of the Little Calumet River.

Figure 28 (SRS Location 9): The condition of the road in this area is very poor due to the freeze/thaw cycle of the wetlands.

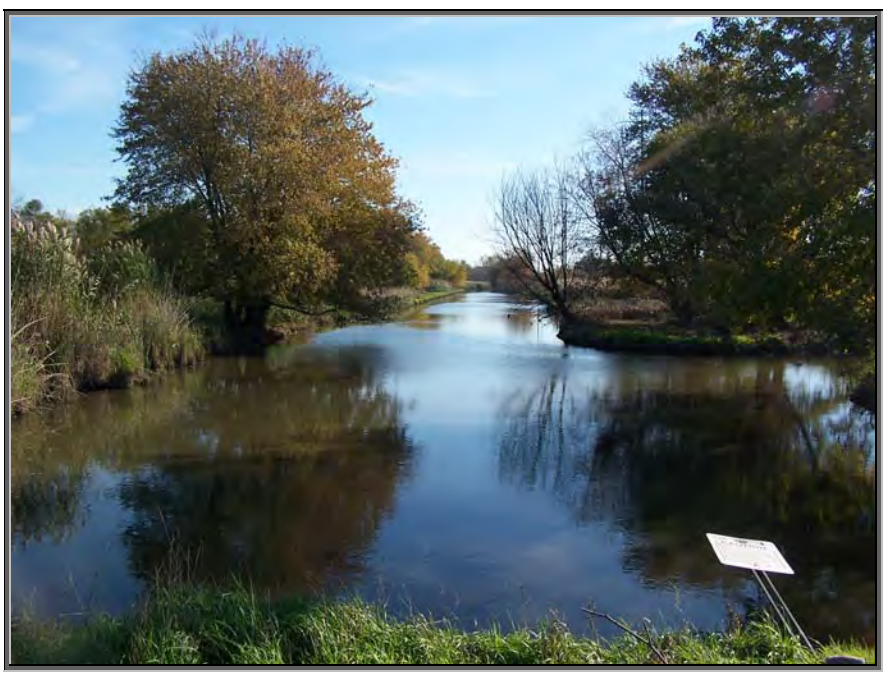


Figure 29 (SRS Location 11): Sampling location 17 located approximately at the intersection of Interstate 80 and Grant Street along the Little Calumet River.

Figure 30 (SRS Location 11): The area on the southern bank of the Little Calumet River in this area is considered to be wetlands that stretch from the area of Ralston to Chase Street and then to Grant Street.

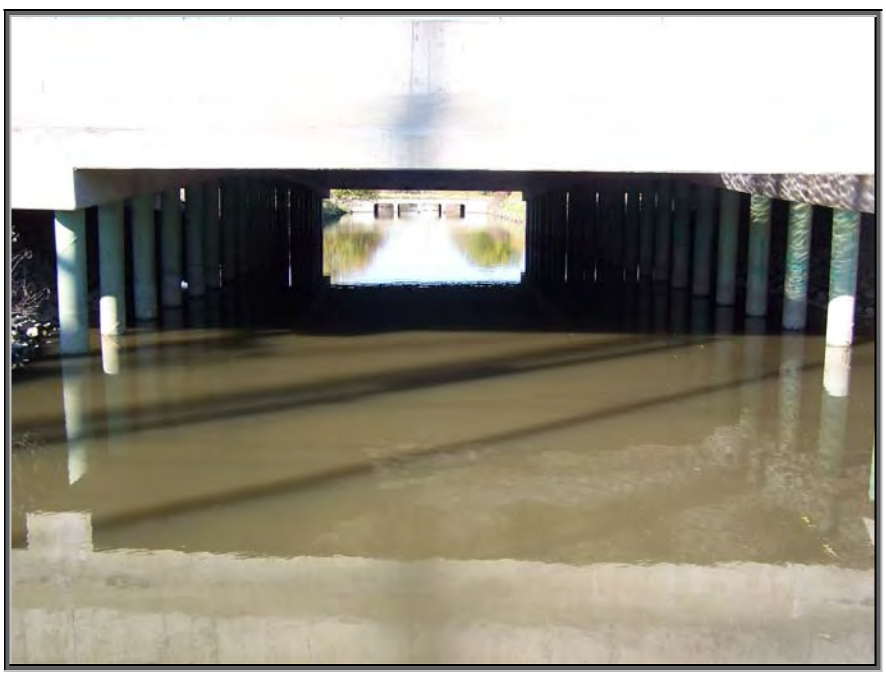


Figure 31 (SRS Location 11): The bridge in the foreground in this image is the Grant Street bridge right before the entrance onto Interstate 80.

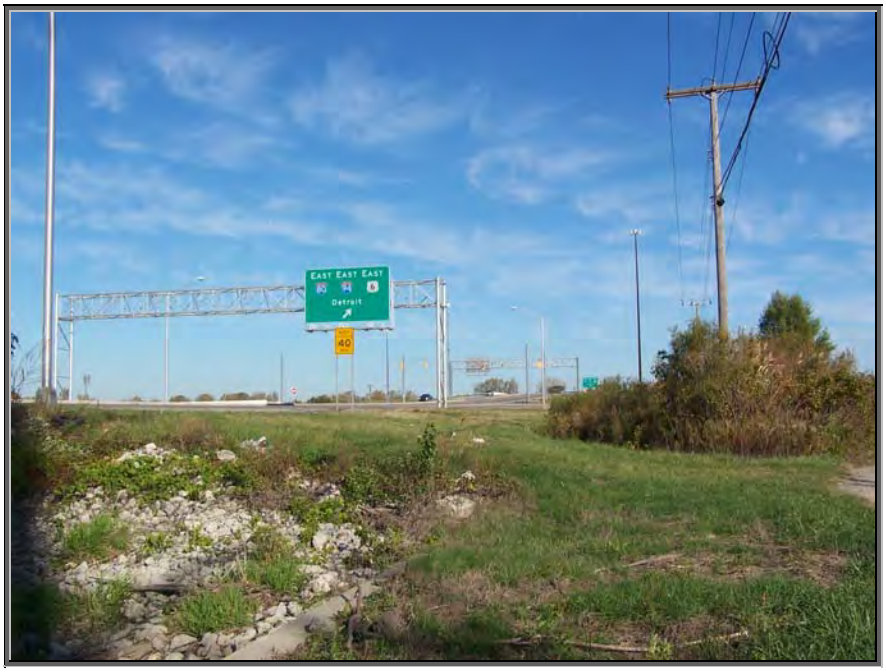


Figure 32 (SRS Location 11): The bank in the foreground is the side of the bridge just shown. This shows the proximity to the interstate at sampling location 17.

Figure 33 (SRS Location 12): Sampling location 30 is located along the Little Calumet River at Broadway.

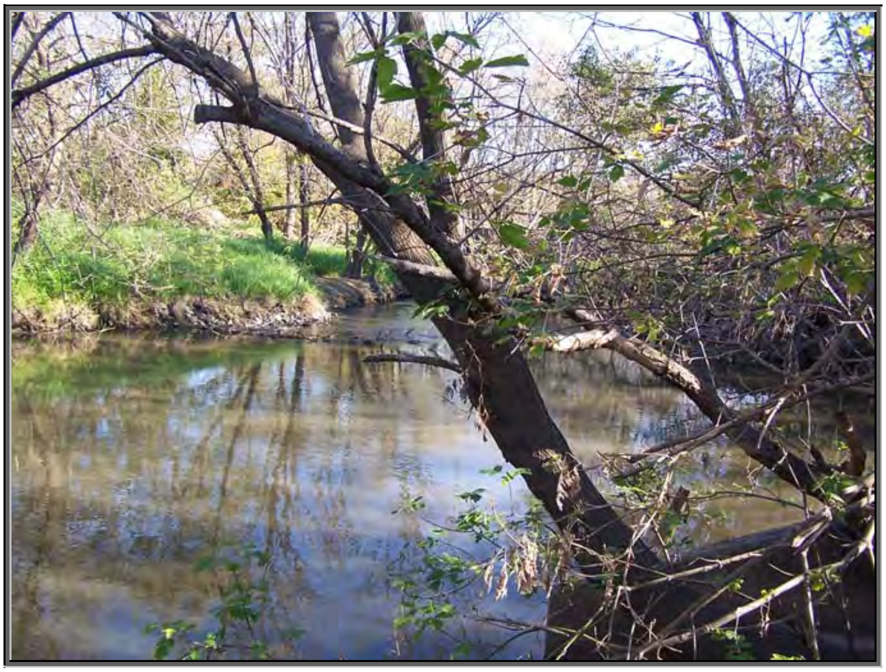


Figure 34 (SRS Location 12): The area on the south bank from Van Buren to the Interstate 65 ramp onto Interstate 80 is also considered to be wetlands. This area includes sample location 30 along Broadway pictured here.

Figure 35 (SRS Location 13): Sample location 19 located on a tributary at Martin Luther King and 33rd.

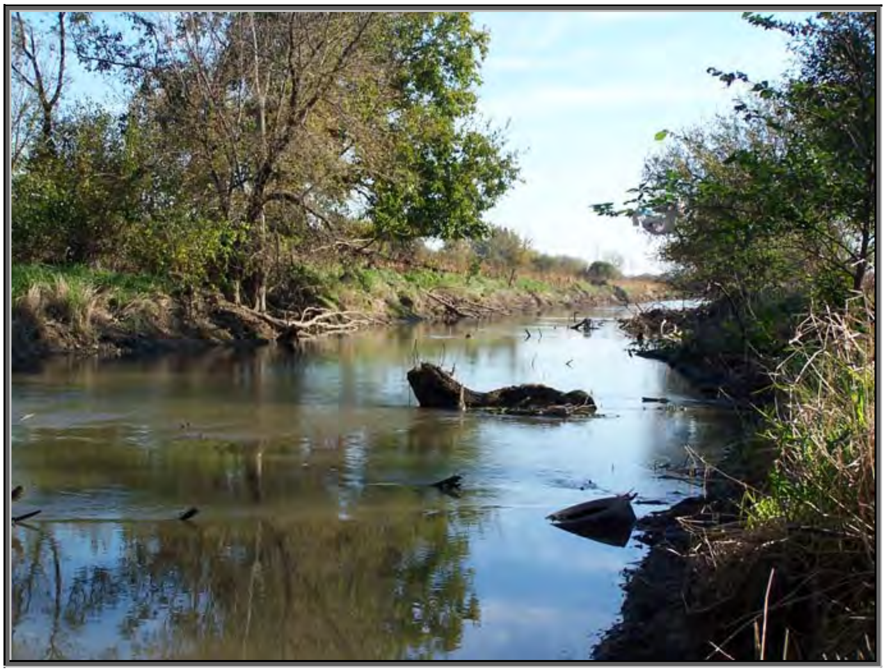


Figure 36 (SRS Location 13): Large pieces of debris can be found in tributary causing obstructions to flow around sample location 19.

Figure 37 (SRS Location 13): Debris matter that can be found in the tributary to the Little Calumet River includes large branches that have fallen off of surrounding trees.

Figure 38 (SRS Location 13): Sample location 19 is on the southern edge of the wetlands running from Van Buren to the Interstate 65 ramp onto Interstate 80.

Figure 39 (SRS Location 14): Sample Location 14 is located along the Little Calumet River by the Intestate 80 and 65 intersection.

Figure 40 (SRS Location 14): A large culvert is used to channel the water underneath the ramps at this location, Sample location 14.

Figure 41(SRS Location 14): Photo looking downstream at sampling location 14. This is the beginning of the channelized portion of the Little Calumet River.

Figure 42 (SRS Location 15): Little Calumet River at sampling location 12 located along Central Avenue. This is the boundary between the Little Calumet River/Deep River Watershed and the Willow Creek/Burns Ditch Watershed.

Figure 43 (SRS Location 15): The Little Calumet River (Burns Ditch) is very channelized in this area.

Figure 44 (SRS Location 15): Areas around sample location 12 have limited habitat due to the extensive channelization; however, many people can be seen fishing in this area.

Figure 45 (SRS Location 16): Sample location 10 can be found along Burns Ditch just east of Clay Street.

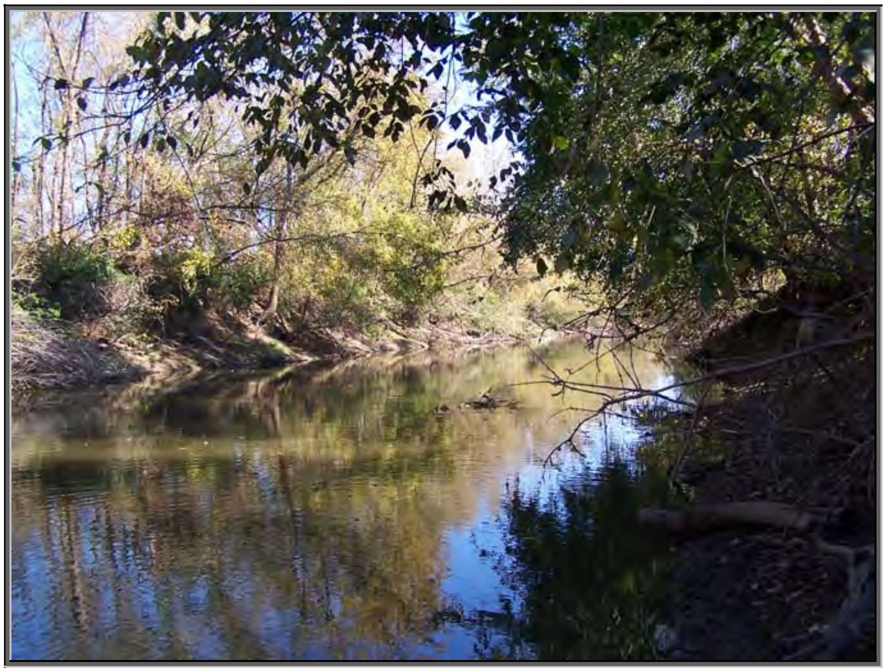


Figure 46 (SRS Location 16): Sample location 10 is also located in the channelized portion of the River where there is limited habitat, similar to location 12.

Figure 47 (SRS Location 17): Sample location 8 along Burns Ditch is located at the Ripley Street Bridge in Lake Station, IN.

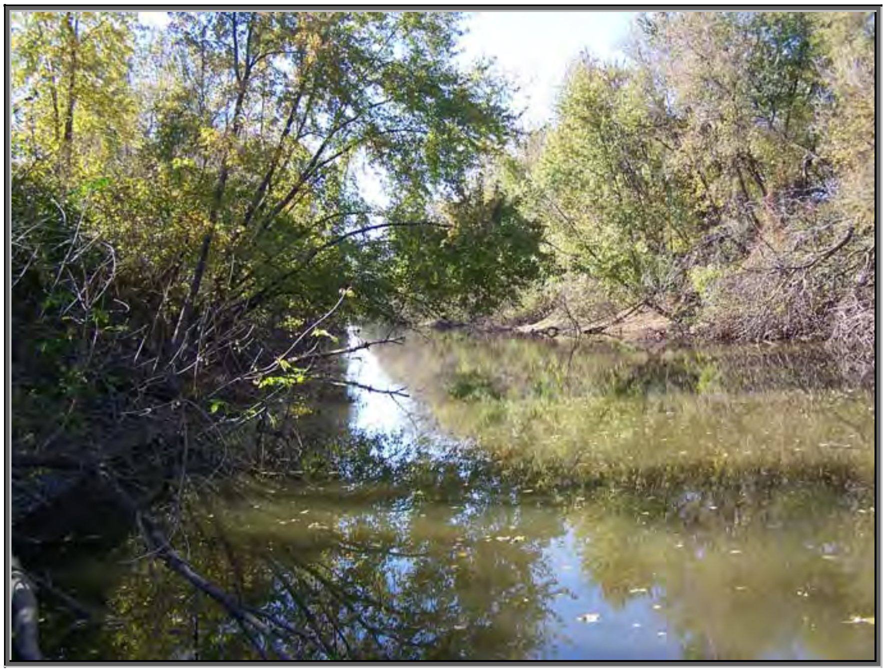


Figure 48 (SRS Location 17): Sampling location 8 is in a very channelized portion of the river where there is limited habitat and a lack of natural buffer.

Figure 49 (SRS Location 18): Sample location 6 is the first sample taken in Porter County along Burns Ditch. It is at the Highway 20 Bridge, just west of Interstate 94.

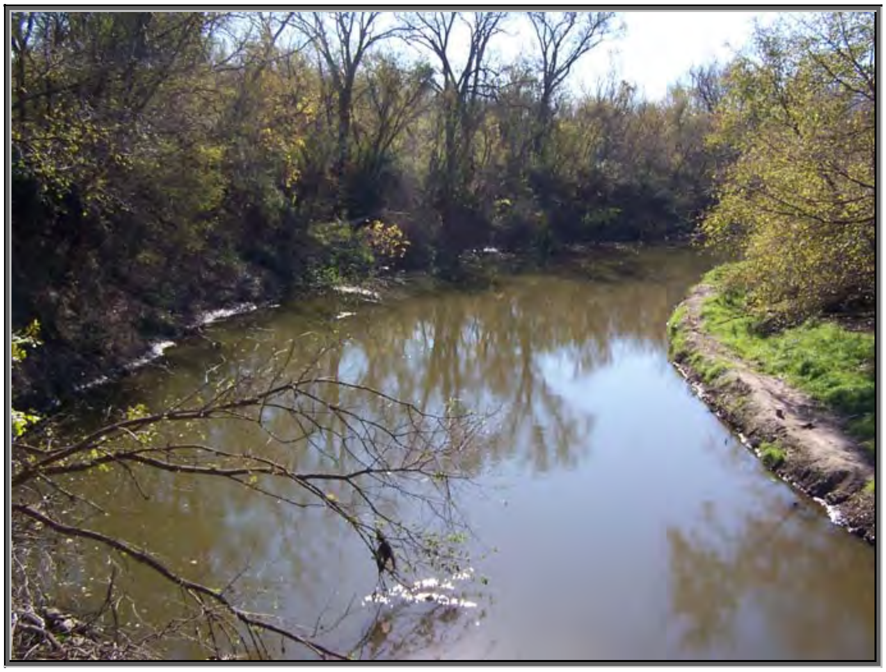


Figure 50 (SRS Location 18): Looking at the condition of the banks in this photo you can see that Burns Ditch is channelized in this sampling location, as is the rest of the Ditch.

Figure 51 (SRS Location 19): Sample location 7 is located along Burns Ditch in Portage, IN.

Figure 52 (SRS Location 19): Sample location 7 is located along Marine Drive and serves as a docking area for local boats.

Figure 53 (SRS Location 19): This area is still very channelized with a minimal amount of natural buffer being offered, despite the boats being able to dock in the area.

Figure 54 (SRS Location 31): Sample location 5 is located along Willow Creek, a tributary to Burns Ditch.

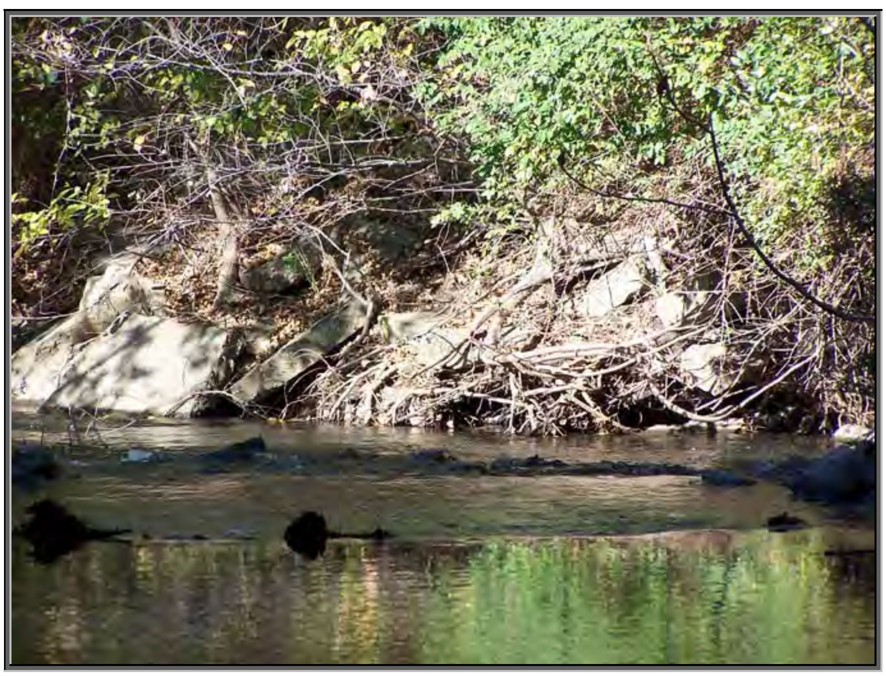


Figure 55 (SRS Location 31): The location is just south of U.S. Highway 20 on Willow Creek and the condition of the stream is superior to that of sample location 6 located along Burns Ditch and Highway 20.

Figure 56 (SRS Location 31): There are natural buffers located along Willow Creek and the flow has not been channelized.

Figure 57 (SRS Location 31): Due to the natural buffer and the fact that Willow Creek has not been channelized sample location 5 can support local habitat.

Figure 58 (SRS Location 30): Sample location 4 is located along Willow Creek at the Willowdale Road intersection in Portage, IN.

Figure 59 (SRS Location 30): Willow Creek in this location has a narrow spread but riffles and pools are beginning to be seen in this area and therefore it will support habitat.

Figure 60 (SRS Location 30): Looking underneath the bridge at sample location 4 you can see the bank that provides a good natural buffer.

Figure 61 (SRS Location 29): Sample location 1 is located on a tributary to Willow Creek that starts in the agricultural land just south of U.S. Highway 6 inside the Portage political boundary.

Figure 62 (SRS Location 20): Sample location 23 is located along Deep River in the southern tip of the watershed study area. It served as a baseline to evaluate data.

Figure 63 (SRS Location 20): Deep River is in a better condition than the Little Calumet River due to the unaltered state.

Figure 64 (SRS Location 21): Sampling location 25 is located along a tributary to Deep River in Hobart, IN; just east of the Hobart/Lake Station Boundary line.

Figure 65 (SRS Location 22): Sample location 24 is located along Deep River in Hobart, IN north of 37th Street.

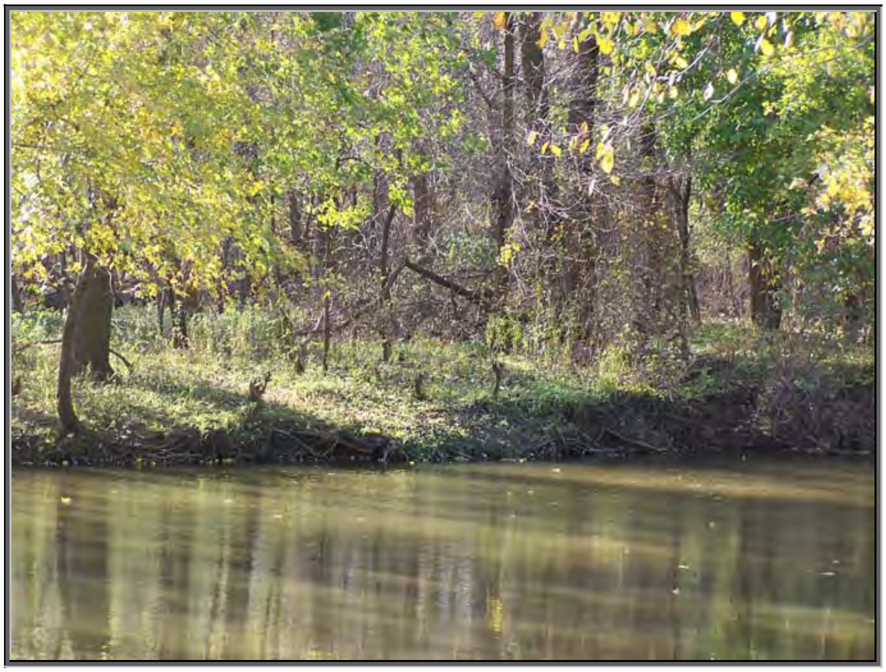


Figure 66 (SRS Location 22): There is excellent habitat in the area and in general Deep River is nicer than the Little Calumet River due to its unaltered state.

Figure 67 (SRS Location 22): This photo shows the excellent natural buffer that exists at sample location 24 along Deep River.

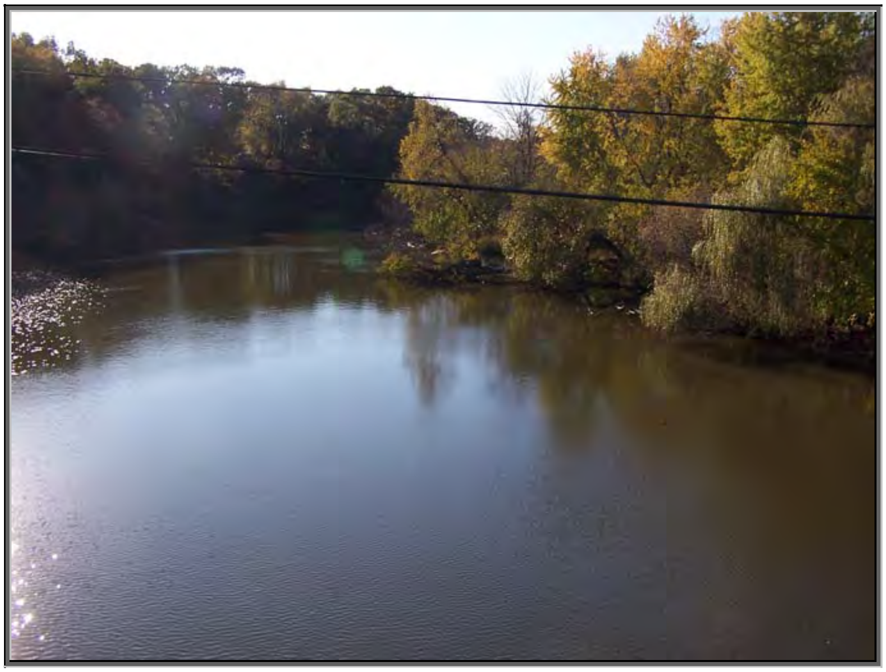


Figure 68 (SRS Location 26): Sample location 26 is along Deep River at the Grand Street Bridge in New Chicago, IN.

Figure 69 (SRS Location 26): The stream banks in this location are still in a natural state and offer great protection for local habitat.

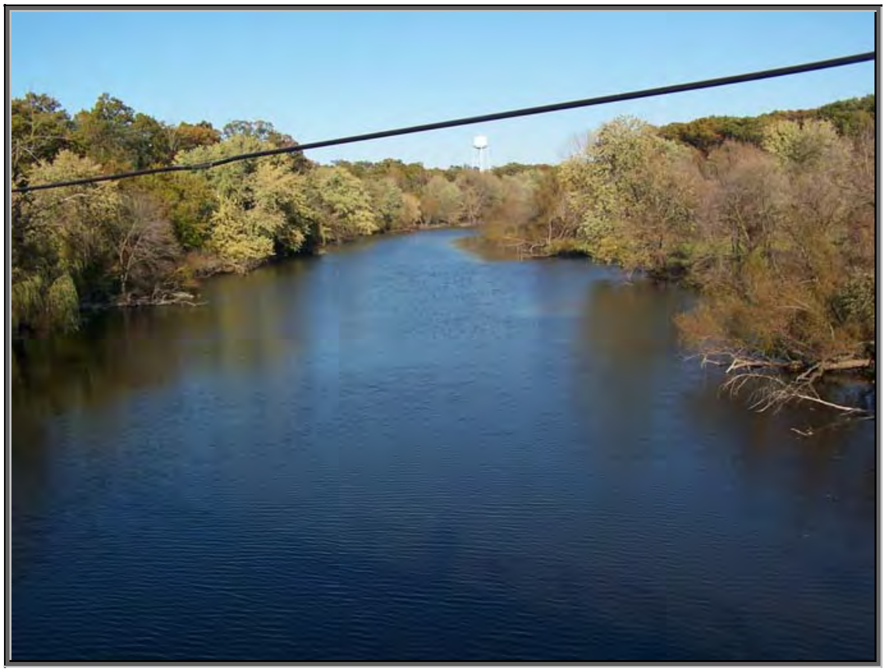


Figure 70 (SRS Location 26): An upstream shot of Deep River at this location shows that the natural buffers exist for a long reach.

Figure 71 (SRS Location 26): Local habitat could be seen bedded down around sample location 26 on Deep River.

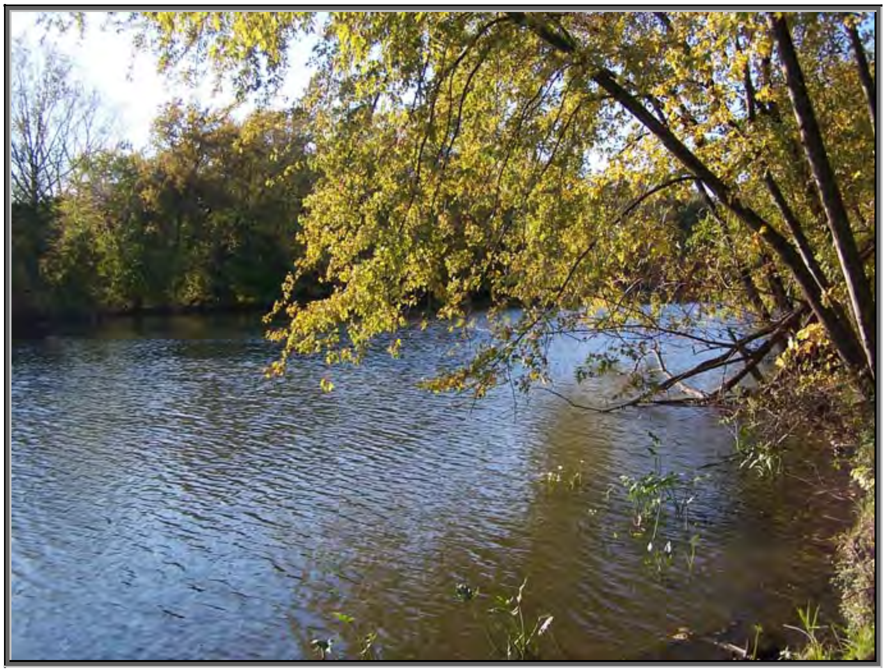


Figure 72 (SRS Location 28): Sample location 20 located along Deep River at the Liverpool Road intersection.

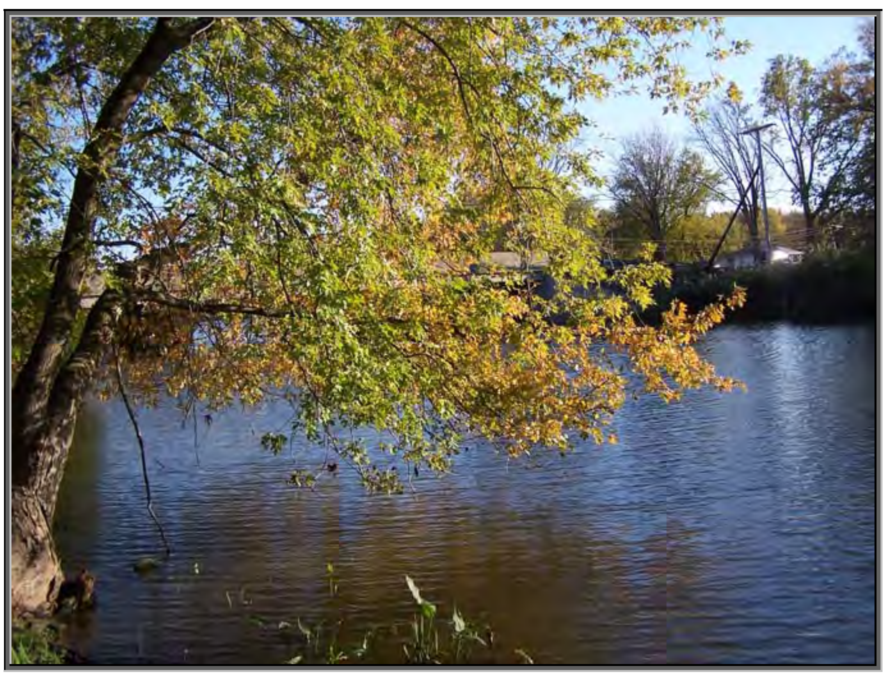


Figure 73 (SRS Location 28): This is located just a little downstream of the Deep River/Little Calumet River Convergence in Lake Station, IN.

Figure 74 (SRS Location 28): This sampling location is located along Deep River but just a little east of the Lake Etta park that is part of the ACOE flood control and recreation project.

Figure 75 (SRS Location 23): Sample location 29 is located along a Deep River Tributary in Hobart, IN along Shelby Street.

Figure 76 (SRS Location 23): This Deep River tributary is a legal drain in Porter County but not in Lake County where this sampling location can be found.

Figure 77 (SRS Location 24): Sample location 27 is located along Deep River by Route 51 just inside the Lake Station Boundary.

Figure 78 (SRS Location 24): Deep River is not channelized and has a good natural buffer associated with it in this area.

Figure 79 (SRS Location 24): The natural buffer available along this stretch of Deep River can be seen in this photo.

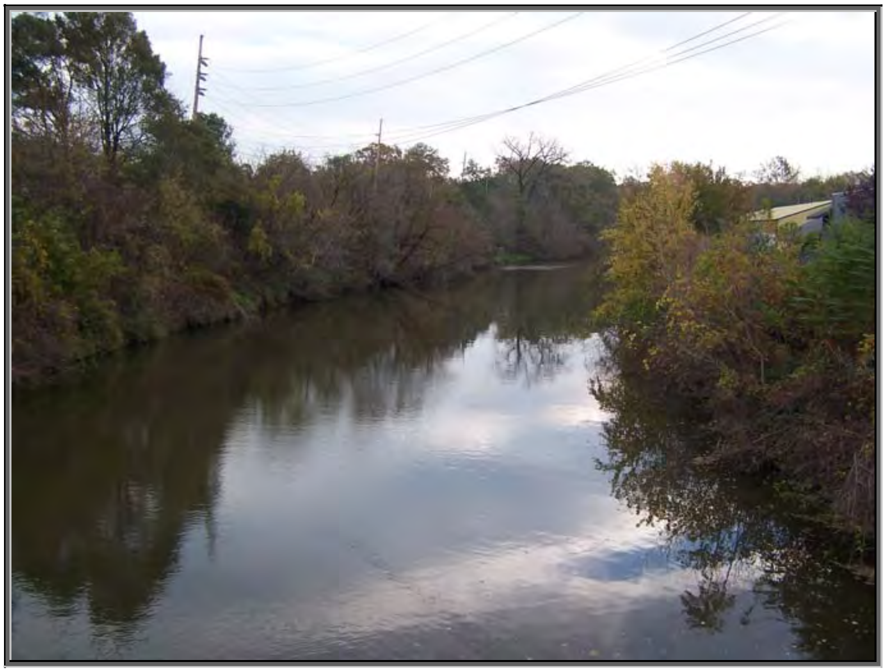


Figure 80 (SRS Location 25): Sample location 28 is also located along Deep River at the intersection of Route 51; however it is located in the northern portion of Lake Station before the river meanders south again.

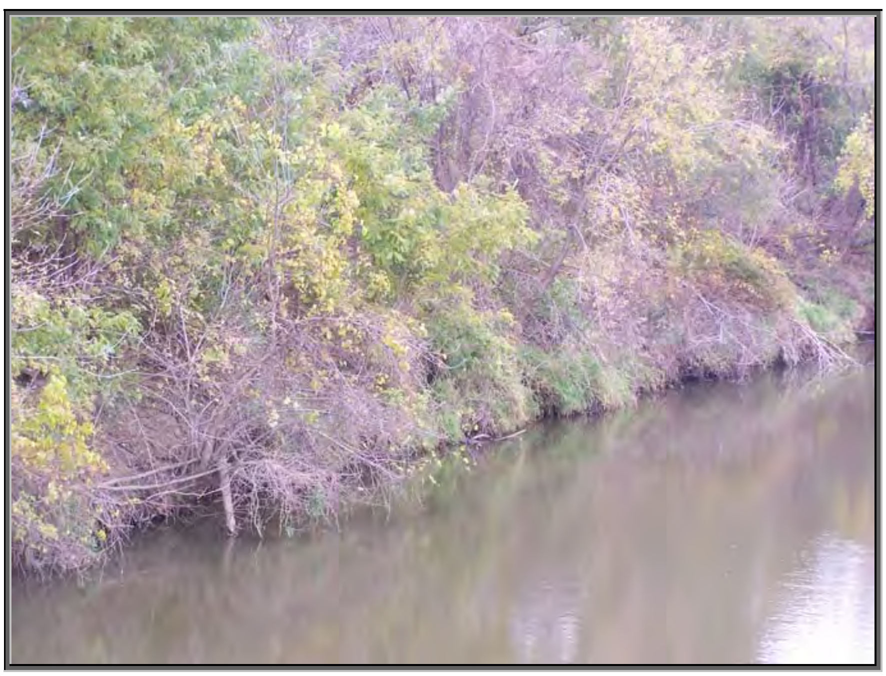


Figure 81 (SRS Location 25): This photo shows the condition of the stream banks and the natural buffer provided along Deep River.

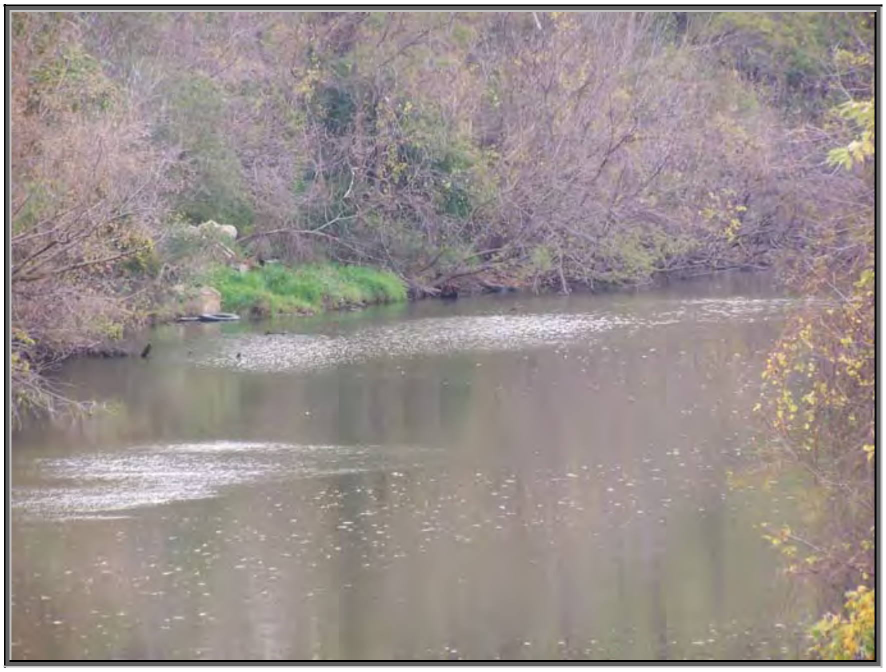


Figure 82 (SRS Location 25): The free movement of Deep River can be seen as the width varies and the natural landscape is still present around sample location 28.

Figure 83 (SRS Location 27): Sample location 21 along Deep River can be found in New Chicago, IN at Michigan Avenue.

Figure 84 (SRS Location 27): This portion of Deep River is not considered to be a legal drain in Lake County so debris is expected to be found in some areas.

Figure 85 (SRS Location 27): Deep River has excellent habitat and good recreational value. Fishing boats are no surprise to be found in this area.

Figure 86 (SRS Location 3): On the Highland-Hammond border Cline Oxbow Park can be found. A portion of this park is located north of the Little Calumet River and some on the south bank of the river. A large variety of habitat can be found in this beautiful recreational area.

Figure 87 (SRS Location 3): Cline Oxbow Park

Figure 88 (SRS Location 3): Cline Oxbow park

Figure 89 (SRS Location 3): Cline Oxbow Park

Figure 90 (SRS Location 3): Cline Oxbow Park

Figure 91 (SRS Location 3): Cline Oxbow Park

Figure 92 (SRS Location 3): Cline Oxbow Park

Figure 93 (SRS Location 3): Cline Oxbow Park

Figure 94 (SRS Location 3): Cline Oxbow Park

Figure 95 (SRS Location 3): Cline Oxbow Park

Figure 96 (SRS Location 3): Cline Oxbow Park

Figure 97 (SRS Location 3): Cline Oxbow Park

Figure 98 (SRS Location 3): Cline Oxbow Park

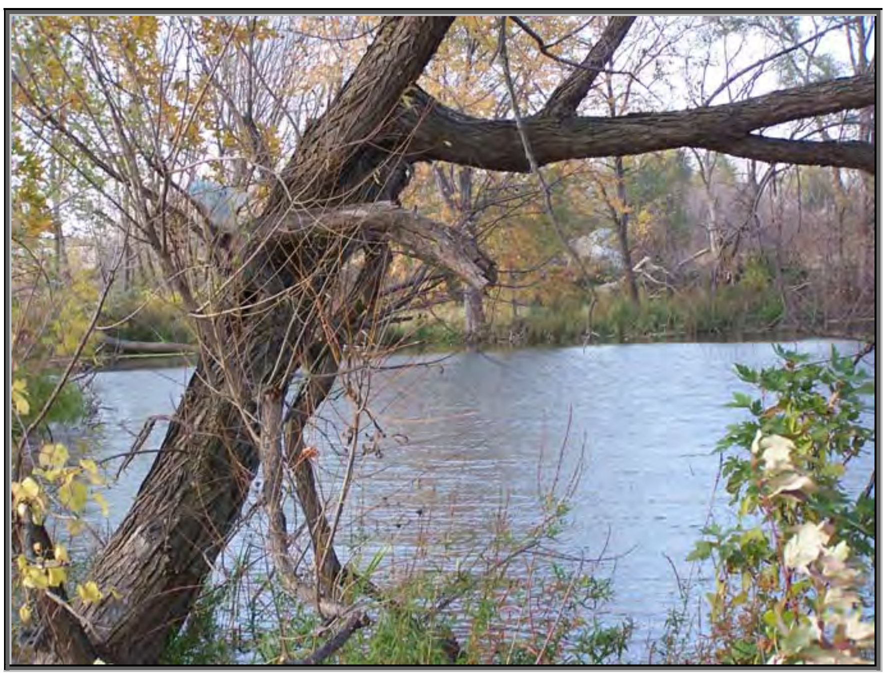


Figure 99 (SRS Location 3): Cline Oxbow Park

Figure 100 (SRS Location 3): Cline Oxbow Park

Figure 101 (SRS Location 3): Cline Oxbow Park

Figure 102 (SRS Location 3): Cline Oxbow Park

Figure 103 (SRS Location 4): Cline Oxbow Park from the levee system surrounding it.

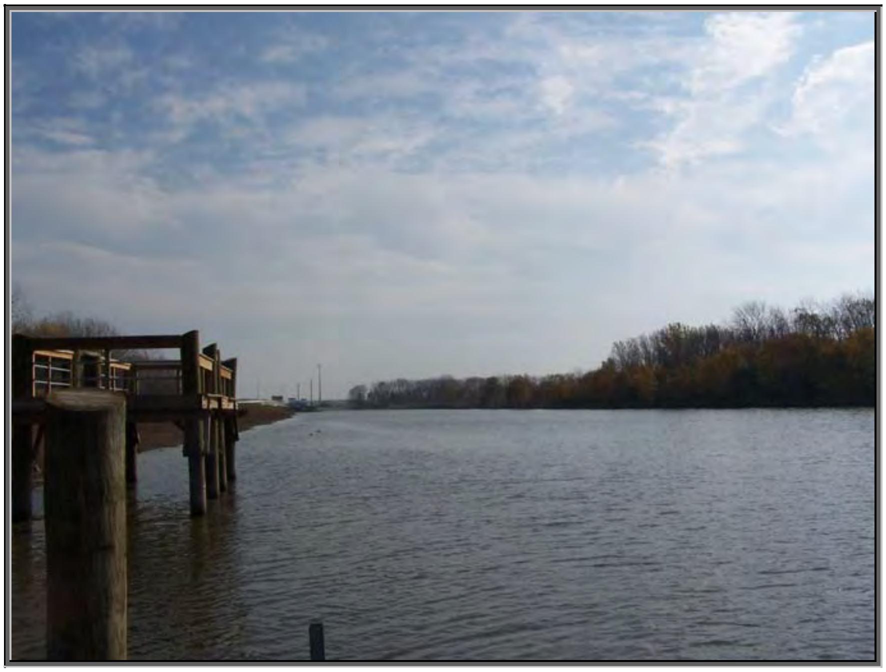


Figure 104 (SRS Location 4): Cline Oxbow Park from the levee system.

Figure 105 (SRS Location 3): Cline Oxbow Park

Figure 106 (SRS Location 3): Cline Oxbow Park

Figure 107 (SRS Location 3): Cline Oxbow Park

Figure 108 (SRS Location 3): Cline Oxbow Park

Figure 109 (SRS Location 3): Cline Oxbow Park

Figure 110 (SRS Location 3): Cline Oxbow Park

Figure 111 (SRS Location 3): Cline Oxbow Park

Figure 112 (SRS Location 10): Storm inlets located along Grant Street draining into the Little Calumet River.

Figure 113 (SRS Location Grant Street): Photos stretching from Riverside Drive to Grant Street along the Little Calumet River, parallel to 29th Street.

Figure 114 (SRS Location Grant Street): Photos stretching from Riverside Drive to Grant Street along the Little Calumet River, parallel to 29th Street.

Figure 115 (SRS Location Grant Street): Photos stretching from Riverside Drive to Grant Street along the Little Calumet River, parallel to 29th Street.

Figure 116 (SRS Location Grant Street): Photos stretching from Riverside Drive to Grant Street along the Little Calumet River, parallel to 29th Street.

Figure 117(SRS Location Grant Street): Photos stretching from Riverside Drive to Grant Street along the Little Calumet River, parallel to 29th Street.

Figure 118 (SRS Location Grant Street): Photos stretching from Riverside Drive to Grant Street along the Little Calumet River, parallel to 29th Street.

Figure 119 (SRS Location Grant Street): Photos stretching from Riverside Drive to Grant Street along the Little Calumet River, parallel to 29th Street.

Figure 120 (SRS Location Grant Street): Photos stretching from Riverside Drive to Grant Street along the Little Calumet River, parallel to 29th Street.

Figure 121 (SRS Location Grant Street): Photos stretching from Riverside Drive to Grant Street along the Little Calumet River, parallel to 29th Street.

Appendix 17

Potential Point Sources

RW ARMSTRONG™
Inspiration to reality.

AREA	PERIMETER	SUBCLASS	CERCLIS ID	SITE NAME	CER FAC ID	FACILITY NAME
106460.594	1373.338	NPL	IND980504005	WASTE INC. LANDFILL	IND980504005	WASTE INC. LANDFILL
46742.633	980.080	NPL	IND980679559	MIDCO II	IND980679559	MIDCO II
264005.813	2109.095	NPL	IND980794432	NINTH AVENUE DUMP	IND980794432	NINTH AVENUE DUMP
18510.609	579.727	NPL	IND980615421	MIDCO I	IND980615421	MIDCO I
225224.406	2073.236	NPL	IND980500524	LAKE SANDY JO (M&M LANDFILL) *	IND980500524	LAKE SANDY JO (M&M LANDFILL)
340135.156	2720.685	NPL	IND016360265	AMERICAN CHEMICAL SERVICE	IND016360265	AMERICAN CHEMICAL SERVICE
280157.594	2459.971	NPL	IND074315896	FISHER-CALO	IND074315896	FISHER-CALO

* Denotes site located within the three HUC watersheds being studied.

SITE STATUS	SITE NAME	X COORD	Y COORD
ACTIVE	NAME NOT GIVEN	493060.50000	4608853.00000
ACTIVE	NAME NOT GIVEN	468056.90625	4605224.00000
ACTIVE	NAME NOT GIVEN *	476371.62500	4599640.50000
ACTIVE	NAME NOT GIVEN	509732.68750	4599608.50000
ACTIVE	NAME NOT GIVEN	461066.21875	4597853.00000
ACTIVE	NAME NOT GIVEN	469407.78125	4597812.50000
ACTIVE	NAME NOT GIVEN	484700.43750	4594067.50000
ACTIVE	NAME NOT GIVEN	469352.84375	4584868.00000
ACTIVE	NAME NOT GIVEN	470696.96875	4571907.00000
ACTIVE	NAME NOT GIVEN	460916.75000	4570098.50000

* Denotes site located withing three watersheds being studied

FACILITY ID	FACILITY NAME	STREET ADDRESS	CITY	ZIP CODE	RCRA ID	TRIS	LUST	SPILLS	CRTK	PCS	X_COOR	Y_COOR
IND984882183	NIMLS FACILITY	422 FRANKLIN ST	MICHIGAN CITY	46360	IND984882183		LUST9112505				508146.1563	4618476.0000
IND984874560	CHECKER UNIT #6090	125 W. 8TH STREET	MICHIGAN CITY		IND984874560		LUST9011536		CRTK04662	IN0056952	508277.4375	4618010.5000
IND005545835	SULLAIR CORP	3700 E MICHIGAN BLVD	MICHIGAN CITY	46360	IND005545835	46360SLLRC3700E	LUST9009554				512820.2188	4616785.5000
IND000609222	SULLAIR CORP	US 20 AND HITCHCOCK RD	MICHIGAN CITY	46360	IND000609222	46360SLLRCUS20A	LUST9304526				512820.2188	4616785.5000
IND984878215	AMERICAN MAIZE PRODUCTS CO SITE B	1100 INDIANAPOLIS AVE	HAMMOND	463201094		46320MRCNM1100I	LUST9103546	SPILL9108117	CRTK02106	IN0000027	456686.7500	4616427.0000
IND984902031	NORTH WEST ROOFING	6012 E MICHIGAN	MICHIGAN CITY	46360	IND984902031		LUST9107505		CRTK05701		514899.3750	4616092.0000
IND984892919	AMOCO SERVICE STATION 362	101 E US 20	MICHIGAN CITY	46360	IND984892919		LUST9012541		CRTK07648		509317.5000	4614286.0000
IND980684252	AMOCO CHEMICALS CORP	2357 STANDARD AVE	WHITING	46394	IND980684252	46394MCCHM2357S	LUST8903041		CRTK00949		460033.7188	4613678.0000
IND981537434	LEND LEASE INC	710 FAIL RD	LA PORTE	46350	IND981537434		LUST9406513		CRTK06915		526629.4375	4612794.0000
IND984929372	MONARCH OIL DBA JIMS SVC STN	1719 BROADWAY	EAST CHICAGO	46312	IND984929372		LUST9405548		CRTK09908		462443.0625	4610591.5000
IND094738762	PRAXAIR INC	4400 KENNEDY AVE	EAST CHICAGO	46312	IND094738762	46312NNCRB4550K	LUST8902054	SPILL8911039		IN0000043	461551.2500	4609209.5000
IND021299730	NATIONAL PROCESSING CO	4505 EUCLID AVE	EAST CHICAGO	46312	IND021299730	46312NTNLP4506W	LUST9005554		CRTK00446		462157.1250	4609016.0000
IND984961060	EMRO MARKETING 8305	4705 CALUMET	HAMMOND	46327	IND984961060		LUST8903089	SPILL8903089	CRTK04423		457645.0938	4608607.5000
IND984872655	LEAVITT TUBE CO INC	4923 COLUMBIA AVE	HAMMOND	46320	IND984872655		LUST9212526		CRTK05177		458362.2188	4608093.0000
IND067447151	ST MARGARET HOSPITAL	5454 HOHMAN AVE	HAMMOND	46320	IND067447151		LUST9011526				456535.6250	4607062.0000
IND984876110	AUTOMOTIVE EXHAUST	104 GRANT ST	CHESTERTON	46304	IND984876110		LUST9009529				495617.5313	4606682.0000
IND005227244	VIKING ENGINEERING	2300 MICHIGAN ST	EAST CHICAGO	46212	IND005227244		LUST8907509				460026.6875	4606576.5000
IND981101132	DANA TRANSPORT INC	5723 KENNEDY AVE	HAMMOND	46323	IND981101132		LUST8906150	SPILL9101010			461573.3125	4606556.5000
IND045608528	KOCH MINERALS INC	1 N BUCHANAN	GARY	46401	IND045608528		LUST9303511				470566.6875	4606356.0000
IND982609729	HOWELL TRACTOR & EQUIPMENT	480 BLAINE ST	GARY	46406	INR000005678		LUST9008594		CRTK09860	IN0058921	464335.0625	4606331.5000
IND016366486	HAMMOND YELLOW & CHECKER CAB	5850 CALUMET AVE	HAMMOND	46320	IND016366486		LUST9204526				457629.3750	4606257.0000
IND069984276	IND BELL TEL CO IND HARBOR BELT RR	2721 161ST ST	HAMMOND	46320	INT190014241		LUST9012530	SPILL9002093			461402.5625	4605772.5000
IND982204141	AGA GAS CENTRAL INC	3930 MICHIGAN AVE	HAMMOND	46323	IND982204141	46323GGSCN3930M	LUST8910038		CRTK02836	IN0054178	463901.7188	4605741.0000
IND069490670	METHODIST HOSPITAL	600 GRANT ST	GARY	46402	IND069490670		LUST9311539		CRTK10057		470225.5938	4605354.5000
IND984966291	REED MINERALS DIV	2243 SUMMER ST	HAMMOND	46320	IND984966291		LUST9003500				460301.8438	4605285.5000
IND103189320	PATTEN INDUSTRIES INC	6400 INDIANAPOLIS BLVD	HAMMOND	46320	IND103189320		LUST9006562		CRTK09779		459945.4375	4605109.5000
IND982612087	PENSKE TRUCK LEASING CO LP	2345 SUMMER ST	HAMMOND	46320	IND982612087		LUST9303552		CRTK05713		460705.4063	4605015.5000
IN0000889360	AMERICAN NATIONAL CAN CO	2501 165TH ST	HAMMOND	46320	IND005449525	46320MRCNN25011	LUST9212515		CRTK01008		460968.4375	4604974.5000
IND984880088	POST TRIBUNE	1065 BROADWAY	GARY	46402	IND984880088		LUST9008514		CRTK09366		471887.9063	4604606.0000
IND000803866	HAMMOND OPERATING HEADQUARTERS *	1313 167TH ST	HAMMOND	46320	IND000803866		LUST9003547		CRTK04921		458657.3125	4604578.0000
IND984899047	R W G RENTALS INC	1247 169TH ST	HAMMOND	463242003	IND984899047		LUST9003537				458451.5000	4604176.5000
IND984904532	AMOCO 19752	3550 169TH ST	HAMMOND	46323	IND984904532		LUST9011564		CRTK07332		463072.7188	4604144.5000
IND984894576	AMOCO 5413	1501 GRANT	GARY	46407	IND984894576		LUST9109500				470288.2813	4604053.5000
IND083085522	INLAND DETROIT DIESEL ALLISON	2601 E 15TH AVE	GARY	46401	IND083085522		LUST9203513				474398.8438	4604024.5000
IND000803874	NIPSCO GARY OPERATING HEADQUARTERS	1460 E 15TH AVE	GARY	46402	IND000803874		LUST9110502		CRTK04910		473730.4688	4604018.5000
IND984898544	SHELL OIL CO	7517 CALUMET AVE N	HAMMOND	46324	IND984898544		LUST9101547				457610.7813	4602876.5000
IND984895532	AMOCO OIL CO SS 0513 *	6090 CENTRAL AVE	PORTAGE	46368	IND984895532		LUST9107539		CRTK07619		485025.7188	4602711.5000
IND016344350	FLYING J AND J CARE *	3030 GRANT ST	GARY	46408	IND016344350		LUST9304531	SPILL8909052			470310.5313	4601425.5000
IND067448605	INDIANA UNIVERSITY NORTH *	3400 BROADWAY	GARY	46408	IND067448605		LUST9101548	SPILL9104192	CRTK05164		471928.1250	4600560.0000
IND984939033	M & M FOREIGN CAR SVC INC *	3845 RIDGE RD	HIGHLAND	463222256	IND984939033		LUST9002100	SPILL9002100			463617.1563	4600118.5000
IND984912170	CLARK OIL STATION 1052	373 W U S HWY 6	VALPARAISO	46383	IND984912170		LUST9107504		CRTK08183		490731.1875	4599861.5000
IND005436514	CHRISTENSON CHEVROLET INC	9700 INDIANAPOLIS BLVD	GRIFFITH	46319	IND005436514		LUST9204542				460745.5000	4598705.5000
IND984885731	JOES SUPER SERVICE	601 W OLD RIDGE	HOBART	46342	IND984885731		LUST9207070		CRTK09424		477702.5625	4598669.5000
IND980791503	NALCO CHEMICAL COMPANY	2550 INDUSTRIAL DRIVE	HIGHLAND	46322	IND980791503	46322QGLYC2550I	LUST9009513				460961.9688	4598368.5000
IND103196564	LINCOLN SALES & SERVICE INC	145 N INDIANAPOLIS BLVD	SCHERERVILLE	46375	IND103196564		LUST9009584				460737.4063	4596630.0000
IND984874404	EMRO MARKETING 5368	1240 SHEFFIELD	DYER	46311	IND984874404		LUST9102525				456745.3125	4595472.5000
IND079737953	CASE POWER & EQUIPMENT	1133 INDIANAPOLIS BLVD	SCHERERVILLE	46375	IND079737953		LUST9301508		CRTK09491		460726.9688	4594587.0000
IND064400054	AVERY DENNISON DFD	650 W 67TH PLACE	SCHERERVILLE	46375	IND064400054	46375VRYDC650WE	LUST9008029	SPILL9008029	CRTK03277	IN0045985	460854.2188	4594215.0000
IND981191810	GENERAL TELEPHONE CO OF INDIANA	802 EVANS AVE	VALPARAISO	46383	IND981191810		LUST8604061				495606.1563	4591885.5000
IND984919365	USA MUFFLER	2300 W 81ST	MERRILLVILLE	46410	IND984919365		LUST9112514				468344.2813	4591129.5000
IND984900761	AMOCO OIL CO	5601 LINCOLN HWY	MERRILLVILLE	46410	IND984900761		LUST9203530				474999.6875	4591100.0000
IND984875393	CHECKER SERVICE STATION 7211	208 US 30 W	VALPARAISO	46383	IND984875393		LUST9110563		CRTK05618		487230.0000	4590990.5000
IND984903260	CENTURY MALL	8275 BROADWAY	MERRILLVILLE	46410	IND984903260		LUST9006510				471957.6563	4590934.0000
IND016251191	CARROLL CHEVROLET INC	1800 N MAIN ST	CROWN POINT	46307	IND016251191		LUST9107542				469520.1563	4587907.5000
IND982211781	CROWN POINT OPERATING HQ NORTHERN PSV OF IN	20 S JOSEPH ST	CROWN POINT	46307	IND982211781		LUST9001506		CRTK04908		470428.1563	4585194.0000
IND984875260	CHECKER SERVICE STATION 7526	1691 E COMMERCIAL	LOWELL	46356	IND984875260		LUST9102536		CRTK05563		466619.2188	4571030.0000

* Denotes site located within three watersheds being studied.

FACILITY ID	FACILITY NAME	LATITUDE	LONGITDUE	OWNER TYPE	MAILING NAME	STREET 1	STREET 2	MAILING CITY	ZIP	OFFICIAL NAME	COUNTY	RECEIVING BODY	MAJOR_CODE	ACTIVE_COD	STANDARD_I	HYDROLOGIC
IN0000248	HARBISON-WALKER REFRACTORIES	+4142300	-08731100	PRIVATE	HARBISON-WALKER REFRACTORIES	DIV. OF INDRESCO INC.	5501 KENNEDY AVENUE	HAMMOND	46323	MR. S. L. HOCKER, ASST. MGR.	LAKE	GRAND CALUMET R TO LAKE MICHIGAN	MINOR	ACTIVE	NONCLAY REFRACTORIES	04040001
IN0000221	COMMONWEALTH EDISON COMPANY	+4142290	-08731170	PRIVATE	COMMONWEALTH EDISION STATION	103RD STREET & LAKE MICHIGAN		HAMMOND	46326	MR. TOM HEMMINGER	LAKE	LAKE MICHIGAN	MAJOR	ACTIVE	ELECTRICAL SERVICES	04040001
IN0000264	LEVER BROTHERS COMPANY	+4141300	-08730380	PRIVATE	LEVER BROTHERS COMPANY		1200 CALUMENT AVENUE	HAMMOND,	46320	MR. MOHAMMAD Z. BABAR	LAKE	LAKE MICHIGAN VIA WOLF LAKE	MAJOR	ACTIVE	SOAP/DETERG EXC SPECIAL CLEANR	04040001
IN0000027	CERESTAR USA, INC.	+4141210	-08730590	PRIVATE	CERESTAR USA (AMERICAN MAIZE)	1100 INDIANAPOLIS BOULEVARD	1100 INDIANAPOLIS BOULEVARD	HAMMOND	463201094	WILLIE KALTUNAS, MANAGER	LAKE	LAKE MICHIGAN VIA WOLF LAKE CHANNEL	MAJOR	ACTIVE	WET CORN MILLING	04040001
IN0046736	MARATHON PIPE LINE, GRIFFITH	+4141020	-08723090	PRIVATE	MARATHON PIPELINE TERMINALS	1900 W H AVE	1900 WEST AVENUE H (BOX 188)	GRIFFITH	46319	ENVIRONMENTAL/SAFETY ENGINEER	LAKE	UNNAMED CREEK	MINOR	ACTIVE	PETROLEUM BULK STATIONS & TERM	04040001
IN0036510	WHITTINGTON UTILITIES INC	+4140300	-08729120	PRIVATE							LAKE		MINOR	INACTIVE	SEWERAGE SYSTEMS	04040001
IN0000108	AMERICAN OIL COMPANY (AMOCO)	+4140090	-08728590	PRIVATE	AMOCO OIL CO.-WHITING REFINERY	2815 INDIANAPOLIS BOULEVARD		WHITING	46394	DANIEL H. WILSON, REF. MGR.	LAKE	LAKE MICHIGAN	MAJOR	ACTIVE	PETROLEUM REFINING	04040001
IN0000205	LTV STEEL COMPANY	+4140090	-08727110	PRIVATE	L T V STEEL COMPANY	INDIANA HARBOR WORKS	3001 DICKEY ROAD	EAST CHICAGO,	46312	MR. CARL BROMAN	LAKE	INDIANA HARBOR CANAL	MAJOR	ACTIVE	BLAST FURN/STEEL WORKS/ROLLING	04040001
IN0032425	U.S.S. LEAD REFINERY, INC.	+4140000	-08727000	PRIVATE	MCCAULIFFE MACHINERY	5300 INDIANAPOLIS BLVD		EAST CHICAGO	46312	MR. LISCUM, R. C.	LAKE	GRAND CALUMET R TO LAKE MICHIGAN	MINOR	INACTIVE	NONFERROUS FOUNDRIES, EXC ALUM	04040001
IN0053694	PRAXAIR, INC. WHITING	+4139000	-08727150	PRIVATE	PRAXAIR INC	STANDARD AVE & FRONT ST	FOOT OF STANDARD AVENUE	WHITING	46394	MR. MARK DYWAN	LAKE	INDIANA HARBOR SHIP CANAL	MINOR	INACTIVE	INDUSTRIAL GASES	04040001
INS230001	PRAXAIR, INC.	+4139000	-08727150	PRIVATE	PRAXAIR, INC.	FOOT OF STANDARD AVENUE		WHITING,	46394	MR. EMIL MOSORA	LAKE	INDIANA HARBOR CANAL TO LK MICHIGAN	MINOR	ACTIVE	INDUSTRIAL GASES	04040001
IN0000167	AMERICAN STEEL FOUNDRIES	+4138570	-08727570	PRIVATE	AMERICAN STEEL FOUNDRIES	3761 CANAL ST	3761 CANAL STREET	EAST CHICAGO	46312	BERNADETTE WELLMAN	LAKE	INDIANA HARBOR CANAL TO LAKE MICH.	MINOR	ACTIVE	STEEL FOUNDRIES, NEC	04040001
IN0000132	NIPSCO, BAILEY GENERATING STA	+4138340	-08707210	PRIVATE	BAILLY GENERATING STATION	NORTHERN INDIANA PUBLIC SERVIC	246 BAILLY STATION ROAD	CHESTERTON	463049754	MR. ARTHUR W. SMITH	PORTER	LAKE MICHIGAN	MAJOR	ACTIVE	ELECTRICAL SERVICES	04040001
IN0056910	MOBIL OIL CORP, E CHICAGO TERM	+4138300	-08728300	PRIVATE	MOBIL OIL CORPORATION	E. CHICAGO TERMINAL	3821 INDIANAPOLIS BOULEVARD	EAST CHICAGO		MR. J. K. WIERZ	LAKE	INDIANA HARBOR SHIP CANAL	MINOR	ACTIVE	GASOLINE SERVICE STATIONS	04040001
ING340003	PHILLIPS PIPE LINE, E CHICAGO	+4138300	-08727300	PRIVATE	PHILLIPS PIPE LINE, E. CHICAGO	400 EAST COLUMBUS DRIVE		EAST CHICAGO,	46312	MR. JACK WILLIAMS	LAKE	INDIANA HARBOR CANAL TO LAKE MICH.	MINOR	ACTIVE	PETROLEUM BULK STATIONS & TERM	04040001
IN0000051	ENERGY COOPERATIVE	+4138200	-08729100	PRIVATE	ENERGY CO OP INC	3500 INDIANAPOLIS BLVD		EAST CHICAGO	46312	MARY KACZKA	LAKE	INDIANA HARBOR CANAL VIA LK GEORGE	MINOR	INACTIVE	PETROLEUM REFINING	04040001
ING340011	CLARK REFINING, HAMMOND TERM.	+4138190	-08730150	PRIVATE	CLARK REFINING, HAMMOND TERM.	1020 141ST STREET	NW 1/4, SEC 30, T37N, R10W	HAMMOND	46320	THOMAS B. KIDWELL, ENV. ENGR.	LAKE	LAKE GEORGE CANAL	MINOR	ACTIVE	GASOLINE SERVICE STATIONS	04040001
IN0000124	NIPSCO, DEAN H. MITCHELL STA	+4138200	-08724260	PRIVATE	D. H. MITCHELL GENERATING STAT	NORTHERN INDIANA PUBLIC SERVIC	CLARK ROAD AND LAKE MICHIGAN	GARY	46401	MR. ARTHUR W. SMITH	LAKE	LAKE MICHIGAN	MAJOR	ACTIVE	ELECTRICAL SERVICES	04040001
IN0048810	MARATHON OIL, HAMMOND TERMINAL	+4138150	-08730000	PRIVATE	PRODUCT TERMINALS INC.	MARATHON OIL COMPANY	4206 COLUMBIA AVENUE	HAMMOND,	46320	MR. DAVID E. SIEBOLD	LAKE	LAKE MICHIGAN VIA WOLF LAKE	MINOR	ACTIVE	PETROLEUM BULK STATIONS & TERM	04040001
ING340020	MARATHON OIL, HAMMOND HYDROTST	+4138150	-08730000	PRIVATE	MARATHON OIL, HAMMOND TERMINAL	4206 COLUMBIA AVENUE		HAMMOND	463271487	WILLIAM R. TAYLOR, MANAGER	LAKE	LAKE GEORGE	MINOR	ACTIVE	PETROLEUM BULK STATIONS & TERM	04040001
IN0056031	BUCKEYE PIPE LINE COMPANY LP	+4138150	-08728450	PRIVATE	BUCKEYE PIPE LINE CO	MCSHANE & COLUMBUS DR		EAST CHICAGO	46312	MR. BARRY A. REMINDER	LAKE	INDIANA HARBOR CANAL TO LAKE MICH.	MINOR	ACTIVE	REFINED PETROLEUM PIPELINE	04040001
IN0000094	INLAND STEEL COMPANY	+4138050	-08726040	PRIVATE	INLAND STEEL COMPANY	INDIANA HARBOR WORKS	3210 WATLING STREET	EAST CHICAGO,	46312	MR. ROBERT D. JOHNSTON	LAKE	LK MICH. VIA IN HARBOR C/GRAND CAL.	MAJOR	ACTIVE	BLAST FURN/STEEL WORKS/ROLLING	04040001
IN0032549	BLAW-KNOX FOUNDRY & MILL	+4138000	-08727300	PRIVATE						MR. J. E. GIVENS, V-P	LAKE	IN. HARBOR CANAL TO LAKE MICHIGAN	MINOR	INACTIVE	STEEL FOUNDRIES, NEC	04040001
IN0000043	PRAXAIR, INC. LINDE DIVISION	+4138000	-08727300	PRIVATE	PRAXAIR INC. - LINDE DIVISION	4400 KENNEDY AVENUE		EAST CHICAGO	46312	MR. JOSEPH KEILMAN, PLANT ENG.	LAKE	INDIANA HARBOR SHIP CANAL	MINOR	INACTIVE	INDUSTRIAL GASES	04040001
IN0000035	PRAXAIR, INC., LAKESIDE PLANT	+4137590	-08724130	PRIVATE	PRAXAIR, INC.	LINDE DIVISION 755	CLARK & DEAN MITCHELL ROADS	GARY,	46406	MR. ROBERT SCHLAGEL	LAKE	LAKE MICHIGAN	MAJOR	ACTIVE	INDUSTRIAL GASES	04040001
IN0000175	BETHLEHEM STEEL CORPORATION	+4138000	-08707550	PRIVATE	BETHLEHEM STEEL, BURNS HARBOR			CHESTERTON	46304	MR. T. W. EASTERLY	PORTER	LITTLE CALUMET R AND BURNS HARBOR	MAJOR	ACTIVE	BLAST FURN/STEEL WORKS/ROLLING	04040001
IN0035661	UNION CARBIDE CORP-LINDE DIV-B	+4138000	-08707300	PRIVATE							PORTER	?	MINOR	INACTIVE	INDUSTRIAL GASES	04040001
IN0043435	PRAXAIR, BURNS HARBOR FACILITY	+4138000	-08707300	PRIVATE	PRAXAIR, INC.	BURNS HARBOR FACILITY	1224 N. BOO ROAD	BURNS HARBOR,	46304	MICHAEL A. MIKOVICH	PORTER	LT CALUMET R TO LAKE MICHIGAN	MINOR	ACTIVE	INDUSTRIAL GASES	04040001
IN0000337	NATIONAL STEEL, MIDWEST DIV.	+4137390	-08710240	PRIVATE	NATIONAL STEEL CORPORATION	MIDWEST DIVISION	U.S. ROUTE 12	PORTAGE,	463681287	MR. KEVIN A. DOYLE	PORTER	BURNS DITCH TO LAKE MICHIGAN	MAJOR	ACTIVE	COLD ROLLED STEEL SHEET/STRIP	04040001
IN0058467	UNION TANK CAR COMPANY	+4137300	-08728150	PRIVATE	UNION TANK CAR COMPANY	151ST STREET & RAILROAD AVENUE		EAST CHICAGO,	46312	MR. CARL CURTOLA, MANAGER	LAKE	INDIANA HARBOR CANAL	MINOR	ACTIVE	RAILROAD EQUIPMENT	04040001
IN0053481	BURNS HARBOR MUNICIPAL STP	+4137250	-08708000	PUBLIC	BURNS HARBOR MUNICIPAL STP			BURNS HARBOR	46304	MR. LAWRENCE SHINNEMAN, PRES.	PORTER	BURNS DITCH TO LAKE MICHIGAN	MINOR	ACTIVE	SEWERAGE SYSTEMS	04040001
ING340009	CITGO PETROLEUM CORP-E CHICAGO	+4137150	-08726200	PRIVATE	CITGO EAST CHICAGO TERMINAL	2500 EAST CHICAGO AVENUE		EAST CHICAGO	46312	SCOTT BUCKNER, ENV. MANAGER	LAKE	GRAND CALUMET R VIA UNNAMED DITCH	MINOR	ACTIVE	PETROLEUM BULK STATIONS & TERM	04040001
IN0023060	HAMMOND MUNICIPAL STP	+4137110	-08729440	PUBLIC	HAMMOND WASTEWATER FACILITY		5143 COLUMBIA AVENUE	HAMMOND	46320	DR. MICHAEL UNGER, CERT. OPER.	LAKE	GRAND CALUMET R TO LAKE MICHIGAN	MAJOR	ACTIVE	SEWERAGE SYSTEMS	04040001
IN0046949	PORTER POTW	+4137130	-08704180	PUBLIC	PORTER AVENUE LIFT STATION	NORTH END PORTER AVE	NORTH END PORTER AVENUE	PORTER	46304		PORTER	LT CALUMET R - SERVD BY CHESTERTON	MINOR	ACTIVE	SEWERAGE SYSTEMS	04040001
IN0022578	CHESTERTON MUNICIPAL STP	+4137090	-08703500	PUBLIC	CHESTERTON UTILITIES WWTP	300 LEAGUE LANE		PORTER	46304	ANN MACDONALD, CERT. OPER.	PORTER	LT CALUMET R TO LAKE MICHIGAN	MAJOR	ACTIVE	SEWERAGE SYSTEMS	04040001
IN0022829	EAST CHICAGO_MUNICIPAL STP	+4137050	-08728440	PUBLIC	EAST CHICAGO SANITARY DISTRICT		5201 INDIANAPOLIS BOULEVARD	EAST CHICAGO	46312	HON. ROBERT PASTRICK	LAKE	GRAND CALUMET R TO LAKE MICHIGAN	MAJOR	ACTIVE	SEWERAGE SYSTEMS	04040001
IN0056014	CLARK OIL & REFINING, HAMMOND	+4137000	-08730150	PRIVATE	HAMMOND TERMINAL	1020 141 ST		HAMMOND	46320	MR. MIKE PETERS	LAKE	LAKE MICHIGAN VIA LAKE GEORGE CANAL	MINOR	INACTIVE	GASOLINE SERVICE STATIONS	07120001
IN0000281	U.S. STEEL - GARY WORKS, USX C	+4137020	-08720210	PRIVATE	U.S.X. - GARY WORKS		1 NORTH BROADWAY, MS 70	GARY,	46402	MR. GREG MACKLEY	LAKE	GRAND CALUMET R TO LAKE MICHIGAN	MAJOR	ACTIVE	BLAST FURN/STEEL WORKS/ROLLING	04040001
IN0000329	E. I. DU PONT DE NEMOURS	+4137000	-08727030	PRIVATE	EI DUPOINT DE NEMOURS & CO	5215 KENNEDY AVE		EAST CHICAGO	46312	LYNN M. FLAIM, PLANT MANAGER	LAKE	GRAND CALUMET R TO LAKE MICHIGAN	MINOR	ACTIVE	INDUSTRIAL INORGANIC CHEMICALS	04040001
IN0036765	NORTHWEST IND. WATER CORP:	+4137000	-08703000	PUBLIC	CHESTERTON PUBLIC WATER CO	300 LEAGUE LANE	EIGHTH STR. NORTH OF WOODLAWN	PORTER	46304	MS. ANN MACDONALD	PORTER	LITTLE CALUMET R VIA COFFEE CREEK	MINOR	INACTIVE	WATER SUPPLY	04040001
IN0039659	BURNS HARBOR ESTATES	+4137000	-08703000	PUB PRI	BURNS HARBOR ESTATES	932 N 150 W	932 NORTH 150 WEST	CHESTERTON	46304	FOREST ASH	PORTER	SWANSON LAMPORTE	MINOR	ACTIVE	OPER OF RES MOBILE HOME SITES	04040001
IN0037630	CHESTERTON TOWN OF	+4137000	-08703000	PUBLIC							PORTER		MINOR	INACTIVE	SEWERAGE SYSTEMS	04040001
IN0029980	OAK TREE MOBILE HOME PARK	+4137000	-08703000	PUB PRI	OAK TREE VILLAGE MHP	254 SANDLEWOOD AVE		PORTAGE	46368	CHRISTINE LAMBERT	PORTER	LT CALUMET R VIA SALT CREEK	MINOR	ACTIVE	OPER OF RES MOBILE HOME SITES	04040001
IN0022055	CHESTERTON TOWN OF	+4137000	-08703000	PUBLIC							PORTER	?	MINOR	INACTIVE	SEWERAGE SYSTEMS	04040001
IN0030937	BRUMMIT ELEM. SCHOOL	+4137000	-08702000	PUB PRI	BRUMMIT ELEMENTARY SCHOOL	2500 INDIAN BOUNDARY RD	2500 INDIAN BOUNDARY ROAD	CHESTERTON	46304	MR. DAVID GRISMER	PORTER	LT CALUMET R VIA KEMPER DITCH	MINOR	INACTIVE	ELEMENTARY & SECONDARY SCHOOLS	04040001
IN0000159	CITGO PETROLEUM CORP.	+4136540	-08725550	PRIVATE	CITGO PETROLEUM CORP	2500 E CHICAGO AVE	2500 EAST CHICAGO AVENUE	EAST CHICAGO	46312	MR. RON SANTELIK	LAKE	GRAND CALUMET R TO LAKE MICHIGAN	MINOR	INACTIVE	PETROLEUM BULK STATIONS & TERM	04040001
IN0050563	AMG RESOURCES CORPORATION	+4136530	-08725380	PRIVATE	AMG RESOURCES CORP	459 NORTH CLINE AVENUE	459 NORTH CLINE AVENUE	GARY	46401	MR. R.H. GABEY, BRANCH MGR.	LAKE	GRAND CALUMET R TO LAKE MICHIGAN	MINOR	ACTIVE	2NDARY SMELT/NONFERROUS METALS	04040001
ING250008	CHRIS CRAFT INDUSTRIAL PRODUCT	+4136500	-08713250	PRIVATE	CHRIS CRAFT INDUSTRIAL PRODUCT	407 COUNTY LINE ROAD		PORTAGE		ROBERT E. ROTTINGER, OPS MGR.	PORTER	BURNS DITCH VIA WPA DITCH	MINOR	ACTIVE	UNSUPPORTED PLSTICS FILM/SHEET	04040001
ING340012	EXPLORER PIPELINE COMPANY	+4136450	-08729550	PRIVATE	EXPLORER PIPELINE CO. HAMMOND	3737 MICHIGAN	NW1/4, NW1/4, SEC 3, T	HAMMOND	46232	MR CLIFFORD R. WOODFORD	LAKE	GRAND CALUMET RIVER	MINOR	ACTIVE	PETROLEUM BULK STATIONS & TERM	04040001
IN0056367	NINTH AVENUE DUMP SUPERFUND SI	+4136450	-08726000	PRIVATE	NINTH AVE DUMP	7357 W NINTH AVE		GARY	46402	MR. MARK KNIGHT, PROJ. COOR.	LAKE	GRAND CALUMET R TO LAKE MICHIGAN	MINOR	INACTIVE	REFUSE SYSTEMS	04040001
ING340006	SHELL OIL, EAST CHICAGO PLANT	+4136320	-08728000	PRIVATE	SHELL OIL, EAST CHICAGO PLANT	2400 MICHIGAN STREET		HAMMOND	46320	MR. R.H. HAHN, TRANS. MANAGER	LAKE	GRAND CALUMET R TO LAKE MICHIGAN	MINOR	ACTIVE	PETROLEUM BULK STATIONS & TERM	04040001
IN0043613	CHRIS CRAFT INDUSTRIAL PRODUCT *	+4136300	-08711000	PRIVATE	CHRIS CRAFT INDIANA INC MON SO	407 S COUNTYLINE RD	407 COUNTY LINE ROAD	PORTAGE	46368	MR. DENNIS T. CONLEY	PORTER	BURNS DITCH VIA DITCH	MINOR	INACTIVE	UNSUPPORTED PLSTICS FILM/SHEET	04040001
IN0022977	GARY WASTEWATER TREATMENT PLT	+4136250	-08723130	PUBLIC	GARY SANITARY DISTRICT	3600 WEST 3RD AVENUE	3600 WEST THIRD AVENUE	GARY	46402	MR. DONALD SMALES, CERT. OPER.	LAKE	GRAND CALUMET R & LITTLE CALUMET R	MAJOR	ACTIVE	SEWERAGE SYSTEMS	04040001
IN0054798	ROLL CENTER, INC.	+4136220	-08718360	PRIVATE	ROLL CENTER, INC.	218 MISSISSIPPI STREET		GARY,	46402	MR. LANDY D. HERNDON, JR.	LAKE	GRAND CALUMET R VIA STORM DRAIN	MINOR	ACTIVE	REPAIR SHOPS & RELATED SERVICE	04040001
INS210001	MARBLEHEAD LIME CO, BUFFINGTON	+4136190	-08722260	PRIVATE	MARBLEHEAD LIME COMPANY	BUFFINGTON PLANT	CLARK ROAD AND LAKE MICHIGAN	GARY,	46402	LARRY REEVES, PLANT MANAGER	LAKE	LAKE MICHIGAN VIA DITCH	MINOR	ACTIVE	LIME	04040001
IN0054178	AGA GAS INC.	+4136060	-08726000	PRIVATE	AGA GAS CENTRAL INC	3930 MICHIGAN STREET		HAMMOND	46323	MR. DENO JOVANOVIC	LAKE	UNNAMED POND - GROUNDWATER INFILTRA	MINOR	ACTIVE	INDUSTRIAL GASES	04040001
IN0052825	CALUMET FLEXICORE CORPORATION	+4136000	-08728000	PRIVATE	CALUMET FLEXICORE CORP	24 MARBLE STREET	24 MARBLE STREET	HAMMOND	463201582	MR. RUSSELL D. HARRISON	LAKE	GRAND CALUMET R TO LAKE MICHIGAN	MINOR	ACTIVE	CONSTRUCTION MACHINERY	04040001
IN0032999	PHILLIPS PIPE LINE COMPANY	+4136000	-08719000	PRIVATE	PHILLIPS PIPELINE CO	400 E COLUMBUS DR	400 EAST COLUMBUS DRIVE	EAST CHICAGO	46312	MR. D. D. BISHOP	LAKE	INDIANA HARBOR CANAL TO LAKE MICH.	MINOR	INACTIVE	PETROLEUM BULK STATIONS & TERM	04040001
IN0038687	MELODY LANE M.H.P.	+4136000	-08719000	PUB PRI	MELODY LANE MOBILE HOME PARK	3625 CALHOUN ST	3625 CALHOUN STREET	GARY	46408	MR. LARRY JOHNSON, MANAGER	LAKE	LITTLE CALUMET R VIA UNNAMED DITCH	MINOR	ACTIVE	OPER OF RES MOBILE HOME SITES	04040001
IN0050911	INDUSTRIAL DISPOSAL CORP.	+4136000	-08719000	PRIVATE						MR. DANNY MCARDLE, VP	LAKE	GRAND CALUMET R TO LAKE MICHIGAN	MINOR	INACTIVE	INDUST. ORGANIC CHEMICALS NEC	04040001
IN0000191	VULCAN MATERIALS CO-METALLICS	+4136000	-08719000	PRIVATE	VULCAN MATERIALS COMPANY	459 NORTH CLINE AVENUE		GARY	46406		LAKE	?	MAJOR	INACTIVE	2NDARY SMELT/NONFERROUS METALS	04040001
IN0109738	WHITE GARY SALES & SERVICE INC	+4136000	-08718000	PRIVATE							LAKE		MINOR	INACTIVE	CAR WASHES	04040001
IN0035483	K A STEEL CHEMICALS INC-GARY P	+4136000	-08718000	PRIVATE							LAKE	?	MAJOR	INACTIVE	INDUSTRIAL INORGANIC CHEMICALS	04040001
IN0040525	POTTAWATAMIE MUNICIPAL STP	+4136000	-08643000	PUBLIC						ROSEMARY SACK	PORTER		MINOR	INACTIVE	SEWERAGE SYSTEMS	07120001
ING080041	MARATHON OIL STATION #3183	+4136000	-08710590	PRIVATE	MARATHON OIL CO. STATION #3183	6003 CENTRAL AVENUE	SW1/4, NW1/4, SEC 13, T36N,R7W	PORTAGE	46368	MR. E. S. MARKEL	PORTER	LT CALUMET R VIA WILLOW CR-CHRISTMN	MINOR	ACTIVE	GASOLINE SERVICE STATIONS	04040001
IN0024368	PORTAGE MUNICIPAL STP	+4135480	-08712070	PUBLIC	PORTAGE MUNICIPAL WWTP	5500 OLD PORTER ROAD		PORTAGE	463681136	HON. SAMMIE MALETTA	PORTER	BURNS DITCH TO LAKE MICHIGAN	MAJOR	ACTIVE	SEWERAGE SYSTEMS	04040001
IN0030767	LIBERTY ELEM & MIDDLE SCHOOL	+4135300	-08705000	PUB PRI	LIBERTY ELEMENTARY & MIDDLE SC	50 & 51 W 900 N	900 NORTH 50 WEST	CHESTERTON	46304	MR. DAVID GRISMER	PORTER	LT CALUMET R VIA SALT CR VIA DAMON	MINOR	ACTIVE	ELEMENTARY & SECONDARY SCHOOLS	04040001
IN0037010	BURNS HARBOR TOWN OF	+4135250	-08708000	PUBLIC							PORTER		MINOR	INACTIVE	SEWERAGE SYSTEMS	04040001
ING080058	IDOT TOLL ROAD AREA 1 SOUTH *	+4135130	-08713010	STATE	IDOT TOLL ROAD AREA 1 SOUTH	5100 PLAZA DRIVE		PORTAGE	46368	JOE KING, MAINTENANCE SUPER.	PORTER	GROUNDWATER INFILTRATION BY BURNS D	MINOR	ACTIVE	GASOLINE SERVICE STATIONS	04040001
IN0035491	MUNSTER TOWN OF	+4135000	-08732000	PUBLIC							LAKE		MINOR	INACTIVE	SEWERAGE SYSTEMS	07120003
IN0050202	EXPLORER PIPELINE CO *	+4135000	-08728000	PRIVATE							LAKE		MINOR	INACTIVE	PETROLEUM BULK STATIONS & TERM	04040001
IN0032417	EAST GARY CITY OF *	+4135000	-08715000	PUBLIC							LAKE	?	MINOR	INACTIVE	WATER SUPPLY	04040001
IN0052345	CONTINENTAL CAN CO *	+4135000	-08714000	PRIVATE						MR. CARLSON, ELDEN L.	PORTER		MINOR	INACTIVE	FIBER CANS, TUBES,DRUMS & PROD	04040001
IN0029998	NEIGHBORHOOD UTILITIES	+4135000	-08708000	PUB PRI						MR. BURRUS, DAVID L.	PORTER	LT CALUMET R VIA SALT CREEK	MINOR	INACTIVE	OPER OF RES MOBILE HOME SITES	04040001
IN0032883	PLEASANT VALLEY MOBILE HOME PK	+4135000	-08708000	PUB PRI						MR. REBA, GABRIEL	PORTER	LT CALUMET R VIA SALT CREEK	MINOR	INACTIVE	OPER OF RES MOBILE HOME SITES	04040001
IN0021725	MIDWEST STEEL DIVISION NAT. ST	+4134400	-08708300	PRIVATE							PORTER	?	MINOR	INACTIVE	STEEL FOUNDRIES, NEC	04040001
IN0045560	CONTINENTAL CAN CO PLT.17 *	+4134060	-08713000	PRIVATE						MANAGER, MANUFACTURING	PORTER		MAJOR	INACTIVE	METAL CANS	04040001
IN0029793	LEHIGH PORTLAND CEMENT/GARY *	+4134000	-08719000	PRIVATE	LEHIGH PORTLAND CEMENT	BUFFINGTON & CLINE AVE	BUFFINGTON STATION	GARY	46401	MR. RALF BOHMAN	LAKE	LAKE MICHIGAN	MINOR	ACTIVE	CEMENT, HYDRAULIC	04040001
IN0036773	AMERICAN BRICK COMPANY	+4133000	-08730000	PRIVATE							LAKE	HART DITCH	MINOR	INACTIVE	CLAY REFRACTORIES	07120001
IN0037591	HIGHLAND SANITARY DIST	+4133000	-08728490	PUBLIC							LAKE		MINOR	INACTIVE	SEWERAGE SYSTEMS	07120003
ING080022	TRISTATE COACH LINES, INC. *	+4133000	-08721450	PRIVATE	TRISTATE COACH LINES, INC.	2101 WEST 37TH STREET	NW1/4, NE1/4, SEC 29, T36N,R8W	GARY,	46408	MR. JOHN SHOUP, PRESIDENT	LAKE	LITTLE CALUMET R VIA UNNAMED DITCH	MINOR	ACTIVE	INTERCITY & RURAL BUS TRANSPOR	07120001
IN0044148	LAKE GEORGE PLATEAU SUBD. *	+4133000	-08715000	PUBLIC						HON. GREEN, CALVIN E.	LAKE		MINOR	INACTIVE	SEWERAGE SYSTEMS	04040001
IN0042021	ELMWOOD MOBILE HOME PARK	+4133000	-08705000	PUB PRI	ELMWOOD MOBILE HOME PARK	001 ELMWOOD PARK DR		VALPARAISO	46383	MR. CAPPUZZELLO, JOSEPH J.	PORTER	LT CALUMET R VIA SALT CR VIA DAMON	MINOR	ACTIVE	OPER OF RES MOBILE HOME SITES	04040001
IN0038709	LIBERTY FARM MOBILE HOME PARK	+4133000	-08705000	PUB PRI	LIBERTY FARM MHP	76 E US 6	76 EAST U. S. HIGHWAY 6	VALPARAISO	463838918	HOWARD HECKMAN	PORTER	LT CALUMET R VIA SALT CR VIA DAMON	MINOR	ACTIVE	OPER OF RES MOBILE HOME SITES	04040001
IN0030651	SOUTH HAVEN WATER WORKS, INC.	+4132110	-08707320	PUB PRI	SOUTH HAVEN WATER WORKS WWTP		305 WEST 700 NORTH	VALPARAISO	46383	MR. STEVEN FICKLE	PORTER	LT CALUMET R VIA SALT CREEK	MAJOR	ACTIVE	SEWERAGE SYSTEMS	04040001
IN0023086	HOBART MUNICIPAL STP *	+4132100	-08715130	PUBLIC						MR. PERRY VANNEST	LAKE	DEEP R TO LITTLE CALUMET RIVER	MINOR	INACTIVE	SEWERAGE SYSTEMS	04040001
IN0030554	RIVER FOREST HIGH SCHOOL	+4132000	-08715000	PUB PRI	RIVER FOREST JR SR HIGH SCHOOL	INDIANA ST & HUBER BLVD	INDIANA STREET AND HUBER BLVD.	HOBART	46342	MR. GERALD E. MCCULLUM	LAKE	DEEP R TO LITTLE CALUMET RIVER	MINOR	INACTIVE	ELEMENTARY & SECONDARY SCHOOLS	04040001
IN0052639	SOUTH HAVEN WATER WORK INC	+4131294	-08706160	PUB PRI	SOUTH HAVEN WATER WORKS INC	CR 305 W & CR 700 N	COUNTY ROAD 175 WEST	VALPARAISO	46383	MR. DAVID SAYLOR	PORTER	LT CALUMET R VIA SALT CR - PEPPER C	MINOR	ACTIVE	WATER SUPPLY	04040001
ING080050	BUCKEYE PIPE LINE - GRIFFITH	+4131070	-08726200	PRIVATE	BUCKEYE PIPE LINE, GRIFFITH ST	PIPELINE DRIVE	SW1/4, NE1/4, SEC 3, T35N, R9W	GRIFFITH		MIKE HASEL, ENVIRONMENTAL TECH	LAKE	GROUNDWATER PIT - TURKEY CR BASIN	MINOR	ACTIVE	REFINED PETROLEUM PIPELINE	04040001
IN0035581	SANDS MOBILE HOME PARK	+4131000	-08703000	PUB PRI	SANDS MOBILE HOME PARK	71 W US HWY 6	71 WEST U. S. HIGHWAY 6	VALPARAISO	46383	MR. VOSS, JOHN J.	PORTER	LT CALUMET R VIA SALT CR VIA DAMON	MINOR	ACTIVE	OPER OF RES MOBILE HOME SITES	04040001
IN0048402	WHEELER SANITARY LANDFILL	+4130500	-08712130	PRIVATE	WHEELER RECYCLING & DISPOSAL F	SR 130 & CR 625 W	STATE ROAD 130 AND JONES ROAD	WHEELER,	46393	MR. DON EHMEN	PORTER	DEEP R VIA DUCK CR VIA KRULL DITCH	MINOR	ACTIVE	REFUSE SYSTEMS	04040001
ING080026	PAULSON OIL COMPANY	+4130250	-08720050	PRIVATE	COASTAL GAS STA., PAULSON OIL	6101 BROADWAY AVENUE	NW 1/4, SEC 10, T 35 N, R 8 W	MERRILLVILLE		MR. THOMAS E. KROH	LAKE	TURKEY CR VIA STORM SEWER DRAIN	MINOR	ACTIVE	FURNITURE STORES	04040001
ING340014	NORCO PIPELINE, HARTSDALE STA	+4130200	-08726580	PRIVATE	NORCO PIPELINE, HARTSDALE STA.	CENTRAL & DIVISION STREETS	NW1/4, SW1/4, SEC 10,T35N, R9W	SCHERERVILLE	46375	MR. RICK H. HOOD	LAKE	LT CALUMET R VIA UNNAMED DITCH	MINOR	ACTIVE	REFINED PETROLEUM PIPELINE	04040001
ING670008	NORCO PIPELINE, HARTSDALE STAT	+4130200	-08726580	PRIVATE	NORCO PIPELINE, HARTSDALE STAT	RR #1, BOX 131D	CENTRAL AVE. & DIVISION STREET	SCHERERVILLE,	46375	MR. RICK HOOD	LAKE	LT CALUMET RV VIA DITCH TRIB	MINOR	ACTIVE	REFINED PETROLEUM PIPELINE	04040001
ING340015	LAKETON REFINING, HARTSDALE TE	+4130200	-08726250	PRIVATE	LAKETON REFINING HARTSDALE TRM	ROUTE 1 BOX 131-D, CNTRL & DIV		SCHERERVILLE	46375	MR. GREGG FISHER	LAKE	LT CALUMET R VIA UNNAMED DITCH	MINOR	ACTIVE	PETROLEUM BULK STATIONS & TERM	07120001
IN0054712	NORCO PIPELINE, INC. HARTSDALE	+4130150	-08727000	PRIVATE	NORCO PIPELINE, INC.	RR1 BOX 131 D		SCHERERVILLE	46375	MR. RICK H. HOOD	LAKE	TURKEY CR VIA UNNAMED DITCH	MINOR	INACTIVE	REFINED PETROLEUM PIPELINE	07120001

* Denotes site located within three HUC watersheds being studied.

Table X.Xa: NPDES located within Lake and Porter counties.

FACILITY ID	FACILITY NAME	LATITUDE	LONGITDUE	OWNER TYPE	MAILING NAME	STREET 1	STREET 2	MAILING CITY	ZIP	OFFICIAL NAME	COUNTY	RECEIVING BODY	MAJOR_CODE	ACTIVE_COD	STANDARD_I	HYDROLOGIC
IN0024457	SCHERERVILLE MUNICIPAL STP	+4130060	-08727520	PUBLIC	SCHERERVILLE WASTEWATER TR FAC	550 KAESER BOULEVARD		SCHERERVILLE	46375	MR. BRIAN P. TUCKER, SUPT.	LAKE	LITTLE CALUMET R VIA SCHERERVILLE D	MAJOR	ACTIVE	SEWERAGE SYSTEMS	04040001
IN0032409	DYER TOWN OF-WATER UTILITY	+4130000	-08731000	PUBLIC	DYER WATER UTILITY BILLING DEP	1 TOWN SQUARE		DYER	463111708		LAKE		MINOR	INACTIVE	WATER SUPPLY	07120001
IN0039381	HIGHLAND MUNICIPAL STP	+4130000	-08730000	PUBLIC						MR. TERRE, THURMAN	LAKE		MINOR	INACTIVE	SEWERAGE SYSTEMS	07120001
IN0039331	DYER MUNICIPAL STP	+4129580	-08730550	PUBLIC	DYER WASTEWATER TREATMENT PLAN	518 EDMOND DRIVE		DYER	46311	MR. FRANK JACHIM, CERT. OPER.	LAKE	LITTLE CALUMET R VIA PLUM CR (HART)	MAJOR	ACTIVE	SEWERAGE SYSTEMS	07120001
IN0035548	MERRILLVILLE CONSERVANCY DIST.	+4130000	-08721000	PUBLIC	MERRILLVILLE CONSERVANCY	6250 BROADWAY		MERRILLVILLE	46410	CHRISTINE SAVARESE	LAKE	SRVD BY GARY	MINOR	ACTIVE	SEWERAGE SYSTEMS	04040001
IN0043907	COMMUNITY UTILITIES OF GARY	+4130000	-08721000	PUB PRI	COMMUNITY UTILITIES OF GARY	2036 W 81 ST	6610 ELLSWORTH PLACE	MERRILLVILLE	46410	MR. WASHBURN, VERNE E.	LAKE	TURKEY CR TO DEEP R TO LT CALUMET R	MINOR	ACTIVE	LAND SUBDIVIDERS & DEV, EX CEM	04040001
IN0044580	BROOKVIEW TERRACE SUBDIVISION	+4130000	-08715300	PUB PRI	BROOKVIEW UTILITIES	16TH & LIVERPOOL	16TH AND LIVERPOOL	HOBART	46342	JOHN DAVIDS	LAKE	TURKEY CR TO DEEP R TO LT CALUMET R	MINOR	ACTIVE	LAND SUBDIVIDERS & DEV, EX CEM	04040001
IN0032069	AMERICAN TRAILER COURT	+4130000	-08700000	PRIVATE							PORTER	?	MINOR	INACTIVE	SEWERAGE SYSTEMS	04040001
IN0022811	DYER WATER DEPT	+4129300	-08731060	PUBLIC	DYER PUBLIC WATER SUPPLY	2140 MOELLER		DYER	463111708		LAKE	?	MINOR	INACTIVE	WATER SUPPLY	07120001
IN0029971	LINCOLN UTILITIES INC.	+4129120	-08720060	STATE							LAKE	?	MINOR	INACTIVE	SEWERAGE SYSTEMS	04040001
ING080051	UNITED GAS STATION #6089	+4129000	-08722000	PRIVATE	UNITED GAS STATION, #6089	7113 TAFT AVENUE (ROUTE 55)		MERRILLVILLE,		MR. GENE POOLE	LAKE	TURKEY CR VIA UNNAMED DITCH	MINOR	ACTIVE	GASOLINE SERVICE STATIONS	04040001
IN0057380	UNITED GAS STATION #6089	+4129000	-08721540	PRIVATE	EMRO MARKETING COMPANY	UNITED GAS STATION #6089	7113 TAFT AVENUE	MERRILLVILLE	46410	MR. G. W. POOLE	LAKE	TURKEY CR VIA STORM SEWER	MINOR	INACTIVE	GASOLINE SERVICE STATIONS	04040001
IN0031089	LINCOLN GARDEN SUBD.	+4129000	-08721000	PUB PRI	WESLEYAN CHURCH OF MERRILLVILL	2920 W 73RD PL		MERRILLVILLE	46410	MR. JAMES G. HOLLIS, PRESIDENT	LAKE	TURKEY CR VIA KAISER DITCH	MINOR	ACTIVE	LAND SUBDIVIDERS & DEV, EX CEM	04040001
IN0057703	WASHINGTON TOWNSHIP SCHOOL	+4129000	-08659350	PUB PRI	WASHINGTON TWP. SCHOOL WWTP	1200 W. OF COUNTY RD. 400 E.	1100 N. OF S.R. 2	NR VALPARAISO	46383	MR. ROGER LUEKENS,SUPT	PORTER	KANKAKEE R VIA HUTTON DITCH	MINOR	ACTIVE	ELEMENTARY & SECONDARY SCHOOLS	04040001
IN0056766	MARATHON SERVICE STATION #2318	+4128560	-08725510	PRIVATE	MARATHON OIL CO, STATION #2318	7889 WEST LINCOLN HIGHWAY		SCHERERVILLE		MR. DAVE WOODSMALL	LAKE	TURKEY CR VIA LAKE GEORGE VIA DITCH	MINOR	INACTIVE	GASOLINE SERVICE STATIONS	04040001
IN0032239	SCHERERVILLE HGHTS UTL INC	+4128000	-08726000	PRIVATE							LAKE	?	MINOR	INACTIVE	SEWERAGE SYSTEMS	04040001
IN0024660	VALPARAISO MUNICIPAL STP	+4128010	-08704300	PUBLIC	ELDEN KUEHL POLLUTION CON FAC		1251 JOLIET ROAD	VALPARAISO	46383	MR. RICHARD E. CONDON	PORTER	LT CALUMET R VIA SALT CREEK	MAJOR	ACTIVE	SEWERAGE SYSTEMS	04040001
IN0050504	CHEM-METALS INC.	+4128000	-08703000	PRIVATE							PORTER		MINOR	INACTIVE	2NDARY SMELT/NONFERROUS METALS	04040001
IN0000302	CCA OF INDIANA, INC.	+4128000	-08703000	PRIVATE	COCA COLA FOODS	2351 INDUSTRIAL DR	2351 INDUSTRIAL DRIVE	VALPARAISO	46383	MR. JOHN BERIBISH	PORTER	SAGER LAKE VIA A DRAINAGE DITCH	MINOR	INACTIVE	METAL CANS	04040001
IN0042498	VALPARAISO WTR WRKS-FLINT LAKE	+4128000	-08703000	PUBLIC	FLINT LAKE WWTP	1903 PUMPING STATION RD		VALPARAISO	46383	MR. PAUL TUMO, CERT. OPER.	PORTER	LT CALUMET R BASIN - FLINT LAKE	MINOR	ACTIVE	WATER SUPPLY	04040001
IN0029866	WILLIAMSBURG MANOR M.H.P.	+4128000	-08701000	PUB PRI						MR. GOOD, JERALD J.	PORTER	KOSELKI DITCH	MINOR	INACTIVE	OPER OF RES MOBILE HOME SITES	04040001
IN0031771	JOHN WOOD ELEMENTARY SCHOOL	+4127300	-08715000	PUB PRI	JOHN WOOD ELEMENTARY SCHOOL	6100 E 73RD AVE	6100 EAST 73RD AVENUE	MERRILLVILLE	46410	DR. ANTHONY LUX, SUPT.	LAKE	DEEP R TO LITTLE CALUMET RIVER	MINOR	ACTIVE	ELEMENTARY & SECONDARY SCHOOLS	04040001
IN0109410	ST. JOHN MUNICIPAL STP	+4127000	-08728100	PUBLIC						MR. FOLTZ, HAL	LAKE		MINOR	INACTIVE	SANITARY SERVICES, NEC	07120001
IN0046051	ANR PIPELINE CO., ST. JOHN	+4126070	-08729000	PRIVATE	SAINT JOHN COMPRESSOR STATION	10313 WHITE OAK AVE	1/2 MILE NORTH OF 101ST AVE	SAINT JOHN	46373	JENNIFER STERLY, ENV. ENGR.	LAKE	KANKAKEE R VIA BULL RUN VIA TRIB	MINOR	ACTIVE	NATURAL GAS TRANSMISSION	07120001
IN0025763	CROWN POINT MUNICIPAL STP	+4126080	-08721330	PUBLIC	CROWN POINT WWTP		1321 MERRILLVILLE ROAD	CROWN POINT	46307	MR. GREGORY L. SHOOK, SUPT.	LAKE	DEEP R VIA BEAVER DAM DITCH	MAJOR	ACTIVE	SEWERAGE SYSTEMS	04040001
IN0056995	ST. JOHN WATER WORKS	+4126000	-08728300	PUBLIC	ST. JOHN WATER WORKS	10200 WICKER AVENUE		ST. JOHN	46373	MR. CLARENCE MONIX, SUPT..	LAKE	KANKAKEE R VIA WEST CR VIA BULL RUN	MINOR	ACTIVE	WATER SUPPLY	07120001
IN0030821	HYLES-ANDERSON COLLEGE	+4126000	-08721000	PUBLIC							LAKE		MINOR	INACTIVE	ELEMENTARY & SECONDARY SCHOOLS	04040001
IN0042943	LAKE REGION CHRISTIAN ASSEMBLY	+4125540	-08721420	PUB PRI	LAKE REGION CHRISTIAN ASSEMBLY	7007 E 117TH AVE		CROWN POINT	46307	MR. MIKE MAUGER	LAKE	CEDAR CR TO KANKAKEE RIVER	MINOR	ACTIVE	SPORTING & RECREATIONAL CAMPS	07120001
IN0032557	CROWN POINT WTR TRMT PLT	+4125000	-08721000	PUBLIC	CROWN POINT WWTP	1321 MERRILLVILLE		CROWN POINT	46307		LAKE	?	MINOR	INACTIVE	WATER SUPPLY	04040001
IN0025283	SOUTH COUNTY UTILITIES	+4124540	-08721420	PUB PRI	SOUTH COUNTY UTILITIES	125TH AVE & WHITE OAK RD	P.O. BOX 265	CROWN POINT	46307	MR. MIKE NOVAC, CERT OPERATOR	LAKE	CEDAR CR VIA FOSS DITCH	MINOR	ACTIVE	LAND SUBDIVIDERS & DEV, EX CEM	07120001
IN0031259	UTILITIES INC	+4124000	-08727000	PRIVATE							LAKE	?	MINOR	INACTIVE	SANITARY SERVICES, NEC	07120001
IN0037176	TWIN LAKES UTILITIES	+4123450	-08713500	PUB PRI	TWIN LAKES UTILITIES	9201 E 123RD AVE	9201 EAST 123 AVENUE	CROWN POINT	46307	MR. HARRY ZIMMER, REG DIR OP	LAKE	KANKAKEE R VIA STONEY RUN CREEK	MINOR	ACTIVE	LAND SUBDIVIDERS & DEV, EX CEM	07120001
IN0052248	MORGAN TOWNSHIP SCHOOLS	+4123300	-08703300	PUB PRI	MORGAN TOWNSHIP SCHOOL		299 SOUTH STATE ROAD 49	VALPARAISO	46383	MR. CURTIS CASBON, PRINCIPAL	PORTER	KANKAKEE R VIA SANDY HOOK D-AHLGRIM	MINOR	ACTIVE	ELEMENTARY & SECONDARY SCHOOLS	07120001
IN0057029	PORTER TOWNSHIP SCHOOL CORP.	+4123050	-08709400	PUB PRI						MR. LEROY J. WEBDELL, SUPT.	PORTER	KANKAKEE R VIA LUDDINGTON D - ARM 3	MINOR	ACTIVE	ELEMENTARY & SECONDARY SCHOOLS	07120001
IN0022527	CEDAR LAKE TOWN OF	+4122000	-08726000	PUBLIC							LAKE	?	MINOR	INACTIVE	SEWERAGE SYSTEMS	07120001
IN0033081	LAKE DALE DEVELOPMENT	+4120000	-08724000	PUB PRI	DALECARLIA UTILITIES LAKE DALE	3476 STELLHORN RD	P.O. BOX 197	FORT WAYNE	46835	MR. DONALD RICE	LAKE	CEDAR CR TO KANKAKEE RIVER	MINOR	ACTIVE	LAND SUBDIVIDERS & DEV, EX CEM	07120001
IN0044342	HEBRON TOWN OF WTR TRMT PLT	+4119120	-08712000	PUBLIC	HEBRON WWTP	106 1/2 E SIGLER		HEBRON	463410478		PORTER		MINOR	INACTIVE	WATER SUPPLY	07120001
IN0056928	MARATHON SERVICE STATION #1291	+4119070	-08701330	PRIVATE	MARATHON OIL CO., STATION 1291	JCT. S.R. 49 AND S.R. 8		KOUTS		MR. MATTHEW J. WRIGHT	PORTER	KANKAKEE R VIA KOUTS STORM SEWER	MINOR	ACTIVE	GASOLINE SERVICE STATIONS	07120001
INP000068	MERIT STEEL COMPANY, INC.	+4119030	-08702170	PRIVATE	MERIT STEEL	STATE ROAD 8 WEST		KOUTS	46347	MR. JAMEY FORD	PORTER	KOUTS STP (KANKAKEE RIVER BASIN)	MINOR	ACTIVE	STEEL WIRE DRAW & STEEL NAILS	07120001
IN0020061	HEBRON MUNICIPAL STP	+4119000	-08712000	PUBLIC	HEBRON MUNICIPAL WWTP	101 UTILITY DR	106 EAST SIGLER	HEBRON	463410478	MR. MIKE NOVAC, CERT. OPER.	PORTER	KANKAKEE R VIA COBBS CREEK	MINOR	ACTIVE	SEWERAGE SYSTEMS	07120001
IN0051446	LAKE ELIZA CONSERVANCY DIST.	+4119000	-08712000	PUBLIC	LAKE ELIZA CONSERVANCY DIST.	1000 FT WEST OF COUNTY RD 500W	& 1000 FT NORTH OF CO RD 100 S			MR. WALTER MATHENEY, PRESIDENT	PORTER	KANKAKEE R VIA WOLF CR - LUDINGTON	MINOR	ACTIVE	SEWERAGE SYSTEMS	07120001
ING080067	AMOCO OIL COMPANY, ST. #10052	+4117360	-08725270	PRIVATE	AMOCO OIL COMPANY, ST. #10052	221 EAST COMMERCIAL AVENUE		LOWELL		STEPHEN VARSA, HYDROGEOLOGIST	LAKE	GROUNDWATER INJECTION	MINOR	ACTIVE	GASOLINE SERVICE STATIONS	07120001
IN0023400	KOUTS MUNICIPAL STP	+4117000	-08704000	PUBLIC	KOUTS TOWN OF	210 S MAIN	KOUTS TOWN HALL	KOUTS	46347	MR. BARRY LOBODY, CERT. OPER.	PORTER	KANKAKEE R VIA BENKIE DITCH	MINOR	ACTIVE	SEWERAGE SYSTEMS	07120001
IN0023621	LOWELL MUNICIPAL STP	+4115500	-08725040	PUBLIC	LOWELL WASTEWATER TR. PLANT	7500 BELSHAW ROAD		LOWELL	46356	MR. JOE PANCINI, CERT. OPER.	LAKE	CEDAR CR TO KANKAKEE RIVER	MAJOR	ACTIVE	SEWERAGE SYSTEMS	07120001
IN0056308	NORTHERN IND. MATERIALS CORP.	+4113300	-08726480	PRIVATE	STONEHENGE QUARRY	NORTHERN IND. MATERIALS CORP.	205TH STREET	LOWELL	46356	MR. WILLIAM J. CRISTER	LAKE	CEDAR CR VIA BRUCE DITCH	MINOR	INACTIVE	CRUSHED AND BROKEN LIMESTONE	07120001
IN0056286	LOWELL MINING COMPANY	+4113300	-08726480	PRIVATE	LOWELL MINING CO	W 1/2 SE 1/4 SEC 9 R 9 W T 32	SOUTH WICKER BOULEVARD	LOWELL,	46356	MR. TERRANCE J. MCGHEE	LAKE	CEDAR CR VIA BRUCE DITCH	MINOR	INACTIVE	CRUSHED AND BROKEN LIMESTONE	07120001
IN0040592	SCHNEIDER MUNICIPAL STP	+4113000	-08727000	PUBLIC	SCHNEIDER WWTP	22700 PARRISH AVE	22700 PARRISH AVENUE	SCHNEIDER	46376	MR. MICHAEL KOHANYI, CERT. OP.	LAKE	KANKAKEE R VIA BROWN DITCH	MINOR	ACTIVE	SEWERAGE SYSTEMS	07120001

* Denotes site located within three HUC watersheds being studied.

Table X.Xb: NPDES permits located within Lake and Porter counties, cont.

Appendix 18

Action Items

RW ARMSTRONG
Inspiration to reality.

Goal 1: Reduce *E.coli* levels in the Little Calumet River by reducing loads to the River to meet beneficial uses.			
	Short Term Milestones and Measurable Goals (through 2009)	**Medium Range Milestone and Measurable Goals (through 2013)**	**Long Term Milestones and Measurable Goals (through 2028)**
Action Item 1: Develop pet waste campaign			
	Locate at least three (3) areas where a pet waste educational campaign would be beneficial.	Develop database of all pet stores and begin program to educate customers regarding pet waste disposal.	Conduct 15 educational events in targeted areas to educate public regarding pet waste disposal.
Action Item 2: Develop septic system maintenance program			
	Develop septic maintenance awareness program targeted at homeowners, realtors, and health departments	Complete GIS of known septic systems by determining which buildings have or had septic systems. (Possibly based on construction date and sewer availability at that time.)	Locate, map, and inspect all known septic systems.
	Develop and utilize an existing onsite sewage disposal systems (OSDS) inventory.	Develop and implement policies that require inspection and maintenance of OSDS such as a Point of Sale Ordinance in each municipality in the watershed.	Map results of inspection in a central GIS of the watershed and in each communities GIS.
Action Item 3: Reduce *E.coli* loading from agricultural sources			
	Identify five (5) areas where wildlife and/or livestock have the greatest impact on the river.	Implement a pond/lake management campaign to reduce nuisance wildlife habitat and implement animal waste management practices by completing one (1) improvement project in each of the five (5) areas.	Add a database of areas impacted by nuisance wildlife and animal waste to each municipalities GIS as part of the pond/lake management campaign.
	Locate and map all livestock operations within the watershed.	Contact property owners of all livestock operations to discuss E.coli pollution prevention and animal waste management.	Install natural buffer areas between five (5) largest livestock operations and waterways.
Action Item 4: Reduce *E.coli* loading from urban sources and Install Best Management Practices (BMPs) to reduce E.coli loading to the River			
	Acquire land and funding to restore 400 acres between the levees to wetlands.	Complete restoration of 400 acres of wetlands between the levees.	Complete restoration of 4780 acres of wetlands.
	Identify three (3) municipalities capable of and willing to implement a Rain Garden installation program.	Install 100 Rain Gardens in the three (3) identified municipalities and add three (3) more municipalities to the programs.	Install 300 Rain Gardens in the six (6) identified municipalities and add all remaining municipalities to the programs.
	Develop Green Parking and Green Roofs ordinances in five (5) municipalities within the watershed.	Allow or Install five (5) green roofs or green parking lots within the five (5) municipalities. Develop Green Parking and Green Roofs ordinances in all remaining municipalities withinthe watershed.	Allow or Install twenty (20) green roofs or green parking lots within the watershed.
	Identify at least twenty (20) areas that could utilize infiltration practices such as grassed swales, infiltration basins, infiltration trenches, and bioretention and prioritize them.	Complete installation of three (3) of the twenty (20) infiltration practices.	Complete installation of ten (10) of the twenty (20) infiltration practices.
	Identify ten (10) areas that vegetated buffers would be most beneficial.	Install 500 LF of vegetated buffers in key areas.	Install 2,000 LF of vegetated buffers in key areas.
	Identify at least fifteen (15) locations for retention/detention ponds and begin land acquisition process as needed.	Complete installation of at least three (3) of the fifteen (15) retention/detention ponds.	Complete installation of at least ten (10) of the fifteen (15) retention/detention ponds.
	Identify five (5) municipalities willing to install/require storm water filtration such as bioretention, rain gardens, sand filters, filter strips, catch basin inserts, and storm water filters/separators.	Pass necessary ordinances in five (5) municipalities within the watershed for the installation of these practices and install ten (10) such practices.	Pass necessary ordinances in all municipalities within the watershed for the installation of these practices and install forty (40) such practices.
		As part of the plan update, research *E.coli* treatment strategies and determine which BMPs or other programs are most successful, and add them to the updated report.	Develop and implement an education/training program for system designers, installers and inspectors to attend.
		Implement conservation measures through the use of local ordinances that will reduce the *E.coli* loads generated during high volume stormwater resulting in CSO events	Construct BMPs throughout the watershed that will reduce the *E.coli* loads that are generated by CSO events and other sources.

Goal 2: Reduce sediment loads by source reduction strategies and, in priority subwatersheds, through the use of BMPs.			
	Short Term Milestones and Measurable Goals (through 2009)	**Medium Range Milestone and Measurable Goals (through 2013)**	**Long Term Milestones and Measurable Goals (through 2028)**
Action Item 1: Reduce sediment loads from agricultural land			
	Identify and contact at least ten (10) eligible landowners and discuss benefits of Farm Bill cost-share programs that are specific to their land; as identified in the IN NRCS Field Office Technical Guide.	Develop conservation program targeted at the landowners that agreed to participate in the Farm Bill cost-share program and enroll at least five (5) of the participants.	Continue to identify and contact landowners and enroll at least ten (10) of the participants in the Farm-Bill cost-share program in the conservation program.
Action Item 2: Reduce sediment loads from urban/rural sources.			
	Incorporate 80% TSS reduction standard into ordinances governing new developments in five (5) municipalities in the watershed.	Incorporate 80% TSS reduction standard into ordinances governing new developments in all municipalities in the watershed.	Implement structural practices that reduce the average annual TSS loadings by 80% or reduce the post-development loadings of TSS so that the average annual resulting TSS loadings are no greater than predevelopment TSS loadings in all municipalities.
	Identify twenty (20) locations that sediment traps could be installed.	Install five (5) sediment traps in key locations in the watersheds.	Install ten (10) sediment traps in key locations in the watersheds.
	Post Indiana Stormwater Manual and supporting storm water and erosion control ordinances to the websites of each municipality so it is readily available to developers and site planners to utilize.	Develop case studies which highlight innovative BMPs and other effective practices to share with neighboring communities and to present to targeted audiences, including stormwater managers, city engineers, developers and builders.	Create and utilize a GIS based storm water BMP tracking system in all municipalities.
	Review existing land use plans, zoning and ordinances in each municipality to see if there are any barriers to implementing "Smart Growth" principles or LID practices.	Update land use plans, zoning and ordinances to allow for "Smart Growth" and various LID practices in each municipality as needed.	Update land use plans, zoning, and ordinances in each muynicipality to ensure that they allow for "Smart Growth" and various LID practices.
Action Item 3: Reduce sediment loading from marina and recreational boating sources			
	Identify existing and/or proposed marinas and encourage them to participate in Indiana Clean Marina Program.	Establish no-wake zones in all marinas	Establish cost-share program for marinas to stabilize eroding shorelines preferably using vegetative measures where feasible.
	Identify five (5) areas in marinas that would benefit most from shoreline stabilization practices.	Implement measures aimed at stabilizing shorelines in at least two (2) identified areas.	Implement measures aimed at stabilizing shorelines in at least five (5) identified areas and identify five (5) more areas.
Action Item 4: Reduce sediment loading from proposed or existing hydromodification projects			
	Identify at least ten (10) areas that would benefit from channel modification to encourage sedimentaion and reduce erosion.	Complete necessary modeling on five (5) of the proposed channel modification sites to evaluate the effectiveness of the plans.	Complete proposed modifications and install other BMPs as appropriate at a minimum of three (3) of the proposed sites.
	Develop a stream and riparian area restoration work plan that includes ten (10) areas for restoration and/or protection.	Implement the developed stream and riparian area restoration work plan in at least two (2) areas.	Implement the developed stream and riparian area restoration work plan in at least five (5) areas.
Action Item 5: Public and Municipality Involvement			
	Develop LID presentation that can travel and is targeted at specific audiences.	Give presentation to decision makers in all municipalities.	Conduct five (5) training workshops focused on development and the benfits of LID methods.
	Develop LID ordinances or policies to use in multiple jurisdictions	Establish LID ordinances in five (5) municipalities.	Establish LID ordinances in all municipalities.

Goal 3: Reduce nutrient loads by source reduction strategies and, in priority subwatersheds, through the use of Best Management Practices (BMPs)			
	Short Term Milestones and Measurable Goals (through 2009)	**Medium Range Milestone and Measurable Goals (through 2013)**	**Long Term Milestones and Measurable Goals (through 2028)**
Action Item 1: Reduce nutrient loads from Agricultural land			
	Identify and contact at least ten (10) eligible landowners and discuss benefits of Farm Bill cost-share programs that are specific to their land; as identified in the IN NRCS Field Office Technical Guide.	Develop conservation program targeted at the landowners that agreed to participate in the Farm Bill cost-share program and enroll at least five (5) of the participants.	Continue to identify and contact landowners and enroll at least ten (10) of the participants in the Farm-Bill cost-share program in the conservation program.
Action Item 2: Reduce nutrient loads from urban/rural sources.			
	Identify ten (10) areas that grass lined channels would be most beneficial.	Install 1,000 LF of grass lined channels.	Install 5,000 LF of grass lined channel.
	Identify and develop partnerships with fertilizer manufacturers and distributors.	Develop program to offset cost and provide availability of phosphorus free fertilizer to local communities to be used on household lawns. Implement the program in at least three (3) municipalities.	Continue to make phosphorus free fertilizer available to communities through organization and cooperation with local stores to supply the fertilizer. Implement the program in all municipalities.
Action Item 3: Public and Municipality Involvement			
	Develop managed lands and homeowner outreach strategy that will educate the public about yard maintenance activities.	Conduct five (5) outreach events for homeowners and contact all golf courses within the watershed regarding maintenance activities.	Conduct fifteen (15) outreach events for homeowners and continue to work with all golf courses within the watershed regarding maintenance activities.

Goal 4: Restore, improve, and/or protect floodplains, wetlands, natural areas, and riparian corridors.			
	Short Term Milestones and Measurable Goals (through 2009)	**Medium Range Milestone and Measurable Goals (through 2013)**	**Long Term Milestones and Measurable Goals (through 2028)**
Action Item 1: Reduce habitat degradation associated with urban/rural areas.			
	Develop and adopt riparian setback ordinances that will aid in future project planning by delineating certain areas as “natural areas” in at least two (2) municipalities.	Develop and adopt riparian setback ordinances that will aid in future project planning by delineating certain areas as “natural areas” in at least five (5) municipalities.	Develop and adopt riparian setback ordinances that will aid in future project planning by delineating certain areas as “natural areas” in all municipalities.
	Develop wetland and riparian protection ordinances in local communities in at least two (2) municipalities.	Develop wetland and riparian protection ordinances in local communities in at least five (5) municipalities.	Develop wetland and riparian protection ordinances in local communities in all municipalities.
Action Item 2: Protect existing wetlands and riparian areas and restore degraded ones			
	Identify twenty (20) priority areas for restoration/mitigation that will have the greatest benefit to water quality and habitat connectivity and funding sources/partnerships to complete them.	Restore/mitigate at least two (2) of the priority areas.	Restore/mitigate at least ten(10) of the priority areas.
	Identify twenty (20) priority areas for protection, the current land owners, and potential funding sources.	Acquire through purchase or conservation easement at least two (2) of the priority areas for protection.	Acquire through purchase or conservation easement at least ten (10) of the priority areas for protection.
	Develop education and outreach material on the importance and function of wetlands and riparian areas to help protect them from adverse public impacts.	Conduct at least five (5) educational events on the importance and function of wetlands and riparian areas.	Conduct at least twenty (20) educational events on the importance and function of wetlands and riparian areas.

Goal 5: Improve public awareness/knowledge of pollutant loads, sources, and solutions, especially with regard to *E.coli*, and the impacts and risks associated with them.			
	Short Term Milestones and Measurable Goals (through 2009)	**Medium Range Milestone and Measurable Goals (through 2013)**	**Long Term Milestones and Measurable Goals (through 2028)**
Action Item 1: Promote positive/healthy locations for reactional purposes.			
	Identify gaps in public access sites and incorporate Coastal Program findings.	Work with the Health Department to increase the number and proper usage of signs regarding the current condition of the water.	Post warnings signs as needed at all public access sites.
Action Item 2: Increase public awareness and knowledge of water condition			
	Develop and implement an Adopt-A-Stream program in all municipalities within the watershed.	Develop and implement a Storm Drain Marking program in all municipalities and mark all storm drains.	Develop volunteer campaigns to involve the public in Reforestation Programs and Wetland Plantings and conduct at least five (5) events.
	Develop Project Wet (Water Education for Teachers) program.	Promote or assist in classroom programs such as Project WET (Water Education for Teachers) and conduct five (5) outdoor activities/workshops	Promote or assist in classroom programs such as Project WET (Water Education for Teachers) and conduct fifteen (15) outdoor activities/workshops
	Develop and conduct Public Service Announcements (PSAs) related to *E.coli* and recreation and develop a campaign to include educational inserts in utility bills.	Conduct five PSAs on at least three (3) local radio and television stations.	Conduct ten PSAs on at least three (3) local radio and television stations.

Goal 6: Create an active watershed alliance or conservancy district that facilitates and implements information sharing including ordinances, projects/experiences, and educational materials in a central location.			
	Short Term Milestones and Measurable Goals (through 2009)	**Medium Range Milestone and Measurable Goals (through 2013)**	**Long Term Milestones and Measurable Goals (through 2028)**
	Determine relevant players in organization and approach them for buy-in. Appoint representation from each group involved.	Host regular meetings of the alliance and develop a communication/outreach strategy to spread a consistent message.	Develop a website through coordination with local agencies.
	Approach public officials with idea and proposed structure to gain buy-in from the local communities and their administrations	Continue to gain support from the new administrations that are part of the various local communities and environmental groups across the watershed study area.	
	Develop organization structure alternatives with input of public officials and develop MOUs between jurisdictions in watershed		
	Coordinate available resources including those provided by NIRPC, IDEM, and the EPA	Develop a contiguous mapping system across political boundaries	Construct and maintain a website that is available for both general public use and municipality use.

Goal 7: Increase river corridor connectivity, river navigability, and public access sites and make the public aware of them.			
	Short Term Milestones and Measurable Goals (through 2009)	**Medium Range Milestone and Measurable Goals (through 2013)**	**Long Term Milestones and Measurable Goals (through 2028)**
	Incorporate (into public education materials) the finding from the pending Coastal Program study regarding significant gaps in public access on sections of the river	Utilize new Coastal Program data and develop maps and web resources highlighting access sites along the Little Calumet River and its tributaries	Distribute maps and increase knowledge of web resources to general public in the communities along the Little Calumet River and its tributaries
	Identify ten (10) areas that would be most effective in improving connectivity along the river and its tributaries.	Design and construct at least two (2) projects that improve connectivity along the river.	Design and construct at least five (5) projects that improve connectivity along the river.
	Identify ten (10) areas along waterway that create the greatest obstruction in the navigability	Develop long range plan to replace structures obstructing navigability on the river.	Install at least three (3) projects that increase navigability on the river.
	Discuss culvert alternatives with state and federal highway authorities	Implement culvert alternatives as parts of other ongoing projects.	Install at least three (3) projects that increase navigability on the river.
	Identify at least ten (10) areas where a new public access site are possible and would be beneficial.	Acquire land and construct at least one (1) new public access site.	Acquire land and construct at least three (3) new public access site.

Appendix 19

Load Reductions

RW ARMSTRONG
Inspiration to reality.

The Watershed Treatment Model (WTM) was first released in 2001 as version 3.0 by the Center for Watershed Protection through funding by the United States Environmental Protection Agency (EPA). Since its original release an updated version has been made available and is called version 3.1. It is the WTM Version 3.1 that was used to find both the expected pollutant loads for each sampling site based on land use alone and the expected load reductions for each HUC 14-digit watershed located in the study area. Version 3.1 of the WTM can be found on the Stormwater Center's website at: http://www.stormwatercenter.net/monitoring%20and%20assessment/watershed_treatment_model.htm.

To calculate the load reductions expected through the implementation of various best management practices (BMPs) in the sub-watersheds the current land use distributions were first entered into the "Primary Sources" worksheet. Other information included on the "Primary Sources" sheet were the planning horizon of 20 years and the stream length which varied in the three watersheds. The impervious area percentages were also changed to reflect a more realistic value. Those changed included medium density and high density urban to 65% and 75%, respectively. The impervious area percentage for the rural land use category was listed at 3% to reflect the land use that was included in the category. Table 1 shows the area in acres used for each land use category for the three 14-digit watersheds along with the impervious percentages used.

The next input worksheet in the WTM Version 3.1 was a "Secondary Sources" worksheet that had no input on any of the watersheds except that "Method 1" was used for channel erosion calculations. This method used an annual sediment loading rate and a bank erosion rate, both of which were default settings in the model.

An outline of the existing management practices was included in the third worksheet of the workbook. The only existing practice included the use of what was currently identified as wetlands being considered riparian buffer areas due to the fact that they were in poor shape and therefore could not act as a proper wetlands corridor.

The next worksheet to have input data was the "Future Management Practices" which outlined a number of different programs. The practices included for incorporation into the plan were a lawn care program and a pet waste program both being promoted via the newspaper. An erosion and sediment control program was also considered to be put in place that would regulate 80 percent of the building permits. Along with the 80 percent of permits regulated a factor of 0.7 was used as the compliance discount and 0.6 for the installation/maintenance discount. The use of street sweeping in the communities within the watershed was also assumed to be happening on a monthly basis. The technique discount was considered to be 0.5 due to on-street parking and a lack of training for street sweepers in most communities.

	Primary Sources Land use	Area (acres)	Impervious Percentage
E-W Split Watershed 07120003030050	Medium Density Urban	4007.5	65
	High Density Urban	1746.4	75
	Roadway	234.1	100
	Forest	1650.5	0
	Rural	1617.5	3
	Open Water	364.7	0
	Active Construction	54.9	2
LC & DR Watershed 04040001040020	Medium Density Urban	5038	65
	High Density Urban	1719.8	75
	Roadway	246.7	100
	Forest	2640.6	0
	Rural	2592.9	3
	Open Water	248.6	0
	Active Construction	49.5	2
WC & BD Watershed 04040001040030	Medium Density Urban	3015.2	65
	High Density Urban	1630.7	75
	Roadway	412	100
	Forest	2921.8	0
	Rural	4318.5	3
	Open Water	119.2	2
	Active Construction	102.2	0

Table 1: “Primary sources” land use areas and percentages.

Other future management practices being considered for implementation in the watershed management plan included a variety of structural BMP’s. Table 2 list the structural BMPs implemented in each 14-dgit watershed. The last future management practice used was a septic system education program. The media used to spread the message was considered to be the newspaper with a factor or 0.3.

	BMP Type	Acreage
E-W Split Watershed	Infiltration Strip	17
	Wet Pond	200
	Dry Extended Detention Pond	100
	Wetlands	1857
LC & DR Watershed	Infiltration Strip	21
	Wet Pond	200
	Dry Extended Detention Pond	151
	Wetlands	970
WC & BD Watershed	Infiltration Strip	54
	Wet Pond	200
	Dry Extended Detention Pond	256
	Wetlands	1954
COMBINED	Infiltration Strip	92
	Wet Pond	600
	Dry Extended Detention Pond	506
	Wetlands	4780

Table 2: BMP acreage for 14-digit watersheds.

Based on the structural BMPs implemented in each 14-digit watershed the future land use changed. For the E-W split watershed the future land use only changed in regards to areas becoming wetlands and therefore being classified as forest. For the remaining two watersheds an area of development was considered to take place in the southern portion of Porter County. This development was considered to be medium density urban and therefore not only was land converted to wetlands but land was also converted to residential. Table 3 shows the future land use acreage for each HUC 14-digit watershed.

Watershed	Future Land use	Area (acres)
E-W Split Watershed 071200030300050	Medium Density Urban	4007.5
	High Density Urban	1746.4
	Roadway	234.1
	Forest	2731.9
	Rural	570.1
	Open Water	364.7
	Active Construction	21.2
LC & DR Watershed 040400010400020	Medium Density Urban	5620.3
	High Density Urban	1719.8
	Roadway	246.7
	Forest	3219.2
	Rural	1446.7
	Open Water	248.6
	Active Construction	34.9
WC & BD Watershed 040400010400030	Medium Density Urban	4981.6
	High Density Urban	1630.7
	Roadway	412
	Forest	4431.6
	Rural	927.4
	Open Water	119.2
	Active Construction	17.1

Table 3: Future land use based on Future BMPs and Porter County Development.

Based on the input listed above the WTM Version 3.1 produced a "Summary Sheet" that contained a table showing the total, storm, and non-storm loads for Total Nitrogen, Total Phosphorus, Total Suspended Solids and Bacteria (Fecal) for existing practices and land use as well as that resulting from future practices being implemented. Table 4 shows the pollutant loads that were found using the WTM. A reduction line was added to each table to show the percentage reduction resulting from the future management practices implemented.

Summary of All Loads			TN lb/year	TP lb/year	TSS lb/year	Bacteria billion/year
07120003030050	Existing	Total	77981.91476	9705.439401	4837800	2914706.201
		Storm	67530.37976	9084.384401	4748591.5	2914706.201
		Non-Storm	10451.535	621.055	89208.5	0
	With Future Practices	Total	63455.42237	7361.817466	744691.9419	1750534.83
		Storm	55941.22165	6799.509151	655483.4419	1750534.83
		Non-Storm	7514.200714	562.3083143	89208.5	0
	Reduction	Total	14526.49239	2343.621935	4093108.058	1164171.372
		Percentage	18.63%	24.15%	84.61%	39.94%
04040001040020	Existing	Total	92725.31373	11734.39655	6268050	3387752.015
		Storm	80278.81373	10907.15155	6177182	3387752.015
		Non-Storm	12446.5	827.245	90868	0
	With Future Practices	Total	81186.87367	10107.42633	1915031.232	2517449.232
		Storm	72243.10359	9350.235932	1824163.232	2517449.232
		Non-Storm	8943.770088	757.1904018	90868	0
	Reduction	Total	11538.44006	1626.970215	4353018.768	870302.783
		Percentage	12.44%	13.86%	69.45%	25.69%
04040001040030	Existing	Total	80958.98496	10490.05076	6259800	2600590.923
		Storm	65848.42496	9348.25776	6168921	2600590.923
		Non-Storm	15110.56	1141.793	90879	0
	With Future Practices	Total	66306.45792	7947.396173	707266.3968	1179873.779
		Storm	53532.37408	6852.332697	616387.3968	1179873.779
		Non-Storm	12774.08384	1095.063477	90879	0
	Reduction	Total	14652.52704	2542.654586	5552533.603	1420717.144
		Percentage	18.10%	24.24%	88.70%	54.63%
Combined	Existing	Total	251666.2134	31929.88671	17365650	8903049.138
		Storm	213657.6184	29339.79371	17094694.5	8903049.138
		Non-Storm	38008.595	2590.093	270955.5	0
	With Future Practices	Total	210948.754	25416.63997	3366989.57	5447857.84
		Storm	181716.6993	23002.07778	3096034.07	5447857.84
		Non-Storm	29232.05464	2414.562193	270955.5	0
	Reduction	Total	40717.45949	6513.246737	13998660.43	3455191.298
		Percentage	16.18%	20.40%	80.61%	38.81%

Table 4: Pollutant loads for existing and future practices found using the WTM Version 3.1.

One drawback of the WTM being used to find load reductions is the fact that they use fecal bacteria in lieu of *E.coli* bacteria. There is a direct correlation between the two bacteria forms and according to the TMDL prepared for the Little Calumet River *E.coli* is typically 80% of the value that fecal bacteria is found to be. With this direct correlation knowledge the percentage reduction found over the entire study area, 38.81%, was used to reduce the *E.coli* concentrations found at each of the 42 sampling locations tested again. The result of this reduction is shown in Table 5.

Sampling Location	E.coli (cfu/100ml)			
	Dry Weather (7/24/2007)		Dry Weather (10/30/2007)	
	Sampling Results	38.81% Reduction	Sampling Results	38.81%Reduction
1		0	225	138
2	1804	1104	341	209
3	448	274	190	116
4	25	15	218	133
5	396	242	174	106
6	94	58	52	32
7	2	1	3	2
8	3	2	5	3
9	1	1	32	20
10	228	140	15	9
11	207	127	144	88
12	108	66	15	9
13	56	34	1	1
14	353	216	20	12
15	270	165	46	28
16	692	423	75	46
17	119	73	78	48
18	345	211	58	35
19	1	1	428	262
20	88	54	113	69
21	51	31	79	48
22	111	68	7	4
23	374	229	40	24
24	505	309	77	47
25	275	168	48	29
26	68	42	16	10
27	937	573	445	272
28	375	229	260	159
29	158	97	5	3
30	168	103	18	11
31	5	3	72	44
32	72	44	102	62
33	50	31	8	5
34	71	43	19	12
35	129	79	27	17
36	51	31	2	1
37	4	2	92	56
38	3	2	79	48
39	36	22	67	41
40	9	6	2	1
41	86	53	44	27
42	913	559	586	359

Table 5: Sampling locations dry weather *E.coli* loads resulting from percentage load reduction.

Appendix 20

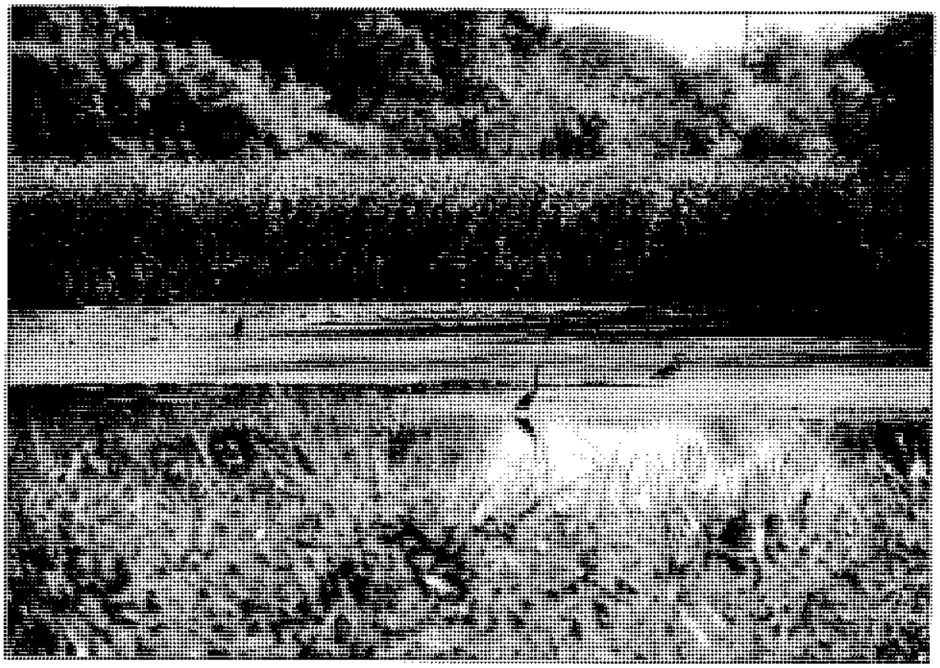
Public Meetings

RW ARMSTRONG™
Inspiration to reality.

Public meetings were held during the creation of the Little Calumet River Watershed Management Plan in order to get continued public input. The first was held on Thursday, March 1, 2007 at the Indiana University Northwest Library Conference Center. The flyer that was created to invite the public is located in this appendix. A newspaper article was also printed and can be found after the flyer. From this meeting public comments were made and can be found as part of the Little Calumet River Watershed Concern or Issue. An email was also sent out by a local citizen that could not attend the meetings and is included in this section. A public survey was completed by those in attendance along with a questionnaire as to what should be focused as part of the report.

A final public meeting was held on March 13, 2008 in order to present the findings of the committee to the public. A flyer was once again used to promote the attendance of the public. The sign-in sheets listing those that attended the meeting can be found in this appendix after the public advertisement flyer. Two local newspapers also summarized the results of the plans in articles. These two articles can be found at the end of this appendix.

YOU ARE INVITED TO A PUBLIC MEETING
on the LITTLE CALUMET RIVER (Western Branch)



HELP PLAN FOR FUTURE IMPROVEMENTS

to

WATER QUALITY, NATURAL RESOURCES, RECREATION, & PUBLIC ACCESS

The Gary Storm Water Management District (GSWMD) has received a Watershed Planning Grant from the Indiana Department Environmental Management (IDEM) to develop a Watershed Management Plan for the Western Branch of the Little Calumet River. The purpose of this planning initiative is to identify water quality problems and other river related concerns and develop solutions through a process of public outreach, education, and involvement. For more information contact Dorreen Carey, Director, City of Gary Environmental Affairs Department at 219 882 3000, or Luci Horton, Director, Gary Storm Water Management District at 219 944 0595.

PLEASE ATTEND - YOUR INPUT IS IMPORTANT!

DATE: Thursday, March 1, 2007

TIME: 6 pm

LOCATION: Indiana University Northwest
Library Conference Center

• Post-Tribune •

LOCAL

NEWS TIP?
Contact Diane Hayes, Metro Editor, dhayes@post-trib.com, 648-3241, Carole Carlson, North Lake Editor, ccarlson@post-trib.com, 881-3133, or Rich Jackson, Porter County Editor, rjackson@post-trib.com, 477-6011

www.post-trib.com 3456 Wednesday, February 28, 2007

Cleaner Little Cal focus of gathering

Meeting at IUN on Thursday aims at creating plan, gathering input.

By Charles M. Bartholomew
Post-Tribune correspondent

GARY — State and local environmental officials are hoping to attract a healthy turnout from cities and towns along the western branch of the Little Calumet River to give them ideas where and how the stream can be cleaned up.

The meeting will be held at 6 p.m. Thursday in the Library Conference Center on the campus of Indiana University Northwest.

The Gary Environmental Affairs Department and the Gary Stormwater Management District began holding public meetings last year on their Little Calumet River Watershed Management Plan, which concentrates on the portion of the river west of Burns Ditch.

The firm of R.W. Armstrong of Merrillville has been hired for $165,000 with a grant from the Indiana Department of Environmental Management to gather input from the stakeholders and the public that will be used to develop goals and projects to improve the quality of the water that flows from northern Lake County into Lake Michigan.

"Our main focus is on a plan to eliminate the E. coli bacteria as much as possible," said Phil Graylik, the company's representative on the regional watershed planning committee.

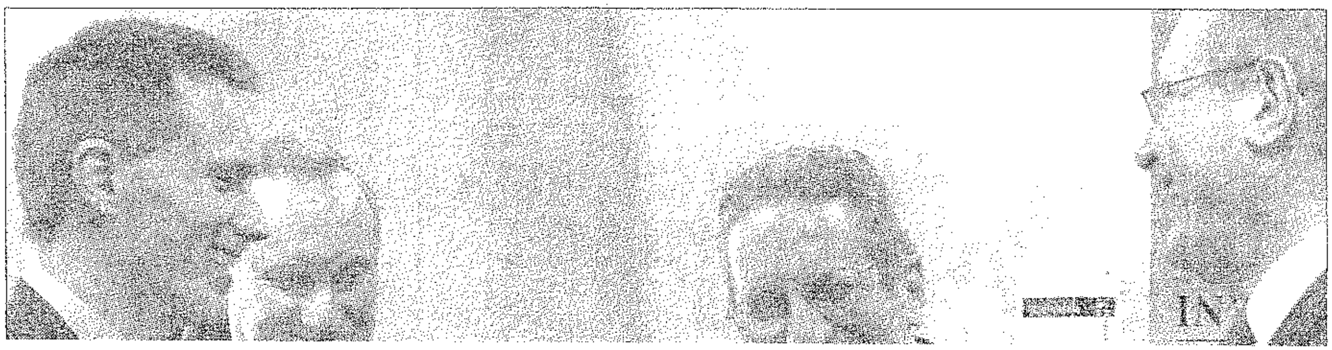
Graylik said pollution of the Little Calumet is being treated as a watershed problem, because of the significant amount of non-point-source pollution — stormwater runoff from oil-covered roads and parking lots and seepage from septic systems.

The engineers will go over the testimony to develop alternatives and projects that will be presented for comment at future public meetings before moving on to applying for construction grants, Graylik said.

Valpo theater drought continues

Cinemark 12 is on track to open, but it

DRUG TRIALS COME TO NWI

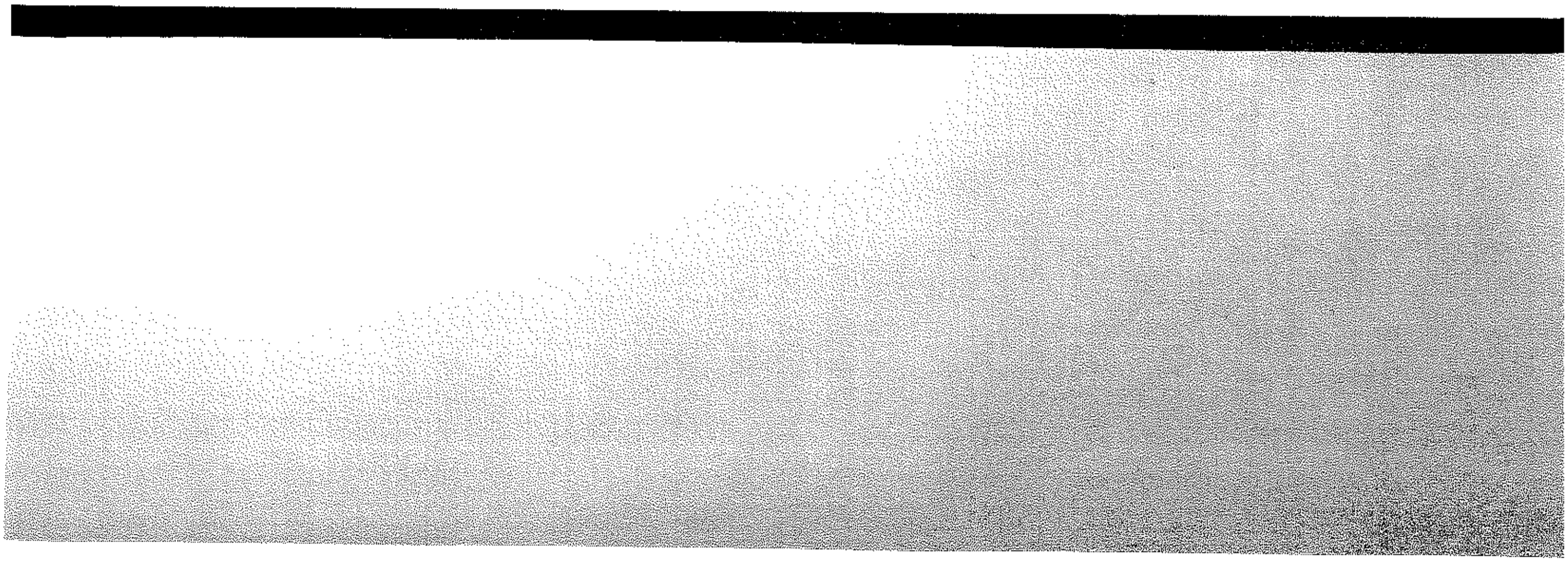


Little Calumet River Watershed
Concern or Issue

Public concern about protection of Blue Heron Rookery near the LCR dike in either Highland or Hammond. It has gotten a lot of local press in connection with the Highland planning grant mentioned tonight

Location description (if appropriate) ____________________

____



Little Calumet River Watershed
Concern or Issue

HAVE REPORTS PUBLICLY AVAILABLE IN GIS-COMPATABLE FORMATS; ~~HAVE~~ (META DATA TOO)

Location description (if appropriate) ____________

Dorreen Carey

From: Carolyn A. Marsh [cmarshbird@prodigy.net]

Sent: Thursday, January 17, 2008 9:24 AM

To: 'Phil Gralik'; 'Amesha Archie'; 'Antwuan Clemmons'; 'Bill Vargo'; 'Bob Helmick'; 'Bob Theodorou'; 'Brenda Scott Henry'; 'Cecil Petro'; 'Connie Clay'; 'D. Black'; 'Dakia Wallace'; 'Dan Gardner'; 'Dan Gossman'; 'Dan Rieden'; 'Dan Vicari'; 'Debra Hammonds'; 'Dorreen Carey'; 'Elizabeth McCloskey'; 'Erin Argyilan'; 'Erin Crofton'; 'Greg Bright'; 'Herb and Charolette Read'; 'Howard Fink'; 'Isabella Simpson'; 'Jackie Harris'; 'Jason Hignite'; 'Jeff Jones'; 'Jenny Orsburn'; 'Jill Hoffman'; 'Jim Bartos'; 'Jim Mandon'; 'Jim Meyer'; 'Joe Exl'; 'John Bach'; 'Kathy Luther'; 'Keenen Fisher'; 'Kevin Breitzke'; 'Kevin Gates'; 'Lilly Almodover'; 'Luci Horton'; 'Mabel Myrick'; 'Malachi Moore'; 'Mark Gordish'; 'Marquis Martin'; 'Martin Brown'; 'Mary Lee'; 'Mary Mulligin'; 'Mike Gulley'; 'Ms. D. J.'; 'Murul Sloan'; 'Nancy Valentine'; 'Rodney Littleton'; 'Roland Cloco'; 'Ruth Mores'; 'Sandra Williams'; 'Sergio Mendoza'; 'Sky Schelle'; 'Spencer Cortwright'; 'Steve Truchan'; 'Steve West'; 'Tammi Davis'; 'Tom Anderson'; 'Valerie Denney'; 'Vern Webbs'; 'Virginia Sewood'; 'Zig Resiak'

Cc: Molnar, Mike; Robert E. Carter (IDNR)

Subject: RE: Steering Committee Meeting and Draft Report

January 17, 2007

Dear Committee members:

RE: Highland Great Blue Heron Rookery

Since I'm not able to attend your Steering Committee Meeting today, this is a quick second appeal to the committee requesting that you protect the Highland Great Blue Heron Rookery along the Little Calumet River in any of your plans for the river. The rookery continues to be threatened by the Army Corp levee that removed trees and shrubs and where a new bike path was built on top of the levee.

For your information, the leaders of the Highland Town Council were defeated in the last election and the Highland Town Manager position was eliminated. These politicians failed to honor the public's request to protect the rookery until just before a Town election when the officials decided to withdraw a study grant that was approved by the Lake Michigan Coastal Program. The Sand Ridge Audubon Society objected to the unpopular grant that would develop an island between Highland and Hammond for recreational activity. That activity would conflict with various heron species that use the remaining green spot for roosting and foraging.

At that meeting, I referred to the Griffith golf course which is adjacent to the rookery, on the east side of Cline Avenue. Since then, the Town of Griffith rezoned the entire Griffith golf course for commercial development up to the Little Calumet River. Previously it was only a section on the south end of the golf course. Because there are many such changes to the land along the Little Calumet River impacting wetlands and wet areas, there is a need for public input on these changes. The damage to the natural environment was never fully documented and therefore not fully mitigated by the Indiana Department of Natural Resources and more damage to the natural environment is in the planning. The Great Blue Heron Rookery was never even mentioned in the mitigation plan that benefited Hobart at the expense of communities west of Hobart and Gary.

Also, we know nothing about the levee that the ACOE will build under a separate contract in Griffith along the river. There have been no public meetings addressing that section of the river and the removal of all the vegetation that is habitat for the herons and other birds. Especially since all the vegetation along the river on the Highland and Hammond sides has been clear-cut.

The entire LCRBDC project needs to be reviewed since massive flooding has occurred within the last two years and a third time as recently as in December and January. The flooding has caused multi-millions in property damage, road closings, and damages to business and closed a hospital in Dyer for weeks.

We are asking that the Indiana Department of Natural Resources and the U. S. Fish & Wildlife Service to investigate funding options to purchase the golf course property that the Town of Griffith and a developer want to commercially develop to protect the Highland Great Blue Heron Rookery. The owner of Griffith golf course is a a willing seller. The land is very low and floods frequently so restoring it as wetland will relieve flooding in the area at the same time it will protect the Great Blue Heron Rookery that the public wants designated as a Nature Area.

I would appreciate a response by those listed on this email.

Sincerely,

Carolyn A. Marsh
Sand Ridge Audubon Society

From: Phil Gralik [mailto:PGralik@rwa.com]
Sent: Tuesday, January 15, 2008 2:53 PM
To: Amesha Archie; Antwuan Clemmons; Bill Vargo; Bob Helmick; Bob Theodorou; Brenda Scott Henry; Carolyn Marsh; Cecil Petro; Connie Clay; D. Black; Dakia Wallace; Dan Gardner; Dan Gossman; Dan Rieden; Dan Vicari; Debra Hammonds; Dorreen Carey; Elizabeth McCloskey; Erin Argyilan; Erin Crofton; Greg Bright; Herb and Charolette Read; Howard Fink; Isabella Simpson; Jackie Harris; Jason Hignite; Jeff Jones; Jenny Orsburn; Jill Hoffman; Jim Bartos; Jim Mandon; Jim Meyer; Joe Exl; John Bach; Kathy Luther; Keenen Fisher; Kevin Breitzke; Kevin Gates; Lilly Almodover; Luci Horton; Mabel Myrick; Malachi Moore; Mark Gordish; Marquis Martin; Martin Brown; Mary Lee; Mary Mulligin; Mike Gulley; Ms. D. J.; Murul Sloan; Nancy Valentine; Phil Gralik; Rodney Littleton; Roland Cloco; Ruth Mores; Sandra Williams; Sergio Mendoza; Sky Schelle; Spencer Cortwright; Steve Truchan; Steve West; Tammi Davis; Tom Anderson; Valerie Denney; Vern Webbs; Virginia Sewood; Zig Resiak
Subject: Steering Committee Meeting and Draft Report

At this Thursday's Steering Committee Meeting we will be looking for feed back on the sections of the draft report that you will be receiving today through a series of three emails. Sections I through III of the draft report are attached to this email, Section IV will be attached to the second email, and Sections V through VIII will be attached to the third email. Please feel free to email your comments directly to me or to bring them to the meeting itself. We especially need feedback on Sections V through VIII and in locating any specific sources of *E.coli*, nutrients, or total suspended solids within the watersheds.

At Thursday's meeting we will also be looking for input/feedback on the Implementation Plan, BMP Selection, and Monitoring Plan that still need to be added to the document. We will try to have ideas for or a draft of these sections then. If we can get through the needed areas on Thursday this could be the last working steering committee meeting. We are still asking that you hold January 30th open in case we do not get far enough along this Thursday though.

Hope to see you all there!

Phillip E. Gralik
Regional Director

8300 Broadway / Suite E-1
Merrillville, IN 46410-6251
ph 219.738.2258
fx 219.738.2259
pgralik@rwa.com

Stakeholder Interest Survey

Name: Constance Clay /Save the Dunes

Address: 444 Barker Road, Michigan City, IN 46360

City, State, Zip: Michigan City, IN 46360

Phone: 219-879-3937

Email: cclay@savedunes.org

- [ ] I'm Interested in Being on the Steering Committee
- [x] I'm Interested in Helping with Events
- [ ] I'm Interested in Sharing my Technical Knowledge -

  My area of expertise is: Focus groups, Surveys, public educ. data collection - analysis
- [x] I Can Help with Marketing Resources (printing, T-shirts, raffle items for events, etc.)
- [ ] I Work for an Organization with Common Goals and Can Introduce You to Key People.

March 1, 2007
Public Meeting

Stakeholder Interest Survey

Name: Brenda Scott Henry

Address: 2676 Van Buren St

City, State, Zip: Gary 46407

Phone: 219 883 0363

Email: bscotthenry@aol.com

☐ I'm Interested in Being on the Steering Committee

☒ I'm Interested in Helping with Events

☐ I'm Interested in Sharing my Technical Knowledge -

My area of expertise is: ______________________

☐ I Can Help with Marketing Resources (printing, T-shirts, raffle items for events, etc.)

☐ I Work for an Organization with Common Goals and Can Introduce You to Key People.

Stakeholder Interest Survey

Name: Dorothy M. Robinson

Address: 1532 E. 36th Ave.

City, State, Zip: Gary, In. 46409

Phone: (219) 887-3413

Email:

- [x] I'm Interested in Being on the Steering Committee
- [ ] I'm Interested in Helping with Events
- [ ] I'm Interested in Sharing my Technical Knowledge -

  My area of expertise is: ____________________
- [ ] I Can Help with Marketing Resources (printing, T-shirts, raffle items for events, etc.)
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Stakeholder Interest Survey

Name: DAN RIEDEN

Address: 7356 County Line Rd.

City, State, Zip: HOBART, IN 46342

Phone: (219) 945-0543

Email: drieden@lcparks.org

☒ I'm Interested in Being on the Steering Committee
IF IS IT DURING DAYTIME HOURS?

☐ I'm Interested in Helping with Events

☐ I'm Interested in Sharing my Technical Knowledge -

My area of expertise is: ______________________

☐ I Can Help with Marketing Resources (printing, T-shirts, raffle items for events, etc.)

☒ I Work for an Organization with Common Goals and Can Introduce You to Key People.

Stakeholder Interest Survey

Name: Elizabeth McCloskey

Address: U.S. Fish & Wildlife Service

City, State, Zip: P.O. Box 2616 Chesterton 46304

Phone: 219-983-9753

Email: elizabeth_mccloskey@fws.gov

- [x] I'm Interested in Being on the Steering Committee
- [ ] I'm Interested in Helping with Events
- [ ] I'm Interested in Sharing my Technical Knowledge –

  My area of expertise is: ______________________
- [ ] I Can Help with Marketing Resources (printing, T-shirts, raffle items for events, etc.)
- [ ] I Work for an Organization with Common Goals and Can Introduce You to Key People.

Stakeholder Interest Survey

Name: Anthony Cimenez

Address: 1461 west 15 Ave.

City, State, Zip: Gary In 46407
youth leader

Phone: 219-981-0661

Email: Avcgod@yahoo.com

- [ ] I'm Interested in Being on the Steering Committee
- [ ] I'm Interested in Helping with Events
- [ ] I'm Interested in Sharing my Technical Knowledge –

  My area of expertise is: ______________________

- [ ] I Can Help with Marketing Resources (printing, T-shirts, raffle items for events, etc.)
- [ ] I Work for an Organization with Common Goals and Can Introduce You to Key People.

Comment: Over my head
speak English

Stakeholder Interest Survey

Name: Charlotte Read

Address: 1453 N. Tremont Rd.

City, State, Zip: Chesterton, IN 46304

Phone: 219-926-2224

Email: readw@skyenet.net

☐ I'm ~~Interested in Being~~ already on the Steering Committee

☐ I'm Interested in Helping with Events

☐ I'm Interested in Sharing my Technical Knowledge -

My area of expertise is: ______________________

☐ I Can Help with Marketing Resources (printing, T-shirts, raffle items for events, etc.)

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Future Public Meeting Input (please check all that apply to you)

- [x] I would be more likely go to public meetings if there was a relevant educational program.
- [ ] I would be more likely to go if there was food and time to socialize.
- [ ] I would be more likely to go on a week day evening.
- [ ] I would be more likely to go on the weekend.
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- [ ] I would like the meetings to include post-meeting watershed tours of relevant concerns or areas of interest.
- [ ] I just want the meetings to cover the basics of what was discovered or developed.
- [ ] I won't go to a meeting that is longer than 1.5 hours no matter what is offered.
- [ ] The University is a good meeting location.

Educational Topics I Would Like to Know More About:

- [x] Sources of water pollution
- [ ] Nutrients and their impacts
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- [x] County land use planning
- [ ] Conservation programs
- [ ] Agricultural Practices
- [x] Things home owners can do to help
- [ ] Dredging
- [ ] Other ______________

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- [ ] Other sensitive natural areas in ~~the~~ watershed

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- [x] Dredging, IMPACTS OF
- [x] Other EMPOWERING CITIZEN ACTION

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Comments.

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LITTLE CALUMET RIVER WATERSHED MANAGEMENT PLAN

"LEARN ABOUT THE LITTLE CALUMET RIVER: WATER QUALITY AND QUANTITY, NATURAL RESOURCES, RECREATION"

The watershed group has been studying the Little Calumet River and surrounding areas for the past year through a Watershed Planning Grant from the Indiana Department Environmental Management (IDEM).

The Public is invited to

- Provide information to be added to the plan
- Learn about water quality in the Little Calumet River
- Learn about recreational access points and uses along the River
- Address concerns about water quality and quantity in the Little Calumet River watershed

Date: Thursday, March 13, 2008
Time: 6:00 p.m.
Location: Indiana University Northwest
Library Conference Center Room 105C

YOUR INPUT IS NEEDED TO HELP PLAN FOR FUTURE PROTECTION AND IMPROVEMENTS

Contact:

Dorreen Carey, Director
Environmental Affairs
Phone: (219) 882-3000
Fax: (219) 882-3012
Email: dcarey@ci.gary.in.us

Luci Horton, Director
Gary Sanitary District
Phone: (219) 944-0595
Fax: (219) 977-8318
Email: luci@garysan.com

GARY

LITTLE CALUMET RIVER WATERSHED MANAGEMENT PLAN

PUBLIC MEETING IUN MARCH 13, 2008 6PM

PLEASE PRINT!!

	PRINT NAME	COMPANY	ADDRESS	PHONE	E-MAIL
	Spencer Cortwright	IUN	Dept. Biol IUN 3400 Broadway Gary IN	980-7760	scortwr@iun.edu
	Dorothy Robinson	None	1532 E. 36th Ave.	887-3413	~~[illegible]~~
CD	Deborah H Black	Provisions Ed Network	5201 Bdwy (46410)	980-6100	deb_black@juno.com
	Alfred Hammonds	Golden Recognition	5201 Bway, Ste 201, Gary	981-0661	goldrec1@aol.com
CD	Erik Sprenne	citizen (pls send canoe launch info)	3118 Wirth Highland	923-2182	eriks444-1@yahoo.com
	Jonathan Hunter	-self-	15 Lincolnway Valparaiso	979-~~[illegible]~~ 4559	jon_m_hunter@yahoo.com
	Richard J. Comer	GSD		796-7387	RichJComer@AOL.com
CD	Muriel Sloan	IUN	6741 Hobart Rd	938-0228	mlsloan@iun.edu
	Michelle Quinn	Post-Trib			zulabean@gmail.com
	Chuck BARMAN	—	—	—	BARMAN4Congress.com
	BILL JOHNSON	FRESH SOLUTIONS	106 W CLARK ST	219-488-7631	BILL.JOHNSON@JOHNSON19.COM
	JOE GRZYCH		627 RIVER DR. Mun St.		
CD	RONIER SCOTT	CITY COUNCIL	401 BROADWAY	219-881-1315	

GARY

LITTLE CALUMET RIVER
WATERSHED MANAGEMENT PLAN

PLEASE PRINT

PUBLIC MEETING IUN MARCH 13, 2008 6PM

	PRINT NAME	COMPANY	ADDRESS	PHONE	E-MAIL	
CD	Michael Scott	GARY School Board	540 W 52 Pl	980-1735	mscott@m-sconsultants.com	X
CD	Nancy Valentine	Comm. Dev	839 Bwy	881-5075	oscarvalentino@yahoo.com	
CD	Jerry Haymon	Precinct G6-13	5421 Broadway	980-3300		
DISC pls. →	Curtis Vosti	—	224 Humpfer Hammond	—	cpvosti@comcast.net	X

GARY

LITTLE CALUMET RIVER WATERSHED MANAGEMENT PLAN

PUBLIC MEETING IUN MARCH 13, 2008 6PM

	PRINT NAME	COMPANY	ADDRESS	PHONE	E-MAIL
CD	Debi Hammonds				
	SUSAN BROWN	THE TIMES		936-3780	SBROWN@NWITIMES.Com
	FRANK PETRITES		8200 INDIANAPOLIS HIGHLAND, IND	847-361-5564	FRANK_PETRITES @ HOTMAIL.COM
	Stan Petrites		SAME		
	Danilo E. Lopez	Golden Rec	5201 N Broadway	981-0661	Erruck@hotmail.com.
	NAKENDA HOOPER	GOLDEN REC	5201 N. Broadway	981-0661	
	Phil Gralik	RW Armstrong	8300 Broadway	738-2258	pgralik@rwa.com
CD	Charles W. Jackson	G.S.D.			Chuckjackson-64@SBC Global.net
CD	John Rhyne		2423 Edison St. Gary IN	845-0703	Rhyne-J@sbcglobal.NET
	Bob Nelmick	RC+D			Bob.Nelmick@NACDnet.net
	Doreen Carey	City of Gary	839 Broadway N206	882 3000	dcarey@ci.gary.in.us
	Harlee Currie	GSD	1048 VAN Buren	5126846	
	ALLEN L. EVANS	ACECO/SAS	7714 VIRGINIA PL	Merr, IN 46410	ACECOM 7 1 AT PEOPLEPC.COM For Information, Please

THE TIMES nwi.com

Gary finishing up watershed plan

BY SUSAN BROWN
sbrown@nwitimes.com
219.836.3780 | Friday, March 14, 2008

GARY | The city is wrapping up a Little Calumet River watershed management plan for submission to the Indiana Department of Environmental Management in April.

Under way since last year, the plan focuses on identifying the amount of pollutants, particularly that of E. coli, which enter the river primarily from stormwater runoff.

Extensive water sampling across three major watersheds, beginning in Hammond and extending east to Portage, confirmed the river and its tributaries regularly exceed the state's daily maximum of the E. coli bacteria, limiting recreation on the river and raising health concerns.

"The river is listed for E. coli as a principal pollutant, and that was what IDEM was most interested in having us look at," said Dorreen Carey, the city's environmental affairs director.

Carey said the city sought the IDEM grant to fund the study to obtain information more specific to Gary than the more broad-based watershed management plan developed by the Northwestern Indiana Regional Planning Commission.

On Thursday, the city held its last presentation of its findings and welcomed input from the public before it sends the 20-year plan to the state for approval.

Besides the high E. coli levels, elevated sediment and nutrient levels were found to be damaging the river's overall health as are man-made manipulations, which impact the natural flow of the river.

Some of those attending the public meeting challenged whether Gary's plan can make a difference without exploring problems in south Lake County, where they argued careless development is contributing to flooding in the north.

But Phillip Gralik, an engineer from the firm of rwArmstrong who presented the plan Thursday, said the plan includes a component for public education and has a goal of creating an alliance with other communities to work together on the issue.

"You have to start somewhere," he said.

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Tests find high E.coli levels in Little Cal

(http://www.post-trib.com/news/842205,gcalumet.article)

March 14, 2008

By Michelle L. Quinn Post-Tribune correspondent

GARY -- The common yet mildly scary bacteria E.coli is only one indicator of what's lurking in the Little Calumet River, but it can be managed relatively easily.

Controlling the bacteria, viruses and water flow of the Little Calumet and its tributaries are far more extensive tasks than the Little Calumet River Watershed Management Group has studied so far, said Phillip Gralik, assistant regional director for engineering firm RW Armstrong.

The meeting was held by the group at Indiana University Northwest on Thursday night, and the hope is that by getting the word out, more municipalities will participate.

Gralik, who's been working with a consortium of groups using a $131,000 grant issued to the Gary Stormwater Management Board by Indiana Department of Environmental Management, has tested several areas between Hart Ditch in Hammond and Portage. A couple areas, in particular the watershed area where the Little Cal and Deep River meet and Hart Ditch in Hammond, have shown high E.coli surges at various times.

The day Hart Ditch was tested, there had been a combined sewer overflow, Gralik said, and levels were higher right after rain events. The Deep River levels, however, are unexplained.

"If any of you know why this is happening, please let us know," he asked the attendees.

And since E.coli is a bacteria, it's the only one that can be tested, Gralik said. It's also the least nasty of what really could be in the water.

Attendees were more concerned with water flow and flooding. To that end, Gralik said builders should build subdivisions in phases and not mow down everything at once.

Chuck Barman, of Cedar Lake, said municipalities clearly haven't been following that edict.

"Every municipality has a financial stake," Gralik said. "St. John, for example, isn't going to turn away subdivisions because they expand the tax base."

If they keep building, flooding will get worse, Barman said.

The watershed planning process

The Little Calumet River Western Branch Watershed Management Plan was developed over the course of fifteen months by the Steering Committee and its consultants with input from the general public. Information was compiled from a wide variety of sources including previous studies and water quality testing information, the Army Corps of Engineers Flood Control and Recreation Project, the Indiana Department of Environmental Management (IDEM) approved Total Maximum Daily Load (TMDL) for the Little Calumet River, municipal Geographic Information Systems (GIS), in-stream water quality sampling, a stream reach survey, and numerous data-bases with information such as topography and land usage.

Problems identified & goals set

Utilizing the previous and newly compiled information and public input, the Steering Committee developed a series of six watershed problem statements:

1. The Little Calumet River and its tributaries regularly exceed the Indiana single sample daily maximum of 235 colonies per 100 milliliters for Escherichia coli (*E.coli*) bacteria, thus limiting recreation, impacting downstream waters, and raising health concerns among the public.
2. Several non-point source pollutants such as sediment and nutrients are elevated to levels that can impact biological communities and overall river health.
3. Severe hydrologic manipulations have impacted the natural topography of the river and riparian areas resulting in disconnection from historic floodplains and wetlands, as well as the creation of extreme low-flow conditions in the river at certain locations.
4. The residents in the Little Calumet River Watershed need more education and information on their role in maintaining the overall quality of the watershed.
5. A single point of contact is not in place to coordinate resources across political boundaries in the Little Calumet River Watershed.
6. Public access to the river is limited due to the highly developed state of the watershed.

These six problem statements were then used to set seven goals for watershed improvement and protection. Specific milestones toward each goal have been set with an indicator designated to measure progress toward completion of each goal. Critical areas have been identified within the watershed where efforts will be focused to have the greatest impact on water quality. (Although flood control problems were raised as a major concern by the Steering Committee and the public, it was determined that the Little Calumet River Basin Commission should be the primary point of contact for flood control management at this time.)

Copies of the final Watershed Management Plan for the Western Branch of the Little Calumet River can be reviewed at the offices of the Gary Storm Water Management District and the City of Gary Environmental Affairs Department, or online at www.garysanitary.com.

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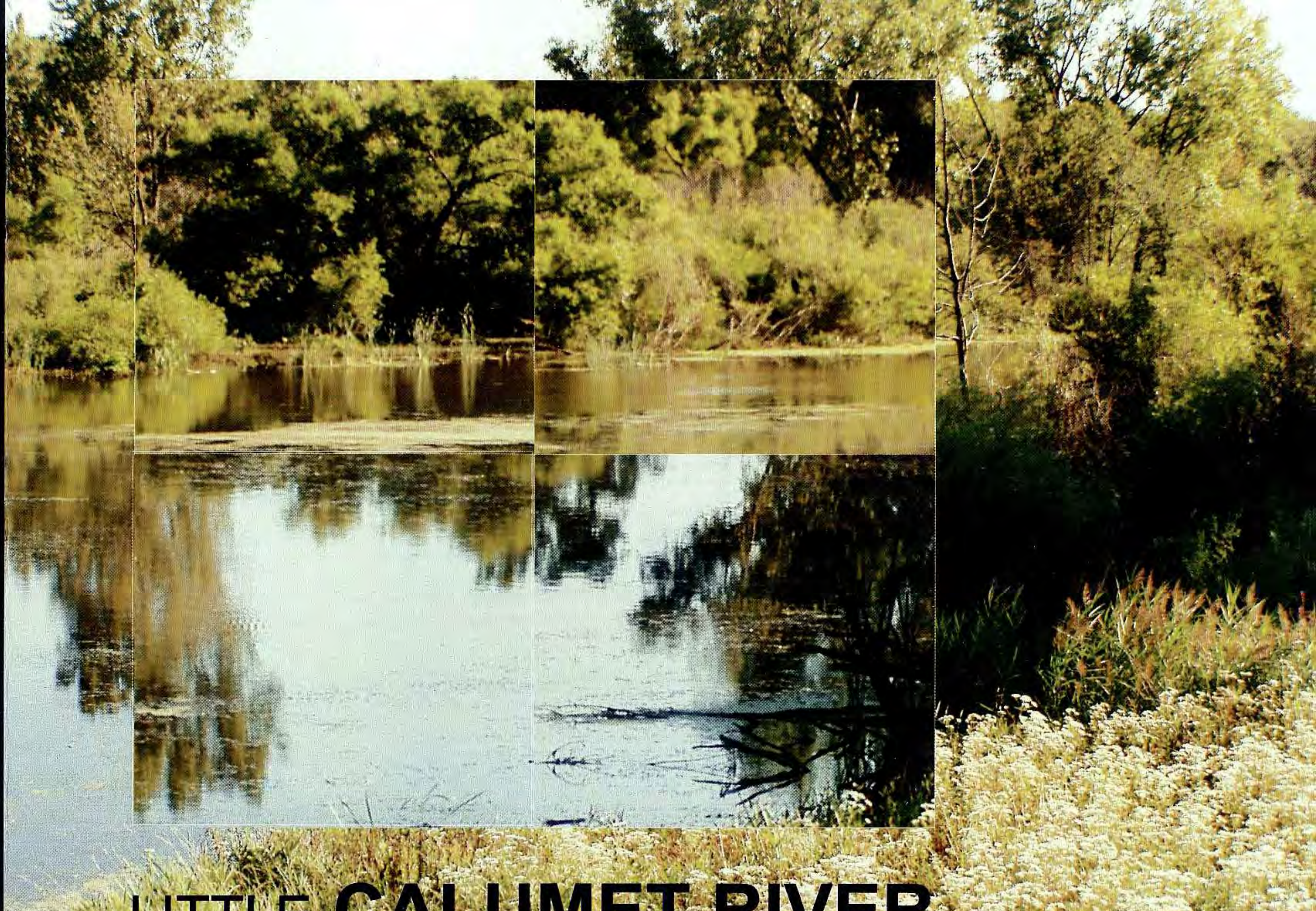


LITTLE CALUMET RIVER watershed management PLAN

Western Branch

LITTLE CALUMET RIVER Watershed Management Plan Western Branch

What is a watershed?

A watershed is an area of land that water flows over or under on its way to a stream, river, lake, or marsh. Watersheds can be extremely large, covering thousands of square miles, or they can be small, covering areas measured only in square feet. Larger watersheds contain many smaller watersheds within them.

We all live in a watershed, and the things we do at home, at school, and at work can affect the water quality of the rivers, streams, and lakes within our watershed.

Why create a watershed management plan?

In order to address watershed problems, a plan needs to be created through a public process that gathers and analyzes information and public concerns, develops objectives, selects watershed management best practices, lists strategies for implementing selected Best Management Practices, and determines how to measure progress. A watershed plan provides a holistic approach to improving water quality, increasing recreational uses, protecting wildlife and natural areas, supporting sustainable community development, and encouraging public awareness and involvement in watershed protection.

The Gary Storm Water Management District (GSWMD) applied for and was awarded a Clean Water Act Section 319 grant from the Indiana Department of Environmental Management (IDEM) for watershed planning. The funds from the grant along with matching funds from the GSWMD were utilized to develop a Watershed Management Plan for the Western Branch of the Little Calumet River.

Since watersheds do not conform to single municipal, county or even state boundaries, the GSWMD watershed planning process required the inclusion of areas outside Gary and Lake County. The planning area for the Western Branch of the Little Calumet River included three 14 digit Hydrologic Unit Code (HUC) watersheds in Gary, Griffith, Hammond, Highland, Hobart, Lake Station, New Chicago, and Portage in Lake and Porter Counties in Indiana.

The watershed planning partnership

The GSWMD invited representatives of all of the cities, towns, and counties located in Little Calumet River Western Branch watersheds to participate in a Steering Committee for plan development. State, federal and local agencies, environmental organizations, businesses, and the general public also participated in the Steering Committee and the planning process.

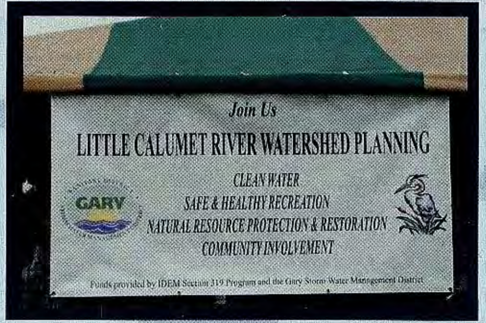
The Steering Committee developed a Mission Statement for the planning process and the formation of an ongoing organization to implement the Watershed Management Plan.

Watershed Management Plan Steering Committee Members: Gary Storm Water Management District, City of Gary/Environmental Affairs, City of Hammond, City of Hobart, City of Lake Station, City of Portage/Parks, Town of Munster, Town of Highland, Town of Griffith, City of Crown Point, Lake County/Surveyor, Porter County/Surveyor, Little Calumet River Basin Commission, Lake County Parks, Indiana Department of Environmental Management, Indiana Department of Natural Resources/Coastal Program, U.S. Fish and Wildlife Service, Northwest Indiana Regional Planning Commission, Northwest Territory Resource Conservation and Development, Indiana University Northwest, Save the Dunes Council, Groundwork Gary, Wildlife Habitat Council, Hammond Southmoor Road Group, United Water, Camp Dresser and McGee.

Project Consultants: R. W. Armstrong & Associates, Empower Results, LLC, Golden Recognition, Inc.

Mission Statement

The Stakeholder Group for the Western Branch of the Little Calumet River exists to effectively and aggressively reduce pollutant loads in the subwatersheds of the Little Calumet River through coordinated planning, public education, and structural Best Management Practice (BMP) implementation.



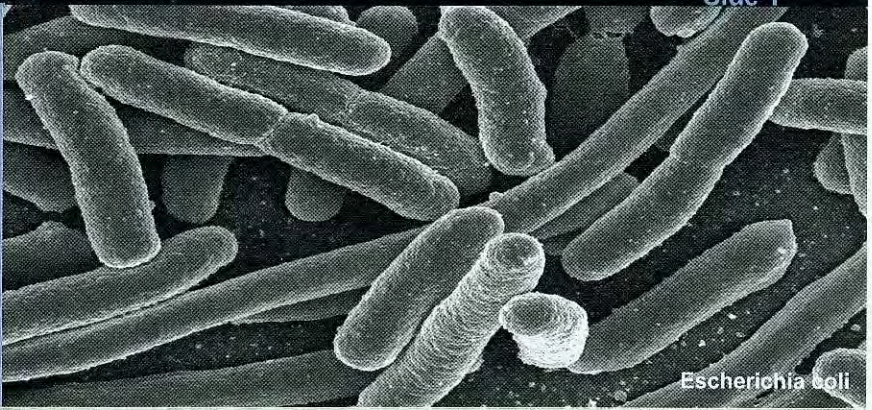
Goal 1

1. Reduce *E. coli* levels in the Little Calumet River by reducing loads to the River to meet beneficial uses.

LITTLE **CALUMET RIVER**

Watershed management PLAN

Western Branch



What is *E. coli*?

Escherichia coli, commonly called *E.coli*, is one of the most common species of coliform bacteria. It is a normal component of the large intestines in humans and other warm-blooded animals. It is found in human sewage in high numbers. *E. coli* is used as an indicator organism because it is easily cultured, and its presence in the water in defined amounts indicates that *human* sewage may be present. If sewage is present in the water, pathogenic or disease causing organisms may also be present.

Why do we measure *E. coli*?

Typhoid and cholera epidemics in the mid-19th century led to the discovery that certain gastro-intestinal diseases of humans are transmitted via water. The disease-causing organisms leave the infected individual via the feces, which can become discharged into surface waters. They then in turn can be consumed by and infect users of the water. These water-born diseases include typhoid, cholera, enteric fevers, and bacterial dysentery. It is not feasible however, to test waters for each possible type of disease causing bacterium. *E. Coli* is used to indicate, on a statistical basis, the likelihood of contracting a disease by consuming or recreating in such waters.

What level of *E. coli* is acceptable?

The Little Calumet River is designated for full-body contact recreation and must be capable of supporting a well-balanced, warm water aquatic community according to the Indiana Department of Environmental Management. Any water body with the recreational designation cannot exceed 125 colonies of bacteria per 100 milliliters (mL) of water as a geometric mean based on not less than 5 samples that have to be equally spaced over a 30 day period, or 235 colonies of bacteria per 100 mL in any one sample in a 30 day period.

The Little Calumet River and its tributaries regularly exceed the Indiana single sample daily maximum of 235 colonies per 100 mL for *E. coli* bacteria.

Several sources of *E. coli* have been identified in the watershed study area. Combined Sewer Overflows (CSOs) contribute to *E. coli* increases during wet weather releases to the river from combined sewers. CSO reductions are being addressed by area Waste Water Treatment Plant Long Term Control Plans. The Watershed Management Plan focuses on prevention and reduction of surface water runoff contributions to *E. coli* pollution which can include failing septic systems, farm animals, agriculture, and pet and wildlife wastes.

For more information please contact either:

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Environmental Affairs City of Gary

Luci Horton, Director Phone: 219-944-0595
Gary Storm Water Mgmt. District

Project funded by an EPA/IDEM Section 319 Watershed Management Grant & the Gary Storm Water Management District

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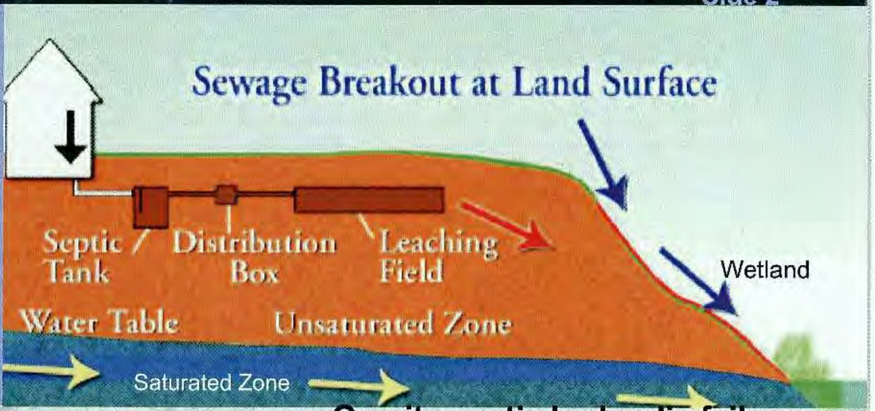

On-site septic hydraulic failure

Failed septic systems can cause *E. coli* pollution

A septic system is an on-site, two part treatment and disposal system designed to condition untreated liquid household waste (sewage) so that it can be readily dispersed and percolated into the subsoil. Percolation through the soil accomplishes much of the final purification of the waste, including the destruction of disease-producing bacteria.

Improperly used or maintained septic systems can release pollutants into surrounding areas that may ultimately reach the Little Calumet River and Lake Michigan.

If a septic system is not maintained properly, it is likely to fail. Septic system failures can occur when wastewater either breaks out at the surface or seeps into the soil and travels to ground and surface water sources, contaminating the water and threatening public health. Bacteria and pathogens associated with fecal matter leak from failing septic systems and degrade groundwater and surface water quality. Fecal coliform contamination is a primary concern relating to septic system failures. These bacteria and pathogens can cause many types of diseases, including diarrhea, hepatitis A, dysentery, typhoid fever, cholera and salmonella.

Septic system maintenance is important for water quality protection

- ☐ Know the location of your septic tank and leaching area.
- ☐ Inspect your tank yearly and have the tank pumped every three to five years as needed.
- ☐ Do not flush bulky items such as throw-away diapers or sanitary pads into your system, only toilet paper.
- ☐ Do not flush toxic materials such as paint thinner, pesticides, or chlorine into your system as they may kill the bacteria in the tank. These bacteria are essential to a properly operating septic system.
- ☐ Be conservative with your water use and use water-reducing fixtures wherever possible.
- ☐ Keep deep-rooted trees and shrubs from growing on your leaching area.
- ☐ Keep heavy vehicles from driving or parking on your leaching area.
- ☐ Don't put food down your sink. Septic systems are not intended to dispose of food waste, coffee grounds, grease, or fat, and, in fact, these substances will harm the septic tank. Try using a compost pile for non-meat food waste.
- ☐ Don't use a kitchen garbage disposal. Having a garbage disposal doesn't make food waste, grease, or fat any easier for your system to handle. If you use a garbage disposal, it's especially important that you have a larger than normal tank that has an effluent screen and that you pump frequently.
- ☐ Balance your water usage throughout the week. When your septic system receives a large volume of water within a short time, it can cause solids to move into the drainfield, resulting in a clog. Don't do all your laundry at one time; spread the chore out over the week.

Improperly maintained septic systems are not only prone to failure, they can be very costly to replace.

For more information please contact either:
Dorreen Carey, Director Environmental Affairs Phone: 219-882-3000 City of Gary
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Project funded by an EPA/IDEM Section 319 Watershed Management Grant & the Gary Storm Water Management District

Goals 2 & 3

2. Reduce sediment loads by source reduction strategies and, in priority subwatersheds, through the use of Best Management Practices (BMPs).

3. Reduce nutrient loads by source reduction strategies and, in priority subwatersheds, through the use of Best Management Practices (BMPs).

LITTLE CALUMET RIVER

Watershed management PLAN

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Total suspended solids/sediment

Erosion of soils through much of the Little Calumet River watershed contributes large amounts of sediment during high river flows. Total Suspended Solids (TSS) are used as a measurement for pollutants contributing to sediment in waterways. TSS are solid materials, including organic and inorganic, that are suspended in the water.

Why test for TSS?

High concentrations of suspended solids contribute to low oxygen levels caused by excess nutrients and other problems such as reduced fish population and reduced recreational quality of a waterway.

How can we prevent sediments from entering our surface waters?

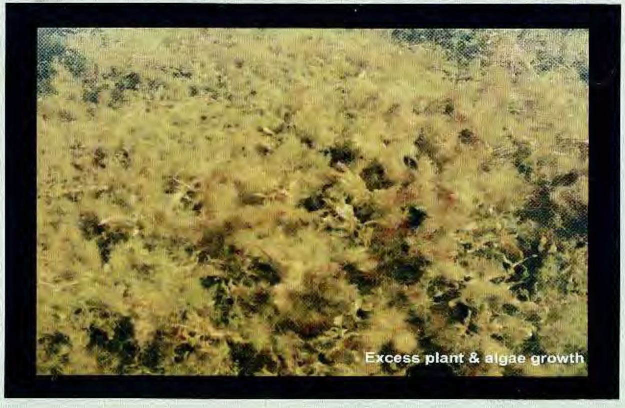
Prevention methods include protection of the land in our watershed from erosion by use of conservation tillage measures by farmers, maintaining erosion control on construction sites, and giving urban runoff time to settle out before reaching surface waters. Increases in impervious areas, or areas that do not allow water to soak into the ground, cause increases in total suspended solids because the solids are not trapped by vegetation and other obstructions as they are in natural flows.

Excess nutrients

The chemical elements and compounds needed for plants and animals to grow and survive that are found in the environment are considered to be nutrients. However, too many nutrients contribute to poor water quality. Excess nutrients can cause algae blooms in rivers and lakes. When algae die, they sink to the bottom and decompose in a process that removes oxygen from the water. Fish and other aquatic organisms can't exist in water with low dissolved oxygen levels. The main nutrients of concern for water-quality investigation include nitrogen and phosphorus.

Where do nutrients come from?

Nutrients can be generated from a number of everyday practices within the Little Calumet River Watershed. Almost everything that goes onto the land surface can be washed away by rain and snow, ending up in waterways. Excessive fertilizer application, animal wastes from pets, livestock, and wildlife, common household products, and failing septic systems can be major sources of nitrogen and phosphorus to waterways.



Excess plant & algae growth

For more information please contact either:

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Goal 4

4. Restore, improve, and/or protect floodplains, wetlands, natural areas, and riparian corridors.

LITTLE **CALUMET RIVER**

Watershed

management

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Western Branch

Natural areas protect water quality

Floodplains, wetlands, natural areas, and riparian corridors provide a natural buffer that can prevent or reduce surface water runoff pollutants from reaching waterways.

What is a natural buffer?

A riparian buffer is an area of trees, usually accompanied by shrubs and other vegetation, along a stream, river, or shoreline that helps to maintain the integrity of the waterway, to reduce pollution, and to provide food, habitat, and thermal protection for fish and wildlife.

Riparian buffers slow and filter nutrients and sediments out of stormwater before they reach the waterway. Buffers also stabilize streambanks and floodplains, reducing erosion. The cool stream temperatures maintained by riparian trees are essential for the survival of many fish and other aquatic species. Leaves and fallen logs and branches provide food and habitat for many organisms that are critical to the aquatic food chain. Riparian buffers can also attract birds and wildlife, providing important habitat and migration corridors for many species.

Large natural buffers along the river have multiple positive impacts to the water quality. They increase the stability of the slope due to the vegetation that will develop and have deeper root systems than those of crops or summer grass. The effect that floods will have on the local community will decrease in severity due to the water having a place to pool before reaching individual communities and homes. The wildlife habitat in the area will also improve as pollution is reduced by slowing down the physical runoff and giving sufficient time for sediments to settle out before reaching the water.

Natural buffers along the Little Calumet River

The Little Calumet River is for the most part a well buffered stream. The work done by the United States Army Corps of Engineers (USACE) building levees and creating flood control zones has also resulted in a system of wetlands and floodplains that provide buffer areas along both sides of the Little Calumet. However, much work is needed to stabilize the river banks, to restore natural buffers between the river and agricultural and livestock areas, and to create and protect greenspace that can allow for stormwater infiltration and cleaning.

For more information please contact either:

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337 Project funded by an EPA/IDEM Section 319 Watershed Management Grant & the Gary Storm Water Management District

Goals 5 & 6

5. Improve public awareness/knowledge of pollutant loads, sources, and solutions, especially with regard to E coli, and the impacts and risks associated with them.

6. Create an active watershed alliance or conservancy district that facilitates and implements information sharing including ordinances, projects/experiences, and education materials in a central location.

LITTLE CALUMET RIVER

Watershed management PLAN

Western Branch

Education, organization and implementation

The Steering Committee and public participants in the watershed planning process agreed that local communities need more information about how to protect their watersheds. Local governments, planning agencies such as the Northwest Indiana Regional Planning Commission (NIRPC), and local environmental, civic, and community organizations can continue to assist in the distribution of watershed materials and the communication of watershed issues.

Little Calumet River watershed planning participants also recognized that there needed to be a coordinating organization established whose main purpose would be to promote public education and involvement, provide linkage between the Western Branch and other watersheds and project activities on the Little Calumet River, communicate the watershed planning goals, act as a point of contact for all watershed concerns and information, and assist with implementation of the proposed Best Management Practices for watershed improvement and protection.

The Steering Committee will continue to work with all watershed stakeholders to establish an on-going organization to implement the Little Calumet River Western Branch Watershed Management Plan.

We can all help protect our watershed

Reduce or eliminate the use of fertilizers and pesticides on your lawn and garden. Choose phosphorous-free fertilizers.

Avoid pouring household chemicals and automobile oils/fluids on the ground, down a sink, toilet, or storm drain. Take excess to Household Hazardous Waste drop off site for proper disposal.

Use non-toxic alternatives to home cleaning chemicals. Use phosphorus-free dishwasher detergent.

Wash your car at the car wash where water is recycled and detergent captured.

Clean up pet waste and dispose of it in the garbage or toilet.

Keep lawn clippings out of streets, drains, and waterways.

Monitor and maintain your septic system.

Use straw bales or silt fence to prevent runoff when doing construction or major landscaping projects.

Conserve water whenever possible.

For more information please contact either:

Dorreen Carey, Director, Environmental Affairs — Phone: 219-882-3000, City of Gary

Luci Horton, Director, Gary Storm Water Mgmt. District — Phone: 219-944-0595

Project funded by an EPA/IDEM Section 319 Watershed Management Grant & the Gary Storm Water Management District

Goal 7

7. Increase river corridor connectivity, river navigability, and public access sites and make the public aware of them.

LITTLE **CALUMET RIVER**

Watershed management PLAN

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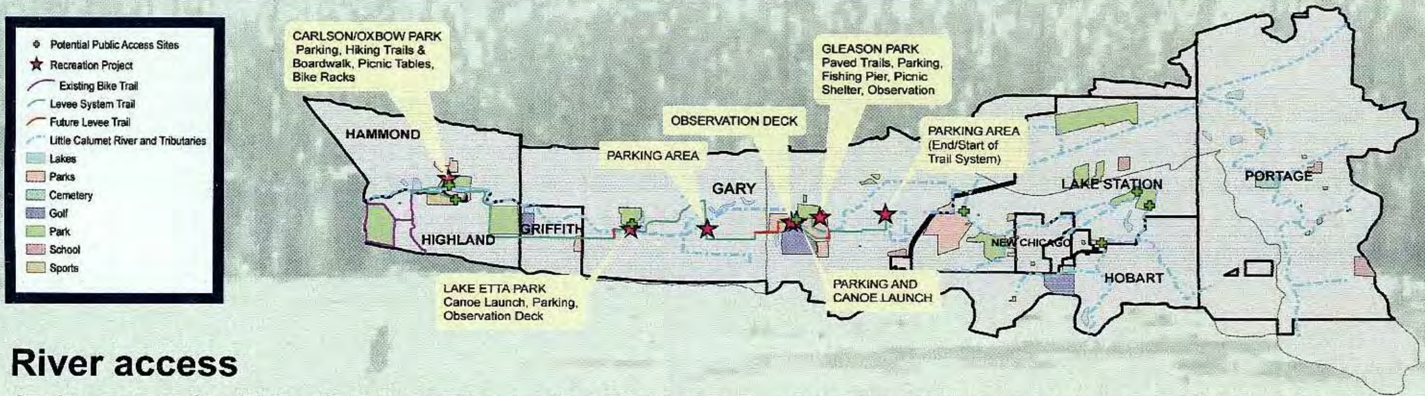

River access

A cleaner safer Little Calumet River will attract more recreational users such as walkers, bicyclists, bird-watchers, canoeists/boaters, and fishing enthusiasts. Access to the river and watershed resources will increase public understanding of watershed issues and create public "buy-in" for needed investment in water quality improvements. Recreational improvements can also contribute to new business opportunities and increased real estate values.

The Little Calumet River Levee Trail constructed by the Corps of Engineers as part of the river flood control project offers several miles of public access opportunities along the levee system, but improvements and maintenance are needed. The steering committee and the public recommended that additional access sites should be created at intervals along the river, as well as new watershed informational and interpretive signage.

For more information please contact either:

Dorreen Carey, Director Environmental Affairs Phone: 219-882-3000 City of Gary

Luci Horton, Director Phone: 219-944-0595 Gary Storm Water Mgmt. District

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