LOWER FALL CREEK WATERSHED MANAGEMENT PLAN UPDATE

Hancock County
Hamilton County
Madison County
Marion County

Prepared for:

Marion County Soil and Water Conservation District

April 2023

Prepared by

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CBBEL Project No. 18-0537

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXHIBITS

APPENDICES

CHAPTER 1 WATERSHED PLANNING INITIATIVE

A watershed is an area of land that collects and drains water to a specific point. Similar to water poured into a bowl, a portion of the precipitation that falls on a watershed will move through the landscape, collecting and concentrating in low areas, creeks and streams, until it exits through an outlet point. A watershed is a measurable and practical landscape feature that is based on how water moves, interacts with, and behaves on the landscape. Watershed planning is especially important to preserve water functions, help prevent future water resource problems and ensure future economic, political and environmental health. This section provides information on the funding, purpose, and stakeholders involved in the development of the Lower Fall Creek Watershed Management Plan (WMP) update.

1.1 BACKGROUND

In March of 2007 the Marion County Soil and Water Conservation District (SWCD) received a Section 319 Non-Point Source Program grant from the Indiana Department of Environmental Management (IDEM) to develop a WMP for the Lower Fall Creek watershed. This original WMP was completed and approved by IDEM in May of 2009. Later in 2009, the Marion County SWCD applied for a Section 319 Non-Point Source Program implementation grant through IDEM. However, this grant application was not funded. Between 2009 and 2019, the Lower Fall Creek WMP was utilized as a reference document for other grant applications, program activities and land use decisions.

In 2019, Reconnecting to Our Waterways (ROW) provided funding to the Marion County SWCD to update the Lower Fall Creek WMP. ROW was established in Indianapolis in 2012 as an initiative consisting of partners from neighborhoods, civic groups, and both public and private organizations. ROW's mission is "To convene and support community partners to enhance quality of life, investing in innovation, analysis, cultural advancement and environmental quality along Indy waterways and adjacent neighborhoods". ROW works through a larger steering committee and six waterway committees. ROW has the ability to provide funding opportunities to applicants who align with their mission and strategic plan, are able to leverage other dollars and contributions, and demonstrate broad-based community support. Funding for the update of the Lower Fall Creek WMP was provided by the ROW Flex Fund grant program and donations from various local partnering organizations including Citizens Energy Group (Citizens), the Children's Museum of Indianapolis, Axia Urban, and the Indiana State Fairgrounds. Further, Christopher B. Burke Engineering, LLC (Burke) was once again retained to assist in the coordination of the planning effort.

1.2 PURPOSE

The overall purpose of a WMP is to gain a greater understanding of the water quality impairments in the Lower Fall Creek watershed and engage the planning committee and the public to identify potential causes, sources, and solutions for implementation.

Much has happened within the Lower Fall Creek watershed since the original planning effort occurred in 2009. With significant and rapid changes in land use, populations, and water quality within the Lower Fall Creek and tributaries, this update will capture a more relevant view of the current impairments and attributes of the watershed.

In addition, the Marion County SWCD and ROW believe the updated Lower Fall Creek WMP will serve as the backbone for future applications for grants to implement the practices and policies proposed to protect and enhance the water quality in the watershed. Therefore, the WMP has been developed to meet IDEM's 2009 WMP checklist in order to also make the implementation of this plan eligible for IDEM grants.

1.3 STAKEHOLDER INVOLVEMENT

A WMP represents the efforts of stakeholders, including water resource professionals, local government leaders, and interested citizens, to understand, analyze, and become an integral part of the solution to improve impaired water quality.

To guide the development of the updated WMP, the effort was led by the ROW Fall Creek Waterway Committee. The Fall Creek Waterway Committee is made of area representatives focused along Fall Creek from 56th Street to Interstate 65 which includes the Quality-of-Life Plan communities of the Mid-North and Northeast Corridor. This also includes representatives from neighborhoods along Lower Fall Creek such as Mapleton Fall Creek, Millersville at Fall Creek Valley, Herron Morton, and Friends and Neighbors and Historic Meridian Park. Early in 2020 the committee voted to make the WMP update a key focus of their annual workplan.

The committee and watershed stakeholders met monthly to discuss the overall direction of the WMP update and guide the overall process by providing input on perceived problems or issues within the watershed. **Table 1-1** lists the ROW Fall Creek Waterway Committee members.

Table 1-1 ROW Fall Creek Committee Members

NAME	REPRESENTING
Chris Corr	ROW Fall Creek Co-Chair
Keith Cruz	ROW Fall Creek Co-Chair
Doug Day	ROW Fall Creek Liaison and Champion for Destination Fall Creek
Brianna Dines	ROW Waterways & Communications Coordinator
Melinda Hall	Millersville at Fall Creek Valley, Inc.
Amy Shau Hammes	Millersville at Fall Creek Valley, Inc.
John Hazlett	Marion County Soil and Water Conservation District
Kevin Senninger	Near North Development Corporation
Nathan Smurdon	ActiveIndy Tours

In addition, input was gathered from additional watershed stakeholders from municipalities, counties, local business and academia, and public representatives through various meetings and correspondence beginning in February 2020. Many stakeholders were invited based on their participation during the last planning effort, their knowledge of the Lower Fall Creek watershed, or their professional representation through an agency or office. Also, in February 2020, ROW held a rain barrel construction workshop with local partners such as the Kheprw Institute and The City League for area residents.

Meetings after February 2020 were vastly different in nature due to the social distancing requirements of the COVID-19 pandemic. Many governmental restrictions were placed on meeting locations, the number of persons meeting in one space, and further, several individuals were practicing quarantine measures which significantly changed the initial meeting plan for the WMP update. Electronic methods of interaction such as web-based conference calls and meetings were largely utilized.

Those providing additional information integral to the update of the Lower Fall Creek WMP are listed in **Table 1-2**.

Table 1-2 Additional Watershed Stakeholders

NAME	REPRESENTING
Sharon Barclay	Brendonwood Neighborhood Association
Chris Barnett	Marion County Wellfield Education Corporation Chair Lawrence Community Development Corporation Executive Director
Matt Benson	Millersville at Fall Creek Valley, Inc.
Jacob Brinkman	Indianapolis DPW Ecologist
Kelly Brown	ROW Metrics Manager
Ginger Davis	Hamilton County SWCD Conservation Administrator
Jason Dearman	Greater Allisonville Community Council, Inc.
Sam Ennett	IDEM Watershed Specialist
Matt Frigo	Devonshire III VI Civic Association
John Hazlett	Marion County SWCD District Manager
Gretchen Quirk	Marion County Public Health Department Water Quality Supervisor
Mo Reynolds	Greater Allisonville Community Council, Inc.
Julie Rhodes	ROW Collective Impact Director

NAME	REPRESENTING
John Ryker	Windridge Condos Homeowner
Alex Spicer	Ivy Tech Community College Associate Director of Purchasing
Jim Wolfe	Lake Charlevoix

Appendix 2 includes meeting agendas and summaries.

Updates on the planning effort, public meeting announcements, and educational materials were placed on the ROW Fall Creek webpage (https://ourwaterways.org/waterways/fall-creek/). General information articles were also included in the Marion County SWCD's newsletter, the Indy Midtown Magazine, the Indianapolis Recorder, the Urban Times, and various neighborhood associations newsletters. The updates, articles, and newsletters developed as a part of this planning effort may be found in **Appendix 3**.

CHAPTER 2 WATERSHED INVENTORY

Figure 2-1 Lower Fall Creek Watershed Location (Burke)

The Lower Fall Creek watershed is unique in that it drains from some of the largest and fastest growing municipalities in Indiana and is rapidly converting from agricultural and open land uses to more developed and urban land uses. This section provides an overview of the physical and social landscape of the Lower Fall Creek watershed using readily available data. The location of the Lower Fall Creek watershed within the State of Indiana is identified in **Figure 2-1**.

It is intended that the information presented within the watershed inventory will serve as the basis in determining whether or not stakeholder concerns are supported by existing conditions or data collected by partner agencies or interest groups.

2.1 WATERSHED DESCRIPTION

The Lower Fall Creek watershed drains approximately 66,000 acres (103 square miles) of rural, suburban, and urban land in Central Indiana. As shown in **Figure 2-2**, the watershed covers portions of Hamilton County (City of Noblesville, City of Fishers), Hancock County (Town of McCordsville), Madison County, and Marion County (City of Indianapolis, City of Lawrence).

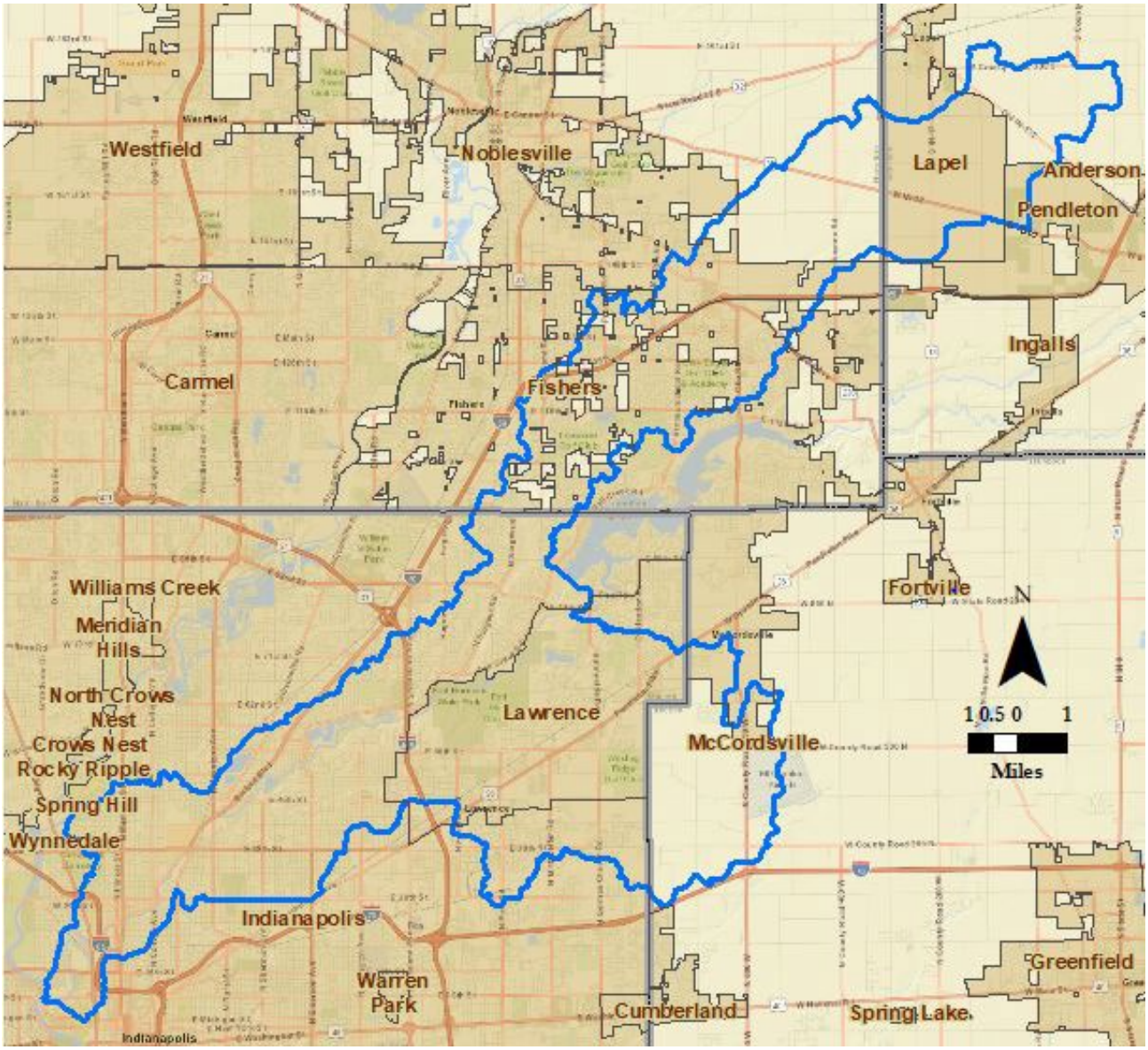

Figure 2-2 Lower Fall Creek Watershed (Burke)

2.2 WATERSHED DEMOGRAPHICS

The Lower Fall Creek watershed is located in the most populated and fastest growing areas of Indiana. Between 2010 and 2018, the Town of McCordsville grew 40%; the City of Fishers and the City of Noblesville increased by 20%. These numbers account for an increase of approximately 76,000 residents; many of whom may be residing within the watershed.

Table 2-1 provides an overview of the populations of each county within the Lower Fall Creek watershed. Data was obtained from the US Census America Fact Finder and utilizes census block group estimates and geographic information system (GIS) overlays of the Lower Fall Creek watershed to estimate the various populations within portions of the watershed within each county.

Table 2-1 Lower Fall Creek Watershed Population

Population	Hamilton		Hancock		Madison		Marion	
	#	%	#	%	#	%	#	%
Asian (Non-Hispanic)	5,343	7%	286	1%	0	0%	4,387	2%
Black (Non-Hispanic)	4,392	6%	1,316	6%	276	2%	94,381	45%
Hispanic	2,739	4%	557	3%	484	3%	15,347	7%
Other	398	1%	133	1%	22	0.14%		
White (Non-Hispanic)	64,438	83%	18,644	88%	15,403	96%	99,759	48%
Total Population	**77,995**	**100**	**21,206**	**100**	**16,112**	**100**	**207,730**	**100**

US Census American Fact Finder, 2020

As with population, median income and poverty levels vary throughout the watershed counties as well. The information provided in **Table 2-2** is not limited to Lower Fall Creek watershed but remains a valuable tool when considering the larger social landscape of the region. The rank signifies the county's rank within the 92 counties in Indiana.

Table 2-2 Lower Fall Creek Watershed Income, Poverty Rate, House Values

	Hamilton		Hancock		Madison		Marion	
	Value	Rank	Value	Rank	Value	Rank	Value	Rank
Median Income	$101,740	1	$73,831	8	$49,522	71	$48,409	76
Poverty Rate	4.2%	92	5.6%	90	24.7%	6	17.2%	7
Median House Value	$249,400	1	$165,200	10	$93,700	76	$129,200	32

STATS Indiana, 2020

The goal of developing a WMP is to implement best management practices (BMPs) on a watershed scale to enhance water quality nearly disregarding political boundaries. As mentioned earlier, this watershed covers some of the most rapidly growing areas in Indiana. The municipalities see great increases in population as well as large areas of growth, development, and changes in land cover. The municipalities and counties partner for various projects such as this planning effort but do still retain largely different styles of basic resource management. Municipal ordinances,

water resource management, and land development practices differ between the primarily agricultural areas of Madison County and the highly developed inner urban areas of the Marion County portion.

2.3 HYDROLOGY

2.3.1 Subwatersheds

There are four 12-digit hydrologic unit codes (HUC) watersheds within the Lower Fall Creek watershed. **Table 2-3** lists the individual HUCs and the acres of each per county. **Exhibit 1** shows the entire Lower Fall Creek watershed and the four 12-digit subwatersheds.

Table 2-3 Lower Fall Creek Watershed Subwatersheds and Acres Per County

HUC12 Watershed	HUC12 Name	Hamilton	Hancock	Madison	Marion	Totals	
		Acres				Acres	%
051202010901	Headwaters Mud Creek	8,803.9		7,900.9	1.4	16,707.5	25.4
051202010902	Indian Lake-Indian Creek		6,856.7		9,581.1	16,437.8	25.0
051202010903	Sand Creek-Mud Creek	8,031.2			2,668.8	10,700.0	16.3
051202010904	Devon Creek-Fall Creek				21,863.6	21,863.6	33.3
Totals	**Acres**	**16,835.1**	**6,856.7**	**7,900.9**	**34,114.9**	**65,708.9**	**100.0**
	%	**25.6**	**10.4**	**12.0**	**51.9**	**100.0**	

USGS Watershed Boundary Dataset, 2019

2.3.2 Streams and Tributaries

Within the Lower Fall Creek watershed, there are over 800 miles of streams and tributaries. These streams and tributaries provide recreational outlets as residents and visitors connect to the water directly through kayaks or fishing, or indirectly through the many parks located on the banks. The number of stream miles for both named and unnamed streams and tributaries as identified by the National Hydrography Dataset (NHD) within the watershed per subwatershed are provided in **Table 2-4**. Further, these streams and tributaries are also identified on **Exhibit 1**.

Table 2-4 Lower Fall Creek Watershed Stream Miles Per Subwatershed

Floodplain Description	Headwaters Mud Creek	Indian Lake – Indian Creek	Sand Creek – Mud Creek	Devon Creek – Fall Creek	Totals	
	Stream Miles				Miles	%
Named NHD Streams	21.9	34.6	17.8	43.7	**118**	**15**
Unnamed NHD Streams	161.8	166.6	113.1	239	**680.5**	**85**
Stream Miles	**183.7**	**201.2**	**130.9**	**282.7**	**798.5**	**100**
%	**23.0**	**25.2**	**16.4**	**35.4**	**100.0**	

NHD, 2019

The Devon Creek-Fall Creek subwatershed has the most stream miles, named and unnamed, of the four subwatersheds. Conversely, the Sand Creek-Mud Creek subwatershed has the fewest number of named and unnamed stream miles.

Stream names, as provided by the NHD, are listed in **Table 2-5**. In addition to these waterways, there are numerous subsurface drains, storm sewer systems, and other man-made conveyance systems that drain the Lower Fall Creek watershed. There are also numerous lakes and ponds within the watershed. These waterbodies may have a direct connection to Fall Creek or tributary streams via inlets and outlets to and from these water systems. Many of these man-made, or altered systems, such as Indian Lake (approximately 60 acres) provide the necessary drainage for rapid and vast new development and re-development taking place throughout the watershed. Further, some lakes such as Lake Maxinhall (approximately 85 acres) and ponds were developed through sand and gravel mining practices and are located in the recharge zones of wellfields. The NHD named lakes and ponds are also listed in the table and identified on **Exhibit 1**.

Table 2-5 Lower Fall Creek Watershed NHD Named Waterbodies Per County

Hamilton	Hancock	Madison	Marion	
High Ditch	Dunn Ditch	Henry Ditch	Atkinson Creek	Lake Maxinhall
Mud Creek	Heinrich Ditch	Kynett Ditch	Bells Run	Lantern Run
Sand Creek	India Branch	Mud Creek	Berkshire Creek	Laurel Run
	Jay Ditch		Billings Creek	Lawrence Creek
	Steele Ditch		Blue Creek	Maibucker Ditch
			Brave Creek	Meadows Brook
			Camp Creek	Minnie Creek
			Chime Run	Mock Creek
			Devon Creek	O'Brian Ditch
			Fall Creek	Osborn Ditch
			Field Creek	Pistol Run
			Fort Branch	Sargent Brook
			Garden Run	Sargs Run
			Hillcrest Creek	Schoen Creek
			Hoss Creek	Scout Branch
			Hunter Mitthoefer Ditch	Squaw Run
			India Branch	Steele Ditch

Hamilton	Hancock	Madison	Marion	
			Indian Creek	Wesley Creek
			Indian Lake	Woollen Run
			Indianapolis Water Company Canal	
			Kesslerwood Lake (East/West)	

NHD, 2019

2.3.3 Regulated Drains

Maintenance of waterways, including the clearing of fallen trees, log jams, and debris is essential to maintaining stream flow during high water events and reducing flooding. Approximately 138 miles of the waterways in the Lower Fall Creek watershed are regulated drains. A regulated drain can be an agricultural drain, urban storm sewer, or open ditch. As shown on **Exhibit 1** these are primarily located in Hamilton (51.49 miles), Hancock (51.34 miles), and Madison (22.25 miles) counties and are under the jurisdiction of the local Drainage Board. Within Marion County, the City of Indianapolis Department of Public Works (DPW) is responsible for regulated drains. Landowners within the drainage area of a regulated drain pay for routine maintenance and reconstruction based on an assessment process. Often times, regulated drain maintenance disrupts the instream flora, fauna, and characteristics associated with high quality waterbodies.

The SWCD in each county and the Indiana Department of Natural Resources (IDNR) Division of Water is able to provide additional guidance on stream maintenance to individual landowners.

2.3.4 Wetlands

Wetlands serve a vital role with the ability to filter pollutants from the water, provide habitat to numerous animal and plant species, and serve as a water storage area. This increased storage area is important within the watershed as this may help to reduce the overall volume of water reaching the mainstem of Fall Creek, thus reducing the impacts of flooding. The water stored within the wetlands is then filtered and released slowly into the soil structure or evaporated. The areas identified by the National Wetlands Inventory (NWI) as having conditions suitable for wetlands are shown on **Exhibit 1**. It is important to note that these areas should be utilized for reference only and will need to be individually field verified. The number of acres of various types of potential wetlands per subwatershed is provided in **Table 2-6**.

Table 2-6 Lower Fall Creek Watershed Wetland Acres Per Subwatershed

Wetland Description		Headwaters Mud Creek	Indian Lake-Indian Creek	Sand Creek – Mud Creek	Devon Creek – Fall Creek	Totals	
		Acres				Acres	%
Freshwater Emergent Wetland		5.1	31.0	7.8	2.4	**46.3**	**2.2**
Freshwater Forest/Shrub Wetland		120.3	45.8	174.7	302.5	**643.3**	**30.3**
Freshwater Pond		180.5	157.1	175.2	165.7	**678.5**	**32.0**
Lake		68.5	53.8	0.0	196.9	**319.2**	**15.0**
Riverine		47.6	83.3	33.1	270.9	**434.9**	**20.5**
Totals	**Acres**	**422.0**	**371.0**	**390.8**	**938.4**	**2,122.2**	**100.0**
	%	**19.9**	**17.5**	**18.4**	**44.2**	**100.0**	

NWI, 2019

Wetlands serve a vital role in water quality, habitat quality, and water quantity protection and enhancement. Wetland protection efforts should take place throughout the watershed, but perhaps mostly within the Devon Creek-Fall Creek subwatershed, where the majority of the wetlands are located. The Indian Lake-Indian Creek subwatershed, with the least amount of wetland acres, would be the best subwatershed in which to increase the number of wetlands.

Hydric soils may serve as an important indicator of areas suitable for wetlands. These soils classifications are continuously saturated for lengthy periods of time and create unique habitats for specialized plants able to withstand the prolonged saturated soils. Within the Lower Fall Creek watershed, there are a total of 46,746 acres of hydric soils; (Hamilton – 14,913 acres, Hancock – 6,857 acres, Madison – 7,848 acres, and Marion – 17,128 acres). **Figure 2-3** identifies the hydric soils in the Lower Fall Creek watershed.

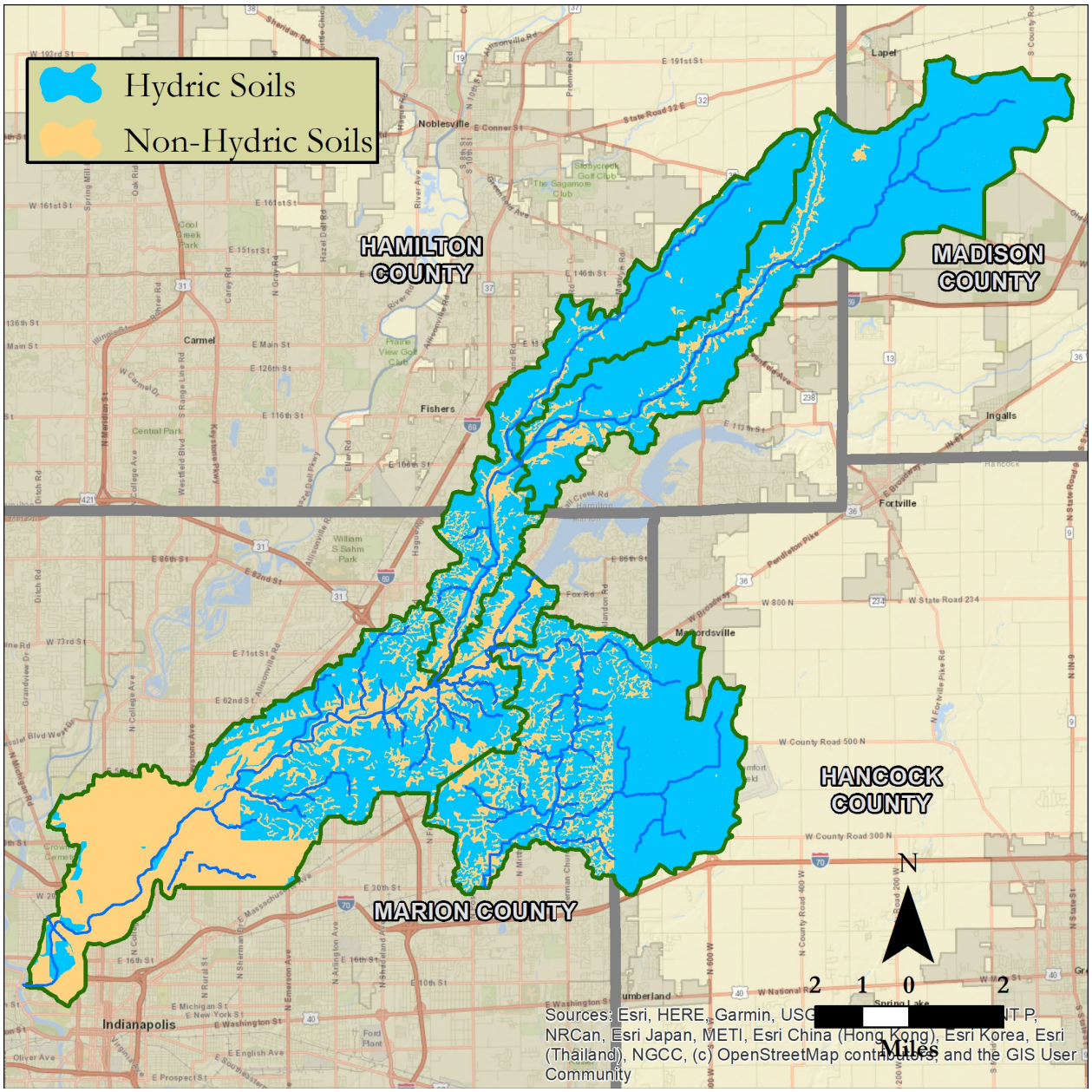

Figure 2-3 Lower Fall Creek Watershed Hydric Soils (Burke)

2.3.5 **Floodplains**

Another important consideration is amount and type of floodplain in the watershed. A floodplain is land adjacent to a stream, river, or creek that provides temporary storage for floodwaters. When portions of floodplains are preserved or restored, they provide many benefits to both human and natural systems. Similar to wetlands, floodplains can provide storage for floodwaters, improve water quality, and offer space that may be suitable habitat for wildlife and wetlands. Certain activities or land use changes should be prohibited within the floodplain or the special flood hazard area (SFHA). The floodway is the main part of the stream, primarily the channel and adjacent floodplain area. The floodway fringe is the areas subjected to flooding by the regulatory flood, or what is typically referred to as the 100-year flood or sometimes as the 1% annual exceedance probability (AEP). The acreages in **Table 2-7** indicate both the Federal Emergency Management Agency (FEMA) effective map zones and the IDNR best available information. These zones are also identified on **Exhibit 1**.

Table 2-7 Lower Fall Creek Watershed Floodplain Acres Per County

Floodplain Description	Hamilton	Hancock	Madison	Marion	Totals	
	Acres				Acres	%
Floodway	811.0	36.7	239.9	1,573.3	2,660.9	**47.8**
Floodway Fringe	704.0	227.1	287.6	1,686.7	2,905.4	**52.2**
SFHA Acres	**1,515.0**	**263.8**	**527.5**	**3,260.0**	**5,566.3**	**100.0**
SFHA %	**27.2**	**4.7**	**9.5**	**58.6**	**100.0**	

Flooding may also occur outside of the floodplain area as a result of increased urbanization relying on antiquated or undersized drainage systems that are unable to deal with the increased volume and velocity of stormwater. The increased volume and velocities of water can be detrimental to receiving streams resulting in severe erosion, scouring, and undercutting of streambanks and ultimately loss of aquatic and terrestrial habitat. Runoff associated with floodwaters may carry extremely toxic substances such as gasoline, oil, and pesticides that results in downstream deterioration of water quality.

2.3.6 **Combined Sewer Systems**

The lower portion of the watershed is a combined sewer system, or a system that collects both stormwater runoff, residential sewage, and sometimes industrial effluents within a combined series of pipes. During times of dry weather, the materials are delivered to the wastewater treatment plant. However, during heavy rain or snow events the pipes become too full and overflows, resulting in a discharge to a waterbody such as a stream or a river. This is a combined sewer overflow (CSO).

Within the City of Indianapolis, from the intersection of Binford Blvd and Keystone Ave. to the confluence with the White River, there are 27 CSO outfalls. It is projected that only one CSO outfall will remain following completion of the DigIndy project

in 2025. These outfalls and overflow events are regulated by IDEM and the US EPA. **Figure 2-4** identifies the locations of the CSO outfalls within the City of Indianapolis. There are no other combined sewer areas in the Lower Fall Creek watershed.

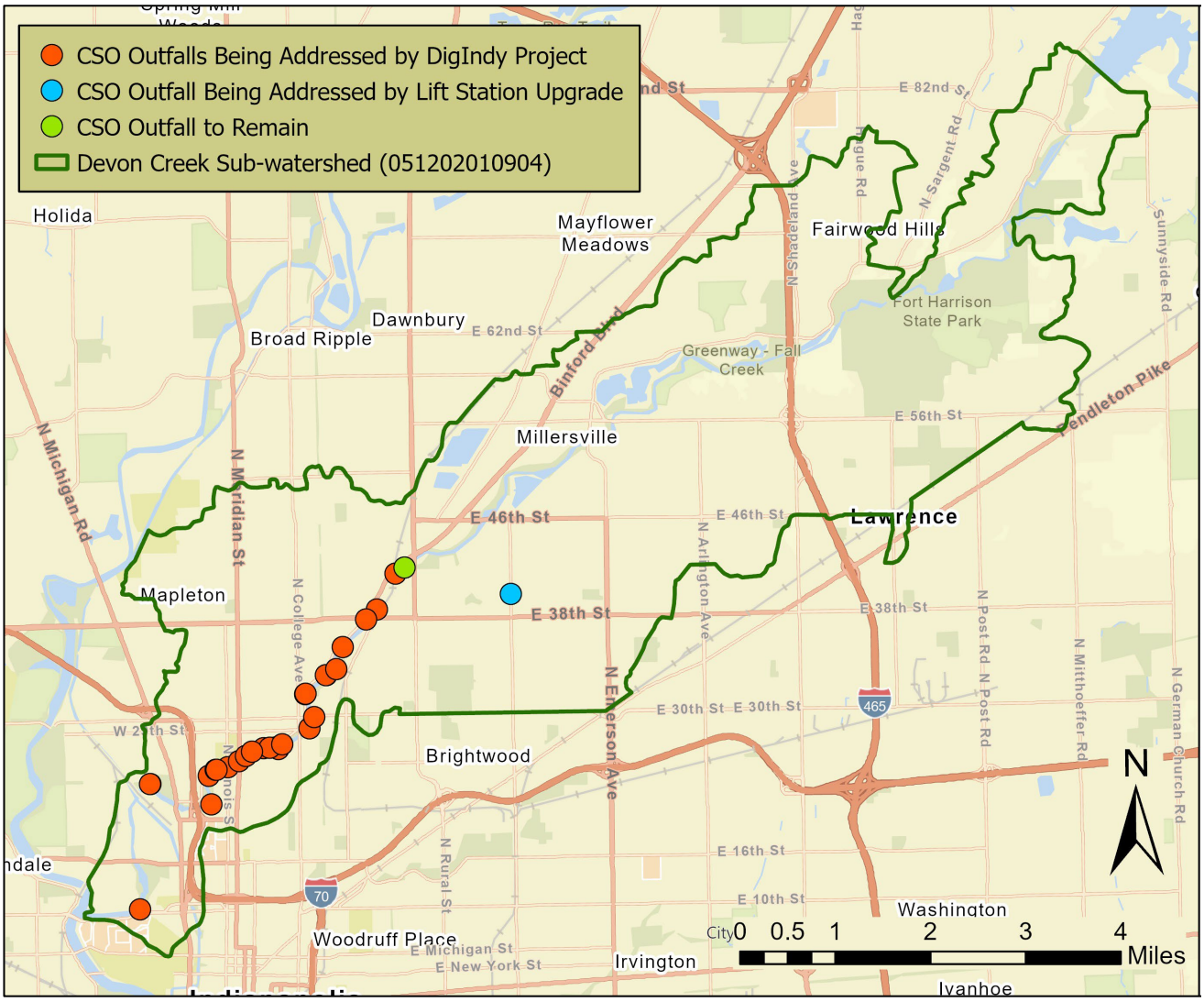

Figure 2-4 Indianapolis Combined Sewer Overflow Outfalls (IDEM)

2.3.7 **Wellfield Protection Areas (WFPA)**

Within the Lower Fall Creek watershed, there are many municipalities which rely on groundwater wells for drinking water purposes. It is estimated that approximately 25% of the watershed is considered within a wellfield protection area (WFPA). This is the area where the water seeps into the ground to recharge the aquifers from which the wells extract the water. It is also estimated that 20% of the central Indiana population is serviced by the wells protected within the WFPAs. These WFPAs are divided into two zones, the one-year and five-year times of travel; the amount of time needed for the groundwater to reach the well. Representatives from the groundwater section in IDEM have indicated it is best practice for safety and security measures to not map the WFPAs within a public document such as this. It will be important for the Lower Fall Creek watershed representatives to work closely with IDEM and municipal staff when recommending and implementing infiltration practices in the watershed, especially, within the WFPAs.

Rural residents within the Hancock and Madison County portions of the watershed are primarily serviced by private residential wells.

The City of Indianapolis has adopted a Wellfield Protection Zoning Ordinance with zoning classifications W-1 for the 1-year time of travel and W-5 for the 5-year time of travel areas. Within these areas, all new site development plans must be reviewed by a Technically Qualified Person (TQP) to ensure that groundwater resources will be protected, and that the facility does not pose and unreasonable risk to the groundwater. Restrictions and requirements to ensure this risk is lowered include connections to sanitary sewers, covering of areas where maintenance will occur, and secondary containment for chemical storage areas.

The Marion County Wellfield Education Corporation (MCWEC) was developed as part of the Wellfield Protection Zoning Ordinance to prevent contamination of the groundwater resource through public awareness and education – targeting pre-existing commercial and industrial businesses in the WFPAs. MCWEC maintains a Potential Source Inventory (PSI) database for each wellfield (a list of existing and potential sources of contamination within the WFPAs which might represent a threat to the public water supply system), visits each facility to discuss groundwater issues, and conducts confidential detailed on-site assessments for interested business owners. Through the efforts of MCWEC, Marion County has been designated as a Groundwater Guardian Community by the National Groundwater Foundation since 1998.

2.3.8 Drainage Complaints

In the fall of 2019, the Marion County SWCD developed a database of over 2,000 historic private property drainage complaints dating back to 1974. Complaints received by the SWCD are those directly from individual landowners, as well as complaints and calls forwarded from the City of Indianapolis Mayor's Action Center (MAC). The complaints were digitized and categorized dependent upon the nature of the issue (i.e., flooding, ponding water, streambank erosion, etc.). These complaints were then geo-coded and mapped to prepare **Figure 2-5**. While this information is provided for Marion County only, the majority (158 or 66%) of the complaints received within the Lower Fall Creek watershed are within the Devon Creek-Fall Creek subwatershed. The database will be maintained by the SWCD in the future to assess improvements needed to both public and private infrastructure.

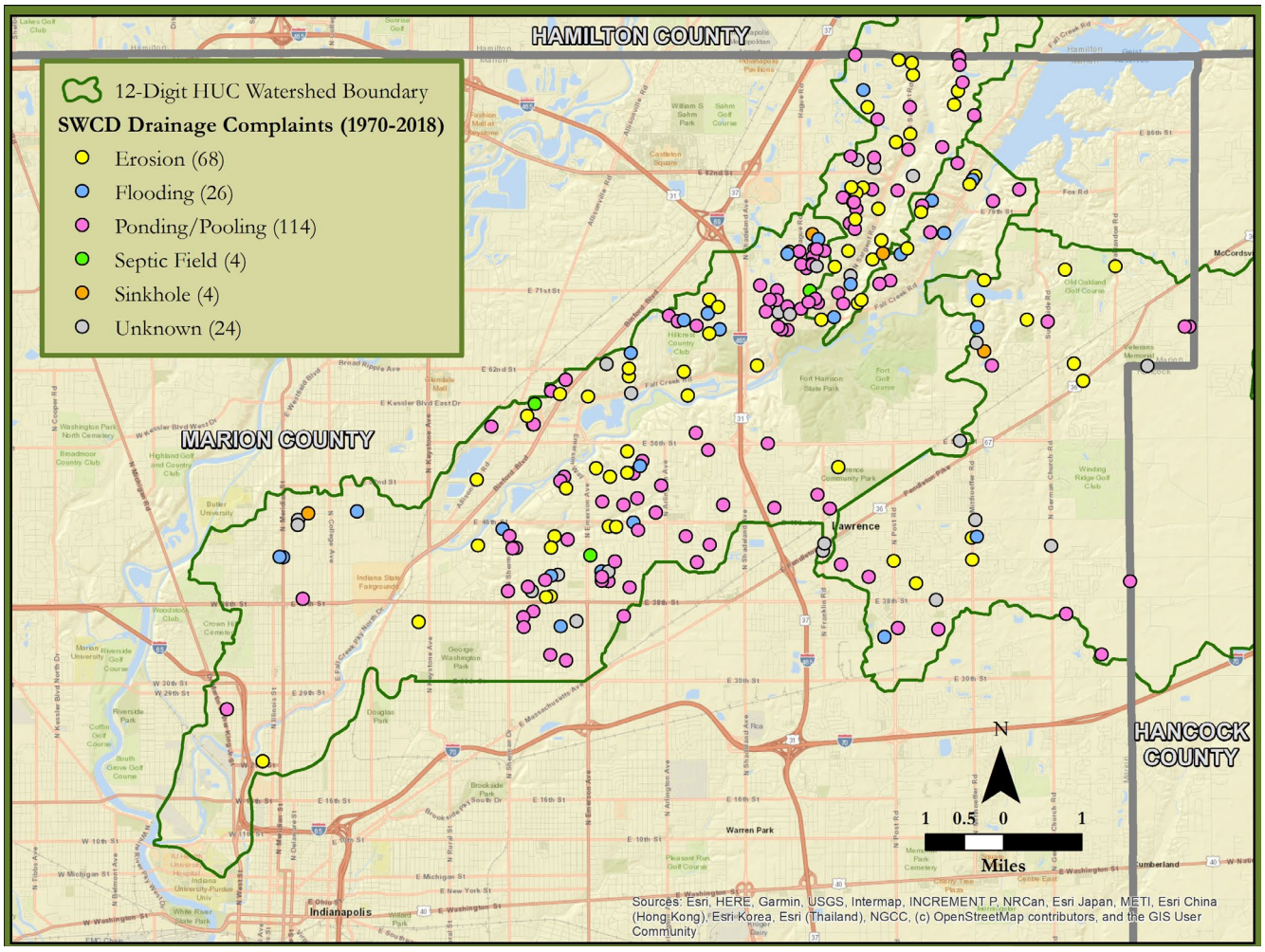

Figure 2-5 Lower Fall Creek Marion County SWCD Complaint Database (Burke)

2.4 SOILS

The relief and soils of the Lower Fall Creek watershed were influenced by three glacial periods. As the glaciers retreated, the watershed was scoured to a relatively flat plain with gently rolling surface, with elevations ranging from approximately 690 to 870 feet above sea level. The more distinctive slopes in the watershed have been formed by the actions of the rivers, streams, and tributaries in the watershed. Some of the greatest relief in the watershed occurs along Fall Creek and Mud Creek in and around the City of Lawrence.

Soil properties and features are important to note with respect to suitability for placement of residential septic systems. Without the proper soil characteristics, septic systems may experience inefficiencies or failures caused by the inability for effluents to be absorbed or properly filtered by the surrounding soils. This may result in water standing over the absorption field of the system or contaminated groundwater. It is estimated that over 90% of the soils in the Lower Fall Creek watershed are moderately to severely limited for septic systems.

As much of the Lower Fall Creek watershed is within an urban municipality, local governments and Health Departments have worked to create and adopt ordinances which regulate the ability for new septic systems to be installed. Within all counties of the watershed, sewage ordinances mandate that new construction must utilize the sanitary storm sewer if available within 300 feet.

Figure 2-6 indicates the soils suitable for proper septic functions within the Lower Fall Creek watershed.

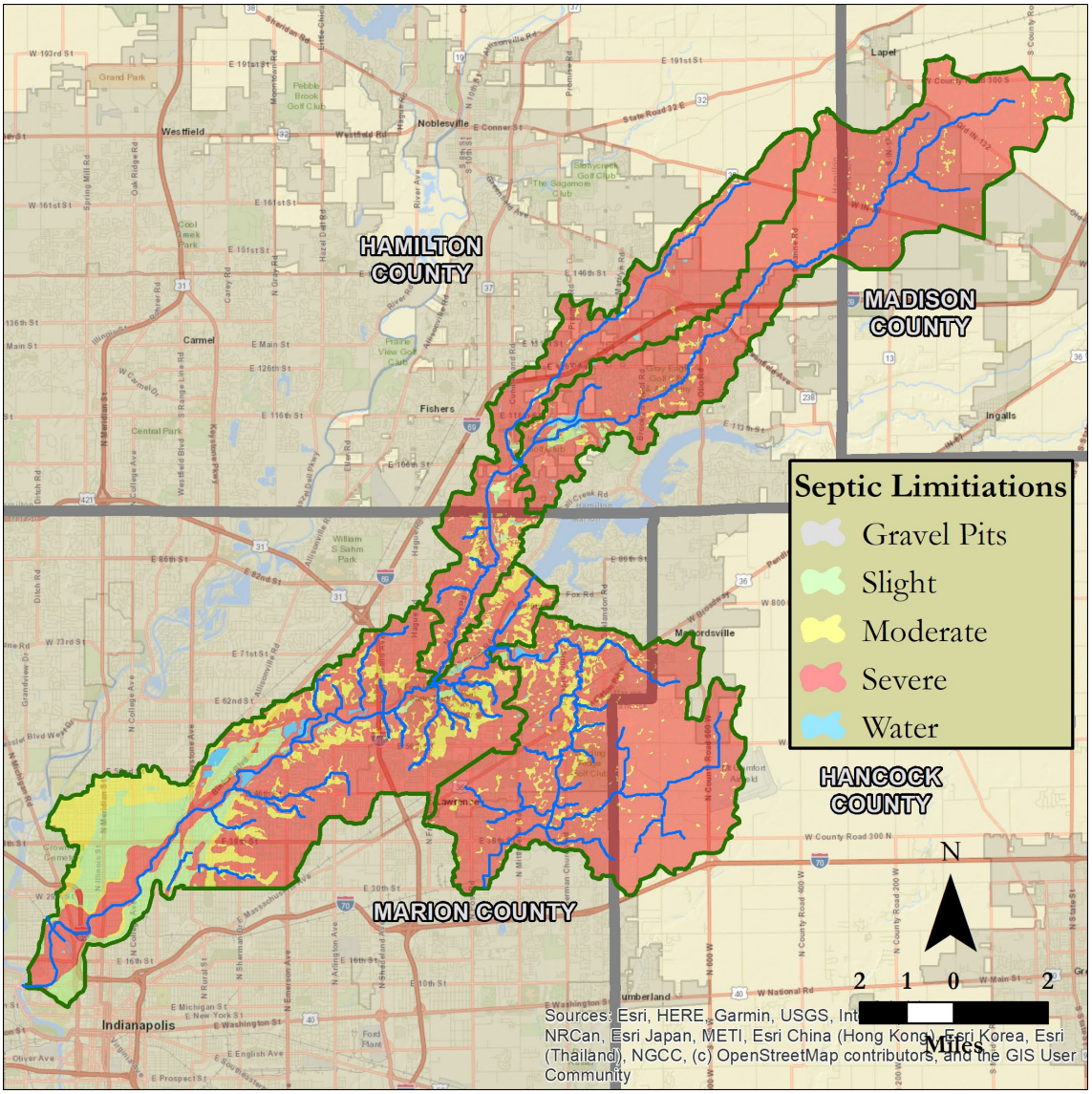

Figure 2-6 Lower Fall Creek Watershed Soil Suitability for Septic Systems (Burke)

Highly Erodible Land (HEL) and Potentially Highly Erodible Land (PHEL) are names given to land that is more susceptible to erosion than most. This typically is in reference to tilled farmland; however, the name applies to the soil map unit regardless of the location or the land cover. Within the Lower Fall Creek watershed, there are approximately 12,300 acres of HEL and PHEL soils (20% overall), shown in **Figure 2-7.** The majority of the HEL and PHEL acres (5,543 acres) are within the Devon Creek-Fall Creek subwatershed; **Figure 2-8**. The other three subwatersheds are nearly equivalent with 2,000 to 2,500 acres of HEL or PHEL soils and are shown on **Figure 2-9**, **Figure 2-10**, and **Figure 2-11**.

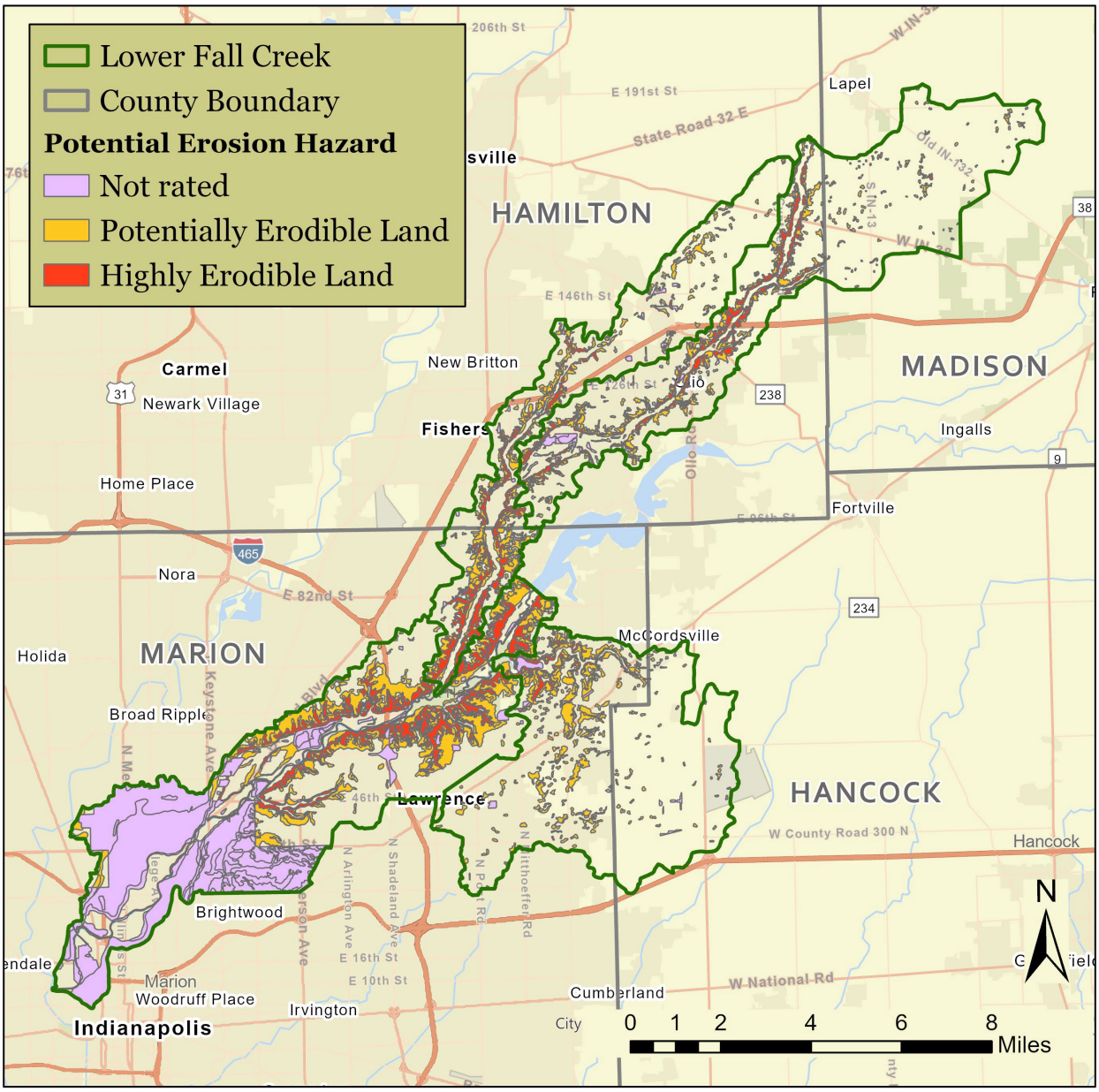

Figure 2-7 Lower Fall Creek Watershed Erodible Land (IDEM)

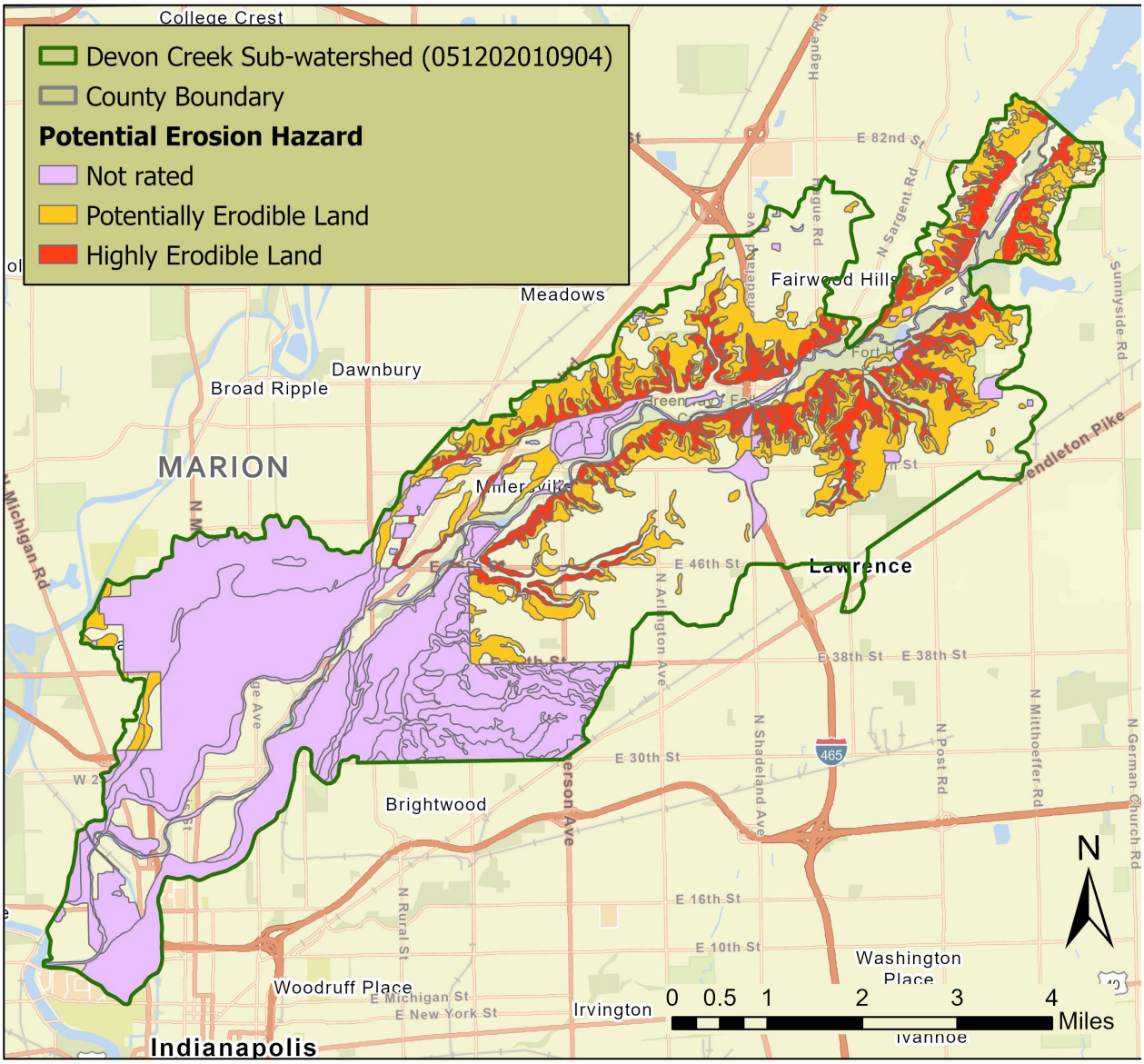

Figure 2-8 Devon Creek Subwatershed Erodible Land (IDEM)

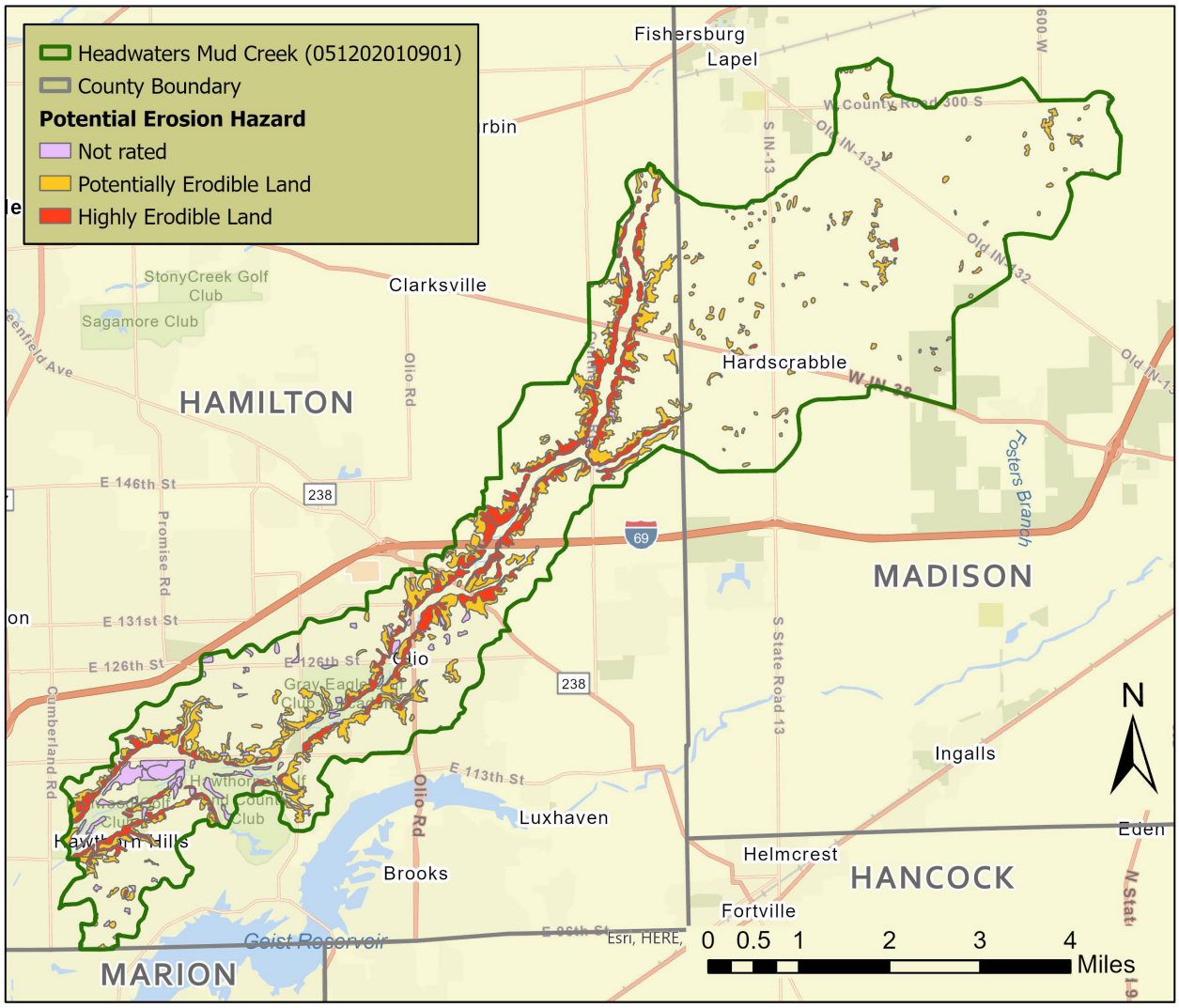

Figure 2-9 Headwaters Mud Creek Subwatershed Erodible Land (IDEM)

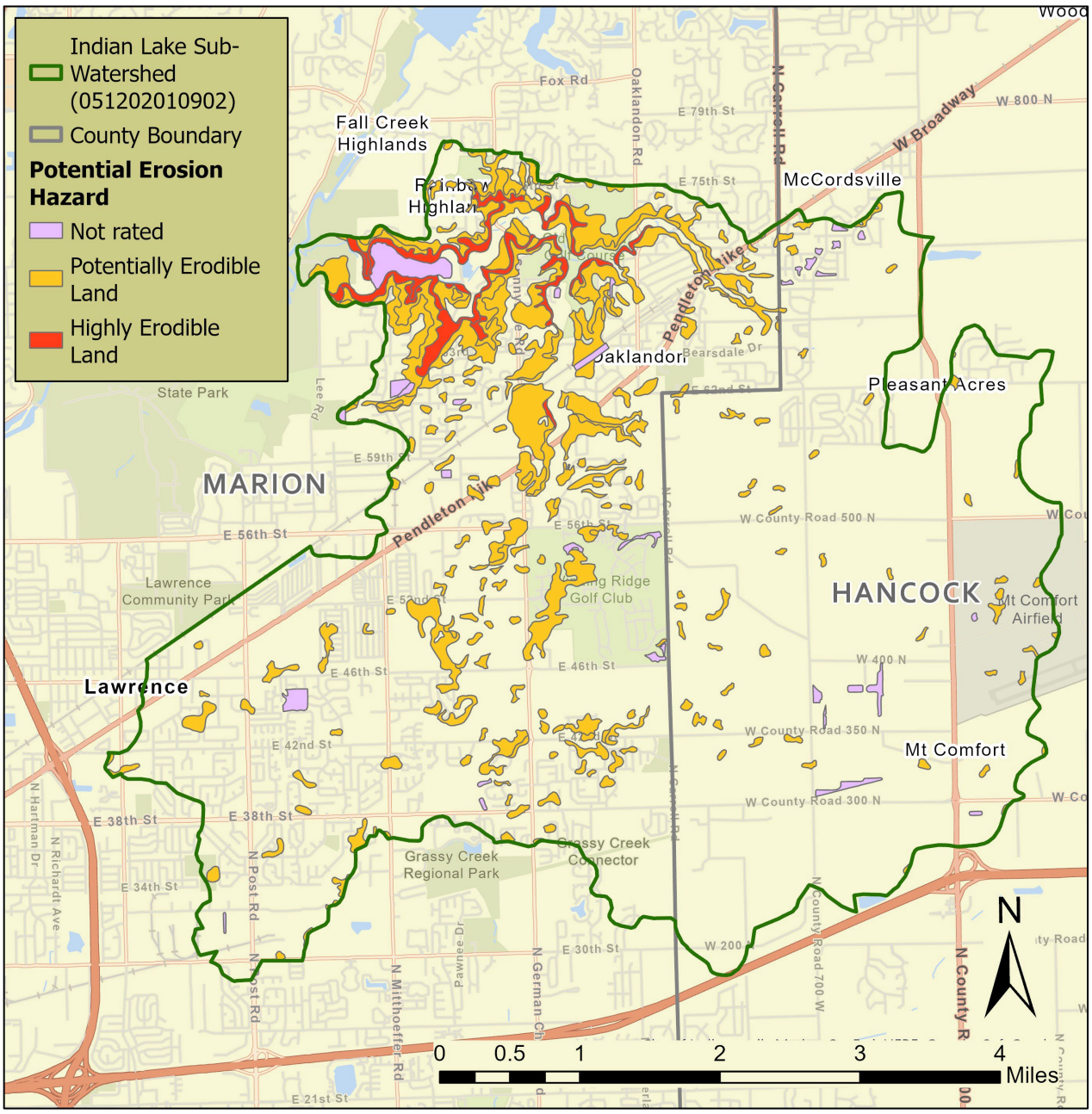

Figure 2-10 Indian Lake Subwatershed Erodible Land (IDEM)

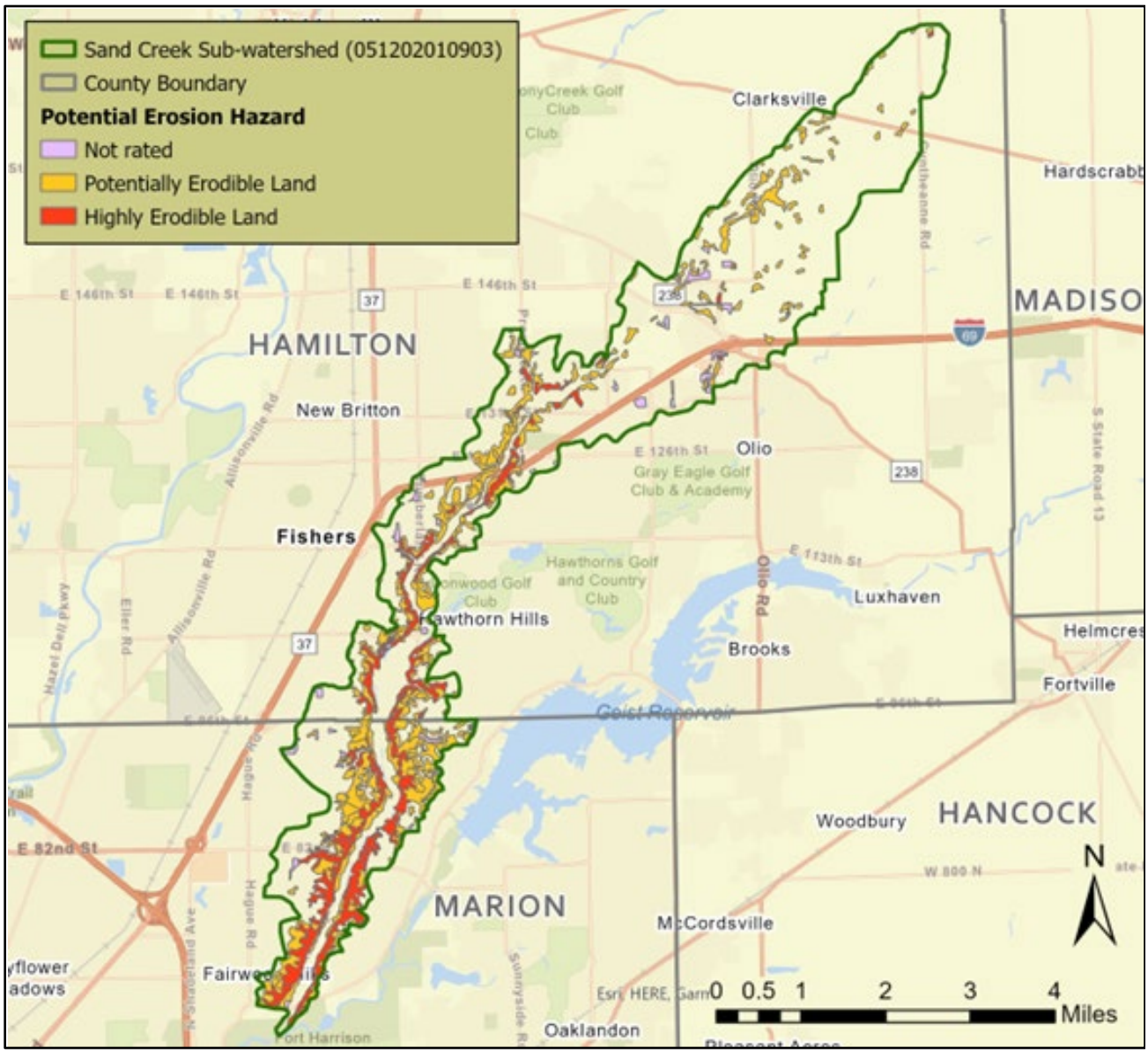

Figure 2-11 Sand Creek Subwatershed Erodible Land (IDEM)

The agricultural areas of the watershed are largely located in Hancock County, Madison County, and the northeastern most portion of the Hamilton County watershed. Utilizing the 2017 Census of Agriculture County Profiles for each county, **Table 2-8** was developed to highlight the various tillage practices. This information is collected and reported by county and therefore must be used to make general assessments of the practices. It is not able to be used to indicate specific tillage types for specific operations within the watershed.

Table 2-8 Lower Fall Creek Watershed Tillage Types by County

Tillage Types	Hamilton	Hancock	Madison	Marion
	% of Farms			
No-Till	25	27	29	15
Reduced Till	13	21	22	15
Intensive Till	21	23	25	6
Cover Crop	9	10	6	10

National Agricultural Census, 2017

Livestock operations are also primarily located in throughout the Hancock (Indian Lake – Indian Creek subwatershed) and Madison County (Sand Creek – Mud Creek subwatershed) portions of the Lower Fall Creek watershed. Smaller farms or hobby farms are located in some of the areas where suburban and rural areas meet within the Headwaters Mud Creek subwatershed. Hobby farms are smaller in nature regarding both acreage and number of animals within the operation.

According to Indiana MAP, there is one confined feeding operation (CFO) located within the Lower Fall Creek watershed. This swine operation is generally located north of Noblesville in the unincorporated Hamilton County. There are no larger, permitted livestock facilities, Concentrated Animal Feeding Operations (CAFOs) located in the watershed.

Agricultural lands often utilize land applications of soil amendments, fertilizers, or wastes from livestock or municipal wastewater treatment plants. Many operations complete soil testing to determine the amount of soil nutrients available and the amount of those nutrients which need to be added for prime crop production. The IDEM Office of Land Quality (OLQ) permits the application of sludge from municipal wastewater treatment plants on agricultural fields.

According to IDEM OLQ, due mainly in part to the expanding municipalities within the watershed and associated loss of farm ground, there is very little to no land application of Class B biosolids within the Lower Fall Creek watershed. Class B biosolids are treated materials from a wastewater treatment plan that meets US EPA guidelines for land application in restricted situations not including home lawns and gardens. Another classification, Class A, may be utilized for home lawns and gardens and farms without restrictions due to the treatment processes of the sludge. Six facilities in close proximity, but not within the Lower Fall Creek watershed are permitted for Class A biosolids distribution. However, these facilities are not required to track or report the acreage upon which the materials were applied and therefore, unknown if materials were applied within the Lower Fall Creek watershed.

The local SWCDs and Natural Resource Conservation Service (NRCS) Offices work with local operations to prepare nutrient management plans, farm conservation plans, and to provide assistance to landowners in designing and installing conservation BMPs.

2.5 LAND COVER

Land cover and land cover change within a watershed is an important consideration for both water quality and water quantity. In many areas, and within the Lower Fall Creek watershed, the pattern of change in land cover is from agricultural and open land use to a more developed or urban land use. This has been true for the Hamilton County subwatersheds (Headwaters Mud Creek and Sand Creek – Mud Creek) and the Hancock County portion of the Indian Lake -Indian Creek subwatershed. Rapid changes are occurring from agricultural land cover to low density development for residential areas in the Indian Lake – Indian Creek subwatershed or medium and high intensity development for more commercial areas along I-69 in the Headwaters Mud Creek subwatershed. Development is anticipated to continue within these areas and within the Sand Creek – Mud Creek subwatershed, especially as municipal infrastructure such as sanitary sewer and drinking water become available. The entire Lower Fall Creek watershed contains many municipal areas among the most rapidly developing within the nation. Land cover, as provided by the 2016 National Land Cover Dataset (NLCD), in acreage by subwatershed is listed in **Table 2-9** and shown on **Figure 2-12.**

Table 2-9 Lower Fall Creek Watershed Land Cover by Subwatershed

NLCD Description	Headwaters Mud Creek	Indian Lake – Indian Creek	Sand Creek – Mud Creek	Devon Creek – Fall Creek	Totals	
	Acres				Acres	%
Barren (Rock/Sand/Clay)	0.7	1.8	0.7	31.0	**34.1**	**0.1**
Cultivated Crops	10,199.3	5,859.3	3,225.6	23.1	**19,307.2**	**29.4**
Deciduous Forest	582.3	807.8	940.8	2,029.7	**4,360.6**	**6.6**
Developed, High Intensity	100.7	626.6	311.6	1,108.7	**2,147.6**	**3.3**
Developed, Low Intensity	1,713.0	3,268.5	2,002.0	8,213.3	**15,196.8**	**23.1**
Developed, Medium Intensity	1,053.2	1,923.6	1,009.8	3,451.2	**7,437.7**	**11.3**
Developed, Open Space	2,352.2	3,237.5	2,590.6	6,197.7	**14,378.0**	**21.9**
Emergent Herbaceous Wetland	5.2	14.3	6.6	121.3	**147.4**	**0.2**
Evergreen Forest	2.7	0.7	10.4	35.9	**49.6**	**0.1**
Grassland/Herbaceous	53.0	61.6	45.2	5.1	**164.9**	**0.3**
Mixed Forest	20.2	36.7	18.6	101.5	**177.1**	**0.3**
Open Water	85.5	96.2	71.1	367.9	**620.7**	**0.9**
Pasture/Hay	484.9	463.3	362.5	19.0	**1,329.7**	**2.0**
Shrub/Scrub		12.0	7.1	5.8	**24.9**	**0.0**
Woody Wetlands	53.4	27.9	101.6	148.2	**331.1**	**0.5**
Totals:	**16,706.1**	**16,437.8**	**10,704.3**	**21,859.3**	**65,707.5**	**100.0**

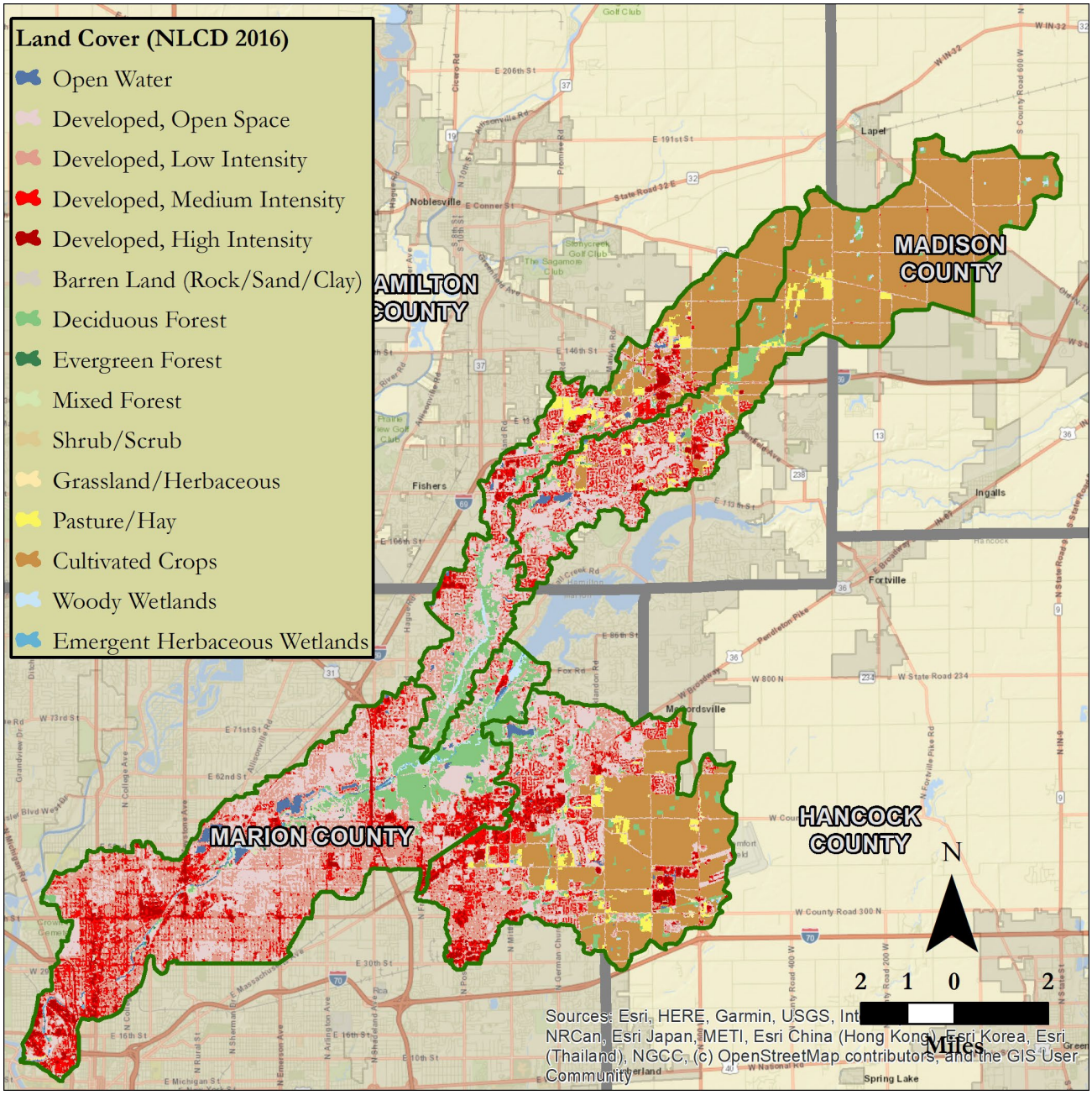

Figure 2-12 Lower Fall Creek Watershed Land Cover (Burke)

As of April 2020, IDEM data records indicate 71 parcels identified as an active brownfield site. A brownfield is a site that is abandoned or inactive, or may not be operated at its appropriate use, due to the presence or potential presence of a hazardous substance, a contaminant, petroleum, or a petroleum product which may be a risk to human health and the environment. All sites are located within Marion County and within the Devon Creek-Fall Creek (66) and Indian Lake-Indian Creek (5) subwatersheds. These brownfield locations are identified on **Figure 2-13**.

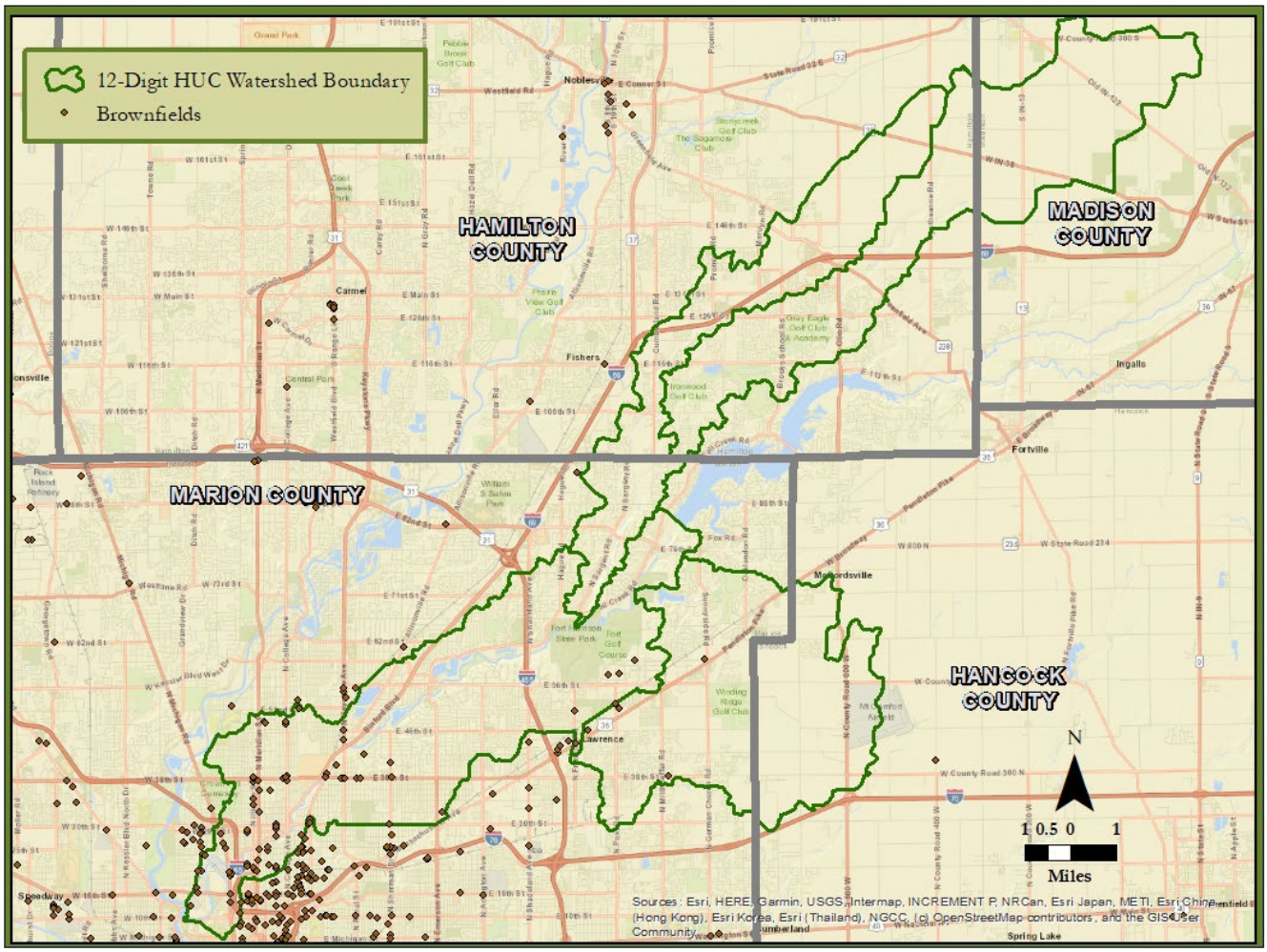

Figure 2-13 Lower Fall Creek Watershed Brownfields (Burke)

Using October 2018 data from IDEM, there are 70 registered underground storage tanks (USTs) and 116 Leaking Underground Storage Tanks (LUSTs) within the entire Lower Fall Creek watershed. Records indicate 14 USTs and 36 LUSTs within the Indian Lake-Indian Creek subwatershed, one LUST within the Sand Creek-Mud Creek subwatershed, and the remaining 56 USTs and 79 LUSTs all within the Devon Creek-Fall Creek watershed. The LUSTs located within the Lower Fall Creek watershed are shown on **Figure 2-14**.

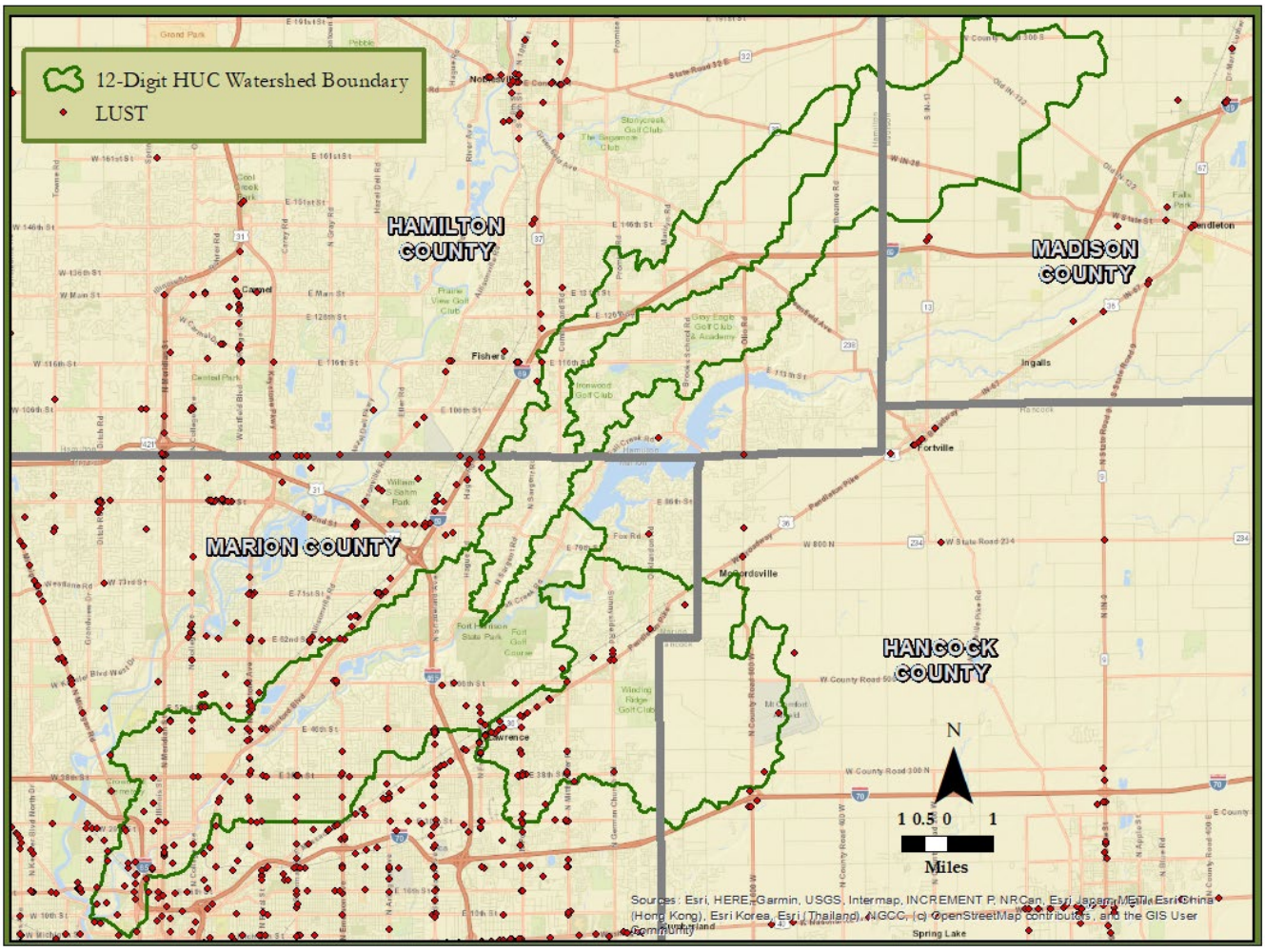

Figure 2-14 Lower Fall Creek Watershed Leaking Underground Storage Tanks (Burke)

Studies completed by US EPA, the Center for Watershed Protection, and others indicate that as the land use in a watershed becomes more urban in nature, the amount impervious land cover also increases. This increase in imperviousness creates an associated decrease in the amount of water able to infiltrate into the ground, thus creating a larger volume of water discharged into nearby streams and waterways.

Figure 2-15, adapted from the Maryland DNR to represent Indiana conditions, shows the relationship between the amount of imperviousness within a watershed and the effects on stream health and stability. As the imperviousness increases (from left to right), the pollution tolerant aquatic species move from the area and stream stability decreases. Using the 2016 NLCD and calculations from GIS, the impervious surface percentage for the Lower Fall Creek watershed is approximately 20.0%.

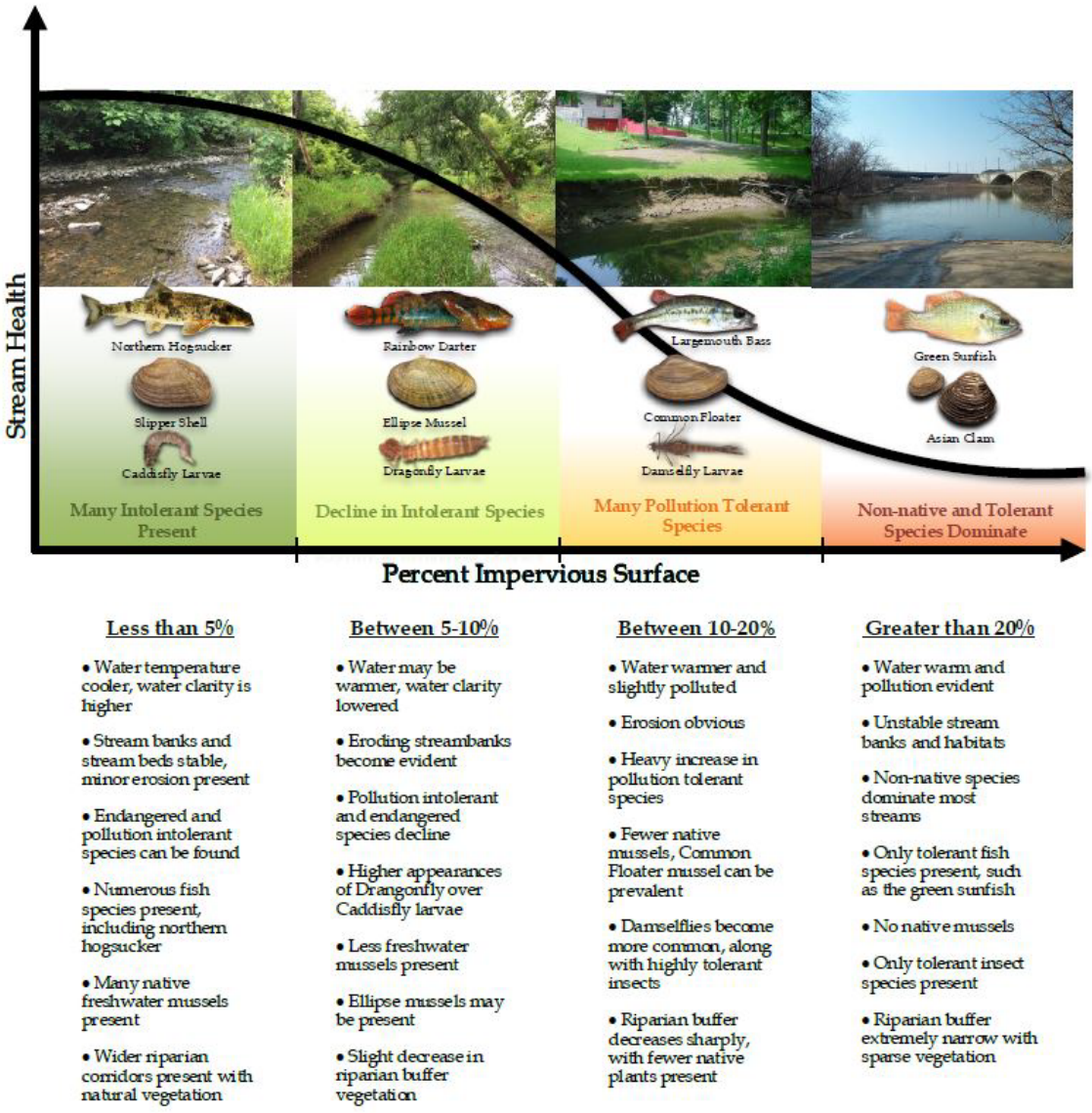

Figure 2-15 Impervious Surface and Stream Health

In addition, this water also picks up pollutants as it travels across the ground and deposits these pollutants into the streams and waterways. In urbanized areas, these pollutants would include gross solids, pet waste, and excess fertilizers/pesticides.

These materials not only create an often-unsightly outdoor environment, but as they decompose, excess nutrients are delivered to or near waterbodies. This leads to an increase in algal growth and imbalances in the water chemistry making it harder, or impossible for organisms to survive.

Gross solids in terms of water pollution includes materials such as blown trash, lawn materials, and litter which become mobilized with stormwater and make their way to local streams, lakes, or other waterbodies. Often, materials such as trash a litter do not decompose and may eventually clog system components also leading to localized flooding. Pet waste is a problem within watersheds as it may carry several types of pathogens leading to diseases or illnesses in other pets or even humans. Excess fertilizers and pesticides also lead to an increase in algal or unwanted vegetation growth.

2.6 ENDANGERED, THREATENED, AND RARE SPECIES

The riparian areas along Fall Creek, Mud Creek, and Sand Creek along with the numerous tributary streams, wetlands, and other natural areas in the Lower Fall Creek watershed, provide a unique home for plant and animal species. The IDNR Natural Heritage Data Center maintains a statewide database (https://www.in.gov/dnr/naturepreserve/4666.htm) of federal and state-listed endangered species and high-quality natural communities observed within each county. There are 23 mollusks, 7 insects, 1 fish, 2 amphibians, 5 reptiles, 20 birds, and 7 mammals listed within Hamilton, Hancock, Madison, or Marion counties. In addition, 22 vascular plants and 8 high quality natural communities have been observed. Detailed studies have not been completed to determine if these species or communities are located within the Lower Fall Creek watershed. **Appendix 4** contains the lists of endangered, threatened, and rare species for each county.

2.7 WATER QUALITY DATA

An inventory and assessment of the existing water quality studies relevant to the Lower Fall Creek watershed is important to develop any baseline trends and summarize water quality prior to implementing practices designed to protect and enhance water quality in the watershed. No additional water quality sampling had occurred for this planning effort. However, beginning in Fall 2021, volunteers from the River Assessment Field Team (RAFT) program administered through the White River Alliance (WRA) began conducting sampling on Mud Creek (Site #1 - Lantern Rd bridge in Marion County) and Sand Creek (Site #2 – Valley Farm Court and Cumberland Rd in Hamilton County). These locations are identified in **Figure 2-16** provided by the RAFT volunteer group. RAFT volunteers are citizen scientists trained on sampling protocols based on the State's sampling procedures and quality

assurance/quality control protocols. These sites will be sampled four times a year for *E. coli*, conductivity, dissolved oxygen, nitrate, nitrite, ortho-phosphate, pH, temperature, turbidity, and flow. Observations and assessments will also be made regarding the surround land use, vegetation, stream shape, and streambed substrate. Collected water quality data and observations will be entered into IDEM's External Data Framework making it accessible to other interested citizens and IDEM staff and is available on the WRA website.

Five samples were collected in 2022 at these locations. In summary:

- Two of the five *E. coli* samples at the Mud Creek location exceeded state water quality standards. Three of the five *E. coli* samples at the Sand Creek location exceeded state water quality standards.
- All five nitrate + nitrite samples at the Mud Creek location were below the EPA's proposed criteria (1.6mg/L as N). All three nitrate+nitrite samples at the Sand Creek location were below the EPA proposed criteria.

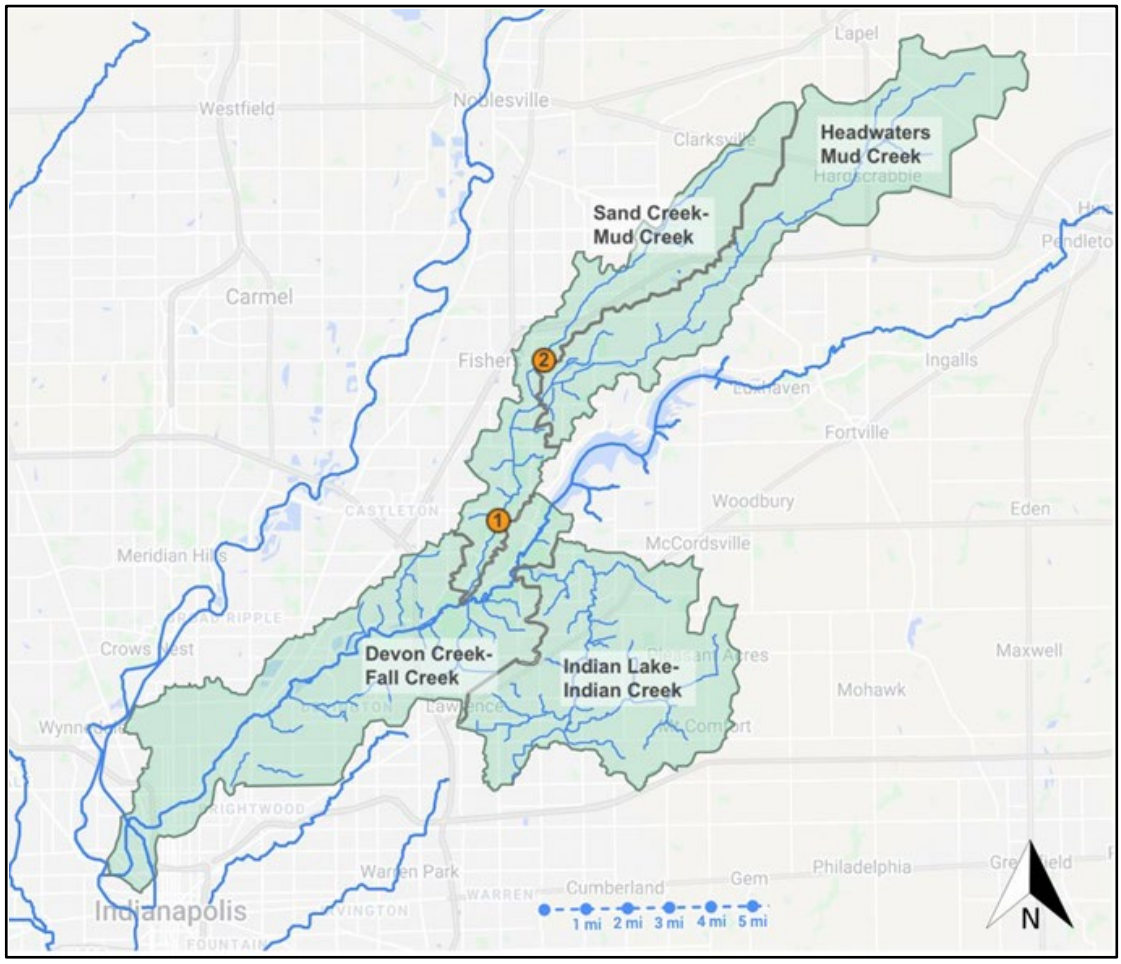

Figure 2-16 WRA RAFT Lower Fall Creek Watershed Sampling Locations (WRA)

2.7.1 Water Quality Standards and Targets

Water Quality Standards (WQS) have been established to restore and maintain the chemical, physical, and biological integrity of the waters of the state. The minimum water quality condition applies to all waters, at all times, and in all places and is referred to as the "free from" condition. The water should be free from substances, materials, floating debris, oil, or scum attributable to municipal, industrial, agricultural, and other land use practices. Certain parameters applicable to the Lower Fall Creek watershed plan have numeric WQS and those are listed in **Table 2-10.**

Table 2-10 Indiana Water Quality Standards

Parameter	WQS	Reference
Total Ammonia (NH3)	0.0 mg/L – 0.21 mg/L dependence on Temp and pH	327 IAC 2-1-6
Atrazine	3.0 ppb (max)	US EPA Drinking Water Standard
Dissolved Oxygen (DO)	4.0 mg/L – 12.0 mg/L	327 IAC 2-1-6
E. coli	235 cfu/100 mL single grab sample	327 IAC 2-1.5-8
Nitrate + Nitrite	1.6 mg/L as N	US EPA Proposed Criteria for Eastern Corn Belt States

Other water quality parameters do not have numeric WQS codified in the Indiana Administrative Code. Rather, targets or benchmarks have been established for those parameters. IDEM defines a target as the desired measured level of a water quality or habitat/biological parameter that a group has decided streams in the watershed should meet. In order to provide guidance on establishing appropriate targets for other water quality parameters, IDEM gives examples of water quality targets used by other groups. Those example targets are listed in **Table 2-11**.

Table 2-11 Example Water Quality Targets

Parameter	Target	Reference
Total Phosphorus	0.3 mg/L	IDEM draft TMDL target
Total Suspended Solids (TSS)	46.0 mg/L	Minnesota TMDL criteria to protect fish/macroinvertebrate health
Turbidity	10.4 NTU	US EPA recommendation
Habitat	51 QHEI Total Score	IDEM Sampling Guidelines
Biology	37 IBI Total Score	IDEM Sampling Guidelines

The following reports and collections of water quality data will be compared to both the Indiana WQS and targets to better assess the overall quality of waterbodies within the Lower Fall Creek watershed.

2.7.2 Integrated Report/303d

Indiana's 303(d) List of Impaired Waters is part of the Integrated Water Monitoring and Assessment Report (IR), which is submitted to the US EPA every two years in

accordance with Sections 305(b) and 303(d) of the Clean Water Act (CWA). The CWA Section 305(b) requires states to make water quality assessments and provide water quality reports to the US EPA, and CWA Section 303(d) requires states to identify waters through their water quality assessments, that do not or are not expected to meet applicable state water quality standards with federal technology-based standards alone. Under CWA Section 303(d), states are also required to develop a priority ranking for these waters taking into account the severity of the pollution and the designated uses of the waters.

According to the 2018 IR (https://www.in.gov/idem/nps/2639.htm), several water body segments within the watershed are listed for exceeding the state water quality standard for *E. coli* while some are listed for the presence of polychlorinated biphenyls (PCBs) in fish tissue. **Table 2-12** identifies the 303(d) listed streams based on assessment units (AU) and the reason, or impairment, for the listing. These streams are also identified on **Exhibit 2.**

Table 2-12 Lower Fall Creek Watershed 303(d) Listed Assessment Units

County	AU Name	Impairment
Hamilton	Mud Creek	*E. coli*
	Sand Creek	*E. coli*
Hancock	Indian Branch	*E. coli*
Marion	Atkinson Creek	PCBs in fish
	Fall Creek	*E. coli*, PCBs in fish
	Indian Creek	*E. coli*
	Lawrence Creek	*E. coli*
	Mud Creek	*E. coli*
	Water Company Canal	PCBs in fish

Once this listing and ranking of impaired waters is completed, states are required to develop Total Maximum Daily Loads (TMDLs) for these waters in order to achieve compliance with the water quality standards.

2.7.3 Total Maximum Daily Loads (TMDLs)

A TMDL is a calculation of the maximum amount of a pollutant which can be delivered to a body of water and still allow the body of water to meet water quality standards. This assists watershed groups and state regulators to also determine the amount of the pollutant which needs to be reduced through BMPs and changes in land use and human behaviors in the watershed. The 2004 TMDL (https://www.in.gov/idem/nps/2863.htm) prepared for the Fall Creek watershed (below Geist Reservoir Dam) shown on the **Exhibit 2** concludes the following:

- The *E. coli* water quality standard is consistently exceeded along Fall Creek from the Geist Reservoir spillway to the confluence with the White River
- A 52% reduction of *E. coli* loadings is needed upstream of the CSO area
- A 99.5% reduction of *E. coli* loadings is needed in the CSO area

2.7.4 IDEM Fixed Station Monitoring

IDEM's Fixed Station Monitoring program is comprised of 165 prioritized locations where monthly water quality samples are collected to best assess the changing characteristics of Indiana's water. There are two fixed-station sites within the Lower Fall Creek watershed: Fall Creek at North Keystone Avenue and Fall Creek at North Stadium Drive (included with the identified monitoring locations shown on Exhibit 2).

General observations regarding the monthly sampling completed at each site, from January 2017 through November 2020, are:

- Pesticides, Poly-Aromatic Hydrocarbons, and Semi-volatile Organics were below detection limits for all sampling events at the North Keystone Avenue location. These parameters were not sampled at the North Stadium Drive location
- Ammonia samples were below detection limits for each of the sampling locations for nearly all sampling events
- Dissolved Oxygen levels met Indiana WQSs at both locations for nearly all sampling events
- The average *E. coli* result for all 37 sampling events at the North Keystone Avenue location was 271 and 1,053 MPN/100 mL at the North Stadium Drive location. Nearly all individual sampling results were higher at the North Stadium Drive location
- Phosphorus levels were below the Indiana target for all events at both locations

2.7.5 Health Department Data

The Hamilton County Health Department (HCHD) completes monthly *E. coli* sampling at recreational waterways during the recreational season, April through October. At the locations, the HCHD has placed interactive signage through which QRC codes link to the HCHD website (https://www.hamiltoncounty.in.gov/334/Recreation-Water-Sampling-Program) where people may view the data for that specific site. There are two sampling locations within the Lower Fall creek watershed:

- Lake Stonebridge (#20) – with the exception of one sample, all results since April 2015 have been satisfactory (below 235 cfu/100mL)
- Grindstone Drive, Lake Stonebridge (#21) – sampling began in August 2018 and all samples have been satisfactory (below 235 cfu/100mL)

The Marion County Health Department (MCHD) has developed a surface water monitoring program (http://marionhealth.org/surface-water-program/) and maintains 12 sites along Fall Creek where they complete routine ambient water quality sampling for *E. coli*, nutrients, metals, and other commonly found pollutants.

MCHD also completes annual macroinvertebrate sampling at five locations along Fall Creek.

- For 2019 and 2020, most of the *E. coli* samples collected at all locations within the watershed exceed the Indiana Water Quality standard of 235 cfu/100 mL per single grab sample
- At many locations, within the same timeframe, phosphorus levels for grab samples were routinely below detection levels of the testing equipment (0.30 mg/L).
- Atrazine samples routinely exceeded the Indiana WQS
- Dissolved Oxygen levels often exceeded the Indiana WQS maximum limit
- Hilsenhoff Biotic Index (HBI) values from 1998 through 2011 consistently ranged from Fair to Very Poor. Between 2012 and 2015, however, scores improved to between Fair and Very Good.

2.7.6 **Fish Consumption Advisory (FCA)**

The Indiana Fish Consumption Advisory (FCA) (https://www.in.gov/isdh/23650.htm) is a set of guidelines for the consumption of recreationally caught fish in public waters. This list is created and maintained by the Indiana State Department of Health (ISDH), IDEM, and IDNR. Toxins such as Mercury and PCBs accumulate in fish tissue and may then cause harmful effects to humans or other animals that eat those fish. The FCA provides insight into the legacy water quality of the area and helps to guide the type of recreation that may or may not be suggested for the area.

It is advised that sensitive populations (women under 50, males under 15, and all with compromised immune systems) limit meals of fish recreationally caught from Fall Creek to once per week. Everyone, regardless of age, is advised to check the FCA to ensure safe consumption of locally caught fish. Commercial fish, which is fish served at restaurants and bought at the grocery store, is not covered in the FCA.

2.7.7 **Lake and River Enhancement (LARE) Studies**

The Lake and River Enhancement (LARE) program is offered by the IDNR Division of Fish and Wildlife with the purpose to protect and enhance aquatic habitat for fish and wildlife in publicly accessible lakes and streams. The LARE program offers technical assistance and grant funding for projects such as watershed assessments, engineering and construction designs, aquatic vegetation management plans, and logjam removal.

Within the last ten years, there have been no LARE studies or grants within the Lower Fall Creek watershed.

2.8 RELATED PLANNING EFFORTS

Since the original 2009 WMP was created, a variety of projects have been implemented to address the water quality concerns associated with sediment, nutrients and pathogens identified in the plan. Various other long-term planning efforts have also been undertaken that are relevant for the current plan update. A summary is provided below of efforts from 2010-2019.

2.8.1 **ROW Fall Creek Collective Impact Efforts**

Between December 2019 and February 2020, ROW representatives and IUPUI students collected water quality samples at four locations along Fall Creek. Recorded observations included notations of discolored water, including one location suspected of septic or sewage effluent resulting in gray water. Dissolved Oxygen levels were slightly above the WQS at all locations, ranging from 12.2 mg/L to 12.8 mg/L averages. *E. coli* results were below WQS and both Nitrate and Ortho-phosphate results were below detection limits.

In September 2016 professional and community scientists completed the Indy Urban Bioblitz with the official results were produced and published by the Indiana Academy of Science. The resulting report can be located here: https://www.indianaacademyofscience.org/MediaLibraries/IAS2018/Documents/BioBlitz%20Info%20and%20Data/Bioblitz-PIAS.pdf. This study was an attempt to measure the overall biodiversity of the area. Approximately 50 scientists and 25 community volunteers worked as teams to inventory all living things located along Fall Creek, Pogue's Run, and Pleasant Run. They identified 58 species of birds, 38 species of fish, and 40 species of spiders. In the 24-hour event, nearly 600 species were identified including bats, butterflies, and beetles. Survey areas were chosen for the riparian corridor, community support and local efforts to re-establish waterways, and activities to reduce invasive species. While water quality sampling was not included in this effort, the findings of the Bioblitz help to identify areas where invasive species are present, have been successfully removed, or where other species of interest are present within the watershed.

Within the same reference reach along Fall Creek, a separate study regarding the effectiveness of Amur honeysuckle and the response rates of other vegetation was finalized. The removal of honeysuckle was completed over several years beginning in 2012. Over the following years, the number of honeysuckle stems, the amount of coverage of the honeysuckle, and the number of other species in the test plots was recorded. Findings indicate the removal efforts are successful but need to continue to ensure reestablishment of native species in the area. The study also identified other species such as Callery pear which may also prove to be problematic to the riparian ecosystem.

Ecology is a key ROW element and the organization has been a part of various efforts by ROW partners to improve the Fall Creek waterway. **Table 2-13** summarizes these efforts and partnering organizations.

Table 2-13 ROW Efforts within the Lower Fall Creek Watershed

Year	Partner Organization	Project Type	Project Description
2012	Keep Indianapolis Beautiful (KIB), Lilly	Invasive Removal	Lilly Day of Service project removing 30 acres of honeysuckle from 39th St and Barton Park
2013/2014	Mapleton Fall Creek CDC	Invasive Removal	Invasive removal of 0.40 acres on west side of Monon Trail
2013	Lilly, KIB, Ivy Tech	Native Planting	Planting of 40,000 native trees, shrubs and grasses
2013	IPS, KIB	Rain Garden Installation	School 60 "William A Bell" Rain Garden
2014	KIB, Ivy Tech	Native Planting	3,000 native plants installed at corner of Meridian and Fall Creek
2015	City of Indianapolis Office of Land Stewardship	Invasive Removal	Invasive control of 13 acres-various locations along Fall Creek
2015-2016	KIB	Tree Planting	Planting of 97 trees along Fall Creek
2015-2019	KIB	Invasive Removal	Invasive control of over 9 acres-various locations along Fall Creek
2016	KIB, Millersville Fall Creek Valley, Inc.	Invasive Removal, Native Planting, Pond Restoration and Public Art, Tree Planting	A four-year effort to create a pocket park along the Fall Creek Trail with native trees and plants
2018	KIB, Marion County SWCD	Invasive Removal, Native Planting, Tree Planting	Creation of Urban Orchard along the Fall Creek Trail between Central and Delaware St bridges downtown; 22 trees, 30 shrubs and 1,700 native plants
2019-Present	Office of Land Stewardship, Marion County SWCD	Invasive Removal and Native Planting	Removal and treatment of honeysuckle and installation of 150 native plugs and tree/shrubs in Barton Park. Site will be utilized for future streambank erosion educational workshops

2.8.2 **White River Vision Plan**

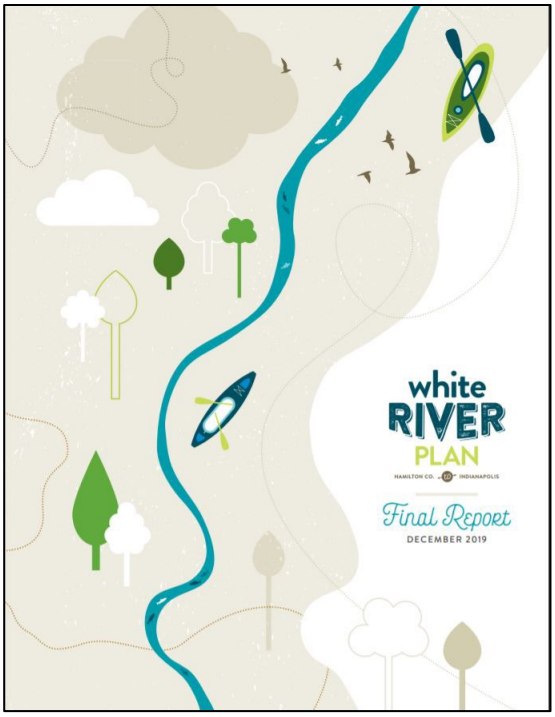

Figure 2-17 White River Vision Plan

Through a collaborative effort between the City of Indianapolis and Hamilton County Tourism, Inc, the White River Vision Plan was developed to coordinate efforts to enhance the White River as it travels through Hamilton and Marion counties. The plan evaluates recreation, culture, accessibility, and the environment along 58 miles of the White River. Areas in need of protection as well as areas in need of enhancement were determined to help guide future projects and municipal planning efforts.

Within the White River Vision Plan, a section regarding the health of the White River is designed to outline several aspects of the importance of water quality and the ecosystem as a whole. The vision includes improving water quality and reducing stormwater volume as well as managing both urban and natural ecosystems in a coordinated manner. This plan may help set the stage for efforts which may also be transferred to the Lower Fall Creek watershed as the two areas share many agency and municipal partners, land uses, and demographics. Within the public feedback gathered through the White River Vision Plan effort, key findings included themes related to recreation, healthy growth, access to the water, and nature. It is felt that this is a shared set of values between the White River and the Lower Fall Creek areas.

The entire White River Vision Plan may be located at https://mywhiteriver.com/

2.8.3 **IDEM Stormwater Permitting**

Beginning in 2003 and continuing through the time of this planning effort, IDEM, with authority from the US EPA, required municipalities and associated urbanized areas to regulate stormwater discharges under the National Pollutant Discharge Elimination System (NPDES) Storm Water Program (https://www.in.gov/idem/stormwater/2333.htm). Within the 2020 MS4 General Permit draft language are specific requirements for MS4 entities discharging to waters where a TMDL has been established. Existing requirements must be strengthened or expanded to increase efforts to control the TMDL pollutants of concern. Within the Lower Fall Creek watershed, approximately 81% of watershed is regulated under the MS4 program. The MS4 municipalities (identified on **Figure 2-18**) are:

- **Hamilton County**: City of Fishers, City of Noblesville, Hamilton County
- **Hancock County**: Town of McCordsville (TMDL), Hancock County (TMDL)
- **Madison County**: Madison County

- **Marion County**: City of Indianapolis (TMDL), City of Lawrence (TMDL)

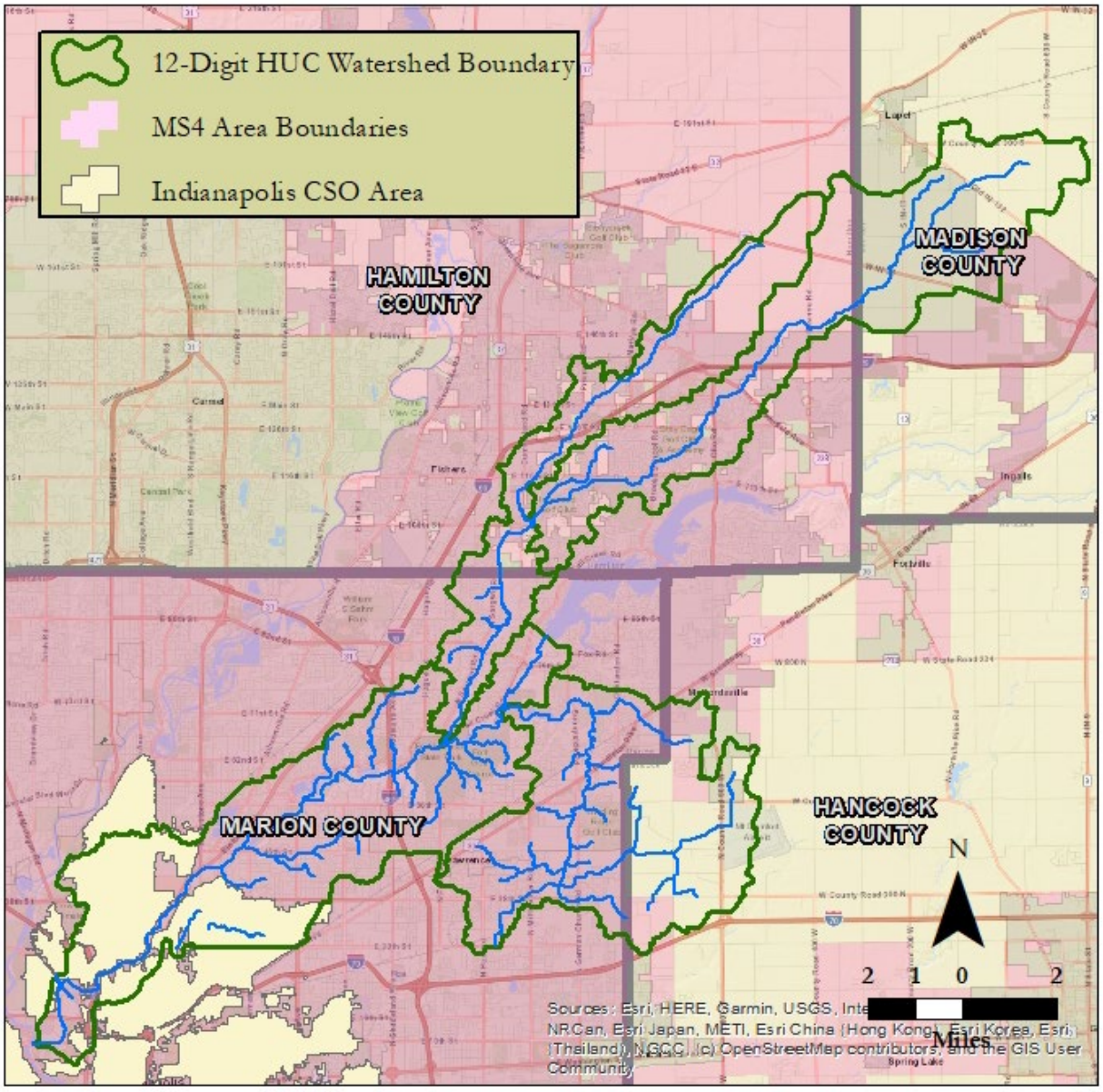

Figure 2-18 Lower Fall Creek Watershed MS4 Areas

These entities are required to implement programs through which polluted stormwater runoff originating from municipally owned or operated facilities and projects will be reduced. This program also requires annual education and outreach components for the public and employees. These program activities implemented throughout the municipalities enhance and protect the water quality of the area by reducing pollutants commonly discharged from individual residential lots, construction sites, and municipally owned and operated facilities.

IDEM also regulates construction activities throughout Indiana with the Construction Stormwater General Permit (CSGP); designed to reduce pollutants from construction sites or land-disturbing activities. The requirements apply to all construction which results in land disturbances over one acre, or smaller if part of a larger plan of development.

Much of the Lower Fall Creek watershed is considered to be very rapidly developing, some of the fastest within the United States. As these areas and individual municipalities continue to develop and redevelop, it is very important they follow regulations set forth in both the MS4 and CGP programs. Compliance will assist in reducing the overall pollutant loadings, especially sediment, to local streams and waterbodies.

2.8.4 **White River Alliance**

The White River Alliance (WRA), (https://thewhiteriveralliance.org/), is a 16-county consortium of local governments, industry, utilities, universities, agriculture and the regional community that exists to improve and protect water quality on a watershed basis in the larger Upper White River Region. With the oversight of a Board representing the numerous interests, the WRA is able to obtain funding which can then be utilized to develop, promote, or hold one of their many programs. These numerous and far-reaching programs and events are designed to raise awareness and increase actions related to improving water quality within the White River watershed. Examples of such programs are:

- Indiana Water Summit
- Trained Individual Contractor Certification
- Stormwater Landscape Maintenance Training
- River Assessment Field Team (RAFT)
- Clear Choices, Clean Water
- White River Festival
- Regional MS4 programming

2.8.5 **Citizens Energy Group (Citizens) Projects and Programs**

DigIndy Project and Long-Term Control Plan (LTCP)

Citizens Energy Group (Citizens) is a public charitable trust that purchased the wastewater and water utility assets in August 2010 from the City of Indianapolis. As part of the asset transfer agreement, Citizens has responsibility for implementation of the LTCP and the associated Consent Decree (CD) with City of Indianapolis, US EPA, Department of Justice, and IDEM. The CD requires implementation of a 20-year LTCP to significantly reduce the volume of combined sewer overflows into Indianapolis' waterways, including capture and treatment of 97% of sewage overflows in Fall Creek and 95% in White River within a typical year by 2025. Based on the typical year, an average of two overflows a year will be permitted on Fall Creek and four overflows per year on White River and other waterways.

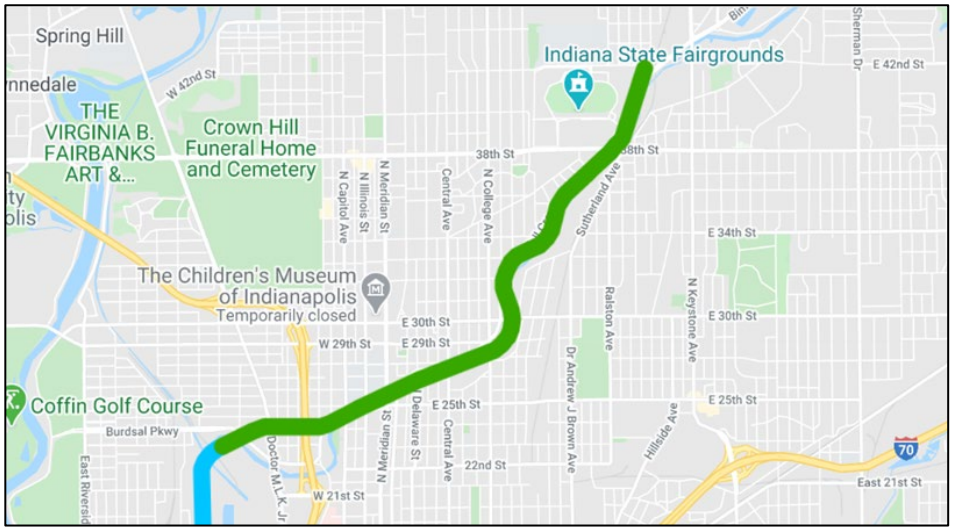

Figure 2-19 DigIndy Fall Creek Tunnel

Citizens is responsible for the implementation of the $2 billion DigIndy project, which is the largest public works project in Indianapolis' history. The DigIndy program consists of a 28-mile network of 18-foot finished diameter deep rock tunnels built more than 200 feet underground that will capture 250 million gallons of CSO for treatment at the Southport Advanced Wastewater Treatment Plant (AWTP). As part of this system, the Fall Creek tunnel is under construction and will extend to the State Fairgrounds and run approximately 3.9 miles parallel to Fall Creek, capturing 26 CSOs. The Fall Creek tunnel system will be completed and online by December 31, 2025. **Figure 2-19** shows the Fall Creek Tunnel in green.

Septic Tank Elimination Program (STEP)

In addition to the improvements to the combined sewer system through the DigIndy program, Citizens is also continuing to implement the Septic Tank Elimination Program (STEP) in various neighborhoods without sanitary sewer systems in the Lower Fall Creek watershed. This program is connecting many of the thousands of homes in Marion County that are currently on septic systems to sanitary sewers, prioritizing projects based on several factors including housing density, proximity to floodplain and the presence of residential drinking water wells. Since 2011, Citizens has connected over 7,000 properties in the county to the sanitary sewer systems, including completion of the following projects in the Lower Fall Creek watershed:

- 42nd & Sherman
- 42nd & Millersville
- 46th & Millersville
- 46th & Emerson

Though no longer involved in sewer extension projects implemented through STEP, the Marion County Health Department keeps records on septic tank repair within the county. Based on an analysis of raw data provide by the health department, between 2010-2019 a total of 922 permits for septic tank repair were issued. Of these septic repair permits, 916 were located in the Lower Fall Creek watershed in Marion County.

The Hamilton County Health Department requires new construction to hook up to existing sanitary sewers if available and can deny permits for repair or replacement

of failing septic tanks if sanitary sewers are available within 300' of the property requesting the permit. However, failing septic systems not located near sewers can be replaced. Similar restrictions are in place for both Hancock and Madison counties.

2.8.6 **City of Indianapolis Department of Public Works (DPW) Capital Improvement Plan**

The City of Indianapolis DPW is responsible for drainage in the city right of way and is implementing a 20-year Stormwater Master Plan Capital Improvement Plan (CIP) for 2015-2035 funded by a stormwater user fee being assessed on private property owners. The stormwater user fee was increased for the first time in 14 years in July 2015 and is based on the effective impervious area of each property. Stormwater credits are available for the use of green infrastructure practices in accordance with the city's Green Supplemental Document. The city now receives nearly $20 million in revenue annually through the stormwater user fee and these funds are being utilized to implement a CIP to address over $300 million in local drainage project needs. These projects and programs are being implemented in accordance with the requirements of the city's MS4 permit.

The city uses an Initial Priority Rating System (IPR) with a weighted point system to prioritize projects based on field investigations, citizen complaints and impacts on local water quality. Many of the projects are also coordinated with Citizens. A variety of culvert pipe replacements and neighborhood drainage improvement projects are planned within the Fall Creek watershed, one of six defined watershed areas in the CIP. The culvert replacements are along Fall Creek Road and Fall Creek Parkway North Drive. One of the largest drainage projects planned in the Lower Fall Creek watershed is 38th and Olney, a six-phase drainage improvement project in the Minnie Creek subwatershed of Fall Creek, with design and construction planned through 2034. This project includes restoration of the Minnie Creek Stream Valley to accept, convey and store stormwater flows from future stormwater separation projects in the area.

2.8.7 City of Indianapolis Office of Sustainability THIRVE Indianapolis

Figure 2-20 THRIVE Indianapolis

The City of Indianapolis Office of Sustainability also recently completed the THRIVE Indianapolis plan (**Figure 2-20**) in 2019 to meet Mayor Joe Hogsett's goal of achieving carbon neutrality by 2050. The plan provides a social vulnerability index rating for the city's neighborhoods that incorporates 12 socioeconomic factors to determine vulnerability to climate change. Three neighborhoods along Fall Creek (The Meadows, Fairgrounds and Mapleton Fall Creek) were identified as being highly vulnerable to flooding due to factors such as high density of impervious area and residents living both in the floodplain and below the poverty threshold. A key strategy noted in the THRIVE plan is to combat the expected increases in volume and intensity of rainfall is installation of residential rain gardens. The city's goal is to have 500 properties registered in the city's stormwater credit program by 2022 utilizing practices such as rain gardens and rain barrels and has identified the Marion County SWCD as an implementation partner. Many of these same practices were implemented in the 2016 Clean Water Indiana (CWI) grant led by the Hamilton County SWCD in partnership with Marion County SWCD. This grant established the Fall Creek Watershed Partnership through which rain gardens, permeable pavers and other water quality practices were built throughout the Lower Fall Creek Watershed.

2.8.8 City of Indianapolis Green Infrastructure Master Plan

In 2009, the City of Indianapolis DPW completed a Green Infrastructure Master Plan for CSO abatement that identified over 100 pilot projects in 15 neighborhoods. The pilot projects included a variety of green infrastructure including eight different BMP types and locations selected based on a variety of factors with the goal of reducing combined sewer overflows. The BMPs were assembled in GIS layers and a GIS model was completed based on the following factors:

- Existing condition
- GIS unit of measurement
- Frequency and intensity of application
- Nominal unit of storage
- SWMM Depressional Storage
- SCS Annual Volume removal

Two of the pilot project neighborhoods recommended for implementation were located in the Lower Fall Creek watershed: Meridian Park and the Indiana State

Fairgrounds. These neighborhoods represent significant opportunities for the implementation of green infrastructure for stormwater management and reduced flow to the combined system. A summary of relevant project information for these two pilot neighborhoods is included in **Table 2-14** below:

Table 2-14 Green Infrastructure Master Plan Pilot Neighborhoods

Pilot Neighborhood	Neighborhood Size / Number of CSO Outfalls	Projects Identified
Meridian Park	187 acres/5 outfalls	5 projects including green street rain gardens, green parking lots and greenspace. Several projects are located on Ivy Tech Community College campus.
Indiana State Fairgrounds	358 acres/2 outfalls	18 projects including rain gardens, green parking lots and rain barrels at the fairgrounds.

The Green Infrastructure Master Plan also determines the impact of widespread application of residential rain gardens on stormwater volume reduction and combined sewer overflow volume, providing further support for a local rain garden program.

Though not part of the plan described above, the IUPUI Environmental Resilience Institute has developed an inventory of public and private green infrastructure project locations in Marion County including bioswales, underground detention chambers, bioretention areas, and permeable pavement. Many of these practices are located within the Lower Fall Creek watershed and are identified on **Figure 2-21.**

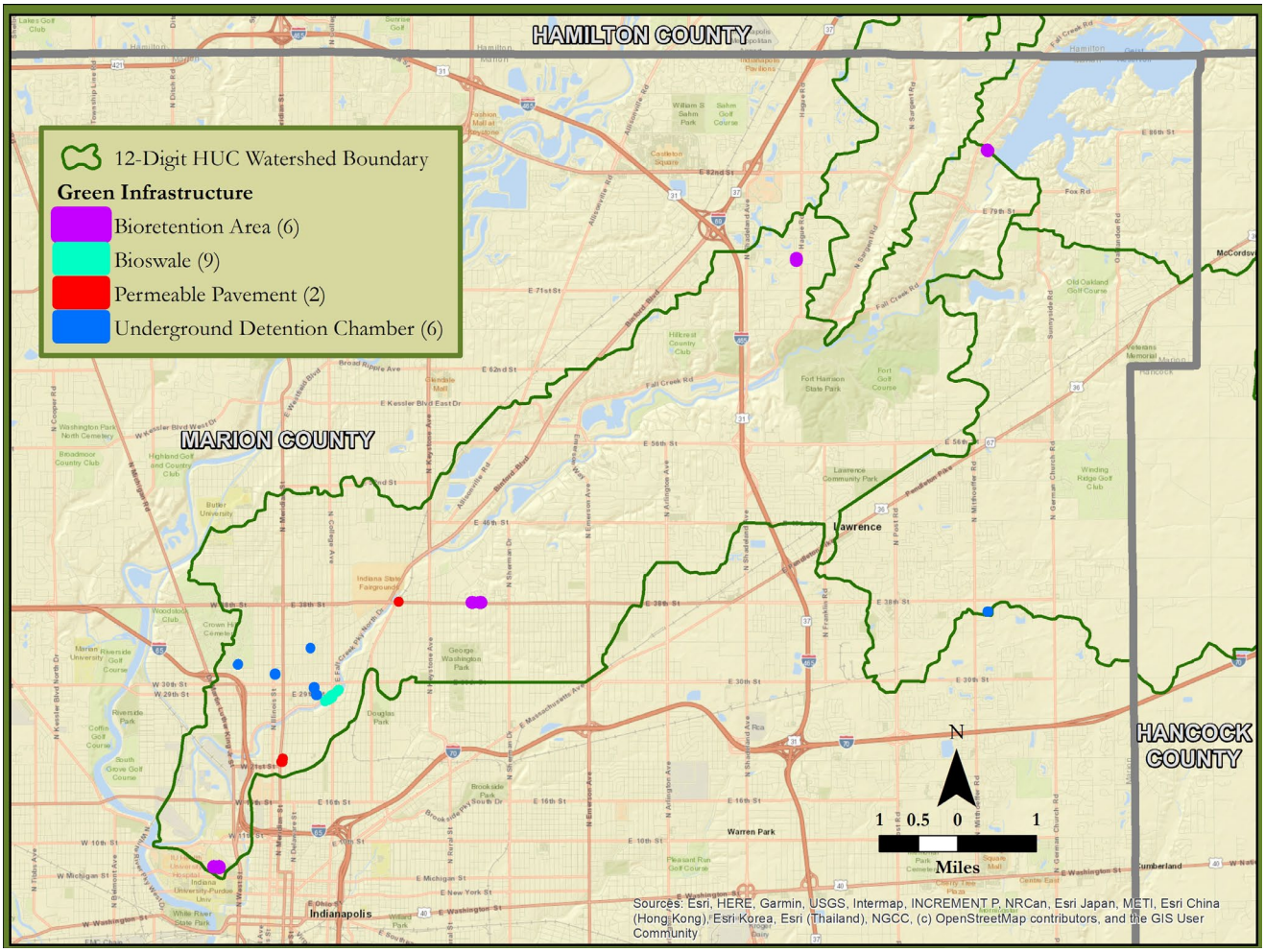

Figure 2-21 IUPUI Green Infrastructure Inventory Installations (Burke)

2.9 SUMMARY OF WATERSHED INVENTORY FINDINGS

Based on the review of watershed characteristics, relevant planning efforts, and existing water quality data, the following conclusions may be drawn regarding the watershed as a whole:

- Bacteria (*E. coli*) concentrations exceed Indiana WQS of 235 cfu/100 mL per individual grab sample throughout the Lower Fall Creek watershed
- DO and Atrazine levels exceed Indiana WQS
- Phosphorus levels are indicated as below detection limits of 0.30 mg/L
- PCB levels are elevated in portions of the Atkinson Creek, Fall Creek and Water Company Canal, all located in Marion County

- High percentages of farms utilize conventional or intensive tillage methods on soils which may be highly erodible, leading to increased potential for erosion and sedimentation of the nearby streams and waterways
- Many residential properties served by septic systems on land unsuitable for fully functioning septic treatments
- Most land cover within the watershed is urbanized and impervious resulting in higher volumes and velocities of water reaching waterbodies often resulting in erosion
- Impervious surfaces deliver increased amounts of pollutants such as pet waste, herbicides/pesticides, and gross solids which may result in increased nitrogen loading

The focus of the WMP, based on the findings of the water quality data and relevant planning information, will be placed on reducing sediment, nutrient, and bacteria (*E. coli*) loadings to the Lower Fall Creek watershed. General pollutants such as gross solids, other herbicides, and pollutants often carried in stormwater runoff were also discussed. It is anticipated that many practices discussed in later sections of this plan will be beneficial in removing these general pollutants.

Further, it was determined that while it is important to identify areas affected by, and the water quality impacts associated with, increased herbicides/pesticides, PCBs, and mercury levels, it is not feasible for the WMP to address these issues. Much of the work required to remediate legacy issues associated with these pollutants needs to be addressed at the State and Federal levels. In addition, much of the CSO issues and related *E. coli* loadings will be addressed through the implementation of the LTCP.

To highlight potential water quality issues and potential concerns at the subwatershed level, the following summarizes the findings of data gathering and information analysis:

<u>Headwater Mud Creek:</u>

- Second highest percentage of wetlands (19.9%)
- Top three land cover categories:
    - Cultivated Crops
    - Developed, Open Space
    - Developed, Low Intensity
- Land use changing primarily from agricultural to residential and commercial areas, especially along I-69

Indian Lake – Indian Creek:

- Second highest percentage of stream miles (25.2%)
- Lowest percentage of wetlands (17.5%)
- Top three land cover categories:
    - Cultivated Crops
    - Developed, Low Intensity
    - Developed, Open Space
- Land use changing primarily from agricultural to residential as existing suburban and municipal areas expand
- TMDL subwatershed

Sand Creek – Mud Creek:

- Smallest subwatershed (16.3%)
- Lowest percentage of stream miles (16.4%)
- Top three land cover categories:
    - Cultivated Crops
    - Developed, Open Space
    - Developed, Low Intensity
- Land use changing primarily from agricultural to residential, especially within the Hamilton County portion

Devon Creek – Fall Creek:

- Largest subwatershed (33.3%)
- Largest percentage of stream miles (35.4%)
- Largest percentage of wetlands (44.2%)
- Largest amount of HEL and PHEL soils
- Largest percentage of Brownfields (93%)
- Largest percentage of LUSTs (69%)
- Largest percentage of CSOs (100%)
- Top three land cover categories:
    - Developed, Low Intensity
    - Developed, Open Space
    - Developed, Medium Intensity
- Land use changing primarily in the form of re-development from low intensity to medium and high intensity development
- TMDL subwatershed

Table 2-15 provides a summary of these watershed characteristics. As can be seen, the Devon Creek – Fall Creek subwatershed has the highest amount of all categories with the exception of cultivated crop acres.

Table 2-15 Subwatershed Comparisons

	Headwaters Mud Creek	Indian Lake – Indian Creek	Sand Creek – Mud Creek	Devon Creek – Fall Creek
Acres (% of LFC)	16,707.5 (25.4%)	16,437.8 (25.0%)	10,700.0 (16.3%)	21,863.6 (33.3%)
Stream Miles (% of LFC)	183.7 (23.0%)	201.2 (25.2%)	130.9 (16.4%)	282.7 (35.4%)
Wetland Acres (% of LFC)	422.0 (19.9%)	371.0 (17.5%)	390.8 (18.4%)	938.4 (44.2%)
HEL/PHEL Acres (% of LFC)	2,101.7 (17.1%)	2,083.5 (16.9%)	2,585.9 (21.0%)	5,543.4 (45.0%)
Cultivated Crop Acres (% of LFC)	10,199.3 (52.8%)	5,859.3 (52.8%)	3,225.6 (16.7%)	23.1 (12.0%)
Developed Acres (% of LFC)	5,219.0 (13.3%)	9,056.2 (23.1%)	5,914.0 (15.1%)	18,970.8 (48.4%)
Brownfields	0	5	0	66
Underground Storage Tanks (USTs)	0	14	1	56
Leaking USTs	0	36	1	79
Combined Sewer Overflow	0	0	0	26

CHAPTER 3 WATERSHED CONCERNS, CAUSES, AND SOURCES

The following section identifies the concerns, perceived or real, as expressed by participants during stakeholder meetings, events, within the survey, and through other correspondence during this planning effort. The stakeholder concerns may then be linked with data proving the concern as a problem. Alternatively, if available data does not support that conclusion, the concern will remain listed as such. In the latter sections of this chapter, potential causes and sources of the watershed's problems will be discussed.

3.1 STAKEHOLDER CONCERNS

Several stakeholders met in February 2020 to discuss the perceived concerns and potential pollutants throughout the Lower Fall Creek watershed. Attendees were asked to provide information such a location and the potential pollutant of concern. **Table 3-1** below is a summation of the information provided by those in attendance. Numbers noted in parenthesis are the number of times that particular location or pollutant was mentioned.

Table 3-1 Lower Fall Creek Watershed Stakeholder Concerns

Location	Potential Pollutant/Issue
Indiana State Fairgrounds (3)	*E. coli*
Ruoff Home Mortgage Music Center	*E. coli*, gross solids, sediment
Golf Courses along Mud Creek	Fertilizer runoff
Failing Septic Systems along Mud Creek (2)	*E. coli*
Non-specified area (2)	*E. coli*
Downtown along Fall Creek	Illegal dumping and excess trash
Non-specified area	Illegal dumping and excess trash
Combined Sewer Overflow areas (3)	*E. coli*
Stormwater outfalls	Sediment from scouring/erosion (5)
	Chemicals and salt
	Oil/grease
Confluence of Mud Creek and Fall Creek	Flash flooding
Indian Lake	Sediment from construction
Non-specified	Sediment from construction
Developed areas along Fall Creek	Increased runoff
	Decreased groundwater recharge
Undercut banks throughout	Sediment
Private retention ponds	Fertilizer, *E. coli*, illegal dumping
Pet waste/hobby farm runoff	*E. coli*
Crop production using conventional tillage	Sediment from exposed acreage

At the same meeting, attendees were then asked to provide information related to areas that they felt should be protected or enhanced due to their unique nature,

location, or amenities provided to the neighboring community. Some of these locations may later serve as partnerships for demonstration projects or implementation of practices to further enhance the contribution to the watershed. **Table 3-2** lists those areas identified by the meeting attendees as areas important to protect or enhance within the watershed. The number of times that particular location was mentioned is also provided for reference.

As an alternative to typical meeting sessions and discussions, the ROW Fall Creek Committee and the Marion County SWCD created a short survey designed to assess the understanding, interests, and willingness to participate in efforts related to enhancing the water quality and natural areas along Fall Creek. Approximately 125 surveys were completed, and respondents represented 12 different neighborhoods within the watershed. Table 3-2 also indicates the areas noted as important to respondents and the number of times each area was selected.

Table 3-2 Lower Fall Creek Watershed Stakeholder Areas to Protect

Location	# Times Noted at Meeting	# Times Noted in Survey
Fall Creek Greenway Rain Gardens Central Ave to 30th	1	38
Barton Park	2	28
Woolens Gardens	1	25
Fort Benjamin Harrison	2	71
Belzer Boy Scout Camp	1	51
Skiles Test Park	1	
Millersville Nature Preserve	1	40
Culturally/Historically Significant Areas	1	
Trail Locations	1	
Rev. Charles Williams Park	1	29
Correct Connect in combined sewer areas	1	
Wellfield Protection Districts	1	
Between Geist Dam and confluence of Mud Creek and Fall Creek	1	63
Educational Institutions – Ivy Tech, St. Richards	1	
Lt. Graham Martin Park		1
Oakland Hills at Geist		1
Indian Lake		6

As discussed earlier in this document, it became very difficult to engage stakeholders during this planning effort due to the COVID-19 pandemic. Due to this difficulty, a web-based mapping application was developed to assist with mapping of areas of concern and potential critical areas. Stakeholders were asked to visit an ArcGIS-based website, create a location to identify an area of concern or an area in need of protection, and enter relevant data regarding the reasoning for their selection. **Figure 3-1** identifies the map and areas entered for consideration. Appendix 3 contains information related to each of the items added to the web-based tool.

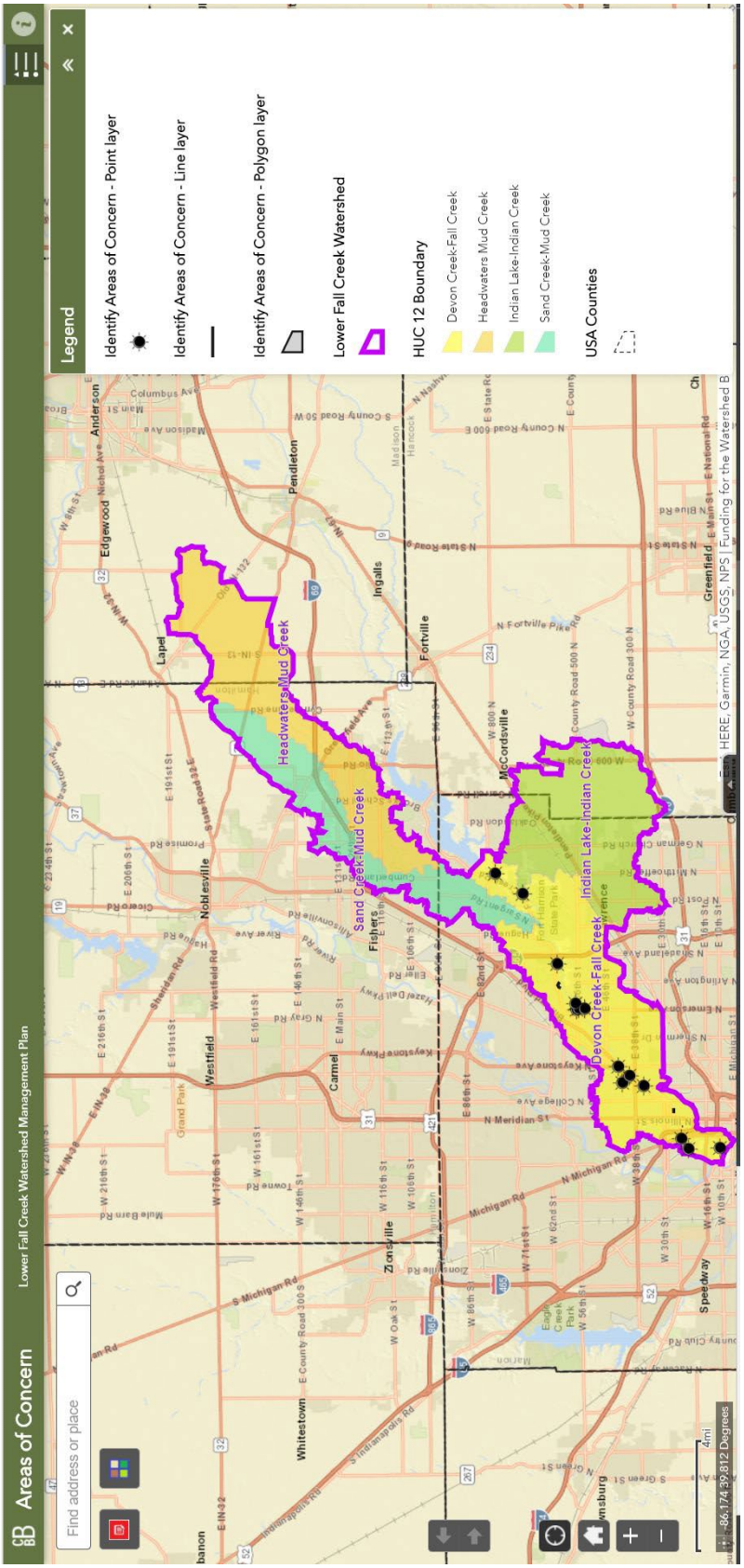

Figure 3-1 Web-Based Mapping Application

Over half of the survey respondents noted they lived within ¼ mile of a lake or a stream and unfortunately over half noted they do not believe their neighborhoods are impacted by poor water quality. This signifies the need for overall education and outreach related to many of the basic water quality issues. More than half of the surveys indicated residents were willing to implement green infrastructure practices on their property, which may indicate an overall need to desire for cost-share assistance. Appendix 3 contains the survey and results, including the number of answers for each option.

When asked specifically about the impact of individual potential pollutants such as sediment, nutrients, *E. coli*, and trash and debris are having in the Lower Fall Creek watershed, the two largest response categories were "Moderate Problem" and "I Don't Know".

Similar results were observed when participants were provided with a list of potential pollutant sources such as construction sites, lawn fertilizers, CSOs, floodplain development, and pet waste. Often, the highest populated response category was "I Don't Know". Coupled with the large "I Don't Know" responses, and the large number of responses included in the "Moderate Problem" and Severe Problem" categories, the survey seems to affirm the potential pollutants and possible sources provided in Table 3-1. Additionally, when asked to identify which areas should be protected, enhanced or further explored for demonstration projects, respondents selected many of the previously mentioned locations and also noted additional locations including Lt. Graham Martin Park, Oaklandon Hills at Geist, and Indian Lake. Results are included in Table 3-2 above. The entire survey and series of results is located in Appendix 4.

Following a review of the various inputs from stakeholders, the potential pollutants were grouped into broader categories. This provides the ability to implement practices based on a location while addressing one or more potential pollutants versus addressing an individual pollutant in a very specific, sometimes too specific location. This categorization process will assist when developing critical areas later in the planning effort. **Table 3-3** identifies how the locations identified by the stakeholders and the potential pollutants were categorized.

Table 3-3 Lower Fall Creek Watershed Potential Pollutant Categories

Location	Potential Pollutant	Category
Indiana State Fairgrounds (3)	*E. coli*	Bacteria
Ruoff Home Mortgage Music Center	*E. coli*, gross solids, sediment	General Pollutants
Golf Courses along Mud Creek	Fertilizer runoff	Nutrients
Failing Septic Systems along Mud Creek (2)	*E. coli*	Bacteria, Nutrients
Non-specified area (2)	*E. coli*	Bacteria, Nutrients
Downtown along Fall Creek	Illegal dumping and excess trash	Gross Solids
Non-specified area	Illegal dumping and excess trash	Gross Solids
Combined Sewer Overflow areas (3)	*E. coli*	Bacteria, Nutrients
Stormwater outfalls	Sediment from scouring/erosion (5)	Sediment
	Chemicals and salt	General Pollutants
	Oil/grease	General Pollutants
Confluence of Mud Creek and Fall Creek	Flash flooding	Quantity
Indian Lake	Sediment from construction	Sediment
Non-specified	Sediment from construction	Sediment
Developed areas along Fall Creek	Increased runoff	Quantity
	Decreased groundwater recharge	Quantity
Undercut banks throughout	Sediment	Sediment
Private retention ponds	Fertilizer, *E. coli*, illegal dumping	Nutrients, Bacteria, Gross Solids
Pet waste/hobby farm runoff	*E. coli*	Bacteria, Nutrients
Crop production using conventional tillage	Sediment from exposed acreage	Sediment

Based on the overall discussions with stakeholders and results from the activity to identify watershed concerns, and results from the survey, the focus will remain on reducing bacteria (*E. coli*), sediment, and nutrient loadings to the Lower Fall Creek watershed as determined following the review of relevant planning efforts and water quality data. In addition, efforts will also be made to reduce the impacts from gross solids and increased water quantity. It is difficult to quantify the overall loadings and associated impacts from both categories within the scope of this planning effort. It is felt that efforts made to reduce loadings and impacts from those categories will also serve to reduce loadings and impacts from the "general pollutant" category created for those areas where inputs are largely unknown or more diverse in nature. Further, several actions and BMPs primarily intended to resolve issues with bacteria, nutrients, and sediment will also have a positive impact on "quantity" related impacts.

Within the next sections the information in Table 3-2 will be developed further into problem statements, associated causes, and potential sources. IDEM provides guidance indicating a problem "is an issue that exists due to one or more of the concerns. Problems build on concerns by formally stating a condition or action that needs to be changed, improved, or investigated further". The cause of the problem is the specific pollutant, or a social behavior. Finally, the source should be identified to the degree known to identify the magnitude of the problem.

3.2 BACTERIA

Bacterial concentrations within the watershed have typically been measured via *E. coli* concentrations. The presence of *E. coli* in aquatic environments indicates that water has been contaminated with fecal material of humans or other animals and is widely used as an indicator of sewage pollution in surface waters. These bacteria have a detrimental effect on fisheries, water supplies, and recreational uses of water bodies. Further bacteriological contamination exposes aquatic life to disease causing organisms, increases drinking water treatment costs, and threatens public health by threatening the drinking water supply, and prevents recreational uses of waterbodies.

Several sources of water quality data indicate bacteria loading to streams and tributaries within the Lower Fall Creek watershed exceed Indiana WQS. This results in many stream segments being listed on the 303(d) list, a TMDL developed to reduce the loading, and signage placed in areas where contact recreation should be limited. **Table 3-4** lists the problems, causes, and potential sources for bacteria as discussed by the stakeholders within the Lower Fall Creek watershed.

Table 3-4 Lower Fall Creek Watershed Bacteria Problems, Causes, and Potential Sources

Problem	Cause	Potential Source
Streams and tributaries in the watershed are listed as impaired due to *E. coli* levels	*E. coli* levels exceed the Indiana State Water Quality Standard of 235 cfu/100 mL per grab sample	CSOs discharge to Fall Creek
		Animal waste from the Indiana State Fairground to Fall Creek
		Inadequately functioning septic systems
		Lack of manure management on small animal farms in central and upper reaches of the watershed
		Pet waste in urban areas

3.2.1 Bacteria Loadings

Referencing the TMDL developed for Fall Creek, the main sources of *E. coli* loads are CSO discharges and stormwater runoff. Further, in the calculations of the allowable loads of *E. coli* to still meet Indiana Water Quality standards, the Fall Creek area was divided into two sections; upstream of the CSO area and within the CSO area. **Table 3-5** identifies the calculated existing load, the TMDL amount to meet water quality standards, and the amount of reduction needed for each of the areas as determined by the Fall Creek TMDL Study prepared by the City of Indianapolis in September 2003 . The majority of the bacterial loading within the Lower Fall Creek watershed is anticipated to stem from the Devon Creek – Fall Creek subwatershed, the location of all CSOs within the larger Fall Creek watershed. There are currently 27 CSO outfalls on Fall Creek, all located within the Devon Creek subwatershed. These are shown on the Figure 4-1 map. The DigIndy project previously described will eliminate one CSO outfall, and the other 26 CSO outfalls will meet a level of control of 97% capture and two overflows in a typical year.

Table 3-5 Lower Fall Creek Watershed Bacteria Loading and Reductions

Location	Existing Total Load	TMDL	Reduction Required %
Fall Creek Upstream of CSO Area	996,000,000,000 cfu	844,000,000,000 cfu	52%
Fall Creek within CSO Area	1,020,000,000,000 cfu	730,000,000,000 cfu	99.5%

Fall Creek TMDL, 2003

In addition to the input from the CSO discharges, bacterial loadings are anticipated to stem from sources such as domestic pets, wildlife, and livestock animals. However, loadings from those sources (6.93E +15 based on STEPL calculations) are not expected to be on the scale of CSO inputs, and land use is rapidly changing throughout the Lower Fall Creek watershed. This land use change will reduce the amount of agricultural land, thereby reducing the number of livestock animals within the watershed. This will have a positive effect on the bacterial loadings, meaning the loadings are anticipated to lower as the number of livestock animals are lowered. The committee determined that primary efforts should be placed on removal of the largest percentage of loadings until the LTCP has been achieved.

Septic Systems

County health departments were surveyed and it was determined there are 2,109 operating septic systems in the Lower Fall Creek watershed, broken out by subwatershed as follows:

- Headwaters Mud Creek: 209
- Indian Lake-Indian Creek: 519
- Sand Creek-Mud Creek: 444
- Devon Creek-Fall Creek: 937

The septic system failure rate estimate used in the STEPL modeling was 2% (42 septic systems of the 2,109 operating systems). Additionally in the Devon Creek subwatershed several future STEP projects have been identified.

3.3 SEDIMENT

Within Lower Fall Creek watershed, sediment loads area anticipated to originate from conventional tillage practices, streambank erosion, and failing or non-existent erosion and sediment control practices on active construction sites.

Sediment impacts fisheries, drinking water supplies, and recreational uses of waterways. By reducing the amount of sunlight reaching aquatic plants and filling fish spawning areas, the availability of fish cover and food is greatly reduced, and mating practices are impacted. **Table 3-6** lists the problems, causes, and potential sources for sediment within the Lower Fall Creek watershed.

Table 3-6 Lower Fall Creek Watershed Sediment Problems, Causes, and Potential Sources

Problem	Cause	Potential Source
Streams and tributaries in the watershed are turbid due to sediment in the water column	Total suspended solids, primarily sediment, concentrations may be elevated throughout the watershed	Scouring at stormwater outfalls
		Instream erosion and bank failure
		Inadequate erosion and sediment control practices on construction sites
		Lack of erosion reducing practices on agricultural lands upstream

3.3.1 Sediment Loadings

The US EPA's Spreadsheet Tool for Estimating Pollutant Loads (STEPL) was utilized to estimate sediment loadings. STEPL calculates nutrient and sediment loads from different land uses and load reductions resulting from implementation of various BMPs. Based on STEPL results, existing sediment loads within the Lower Fall Creek watershed are estimated at 11,123 tons per year. This is roughly 715 full dump truck loads of sediment delivered to waterbodies within the watershed each year. The primary sources of sediment loading are anticipated to be within the Headwater Mud Creek and Indian Lake – Indian Creek subwatersheds due to large acreages of cultivated croplands. **Table 3-7** outlines the sediment loadings estimated through the STEPL program.

Table 3-7 Lower Fall Creek Watershed Sediment Loadings

Subwatershed	STEPL Estimated Total Load (T/yr)
Headwaters Mud Creek	3,817.5
Indian Lake-Indian Creek	2,995.1
Sand Creek-Mud Creek	1,793.5
Devon Creek-Fall Creek	2,517.7
Total	**11,123.8**

Land use throughout the Lower Fall Creek watershed is rapidly changing, and the number of agricultural acres in the watershed is being reduced. Therefore, the committee determined primary efforts should focus on short-term goals related to cropland, agricultural BMPs and sediment load reductions. Sources of sediment in the watershed include stream bank erosion, construction sites and agricultural land that utilizes conventional tillage practices.

Streambank Erosion

Streambank erosion/failure has been observed in 53 locations throughout the watershed. **Table 3-8** and **Figure 3-2** below include all streambank and pond/lake erosion observed through site visits by Marion County SWCD staff for private property drainage assistance requests within the watershed and Marion County dating back to 1974. The locations indicated by "other drainage issue" refer to observed ponding, pooling or flooding on private properties.

Table 3-8 Marion County Streambank Erosion Locations

Fall Creek Tributary Stream	# Streambank Erosion Location Observed (Marion County)
Garden Run	2
Lantern Run	2
Hillcrest Creek	1
Mud Creek	10
Laurel Run	2
Berkshire Creek	1
Atkinson Creek	2
India Branch	2
Blue Creek	3
Dry Run	1
Indiana Creek	4
Mock Creek	1

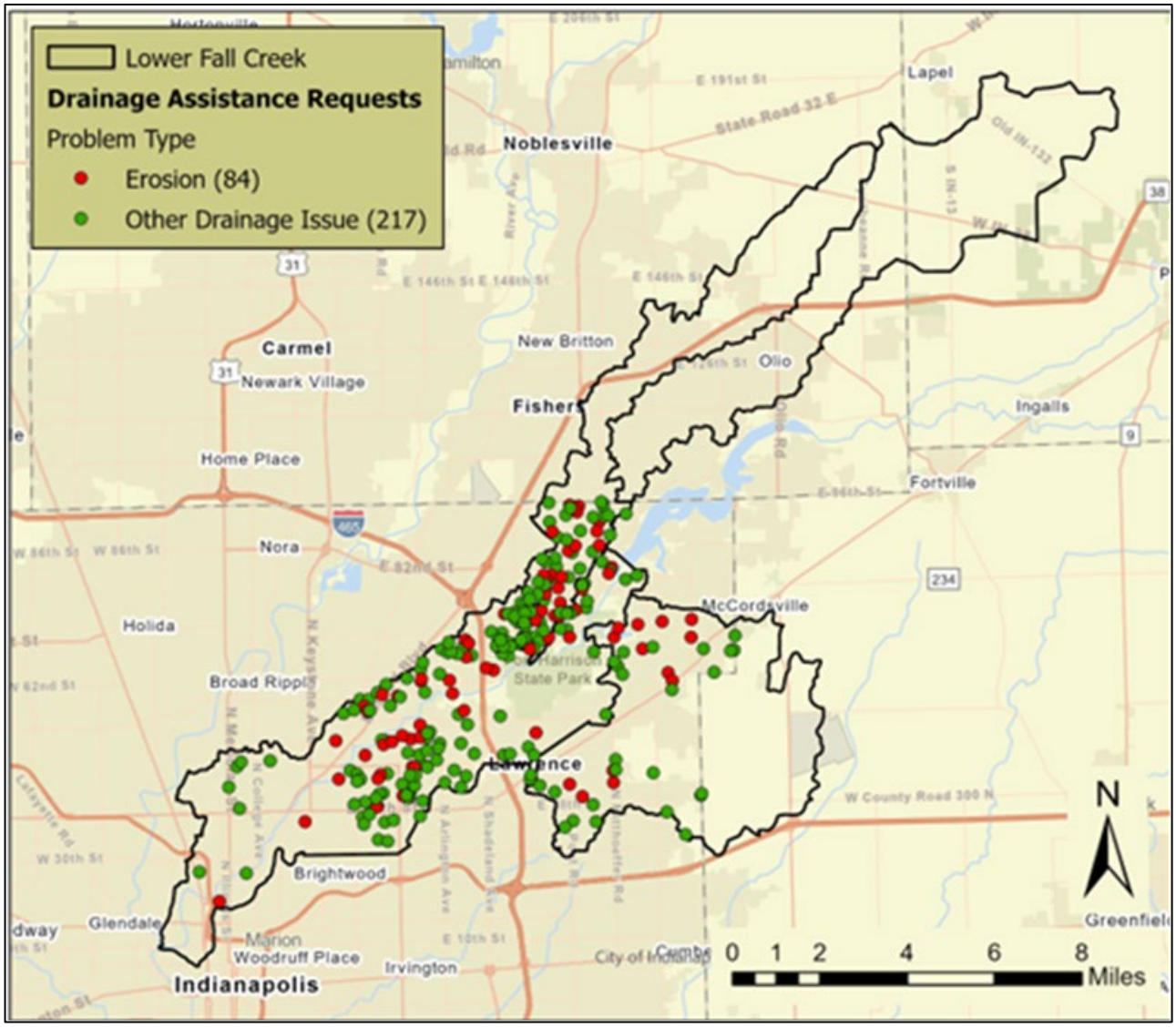

Figure 3-2 Marion County Drainage Assistance Requests (IDEM)

In addition to streambank erosion observed through historic drainage assistance requests, the Areas of Concern StoryMap includes (16) streambank erosion sites previously identified by IUPUI and Commonwealth in the 2009 WMP as well as (7) locations of extensive streambank erosion on Fall Creek and Devon Creek observed by SWCD staff.

Due to the extensive amount of streambank erosion in the watershed, the SWCD has reached out to partner groups like Reconnecting to Our Waterways and the Mud Creek Conservancy District encouraging property owners to inventory observed streambank erosion using the Areas of Concern StoryMap. An example is included in the Mud Creek Conservancy District's newsletter included in **Appendix 3**.

Construction Sites

Construction sites over an acre in size are required to secure permit coverage through IDEM's Construction Stormwater General Permit (CSGP) described in Section 2.8.3 Current active construction sites, nearly 110, with current permit coverage are shown in **Figure 3-3**.

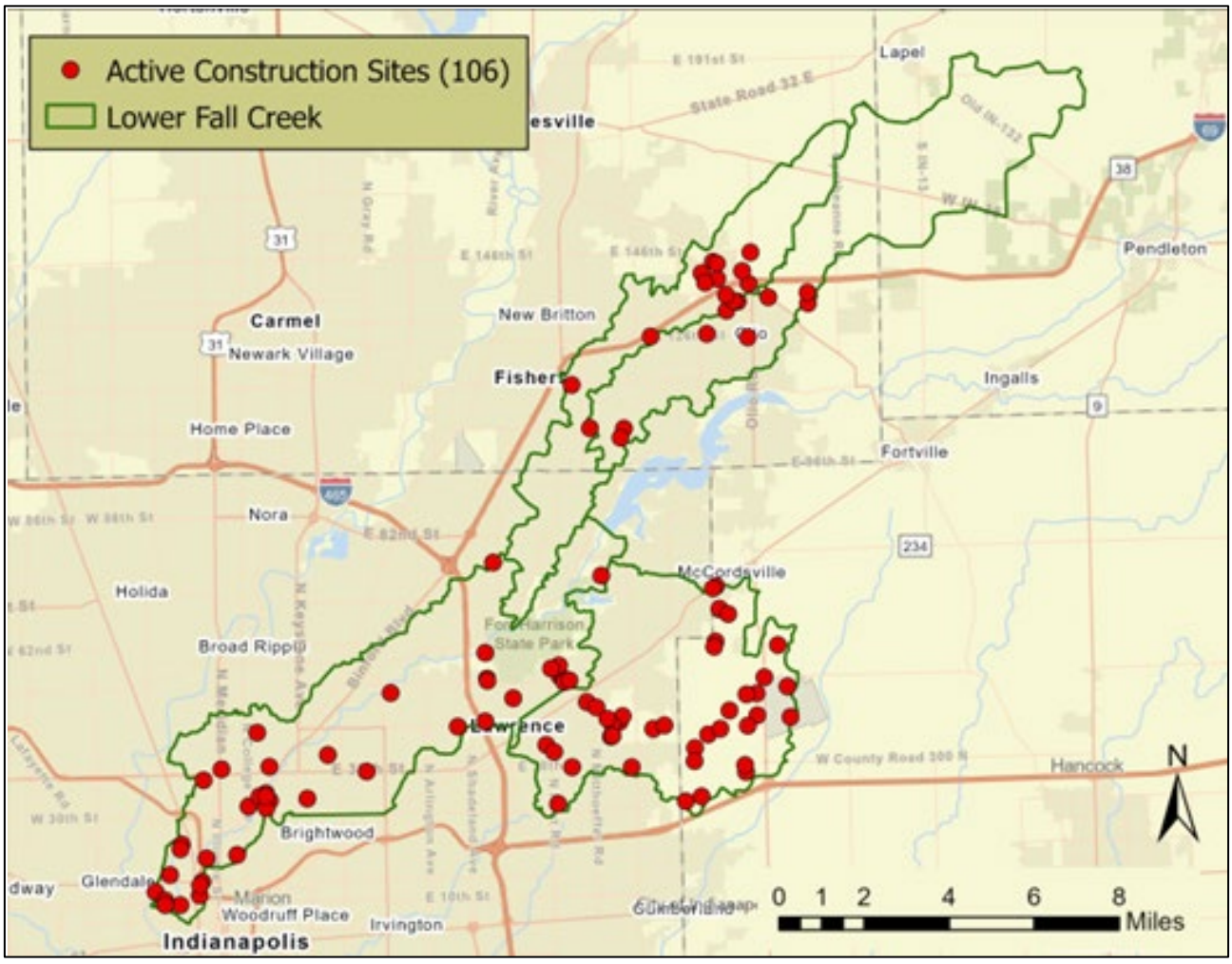

Figure 3-3 Lower Fall Creek Permitted Construction Sites (IDEM)

Agricultural cropland totals 20,580 acres (31% of the watershed). It is unknown how much of this cropland currently applies erosion reduction practices, however **Table 3-9** shows estimates by county for various tillage practices that impact water quality. Additionally, the 2022 County Conservation Survey Data from the Indiana State Department of Agriculture (ISDA) is provided below for two counties, Hamilton and Hancock, that contain 25% and 10% of the watershed respectively:

Table 3-9 ISDA Conservation Tillage Data

	Hamilton County	Hancock County
Total Cover Crops (ac)	12,887	9,382
Total Cover Crops (%)	9	6
2021 Fall Corn Residue Not Tilled (%)	79	98
2021 Fall Soybean Residue Not Tilled (%)	76	81

3.4 NUTRIENTS

According to the US EPA, nutrient pollution, especially from nitrogen and phosphorus, has consistently ranked as one of the main causes of ambient water degradation. Increased algal blooms, increased drinking water treatment costs, and reduced dissolved oxygen concentrations are all impacts associated within increased nutrient loading. Within the Lower Fall Creek watershed, the three primary sources of nutrients are anticipated to be fertilizer application, inadequately functioning septic systems, and combined sewer overflows. Additionally, a significant source of nutrients is expected to be manure outputs from agricultural areas and hobby farms in the upper reaches of the watershed. Golf courses are also a source of fertilizer runoff.

Table 3-10 lists the problems, causes, and potential sources for nutrients within the Lower Fall Creek watershed.

Table 3-10 Lower Fall Creek Watershed Nutrient Problems, Causes, and Potential Sources

Problem	Cause	Potential Source
Streams and tributaries in the watershed are suspected of having increased levels of nutrients	Nutrient levels in waterbodies throughout Indiana have elevated levels of nutrients (nitrogen and phosphorus)	Fertilizer runoff from golf courses and residential lawns
		Animal and human waste from agricultural practices, inadequately, functioning septic systems, and CSOs

3.4.1 Nutrient Loadings

STEPL was also utilized to estimate the amount of nutrient (nitrogen and phosphorus) loadings from sources within the watershed. It is estimated that existing nitrogen inputs are 165 tons per year and phosphorus inputs are approximately 28 tons per year. It is anticipated the largest source of nutrient loading

in the watershed would be Devon Creek – Fall Creek subwatershed due to the location of the CSOs. **Table 3-11** outlines the estimated nitrogen and phosphorus loadings as estimated through the STEPL program.

Table 3-11 Lower Fall Creek Nutrient Loadings

Subwatershed	STEPL Estimated Total Load (lb/yr)	
	Nitrogen	Phosphorus
Headwaters Mud Creek	91,897.5	16,339.5
Indian Lake-Indian Creek	76,388.9	12,945.9
Sand Creek-Mud Creek	47,952.6	8,032.6
Devon Creek-Fall Creek	108,923.3	16,882.5
Total	**325,162.3**	**54,200.5**

The implementation of the LTCP is anticipated to have positive impacts on nutrient loadings as the number of CSO outfalls and events are reduced. In addition, rapidly changing land use may assist with removing inadequately functioning septic systems from the watershed as sanitary sewer is provided to new areas.

Golf Courses

There are a total of 11 golf courses in the watershed that are distributed almost evenly across the four subwatersheds. The locations of the golf courses are indicated in the critical area maps in section 4.1 and cover approximately 2,700 acres in the watershed.

Combined Sewer Overflows

Nutrient loading from combined sewer overflows within the Lower Fall Creek watershed comes from the Devon Creek – Fall Creek subwatershed, the location of all CSOs within the larger Fall Creek watershed. There are currently 27 CSO outfalls on Fall Creek, all located within the Devon Creek subwatershed. These are shown on the Figure 4-1 map. The DigIndy project previously described will eliminate one CSO outfall, and the other 26 CSO outfalls will meet a level of control of 97% capture and two overflows in a typical year.

Septic Systems

Failing septic systems are a nutrient source in the Lower Fall Creek watershed. County health departments were surveyed and it was determined there are 2,109 operating septic systems in the Lower Fall Creek watershed, broken out by subwatershed as follows:

- Headwaters Mud Creek: 209
- Indian Lake-Indian Creek: 519
- Sand Creek-Mud Creek: 444
- Devon Creek-Fall Creek: 937

The septic system failure rate estimate used in the STEPL modeling was 2% (42 septic systems of the 2,109 operating systems). Additionally in the Devon Creek subwatershed several future STEP projects have been identified.

Livestock Manure

Livestock estimates were utilized to develop the following nutrient loading in the Lower Fall Creek Watershed:

Table 3-12 Livestock Estimates and Nutrient Loading

Species	Manure T/yr	Nitrogen lb/yr	Phosphorus lb/yr	*E. coli* cfu/T
Beef	1,020.90	1,648.20	897.90	7.65E+13
Chicken	0.80	131.50	106.50	1.05E15
Ducks	1.90	1,064.00	889.20	
Horse	1,590.80	9,92.20	516.60	2.36E+13
Pigs	9,184.00	27,552.00	2,0832.00	5.09E+15
Sheep	30.00	1,560.00	705.00	6.78E+14
Turkeys	1,2.10.00	3,024.00	2,635.20	2.19E+13
TOTAL	**11,840.00**	**35,972.00**	**26,582.00**	**6.93E+15**

CHAPTER 4 CRITICAL AREAS AND GOALS

Critical areas are defined as areas or activities in the watershed that are suspected of degrading water quality. Focusing on a specific critical area or activity is more effective at improving water quality than a generalized program. Implementation of management measures (programs, policies, or projects) in a specific area in the watershed will have the greatest impact on water quality.

It becomes difficult to identify those specific areas when land use and populations change drastically in a short time span. Watersheds with a more stable land use have the ability to assess the problem areas, develop solutions for those specific areas, apply for and obtain grant funding, and develop a cost share program for implementation of BMPs. While this may still be true within the Lower Fall Creek watershed, it is required to occur in a much faster time period. If not, areas identified within a WMP as critical for agricultural BMPs may be a commercial development or a residential subdivision by the time grant funds were awarded.

In light of this, and in an effort to remain consistent with US EPA and IDEM guidance on the development of WMPs, subwatersheds have been identified as critical areas. Prioritization of subwatersheds varies dependent on the pollutant, the BMPs, and even the potential for participation of partners.

4.1 IDENTIFICATION OF CRITICAL AREAS

To identify critical areas in the Lower Fall Creek watershed, stakeholder concerns, survey results, and data gathered from an interactive ArcGIS StoryMap were collected and reviewed along with available water quality data. Based on this review, it was determined that by focusing on the Devon Creek-Fall Creek 12-digit HUC subwatershed as a primary critical area, greater improvements may be realized through implementation of water quality improvement strategies. Additional, or secondary, critical areas have been developed related to categories of pollutants; bacteria, sediment, and nutrients, based on the watershed inventory. The inventory and prioritization of primary and secondary critical areas was completed using a combination of available water quality data, land use data, and input from the steering committee and stakeholders. As described in section 3.1, stakeholder concerns were initially inventoried at steering committee meetings; additional stakeholder input was obtained via an electronic survey with 125 participants who answered questions regarding their perception of how big of a problem pollutants and their sources are in the watershed. Those pollutants and source perceived as moderate/severe in the survey were then compared with water quality data and identified stakeholder concerns to support the critical area selections.

4.1.1 **Devon Creek – Fall Creek Subwatershed**

The Devon Creek – Fall Creek subwatershed (Error! Reference source not found.) encompasses much of the lower reaches of the planning area. Additionally, this

largest subwatershed is also the area affected by the TMDL, CSOs, urbanized development and impervious surfaces, and contains numerous waterbodies listed on the 303(d) list compared to the other subwatersheds. Nutrient loading is also highest in this subwatershed.

In addition, the following previously identified critical areas from the 2009 Lower Fall Creek WMP are present within the Devon Creek – Fall Creek subwatershed:

- HEL/PHEL soils: especially compounded by lack of erosion and sediment control
- Eroded streambanks, especially along Fall Creek
- Golf Courses: Brendonwood, Hillcrest Country Club, Fort Benjamin Harrison
- Residential Lakes: Kesslerwood Lake, Lake Maxinhall
- Non-sewered neighborhoods
- Indiana State Fairgrounds
- Wellfield Protection Areas

This cumulative impact on water quality as supported by stakeholder input and water quality data is the reason for the selection of this subwatershed as the primary critical area.

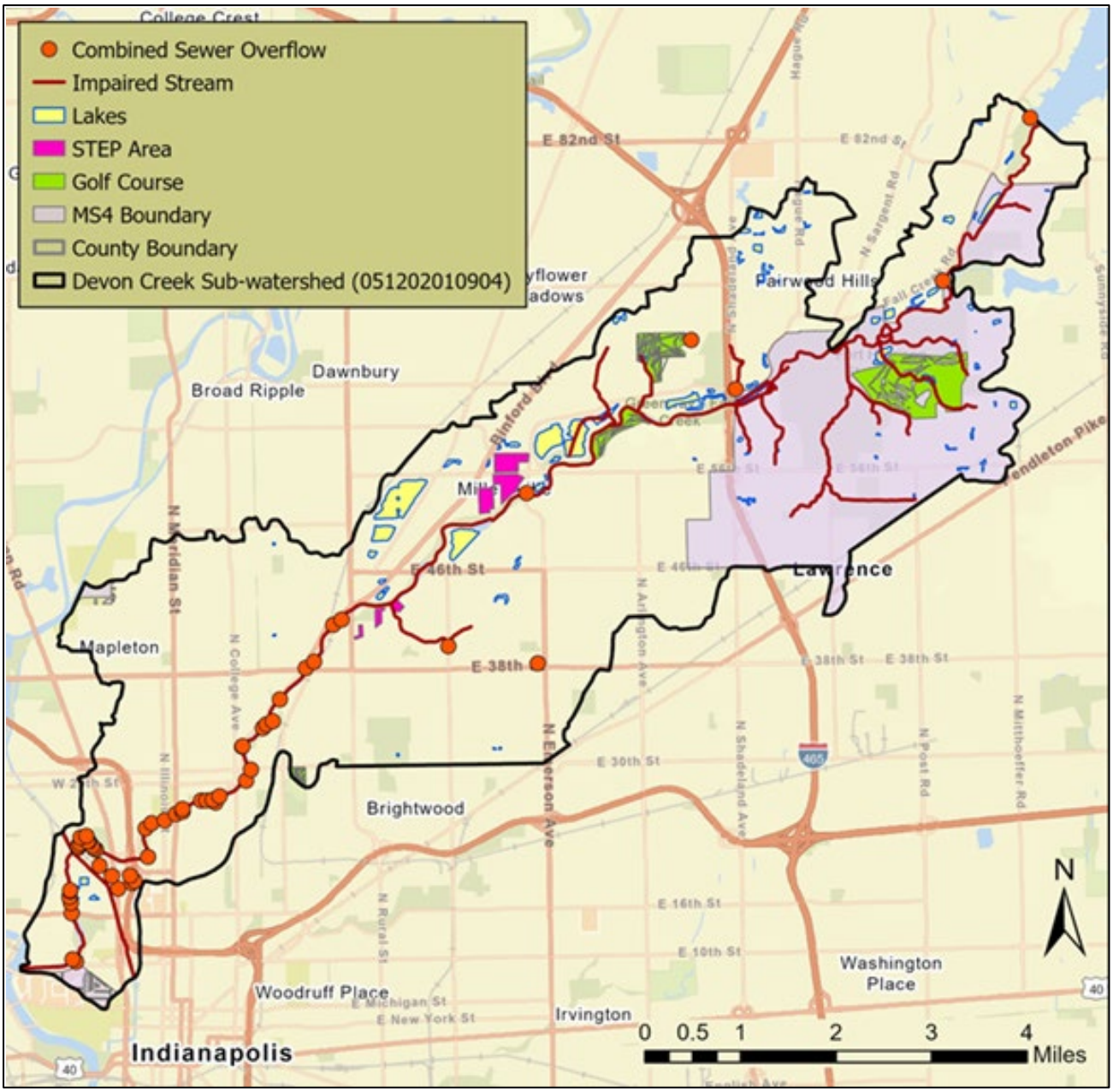

Figure 4-1 Lower Fall Creek Watershed Primary Critical Areas (IDEM)

4.1.2 Secondary Critical Areas

Similar considerations were used to develop additional critical areas. As this watershed is very rapidly changing in population and land use, it is difficult to select a critical area such as agricultural lands or even eroded streambanks as these may change six months after the writing of this plan. In more traditional watersheds, and WMPs, land use and other considerations may remain generally stable for up to 10 years making it easier to develop a WMP, apply for and receive grant funding, and move into implementation phase. Many areas of the Lower Fall creek watershed, (outside of the Devon Creek -Fall Creek subwatershed) have been among the most rapidly growing areas in the United States for several years. Much of the agricultural land near the headwater areas will be transformed to residential or commercial developments, and as a result, sanitary sewer services will be extended. This will allow inadequately functioning septic systems to be eliminated from the subwatersheds. Similarly, as agricultural land use is converted to residential or commercial land uses, sediment loads are anticipated to be reduced as exposed soils are hardened with buildings or protected with vegetation.

Therefore, secondary critical areas are also subwatershed-based and are listed in the BMP Action tables (Table 5-1, 5-2, and 5-3) within Chapter 5 for bacteria, sediment, and nutrients. The subwatersheds listed in the Focus Areas columns of those tables have been prioritized based on the types of actions or BMPs being proposed. **Figure 4-2**, **Figure 4-3**, and **Figure 4-4** identify the secondary critical areas for the remaining subwatersheds.

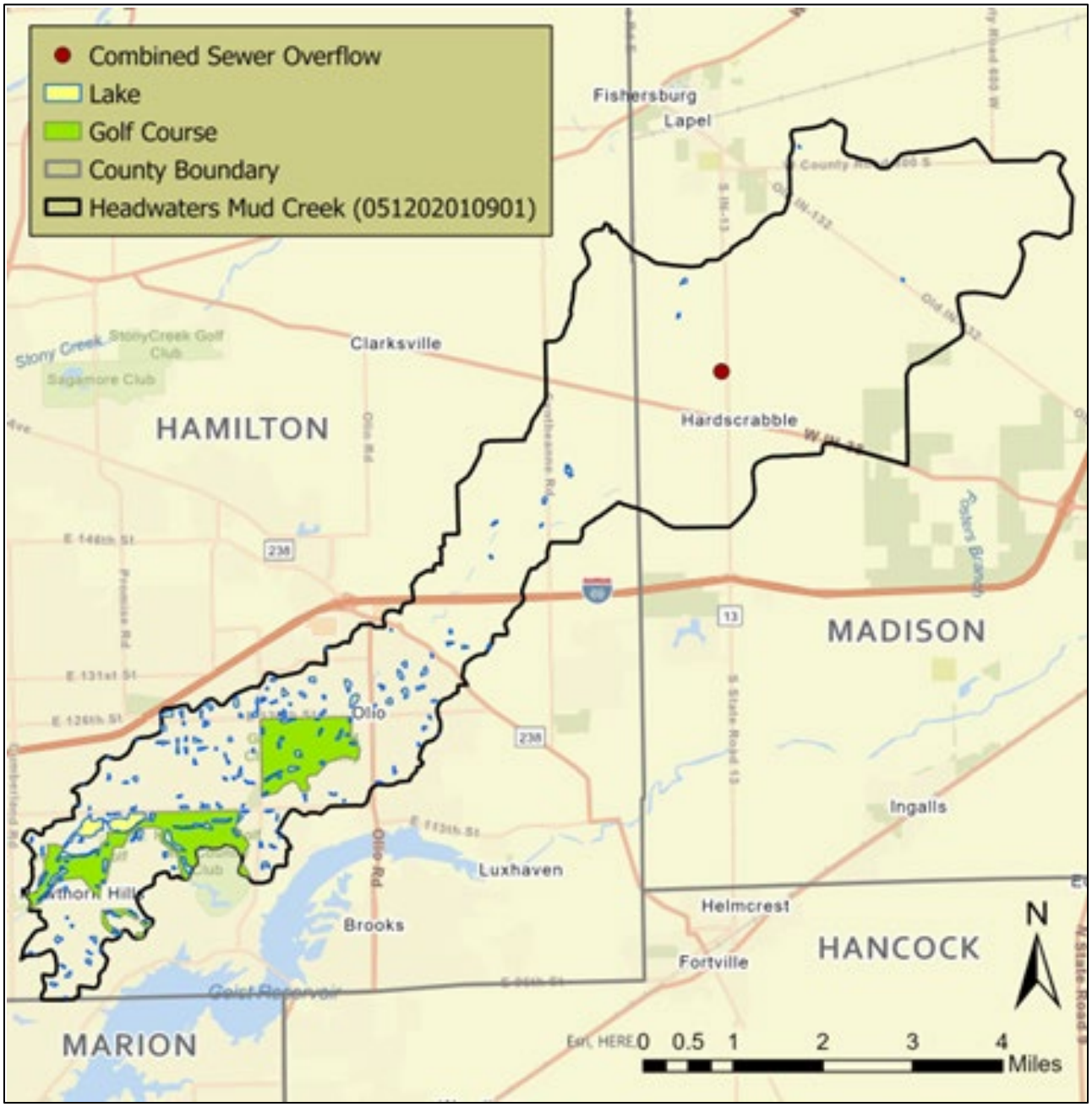

Figure 4-2 Secondary Critical Areas, Headwaters Mud Creek (IDEM)

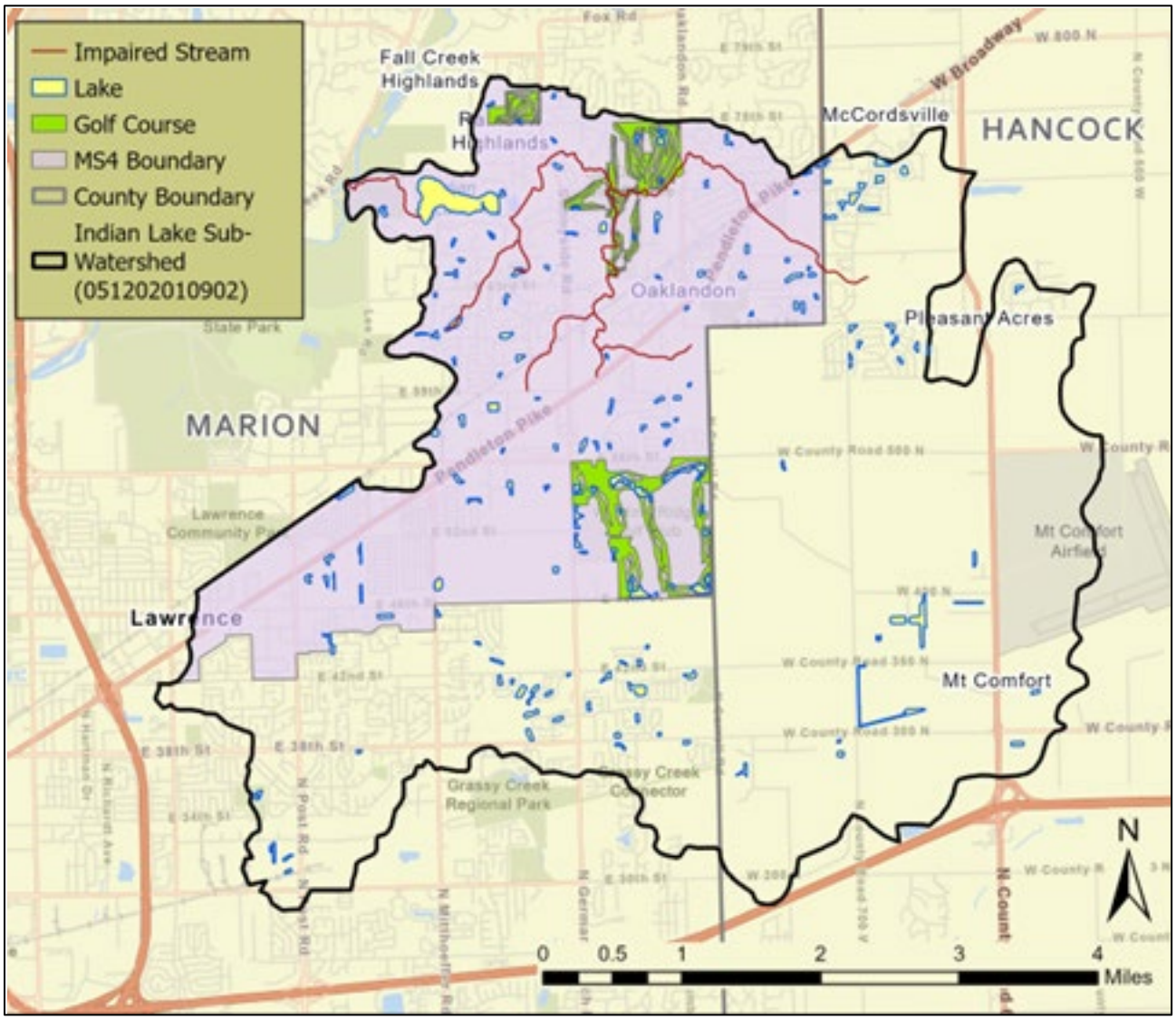

Figure 4-3 Secondary Critical Areas, Indian Lake Subwatershed (IDEM)

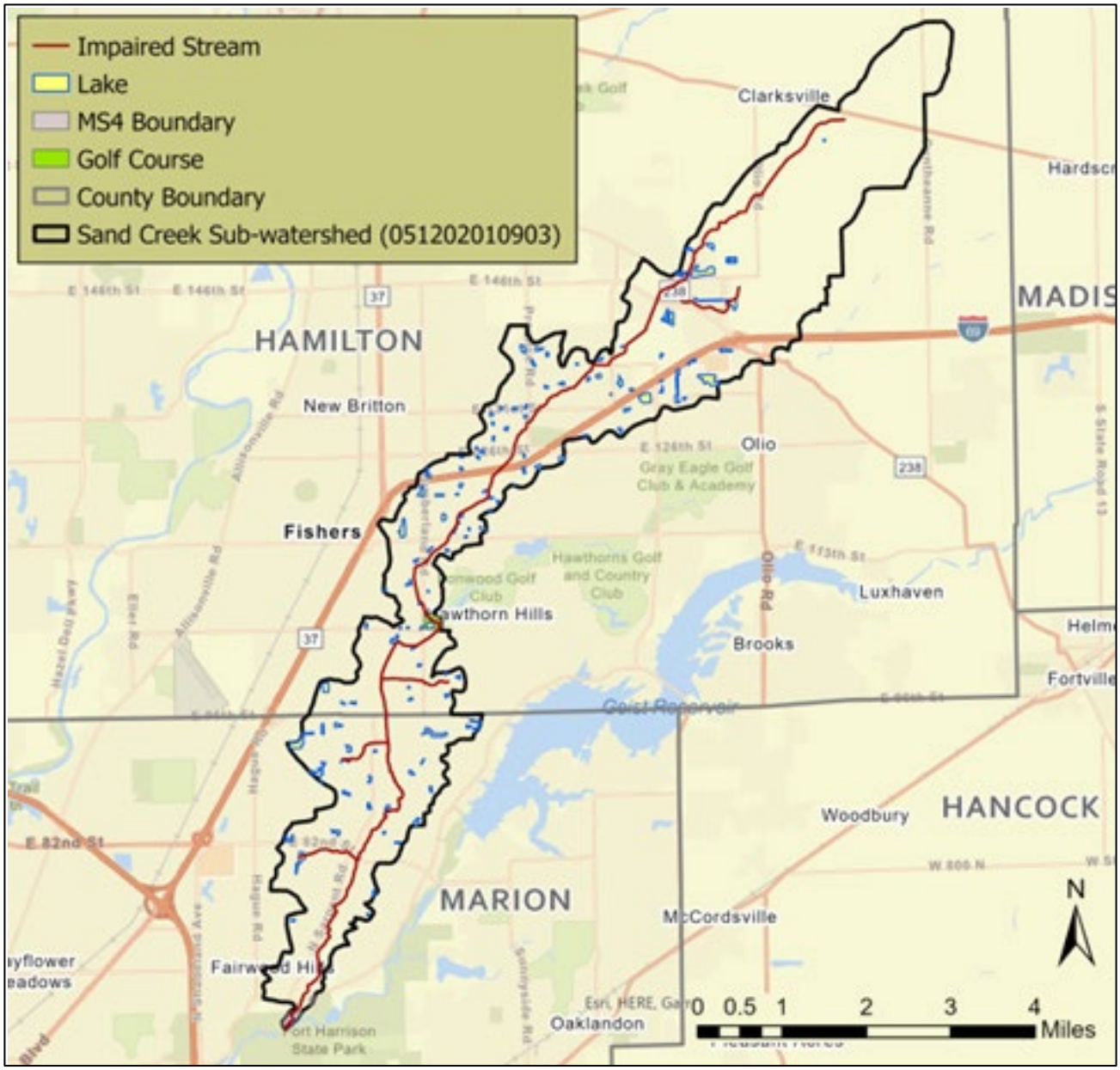

Figure 4-4 Secondary Critical Areas, Sand Creek Subwatershed (IDEM)

4.2 IDENTIFICATION OF GOALS

Setting realistic and measurable goals is key to the successful implementation of this plan. A goal is the desired change or outcome as a result of the watershed planning effort. Depending on the magnitude of the problem, goals may be general or specific, long-term or short-term. The goals in this plan focus on improving water quality through the implementation of a variety of management measures focusing on reducing loadings and impacts associated with bacteria, sediment, and nutrients and were developed from the stakeholder concerns in Tables 3-1 and 3-2. Further, these goals and actions may be applied to all subwatersheds within the Lower Fall Creek watershed as a way to reduce the overall loading and impact of pollutants. The actions are found in more detail in Section 5.

4.2.1 **Bacteria Goal**

Much is being done to address the *E. coli* loading within the Devon Creek – Fall Creek subwatershed based on the TMDL established. Work is being completed by Citizens and the City of Indianapolis through the LTCP and is slated to be implemented by December 2025. The watershed partners will work to support these goals through collaborative efforts where possible and practical.

Additional work will be continued to capture potential sources not associated with the CSOs throughout the watershed. This includes partnering with other agencies and municipal offices to offer education and outreach programs to their constituents which deal with topics such as pet waste, septic tank maintenance, sanitary sewer hook-up, or agricultural manure management. As the northern reaches of the watershed continue to be developed at a quick rate, areas with failing septic systems may be addressed due to new development and extension of sanitary services.

The specific goal of the TMDL, and therefore the specific goal of the WMP is:

Reduce the *E. coli* loading to Lower Fall Creek by 99.5% within the CSO area and 52% upstream of the CSO area, by 2026 per the LTCP.

Following the implementation of the LTCP in 2025, the watershed partners will evaluate additional bacterial sources such as pet waste and failing septic systems, potentially based on the state water quality standard for *E. coli* previously listed in Table 2-10. New goals will be developed at that time.

4.2.2 **Sediment Goal**

A TMDL for sediment loading within the Lower Fall Creek watershed has not been established. Therefore, it is up to planning representatives to determine a realistic goal for the reduction of sediment loading to the waterbodies within the watershed. This WMP update is utilizing the TSS goal of 46 mg/L previously listed in Table 2-11.

Sediment loads may be reduced over time due to rapidly changing landscape; from agricultural land uses to residential. For those areas remaining as cropland, partnerships with the SWCDs will increase conservation efforts designed to conserve soil and prevent erosion. As municipalities grow in size, loadings may also be reduced with implementation and enforcement of municipal programs designed to increase sediment control and reduce erosion from construction sites.

The current loading has been estimated through STEPL (Table 3-7) as 11.1K tons of sediment per year and the reduction needed to meet the target TSS goal is 7.5K tons of sediment per year or a 67% decrease in sediment loading. Efforts will continue to increase soil conservation in agricultural settings, reduce erosion from construction sites, and stabilize eroding streambanks within this rapidly changing watershed. As such, approximately 30% of the sediment loadings could be reduced by 2033 (10 years).

Through collaborative efforts with various agricultural, construction, and land stewardship partners, the goal for sediment reduction is:

Reduce sediment loading to Lower Fall Creek watershed from 11.1K tons/year to 7.7K tons/year within 10 years.

Actions and estimated sediment load reductions are provided in Section 5.0.

4.2.3 Nutrient Goal

Similar to sediment, a TMDL has not been established for nutrients within the Lower Fall Creek watershed. In addition, sampling sources referenced in Section 2 also indicate that most monthly samples taken within the watershed by the MCHD result in a "Below Detection Level" for both nitrogen and phosphorus. However, based on local and regional efforts to reduce overall inputs of nutrients, the planning representatives have determined that actions should be taken within the Lower Fall Creek watershed to reduce the overall loading of these pollutants and the total phosphorus target (0.3 mg/L) and the 1.6 mg/L Nitrite standard (the EPA Proposed Criteria for Eastern Corn Belt Plains) were used to determine the load reduction needed. As educational events are continued within the watershed and habits continue to improve, it is hoped nutrient loadings will continue to be reduced improving the overall health of the watershed. This will be especially important with the rate of development and land use change occurring in the Lower Fall Creek watershed. It is hoped through these efforts both nitrogen and phosphorus nutrient loadings could be reduced to meet both target criteria by 2033 (10 years).

STEPL calculations have estimated nitrogen loading as 165 tons/year and phosphorus loading at 28 tons/year. The reductions needed to meet the target loading goals above are 40 tons of nitrogen per year (a 24% decrease) and 4.5 tons of phosphorus (a 16% decrease). Therefore, the goal for nutrient reduction in the entire watershed is:

Reduce nitrogen loading to Lower Fall Creek watershed from 165 tons/year to40 tons/year within 10 years.

Reduce phosphorus loading to Lower Fall Creek watershed from 28 tons/year to 4.5 tons/year within 10 years.

4.2.4 Other Pollutants

During the outreach efforts and exercises, other pollutants such as gross solids, salts, and oil/grease were mentioned. Loadings and related load reductions were not established for these pollutants. However, as actions are implemented to reduce loadings, regarding bacteria, sediment, and nutrients, these pollutants and loadings will also be reduced. For example, using native vegetation to stabilize eroded streambanks to reduce sediment loading will also reduce nutrient loadings by filtering pollutants carried by stormwater runoff.

CHAPTER 5 ACTIONS AND PRACTICES

This section outlines the actions and proposed best management practices (BMPs) which may be appropriate for the primary critical area, Devon Creek – Fall Creek subwatershed, but also may be applicable and beneficial to other critical areas within the larger Lower Fall Creek watershed. The Focus Area columns identify the prioritized primary and secondary critical areas applicable for each BMP.

5.1 PROPOSED BMPS

The actions and practices listed in **Table 5-1**, **Table 5-2**, and **Table 5-3** outline the proposed actions and practices which are being considered for implementation within the Lower Fall Creek watershed. The estimated load reductions, where able to be estimated, have also been included.

Table 5-1 Bacteria BMPs

BACTERIA				
Focus Area	**BMP**	**Estimated Load Reduction**		
		Sediment	**Nitrogen**	**Phosphorus**
Urban residential septic systems Primary *Devon Creek – Fall Creek*	Support existing STEP program through Citizens'; focus on areas within WFPA and floodplains	NA	NA	NA
Streambanks of 303(d) listed streams Primary *Devon Creek – Fall Creek* Secondary *Sand Creek – Mud Creek* *Indian Lake – Indian Creek* *Mud Creek Headwaters*	Establish or enhance riparian buffers to reduce potential increases in bacteriological impacts from livestock or other inputs	*80% with 100 ft buffer*	110 lb/yr	42 lb/yr
Residential septic systems and/or illicit connections Primary *Devon Creek – Fall Creek* Secondary *Mud Creek Headwaters* *Sand Creek – Mud Creek* *Indian Lake – Indian Creek*	Develop and provide education and outreach materials to areas with anticipated inadequately functioning septic systems or illicit storm sewer connections; may include workshops	NA	NA	NA
Agricultural land cover *Mud Creek Headwaters* *Indian Lake – Indian Creek* *Sand Creek – Mud Creek*	Partner with SWCD and NRCS to identify lands and work with landowners to implement BMPs such as nutrient management or establishment of filter strips. *Load reductions would be dependent on specific practices and number of practices implemented.*	NA	NA	NA
		NA	NA	NA

Table 5-2 Sediment BMPs

SEDIMENT				
Focus Area	**BMP**	**Estimated Load Reduction**		
		Sediment	**Nitrogen**	**Phosphorus**
Developed areas Primary *Devon Creek – Fall Creek* Secondary *Indian Lake – Indian Creek* *Sand Creek – Mud Creek* *Mud Creek Headwaters*	Install green infrastructure practices to capture first flush and filter sediment and suspended solids from runoff *IN Stormwater Quality Manual suggested removal rates*	*Bio-retention area: 90% TSS / Bacteria; 68-83% Nitrogen and Phosphorus*		
		Infiltration Trench: 90% TSS / Bacteria; 60% Nitrogen and Phosphorus		
		Stormwater Wetland: 67% TSS, 77% Bacteria; 28% Nitrogen and 50% Phosphorus		
Eroding streambanks or areas near outfalls Primary *Devon Creek – Fall Creek* Secondary *Sand Creek – Mud Creek* *Mud Creek Headwaters* *Indian Lake – Indian Creek*	Stabilize eroded areas and install native vegetation, removing invasive species if necessary *STEPL: 300 linear ft/15 ft height, severe lateral recession*	59.8 T/yr	110 lb/yr	42 lb/yr
Development or Redevelopment Primary *Devon Creek – Fall Creek* Secondary *Sand Creek – Mud Creek* *Mud Creek Headwaters* *Indian Lake – Indian Creek*	Educate contractors and developers regarding stormwater regulations, inspections, and enforcement, emphasizing sediment and erosion control on construction sites.	NA	NA	NA
Agricultural land cover *Mud Creek Headwaters* *Sand Creek – Mud Creek* *Indian Lake – Indian Creek*	Partner with SWCD and NRCS to identify lands and work with landowners to implement BMPs such as establishment of cover crops or conversion to conservation tillage methods. *Load reductions would be dependent on specific practices and number of practices implemented* *Region V Load Reduction Model*	*Cover Crop:* 2.2 T/yr	2.6 lb/yr	5.2 lb/yr
		Reduced Till: 4.4 T/yr	4.3lb/yr	8.6 lb/yr

SEDIMENT				
Focus Area	**BMP**	**Estimated Load Reduction**		
		Sediment	**Nitrogen**	**Phosphorus**
Residential lakes <u>Primary</u> *Devon Creek – Fall Creek* <u>Secondary</u> *Mud Creek Headwaters* *Sand Creek – Mud Creek* *Indian Lake – Indian Creek*	Partner with lake associations to identify potential pollutants and problems within the lake watersheds	NA	NA	NA

Table 5-3 Nutrient BMPs

NUTRIENTS				
Focus Area	**BMP**	**Estimated Load Reduction**		
		Sediment	**Nitrogen**	**Phosphorus**
Developed areas <u>Primary</u> *Devon Creek – Fall Creek* <u>Secondary</u> *Indian Lake – Indian Creek* *Sand Creek – Mud Creek* *Mud Creek Headwaters*	Install green infrastructure practices to capture first flush and filter nutrients from runoff *Load reductions would be dependent on specific practices and number of practices implemented*	NA	NA	NA
Urban residential septic systems <u>Primary</u> *Devon Creek – Fall Creek*	Support existing STEP program through Citizens'; focus on areas within WFPA and floodplains	NA	NA	NA
Residential septic systems and/or illicit connections <u>Primary</u> *Devon Creek – Fall Creek* <u>Secondary</u> *Mud Creek Headwaters* *Sand Creek – Mud Creek* *Indian Lake – Indian Creek*	Develop and provide education and outreach materials to areas with anticipated inadequately functioning septic systems or illicit storm sewer connections; may include workshops	NA	NA	NA
Agricultural land cover *Mud Creek Headwaters* *Sand Creek – Mud Creek* *Indian Lake – Indian Creek*	Partner with SWCD and NRCS to identify lands and work with landowners to implement BMPs such as nutrient management or establishment of filter strips. *Load reductions would be dependent on specific practices and number of practices implemented* *Region V Load Reduction Model*	*Filter Strip:* 2.5 T/yr	2.9 lb/yr	6.0 lb/yr
Green Infrastructure *Devon Creek – Fall Creek* *Sand Creek – Mud Creek* *Mud Creek Headwaters* *Indian Lake – Indian Creek*	Initiate training of local landscape contractors, non-profits, and city staff through the National Green Infrastructure Certification Program administered by EnviroCert International	NA	NA	NA

The next step to develop the proposed BMPs for the Lower Fall Creek watershed was to determine potential partners, any financial or technical needs, a timeline for implementation, and various milestones throughout implementation. Many milestones proposed within the timeline are considered short-term or within five

years. These timelines were established to specifically build on the momentum for actions within the Lower Fall Creek watershed developed by the Marion County SWCD and ROW. Attainable goals and milestones have been established to continue the actions of the group, while continuing to build interest and participation from additional partners as the watershed continues to develop. This information is found detailed in **Table 5-4.**

5.2 ACTION REGISTER AND IMPLEMENTATION SCHEDULE

The action register and implementation schedule in Table 5-4 was developed to serve as an action plan to meet the goals of the WMP update. The action items are listed by priority and grouped according to the following expected timeline:

- **Near Term Actions**: complete within 3 years of plan approval
- **Mid Term Actions**: complete within 5 years of plan approval
- **Long Term Actions**: complete within 10 years of plan approval

Table 5-4 Action Register and Implementation Schedule

#	Target Goal	BMP	Responsible / Partnering Entity	Financial/Technical Assistance Needed	Timeline	Milestones for Implementation
1	Bacteria Sediment Nutrients	Train 20 local landscape contractors, non-profits, and city staff through the National Green Infrastructure Certification Program administered by EnviroCert International (ECI), *Where: Devon Creek-Fall Creek*	*Lead:* Marion County SWCD *Partners:* • SWCDs • ROW • City of Indianapolis DPW • Local Non-Profits and contractors implementing GI	• NGICP Tier 1 Training Package (license for partners; certification for 20 individuals) • Materials for attendees • Training and testing logistics • *Cost is $30K for Tier 1 Training Package1*	Near Term	1. Initiate training partner package activities with ECI 2. Provide training locally of up to 20 individuals 3. Complete testing and certification 4. Hold graduation ceremony and develop list of certified individuals to serve cost share program in item #2
2	Bacteria Sediment Nutrients	Install a total of 27 projects utilizing green infrastructure practices to capture first flush and filter bacteria, nutrients, sediment, and suspended solids from runoff. Hold six workshops at demonstration project sites. *Where:* *Devon Creek – Fall Creek* *Sand Creek – Mud Creek*	*Lead:* Marion County SWCD *Partners:* • NGICP Trained Professionals • NRCS • ROW • Landowners • Educational institutions for demo projects	• Demonstration project design/signage • Workshop materials • Green infrastructure practice design and installation oversight • *Cost will vary with BMP alternative* *Rain Garden: $10-$40/ft²* *Rain Barrel: $250* *Native Planting: $10-25/ft*	Mid Term	1. Develop plans and install two demonstration projects at educational institutions 2. Develop and facilitate six workshops for 180 interested landowners (two per year) utilizing demonstration projects as workshop sites 3. Develop cost-share program for 25 residential green infrastructure practices utilizing technical resources on SWCD board; submit cost share program to IDEM for approval 4. Track location and load reductions as residential practices are installed

#	Target Goal	BMP	Responsible / Partnering Entity	Financial/Technical Assistance Needed	Timeline	Milestones for Implementation
3	Sediment Nutrients	Stabilize up to 1,200 linear feet of eroded streambanks and areas near outfalls and install native vegetation, removing invasive species if necessary *Where:* *Devon Creek – Fall Creek* *Sand Creek – Mud Creek*	*Lead:* SWCDs *Partners:* • Riparian Landowners • Friends of White River, Inc Stream Steward Program • MS4 Entitities • DNR LARE Program • SICIM (Invasive Removal efforts)	• Stabilization design and installation • Invasive removal and native vegetation installation • Costs can range $300-$1,000 per linear foot depending on severity	Near Term	1. Identify and prioritize areas still in need of stabilization, target these areas for Stream Steward Workshops 2. Determine appropriate method for stabilization 3. Collaborate with agencies and landowners on permitting requirements 4. Utilize SICIM Weed Wrangle© for invasive removal efforts depending on site access and extent of problem 5. Install and track stabilization efforts
4	Sediment	Educate contractors and developers regarding stormwater regulations, inspections, and enforcement, emphasizing sediment and erosion control on construction sites. *Where: Devon Creek-Fall Creek*	*Lead:* Marion County SWCD *Partners:* • IDEM • SWCDs • MS4 entities • White River Alliance	• Educational materials (IDEM, EPA, SWCD) • List of contractors and developers • Regulation expertise • Training materials •	Near Term	1. Partner to develop training agenda and materials based on inspection observations 2. Develop field and classroom modules 3. Conduct three annual training targeting common problems seen in the field
5	Bacteria Nutrients	Support existing STEP program through Citizens Energy Group *Where:* *Devon Creek – Fall Creek Floodplains* *WFPA*	*Lead:* Citizens Energy Group *Partners:* • Indianapolis DPW • HOAs, neighborhood associations • Residential homeowners	• Materials related to STEP program and septic tank maintenance practices • Map of areas served by septic systems • Inclusion of STEP program into SWCD programming • *Cost of existing staff time* • *$500 printed materials*	Mid Term	1. Include STEP and septic tank maintenance materials on SWCD websites 2. Provide STEP materials during SWCD workshops and outreach activities

#	Target Goal	BMP	Responsible / Partnering Entity	Financial/Technical Assistance Needed	Timeline	Milestones for Implementation
6	Bacteria Nutrients	Develop and provide education and outreach materials to areas with inadequately functioning septic systems or illicit storm sewer connections *Where:* *Entire Fall Creek watershed*	*Lead:* Marion County SWCD *Partners:* • Health Departments • Indiana State Department of Health • ROW	• Educational materials related to septic system maintenance or illicit storm sewer connections • Mapping to track areas in need and progress • *Cost of existing staff time* • *$500 printed materials*	Mid Term; review failure data as available to determine need to continue beyond 5 years	1. Identify and prioritize remaining target areas 2. Develop and mail 100 educational material packets, offering follow up site visits/technical assistance 3. Partner with landowners to develop strategies for mitigation 4. Seek grant funding to assist landowners as able
7	Bacteria Sediment Nutrients	Identify 100 acres of agricultural lands and work with landowners to implement BMPs such as nutrient management, establishment of filter strips and conservation tillage *Where:* *Mud Creek Headwaters* *Sand Creek – Mud Creek*	*Lead:* SWCDs *Partners:* • NRCS • Agricultural landowners	• Farm conservation planning • Mapping to track areas in need and progress • *Cost of existing staff time*	Long Term (Initiate within 5 years of plan approval and complete within 10 years of plan approval)	1. Identify and prioritize remaining agricultural land practicing conventional tillage. 2. Partner with landowners to develop strategies for BMP placement 3. Seek grant funding to assist landowners as able
8	Bacteria Sediment Nutrients	Partner with lake associations to identify potential pollutants and problems within the lake watersheds *Where:* *Devon Creek-Fall Creek* *Indian Lake-Indian Creek*	*Lead:* ROW *Partners:* • HOAs/Lake Associations • SWCDs • City of Indianapolis	• Coordinator or plan developer • GIS for analysis and exhibits • *$10,000 - $30,000 (will vary with size of lake or watershed)*	Long Term (Initiate within 5 years of plan approval and complete within 10 years of plan approval)	1. Gather agreements from lake associations 2. Identify pollutants, sources and causes 3. Develop and adopt three lake management plans 4. Work with planning and zoning to amend ordinances if necessary

5.3 IMPLEMENTATION PROGRESS TRACKING

Residents of the Lower Fall Creek watershed will be informed of the implementation progress on the action items above through several existing communication channels described below:

Marion County SWCD maintains a current electronic distribution list of over 1,500 households and a website receiving over 10,000 visitors annually. Quarterly "Conservation in the Neighborhood" newsletters are distributed electronically and will include an ongoing feature on the progress of the WMP implementation once approved. These newsletters also contain educational resources for residents about the impacts of pollutants on waterways and human health, and what residents can do on their properties to improve water quality (i.e., Tox Drop locations, picking up pet waste, proper lawn care etc.). Implementation progress will also be a main feature in the district's annual report published in February each year. Additionally, a new section will be added to the SWCD website focused on the WMP update and implementation item progress with quarterly updates and planned activities.

SWCD employees provide a quarterly report to City of Indianapolis DPW and BNS officials and will include plan implementation progress in these reports as well as feature the plan's progress in our annual presentation to the City County Council's Public Works Committee each Fall. Relevant implementation items (i.e., workshops) will also be included in the City's NPDES report.

Project partners ROW, Mud Creek Conservancy District and SICIM issue frequent electronic newsletters that will include progress tracking on the WMP implementation. The ROW Fall Creek committee meets monthly, and the Lower Fall Creek WMP update is a standing item on that committee's agenda. SICIM also issues an annual report that will include Weed Wrangle© and other relevant activities happening in the watershed and periodically issues newsletters as well.

5.4 PLAN IMPLEMENTATION FUNDING OPPORTUNITIES

Marion County SWCD has cultivated a variety of relationships with various funding agencies and non-profit organization over the last five years and will continue to utilize existing partnerships to help fulfill the financial assistance needed for plan implementation. The following are examples of existing partner agencies and recent funding provided to the SWCD for activities similar to those recommended in Table 5-4 as well as future funding partnership opportunities:

- **Natural Resources Conservation Services (NRCS) -** the SWCD is currently engaged in a 5-year cooperative agreement focused on technical assistance related to soil health in urban agriculture. This agreement provides staff and training support for our Soil Health Position and the development of a "Soil Health in the Garden" guide as a technical resource for urban farming practices on agricultural lands less than 5 acres in size.

The training opportunities provided to urban farmers can help promote cost share practice opportunities tied to agriculture (item #8 in table 5-4).

- **Indiana State Department of Agriculture (ISDA) -** the SWCD has been successful in procuring competitive grants offered through the Clean Water Indiana (CWI) grant program the past three years, and seven out of the last nine years. Our current CWI grant is a partnership with Purdue Extension where we offer a multiday Rainscaping course for homeowners on designing, building and maintaining rain gardens. The course is hosted at the IN-State Fairgrounds in the heart of the Lower Fall Creek watershed and offers residents native plants and other supplies for building their own rain gardens. This program and future similar workshops could provide additional funding for the rain gardens in item #2 in Table 5-4.
- **State of Indiana Cooperative Invasives Management (SICIM) -** this non-profit is funded through a 5-year cooperative agreement with NRCS and provided grant funding for a Weed Wrangle© invasives removal event in the Millersville neighborhood along Fall Creek on the eastside of Indianapolis which the district helped lead in May 2022. A future similar event will be held in 2023 with grant funding offered through SICIM along with an Indianapolis Neighborhood Resource Center (INRC) neighborhood grant secured by Millersville. Both of these grants will help support item #3 in table 5-4. The SICIM grants will be offered annually moving forward, providing additional support for this item. Additionally, through SICIM's support
- **Nina Mason Pulliam Charitable Trust (NMPCT)** - the district has partnered with Friends of White River, a local non-profit, to secure funding the past two years for a Stream Steward Program that included creation of a guide (https://marionswcd.org/wp-content/uploads/Stream-steward_digital.pdf) and holding various workshops for riparian property owners on streambank maintenance and restoration. Several of the workshops have been held in the Millersville area referenced previously along Fall Creek and a workshop is being planned at a site along Mud Creek in Spring 2023. The district and Friends of White River have been invited by NMPCT to submit a renewal application for a third year of this funding due in March 2023 that would support item #3 in table 5-4.
- **IDEM** - the district has applied for 319 implementation grant funding the last 3 years and will continue to pursue this annual funding source.
- **Indiana Finance Authority (IFA)** - state revolving fund (SRF) loan programs are available for wastewater infrastructure projects potentially supporting item #7 in table 5-4.
- **Indiana Department of Natural Resources (IDNR)** - offers Lake and River Enhancement Grants (LARE) to support streambank stabilization, logjam removal and other water quality improvement projects. This could serve as a funding source to support item #3 in table 5-4.

CHAPTER 6 MONITORING EFFECTIVENESS

Monitoring effectiveness is an essential part of implementation of the WMP. Monitoring is based on a series of indicators that describe how the implementation steps will be tracked and evaluated to ultimately measure the success of the WMP.

6.1 IDENTIFYING INDICATORS

An indicator is a fact or datum that can be measured to show rate of change. There are three types of indicators: 1) administrative, such as something that can be counted – the number of permits, number of grassed waterways, or policy and ordinances adopted or enforced; 2) environmental, are long-time measurements of water quality of habitat – concentration of phosphorous or nitrogen in water; and 3) social, indicating changes in stakeholder attitudes and behaviors.

Indicators have been identified for each goal and management measure. Section 5 of this WMP discussed the problem, goal, and target for sediment, nutrient, pathogen, and education/outreach. These goals are as follows:

1. Reduce sediment delivery to waterbodies within the Lower Fall Creek watershed.
2. Reduce excess nutrient loadings to waterbodies within the Lower Fall Creek watershed.
3. Reduce pathogen loadings to waterbodies within the Lower Fall Creek watershed.

Table 6-1 identifies the indicators and the tracking process which will be utilized for each of the management measures identified in Section 5. The successful implementation of the WMP depends on the participation of several responsible or partnering entities. However, tracking progress of the WMP will be the responsibility of the Marion County SWCD. Information specific to each action item and indicator will be entered into a tracking database developed and maintained by the Marion County SWCD. The tracking database will be updated as action items are completed or installed. Specific goals for each parameter such as number of trainings, number of materials distributed, or load reductions will be developed with future efforts and grant applications.

Social indicators are somewhat difficult to measure and track throughout efforts such as WMPs. Some examples of ways to measure these indicators are assessments such as pre- and post-event questionnaires or surveys for attendees to complete; activity trend analysis based on topics presented in educational activities; or activities such as sign ups or increases in attendance at activities. For each social indicator listed in Table 6-1, a tracking method has been developed (and noted in *italics)* which may be helpful in long-term tracking of increases in awareness and education successes.

Table 6-1 Action Items, Indicators, and Tracking Process

Action Item	Indicator	Tracking Process
Train local landscape contractors, non-profits, and city staff through the National Green Infrastructure Certification Program administered by EnviroCert International	Administrative – number of trainings Environmental – reduce pathogens, sediment, and nutrients through use of green infrastructure BMPS Social – change awareness, attitudes and behaviors related to green infrastructure practices	Number of trainings Number of participants *Increase in attendees, certifications, and conversations related to green infrastructure following activities*
Support existing STEP program through Citizens Energy Group	Administrative – number of septic systems Environmental – reduce pathogens from inadequately functioning septic systems Social – change attitudes and behaviors of residents	Number of materials distributed Number of systems maintained or removed Estimated load reductions *Increase in questions related to STEP program.* *Increase in understanding of proper septic tank maintenance*
Develop and provide education and outreach materials to areas with anticipated inadequately functioning septic systems or illicit storm sewer connections	Administrative – educational materials distributed or provided Environmental – reduced pathogens from failing septic systems or illicit connections Social – increased awareness of septic system maintenance, illicit discharges and associated water quality impacts	Number of materials distributed Landowners/residents reached *Increase in understanding of proper septic tank maintenance*
Identify agricultural lands and work with landowners to implement BMPs such as nutrient management, establishment of filter strips, conservation tillage	Administrative – implementation of BMPs Environmental – reduce pathogen, sediment, and nutrient laden runoff Social – increase awareness of benefits of nutrient management or other BMPs	Number of Nutrient Management Plans developed, or number of other BMPs implemented Estimated load reductions *Increase in participation in conservation programs within watershed*

Action Item	Indicator	Tracking Process
Install green infrastructure practices to capture first flush and filter sediment and suspended solids from runoff	Administrative – implementation of BMPs Environmental – capture and treat nutrients on-site; reduce runoff to receiving water Social – change attitudes and behaviors among decision-makers, developers, and landowners	Number of GI techniques installed Estimated load reductions *Increase in green infrastructure practices installed within watershed*
Stabilize eroded streambanks and areas near outfalls and install native vegetation, removing invasive species if necessary	Administrative – number of linear feet of streambank stabilized with natives Environmental – reduce sediment from failing streambanks Social – increase awareness about natives and value for water quality, streambank stabilization	Linear feet stabilized Number of plants removed/added Number and type of participants Estimated load reductions *Increase in native plant purchases and plantings along streambanks*
Educate contractors and developers regarding stormwater regulations, inspections, and enforcement, emphasizing sediment and erosion control on construction sites.	Administrative – educational offerings (workshops, presentations, handouts) Environmental – reduce sediment runoff from construction sites Social – change attitude and behavior of contractors and developers	Number of trainings Number of participants *Decrease in number of violations*
Partner with lake associations to identify potential pollutants and problems within the lake watersheds	Administrative – completed Lake Management Plans Environmental – through the development of the Plan, reduction of pollutants and loadings Social – through the development of the Plan, change attitudes and behaviors of lake residents	Number of collaborations with lake associations Number of completed Lake Management Plans *Increase in discussions with Lake Associations*

6.2 PLAN EVALUATION

The Marion County SWCD in cooperation with interested partners will be responsible for the regular review and update of this WMP. This plan will be evaluated on a biennial basis to document and celebrate progress; assess effectiveness

of efforts; modify activities to better target water quality issues; and keep implementation of the plan on schedule. Significant changes in populations and land use will also be noted where relevant to water quality, pollutant loading, or successful implementation of the WMP.

Through the partnerships developed, water quality will continue to be monitored by local groups such as ROW or WRA as funding allows. Currently the RAFT sampling program administered by WRA has funding to continue the program described in section 2.7 through the end of 2023. The program is anticipated to receive additional grant funding through the end of 2025. Once the LFC WMP has been approved and implementation funding has been obtained, a specific monitoring program will be developed which will include monthly water sampling throughout the watershed during the recreational season. This chemical program will be matched with a physical monitoring program which will include the use of the Qualitative Habitat Evaluation Index (QHEI) to evaluate land use changes and habitat availability along streams and rivers. A biological (macroinvertebrate and/or fish) sampling program may also be included provided funding and staffing are available for this type of effort. In addition to these protocols, local Health Department and IDEM sampling will also be observed and compared where relevant to assess changes in the watershed.

The WMP will be further evaluated and revised following implementation of BMPs installed throughout the watershed, either by partnering agencies or by the SWCD. Project relevant information will be collected during the biennial review, information regarding each BMP will be entered into a tracking database, load reductions will be calculated, and overall progress will be evaluated. This will provide the Marion County SWCD and project partners an overview of successes as well as outline opportunities for additional enhancements or projects within the Lower Fall Creek watershed.

Further, critical areas will be reviewed and revised based on the information compiled. BMP installations, load reductions, and actions of partnering agencies may result in the selection of a different critical area.

APPENDIX 1 List of Acronyms

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AEP	Annual Exceedance Probability
AU	Assessment Unit
AWTP	Advanced Wastewater Treatment Plant
BMP	Best Management Practices
CAFO	Confined Animal Feeding Operation
CD	Consent Decree
CFO	Confined Feeding Operation
CIP	Capital Improvement Plan
CSO	Combined Sewer Overflow
CWA	Clean Water Act
CWI	Clean Water Indiana
DPW	Department of Public Works
EPA	Environmental Protection Agency
FCA	Fish Consumption Advisory
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
HBI	Hilsenhoff Biotic Index
HCHD	Hamilton County Health Department
HEL	Highly Erodible Land
HUC	Hydrologic Unit Code
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
IPR	Initial Priority Rating
IR	Integrated Report
ISDH	Indiana State Department of Health
LARE	Lake and River Enhancement
LTCP	Long Term Control Plan

MAC	Mayor's Action Center
MCHD	Marion County Health Department
MCWEC	Marion County Wellhead Education Committee
MS4	Municipal Separate Storm Sewer System
NHD	National Hydrography Dataset
NLCD	National Land Cover Dataset
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
OLQ	Office of Land Quality (IDEM)
PCB	Polychlorinated biphenyls
PHEL	Potentially Highly Erodible Land
RAFT	River Assessment Field Team
ROW	Reconnecting to Our Waterways
SFHA	Special Flood Hazard Area
STEP	Septic Tank Elimination Program
STEPL	Spreadsheet Tool for Estimating Pollutant Loads
SWCD	Soil and Water Conservation District
TMDL	Total Maximum Daily Load
WFPA	Wellfield Protection Area
WMP	Watershed Management Plan
WQS	Water Quality Standard
WRA	White River Alliance

APPENDIX 2 Meeting Agendas and Summaries

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2/20/20 Lower Fall Creek WMP Update-Meeting #1 Steering Committee Project Kickoff Meeting

La Cantina Restaurant (located on Fall Creek)

5450 E Fall Creek Parkway N Drive

Indianapolis, IN 46226

1. Welcome Attendees

Meeting Attendees:

John Hazlett-Marion County SWCD

Heather Buck-Christopher Burke Engineering

Bri Dines-ROW

Chris Barnett-Lawrence CDC

Keith Cruz-ROW Waterway Fall Creek Co Chair

Chris Corr-ROW Waterway Fall Creek Co Chair

Doug Day-ROW Fall Creek Liaison

Jake Brinkman-City of Indianapolis Office of Land Stewardship

Gretchen Quirk-Marion County Public Health Department

Sam Ennett-IDEM

2. Review of "By the Numbers" Handout-John Hazlett

- John provided an overview of highlights from the 2009 WMP and the purpose of the plan update. The "By the Numbers" handout was provided prior to the meeting and to those in attendance for reference.

3. Project Schedule Overview-Heather Buck

- The goal of the project is to update the plan and submit along with a 319 implementation application due 9/1/20 to IDEM.

4. Watershed Concerns and Key Locations-Heather Buck

- Heather presented a map of the watershed and led a discussion to identify stakeholder concerns

5. Next Steps and Next Meeting

- Heather to update the Watershed Inventory to determine if the data supports the concerns and issues identified during the discussion
- Next Meeting will be 4/16/20

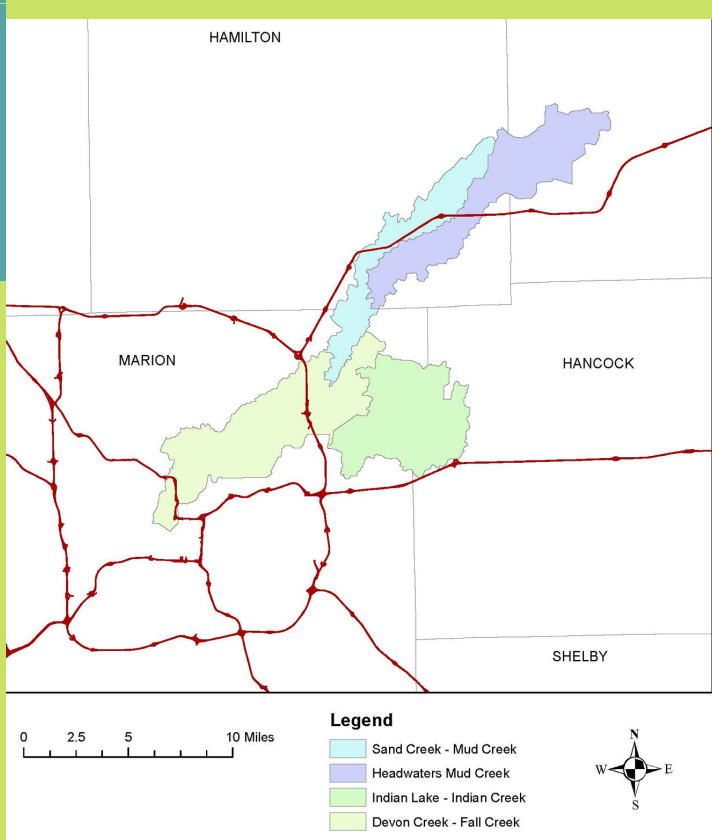
FALL CREEK WATERSHED: BY THE NUMBERS

From 2009 Lower Fall Creek WMP

- Total Watershed is **90** square miles
- **126** miles of waterways with **65** named waterbodies
- Combined sewer area is **21** square miles-**28** of Indy's **134** combined sewer outfalls
- **25%** of watershed is in Wellfield Protection Area
- **20%** of soils are classified Highly Erodible (HEL) or Potentially Highly Erodible Land (PHEL)

Water Quality Issue	Causes	Critical Area Location
Nutrients-Phosphorus and Nitrogen	CSOs, failing septic, fertilizers	Golf courses and residential lakes >50 acres
Sediment	Streambank erosion, stormwater runoff	HEL/PHEL-Indian Lake and Windridge Condos
Pathogens/Bacteria *(E. coli)*	Stormwater runoff, pet waste, CSOs, failing septics	STEP priority areas and State Fairgrounds

HUC 12 Subwatersheds



ROW Fall Creek Meeting Minutes

La Cantina
2/20/20
4:30-5:30 PM

NOTE TAKER	Bri Dines
ATTENDEES	Bri Dines, Chris Corr, Keith Cruz, Doug Day, John Hazlett, Kevin Senninger, Lisa Terry, Ruth Ann Wright, Melinda Hall, Cac Diehr, Cecelia Dodson , Jimmy Strathman
NEXT MEETING	Thursday, March 19th from 4:30-5:30 PM at Guggman Haus

INTRODUCTIONS	

DISCUSSION/ PRESENTATION	**Land Stewardship at Barton Park (Jacob Brinkman)**

- Barton Park Opportunity
  - Recently cleared of invasives and managing area
  - Must manage cleared areas long-term to establish natives in place
  - How pick site- traditionally managed this area and returned to do another clearing with better follow up practices inpace
  - Council President Vop Osili asked us to focus on this area as well
  - Neighbors have already expressed gratitude for the work (potential story collection)
  - Marion County Soil and Water Conservation District (MCSWD) got a grant for plant material working with Groundwork Indy and cou add to the effort at Barton Park
  - Land Stewardship's Site Steward program will also contribute to maintenance
- Proposing apply for ROW Flex Fund money- through Ecology or Fall Creek?
  - One project of Fall Creek is invasive removal (Strike Force); could be one site focus on as part of work plan
  - Fall Creek Committee did get significant money from Flex Fund recently, so maybe more likely to do well coming from Ecology
  - All present endorse/support Land Stewardship application through Ecology

Conclusion: Committee supports Land Stewardship's application for funds to maintain Barton Park with native plantings.

DISCUSSION/ PRESENTATION	**Work Plan 2020**

- Watershed Management Plan (WMP)
  - First official WMP meeting included brainstorming concerns AND Benefits want to protect
  - Next step is to narrow down priorities in conjunction with on-the-ground data
  - Meetings will be a different date than waterway meeting next time, based on availability of key stakeholders
- Rev. Charles Williams Park
  - Support City and Park Advisory Council relationships
  - Find ways to activate and fundraise for further amenities
- Fall Creek Strike Force
  - Invasive removal
  - Barton Park as one site, others around 30th Street
  - Keith and Chris leading
  - Partners Land Stewardship, KIB
- Anchor Institutions and Green Infrastructure
  - Doug and Chris leading
  - Ivy Tech moving forward specifically on project lists to develop gardens
  - Evaluating ecosystem services among the normal stuff
  - Invasive cards - promoting best practices to staff, students, neighbors
  - Register property with native plantings, calm neighbors
  - Would welcome destination model
- Millersville Signage and Other Signage
  - Organizing buy-in at Millersville
  - Need to smooth over INDOT issues for gateway between Millersville and Lawrence
  - ROW-wide signage awaiting consistent weather
- All present approve above Work Plan items for 2020

Conclusion: Committee approves work plan items as follows: Watershed Management Plan, Rev Charles Williams Park, Fall Creek (invasive) Strike Force, Ancho Institutions and Green Infrastructure, and Signage.

CONCLUSIONS
Committee supports Land Stewardship's application for funds to maintain Barton Park with native plantings.
Committee approves work plan items as follows: Watershed Management Plan, Rev Charles Williams Park, Fall Creek (invasive) Strike Force, Anchor Institution and Green Infrastructure, and Signage.

ACTION ITEMS	PERSON RESPONSIBLE	DUE DATE

Submission of Barton Park proposal	**Jacob, ROW Staff**	ASAP
Continuing conversations with Ivy Tech and other area partners on green infrastructure possibilities	**Committee Leadership**	Ongoing
Explore community outreach/education opportunities to support above	**Bri**	Ongoing

OTHER	

- Property at 56th Street
  - Looking into how to acquire and convert to conservation area
  - Marion County Soil and Water Conservation District can acquire property
  - 319 funds cannot be used for acquiring property

ROW Fall Creek Meeting Minutes

Conference Call
4:30-5:30 PM
3/19/2020

NOTE TAKER	Bri Dines
ATTENDEES	Chris Corr, Keith Cruz, John Hazlett, Nathan Smurden, Kevin Senninger, Julie Rhodes, Christin Shafer, Doug Day, Robert Caldwell
NEXT MEETING	Thursday, April 16th from 4:30-5:30 PM Join Google Hangouts Meet: https://meet.google.com/efg-bibn-adj +1 260-296-0050 PIN: 423766574#

INTRODUCTIONS	

DISCUSSION/ PRESENTATION	**Work Plan Updates**

- Rev Charles Williams Park
  - Master Plan from 2015 v. Developing Plan – must be basically same, details could be open
  - Why and how doing 13 acres instead of 7.5 acres?
  - Two different parcels of land - some cleared and other covered with vegetation
  - Not a lot of wiggle room within this round of funding; other amenities would be through fundraising/foundation
  - Details with Don Colvin and Andre Denman at next CWPAC meeting (March 31)

- Watershed Management Plan Update (WMP)
  - Updated watershed inventory: will webinar on this inventory that folks could attend and react to as deliverable
  - Met with Millersville about property trying to acquire at 56th St bridge
    - Yellow house in floodplain very problematic over the years; Going up for tax sale
    - Could convert to natural wetland space, manage invasive and plant natives that can have wet feet
  - Barton Park: Land Stewarship applying for ROW Seed Fund money for shrubs and small trees to put native materials in; MCSWCD has some funding for this as well to match with Groundwork Indy
  - New information including
    - Brain dump of stuff MCSWCD is aware of and City aware of that's changed, working on this document
    - Hamilton Co Health Dept, getting info on how many septics and plans to connect to new sewers
  - CSO trash nets
    - Company needed exact sizes and pictures of the CSOs and immediately after that, weather turned; Keith will follow up
    - Sites, just south of Monon; worthwhile to identify the worst of them as priotity
  - Green Infrastructure Partnerships
    - vy Tech, Children's Museum, State Fair - pick lead orgs that can show us the way or be leaders/early adopters
    - ***These partners need to be part of overall 319 application TOGETHER; can't have people go out apply by selves and we have institutions competing with each other - DEMONSTRATIONS to show off and encourage others***

- Fall Creek Strike Force
  - Keith and family going out as part of Site Stewardship with Land Stewardship
  - Didn't want to get fatigue over April with KIB events, but now with COVID19 and distancing…
  - Plan for small outing (distanced) to help beautify the area for mid-May
  - Fall Creek and College and 30th and Fall Creek areas as priorities

Conclusion: City will update Charles Williams Park efforts at the next Council meeting March 31st. Watershed Management Plan Update moves forward with online engagement and direct conversations with stakeholders. KEY: All partners need to come together for one application for 319 funding. Fall Creek Strike Force begins with mid-May social distancing cleanup.

DISCUSSION/ PRESENTATION	**Upper Fall Creek Watershed Conservation Efforts (Christin Shafer)**

- Upper Fall Creek watershed conservation
  - Same problems, but more spread out
  - Homes on septic and flooding, direct flow straight into Geist reservoir
  - Starting at the bottom of watershed because that's where we have human resources and financial resources
  - WMP needs updated as well; reaching out to company that did plan previously and get estimate from them
  - Trying to get base group on this established
  - One parent reprieve during social distancing is going to the park with trash bag and picking up trash
  - Don't have a clear overarching structure in place yet
  - Lower and Upper split because focus on CSOs v Geist and above issues

Conclusion: Upper Fall Creek communities are also beginning to organize for updating their plan including key issues like septic systems.

DISCUSSION/ PRESENTATION	**Fall Creek Infrastructure Updates**

- Ripping up Monon and rails, for renovating and widening

- Trails connecting and extensions beginning
- Fall Creek Trail Phase 1 had to be rebid, came in too high; don't know what outcome is yet; Gretchen said would start do some initial clearing for that regardless
- Still want to get started this summer; Kevin will send some more info if he can find it; back on board and making progress

Conclusion: Many construction projects still moving forward at time of this call during social distancing, including Monon work and Fall Creek Trail preparation for main construction work.

CONCLUSIONS
City will update Charles Williams Park efforts at the next Council meeting March 31st. Watershed Management Plan Update moves forward with online engagement and direct conversations with stakeholders. KEY: All partners need to come together for one application for 319 funding. Fall Creek Strike Force begins with mid-May social distancing cleanup.
Upper Fall Creek communities are also beginning to organize for updating their plan including key issues like septic systems.
Many construction projects still moving forward at time of this call during social distancing, including Monon work and Fall Creek Trail preparation for main construction work.

ACTION ITEMS	PERSON RESPONSIBLE	DUE DATE
CWP updates call	**Robert, Bri, Doug**	March 31
Set date and location for first Fall Creek Strike force efforts	**Keith, Chris**	ASAP
Change meeting Google info for next meeting	**Bri**	ASAP

OTHER
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ROW Fall Creek Meeting Minutes

Conference Call
4:30-5:30 PM
4/16/2020

NOTE TAKER	Bri Dines
ATTENDEES	Doug Day, Amy Hammes, Chris Corr, Keith Cruz, John Hazlett, Julie Rhodes, Kevin Senninger, Melinda Hall
NEXT MEETING	Thursday, May 21 from 4:30-5:30 PM at Virtual

INTRODUCTIONS	

DISCUSSION/ PRESENTATION	**Watershed Management Plan Update**

- Current Work
  - Summarizing perceived issues
  - Table with specific locations corresponding to water quality issues
  - Classify feedback verbally and include post-it exercise
  - Identifying areas that should continue to be protected, should be newly protected, and potential partnerships for implementation of water quality improvements
- Interesting Data
  - Some holes in graphics and additional info that's out there that we know we need to bring in
  - Marion County Public Health sent huge database of septic repair permits that had been pulled going back to 2006
    - Ten years ,925 permits pulled for repair, 916 were in our watershed
    - Tells you that E Coli is not just a CSO issue but a septic issue
    - These are just the ones people have decided to do something about, which means there are many more
    - Tried to get similar data from HamCo but ran into a brick wall, but Heather has relationship to pull that
  - Much septic repairs needed on Mud Creek and Fall Creek
  - 58% of land in Marion in watershed is considered flood hazard area, floodway and floodway fringe; sounds high, but stats say 20% of Marion is floodway
  - Old Indy map GIS system could overlay flood areas
  - Will check this to confirm
- Questions/Comments
  - Any community plans for the listed protection areas?
  - We definitely want to replant to maintain existing projects
  - Yellow House? - nothing else at this time since we last met
    - Looking into environmental solutions as a conservation property or GI infrastructure
    - At a standstill because of COVID19, need to connect more with Land Stewardship on this, too
  - IU Health and Plans for Redevelopment Connection?
    - Early in the process as far as what they are presenting publicly, and larger health district they are working on
    - Kevin can serve as intermediary to have that conversation and how redevelopment affects the watershed
    - Low=impact development and GI concepts for them, work on these conceptually
- Outreach
  - Haven't had much luck with Mayor's office and MNAs to get with neighborhood association folks, hope was to be a part of those meetings and doing quick show about the project to elicit feedback
  - Kevin can get MNA for Meridian-Highland and Crown Hill
  - Many not meeting at all at this time
  - NextDoor - good way to get the word out
  - Our own neighborhood listservs, Facebook pages
  - Concern is that the document is highly technical, and needs to be presented in a more accessible way
  - Distill report/summary as we did with fact sheet on Canva
  - Landing page on MCSWCD
- TImeline
  - New solicitation out for awards in fiscal 2021; June would submit LOI, September would submit the implementation app
  - Correction on above stat about floodplain area needed

Conclusion: Watershed Plan Update moves on with gathering more priority areas and important water quality data, with stepped up outreach via digital channels due to COVID. Committee can help by providing John with contacts and neighborhood distribution list access. ROW Staff will work toward an outreach piece that will help translate the technical issues.

Discussion/ Presentation	**Millersville Signage**

- Putting three of these signs up, at, three different sites - triangulates the area
- Natural base, collapsible facade, concrete dyed limestone color
- Economic development began with the grist mills on Fall Creek; seeking to dor further reative placemaking and celebration as destination for business and along waterway
- Funding very close! $3000 from ROW to put us very near completion $16,000 -
- Missing the hawk from the Preserve sculpture, talking with the artist to see if possible to get a replacement, maybe replacement out of different material that's less valuable for theft

Conclusion: Millersville signage is now being implemented! Also working to repair the Nature Preserve sculpture that was stolen/vandalized.

Discussion/ Presentation	**Charles Williams Park**

- Leadership of CWP has decided that they need another $2 million to build this park
- Meeting weekly to figure out how to do that
- What's basis of $2 million dollar number? - based on ideal amenities and nature center

Conclusion: Charles Williams Park efforts continue at the Advisory Council group.

Discussion/ Presentation	**Fall Creek (Invasive) Strike Force**

- Cleared a lot of honeysuckle along Fall Creek at 30th area; .25 acres removed!
- What'd you do with the brush, it's over to the left
- Land Stewardship staff suggests leaving brush as habitat
- Extend invitation and go out on a Sunday or could do some trash pickups, distanced
- Areas that we've already delineated - could add to Honeysuckle Hackathon content creating with others

Conclusion: Keith has cleared/is leading clearing of invasives at 30th Park area and can combine these images and efforts with other waterway members doing similar things to share to network.

Conclusions	

Watershed Plan Update moves on with gathering more priority areas and important water quality data, with stepped up outreach via digital channels due to COVID. Committee can help by providing John with contacts and neighborhood distribution list access. ROW Staff will work toward an outreach piece that will help translate the technical issues.

Millersville signage is now being implemented! Also working to repair the Nature Preserve sculpture that was stolen/vandalized.

Charles Williams Park efforts continue at the Advisory Council group.

Keith has cleared/is leading clearing of invasives at 30th Park area and can combine these images and efforts with other waterway members doing similar things to share to network.

Other	

-

5/21/20 Lower Fall Creek WMP Update-Meeting #2 Steering Committee Minutes (virtual meeting)

1. Welcome Attendees

Meeting Attendees:

John Hazlett-Marion County SWCD

Heather Buck-Christopher Burke Engineering

Julie Rhodes-ROW

Bri Dines-ROW

Keith Cruz-ROW Waterway Fall Creek Co chair

Chris Coor-ROW Watewray Fall Creek Co Char

Doug Day-ROW Fall Creek Liason

Jason Dearman-Greater Allisonville Community Council, Inc. (GACC)

Mo McReynolds-GACC

Matt Frigo-Devonshire Residential Association

Melinda Hall-Millersville Fall Creek Valley, Inc.

Amy Hammes-Millersville Fall Creek Valley, Inc.

2. Revised Schedule

- note LOI due to IDEM 6/1

3. Brief Review of WMP Update Reasoning and Approach

- Julie Rhodes discussed important of reaching citizens/engagement with neighborhoods during the time of COVID crisis
- John Hazlett noted a neighborhood roster for the project has been developed and that 12 neighborhood associations within Lower Fall Creek watershed were notified of this meeting

4. Watershed Concerns/Problems/Causes

- Matt Frigo-in Devonshire III/IV there are swales which were originally put in when neighborhood was developed. In general there is poor drainage in these areas, so is this plan update focused on improving water quantity or water quality? Heather clarified it is water quality, but that often times improvements like green infrastructure can also address quantity at the same time.
- Doug Day-how much green infrastructure is needed to reduce CSOs to zero? John Hazlett-some modeling was done with the City's 2009 GI Master Plan but the scale is vast to completely address CSOs to Fall Creek as there are 30 outfalls in the combined

area, and still *E. coli* issues associated with failing septics upstream of the combined area. John will provide modeling info from GI Master Plan to give idea of how much GI it would take.

- Mo McReynolds-have there been any updates to the STEP (Septic Tank Elimination Program) since 2019? John-a list of projects that have been implemented has been obtained from CEG and will be included in the WMP update. Mo also recommended we add residential property chemical list to the watershed concerns.

5. Watershed Critical Areas

6. Next Steps

- John/Bri to create outreach fact sheet and survey to help inform water quality concerns and help define critical areas for discussion at next meeting. This information will also incorporate the table of concerns developed from the February steering committee meeting.
- Melinda Hall-would like to reach out to Brendonwood, Windridge, Mallard Lake

7. Next Meeting

- 6/18/20

ROW Fall Creek Meeting Minutes

30th and Fall Creek Parkway/Virtual
6/18/20
4:30-3:30 PM

Note taker	Bri Dines
Attendees	Keith Cruz, Chris Corr (and daughters), Nathan Smurden, Coach Greg Harger, Kevin Senninger, John Hazlett, Doug Day
Next Meeting	July 23rd 4:30-5:30 PM; Marshal Major Taylor Sign at Fall Creek and Monon/Virtual

Introductions	

Discussion/ Presentation	**Work Plan Items**

- Watershed Management Plan Update
  - Christopher Burke continuing to look at data
  - Nutrient loading has decreased a bit
    - Lawn fertilizer less? Most likely using more natural methods
    - E. coli continues to be a major issue
  - Survey
    - 11 questions based on feedback thus far and needed input
    - Get out to folks ASAP
    - Please look at roster again to add folks, 25 neighborhoods
    - Use responses to draft critical areas
  - Next Steps
    - July meeting
    - August walking tour of new trails and draft update
    - LOI submitted high level for GI package

- Hackberry Canoe Race
  - White River, Fall Creek, and Canal working together on event, with legacy rustic trail connection and clearing
  - Route
    - From here to fire station to white river state park/Uwt
    - Quarter mile loop portage trail going by enormous hackberry tree
    - A bit over six miles, unique for a canoe race with portage, weight
  - Legacy
    - Trail building by GWI and programming is legacy
    - At fire station will have med/refreshment stations
  - Timeline: Late August/Early September
    - Future alignment with A Rising Tide and/or July Fourth Bridge Part on White River
  - Rough Budget: $1200 - 1500 with matching from Groundwork Indy in-kind and Friends of White River
    - Event fund split between all three waterways
    - Even if race doesn't happen, still can do all the other activities
  - Next Steps: submit application and waivers for liability (water pollution, etc)

Action items	Person responsible	Due Date
Review survey questions and feedback	**All**	Early next week (by Wed)
Create visual to send with survey and for general outreach	**Bri**	ASAP
Draft waiver and grant application for Canoe Race	**Keith**	ASAP

Other	

-

7/29/20 Lower Fall Creek WMP Update- Steering Committee Minutes (virtual meeting)

1. Welcome Attendees

Meeting Attendees:

John Hazlett-Marion County SWCD

Heather Buck-Christopher Burke Engineering

Julie Rhodes-ROW

Bri Dines-ROW

Keith Cruz-ROW Waterway Fall Creek Co chair

Chris Coor-ROW Watewray Fall Creek Co Char

Doug Day-ROW Fall Creek Liason

Sharon Barclay-Brendonwood

Jim Wolf-Lake Charlevoix

2. Watershed Highlights (John Hazlett)

- John provided an overall overview of the LFC watershed and pointed out key findings from the survey (Q=73) to date:
    - Most respondents live near a lake or stream but don't think their neighorhood is impacted by poor water quality
    - Over 50% of respondents were willing to implement green infrastructure to help improve water quality
    - More than half saw sediment/nutrients as a water quality problem, but more than half indicated "I don't know" with regard to *E. coli*
    - Over half of the respondents indicated CSOs are a major problem despite the knowledge gap regarding *E. coli*

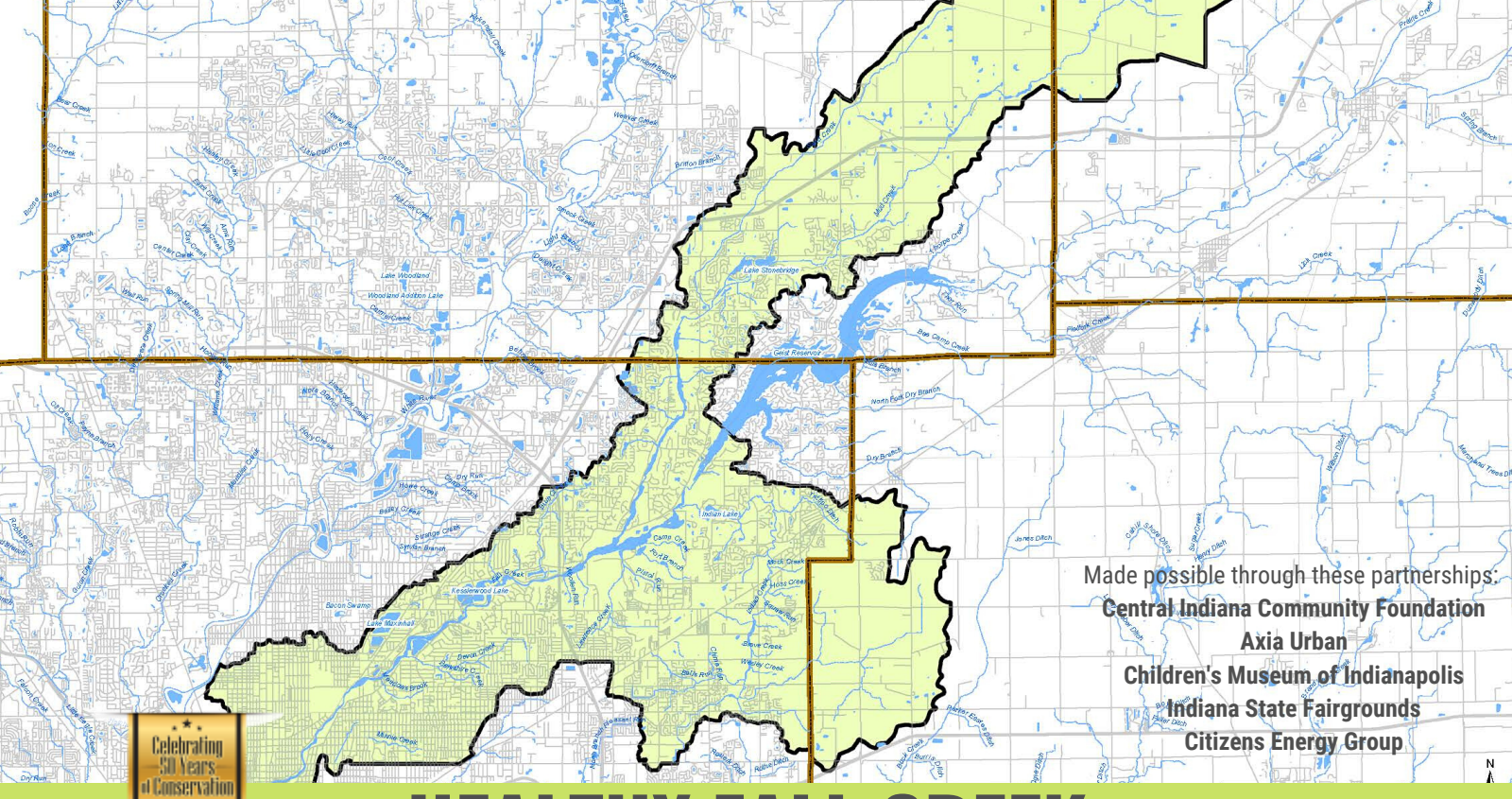
3. Review of interactive watershed map (Heather Buck)-demonstration on how the map will utilized to indicate water quality concerns and confirm old critical areas as well as identify new ones.

4. Watershed Concerns/Problems/Causes

- Sharon Barclay-indicated invasives is a major issue in Brendonwood area and that their goal is to be able to see the creek again. In particular Japanese Knotweed has been prevalent.
- Jim Wolf-Lake Charlevoix is SW of Skiles Test Nature Park. Their lake is getting sediment from Blue Creek that is filling in the east end of the lake.
- Both of the above issues were added to the interactive map.

5. Next Meeting

- To be planned for August-walking tour in Millersville



Made possible through these partnerships:
Central Indiana Community Foundation
Axia Urban
Children's Museum of Indianapolis
Indiana State Fairgrounds
Citizens Energy Group

Celebrating 50 Years of Conservation
MARION COUNTY SOIL AND WATER CONSERVATION DISTRICT

HEALTHY FALL CREEK, HEALTHY COMMUNITIES

ROW RECONNECTING TO OUR WATERWAYS

More than HALF of the Lower Fall Creek Watershed (an area where water drains to a common body) is in Marion County and includes many diverse neighborhoods. Updating the plan for this area means better opportunities to improve water quality, improving the health of our city, communities, friends, and family.

90 square miles of **watershed**
everything that happens in a watershed affects everyone who lives in that watershed

25% is a source of **local drinking water**

28 Combined **Sewer** Overflows (CSOs)
where raw sewage (what comes from our toilets) and stormwater drains to our waterways

Nutrients, such as nitrogen and phosphate, are routinely below Indiana developed water quality standards

E. coli levels are regularly higher than the Indiana water quality standards

YOUR WATERWAY

WHAT CAUSES POOR WATER QUALITY?

HEALTH CONCERNS

Harmful bacteria like E. Coli from pet, human, and other animal **waste**

Extra nutrients like nitrogen and phosphorous that come from **fertilizers**

Too much **dirt** from eroding banks and other destablized sites

HOW CAN WE PROTECT OUR HEALTH BY PROTECTING OUR WATERWAY?

Create **green infrastructure** demonstration projects at community institutions like schools that directly improve water quality, absorb and filter rainwater and recharge our groundwater supply

Green infrastructure includes practices like:
- **rain gardens** with native, deep-rooted plants;
- **permeable pavers**; and
- **rain barrels** to capture and reuse stormwater.

A CLEANER WATERWAY

DETERMINE THE FUTURE OF YOUR FALL CREEK

OUR FUTURE

You can help! Take the survey and help us identify areas where you see problems or special areas to improve at www.surveymonkey.com/r/fallcreekplan!

Attend a Lower Fall Creek Watershed **Planning Session** (virtually or in-person) by heading to ourwaterways.org/events

Contact project leader John Hazlett at john-hazlett@iaswcd.org

APPENDIX 3 Outreach Efforts

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August 2020 article in *Urban Times*

You can help determine the future of Fall Creek

By **BRIANNA DINES**
Waterways and communications coordinator

More than HALF of the Lower Fall Creek Watershed (an rea where water drains to a common body) is in Marion County, and includes many diverse neighborhoods. ROW officials point out tpdating this plan for the area means better opportunities to improve water quality, improving the health of the city, communities, friends and family.

90 square miles of watershed

25% is a source of local drinking water

28 combined sewer overflows

RECONNECTING to Our Waterways invites neighbors, businesses and institutions along Fall Creek to engage in a unique opportunity to learn about and inform decisions for the future of this important waterway.

Efforts are under way to help improve water quality and demonstrate innovative, natural approaches to our urban environments and you can play an integral part in stewarding our waterway future.

The Marion County Soil and Water Conservation District is working now to update the *Lower Fall Creek Watershed Management Plan* which will

- ☐ Identify key areas of concern and opportunity.
- ☐ Prioritize projects and areas that communities want for their waterway neighborhoods.
- ☐ Allow interested folks to come together to bring funding to those critical areas.

Lower Fall Creek begins its journey through Marion County flowing from Geist Reservoir and winds through areas such as Lawrence, Millersville, Mapleton-Fall Creek, Watson-McCord, Crosstown, Fall Creek Place and many other neighborhoods along the way.

While this waterway physically connects diverse neighborhoods, its contours have also traced division and divestment in downstream Black and Brown communities – many of those same neighborhoods bearing the brunt of stormwater runoff from upstream sources (yard and farm chemicals, industrial pollution) and raw sewage from the Combined Sewer Overflow (CSO) system in which what is flushed from our homes flows directly into our waterways.

Fall Creek's African American residents began a fight 20 years ago that led to the current Citizens Energy Group DigIndy project to mitigate CSO pollution. This $2 billion infrastructure project will improve all of Indy's water quality by addressing some of the long-standing environmental justice challenges for the most negatively impacted areas. The investment can dramatically improve quality of life for everyone in our city, but there is still more to do.

What determines water quality? Everything we do in our watershed, an area in which water flows to a common body, and our built environments affect the quality of our water. In a sense, everyone in the Fall Creek watershed lives on waterfront property.

Some of the key contributions to poor water quality include:

- ☐ E. Coli, a bacteria that comes from human, livestock, and pet waste flowing into our waterways through CSOs or from stormwater runoff carrying waste into the waterways.
- ☐ Nutrients, which sounds like a good thing, but too much of common fertilizer elements like phosphorous and nitrogen create excess algae and plant growth that clog up the waterway and decrease oxygen and light available for other important life.
- ☐ Sediment (soil, dirt) that washes into our water from construction sites, eroding banks, or other areas also prevents the right amount of oxygen and light for a healthy waterway ecosystem.

When our waterways are polluted, we pay more in water treatment, the stench invades our communities, and we avoid beautiful outdoor spaces rather than enjoy them together.

Creating a plan for the Fall Creek watershed. The current state of Fall Creek is a mixed bag. Nutrient loads are most often lower than standards require – a good thing - they don't contribute as much to poor water quality. However, throughout the 90 square miles that make up the watershed, there are 28 CSOs currently operating in Marion County, and E. Coli rates are routinely higher than the acceptable waterway quality standard.

Some critical areas that have been identified so far include Barton Park area, where ROW is helping partner City of Indianapolis Land Stewardship to remove invasive plants and restore native landscapes that filter stormwater and absorb water, preventing harmful runoff and creating a beautiful waterway space for neighbors. Residents have also identified opportunities to protect and maintain rain gardens in the Central Avenue/30th Street area and Millersville Nature Preserve. And, Crosstown neighborhood's Reverend Charles Williams Park, soon to be developed with playground and other amenities, is another identified site where neighbors want to include water quality improvements. Trails, schools, and other historically and culturally significant areas are also important places to consider demonstration projects.

What are your priorities? Fall Creek is your waterway and we want to know what your priorities are to improve water quality in your community. Start by taking a five-minute survey to let us know what you think. Go to www.surveymonkey.com/r/fallcreekplan. Then, join us online from 4:30 to 5:30 p.m. Thursday, July 30, by registering at fallcreekplan.eventbrite.com for an interactive planning session to give voice to your concerns and the places you want to improve and protect for current and future generations. Finally, get even more involved and help make decisions about projects and programs along Fall Creek or another waterway near you by attending an upcoming ROW Waterway Committee meeting. Get connected by visiting ourwaterways.org/events or contacting info@ourwaterways.org. ■

Stay in the know with ROW at ourwaterways.org and on Facebook, Twitter, and Instagram @ourwaterways.

Celebrating 50 Years of Conservation
MARION COUNTY SOIL AND WATER CONSERVATION DISTRICT

Conservation in the Neighborhood

VOL. 41, NO. 2 SPRING, 2020

INSIDE THIS ISSUE:

SWCD Wins NACD Native Plant Grant

The Marion County SWCD was one of 21 conservation districts across 13 states to receive funding through a partnership with the National Association of Conservation Districts and the USDA Natural Resources Conservation Service. The SWCD won a $50,000 grant 2020 Urban Agriculture Grant, designed to help conservation districts provide technical assistance for agriculture conservation in developed or predominately developing areas.

Native plants provide critical habitat to beneficial insects & pollinators.

Through this project, the SWCD will explore the potential of native plantings, hedgerows, and polycultures on urban farms to provide perennial food and medicinal products, valuable ecosystem services including biodiversity, and critical habitat for beneficial insects and pollinators.

Key components of the grant includes staff training, educational workshops and trainings, and the establishment of native perennial habitat at demonstration sites. This spring, the SWCD is working closely with Indy Urban Acres, a project of the Indianapolis Parks Foundation, to grow native herbaceous species and plant them in along with locally sourced trees and shrubs on their farm. American plum, chokecherry, dogwoods, elderberry, ninebark, northern pecan, and witch hazel are examples of the diversity of species we will be planting this year. The herbaceous list of forbs, grasses, and sedges is extensive, many of which are from our publication on Native Plantings that could benefit your own gardens. Don't forget to check out local plant sales this spring! (See page 6)

We recently made a YouTube video at Indy Urban Acres to introduce our 2020 Project: Native Plant Agriculture on Urban Farms!

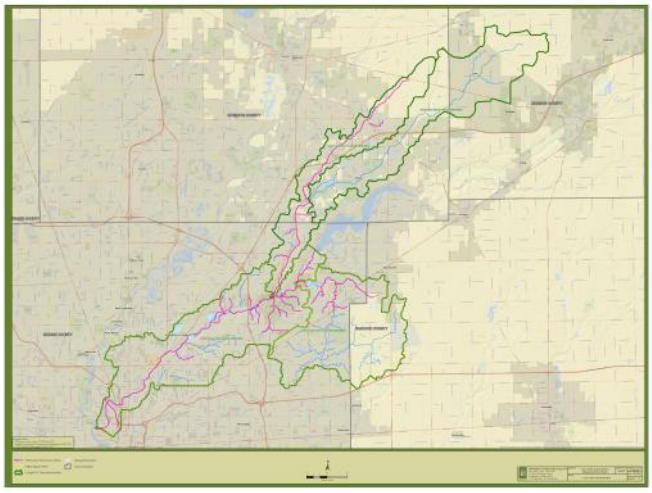
https://www.youtube.com/watch?v=lrK5NgnJZ5o&t=5s

Lower Fall Creek Watershed Management Plan Update

Streams in urban areas are especially impacted by pathogens, nutrients & sediment loading.

By John Hazlett, District Manager

In May 2009, the district utilized the services of local engineering firm Christopher Burke Engineering to complete a watershed management plan (WMP) for Lower Fall Creek , which drains approximately 90 square miles of rural, suburban and urban land in Central Indiana. Watershed management planning is a tool used since the late 1980s as a proven framework for improving local water quality through a series of steps to characterize existing waterway and watershed conditions, identify and prioritize problems and develop and implement strategies to address them. The plan includes portions of Madison, Hamilton, Hancock and Marion counties. The Marion County portion of the plan includes 18 miles of stream from 96th Street and Geist Reservoir downstream to the confluence of Fall Creek and White River in downtown Indianapolis, and 75% of this stretch is considered urbanized, presenting significant water quality challenges related to pathogens, nutrients and sediment loading.



The plan completed in 2009 doesn't meet the current US EPA watershed plan checklist, a requirement to receive funding prioritization for implementation funding via IDEM's competitive 319 grant program. Utilizing funding secured through a variety of philanthropic and private donations through Reconnecting to Our Waterways, Central Indiana Community Foundation, Axia Urban, the Children's Museum of Indianapolis and the Indiana State Fair Commission, the district has engaged Christopher Burke Engineering to assist with a plan update via five community meetings and technical analysis. Led by a waterway stakeholder group, these meetings and analysis will gather input on current water quality concerns, critical areas, recommended action items and potential locations for water quality projects.

Watch our website for future updates on this project.

Crowd Helps to Celebrate SWCD's 50th Annual Meeting

The District's 50th annual meeting was a fun filled, informative evening attended by a variety of residents representing the wide spectrum of nature resource management topic areas we serve.

Our guest speakers were Brad Beaubien, Director of Destination Development for Visit Indy, and Kevin Hardie, Executive Director for Friends of the White River. Brad presented an update on the White River Vision Plan and Kevin Hardie shared memories of the White River chemical discharge that occurred 20 years ago. The presentations followed staff updates and presentation of a Partner in Conservation award to Soil Health Outreach Specialist Elli Blaine. St. Albans was also honored with a River Friendly Farmer award.

Board elections were led by committee representative Brian Neilson, who conducted the election of supervisors whereby Scott Minor was elected for a three year term. The evening was capped off with a community dinner and hands on demonstration by NRCS Soil Health Specialist Stephanie McClain.

Thanks to our partners at government access Channel 16, who filmed the meeting which can be viewed here:

https://www.youtube.com/watch?v=XmF3TqnSeZk&feature=youtu.be

Annual Meeting attendees hear about White River improvements

Thank you Cheyenne!

After nearly three years serving the District as Urban Conservationist, Cheyenne Hoffa is taking a new position as Division Regulatory Compliance Administrator for Westport Homes/D.R. Horton where she will oversee their NPDES and OSHA compliance programs. We can't say enough about the outstanding job Cheyenne has done for our district and her incredibly positive attitude and contributions to the City of Indianapolis Rule 5 program. In 2018 and 2019 alone, Cheyenne conducted over 1,400 site inspections for erosion and sediment control and provided additional onsite technical assistance to 49 sites. We are sad to lose her, but look forward to watching her future success and will always consider her part of our district "family"!

Spring into Natural Lawn Care

Practicing ecological lawn care is good for people, pets & wildlife.

Bloodroot—a sure sign of spring!

What's your favorite early spring plant? Tell us on Facebook!

The grass is greening up and buds are breaking open everywhere! Spring is here!!! As our health is in the forefront of our minds it's a good time to consider how we take care of our own little pieces of nature – our lawns. Making small changes can yield big positive gains for our health and the health of our environment. This year take another step towards a healthier home & community by treating your lawn naturally. Here's how to start:

Spring Cleaning – Remove any leaves or debris left from last fall and add them to your composter to get a new batch of compost started. If you've not turned your compost over the winter, start turning it now to have it finish decomposing in time to use it for your vegetable and flower plantings.

Help areas recover from Snow Mold - Snow Mold Disease is caused by a fungus that is active during the winter months. It doesn't generally kill the grass but makes unsightly areas in the yard. It can be caused by a number of things including not mowing the grass short enough in the fall so it bends over, or from soil that holds a lot of moisture. The grass will recover on its own but you can help it with a little **light** raking, adding some compost and if severe, aeration.

Soil Testing – If you did not get your soil test done last fall, take samples and send them in this spring to help you adjust your fertilization plan for this summer and fall - add only what your lawn really needs! Adjust the pH of the soil as needed. Scroll down our website under the Lawn & Garden link for a listing of soil testing labs and instructions for how to take your samples.

Overseeding – spot seed bare or sparse areas now before weeds take over those spots. Seed, mulch and compost then water those areas as needed to sprout the seeds and give them a strong start.

Mowing – Bump your mower up a level. Keeping your lawn height higher will help to shade out weeds, improve your grass root structure, keep the soil cooler and reduce moisture loss. Keep your grass 2.5 – 4 inches tall (depending on type of grass) and only mow 1/3 of the blades' height at a time.

Core Cultivation & Compost Topdressing – Core Cultivation or Aeration helps to decrease thatch, improves water percolation and air movement through the soil. Spring is a great time to aerate and prepare your lawn for compost topdressing while the temperatures are still cool. Compost will add much needed organic matter and some nutrients to your soil. Compost can also help speed up decomposition of thatch. Add a ¼" layer of compost over the lawn and drag a mat or otherwise work the compost into the holes created with core aeration.

Corn Gluten and Herbicidal Soaps – Corn Gluten has been shown to be an effective natural herbicide, but it needs to be put on NOW, in early spring before the weed seeds have sprouted.

(Continued on page 5)

Invasives Highlight: Bull Thistle

Photos University of Georgia

The Bull Thistle is very spiny and is a common plant that occurs in most Indiana counties. It is a biennial, forming a rosette in the first year and an erect branched blooming stem in the second year. This thistle is from Eurasia, and it has existed in the United States since the 19th century, if not earlier. Habitats include pastures, abandoned fields, fence rows, lawns, golf courses, areas along roadsides and railroads, cut-over woods, and miscellaneous waste areas. This species prefers disturbed areas and it is not common in high quality natural areas. A good control technique is a foliar spray on the first year rosettes of triclopyr plus 2,4-D in the late fall or in the early spring before flower stalk formation.

More information on invasive species identification and control can be found on our website:

https://marionswcd.org/invasive-species/

First year's growth

Fluffy Seed head

(Continued from page 4)

Don't use it if you plan to overseed this spring because it works to kill young seedlings. Corn Gluten application can be a little tricky to time. It needs watering the day you put it on, then needs 2-3 days of dry weather. If it rains, it will decrease the effectiveness. You will need to treat your lawn for 3 years in order to obtain 90% weed control.

Herbicidal soaps are also used with success on small annual and biennial weeds. They don't work well on perennial weeds with extensive root systems. They will kill desirable plants as well as weeds so use it carefully.

Other tools for weed management for the natural lawn may include manual removal, flame weeders, hot water weeders, flameless radiant heaters, and soil solarization for large weedy areas.

Check your sprinkler system – make sure your sprinkler system is functioning properly, not wasting water by watering the driveway or street and setting the timer so it only comes on as needed. Adjust timing so that it isn't needlessly watering when we've had enough rain.

Check out our website for more information:

https://marionswcd.org/lawn-and-garden/

Protecting the Peepers

Can you hear them? One of the earliest signs of spring is the song of the spring peepers! We love hearing their happy little chirps but they are shy and rarely seen. In many areas frog populations are declining. This is disturbing because amphibians are good indicators of ecological health. Their eggs and skin are highly absorbable so that they can absorb water and oxygen. Unfortunately they can also easily absorb pollutants.

Controlling soil erosion is a proactive way to protect water quality and amphibian habitat. Soil is our #1 pollutant by volume and soil also is a carrier for other pollutants. The SWCD is involved in helping landowners control erosion by offering technical assistance and helping monitor erosion on construction sites.

You can help by becoming a SWCD Affiliate Member. See page 7 for more information or click HERE to donate. Thank you!

Spring 2020 Native Plant Sales

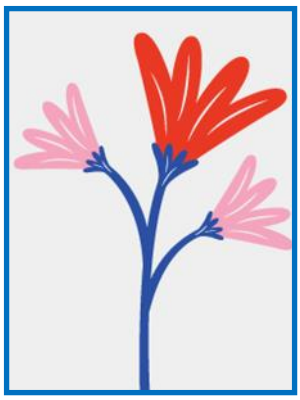
Support Pollinating & beneficial insects.

Beautify your farm, garden & yard.

SALE DATES & LOCATIONS

Hamilton County SWCD	April 17th Deadline to order online
Indy Urban Acres	April 19th Deadline to order online In person sales April 25-May 17
Nina Mason Pulliam EcoLab	April 1st — April 30th Online only
Native Plants Unlimited	May 1st— May 17th Sale Details
Indiana Native Plant Society's Native Plant Sale & Auction	May 9th Sale Details
Friends of Mounds State Park (DNR)	May 9th Sale Details
Hamilton County Master Gardeners Plant Sale	May 16th Sale Details
Indiana Wildlife Federation	Mostly fall sale— Online only

Kick off the warmer months with your purchase of local native plants.



Other nurseries with native stock can be found HERE.

MARION COUNTY
SOIL AND WATER
CONSERVATION DISTRICT

1200 S. Madison Ave., Suite 200
Indianapolis, IN 46225

Phone: 317-786-1776
Find us on the web: www.marionswcd.org

The Mission of the Marion County Soil & Water Conservation District is to assist Marion County land users in conserving soil, water, and related natural resources by providing technical, financial and educational services.

**** PLEASE NOTE****

Due to the current COVID 19 crisis our office is temporarily closed and staff is working remotely. Use the "Contact Us" tab on our website to leave a message & we will get back with you as soon as possible.

Please Join our Team!

Join our Conservation Team to benefit Marion County! Donate to become an Affiliate Member.

What is a SWCD Affiliate Member? Affiliate members are individuals, groups or organizations who choose to financially support the work of the Marion County Soil and Water Conservation District. These funds are vitally needed to sustain and enhance the work we do for our county.

What are the Affiliate Membership funds used for? Gifts from affiliate members are used to continue services provided to county residents including consultation in land use, erosion control and drainage problems. For many of our lower income residents, it is not financially possible to hire private engineering and consulting firms to design and install drainage and erosion control practices on their property. In many instances our office can provide simple, do it yourself suggestions that will alleviate or minimize their problems. No other agency is able to do this for individuals and small neighborhood groups.

Funding is needed to help continue erosion control inspections which are a critical part of improving and protecting water quality in the county. New construction, without proper erosion control can release literally tons of sediment into our waterways each year. Sedimentation clogs drainage ways, is a carrier for pollutants and is detrimental to fish and other aquatic life.

The District is also strongly involved in education of soil health principles which improve the nutrition of locally grown food. We provide technical assistance to landowners and small farmers and hold a number of educational workshops during the year.

In addition, the SWCD is active in promoting wise land use and improvements in water quality through their other educational programs, workshops and publications. Education is key to long term progress in soil and water quality and has always been a high priority for this District.

To become an affiliate member visit our website link HERE. **We now accept PayPal for your convenience!**

Follow us on Facebook!

SWCD Staff

John Hazlett,
District Manager

Kevin Allison,
Urban Soil Health
Specialist

Cheyenne Hoffa,
Urban
Conservationist

Julie Farr,
Resource
Conservationist, PT

Eliana Blaine,
Soil Health, PT

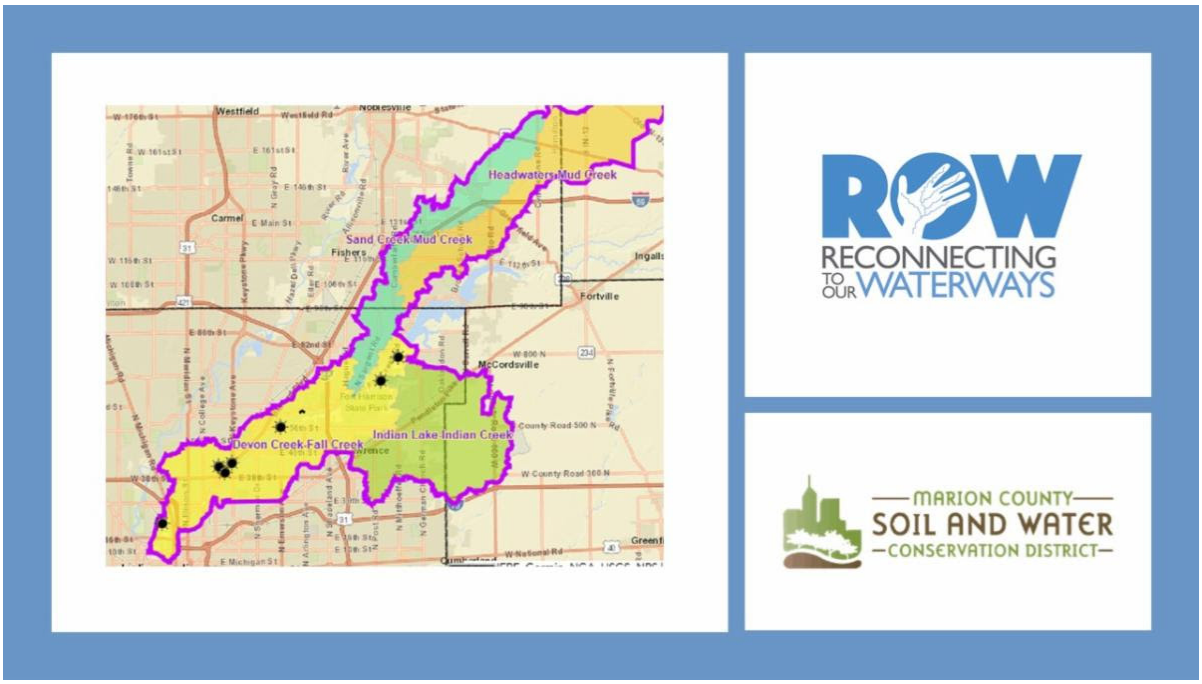
Jerod Chew,
NRCS District
Conservationist

John Hazlett <john-hazlett@iaswcd.org>

DEADLINE APPROACHING

4 messages

Millersville at Fall Creek Valley <dr.schau.hammes@gmail.com> Tue, Aug 11, 2020 at 5:55 PM
Reply-To: millersvilleboard@gmail.com
To: john-hazlett@iaswcd.org



Do your part to protect the future of Fall Creek!

We are helping to gather vital information for the **Lower Fall Creek Watershed Management Plan Update.** *Reconnecting to Our Waterways (ROW)*, the *Marion County Soil & Water Conservation District* and *Christopher Burke Engineering* are teaming up to offer several important tools so residents can voice their concerns for the waterway:

- An **easy-to-use mapping** tool to allow you and your neighbors the ability to identify key areas of interest and concern within the watershed -
- A **step-by-step guide** can be found on ROW's Fall Creek page to make it even easier to use the mapping tool linked above -
- And a short **survey** to collect your input!

DEADLINE FOR COMPLETING THIS INFORMATION IS SUNDAY AUGUST 16.

Questions? Contact John Hazlett

John Hazlett <john-hazlett@iaswcd.org> Tue, Aug 11, 2020 at 5:59 PM
To: Heather Buck <hbuck@cbbel-in.com>

A nice little push from Millersville!
[Quoted text hidden]
--
John Hazlett
District Manager-Marion County Soil and Water Conservation District
john-hazlett@iaswcd.org
1200 S. Madison Ave-Suite 200
Indianapolis, IN 46225
317.786.1776
marionswcd.org/connect/

John Hazlett <john-hazlett@iaswcd.org> Tue, Aug 11, 2020 at 6:15 PM
To: Julie Rhodes <director@ourwaterways.org>

I had Millersville push this out as well, 600 plus distribution list

---------- Forwarded message ---------
From: **Millersville at Fall Creek Valley** <dr.schau.hammes@gmail.com>
Date: Tue, Aug 11, 2020 at 5:55 PM
Subject: DEADLINE APPROACHING
To: <john-hazlett@iaswcd.org>

[Quoted text hidden]
[Quoted text hidden]

Julie L Rhodes, Collective Impact Director <director@ourwaterways.org> Tue, Aug 11, 2020 at 8:00 PM
To: John Hazlett <john-hazlett@iaswcd.org>

That looks great! Thrilled to see this. Thanks for sharing.

[Quoted text hidden]

--

Julie L Rhodes
Collective Impact Director
for Reconnecting to Our Waterways

RECONNECTING TO OUR WATERWAYS

Director@ourwaterways.org | 317-371-2788
http://ourwaterways.org

http://www.indianapolisrecorder.com/news/article_039bd11e-e3c4-11ea-b38c-3f831087af60.html

Fall Creek's future needs your input

By JULIE L RHODES
Aug 21, 2020

Fall Creek, which starts in Pendleton, flows through Geist Reservoir and Fort Harrison State Park before flowing into White River (shown here) (Photo/Tyler Fenwick)

ROW invites neighbors, businesses, and institutions along Fall Creek to engage in a unique opportunity to learn about and inform decisions for the future of this important waterway. Efforts are underway to help improve water quality and demonstrate innovative, natural approaches to our urban environments. You can play an integral part in stewarding this waterway future.

Marion County Soil and Water Conservation District,with ROW's Fall Creek committee, are working now to update the Lower Fall Creek Watershed Management Plan, which will:

- identify important areas of concern and opportunity;
- prioritize projects and areas that Fall Creek neighborhoods want most; and
- help secure future funding to make those project ideas a reality.

Some Background

Lower Fall Creek begins in Marion County from Geist Reservoir and winds through areas such as Lawrence, Millersville, Mapleton-Fall Creek, Watson-McCord, Crosstown, Fall Creek Place, and other neighborhoods along the way. This waterway physically connects diverse areas — many of which represent the Black and brown neighborhoods who have born the brunt of stormwater pollution from upstream sources (yard and farm chemicals, industrial pollution) and raw sewage from the combined sewer system. Years of neglect and pollution have resulted in long-term disinvestment in these neighborhoods.

Now, after 20 years of advocacy, the current Citizens Energy Group DigIndy project to mitigate CSO pollution is mid-way. This $2 billion infrastructure project will improve all of Indy's water quality by addressing some of the long-standing environmental justice challenges for the most negatively impacted areas. The investment is expected to dramatically improve quality of life for everyone in our city, but more work is needed.

Understanding Watersheds and Water Quality?

Everything we do in our Fall Creek watershed (all the land areas that drain to Fall Creek, then to the White River, and ultimately to the world's oceans) affect the quality of our water. Some of Fall Creek's main water quality concerns include:

- **E. Coli**, a bacteria that comes from human and animal waste (even from pet waste), when it gets into our waterways from combined sewer overflows (CSOs) or from stormwater running across yards, parks or livestock operations.
- **Nutrients** enters our waterways in excess when fertilizers run off from lawns and farms. Phosphorous and nitrogen can cause algae and plant growth that decreases the necessary oxygen and light for aquatic life.
- **Sediment** (soil, dirt) washes into our water from construction sites, streambank erosion and other areas. It can prevent adequate oxygen and light necessary for healthy aquatic life to thrive.

Have questions or want to get even more involved in the future of Fall Creek? Visit ourwaterways.org/events for upcoming meetings, or contact info@ourwaterways.org.

Stay in the know with ROW at ourwaterways.org and on Facebook, Twitter and Instagram @ourwaterways.

Julie L Rhodes, collective impact director, Reconnecting to Our Waterways (ROW).

All these sources of water pollution equate to higher costs to clean up our drinking water and reduce quality of plant, animal and human life along our waterways.

Planning for Fall Creek's Future

Currently the science tells us that Fall Creek has both challenges and opportunities. On the positive side, nutrient loads from fertilizers tend to be mostly lower than water quality standards require. At the same time, there are 28 CSOs currently operating in Marion County that lead to waterway quality frequently below standards.

There are already some positive improvements underway. The City of Indianapolis Land Stewardship is removing invasive plants and restoring native landscapes in Barton Park. The Central Avenue-30th Street area and Millersville Nature Preservehas been identified for long-term care and maintenance. Rev. Charles Williams Park, slated for installation of a new playground and other amenities, has also been recommended for water quality improvements by nearby Crosstown neighbors.

Your Input Matters

Fall Creek runs through many Indy neighborhoods and whether your concern is water quality, flooding, beautification or recreation, we need your thoughts now. Take this 5-minute survey to share your thoughts. An easy-to-use mapping tool has also been developed where you can mark a spot and tell us your concern or idea. The link provides access to both the mapping tool and a step-by-step guide.

Lower Fall Creek Watershed Management Plan Update - Critical Areas Survey

To improve water quality in your area, the Marion County Soil and Water Conservation District and Reconnecting to Our Waterways (ROW) are collaborating on an update of the 2009 Lower Fall Creek Watershed Management Plan (https://www.in.gov/idem/nps/3246.htm). More background information about the project is provided in the attached brochure. The planning effort includes Fall Creek downstream of the Geist Reservoir to the confluence with the White River downtown.

As a resident of the Fall Creek watershed, you can help with this effort by taking the short survey below, and input will be utilized to help identify water quality concerns and critical areas for the implementation of best management practices to improve Lower Fall Creek.

1. Do you live close to a lake or stream?
    a. I live on waterfront property.
    b. I live within a 1/4 mile of a lake or stream.
    c. I live within a 1/2 mile of a lake or stream.
    d. I live within 1 mile of a lake or stream.
    e. I live farther than 1 mile from a lake or stream.
    f. I don't know.
    g. Other (please specify)

2. Do you own or rent your home?
    a. Own
    b. Rent
    c. Other (please specify)

3. Do you think your neighborhood is impacted by poor water quality?
    a. Yes
    b. No

4. What is the source of your drinking water?
    a. Private property well.
    b. Municipal city water.
    c. I don't know.

5. Indicate your level of agreement/disagreement with the following statements:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. I feel an attachment to the Lower Fall Creek Watershed and want to improve it.					
b. How I care for my lawn/yard influences the water quality of Lower Fall Creek.					
c. I am willing to change my lawn/yard care practices to improve the water quality of Lower Fall Creek.					
d. I am willing to implement green infrastructure practices (i.e. rain gardens, rain barrels) on my property to help improve the water quality of Lower Fall Creek.					

6. My property has a gutter downspout that is directly connected to a stormwater system or combined sewer system.
    a. Yes
    b. No
    c. I don't know

7. How big of a problem do you think the following water pollutants and issues are in the Lower Fall Creek watershed?

	Not a Problem	A Slight Problem	A Moderate Problem	A Severe Problem	I Don't
a. Sediment/soil from eroding streambanks, construction sites and other sources					
b. Nutrients-nitrates, nitrogen, phosphate, phosphorus					
c. E. coli					
d. Trash and debris					
e. Invasive plants					
f. Flooding					

8. The following are potential sources of water pollutants. How big of a problem are the following sources in the Lower Fall Creek Watershed?

	Not a Problem	A Slight Problem	A Moderate Problem	A Severe Problem	I Don't
a. Soil erosion from construction sites					
b. Lawn fertilizers/pesticides					
c. Combined sewer overflows					
d. Failing septic systems					
e. Stormwater runoff					
f. Pet waste					
g. Littering/illegal dumping					
h. Floodplain development					
i. Failing retention ponds					
j. Illegally connected downspouts					

9. The practices below have the potential to improve the water quality of Lower Fall Creek. Indicate your willingness to consider implementing each practice on your own property.

	Yes	No	Maybe	Need More Information
a. Build a rain garden and/or use native plants/ landscaping				
b. Install a rain barrel				
c. Keep yard clippings and trash out of drainage ditches and storm drains				
d. Use phosphorus free lawn fertilizer or no fertilizer				
e. Properly dispose of household waste				
f. Implement streambank stabilization measures				

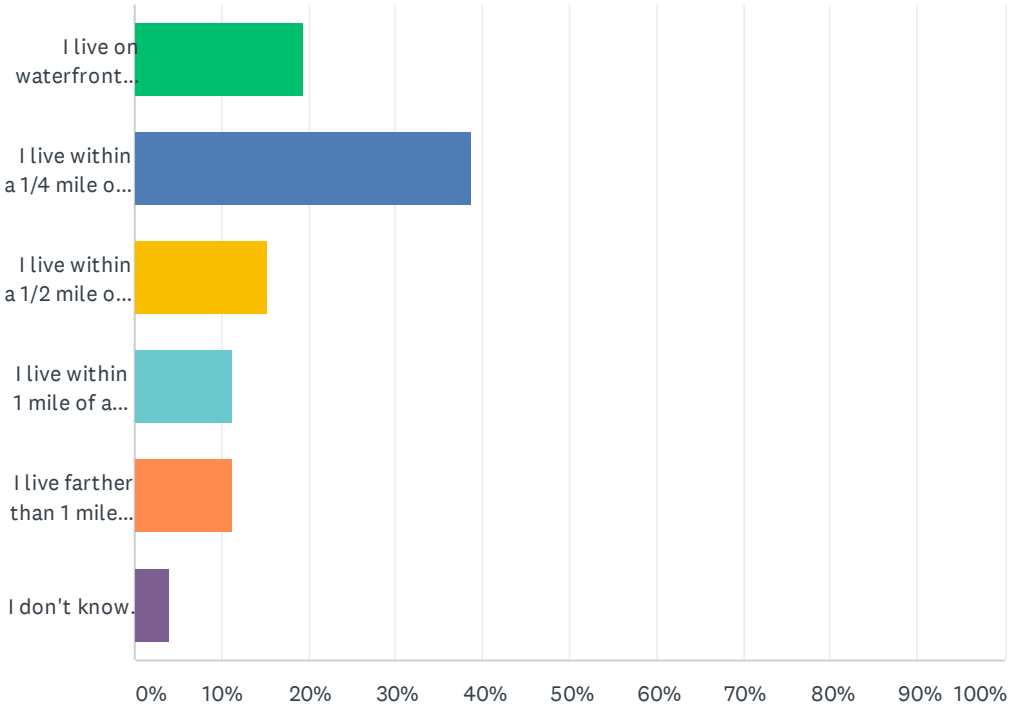
10. Green Infrastructure refers to stormwater management practices that mimic nature to treat stormwater where it lands and promote water infiltration back into the ground. Indicate your willingness to consider attending a free green infrastructure workshop to learn ways you can implement these practices on your property.
    a. I'd be very interested in attending.
    b. I'd need more information before deciding whether to attend.
    c. I wouldn't be interested in attending.

11. The following areas have been identified by Lower Fall Creek watershed residents as specific locations that should either be protected, enhanced, or explored further for future demonstration projects to address identified water quality problems. Please indicate if you support these locations and note any other specific locations you think should be included.
    a. Fall Creek Greenway rain gardens- Central Avenue to 30th St
    b. Barton Park
    c. Woolens Gardens
    d. Fort Benjamin Harrison
    e. Belzer Boy Scout Camp
    f. Millersville Nature Preserve
    g. Reverend Charles Williams Park
    h. Geist Dam downstream to the confluence of Mud Creek and Fall Creek
    i. Other (please specify)

12. What other general areas do you think should be included in potential project efforts?
    a. Culturally/historically significant areas (specify below)
    b. Trail locations
    c. Properties with improperly connected downspouts in the combined sewer areas
    d. Education institutions (specify below)
    e. Other (please specify)

Q1 Do you live close to a lake or stream?

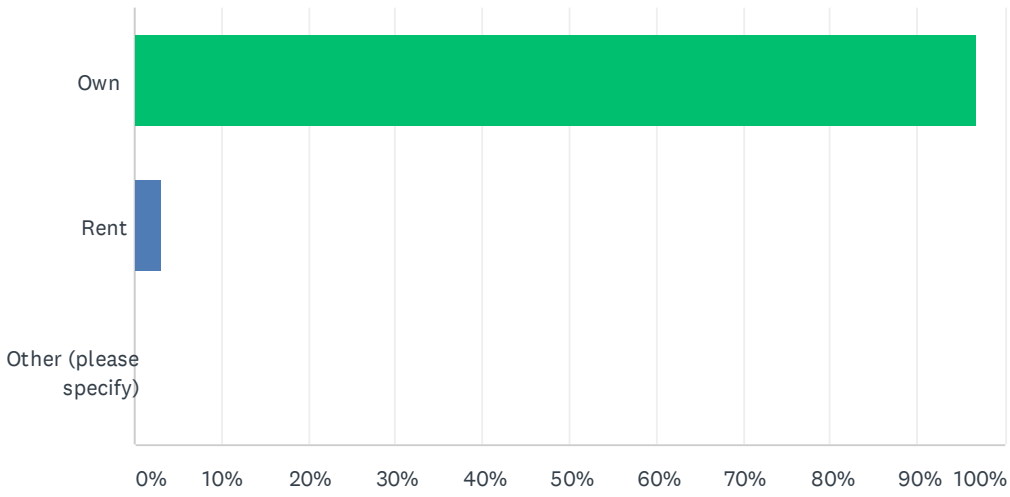
Answered: 124 Skipped: 0



ANSWER CHOICES	RESPONSES	
I live on waterfront property.	19.35%	24
I live within a 1/4 mile of a lake or stream.	38.71%	48
I live within a 1/2 mile of a lake or stream.	15.32%	19
I live within 1 mile of a lake or stream.	11.29%	14
I live farther than 1 mile from a lake or stream.	11.29%	14
I don't know.	4.03%	5
TOTAL		124

Q2 Do you own or rent your home?

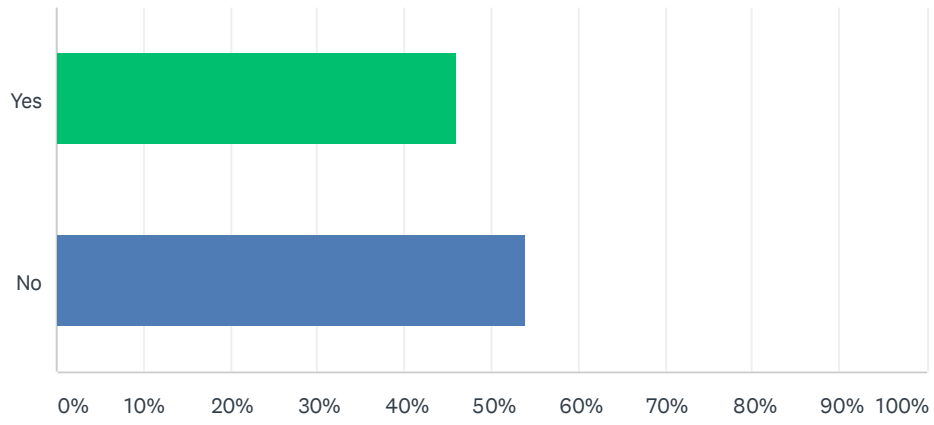
Answered: 124 Skipped: 0



ANSWER CHOICES	RESPONSES	
Own	96.77%	120
Rent	3.23%	4
Other (please specify)	0.00%	0
TOTAL		124

Q3 Do you think your neighborhood is impacted by poor water quality?

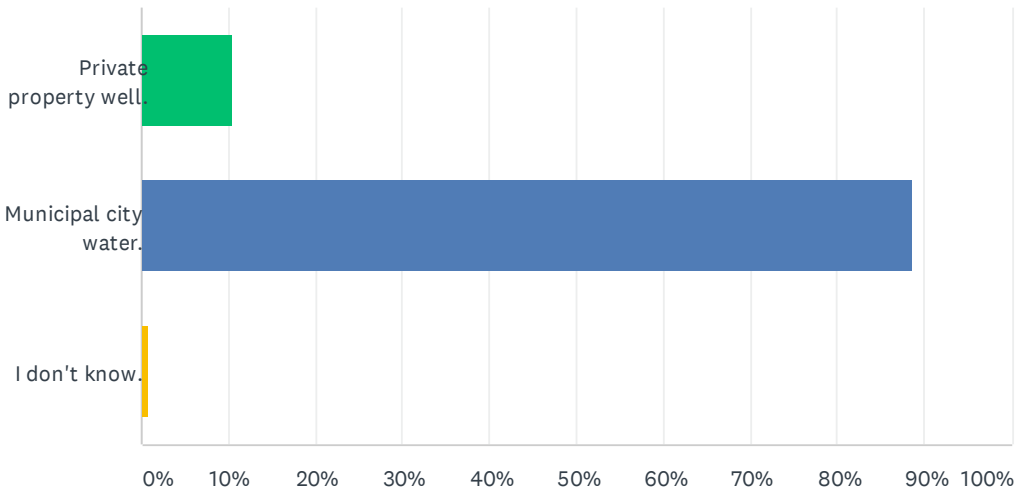
Answered: 124 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	45.97%	57
No	54.03%	67
TOTAL		124

Q4 What is the source of your drinking water?

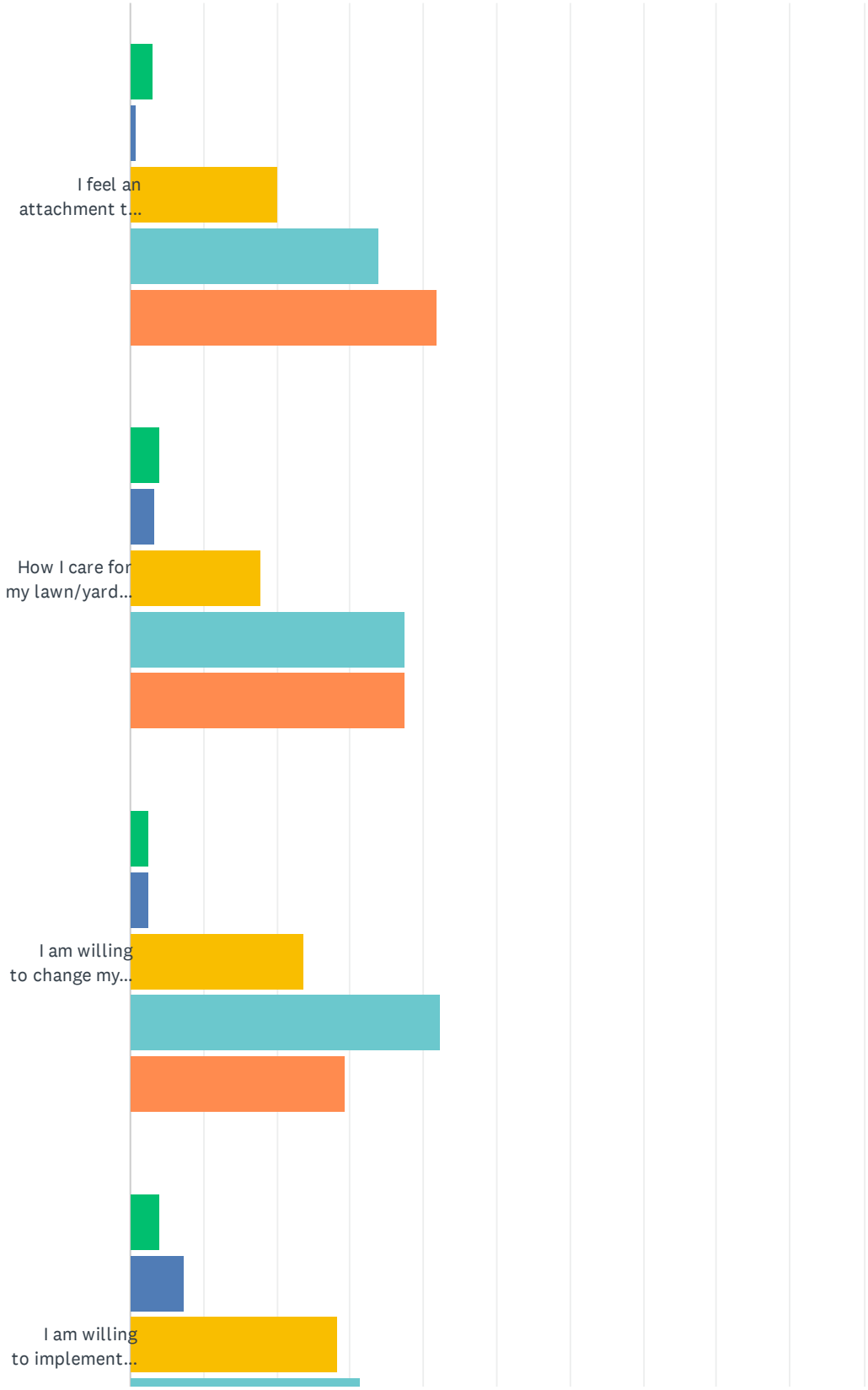
Answered: 124 Skipped: 0

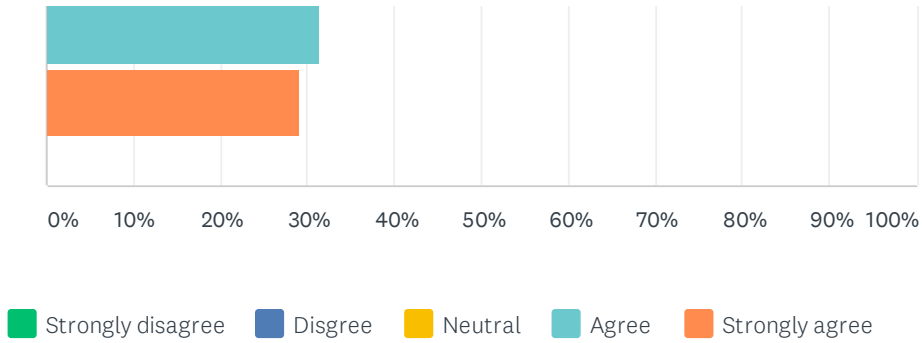


ANSWER CHOICES	RESPONSES	
Private property well.	10.48%	13
Municipal city water.	88.71%	110
I don't know.	0.81%	1
TOTAL		124

Q5 Indicate your level of agreement/disagreement with the following statements:

Answered: 124 Skipped: 0

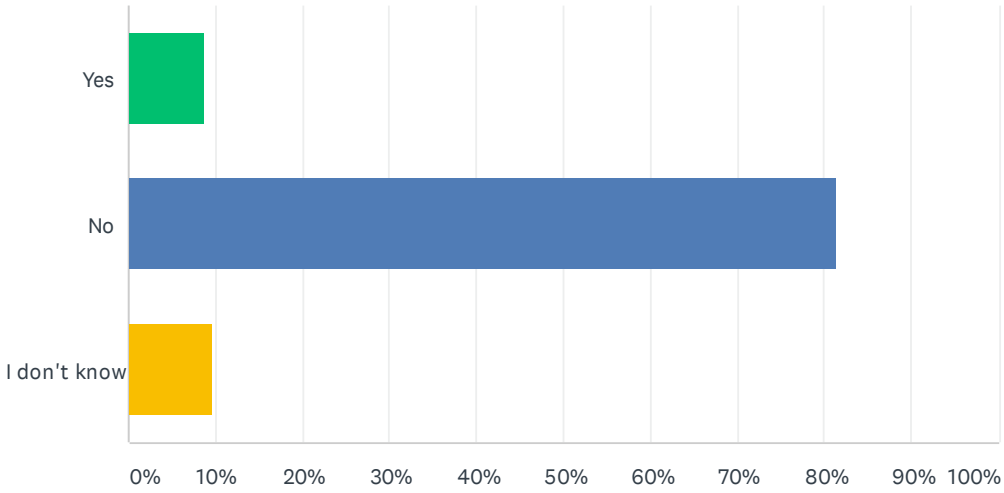




	STRONGLY DISAGREE	DISGREE	NEUTRAL	AGREE	STRONGLY AGREE	TOTAL
I feel an attachment to the Lower Fall Creek Watershed and want to improve it.	3.23% 4	0.81% 1	20.16% 25	33.87% 42	41.94% 52	124
How I care for my lawn/yard influences the water quality of Lower Fall Creek.	4.07% 5	3.25% 4	17.89% 22	37.40% 46	37.40% 46	123
I am willing to change my lawn/yard care practices to improve the water quality of Lower Fall Creek.	2.44% 3	2.44% 3	23.58% 29	42.28% 52	29.27% 36	123
I am willing to implement green infrastructure practices (i.e. rain gardens, rain barrels) on my property to help improve the water quality of Lower Fall Creek.	4.03% 5	7.26% 9	28.23% 35	31.45% 39	29.03% 36	124

Q6 My property has a gutter downspout that is directly connected to a stormwater system or combined sewer system.

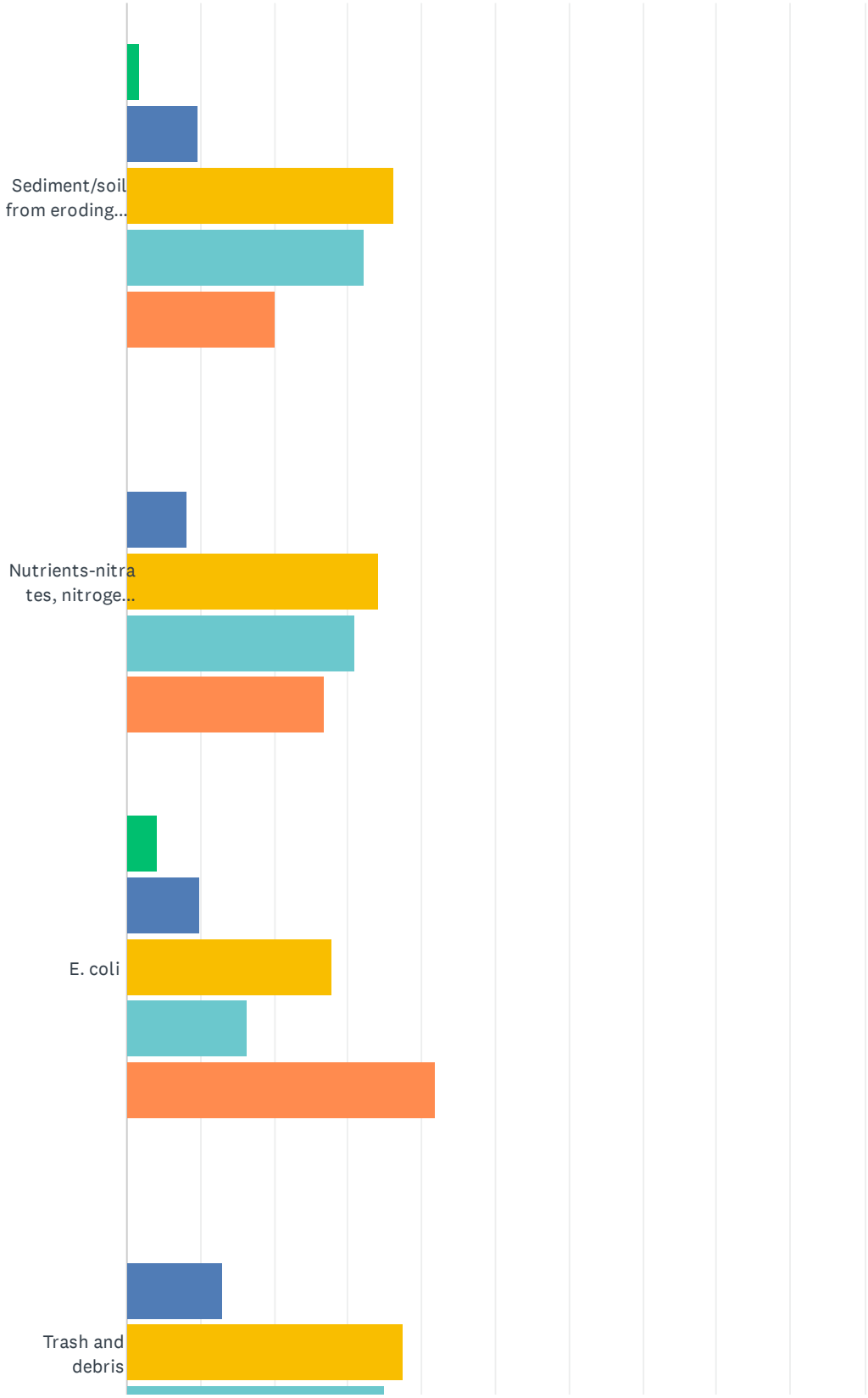
Answered: 124 Skipped: 0

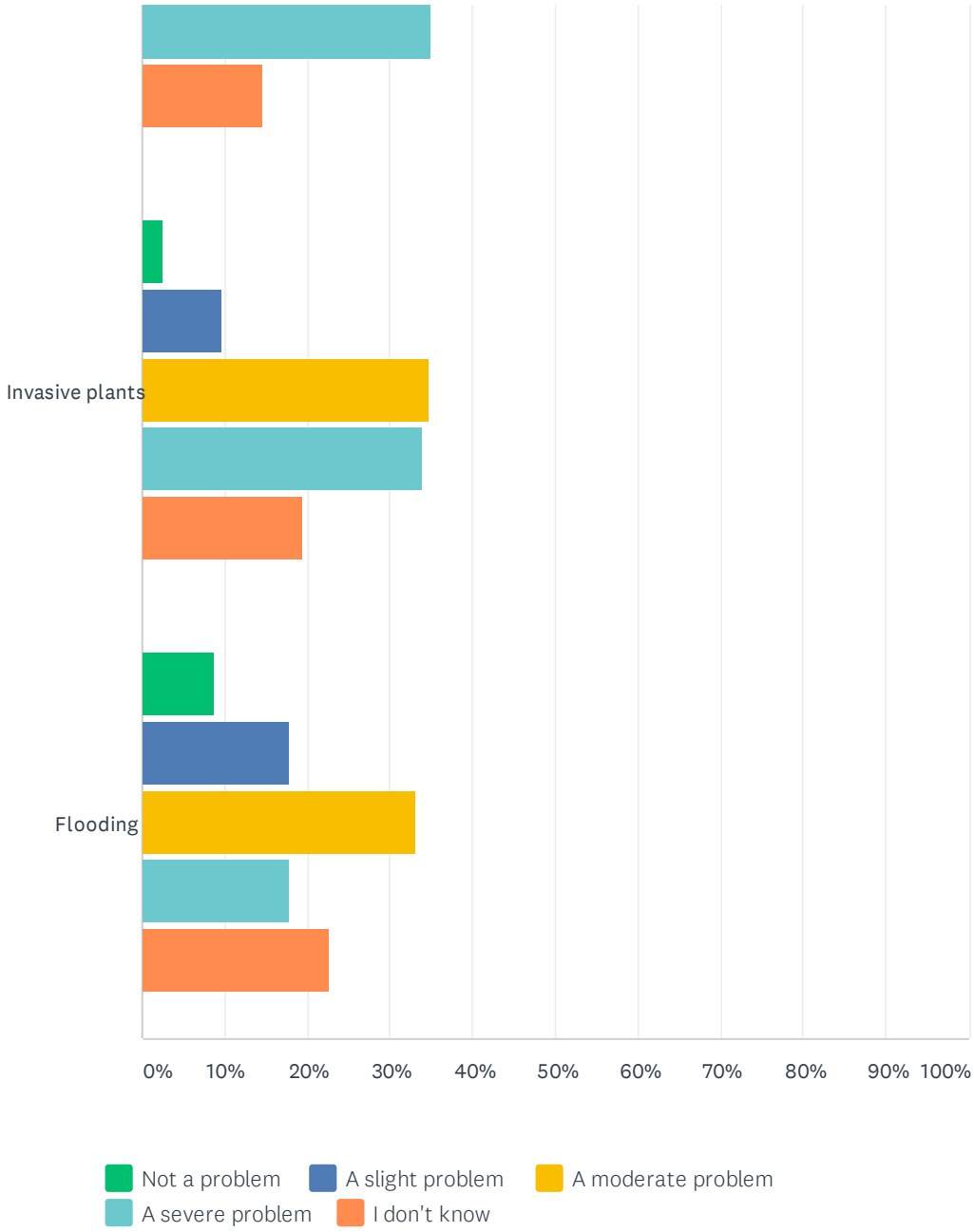


ANSWER CHOICES	RESPONSES	
Yes	8.87%	11
No	81.45%	101
I don't know	9.68%	12
TOTAL		124

Q7 How big of a problem do you think the following water pollutants and issues are in the Lower Fall Creek watershed?

Answered: 124 Skipped: 0

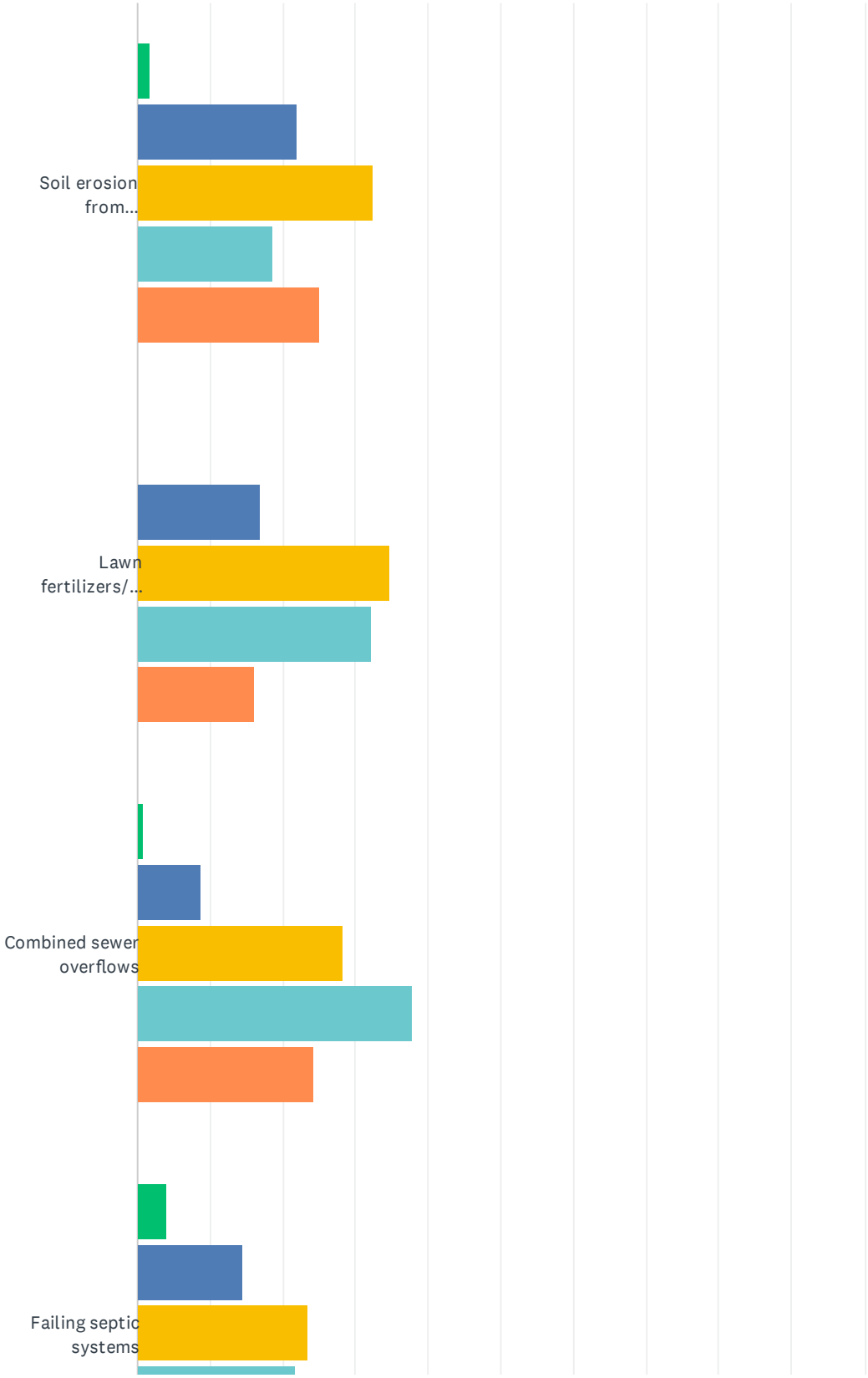


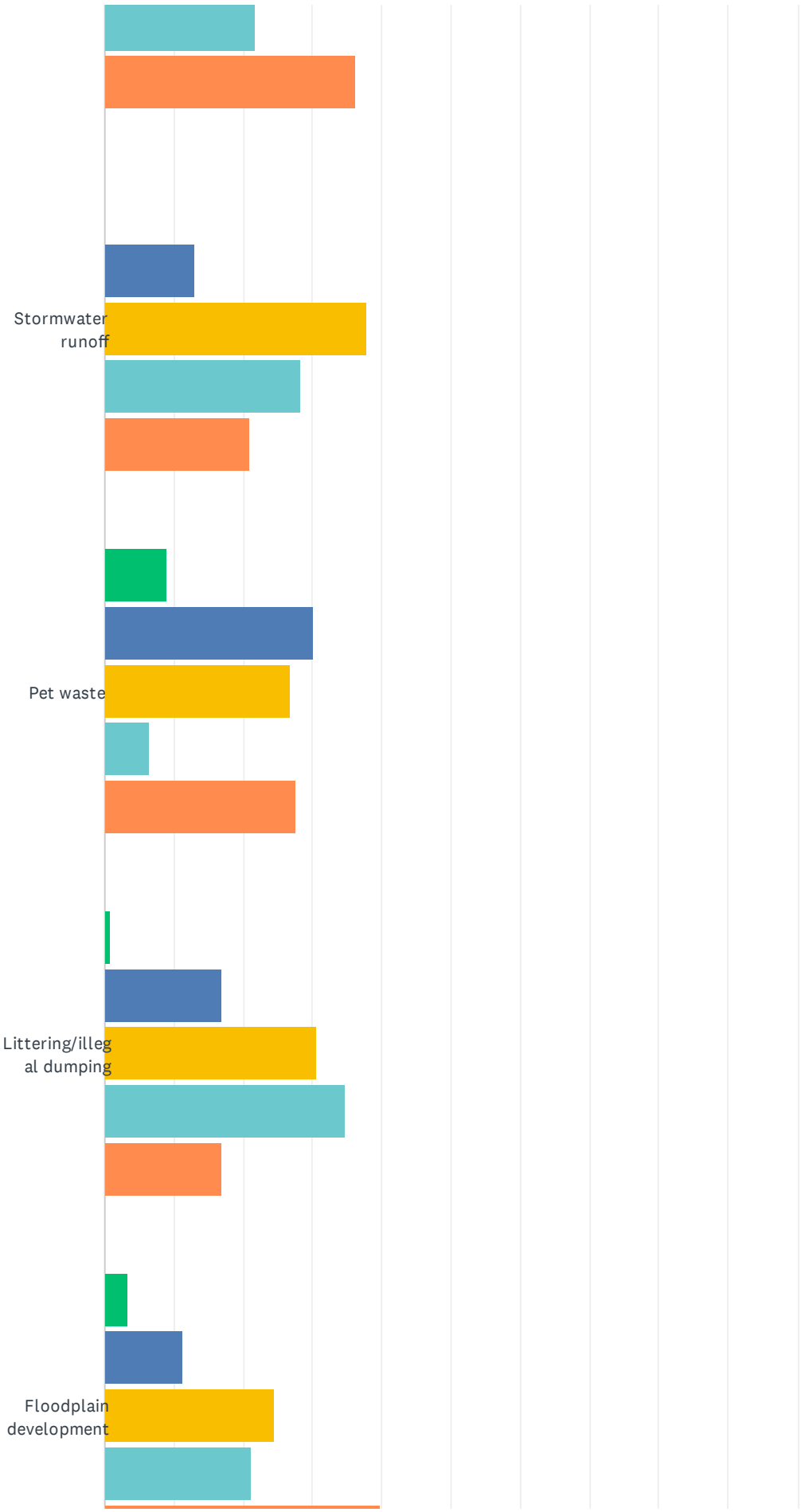


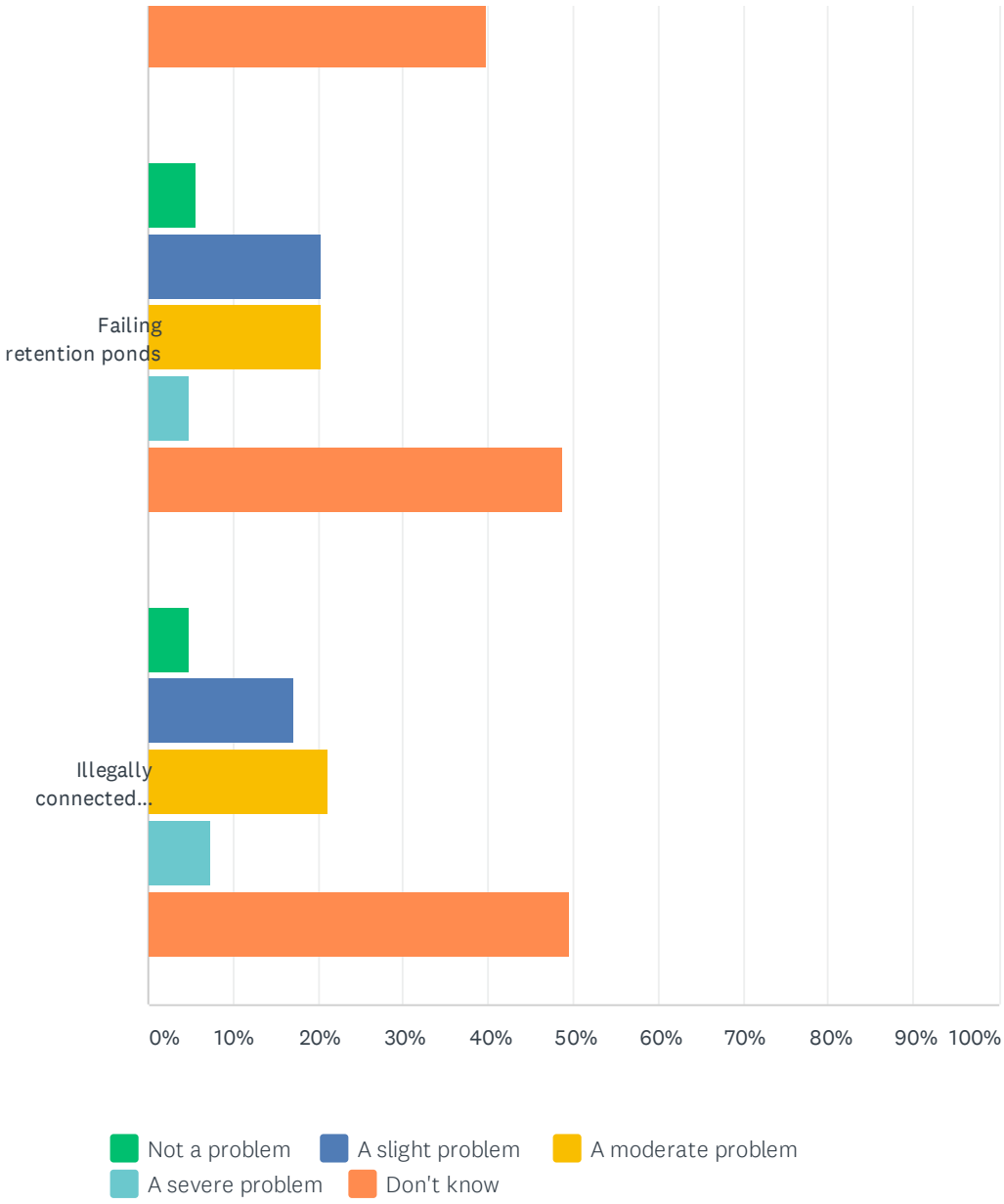
	NOT A PROBLEM	A SLIGHT PROBLEM	A MODERATE PROBLEM	A SEVERE PROBLEM	I DON'T KNOW	TOTAL
Sediment/soil from eroding streambanks, construction sites and other sources	1.61% 2	9.68% 12	36.29% 45	32.26% 40	20.16% 25	124
Nutrients-nitrates, nitrogen, phosphate, phosphorus	0.00% 0	8.13% 10	34.15% 42	30.89% 38	26.83% 33	123
E. coli	4.10% 5	9.84% 12	27.87% 34	16.39% 20	41.80% 51	122
Trash and debris	0.00% 0	13.01% 16	37.40% 46	34.96% 43	14.63% 18	123
Invasive plants	2.42% 3	9.68% 12	34.68% 43	33.87% 42	19.35% 24	124
Flooding	8.87% 11	17.74% 22	33.06% 41	17.74% 22	22.58% 28	124

Q8 The following are potential sources of water pollutants. How big of a problem are the following sources in the Lower Fall Creek Watershed?

Answered: 124 Skipped: 0



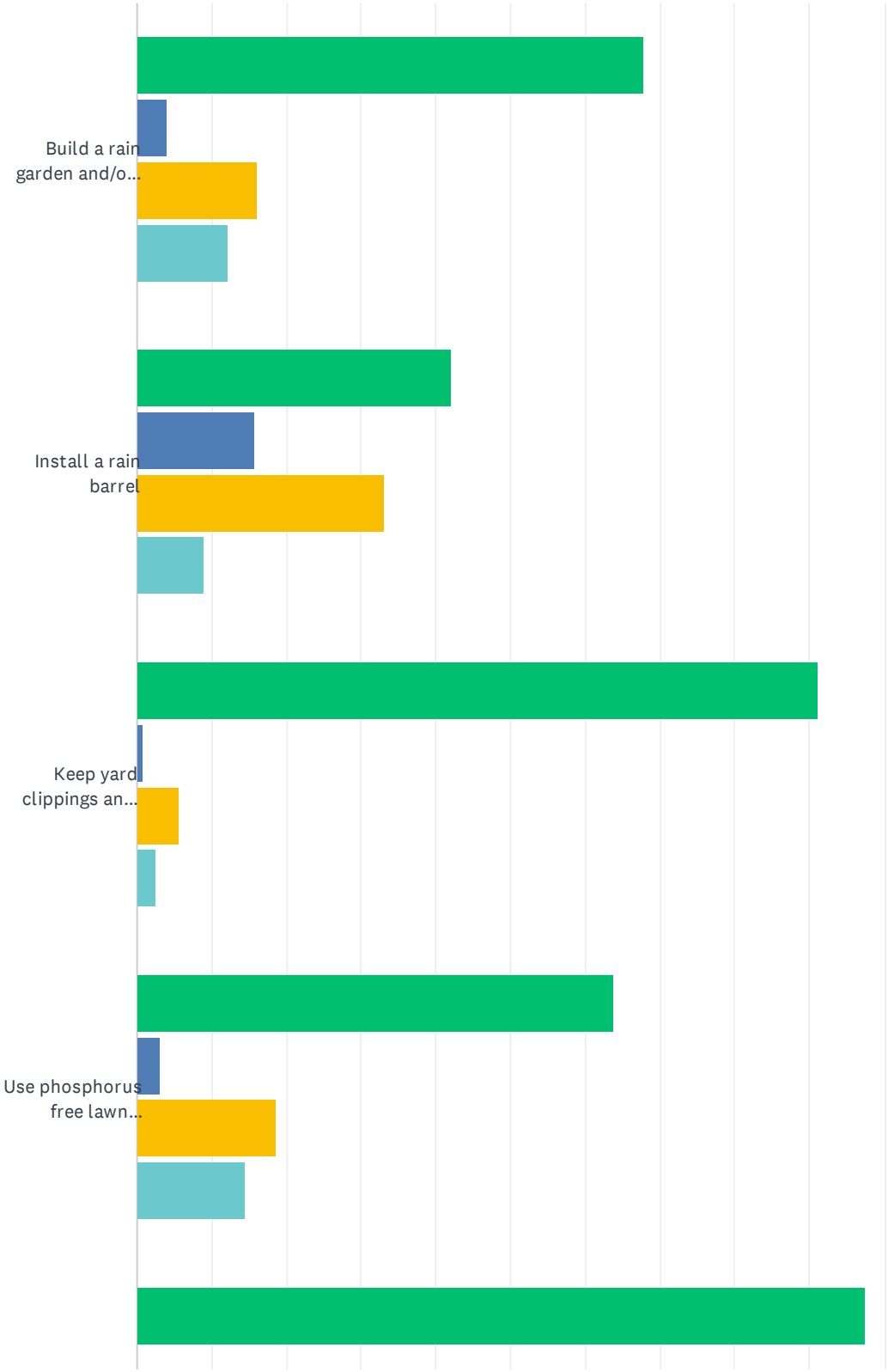

Stormwater runoff
Pet waste
Littering/illegal dumping
Floodplain development

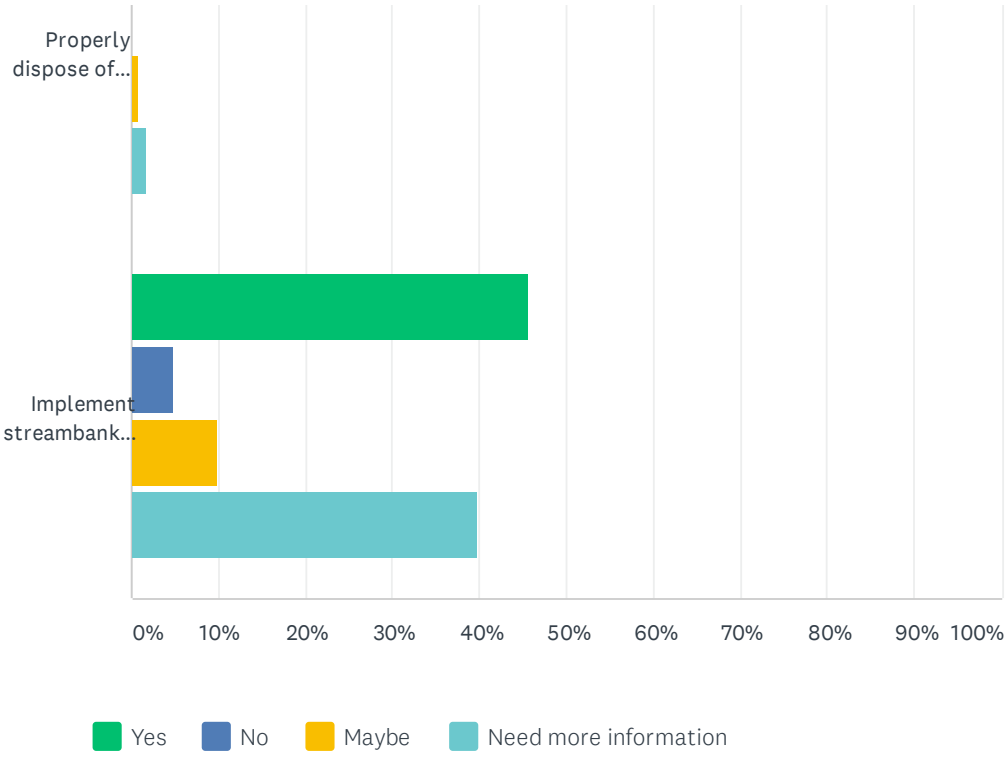

Failing retention ponds
Illegally connected...
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Not a problem
A slight problem
A moderate problem
A severe problem
Don't know

	NOT A PROBLEM	A SLIGHT PROBLEM	A MODERATE PROBLEM	A SEVERE PROBLEM	DON'T KNOW	TOTAL
Soil erosion from construction sites	1.63% 2	21.95% 27	32.52% 40	18.70% 23	25.20% 31	123
Lawn fertilizers/pesticides	0.00% 0	16.94% 21	34.68% 43	32.26% 40	16.13% 20	124
Combined sewer overflows	0.81% 1	8.87% 11	28.23% 35	37.90% 47	24.19% 30	124
Failing septic systems	4.03% 5	14.52% 18	23.39% 29	21.77% 27	36.29% 45	124
Stormwater runoff	0.00% 0	12.90% 16	37.90% 47	28.23% 35	20.97% 26	124
Pet waste	8.94% 11	30.08% 37	26.83% 33	6.50% 8	27.64% 34	123
Littering/illegal dumping	0.81% 1	16.94% 21	30.65% 38	34.68% 43	16.94% 21	124
Floodplain development	3.25% 4	11.38% 14	24.39% 30	21.14% 26	39.84% 49	123
Failing retention ponds	5.69% 7	20.33% 25	20.33% 25	4.88% 6	48.78% 60	123
Illegally connected downspouts	4.88% 6	17.07% 21	21.14% 26	7.32% 9	49.59% 61	123

Q9 The practices below have the potential to improve the water quality of Lower Fall Creek. Indicate your willingness to consider implementing each practice on your own property.

Answered: 124 Skipped: 0

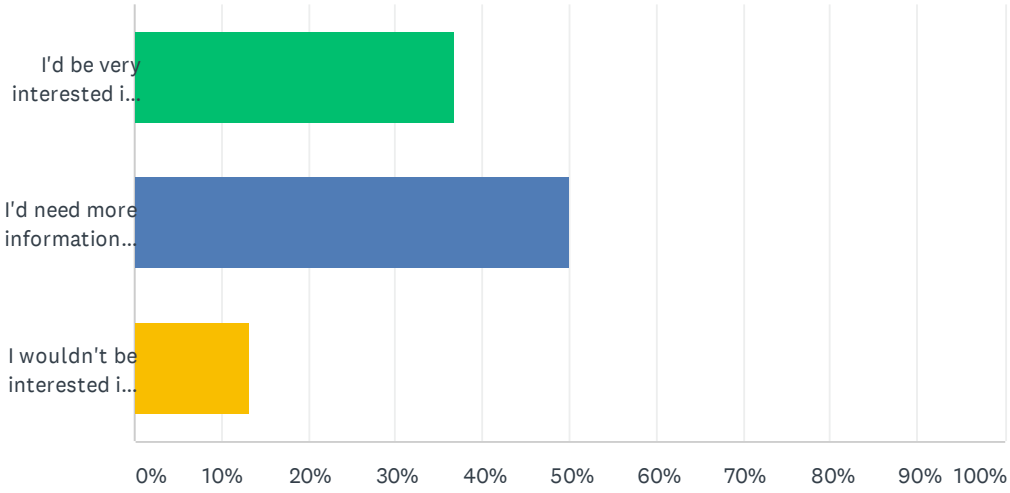




	YES	NO	MAYBE	NEED MORE INFORMATION	TOTAL
Build a rain garden and/or use native plants/landscaping	67.74% 84	4.03% 5	16.13% 20	12.10% 15	124
Install a rain barrel	42.15% 51	15.70% 19	33.06% 40	9.09% 11	121
Keep yard clippings and trash out of drainage ditches and storm drains	91.13% 113	0.81% 1	5.65% 7	2.42% 3	124
Use phosphorus free lawn fertilizer or no fertilizer	63.71% 79	3.23% 4	18.55% 23	14.52% 18	124
Properly dispose of household waste	97.54% 119	0.00% 0	0.82% 1	1.64% 2	122
Implement streambank stabilization measures	45.53% 56	4.88% 6	9.76% 12	39.84% 49	123

Q10 Green Infrastructure refers to stormwater management practices that mimic nature to treat stormwater where it lands and promote water infiltration back into the ground. Indicate your willingness to consider attending a free green infrastructure workshop to learn ways you can implement these practices on your property.

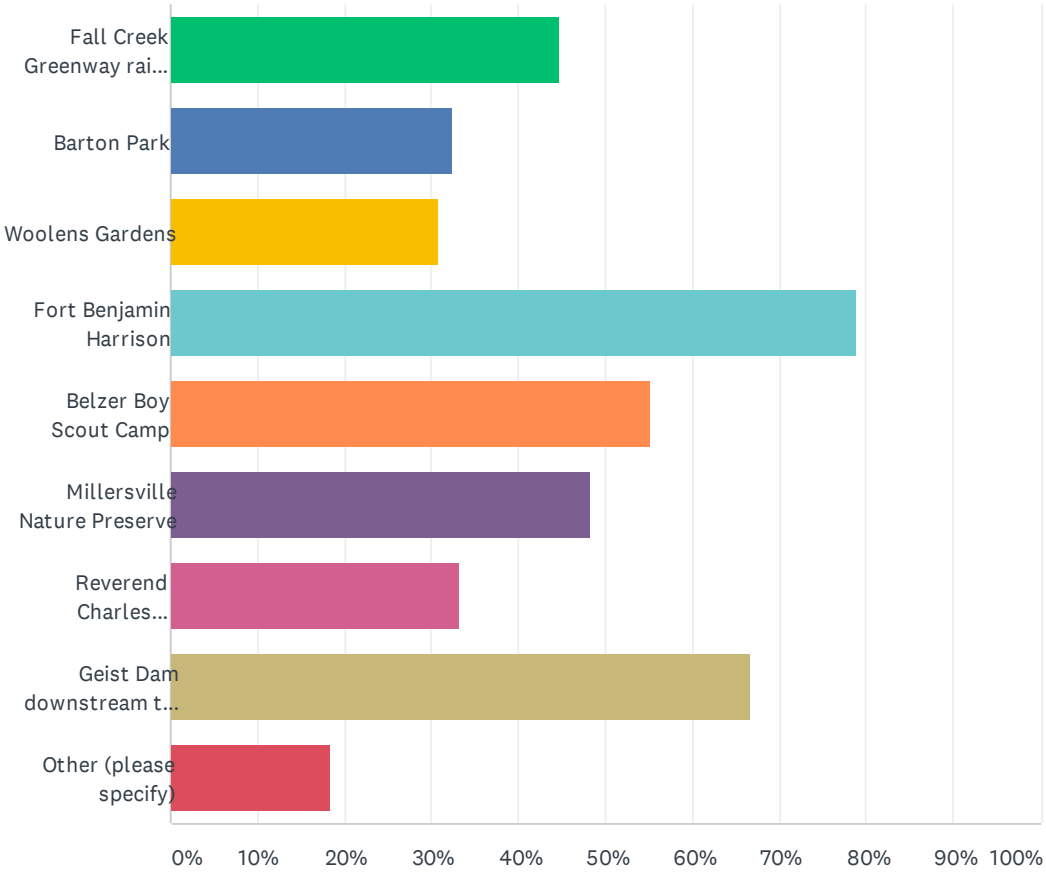
Answered: 122 Skipped: 2



ANSWER CHOICES	RESPONSES	
I'd be very interested in attending.	36.89%	45
I'd need more information before deciding whether to attend.	50.00%	61
I wouldn't be interested in attending.	13.11%	16
TOTAL		122

Q11 The following areas have been identified by Lower Fall Creek watershed residents as specific locations that should either be protected, enhanced, or explored further for future demonstration projects to address identified water quality problems. Please indicate if you support these locations and note any other specific locations you think should be included.

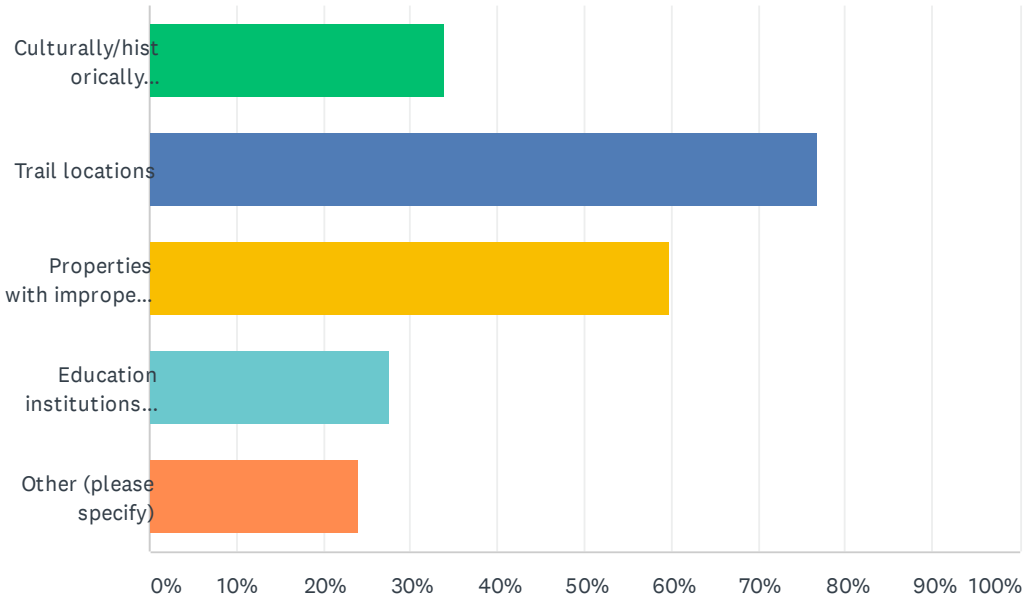
Answered: 114 Skipped: 10



ANSWER CHOICES	RESPONSES	
Fall Creek Greenway rain gardens- Central Avenue to 30th St	44.74%	51
Barton Park	32.46%	37
Woolens Gardens	30.70%	35
Fort Benjamin Harrison	78.95%	90
Belzer Boy Scout Camp	55.26%	63
Millersville Nature Preserve	48.25%	55
Reverend Charles Williams Park	33.33%	38
Geist Dam downstream to the confluence of Mud Creek and Fall Creek	66.67%	76
Other (please specify)	18.42%	21
Total Respondents: 114		

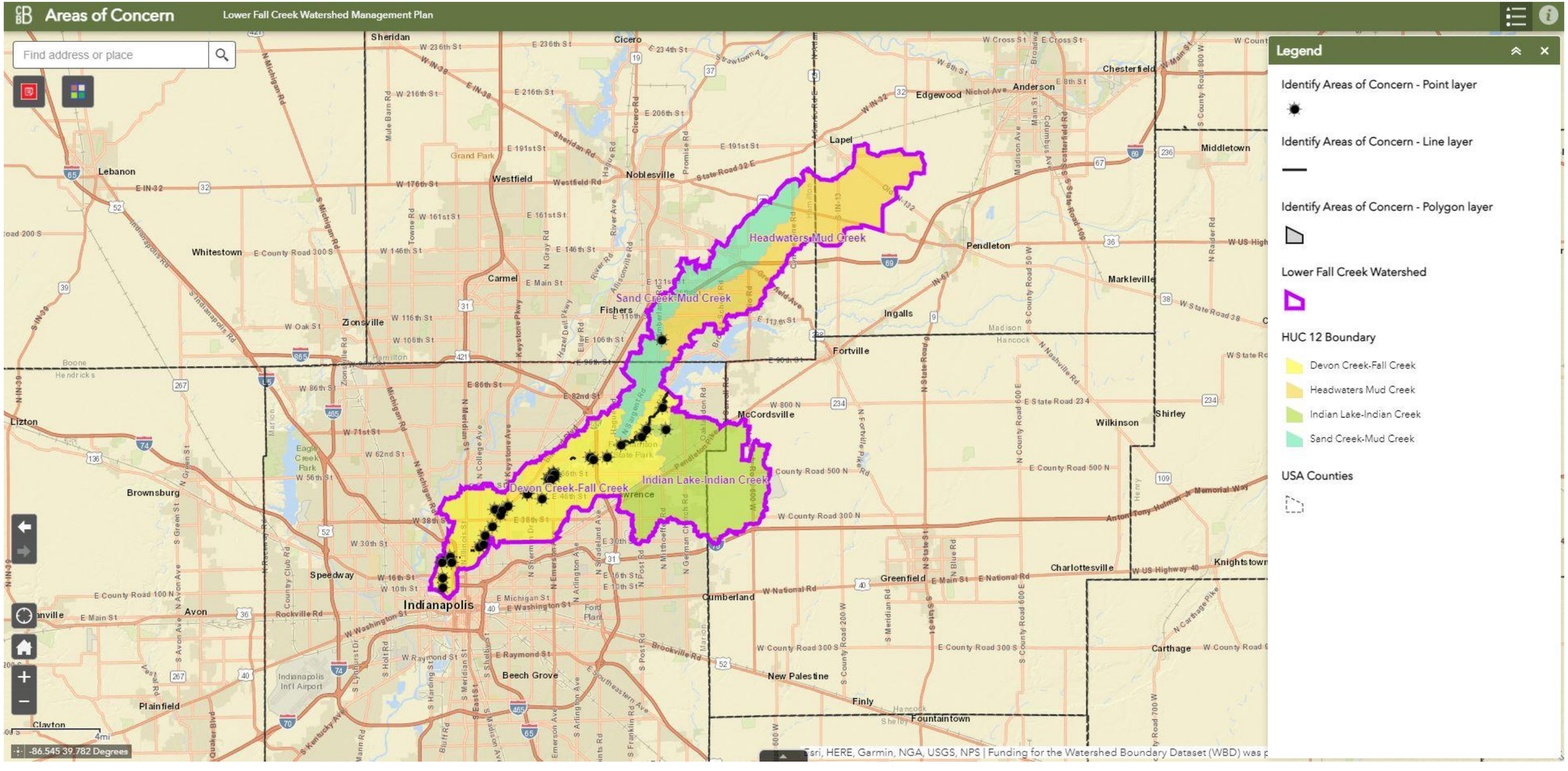
Q12 What other general areas do you think should be included in potential project efforts?

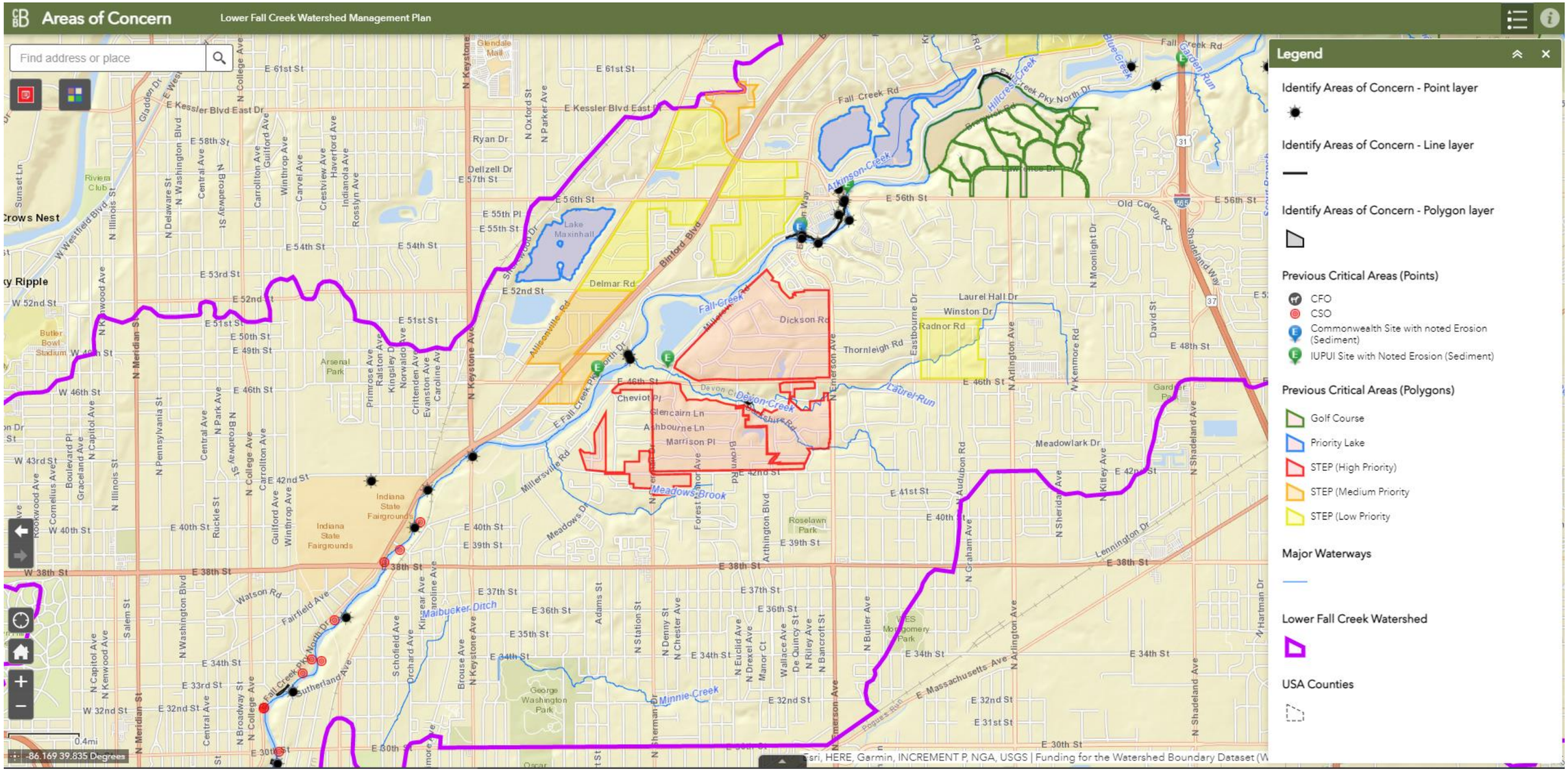
Answered: 112 Skipped: 12



ANSWER CHOICES	RESPONSES	
Culturally/historically significant areas (specify below)	33.93%	38
Trail locations	76.79%	86
Properties with improperly connected downspouts in the combined sewer areas	59.82%	67
Education institutions (specify below)	27.68%	31
Other (please specify)	24.11%	27
Total Respondents: 112		

ArcGIS web-based tool used by stakeholders to identify Areas of Concern




Areas of Concern
Lower Fall Creek Watershed Management Plan
Find address or place
Legend
Identify Areas of Concern - Point layer
Identify Areas of Concern - Line layer
Identify Areas of Concern - Polygon layer
Previous Critical Areas (Points)
CFO
CSO
Commonwealth Site with noted Erosion (Sediment)
IUPUI Site with Noted Erosion (Sediment)
Previous Critical Areas (Polygons)
Golf Course
Priority Lake
STEP (High Priority)
STEP (Medium Priority
STEP (Low Priority
Major Waterways
Lower Fall Creek Watershed
USA Counties
Fall Creek Rd
E 61st St
E Kessler Blvd East Dr
E 58th St
E 56th St
E 55th St
E 54th St
E 53rd St
E 52nd St
E 51st St
E 50th St
E 49th St
E 48th St
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W 52nd St
W 46th St
W 43rd St
W 40th St
W 38th St
W 34th St
W 32nd St
Delmar Rd
Dickson Rd
Thornleigh Rd
Laurel Hall Dr
Winston Dr
Radnor Rd
Meadowlark Dr
Lennington Dr
Old Colony Rd
Cheviot Pl
Glencairn Ln
Ashbourne Ln
Marrison Pl
Devon Creek
Fall Creek Pkwy North Dr
Millersville Rd
Binford Blvd
Allisonville Rd
N Keystone Ave
N Meridian St
N College Ave
N Broadway St
N Delaware St
N Washington Blvd
N Illinois St
N Pennsylvania St
N Park Ave
N Capitol Ave
N Kenwood Ave
N Rookwood Ave
N Emerson Ave
N Arlington Ave
N Shadeland Ave
N Graham Ave
N Butler Ave
N Sherman Dr
N Station St
N Denny St
N Chester Ave
N Euclid Ave
N Drexel Ave
N Riley Ave
N Bancroft St
N Moonlight Dr
N Kenmore Rd
N Kitley Ave
N Sheridan Ave
N Hartman Dr
Fairfield Ave
Sutherland Ave
Schofield Ave
Orchard Ave
Kingsley Dr
Norwalk Ave
Crittenden Ave
Evanston Ave
Caroline Ave
Brouse Ave
Adams St
Arsenal Park
Riviera Club
Crows Nest
Butler Bowl Stadium
Indiana State Fairgrounds
Glendale Mall
Lake Maxinhall
George Washington Park
Roselawn Park
VFW Montgomery Park
Gardner Park
Atkinson Creek
Fall Creek
Blue Creek
Hillcrest Creek
Garden Run
Laurel Run
Meadows Brook
Maibucker Ditch
Minnie Creek
Pogues Run
0.4mi
-86.169 39.835 Degrees
Esri, HERE, Garmin, INCREMENT P, NGA, USGS | Funding for the Watershed Boundary Dataset (W

Name of the Area	Geographical Description	Reason for Inclusion
Yellow House in Millersville Valley	Just upstream of the 56th St bridge over Fall Creek	This is an illegal dumping area
Normandy Barn Rain Garden	This rain garden is located immediately to the west of the Normandy Barn.	This small rain garden accepts runoff from the east side of the greenhouse roof, keeping stormwater out of the combined sewer system using native plants.
71st St and Fall Creek		Fisherman access results in dumping. Either open it up, marks as access, or fence it.
Best put-in below dam	river right, upstream of bridge	This has been used as a put in and fisherman access for years, yet without signage, and maybe some erosion control, it will continue to attract dumpers.
Creek, back side of campground	steep bank	sure would be nice to have a putin here, there is no easy way to access this section of the cr.
creek crosses under Keystone		There is no portage marked around the dam.
new dam built for water supply	under the aqueduct	They removed a nice ledge feature, and replaced with a low head dam,that will form a back roller at some levels, potentially deadly.
56th Street Pipe discharge	Pipe with active flow is located to the south west of 56th near the Fall Creek trail.	Water discharged form pipe was much warmer then stream in Nov of 2019, source of thermal pollution and concerned about illicit connection. (This was reported to IDEM, not heard back).
CSO by Stadium Dr	CSO to the south east of Stadium Dr bridge and on the east bank of Fall Creek.	CSO is flowing during dry weather/ constantly
Historic Railroad Yard-Brownfield	Between Sutherland and Fall Creek, south of 38th Street	There is historic use at this location that may have pollution impacts to Fall Creek, among other brownfields in this lower portion of Fall Creek.
Millersville at Fall Creek Preserve	Land between creek and Fall Creek Trail	Honeysuckle removed and controlled for 4+ years between 56th and a lite south of Emerson Way
Lake Charlevoix	East end of Lake Charlevoix	Resident noted eastern end of lake is receiving sediment from Blue Creek upstream
Flanner House Community Orchard	242 Dr. MLK St	Collaboration between KIB, Flanner House, Groundwork Indy and Center of Wellness for Urban Women-transformation of vacant lot into education center/ urban orchard with native trees and plants.
Millersville Village Erosion	East bank	Erosion visible on east bank of the creek.
2201 DMLK Gas Station	NE corner of DMLK St. and Fall Creek Pkwy.	Former gas station. Per communication with DMD Brownfields it achieved IDEM closure in 2003 but screening levels for some contaminants have since changed. Further investigation may be warranted.
Fall Creek Pkwy Gas Station	Fall Creek Pkwy across from State Fairgrounds, next to former Nickel Plate RR	Potential contaminants, cleanup status unknown. Pump islands remain visible.
Knotweed at Brendonwood	Along the creek	Knotweed is invasive
Fall Creek Community Orchard	Along Fall Creek Greenway trail, south bank of creek, between Delaware St and Central Ave	Fall Creek Place HOA and KIB collaboration to remove invasive species and plant native fruit trees, shrubs and plant material.
Millersville	Area on northside of creek between creek and trail has been cleared of honeysuckle from N Dequincy to 56th St Bridge	Invasive removal of honeysuckle
Barton Park	Open area off alley downstream of the playground area in Barton Park.	This area has been cleared of invasive honeysuckle using a Fecon machine, then resprouts were treated. In August 2020, the area was replanted with over 150 native plugs grown at Indy Urban Acres. Native trees and shrubs will be added in Fall 2020.

APPENDIX 4 Endangered, Threatened, and Rare Species

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Indiana County Endangered, Threatened and Rare Species List

County: Hamilton

Species Name	Common Name	FED	STATE	GRANK	SRANK
Mollusk: Bivalvia (Mussels)					
Alasmidonta viridis	Slippershell Mussel		SSC	G4G5	S3
Epioblasma rangiana	Northern Riffleshell	LE	SE	G1	S1
Epioblasma triquetra	Snuffbox	LE	SE	G3	S1
Eurynia dilatata	Spike		SSC	G5	S4
Lampsilis fasciola	Wavyrayed Lampmussel		SSC	G5	S3
Ligumia recta	Black Sandshell		SSC	G4G5	S2
Obovaria subrotunda	Round Hickorynut	C	SE	G4	S1
Plethobasus cyphyus	Sheepnose	LE	SE	G3	S1
Pleurobema clava	Clubshell	LE	SE	G1G2	S1
Ptychobranchus fasciolaris	Kidneyshell		SSC	G4G5	S2
Theliderma cylindrica	Rabbitsfoot	LT	SE	G3G4	S1
Toxolasma lividus	Purple Lilliput	C	SSC	G3Q	S2
Venustaconcha ellipsiformis	Ellipse			G4	S2
Villosa fabalis	Rayed Bean	LE	SE	G2	S1
Villosa iris	Rainbow		SSC	G5	S3
Villosa lienosa	Little Spectaclecase		SSC	G5	S3
Insect: Odonata (Dragonflies & Damselflies)					
Enallagma divagans	Turquoise Bluet		SR	G5	S3
Amphibian					
Acris blanchardi	Blanchard's Cricket Frog		SSC	G5	S4
Necturus maculosus	Common mudpuppy		SSC	G5	S2
Reptile					
Clemmys guttata	Spotted Turtle	C	SE	G5	S2
Sistrurus catenatus	Eastern Massasauga	LT	SE	G3	S2
Bird					
Bartramia longicauda	Upland Sandpiper		SE	G5	S3B
Certhia americana	Brown Creeper			G5	S2B
Haliaeetus leucocephalus	Bald Eagle		SSC	G5	S2
Ixobrychus exilis	Least Bittern		SE	G4G5	S3B
Lanius ludovicianus	Loggerhead Shrike		SE	G4	S3B
Nycticorax nycticorax	Black-crowned Night-heron		SE	G5	S1B
Pandion haliaetus	Osprey		SSC	G5	S1B
Setophaga cerulea	Cerulean Warbler		SE	G4	S3B
Thryomanes bewickii	Bewick's Wren			G5	S1B
Mammal					
Lasionycteris noctivagans	Silver-haired Bat		SSC	G3G4	SNRN
Taxidea taxus	American Badger		SSC	G5	S2
Vascular Plant					

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Indiana Department of Natural Resources
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Indiana County Endangered, Threatened and Rare Species List

County: Hamilton

Species Name	Common Name	FED	STATE	GRANK	SRANK
Chelone obliqua var. speciosa	rose turtlehead		WL	G4T3	S3
Drosera intermedia	spoon-leaved sundew		ST	G5	S3
Helenium virginicum	Virginia sneezeweed	LT	ST	G3	SU
Magnolia acuminata	cucumber magnolia		SE	G5	S1
Platanthera leucophaea	prairie white-fringed orchid	LT	SE	G2G3	S1
Rorippa aquatica	lake cress		SE	G4?	S1
High Quality Natural Community					
Forest - floodplain wet-mesic	Wet-mesic Floodplain Forest		SG	G3?	S3
Forest - upland mesic Central Till Plain	Central Till Plain Mesic Upland Forest		SG	GNR	S3

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Indiana County Endangered, Threatened and Rare Species List

County: Hancock

Species Name	Common Name	FED	STATE	GRANK	SRANK
Mollusk: Bivalvia (Mussels)					
Alasmidonta viridis	Slippershell Mussel		SSC	G4G5	S3
Epioblasma triquetra	Snuffbox	LE	SE	G3	S1
Lampsilis fasciola	Wavyrayed Lampmussel		SSC	G5	S3
Pleurobema clava	Clubshell	LE	SE	G1G2	S1
Ptychobranchus fasciolaris	Kidneyshell		SSC	G4G5	S2
Toxolasma lividus	Purple Lilliput	C	SSC	G3Q	S2
Venustaconcha ellipsiformis	Ellipse			G4	S2
Villosa lienosa	Little Spectaclecase		SSC	G5	S3
Bird					
Bartramia longicauda	Upland Sandpiper		SE	G5	S3B
Haliaeetus leucocephalus	Bald Eagle		SSC	G5	S2
Ixobrychus exilis	Least Bittern		SE	G4G5	S3B
Lanius ludovicianus	Loggerhead Shrike		SE	G4	S3B
Nycticorax nycticorax	Black-crowned Night-heron		SE	G5	S1B
Setophaga cerulea	Cerulean Warbler		SE	G4	S3B
Mammal					
Mustela nivalis	Least Weasel		SSC	G5	S2?
Myotis sodalis	Indiana Bat	LE	SE	G2	S1
Taxidea taxus	American Badger		SSC	G5	S2
Vascular Plant					
Magnolia acuminata	cucumber magnolia		SE	G5	S1
Sanguisorba canadensis	Canada burnet		SE	G5	S1
Valerianella chenopodiifolia	goose-foot corn-salad		WL	G4	S3

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Indiana County Endangered, Threatened and Rare Species List

County: Madison

Species Name	Common Name	FED	STATE	GRANK	SRANK
Mollusk: Bivalvia (Mussels)					
Alasmidonta viridis	Slippershell Mussel		SSC	G4G5	S3
Epioblasma rangiana	Northern Riffleshell	LE	SE	G1	S1
Eurynia dilatata	Spike		SSC	G5	S4
Lampsilis fasciola	Wavyrayed Lampmussel		SSC	G5	S3
Plethobasus cyphyus	Sheepnose	LE	SE	G3	S1
Pleurobema clava	Clubshell	LE	SE	G1G2	S1
Ptychobranchus fasciolaris	Kidneyshell		SSC	G4G5	S2
Theliderma cylindrica	Rabbitsfoot	LT	SE	G3G4	S1
Toxolasma lividus	Purple Lilliput	C	SSC	G3Q	S2
Villosa fabalis	Rayed Bean	LE	SE	G2	S1
Villosa iris	Rainbow		SSC	G5	S3
Villosa lienosa	Little Spectaclecase		SSC	G5	S3
Insect: Odonata (Dragonflies & Damselflies)					
Cordulegaster bilineata	Brown Spiketail		WL	G5	S3
Somatochlora tenebrosa	Clamp-tipped Emerald		SR	G5	S2S3
Tachopteryx thoreyi	Gray Petaltail		WL	G4	S3
Bird					
Botaurus lentiginosus	American Bittern		SE	G5	S2B
Haliaeetus leucocephalus	Bald Eagle		SSC	G5	S2
Lanius ludovicianus	Loggerhead Shrike		SE	G4	S3B
Nycticorax nycticorax	Black-crowned Night-heron		SE	G5	S1B
Rallus elegans	King Rail		SE	G4	S1B
Mammal					
Mustela nivalis	Least Weasel		SSC	G5	S2?
Taxidea taxus	American Badger		SSC	G5	S2
Vascular Plant					
Deschampsia cespitosa	tufted hairgrass		ST	G5	S3
Eriophorum gracile	slender cotton-grass		ST	G5	S2
Hypericum pyramidatum	great St. John's-wort		ST	G4T4	S2
Juglans cinerea	butternut		ST	G3	S2
Lithospermum parviflorum	shaggy false-gromwell		SE	G4G5T4	S1
Magnolia acuminata	cucumber magnolia		SE	G5	S1
Poa paludigena	bog bluegrass		ST	G3G4	S3
Selaginella apoda	meadow spike-moss		WL	G5	S1
Spiranthes lucida	shining ladies'-tresses		ST	G4	S3
Valerianella chenopodiifolia	goose-foot corn-salad		WL	G4	S3
High Quality Natural Community					
Forest - upland mesic Central Till Plain	Central Till Plain Mesic Upland Forest		SG	GNR	S3

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Indiana County Endangered, Threatened and Rare Species List

County: Madison

Species Name	Common Name	FED	STATE	GRANK	SRANK
Wetland - fen	Fen		SG	G3	S3
Wetland - marsh	Marsh		SG	GU	S4
Other Significant Feature					
Geomorphic - Nonglacial Erosional Feature - Water Fall and Cascade	Water Fall and Cascade			GNR	SNR

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Indiana County Endangered, Threatened and Rare Species List

County: Marion

Species Name	Common Name	FED	STATE	GRANK	SRANK
Mollusk: Bivalvia (Mussels)					
Alasmidonta viridis	Slippershell Mussel		SSC	G4G5	S3
Cyprogenia stegaria	Eastern Fanshell Pearlymussel	LE	SE	G1Q	S1
Epioblasma obliquata perobliqua	White catspaw	LE	SE	G1	SX
Epioblasma rangiana	Northern Riffleshell	LE	SE	G1	S1
Epioblasma triquetra	Snuffbox	LE	SE	G3	S1
Eurynia dilatata	Spike		SSC	G5	S4
Fusconaia subrotunda	Longsolid	C	SX	G3	SX
Lampsilis fasciola	Wavyrayed Lampmussel		SSC	G5	S3
Obovaria subrotunda	Round Hickorynut	C	SE	G4	S1
Plethobasus cicatricosus	White Wartyback	LE	SX	G1	SX
Plethobasus cooperianus	Orangefoot Pimpleback	LE	SX	G1	SX
Plethobasus cyphyus	Sheepnose	LE	SE	G3	S1
Pleurobema clava	Clubshell	LE	SE	G1G2	S1
Pleurobema plenum	Rough Pigtoe	LE	SE	G1	S1
Pleurobema rubrum	Pyramid Pigtoe		SX	G2G3	SX
Ptychobranchus fasciolaris	Kidneyshell		SSC	G4G5	S2
Theliderma cylindrica	Rabbitsfoot	LT	SE	G3G4	S1
Toxolasma lividus	Purple Lilliput	C	SSC	G3Q	S2
Venustaconcha ellipsiformis	Ellipse			G4	S2
Villosa iris	Rainbow		SSC	G5	S3
Villosa lienosa	Little Spectaclecase		SSC	G5	S3
Insect: Hymenoptera					
Bombus affinis	Rusty-patched Bumble Bee	LE	SE	G2	S1
Insect: Lepidoptera (Butterflies & Moths)					
Hyperaeschra georgica	A Prominent Moth		ST	G5	S2
Insect: Neuroptera					
Sisyra sp. 1	Indiana Spongilla Fly		ST	GNR	S2
Fish					
Percina evides	Gilt Darter		SE	G4	S1
Amphibian					
Necturus maculosus	Common mudpuppy		SSC	G5	S2
Reptile					
Clemmys guttata	Spotted Turtle	C	SE	G5	S2
Clonophis kirtlandii	Kirtland's Snake		SE	G2	S2
Emydoidea blandingii	Blanding's Turtle	C	SE	G4	S2
Thamnophis butleri	Butler's Garter Snake		SE	G4	S1
Bird					
Aimophila aestivalis	Bachman's Sparrow			G3	SXB

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Indiana County Endangered, Threatened and Rare Species List

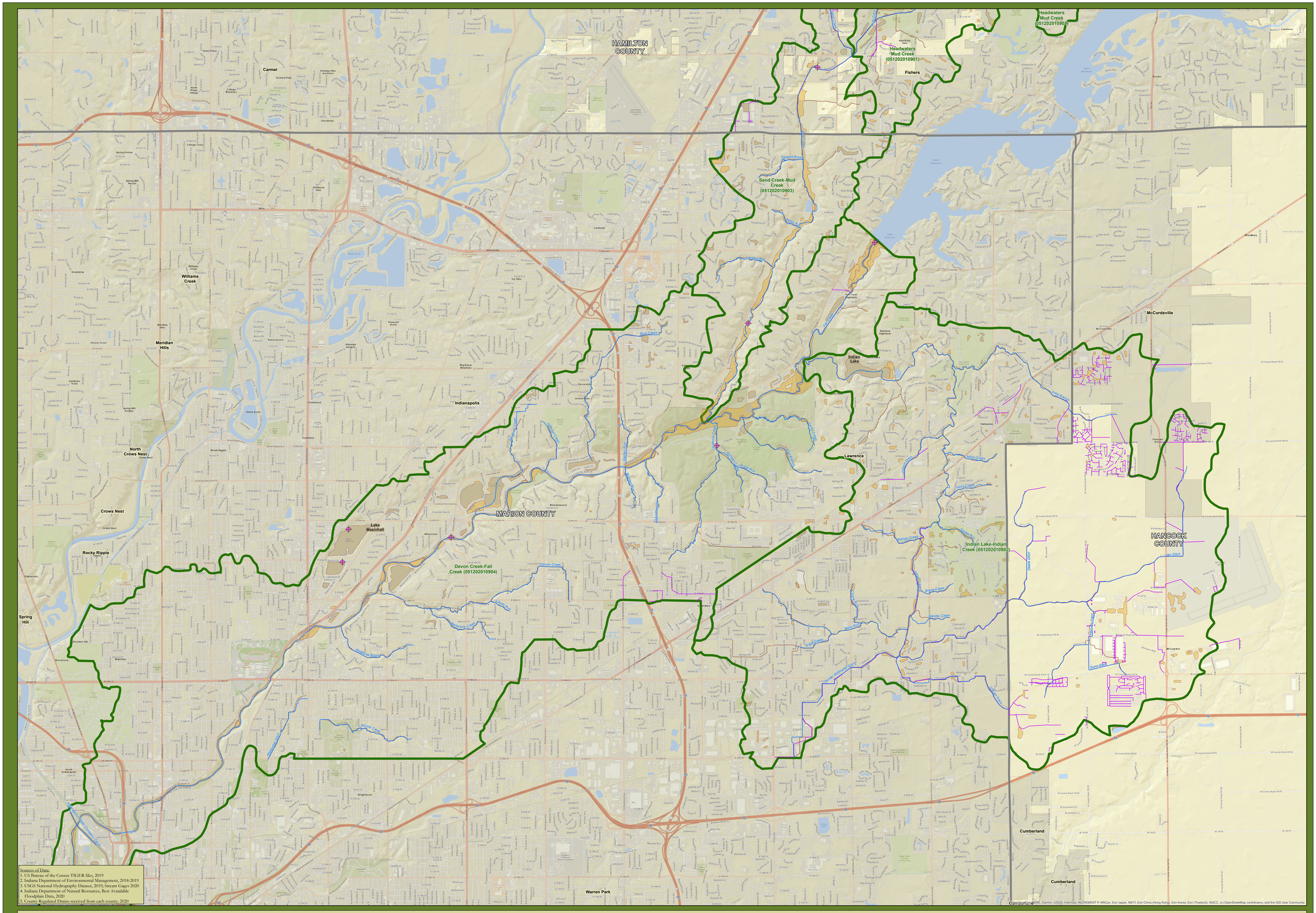
County: Marion

Species Name	Common Name	FED	STATE	GRANK	SRANK
Ardea alba	Great Egret		SSC	G5	S1B
Bartramia longicauda	Upland Sandpiper		SE	G5	S3B
Botaurus lentiginosus	American Bittern		SE	G5	S2B
Buteo platypterus	Broad-winged Hawk		SSC	G5	S3B
Certhia americana	Brown Creeper			G5	S2B
Chordeiles minor	Common Nighthawk		SSC	G5	S4B
Falco peregrinus	Peregrine Falcon		SSC	G4	S2B
Haliaeetus leucocephalus	Bald Eagle		SSC	G5	S2
Helmitheros vermivorus	Worm-eating Warbler		SSC	G5	S3B
Ixobrychus exilis	Least Bittern		SE	G4G5	S3B
Lanius ludovicianus	Loggerhead Shrike		SE	G4	S3B
Mniotilta varia	Black-and-white Warbler		SSC	G5	S1S2B
Nycticorax nycticorax	Black-crowned Night-heron		SE	G5	S1B
Pandion haliaetus	Osprey		SSC	G5	S1B
Rallus elegans	King Rail		SE	G4	S1B
Setophaga cerulea	Cerulean Warbler		SE	G4	S3B
Setophaga citrina	Hooded Warbler		SSC	G5	S3B
Sitta canadensis	Red-breasted Nuthatch			G5	S1B
Mammal					
Lasiurus borealis	Eastern Red Bat		SSC	G3G4	S4
Myotis lucifugus	Little Brown Bat	C	SE	G3	S2
Myotis septentrionalis	Northern Long Eared Bat	LT	SE	G1G2	S2S3
Myotis sodalis	Indiana Bat	LE	SE	G2	S1
Taxidea taxus	American Badger		SSC	G5	S2
Vascular Plant					
Chelone obliqua var. speciosa	rose turtlehead		WL	G4T3	S3
Deschampsia cespitosa	tufted hairgrass		ST	G5	S3
Hydrastis canadensis	golden seal		WL	G3G4	S3
Juglans cinerea	butternut		ST	G3	S2
Melanthium virginicum	Virginia bunchflower		SE	G5	S1
Panax quinquefolius	American ginseng		WL	G3G4	S3
Poa wolfii	Wolf's bluegrass		ST	G4	S3
Rubus odoratus	purple flowering raspberry		ST	G5	S2
Trifolium stoloniferum	running buffalo clover	LE	SE	G3	S1
High Quality Natural Community					
Forest - flatwoods central till plain	Central Till Plain Flatwoods		SG	G3	S2
Forest - floodplain mesic	Mesic Floodplain Forest		SG	G3?	S1
Forest - floodplain wet	Wet Floodplain Forest		SG	G3?	S3
Forest - floodplain wet-mesic	Wet-mesic Floodplain Forest		SG	G3?	S3

Indiana County Endangered, Threatened and Rare Species List

County: Marion

Species Name	Common Name	FED	STATE	GRANK	SRANK
Forest - upland dry-mesic Central Till Plain	Central Till Plain Dry-mesic Upland Forest		SG	GNR	S2
Forest - upland mesic Central Till Plain	Central Till Plain Mesic Upland Forest		SG	GNR	S3
Wetland - fen	Fen		SG	G3	S3
Wetland - marsh	Marsh		SG	GU	S4


HAMILTON COUNTY
MARION COUNTY
HANCOCK COUNTY
Headwaters Mud Creek (051202010905)
Headwaters Mud Creek (051202010901)
Sand Creek-Mud Creek (051202010903)
Devon Creek-Fall Creek (051202010904)
Indian Lake-Indian Creek (051202010902)
Fishers
Carmel
Indianapolis
Lawrence
McCordsville
Cumberland
Warren Park
Lake Maxinhall
Rocky Ripple
Crows Nest
Meridian Hills
Williams Creek
Spring Hill
Shoelers Hill
Brighwood
Sources of Data:
1. US Bureau of the Census TIGER files, 2019
2. Indiana Department of Environmental Management, 2018-2019
3. USGS National Hydrography Dataset, 2019; Stream Gages 2020
4. Indiana Department of Natural Resources, Best Avaialable Floodplain Data, 2020
5. County Regulated Drains received from each county, 2020
USGS Stream Gage
Regulated Drains
Wetlands
12-Digit HUC Watershed Boundary
Municipal Boundaries
N
1 0 1
Scale in Miles
Christopher B. Burke Engineering, LLC
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PROJECT: Lower Fall Creek Watershed Management Plan Update
PROJECT NO. 18-0537
APPROX. SCALE as shown
DATE: 07/2022
TITLE: Watersheds and Hydrology
EXHIBIT 1

Headwaters Mud Creek (051202010901)

Sand Creek-Mud Creek (051202010903)

Devon Creek-Fall Creek (051202010904)

Indian Lake-Indian Creek (051202010902)

Sources of Data:
1. US Bureau of the Census TIGER files, 2019
2. Indiana Department of Environmental Management, 2018-2019
3. USGS National Hydrography Dataset, 2019

- Water Quality Monitoring Sites (Marion County Health Dept & IDEM Fixed Station)
- 303d Listed NHD Streams (2018)
- KIB Restoration
- DPW Restoration
- TMDL Reports (2019)
- 12-Digit HUC Watershed Boundary
- Municipal Boundaries
- County Boundaries

N

1 0 1

Scale in Miles

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PROJECT: Lower Fall Creek Watershed Management Plan Update	PROJECT NO. 18-0537	APPROX. SCALE as shown
		DATE: 07/2022
TITLE: Water Quality		EXHIBIT 2