

# **CITY OF MISHAWAKA AND BETHEL UNIVERSITY**

**MS4 NPDES PERMIT INR040106**

## **WATER QUALITY CHARACTERIZATION REPORT**



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**MARCH 2023 (REVISION 1)**

**APRIL 2004 (ORIGINAL)**

**WQCR/SWQMP Certification in accordance with 327 IAC 15-4-3(i) & MS4GP 3.3 and 4.9**

"I certify under penalty of law that this document and attachments was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

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## 1. INTRODUCTION

The City of Mishawaka (City), located in St. Joseph County, Indiana, falls under the National Pollutant Discharge Elimination System (NPDES) Phase II Storm Water Program, which is for a small Separate Storm Sewer System (MS4) in urbanized areas serving a population of greater than 10,000 and less than 100,000. According to the 2020 US Census, the City population was 51,063. The Indiana Department of Environmental Management (IDEM) adopted Phase II rules became effective on August 6, 2003.

On December 18, 2021, the IDEM replaced 327 IAC 15-13 (Rule 13) with an MS4 General Permit (MS4GP). The MS4GP permit authorizes 1) stormwater discharges to waters of the State of Indiana from all known outfalls and conveyances that are owned and/or operated by the MS4, and 2) stormwater commingled with other discharges either regulated by other NPDES permits or determined by IDEM or the MS4 entity to not be a significant source of pollutants.

The City and Bethel University (Bethel) are MS4 co-permittees and a Notice of Intent (NOI) was submitted to the IDEM on June 24, 2022. The NOI renewed NPDES permit INR040106 under the new MS4GP. Based on the City of Mishawaka GIS, the MS4 is approximately 11,776 acres and the jurisdictional boundaries are the same as the City boundaries. The St. Joseph River Basin Sub-Watershed and MS4 Boundaries, and Receiving Waters Map is included as **Figure 1**. The primary responsibility for implementing the MS4GP requirements is the City Engineering Department, while the Sewer Maintenance Department maintains the City MS4 infrastructure.

MS4s are defined as a conveyance or system of conveyances owned by a state, city, county, town, district, or other public entity discharges to waters of the United States and is designed or used for collecting or conveying stormwater. The term “MS4” refers to the permit holder(s) (City/Bethel) as well as the separate storm sewer system that the city owns, operates, and maintains. Regulated conveyance systems include roads with public drains, catch basins, inlets, curbs, gutters, storm drains, piping, channels, ditches, tunnels, and conduits. Combine sewer overflows and publicly owned treatment systems are not included.

## 2. WATER QUALITY CHARACTERIZATION REPORT

### a) Land Use

According to MS4GP 3.1(c)(1), the WQCR must include an assessment of land use.

Land use affects surface runoff, stream flow, and groundwater recharge. The City requires new development to keep stormwater runoff confined to the property.

(1) City of Mishawaka – The MS4 is approximately 11,776 acres. Land use types are shown below as percent of total acres.

Agricultural	5%
Commercial/Service	18%
Forest Land	4%



Hydrology/Water/Wetlands	4%
Industrial	4%
Institutional	3%
Multi-Family Residential	7%
Open/Recreational	12%
Single Family Residential	26%
Transportation/Utilities	17%

A City of Mishawaka Land Use Map is included in **Figure 2**.

Bethel University is located within the MS4 boundaries and is approximately 80 acres.

(2) Bethel University – The approximate percentage of each land use type is as follows:

Institutional	43%
Open/Recreational	41%
Parking	12%
Residential	4%
Hydrology	0%

A Bethel University Land Use Map is included in **Figure 3**.

#### **b) MS4 Owned and Operated Structural Stormwater Management Measures**

According to MS4GP 3.1(c)(2), the WQCR must include an inventory of MS4 owned and/or operated structural stormwater management measures that include an identification number, geographic coordinate, and structure condition.

Structural stormwater measures in the City include retention/detention basins, underground infiltration systems, and stormwater treatment systems (hydrodynamic separators) and they are included in the City GIS. An inventory of MS4 owned/operated structural stormwater management measures is available upon request.

#### **c) Receiving Waters**

According to MS4GP 3.1(c)(3), the WQCR must include identification of all receiving waters that receive discharges from outfalls within the MS4, including wetlands and lakes. In addition, according to MS4GP 3.1(c)(4), any 303d listed impaired waters or Total Maximum Daily Load (TMDL) for receiving waters need to be identified.

Stormwater receiving waters in the City MS4 include Juday Creek and Lashbaugh Ditch on the north side of the City; Woomer Ditch in the center; Laing Ditch on the south side; and Willow Creek, Woodard Ditch, and Eller Ditch on the east side. A Summary of Receiving Waters and Impairments is included in **Table 1**.

#### **1) Watersheds**

According to the U.S. Geological Survey (USGS), watersheds are delineated using a nationwide system based on surface hydrologic features. This system is divided into regions (2-digit), sub-regions (4-digit), basins (6-digit), sub-basins (8-digit), watersheds (10-digit), and

sub-watersheds (12-digit). A hydrologic unit code (HUC) consisting of two additional digits for each level in the hydrologic unit system is used to identify any hydrologic area.

The City MS4 area overlays one 8-digit HUC watershed, which is the St. Joseph River Basin (HUC 04050001 – Coldwater). The 12-digit HUC sub-watersheds include, Juday Creek (040500012206), Willow Creek – St. Joseph River (040500012204), Eller Ditch – St. Joseph River (040500012203, and Auten Ditch – St. Joseph River (40500012205).

## 2) Integrated Water Report

Section 303(d) of the Clean Water Act (CWA) requires states to identify waters that do not meet the state's water quality standards (WQS) or not expected to meet WQS with federal technology-based standards alone. States are also required to develop a priority ranking, considering the pollution severity and designated uses of the waters.

Section 305(b) of the CWA requires states to assess and report on the degree to which Indiana waters support the beneficial uses designated in Indiana's WQS. Water quality assessments are completed using IDEM's Consolidated Assessment and Listing Methodology (CALM) by comparing existing water quality data to the WQS. To develop the Consolidated List, IDEM places each waterbody assessment unit (sections of streams) into one or more categories (Categories 1-5) based on its water quality and the degree to which it is supporting its designated beneficial uses. Because IDEM makes use support assessments for 3 to 4 of the designated beneficial uses, a waterbody may appear in one or more categories. The 303(d) list (Category 5) is a subset of the Consolidated List.

Definition of Category 4: The available data and/or information indicate at least one designated use is impaired or threatened, but a total maximum daily load (TMDL) is not required.

A. TMDL has been completed that is expected to result in attainment of all applicable water quality standards and has been approved by U.S. EPA.

B. Other pollution control requirements are reasonably expected to result in the attainment of the water quality standards in a reasonable period.

C. The impairment is not caused by a pollutant.

Definition of Category 5: The available data and/or information indicate that at least one designated use is impaired or threatened and a TMDL is required. Waters may be listed in both 5A and 5B depending on the parameter(s) causing the impairment.

A. The waterbody has one/more impaired biotic communities or pollutants.

B. The waterbody is impaired due to the presences of presence of mercury or PCBs, or both in the edible tissue of fish collected from them at levels exceeding Indiana's human health criteria for these contaminants.

The majority of data collected by IDEM uses a rotating basin approach, dividing Indiana into nine water management basins and monitoring one basin each year. In addition, IDEM retrieves data through its External Data Framework from external organizations and agencies, including the United States Geological Survey, universities, and local organizations.

IDEM water quality assessments are submitted to the USEPA every two years via the Integrated Water Monitoring and Assessment Report (IR). The IDEM uploaded its 2022 Integrated Report, including the finalized 2022 303(d) list of impaired waters to USEPA's Assessment and Total Maximum Daily Load Tracking and Implementation System (ATTAINS) online on April 1, 2022. The IDEM 303(d) Online Tool and IR, Appendix L Tables (Category 5), and Appendix M Tables (Category 1 - 5) were reviewed. A Summary of Receiving Waters and Impairments is included in **Table 1**.

### 3) Total Maximum Daily Loads (TMDLs)

Section 303(d) also requires states to develop TMDLs in order to achieve compliance with the WQS. WQS are set at levels necessary for protecting a waterway's designated use(s), such as recreation activities, aquatic life, and water supply use. TMDL reports are assessments of water quality in rivers, lakes, and streams in a given watershed where impairments exist. The report contains an overview of the waterbodies, the sources of pollutants, the methods used to analyze data, reductions in pollutant levels needed to restore water quality, actions that need to be taken to reduce pollutant levels, and actions that are being taken to improve water quality. The IDEM published the "Total Maximum Daily Load for Escherichia coli (E. coli) for the St. Joseph River, Elkhart and St. Joseph Counties" in February of 2004. The USEPA approved the TMDL on July 21, 2004. The TMDL protects the designated use for Full Body Contact Recreation from April 1 to October 31, 2022.

### 4) Wetlands

The 2021 National Wetlands Inventory (NWI) identifies potential wetland areas by utilizing infrared photography, which has not been field verified. Information provided through the NWI should be utilized only as a reference, not as a definitive answer of whether wetlands are present on a particular site. Potential wetlands in the City are included in a GIS hydrology shape file.

The MS4GP requires MS4s to establish a construction program that contains, at a minimum, the requirements of the Indiana Construction Stormwater General Permit (CSGP). The CSGP requires all project site owners to develop construction plans that include an project site layout describing the location and name of all wetlands, lakes, and water courses on or adjacent to the project site (CSGP 4.1(a)(3)(J)).

### **d) Known Sensitive Areas**

According to MS4GP 3.1(c)(5), the WQCR must include identification of known sensitive areas including, but not limited to public swimming areas, drinking water intakes, habitats associated with threatened or endangered species, and outstanding state and national resource waters.

The IDEM defines Sensitive Waters as a waterbody needing priority protection or remediation based on:

- Full body contact recreation areas such as bathing beaches;
- Usage as a public surface water supply intake;
- Having threatened or endangered species or their habitat;

- Limited Use Waters as found in 327 Indiana Administrative Code (IAC) 2-1-11(a); or Outstanding State Resource Water as found in 327 IAC 2-1-11(b), 327 IAC 2-1.3(d) and 327 IAC 2-1.5-19(b); and
- Other – Salmonid waters, defined in 327 IAC 2-1.5-5(a)(3)(F).

### 1) Full-Body Contact Recreation Areas

Full body contact means the use of surface water, which is for swimming or other recreational activity that causes the human body to come into direct contact with the water to the point of complete submergence.

The St. Joseph River was designated “fishable, swimmable” under the Indiana Water Quality Standards. The combined sewer system serving Mishawaka was constructed prior to November of 1975. The St. Joseph River does not have any swimming beaches or other areas designated for primary contact recreation in Mishawaka.

However, IDEM and USEPA indicated that they determined that the East Race in South Bend was a primary contact recreation area comparable to a beach or other designated swimming area (letter dated June 5, 2005). Notwithstanding the City’s disagreement with the agencies’ position, the screening and evaluation of LTCP alternatives were conducted to include the level of control that would be required if the East Race was considered to be a sensitive area due to primary contact recreation.

### 2) Drinking Water Intakes

There are no drinking water intakes associated with surface water in the City. The City public water supply system (Water System IN5271009) is groundwater from the St. Joseph Aquifer. Mishawaka Utilities Water Division provides drinking water via three treatment plants and wellfields (Gumwood Road, Division Street, and Virgil Street). Construction of a fourth water treatment plant and well field near Juday Creek will be completed soon and is expected to be operational in 2023.

The IDEM Drinking Water Branch carries out the requirements of the federal Safe Drinking Water Act (SDWA), which is designed to ensure that public water supplies deliver water to Hoosier homes and businesses that is adequate in quantity and is safe to drink. Public water system information can be found via the Safe Drinking Water Information Search link. A search for “Mishawaka Utilities” listed twenty-two (22) active and five (5) inactive community wells. In addition, there was one inactive non-community well under Mishawaka Shell & Subway”.

The Indiana Department of Natural Resources (IDNR) Division of Water conducts resource assessments of ground water aquifers and maintains the records of water wells drilled in Indiana. Based on the IDNR Water Well Records Viewer, there are twenty-two (22) significant withdraw wells shown under “Mishawaka Municipal Water Utility” and the well depths range from 70 to 303 feet.

### 3) Wellhead Protection

The City of Mishawaka obtains drinking water from groundwater sources via twenty-two (22) significant withdraw wells with well depths ranging from 70 to 329 feet. Groundwater is

susceptible to contamination due to the soil type, which can allow contaminants to move easily through groundwater. Under County Code 52, the St. Joseph County Department of Health protects groundwater in areas where large volumes of water are pumped to supply drinking water. These areas are called Wellhead Protection Areas (WHPAs). Any business that is located within a WHPA and poses a threat to groundwater is required to be permitted and inspected.

According to Section 52.069, a WHPA is designed to safeguard the public health, safety and welfare of people by regulating the storage, handling, use and/or production of potential sources of contamination within the areas. All regulated activities within the WHPA shall be in conformance with the requirements of the County Board of Health, the State Wellhead Protection Program adopted by the State Department of Environmental Management, and 327 I.A.C. 8-4.1. In addition, a community public water system may request the Health Department to provide a wellhead protection program.

City Ordinance 4899 (municipal code Section 62-384 - Wellhead Protection) was approved on November 15, 2004. The City adopted and incorporated by reference the contents of the St. Joseph County Wellhead Protection Ordinance 103-98 (10-14-1997) and authorized the county health department to administer the wellhead protection program for the benefit of the community public water system utilized by the City and the city utilities. The City WHPA is shown on the Sensitive Areas Map, **Figure 4**.

#### 4) Habitats Associated with Threatened or Endangered Species

Information was requested from the Indiana Department of Natural Resources Division (IDNR) Division of Nature Preserves via the Indiana Natural Heritage Data Center (INHDC) Portal. A database search of the City by IDNR included endangered, threatened, and rare species, high-quality natural communities, and significant natural areas within a 0.5-mile radius. The IDNR database reflects specific field studies conducted by independent research groups. The IDNR search information is summarized below:

- (a) Bird - There was a state species of special concern record for *Pandion haliaetus*, common name Osprey, documented in Mishawaka – AEP Nest Site Tower (2020)
- (b) Fish - There was a state endangered record for *Moxostoma valenciennesi*, common name Greater Redhorse, documented in the St. Joseph River (2010)
- (c) Mammal - There was a state species of special concern record for *Taxidea taxus*, common name American Badger, documented in Mishawaka (1999)
- (d) Vascular Plant - There was a state endangered record for *Boechera stricta*, common name Drummond's rockcress, documented at the Transmission Corridor for AEP (2013) and
- (e) Vascular Plant - There was a state threatened record for *Geranium robertianum*, common name herb-Robert, documented in Mishawaka (1947)

Based on having threatened or endangered species, or their habitat, the St. Joseph River is a sensitive water. Information received from the IDNR is depicted on the Threatened / Endangered Species Map, **Figure 5**.

#### 5) Limited Use Waters and Outstanding State and National Resource Water

- (a) As defined in 327 IAC 2-1-11(a), there are no limited use waters in the City MS4.

(b) As defined in 327 IAC 2-1-11(b), 327 IAC 2-1.3(d), and 327 IAC 2-1.5-19(b), there are no outstanding state resource waters within the City MS4.

6) Other – Salmonid Waters

As defined in 327 IAC 2-1.5-5(a)(3)(F) (surface water use designations), the St. Joseph River and its tributaries from the Twin Branch Dam in Mishawaka downstream to the Indiana/Michigan state line is designated as salmonid water. Therefore, this section of the St. Joseph River and its tributaries (Juday Creek and Willow Creek).

The St. Joseph River was included on IDEM's 2006 303(d) list of waters impaired for bacteria (*E. coli*). The river was included on prior 303(d) lists as impaired for bacteria. Monitoring data collected during periods of CSO discharge supported the conclusion that the water quality needed to support the full-body contact recreation (swimmable) designated use has not been attained, and thereby not an existing use, during and following periods of wet weather conditions that result in CSO discharges.

Based upon information obtained through IDEM, the Indiana Department of Natural Resources, and the U.S. Department of Interior Fish and Wildlife Service it was determined that there are no threatened or endangered species or their habitat, Outstanding State Resource Waters, Outstanding National Resource Waters, or drinking water sources impacted by Mishawaka CSO discharges.

Bethel, which is located entirely within the City MS4, does not have any sensitive areas.

**e) Review and Summary of Existing Monitoring Data in MS4 Receiving Streams**

Existing monitoring data in MS4 receiving streams (Juday Creek, Willow Creek, Laing Ditch, Eller Ditch, Woomer Ditch, Lashbaugh Ditch, Woodard Ditch, and St. Joseph River) was reviewed and summarized. The data sources included:

- Mishawaka Wastewater Treatment Plant
- IDEM Assessment Information Management System (AIMS)
- United States Environmental Protection Agency (USEPA) and United States Geological Survey (USGS) (surface water and ground water)
- Hoosier Riverwatch
- St. Joseph River Basin Commission
- Aquatics Community Monitoring Program
- St. Joseph County and Indiana State Health Department
- Indiana Water Monitoring Inventory – Purdue University
- Stream Reach Characterization and Evaluation Report (SRCER)

### 1) Mishawaka Wastewater Treatment Plant

The Mishawaka Wastewater Treatment Plant (WWTP) performs water quality sampling one (1) to four (4) times per month on the St. Joseph River. Samples are collected at five locations: Bittersweet Road (eastern MS4 boundary), Main St., WWTP Outfall, Ironwood Road (western MS4 boundary), and Angela Blvd. (downstream) and shown on **Figure 5**. Data was available from 1997 to 2022 for E-coli and from 2016 to 2022 for precipitation (the day before sampling and the day of sampling). In addition, data was available from 1997 to 2003 for DO, temperature, TSS, PH, conductivity, and weather conditions.

Water quality data for the St. Joseph River was evaluated by comparing data to the Indiana Water Quality Standards (WQS), which are found in Title 327 of the Indiana Administrative Code (IAC) under Article 2. In accordance with 327 IAC 2-1.6(d)(3): For full body contact recreational uses (April through October), E. coli bacteria must not exceed the following:

(A) One hundred twenty-five (125) colony forming units (cfu) or most probable number (MPN) per one hundred (100) milliliters as a geometric mean based on not less than five (5) samples equally spaced over a thirty (30) day period.

(B) Two hundred thirty-five (235) cfu or MPN per one hundred (100) milliliters in any one (1) sample in a thirty (30) day period, except that, in cases where there are at least ten (10) samples at a given site, up to ten percent (10%) of the samples may exceed two hundred thirty-five (235) cfu or MPN per one hundred (100) milliliters where the: (i) E. coli exceedances are incidental and attributable solely to E. coli resulting from the discharge of treated wastewater from a wastewater treatment as defined in IC 13-11-2-258; and (ii) criterion in clause (A) is met.

A single sample is used for making beach notification and closure decisions. If a geometric mean cannot be calculated because five (5) equally spaced samples are not available, then the criterion stated in clause (B) must be met.

Based on the St. Joseph River Water Analytical Results in **Table 2**, there were nine (9) dates in 2018, seven (7) dates in 2019, thirteen (13) dates in 2020, and three (3) dates in 2021, that a geometric mean could be calculated for E. coli. A geometric mean could not be calculated for 2022 data. There were seven (7) dates in 2018, four (4) dates in 2019 and in 2020, and one (1) date in 2021, where the E.coli results were above the geometric mean WQS (125 cfu /100ml) for one or more sampling locations. Note: There is a decreasing trend in E.coli concentrations at each sampling location.

**Bittersweet Road:** Based on single sample data (where geometric data cannot be calculated), there were nine (9) sampling dates in 2018, seven (7) sampling dates in 2019, two (2) sampling dates in 2020, three (3) sampling dates in 2021, and two dates in 2022, where the E.coli results were above the single sample WQS (235 cfu/100ml).

**Main St:** There were nine (9) dates in 2018, seven (7) dates in 2019, two (2) dates in 2020, three (3) dates in 2021, and one (1) date in 2022, where the E.coli results were above the single sample WQS.

**WWTP Outfall:** There was one (1) date in 2018, 2019, and 2020, two (2) dates in 2021, and four (4) dates in 2022, where the E.coli results were above the single sample WQS.

**Ironwood Rd:** There were eight (8) dates in 2018, six (6) dates in 2019, four (4) dates in 2020, two (2) dates in 2021, and one (1) date in 2022, where the E.coli results were above the single sample WQS.

**Angela Blvd:** There were seven (7) dates in 2018, nine (9) dates in 2019, four (4) dates in 2020, three (3) dates in 2021, and two (2) dates in 2022, where the E.coli results were above the single sample WQS (235 cfu/100ml). Note: There is a decreasing trend in E.coli concentrations at each sampling location.

## 2) IDEM Assessment Information Management System (AIMS)

The IDEM Water Quality Assessment Information Management System (AIMS) | Indiana Map (arcgis.com) database was reviewed for water quality (chemical, fish, and macroinvertebrate) data in the MS4 receiving streams. Water quality sampling locations within the MS4 boundaries are shown on **Figure 6**. Water quality data was available for sampling stations:

- LMJ240-0021 (Juday Creek; Grape Road) (2000)
- LMJ240-0022 (Willow Creek; Early Road) (1990 and 2004)
- LMJ240-0005 (Willow Creek; Jefferson Street upstream) (2000)
- LMJ240-00040 (Eller Ditch; Mariellen Avenue) (2005, 2021, 2022)
- LMJ240-0009 (St. Joseph River; Eberhart) (1991-2002)
- LMJ240-0015 (St. Joseph River; Main St. downtown) (2000)
- LMJ240-0016 (St. Joseph River; Bittersweet Road) (2000)
- LMJ240-0026 (St. Joseph River; Mishawaka Avenue) (2002-2022)
- LMJ240-0014 (St. Joseph River; Twyckenham upstream) (2000)

### **IDEM AIMS | LMJ240-0021 (Juday Creek; Grape Road)**

Based on a request to the IDEM to perform an AIMS database search, water quality (chemical) data was available from 2000 for sampling station LMJ240-0021. Parameters analyzed included coliform, E-coli, % saturation, dissolved oxygen (DO), pH, specific conductance, temperature, and turbidity.

Based on five (5) samples from 2000, E. coli results were 688, 205, 185, 411, and 1203 MPN/100 ml for sampling station LMJ240-0021. The single sample WQS is 235 MPN/100ml.

Fish and macroinvertebrate community data was not available. Fish and macroinvertebrate (animals without a backbone that can be seen with the naked eye such as immature dragonflies and mayflies, beetles, snails, crayfish, mussels, etc.) community data were not available. Fish tissue data for PCBs was not available.

### **IDEM AIMS | LMJ240-0022 (Willow Creek; Early Road)**

Based on a request to the IDEM to perform an AIMS database search, the only water quality (chemical) data available for sampling station LMJ240-0022 was from August 15, 1990 and September 28, 2004. Parameters analyzed in 2004 included DO, % saturation, pH, specific conductance, temperature, and turbidity.



Fish community data was not available. The IDEM uses the Index of Biotic Integrity (IBI) to determine if the stream is impaired for Aquatic Life Use due to poor fish community structure. The IDEM fact sheet "Biological Community Assessment: Macroinvertebrates and Fish" discusses the IBI further. An Indiana narrative biological criterion 327 IAC 2-1-3(2) states, "all waters, except those designated as limited use, will be capable of supporting a well-balanced, warm water aquatic community". The water quality definition of a "well-balanced aquatic community" is "an aquatic community which is diverse in species composition, contains several different trophic levels, and is not composed mainly of pollution tolerant species" [327 IAC 2-1-9(59)]. In Indiana, a stream segment is non-supporting when the monitored fish community receives an IBI score of less than thirty-six (36), which is considered "Poor" or "Very Poor".

In addition, the IDEM uses a Qualitative Habitat Evaluation Index (QHEI) to score the available habitat for potential biological community structure. The higher the score the more diverse and better quality the habitat. The IDEM has determined that a QHEI total score of less than fifty-one (51) is poor for habitat, meaning habitat quality could have a negative effect on the biological communities present. If the biology is poor and the habitat is good, the IDEM would look closer at the water chemistry to find a cause.

Macroinvertebrate data was available for sampling station LMJ240-0022 from 1990 and 2004. All macroinvertebrate samples collected from 2004 to the present were collected using a multi-habitat (MHAB) sampling procedure. The mIBI score from 2004 was 20. Based on communication with Mitchell Owens of the IDEM (Senior Environmental Manager), in Indiana, a stream segment is non-supporting for Aquatic Life Use and listed as an Impaired Biotic Community (IBC) when the monitored macroinvertebrate community or fish community receives an mIBI or IBI score of less than thirty-six (36).

#### **IDEM AIMS | LMJ240-0005 (Willow Creek; Jefferson Avenue)**

Based on an AIMS database search by the IDEM, water quality (chemical) data was available from September/October 2000 for sampling station LMJ240-0005. Parameters analyzed included coliform, E-coli, % saturation, DO, pH, specific conductance, temperature, and turbidity.

Based on five (5) total samples from September/October 2000, E. coli results were 547.5, estimated >2420, 688.7, 727, and 517.2 MPN/100ml.

Fish and macroinvertebrate community data were not available. Fish tissue data for PCBs was not available.

#### **IDEM AIMS | LMJ240-0040 (Eller Ditch; Mariellen Avenue)**

Based on an AIMS database search by the IDEM, water quality (chemical) data was limited and sporadically available from 2005, 2021, and 2022 (unless otherwise noted) for sampling station LMJ240-0040.

Water quality parameters analyzed included **Algal Biomass (2005); Bacteriology (2005):** coliform and E-coli; **General Chemistry:** % saturation, alkalinity (2005), chloride (dissolved; 2005), cyanide (2005), DO, fluoride (2005), hardness (2005, 2022), pH, TSS (2005, 2022), total solids (2005, 2022) and TDS (2005, 2022), specific conductance, sulfate

(2005, 2022), temperature, and turbidity (2005); **Metals**; and **Nutrients (2005, 2022)**: COD, ammonia, nitrate + nitrite, phosphorus, TKN, and TOC.

Based on five (5) total samples from July/August 2005, E-coli results were 1553, 4611, 1120, 4786, and 1300 MPN/100ml.

Fish community data was available from July 5, 2006, and June 15, 2022, resulting in IBI scores of 32 and 42, respectively. Macroinvertebrate community data was available from July 19, 2005, resulting in an IBI score of 30. An IBI total score of less than thirty-six (36) is non-supporting for receiving waters. The IBI scores from August 30 and September 8, 2022, are not available at this time. Fish tissue data for PCBs was not available.

Habitat data from August 30 and September 8, 2022, resulted in QHEI scores of 70 and 67, respectively. A QHEI score of less than fifty-one (51) is non-supporting for receiving waters.

#### **IDEM AIMS | LMJ240-0009 (St. Joseph River; Eberhart)**

Based on an AIMS database search by the IDEM, water quality (chemical) data was available from 1991 to 2002 (unless otherwise noted) for sampling station LMJ240-0009. Parameters analyzed included E-coli (1991-1999); **General Chemistry**: alkalinity, chloride (1991, 1999-2002), cyanide, DO, hardness, pH, TS, TSS, TDS (1999-2002), specific conductance, sulfate (1999-2002), temperature, and turbidity (1996-2002); **Metals**; and **Nutrients**: ammonia, COD, nitrate + nitrite, phosphorus, TBOD5, TKN (1991, 1999-2002), and TOC (1999-2002).

E-coli results ranged from 40 to 70 cfu/100ml during 1999, < 20 to 2900 cfu/100ml during 1998, and < 1 to 3900 cfu/100ml during 1997.

Fish and macroinvertebrate community data were not available. Fish tissue data for PCBs was not available.

#### **IDEM AIMS | LMJ240-0015 (St. Joseph River; Main Street)**

Based on an AIMS database search by the IDEM, water quality (chemical) data was available from September/October 2000 for sampling station LMJ240-0015. Parameters analyzed included chlorophyll a, E-coli, % saturation, chloride, DO, pH, specific conductance, temperature, and turbidity.

Based on five (5) total samples from 2000, E-coli results were 100, 140, 30, <10, and 40 cfu/100ml.

Fish and macroinvertebrate community data were not available. Fish tissue data for PCBs was not available.

#### **IDEM AIMS | LMJ240-0016 (St. Joseph River; Bittersweet Rd)**

Based on an AIMS database search by the IDEM, water quality (chemical) data was available from September/October 2000 for sampling station LMJ240-0016. Parameters analyzed included chlorophyll a, E-coli, % saturation, chloride, DO, pH, specific conductance, temperature, and turbidity.

Based on five (5) samples from 2000, E-coli results were 10, 90, 20, <10, and 100 cfu/100ml.

Approaching sampling station LMJ240-0016 (St. Joseph River; Bittersweet) from the west, the City limits extend to Cedar Road (east of Bittersweet) on the south side of the St. Joseph River and to SR331/Capital Ave (west of Bittersweet) on the north side.

Fish and macroinvertebrate community data were not available. Fish tissue data for PCBs was not available.

#### **IDEM AIMS | LMJ240-0026 (St. Joseph River; Mishawaka Ave)**

Based on an AIMS database search by the IDEM, water quality (chemical) data was available from 2002 to 2022 (unless otherwise noted) for sampling station LMJ240-0026 (300 feet upstream of Mishawaka Ave. bridge). E-coli was not a parameter analyzed.

Parameters analyzed included: **General Chemistry:** % saturation (2011-2022), alkalinity, chloride, cyanide (2002-2006), DO, hardness, pH, TSS, TS, TDS, specific conductance, sulfate, temperature, and turbidity; **Metals; Nutrients:** COD, ammonia, nitrate + nitrite, phosphorus, TBOD5, TKN, and TOC; **Pesticides; Polynuclear Aromatic Hydrocarbons:** benzo[a]pyrene; and **Semi-Volatile Organics:** DEHP, hexachlorobenzene, hexachlorocyclopentadiene, pentachlorophenol, and trifluralin (2005-2022).

Fish and macroinvertebrate community data were not available. Fish tissue data for PCBs was not available.

#### **IDEM AIMS | LMJ240-0025 (St. Joseph River; Baugo Bay upstream)**

The IDEM AIMS sampling station LMJ240-0025 (St. Joseph River; Baugo Bay) is located approximately 4 miles upstream from the most eastern sampling station LMJ240-0026 (Mishawaka Ave) in the City. Based on an AIMS database search by the IDEM, water quality (chemical) data was not available for sampling station LMJ240-0025 (St. Joseph River; Baugo Bay).

**Fish tissue data for PCBs** was available from September 2000, August 2005, August 2015, and July 2020 for sampling station LMJ240-0025. Multiple fish species samples were collected during each sampling event. Based on eight (8) samples from 2015, total PCBs were <25, 106, <25, 66, <25, <25, 38.8, and <25 micrograms per kilogram (µg/kg). Based on three (3) samples from 2020, total PCBs were 46.9, <25, and 17 µg/kg. Total PCBs in a White Sucker were 16.6 (2005), <25 (2015), and 17 µg/kg (2020). Total PCBs in a Rock Bass were 34.4 (2005) and <25 µg/kg (2020). Total PCBs in a Longear Sunfish were 46.9 µg/kg in 2020. In addition, sediment data was available from July 19, 2000.

#### **IDEM AIMS | LMJ240-0014 (St. Joseph River; Twyckenham downstream)**

Sampling station LMJ240-0014 (South Bend; Twyckenham) is located approximately 2.5 miles downstream from the most western sampling station LMJ240-0026 (Main St) in the City. Based on an AIMS database search by the IDEM, water quality (chemical) data was available from September/October 2000 for sampling station LMJ240-0014. Parameters analyzed included chlorophyll a, E-coli, % saturation, chloride, DO, pH, specific conductance, temperature, and turbidity.

Based on five total (5) samples from 2000, E-coli results were 40, < 10, 20, 1700, and 320 cfu/100ml.

Fish and macroinvertebrate community data were not available. Fish tissue data for PCBs was not available.

### 3) United States Environmental Protection Agency and United States Geological Survey

Based on a USGS / USEPA database search, water quality data was available from 1977 to 2022 for St. Joseph County. The Water Quality Exchange (WQX) is the mechanism for data partners to submit water monitoring data to USEPA. The Water Quality Portal (WQP) is the mechanism for anyone, including the public, to retrieve water monitoring data from EPA. This cooperative service integrates publicly available water-quality data from the United States Geological Survey (USGS), United States Environmental Protection Agency (USEPA), and over 400 state, federal, tribal, and local agencies. USEPA/USGS water quality data was available from sampling stations:

- LMJ240-0021 (Juday Creek; Grape Road) (2000)
- LMJ240-0005 (Willow Creek upstream; Jefferson St; Powerline Easement) (2000)
- LMJ240-00040 (Eller Ditch; east of Capital Ave) (2005, 2021, 2022)
- LMJ240-0009 (St. Joseph River; Eberhart Golf) (1999-2002)
- LMJ240-0014 (St. Joseph River downstream; Twyckenham) (2000)
- LMJ240-0015 (St. Joseph River; N. Main St. downtown) (2000)
- LMJ240-0016 (St. Joseph River; Bittersweet) (2000)
- LMJ240-0026 (St. Joseph River; Mishawaka Ave) (2002-2010, 2018-2022)

#### **LMJ240-0021 (Juday Creek; Grape Road)**

Water quality (chemical) data was available from October 2000 for sampling station LMJ240-0021. Parameters analyzed included total coliform, E-coli, chloride, DO, % saturation, pH, specific conductance, temperature, and turbidity.

Based on five (5) water samples from 2000, E-coli results were 204.6, 185, 410.6, 1203.3, and 687.7 MPN/100ml.

#### **LMJ240-0005 (Willow Creek upstream; Jefferson St; Powerline easement)**

Water quality (chemical) data was available from September/October 2000 for sampling station LMJ240-0005 (Willow Creek upstream; Jefferson St; Powerline easement). This station is just east of the City limits. Parameters analyzed included total chloroform, E-coli, DO, % saturation, pH, specific conductance, temperature, and turbidity.

Based on five (5) water samples from 2000, E-coli results were 547.5, >2420 (estimated; above the reporting limit), 688.7, 727, and 517.2 MPN/100ml.

#### **LMJ240-0040 (Eller Ditch; Mariellen Avenue)**

Water quality (chemical) data was available on a limited basis (not monthly) from 2005, 2021, and 2022 (unless otherwise noted) for sampling station LMJ240-0040. Parameters

analyzed included **Alga Biomass (2005); Bacterial (2005):** total coliform, E-coli, and enterococcus; **General Chemistry:** alkalinity (2005, 2022), chloride (dissolved; 2005, 2022), cyanide (2005), DO, % saturation, hardness (2005, 2022), pH, specific conductance, sulfate (2005, 2022), TDS (2005, 2022), temperature, total solids (2005, 2022), TSS (2005, 2022), and turbidity; **Metals;** and **Nutrients:** ammonia (2005, 2022), COD (2005, 2022), Kjeldahl nitrogen (2005, 2022), nitrate and nitrite (2005, 2022), phosphorus (2005, 2022), and TOC (2005, 2022).

Based on five (5) water samples from July/August 2005, E-coli results were 1553, 4611, 1120, 4786, and 1300 MPN/100ml.

#### **LMJ240-0009 (St. Joseph River; Eberhart Golf)**

In general, monthly water quality (chemical) data was available from 1992 to 2002 (unless otherwise noted) for sampling station LMJ240-0009. Parameters analyzed included E-coli (1992-1999), **General Chemistry:** alkalinity, chloride (1999-2002), cyanide, DO, hardness, pH, specific conductance, sulfate (1999-2002), temperature (1999-2002), TDS (1999-2002), total solids, TSS, and turbidity (1996-2002); **Metals;** and **Nutrients:** ammonia, COD, Kjeldahl nitrogen (1999-2002), nitrate and nitrite, phosphorus, and TOC (1999-2002).

Based on four (4) water samples from 1999, E-coli ranged from 40 to 70 cfu/100ml. Based on eight (8) samples from 1998, E-coli ranged from 20 to 2900 cfu/100ml. Based on eleven (11) samples from 1997, E-coli ranged from 40 to 3900 cfu/100ml.

#### **LMJ240-0014 (St. Joseph River downstream; Twyckenham)**

Water quality (chemical) data was available from September/October 2000 for sampling station LMJ240-0015. Parameters analyzed included E-coli, chloride, DO, % saturation, pH, specific conductance, temperature, and turbidity.

Based on five (5) water samples from 2000, E-coli results were 320, 1700, 20, < 10, and 40 cfu/100ml.

#### **LMJ240-0015 (St. Joseph River; N. Main St. downtown)**

Water quality (chemical) data was available from September/October 2000 for sampling station LMJ240-0015. Parameters analyzed included chlorophyll a, E-coli, chloride, DO, % saturation, pH, specific conductance, temperature, and turbidity.

Based on five (5) water samples from 2000, E-coli results were 100, 140, 30, < 10, and 40 cfu/100ml. The single sample WQS is 235 cfu/100ml.

#### **LMJ240-0016 (St. Joseph River; Bittersweet)**

Water quality (chemical) data was available from September/October 2000 for sampling station LMJ240-0016. Parameters analyzed included chlorophyll a, E-coli, chloride, DO, % saturation, pH, specific conductance, temperature, and turbidity.

Based on five (5) water samples from 2000, E-coli results were 10, 90, 20, < 10, and 100 cfu/100ml. The single sample WQS is 235 cfu/100ml.

#### **LMJ240-0026 (St. Joseph River; Mishawaka Ave)**

In general, monthly water quality (chemical) data was available from 2002-2010 and **2018-2022** (unless otherwise noted) for sampling station LMJ240-0026. E-coli was not a parameter analyzed. Parameters analyzed included: **General Chemistry:** alkalinity, ammonia (2002-2010), cyanide (2002-2006), DO, % saturation (2018-2022), hardness, pH, specific conductance, sulfate, TDS, temperature, total solids, TSS, and turbidity; **Metals;** **Nutrients:** ammonia, COD, Kjeldahl nitrogen, nitrate and nitrite, phosphorus, and TOC; **Pesticides;** **PAHs:** benzo[a]pyrene; and **Semi-Volatile Organics:** hexachlorobenzene, hexachlorocyclopentadiene, pentachlorophenol, and trifluralin (2005-2010, 2018-2022).

Sampling station LMJ240-0026 is in the immediate vicinity of the Mishawaka Pool. Chloride ranged from 25 to 31 mg/L in 2022, 26 to 44 mg/L in 2021, 23 to 32 mg/L in 2020, 22 to 31 mg/L in 2019, and 27 to 34 mg/L in 2018. In general, the IDEM WQS for chloride is dependent on hardness and sulfate.

DO ranged from 8.09 to 12.89 mg/L in 2022, 9.49 to 13.4 mg/L in 2021, 7.1 to 13.59 mg/L in 2020, 7.71 to 13.93 mg/L in 2019, 7.46 to 13.43 mg/L in 2018. The IDEM WQS for DO is 4 to 12 mg/L (minimum six (6) for cold-water fishery streams).

Nitrate + nitrite ranged from 1.3 to 2 mg/L in 2022, 1.1 to 3 mg/L in 2021, 1.1 to 2.1 mg/L in 2020, 1.2 to 2.9 mg/L in 2019, and 1.3 to 4.1 mg/L in 2018. The IDEM WQS for nitrate plus nitrite is 10 mg/L.

Phosphorus ranged from 0.031 to 0.059 mg/L in 2022, 0.037 to 0.069 mg/L in 2021, 0.026 to 0.115 mg/L in 2020, 0.069 to 0.138 mg/L in 2019, and 0.026 to 0.171 mg/L in 2018. The IDEM WQS for phosphorus is 0.3 mg/L.

TSS was < 10 mg/L in 2022, and ranged from 10-20 mg/L in 2021, 11-26 mg/L in 2020, 12-34 mg/L in 2019, and 11-17 mg/L in 2018. The IDEM target WQS is 30 mg/L.

#### **4) Hoosier Riverwatch**

Based on the Hoosier Riverwatch database, water quality data was available from 2001, 2002, 2004, 2005, 2011, and 2012 for streams and rivers within the City limits. In general, parameters analyzed included E-coli, % saturation, biochemical oxygen demand (BOD), DO, flow, habitat, invert sampling, nitrate, Ortho P, pollution tolerance index rating (PTIR), temperature, temperature change, turbidity, water quality index and pH.

No Juday Creek sampling sites were located within the City MS4. Juday Creek sampling site ID 295 (bridge at SR23) is downstream just west of the City limits. Based on three (3) samples from 2001, 2002, and 2011, E-coli was 316, 683, and 300 cfu/100ml, respectively. There were no sampling sites or datasets available for Willow Creek, Lashbaugh Ditch, Laing Ditch, Woormer Ditch, and Eller Ditch.

St. Joseph River sampling sites within the City MS4 include Site ID 184 (E. Mishawaka Ave), 186 (E. Mishawaka Ave), and 1047 (Capital Ave/Zappia Park). Water quality data was available from May 9, 2001, for sites ID 184 and 186. Parameters analyzed included % saturation, DO, flow, nitrate, temperature, and pH.

**Site ID 1047 (Capital Ave/Zappia Park)**

E-coli and temperature data was available from 2004 (eleven sampling events), 2005 (nine events), 2011 (two events), and 2012 (three events). Additional water quality data was available for % saturation, BOD, DO, flow, habitat, invert sampling, nitrate, Ortho P, PTIR, turbidity, water quality index, and pH in 2011 and 2012.

E-coli ranged from 10 to 160 cfu/100ml in 2004 and 10 to 170 cfu/100ml in 2005. E-coli results were 0 and 50 cfu/100ml in 2011, and 0, 500, and 0 cfu/100ml in 2012.

**Site ID 1048 (Capital Ave/Zappia Park)**

E-coli, temperature, and turbidity data was available from 2004 (11 sampling events) and 2005 (9 events). E-coli ranged from 60 to 2300 cfu/100ml in 2004 and 20 to 5500 cfu/100ml in 2005.

The nearest downstream St. Joseph River sampling is Site ID 1489 (Ironwood Drive). Water quality data was available from 2008, 2009, and 2016, unless otherwise indicated. Parameters analyzed included: % saturation (2008, 2009), BOD (2008, 2009), DO (2009, 2016), flow (2008), habitat (2008), invert sampling, nitrate, Ortho P, PTIR, temperature, temperature change (2016), turbidity, water quality index (2016), and pH.

The only E-coli sample result (0.33 cfu/100ml) was from April 20, 2009.

**5) St. Joseph River Basin Commission**

The St. Joseph River Basin Commission (SJRBC) performed baseline water quality (chemical) sampling at fifty (50) locations in St. Joseph, Noble, Elkhart, and Kosciusko counties from 2014 to 2017. Each location was sampled monthly for a year. Water quality data was available within the City MS4 for Eller Ditch (Site 47 Culvert – Mariellen Avenue west of Kline St) and Woodward Ditch (Site 46 Bridge – York St. west of Oakside Ave) from April 30, 2016, to March 31, 2017. Parameters analyzed included E-coli, pH, temperature, DO, BOD, chlorides, conductivity, TDS, nitrate-nitrite, phosphorus, turbidity, TSS, and flowrate.

At the Eller Ditch sampling location, E-coli was 50 cfu/100ml for nine (9) water samples collected in 2016, and 50, 100, and 100 cfu/100ml for three (3) samples collected in 2017. At the Woodward Ditch sampling location, E-coli was 50 cfu/100ml for nine (9) water samples collected in 2016, and 100, 150, and 150 cfu/100ml for three (3) samples collected in 2017. Water quality data was not available for Juday Creek, Willow Creek, Lashbaugh Ditch, Laing Ditch, Woomer Ditch, or the St. Joseph River.

In 2021, the SJRBC initiated a long-term macroinvertebrate community, monitoring program to evaluate water quality trends and ecosystem functioning at eleven (11) sites along tributaries of the St. Joseph River in Indiana and Michigan. None of the eleven (11) sampling sites are located in the City MS4 receiving waters.

**6) Aquatics Community Monitoring Program**

An additional source of water quality data (beginning 1998) is the Aquatics Community Monitoring Program, a joint effort between the Cities of Elkhart and South Bend to evaluate the health of the St. Joseph and Elkhart Rivers and their tributaries. Baseline fish community monitoring was conducted in St. Joseph County from 2001 to 2006. Other biological

monitoring included the Mishawaka area from 2007 to 2009 and an evaluation of aquatic plant communities in the St. Joseph River Watershed in 2017 and 2018.

Based on a 2021 Aquatic Monitoring Report (Deegan), water quality data exists from 2015 to 2021 for Juday Creek at four (4) sampling locations: Holy Cross Parkway, Winding Brook Drive, Grape Road, and Driftwood Drive. An additional sampling location at Myrtle Street (downstream) is approximately 3 miles west of the Driftwood Drive location.

Juday Creek is considered a cool water stream. The IBI (Simon, 1997) system was used to assess local fish communities, while the Invertebrate Community Index (ICI) (Ohio EPA, 1987) system was used to evaluate macroinvertebrates. The IBI and ICI systems score a stream based on a range of 0 to 60. Habitat is evaluated using the QHEI (Rankin, 1989) system at every site where a fish community survey is completed. The QHEI scores a stream based on a range of 0-100.

In 2021, the IBI, ICI, and QHEI scores at Holy Cross Parkway were 33, 30 (marginally good), and 63, respectively. The IBI, ICI, and QHEI scores at Grape Rd. were 33, 38, and 63, respectively. The IBI, ICI, and QHEI scores at Myrtle St. were 33, 42, and 49, respectively. The only score available for Winding Brook Dr. was the QHEI, which was 52. The only score available for Driftwood Dr. was the ICI, which was 38.

The fish community IBI scores for Holy Cross Parkway has decreased from 38 (2019) to 33 (2021). The IBI score for Grape Rd. has increased from 31 (baseline) to 33. The IBI score for Myrtle has increased from 24 (baseline) to 33.

The macroinvertebrate ICI scores at Holy Cross Parkway has decreased from 44 (2016) to 30, at Grape Rd. from 40 (2015) to 38, and at Myrtle St. from 50 (baseline) to 42. The ICI score at the Driftwood Rd location was unchanged. The Aquatics Program used to recognize Juday Creek as being a stable stream that did not react much to heavy rain events. During the June 2021 sampling, heavy rain caused the stream flow to increase significantly, which contributed to significant sediment movement (particularly at the Holy Cross Parkway location). The sedimentation increase contributed to the lower macroinvertebrate scores.

For the St. Joseph River, fish, macroinvertebrate, and habitat scores were available for five (5) sampling sites in St. Joseph County (South Bend) and three (3) sites in Elkhart County, but not within the MS4 City limits.

In May 2022, Dr. Katherine Barret of the SJRBC prepared a report “Greater Elkhart County Stormwater Partnership Surface Water Monitoring Report: Long-Term Trends in Water Quality (2010 – 2021). Water quality data included E-coli, temperature, DO, pH, TSS, specific conductance, chlorides, nitrates, phosphorus, fish, and macroinvertebrate. The St. Joseph River, Ash Rd. sample location (upstream) may be of interest to the City.

## 7) Indiana Department of Health

Water quality data was requested from the Indiana Department of Health (IDH). The only data available was for sampling station LMJ240-0025 which is Baugo Bay on the St. Joseph River. Fish tissue data for PCBs was available from September 2000, August 2005, August 2015, and July 2020. Based on eight (8) samples from 2015, total PCBs were <25, 106, <25, 66, <25, <25, 38.8, and <25 micrograms per kilogram (µg/kg). Based on three (3) samples from 2020,



total PCBs were 46.9, <25, and 17 µg/kg. Total PCBs in a White Sucker were 16.6 (2005), <25 (2015), and 17 µg/kg (2020). Total PCBs in a Rock Bass were 34.4 (2005) and <25 µg/kg (2020). Total PCBs in a Longear Sunfish were 46.9 µg/kg in 2020.

#### 8) Indiana Water Monitoring Inventory – Purdue University

An additional source of water quality data is the Indiana Water Monitoring Inventory – Purdue University database. The website was reviewed, but was not evaluated in detail.

#### 9) Stream Reach Characterization and Evaluation Report (SRCER)

According to Indiana’s Combined Sewer Overflow (CSO) Strategy (1991 and 1994), all CSO communities are required to address the ninth minimum control measure (MCM). The ninth MCM is “monitoring to effectively characterize CSO impacts and the efficacy of CSO control”. The City of Mishawaka addressed this requirement by completing a Stream Reach Characterization and Evaluation Report (SRCER) and submitting it to the IDEM in May 1999. The SRCER characterized the CSO impacts on the St. Joseph River and provided a baseline for determining long-term CSO controls.

The river study extent was from the Bittersweet bridge (river mile 68) at the eastern boundary (upstream of CSOs) to the Ironwood Bridge (river mile 60) downstream of the CSOs and WWTP discharge. The study area receives CSOs, stormwater, and treated municipal wastewater discharges and included eighteen (18) combined sewer service areas, draining approximately 3,661 acres. The CSO impacts on the St. Joseph River were evaluated based on river and CSO sampling results, and calibrated models of the river and CSO system.

A CSO and river sampling, and sewer system flow monitoring program was conducted in summer/fall 1995. The program involved 1) gathering rainfall data, 2) obtaining dry and wet weather flow, 3) obtaining dry and wet weather samples during three (3) storm events, 4) obtaining bacteria and DO grab samples from the St. Joseph River during two (2) storm events, and 5) obtaining storm sewer bacteria grab samples during two (2) storm events.

Wet weather, river water samples were collected on August 2 and 3, and August 15, 1995 from the Bittersweet and Ironwood bridges. Samples were collected at four (4) hour intervals for 24 hours, with the first sample collected 4 hours before the start of the two (2) storm events. Based on sampling results, dissolved oxygen (DO) concentrations ranged from 6.8 to 10.0 mg/L. The IDEM WQS for DO is 4 to 12 mg/L (minimum six (6) for cold-water fishery streams). CSOs appear to have little impact on the St. Joseph River DO concentrations. Elevated levels of *E. coli* concentrations were observed during wet weather river sampling, with concentrations returning to baseline levels within 24 hours after the start of storm events.

Wet weather, CSO wastewater samples were collected on July 22, August 2 and 3, and August 15, 1995 from three locations; upstream of CSO Diversion Structure 003 (industrial service areas) and inside Diversion Structures 011 (commercial service areas) and 018 (residential service areas). Samples were collected during the first two (2) hours of rainfall events and at five (5) minute intervals. Based on sampling results, initial discharges had high concentrations of solids, exhibiting a “first flush” effect. Total copper concentrations were above the WQS Final Acute Value (FAV) in nineteen (19) of twenty-three (23) samples, while total zinc concentrations were above the WQS in nine (9) of twenty-three (23) samples.

Dry weather sampling was performed on August 24, 1995 at CSO structures 003, 011, and 018 (trunk sewers). Based on sampling results, total and soluble zinc concentrations were above the WQS FAV in one (1) of (3) composite samples at CSO 011, and total copper concentrations were above the WQS FAV in two of three composite samples at CSO 018.

Stormwater sampling was conducted on June 25, and August 11, 1997, from three (3) locations; a 36-inch storm sewer in Battel Park (residential area), a 66-inch storm sewer the corner of Jefferson Blvd. and Merrifield Ave. (residential, commercial, and industrial areas), and a 72-inch storm sewer on the corner of Roosevelt and Linden Avenues (residential area).

Based on dry weather stormwater sampling results from June 25, 1997, E.coli concentrations were 79 cfu/100ml at the Jefferson/Merrifield location and 224 cfu/100ml at the Roosevelt/Linden location, which are below the WQS (235 cfu/100ml).

Based on wet weather sampling results from June 25, 1997, E.coli concentrations ranged from 11,300 to 18,000 cfu/100ml at the Battel Park location, 6,300 to 10,000 cfu/100ml at the Jefferson/Merrifield location, and 4,400 to 11,600 cfu/100ml at the Roosevelt/Linden location.

Based on wet weather sampling results from August 11, 1997, E.coli concentrations ranged from 11,400 to 22,100 cfu/100ml at the Battel Park location, 11,600 to 13,600 cfu/100ml at the Jefferson/Merrifield location, and 6,000 to 13,300 cfu/100ml at the Roosevelt/Linden location.

### **Established TMDLS**

According to MS4GP 3.1(c)(4), the WQCR must include identifying any 303d listed impaired waters or TMDLs for receiving waters.

The IDEM published the “Total Maximum Daily Load for Escherichia coli (*E. coli*) for the St. Joseph River, Elkhart and St. Joseph Counties” in February of 2004. The TMDL report stated there were over eighty-eight (88) combined sewer overflows (CSOs) along the St. Joseph River, while nineteen (19) of those CSOs were located in the City of Mishawaka. There are currently sixteen (16) permitted CSOs in the City. Each community with CSOs is required to complete a Long Term Control Plan (LTCP) in which the City of Mishawaka currently has an approved LTCP for zero overflows during the typical year. In addition, implementing the City MS4 permit will improve water quality and address stormwater impacts in the St. Joseph River.

### **Watershed Management Plans**

A watershed management plan (WMP) is a strategy and a work plan for achieving water resource goals for a geographically defined watershed. Plans include hydrologic and land use information and analysis, public involvement, and other resources which are used to develop the goals and best management practices suited for a watershed. The main purpose of WMPs is to guide stakeholders in protecting and restoring our water resources. The US Environmental Protection Agency (USEPA) sets guidelines for developing an approved WMP.

Several watershed plans have been published within the St. Joseph River Basin, including The St. Joseph River WMP (2005), which covers the entire basin. Approximately 67% of the basin is managed under sub-watershed management plans, such as the Juday Creek WMP (1995).

#### St. Joseph River Watershed Management Plan (June 2005)

The St. Joseph River Watershed is located in the southwest portion of the lower peninsula of Michigan and northwestern portion of Indiana. The watershed drains 4,685 square miles from 15 counties and includes 3,742 river miles. The St. Joseph River WMP goals and objectives were developed to address five primary concerns: sediments, nutrients, habitat and natural systems loss, pathogens, and toxins. The St. Joseph River WMP goals include:

- Establish and sustain the financial and institutional capacity of a stakeholder group (e.g. steering committee, joint basin commission, watershed council, Friends of the St. Joe River Association) that assumes responsibility for coordinating implementation of the management plan and acts as the primary advocacy group, information clearinghouse, and planning partner for the watershed.
- Reduce soil erosion and sedimentation so that surface water functions and aesthetics are improved and protected.
- Reduce the amount of nutrient loading so that surface water functions and aesthetics are improved and protected.
- Increase cooperation, coordination, and collaboration among stakeholders (governmental and nongovernmental) on a regular basis to eliminate program duplication, reduce costs, find more effective solutions, and maximize human, financial, and institutional resources.
- Increase preservation, restoration, protection, and appreciation of open space (a system of natural areas, natural systems, corridors, farmland, open land, and parklands).
- Eliminate/correct sources of disease-causing organisms that are harmful to public health and that limit the use of rivers, creeks, and lakes.
- Reduce the levels of pesticides, and other toxins that are harmful to public health and that degrade aquatic habitat.

As a regulated drain, Juday Creek is managed by the St. Joseph County Surveyor and the St. Joseph County Drainage Board (SJCDB). In 1997, the joint task force was created to provide developers and the SJCDB with technical advice related to watershed management issues. Juday Creek has unique environmental and economic significance as a cold-water resource.

Any proposed project in St. Joseph County or in the City, which will discharge stormwater to Juday Creek, encroach on the existing 75' drainage easement along the creek, or presents a high risk of impact to the stream, requires approval from the SJCDB. The Juday Creek Task Force should review all projects before they are submitted to the Drainage Board. The Task Force assists the developer with the selection and implementation of Best Management Practices (BMPs) to minimize negative impacts to the creek.

The Juday Creek Task Force is comprised of stakeholders from the City of Mishawaka, St. Joseph County Engineering, St. Joseph County Health Department, St. Joseph County Surveyor's Office, St. Joseph County Planning Department, St. Joseph River Basin Commission, University of Notre Dame Biology Department, St. Joseph County Soil and Water Conservation District, Friends of Juday Creek, and Izaak Walton League.

### Juday Creek Watershed Management Plan (October 1995)

Juday Creek, designated as a breeding brown trout (*Salmo trutta*) stream, is 12-miles long, originates in the northeastern portion of St. Joseph County, and discharges into the St. Joseph River in the northcentral portion of the county. The Juday Creek sub watershed includes 37.6 square miles. The Juday Creek WMP goals include:

- Preserve/improve the creek's population of brown trout and other species to 1986 levels
- Reduce the frequency and severity of flooding of riparian landowner's properties
- Eliminate stream bank erosion
- Prevent groundwater contamination
- Develop a master planning process which will add future development in the watershed
- Restore sediment movement in Juday Creek to natural levels based on USGS and IDNR guidance
- Reduce E. coli concentrations in Juday Creek 50% by the year 2000
- Strictly adhere to existing rules and regulations governing activities along the creek
- Establish filter strips along both sides of the creek in agricultural use areas by the year 2000 based on IDNR guidelines
- Preserve/protect the creek's natural wetlands at current locations, meeting or exceeding 1995 levels

### **Lake and River Enhancement Projects**

The goal of the IDNR Division of Fish and Wildlife Lake and River Enhancement Program (LARE) is to protect and enhance aquatic habitat for fish and wildlife, and to ensure the continued viability of Indiana's publicly accessible lakes and streams. The LARE goal is accomplished through measures that reduce non-point sediment and nutrient pollution of surface waters to a level that meets or surpasses state WQS. The program provides technical and financial assistance for projects that fall under three funding categories:

- Watershed Land Treatment, Biological and Engineering Projects
- Aquatic Vegetation Management
- Logjam and Sediment Removal

The Preservation of the Res Inc. (Res) received a LARE engineering/feasibility study grant in 2013 to identify projects within Eller Ditch aimed at reducing sediment and nutrient loading and improving riparian habitat. The Eller Ditch Engineering Feasibility Study report was completed in March 2015. The study notes that the State of Indiana has designated Eller Ditch as a salmonid stream because it is a tributary of the St. Joseph River.

The RES also received a design-build grant in 2015 to address 760 feet of eroding embankments on Eller Ditch, which flows through the Res property, and ultimately the St. Joseph River. The goal of the project was to save approximately 51.4 tons (46.6 metric tons) of eroded soil from entering Eller Ditch each year. Six distinct sites were stabilized with various bioengineering methods in October/November 2016. The methods included the use of rock toe installation, bankfull bench construction, streambank grading, and streambank vegetation

improvements. Project results are included in the Eller Ditch Streambank Stabilization Design/Build Report (August 2017).

The St. Joseph County Drainage Board received a LARE engineering/feasibility study grant in 2002 to identify projects within Juday Creek to improve fish and wildlife habitat. The study explored the feasibility of the recommendations made in the Juday Creek WMP (1995) and focused on projects that will reduce stream bank erosion and surface erosion on land adjacent to the creek, as well as reducing pollutant loading from roads and parking lots. Projects studied included:

- Stabilization/habitat improvement west of Brooktrails Drive
- Erosion control surrounding stormwater outlet at Kenilworth Road
- Stream reroute/wetland filter (southeast side of Interstate 80/90 at US933)
- Stream reconstruction/wetland filter between Ironwood and Douglas Roads
- Pond fill/constructed stream channel (Douglas Rd east of Ironwood)
- Habitat improvement from Edison Lakes Parkway to Fir Rd
- 30-foot filter strips from Capital Avenue to Interstate 80/90
- Infiltration trench on the south side of Interstate 80/90
- Regraded slope/bank stabilization of ditch north of Interstate 80/90

The SJCDB also received a LARE grant in 2012 to stabilize and restore habitat values to Juday Creek and adjacent land along a 1200 feet reach of the creek near the intersection of Douglas Rd and Ironwood Dr. Project results are included in the Juday Creek at Douglas and Ironwood Final Construction Report (May 2014).

#### **f) Potential and Actual Areas of Stormwater Problems**

According to MS4GP 3.1(c)(7), the WQCR must include identification of areas that have a reasonable potential for or are actually contributing to stormwater quality problems based on available land use, complaint information, and relevant chemical, biological, and physical data.

##### **1) Complaint Data**

Complaints or drainage problems (erosion, flooding, illicit discharges, and spills) can be reported on the City of Mishawaka website. The complaint can be anonymous or include name, email, or phone. Complaints, drainage problems and other stormwater concerns are investigated and tracked by the City Sewer Maintenance Department via an Illicit Discharge Tracking Report form. The reporting form includes an incident ID#, the maintenance area (A through L), the collection area, date/time of initial incident, and notes and dates of investigation and corrective action. Each maintenance area is scheduled for inspection on a rotating basis. Potential areas of stormwater quality problems can be determined by historical maintenance trends, land use, complaint information.

##### **2) Industrial Facilities**

The Mishawaka Utilities WWTP has permitted eleven (11) industrial/manufacturing users to discharge to the City sanitary and combined sewers. The facilities are classified by Standard

Identification Classification (SIC) codes which are categorically and significant. A list of WWTP permitted industrial users in the City is available upon request.

The NPDES permit program is authorized by Section 402 of the federal Clean Water Act. NPDES permits are issued by the State of Indiana via a memorandum of agreement with the USEPA. The purpose of a NPDES permit is to control the point source discharge of pollutants into waters of the State such that the water quality is maintained. The IDEM Industrial Permits Section issues permits covering discharges from all industries facilities. Stormwater discharges exposed to industrial activity are regulated under 327 IAC 15-6 (Rule 6). The IDEM is currently working to replace Rule 6 (industrial) with a Master General Permit.

Indiana NPDES permits are tracked within the USEPA Integrated Compliance Information System (ICIS) database. A list of all NPDES permit records within the ICIS system for Indiana is available at the IDEM Wastewater Permitting web page. The file is broken into multiple tabs (22) with the first tab containing all records, then the subsequent tabs containing subsets of specific groups of records commonly of interest. There are nine (9) active industrial stormwater (NPDES) permitted facilities listed in the City. A list of the industrial stormwater (NPDES) permitted facilities is available upon request. Detailed information including maps, inspections, compliance, and reported effluent data for surface discharges is available on the USEPA Enforcement and Compliance History Online (ECHO) web page.

The City has obtained an IDEM Underground Storage Tank (UST) report of sites located in the City limits. The risk to stormwater from UST sites can occur during fuel transferring activities at the pump islands and USTs.

### 3) Residential Septic Systems

Existing City policy states that all new developments are required to connect to the sanitary sewer system, if service is readily available (within 300 feet of property line). However, when sanitary sewer service is not available, on-site wastewater treatment permits are issued by the St. Joseph County Health Department if site conditions meet all applicable Indiana State Department of Health standards.

Septic systems that have failed to meet expected performance criteria, or have violations within the City MS4, will be identified and assessed for their potential to contribute to stormwater quality problems.

### 4) Surface Visual Conveyance Inspections

According to MS4GP 4.7(g) Municipal Operation Pollution Prevention and Good Housekeeping Minimum Control Measure (MCM), an MS4 is required to develop a written operation and maintenance (O&M) plan for MS4 owned and/or operated stormwater infrastructure. The plan at a minimum must include a surface visual inspection of all catch basins, outfalls, and conveyance systems (4.7(g)(3)). The inspections must be prioritized in year one and inspections completed by the end of year five (5) with at least a minimum of 15 percent completed annually. Outfalls and conveyance systems (outfalls, open channels, ditches, and other drainage structures) will also need to be inspected.

Stormwater infrastructure maintenance is performed by the Sewer Maintenance Department. Catch basins, storm inlets, and manholes are inspected on a rotating basis as part of their

preventative maintenance program, and are scheduled based on inlet area maps A through L. In 2022, the City cleaned 336 catch basins and 444 inlets, and the material collected was disposed of at the City Biosolids facility. Bethel cleans catch basins on an as-needed basis.

#### 5) Illicit Discharge Detection and Elimination

According to Chapter 5 of the Illicit Discharge Detection and Elimination (IDDE), A Guidance Manual for Program Development and Technical Assessments (Center for Watershed Protection 2004), desktop assessment of illicit discharge potential uses mapping and other available data to determine the potential severity of illicit discharges within a community, and identifies which sub-watersheds or generating land uses merit priority investigation. Desktop assessments initially characterize illicit discharge potential at the sub-watershed level. Sub-watersheds are then screened based on their composite score, and are designated as having a low, medium, or high risk. Screening factors based on illicit discharge potential may include the frequency of historical discharge complaints/reports/spill responses, frequency of water quality exceeding benchmark values during dry weather, and the location or density of Industrial NPDES stormwater permitted facilities.

In accordance with MS4GP IDDE MCM 4.4(b), 4.4(f), and 4.4(h), the City will review/update the IDDE plan; develop a map that identifies high priority areas for administering the IDDE program, and conduct dry weather screening for all mapped stormwater outfalls owned/operated by the MS4 entity.

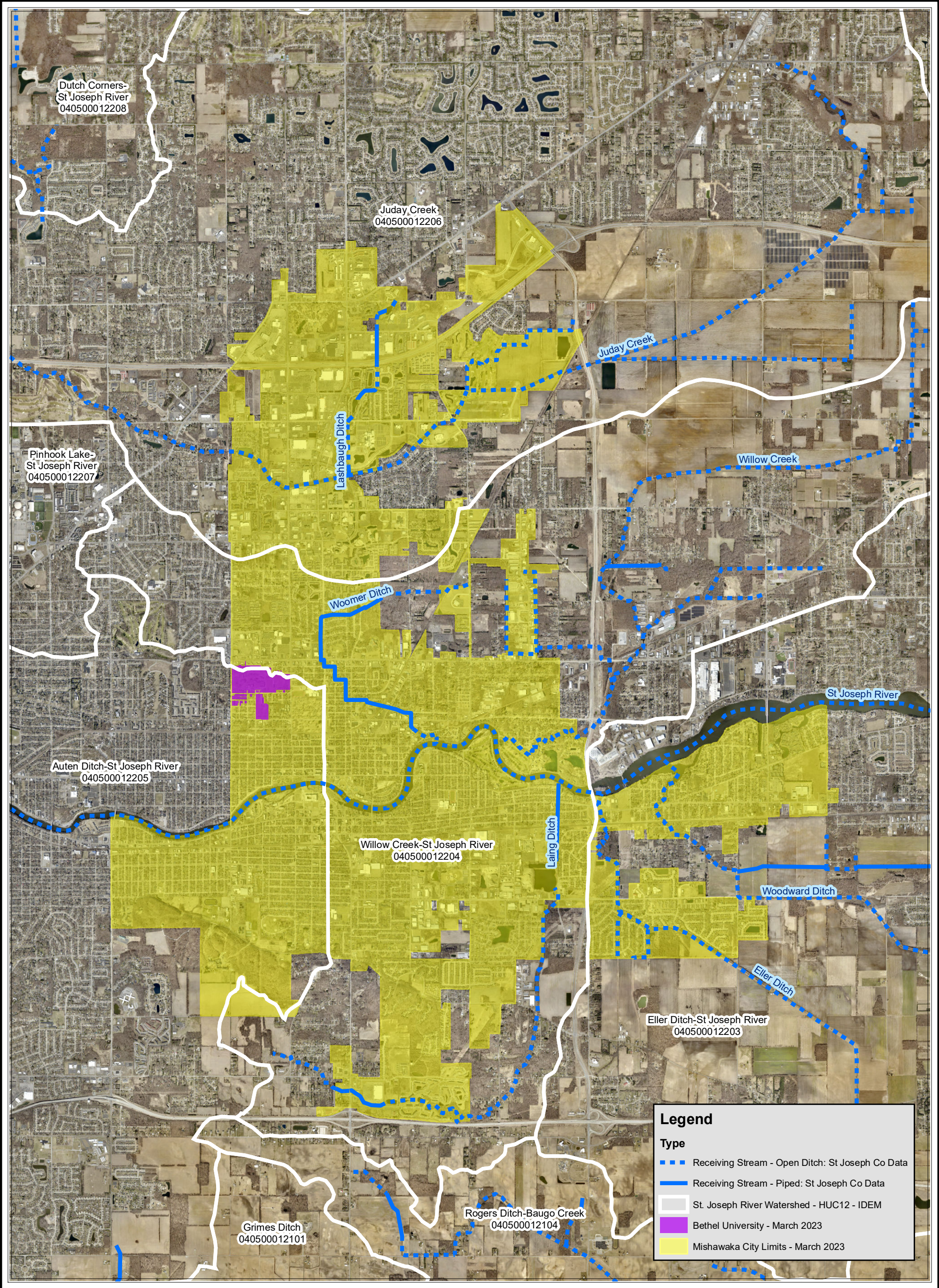
#### **g) Areas or Specific Discharge Points to be Considered for Future Planning and Implementation of New Stormwater Measures or Modification of Existing Measures**

According to MS4GP(c)(8), an evaluation of data collected to determine which areas or specific discharge points that may need to be considered for future planning and implementation of new stormwater measures or modification of existing measures. The highest priority should be given to sensitive areas and the prohibition of new or significantly increased MS4 discharges.

The City of Mishawaka through their LTCP, has identified and modeled all areas of the Storm and Collection system. Specific areas have been identified and are in construction or scheduled for construction, that have Future Water Quality implications.

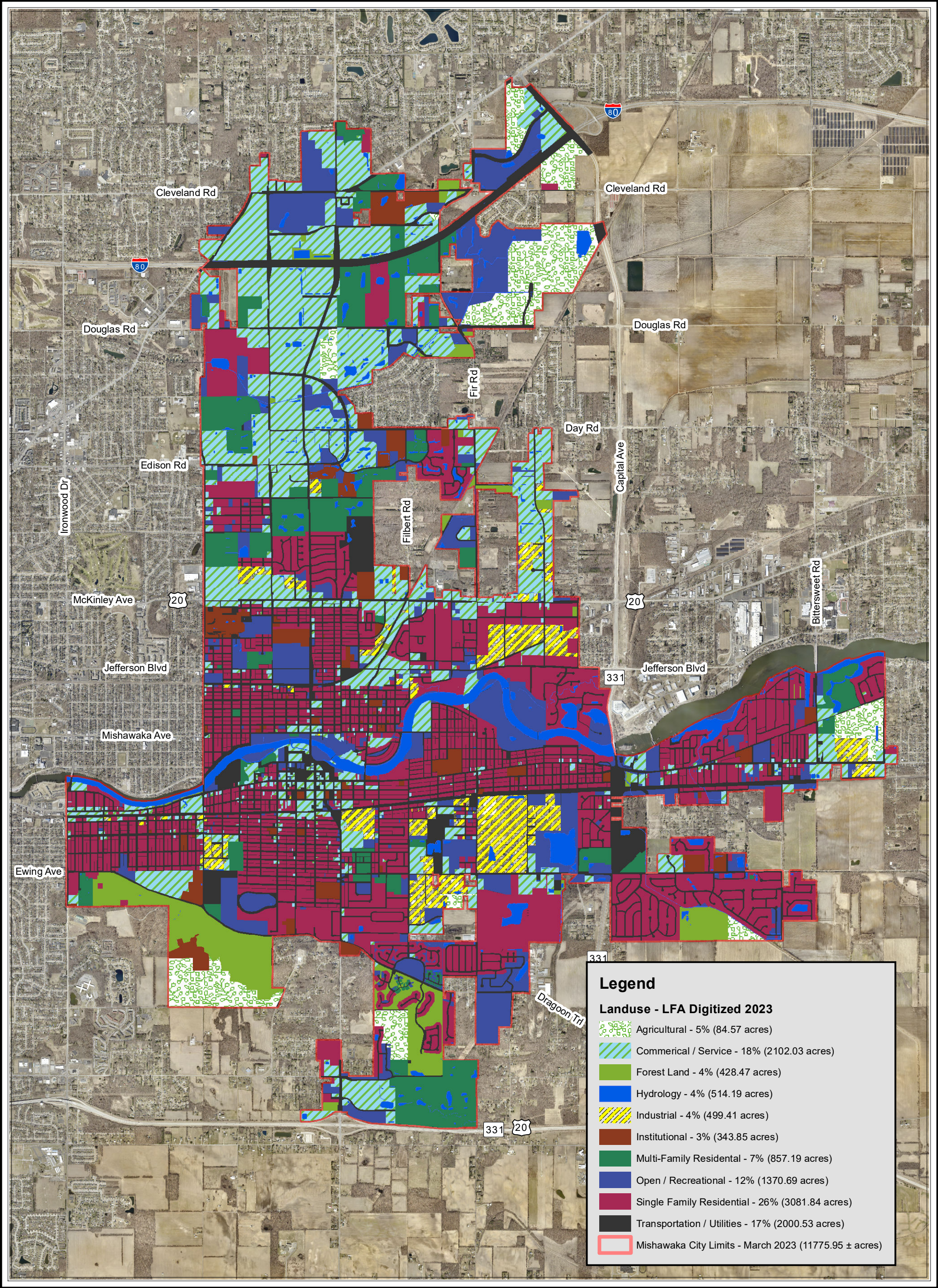
## FIGURES





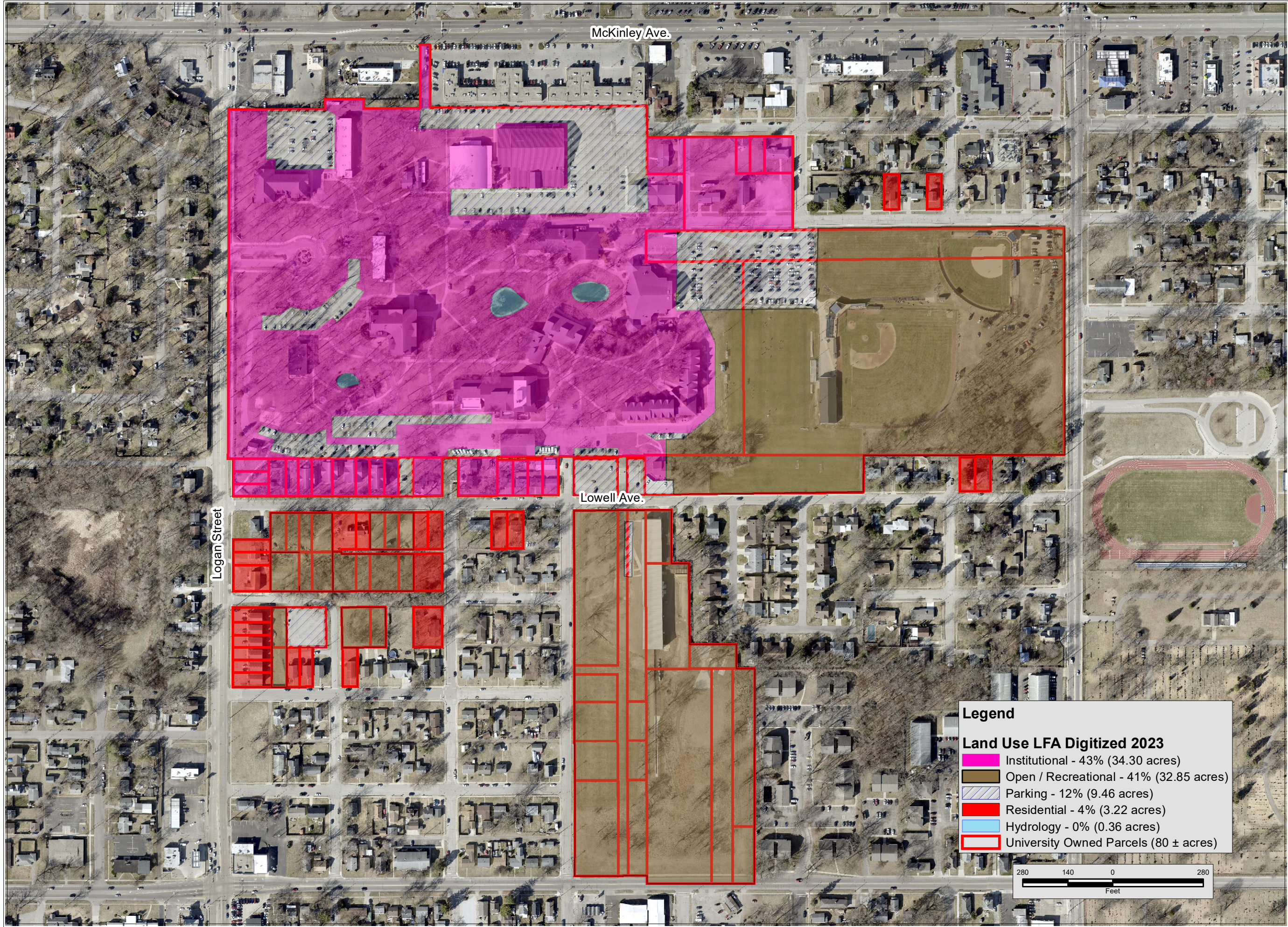
Aerial Photography provided by City of Mishawaka, 2021






Aerial Photography provided by City of Mishawaka, 2021



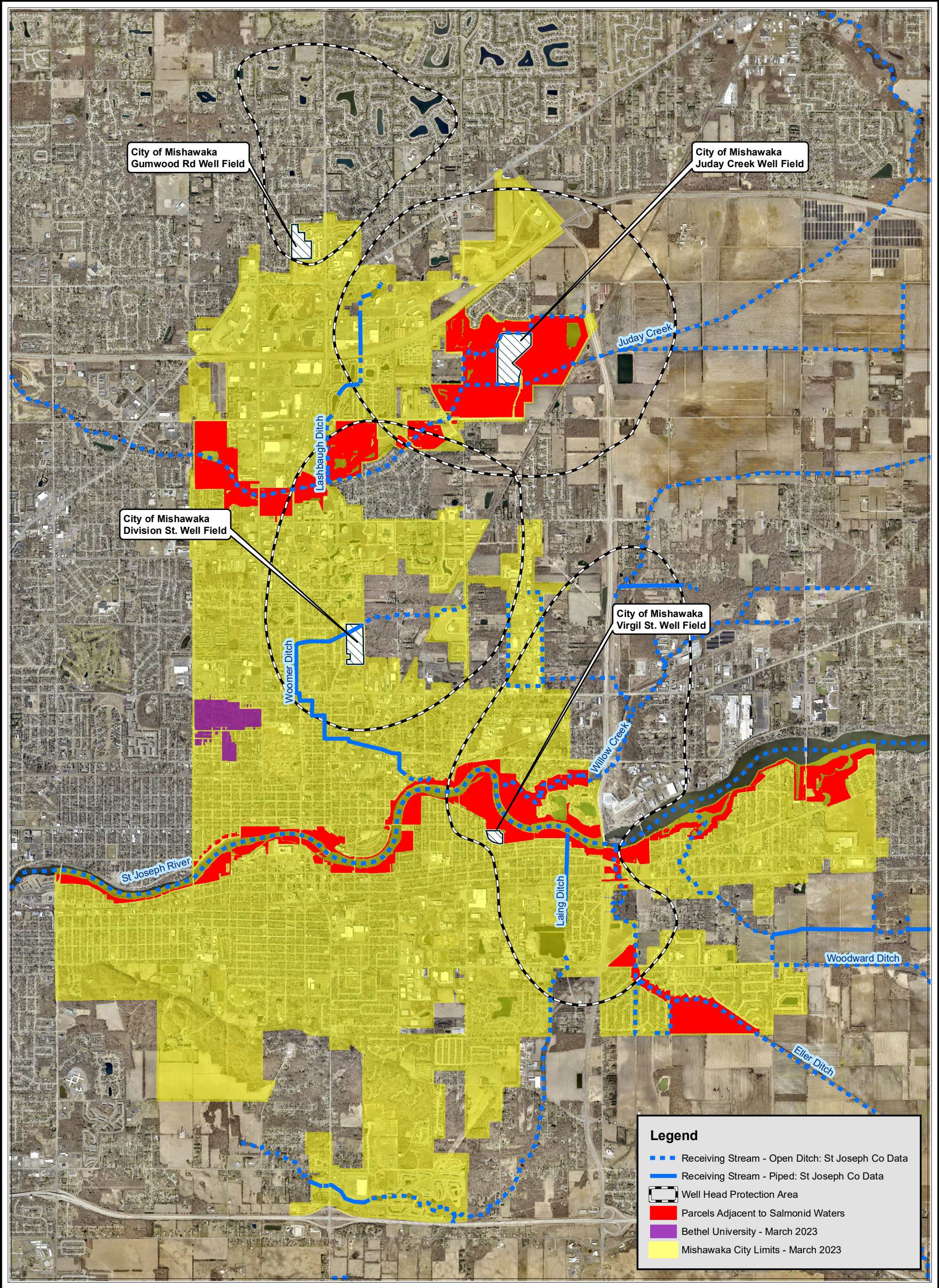


Aerial Photography provided by City of Mishawaka, 2021

Water Quality Characterization Report	 <b>LAWSON FISHER ASSOCIATES P.C.</b> 525 W WASHINGTON AVENUE SOUTH BEND, INDIANA 46601 PH: (574) 234-3167
Figure 3	
202231.00	
March 2023	

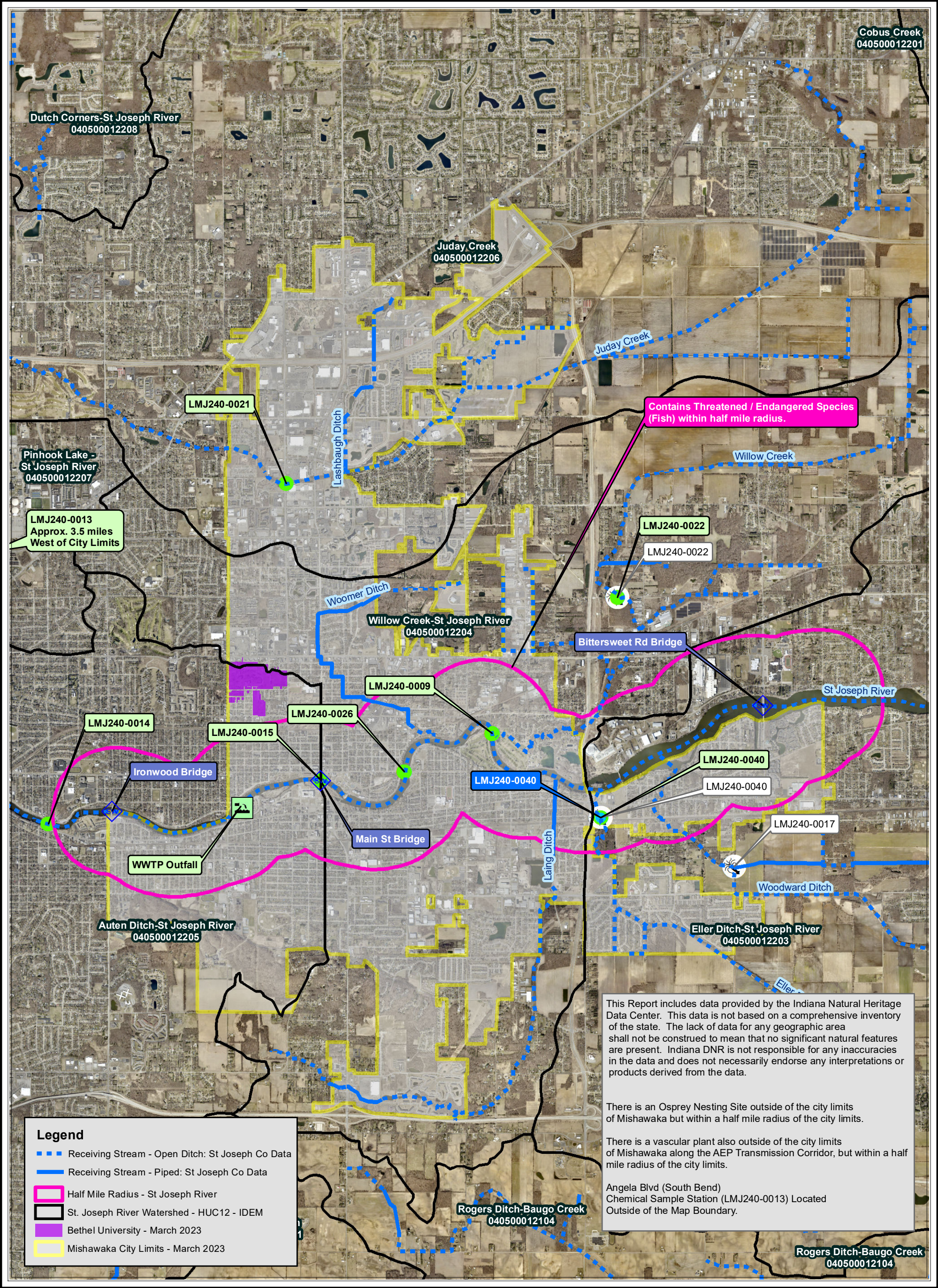
Bethel University Land Use Map





Aerial Photography provided by City of Mishawaka, 2021





Aerial Photography provided by City of Mishawaka, 2021



# TABLES

**Table 1**  
**Summary of MS4 Receiving Waters and Impairments**  
**City of Mishawaka and Bethel University**

Receiving Water	Assessment Unit ID	Miles	Category	Designated Use	Impairment
Juday Creek - St. Joseph River (Coldwater)	INJ01M6_04	7.93	5A	Full Body Contact	E-Coli
<b>Category 5:</b> The available data and/or information indicate that at least one designated use is impaired or threatened and a TMDL is required. <b>Subcategory A:</b> The waterbody has one/more impaired biotic communities or is impaired for one or more pollutants.					
Willow Creek - St. Joseph River (Coldwater)	INJ01M4_T1005	11.44	4A 5A	Full Body Contact Warm Water Aquatic Life	E-Coli Biological Integrity
<b>Category 4:</b> The available data and/or information indicate that at least one designated use is impaired or threatened, but a TMDL is not required. <b>Subcategory A:</b> A TMDL has been completed that is expected to result in attainment of all applicable WQS and has been approved by USEPA.					
Eller Ditch - St. Joseph River (Coldwater)	INJ01M3_T1004	10.95	5A 5A 5B	Full Body Contact Warm Water Aquatic Life Human Health and Wildlife	E-Coli Biological Integrity PCBs in Fish Tissue
<b>Subcategory B:</b> The waterbody is impaired due to the presence of mercury or PCBs, or both in the edible tissue of fish collected at levels exceeding Indiana's human health criteria for these contaminants.					
St. Joseph River (Coldwater)	INJ01M3_03	2.94	4A 5B	Full Body Contact Human Health and Wildlife	E-Coli PCBs in Fish Tissue
St. Joseph River (Coldwater)	INJ01M3_04	0.37	4A 5B	Full Body Contact Human Health and Wildlife	E-Coli PCBs in Fish Tissue
St. Joseph River (Coldwater)	INJ01M3_05	0.61	4A 5B	Full Body Contact Human Health and Wildlife	E-Coli PCBs in Fish Tissue
St. Joseph River (Coldwater)	INJ01M4_02	1.01	4A 5B	Full Body Contact Human Health and Wildlife	E-Coli PCBs in Fish Tissue
St. Joseph River (Coldwater)	INJ01M4_03	1.77	4A 5B	Full Body Contact Human Health and Wildlife	E-Coli PCBs in Fish Tissue
St. Joseph River (Coldwater)	INJ01M4_04	0.26	4A 5B	Full Body Contact Human Health and Wildlife	E-Coli PCBs in Fish Tissue
St. Joseph River (Coldwater)	INJ01M5_02	1.17	4A 5B 5A	Full Body Contact Human Health and Wildlife Warm Water Aquatic Life	E-Coli PCBs in Fish Tissue Biological Integrity
Receiving water and impairment information are based on the 2022 IDEM Intergrated Water Monitoring Assessment Report (Appendix L and M). Note: The USEPA approved a Total Maximum Daily Load (TMDL) report for E. coli in the St. Joseph River (Elkhart and St. Joseph Counties) on July 21, 2004.					

**TABLE 2**  
**ST. JOSEPH RIVER WATER ANALYTICAL RESULTS**  
**MISHAWAKA WASTEWATER LABORATORY**

	Bittersweet Rd	Main St.	WWTP Outfall			Ironwood Rd	Angela Blvd (downstream)	Bittersweet	Main St.	WWTP Outfall	Ironwood Rd	Angela Blvd (downstream)
Sample Date	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	DAY BEFORE SAMPLING	DAY OF SAMPLING	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)
<b>IDEM Water Quality Standards 327 IAC 2-1.6(d)(3) = Full Body Contact Recreational Uses (April through October)</b>												
	Single Sample					Single Sample		Geometric Mean for Five Samples Over 30 days				
	235					235		125				
2/27/18	590	620	603	0.00	0.00	500	625	NA	NA	NA	NA	NA
3/6/18	175	310	480	0.05	0.13	440	380	NA	NA	NA	NA	NA
3/15/18	40	50	756	0.00	0.00	56	40	NA	NA	NA	NA	NA
3/23/18	39	39	30	0.00	0.00	39	45	NA	NA	NA	NA	NA
3/28/18	26	44	13	0.41	0.04	36	52	84	111	154	112	117
4/5/18	320	570	9	0.00	0.05	430	680	NA	NA	NA	NA	NA
4/12/18	17	8	2400	0.00	0.12	80	11	NA	NA	NA	NA	NA
4/19/18	84	144	33	0.09	0.00	160	188	NA	NA	NA	NA	NA
4/26/18	18	9	9	0.00	0.00	22	17	NA	NA	NA	NA	NA
5/3/18	6400	200	84	1.41	1.58	580	4800	139	65	56	148	163
5/10/18	112	100	3	0.16	0.16	100	100	NA	NA	NA	NA	NA
5/17/18	495	700	9	0.12	0.00	900	467	NA	NA	NA	NA	NA
5/24/18	136	CG	16	0.00	0.00	152	CG	NA	NA	NA	NA	NA
5/31/18	3600	900	10	0.94	0.01	540	500	705	335	13	336	579
6/14/18	73	157	9	0.01	0.00	173	127	NA	NA	NA	NA	NA
6/28/18	144	142	3	0.12	0.00	220	230	NA	NA	NA	NA	NA
7/12/18	45	61	21	0.00	0.00	91	55	NA	NA	NA	NA	NA
7/19/18	33	74	7	0.00	1.52	72	96	NA	NA	NA	NA	NA
7/27/18	240	300	109	0.00	0.04	100	100	NA	NA	NA	NA	NA
8/2/18	96	160	18	0.00	0.61	208	76	NA	NA	NA	NA	NA
8/9/18	93	187	17	0.02	0.09	93	153	80	132	22	105	91
8/23/18	200	40	13	0.09	0.00	40	80	NA	NA	NA	NA	NA
8/30/18	50	44	12	0.10	0.00	31	50	NA	NA	NA	NA	NA
9/6/18	112	160	40	0.19	0.00	92	240	NA	NA	NA	NA	NA
9/13/18	83	30	12	0.00	0.00	19	46	NA	NA	NA	NA	NA
9/20/18	44	28	7	0.00	0.92	36	136	84	47	14	38	90
9/27/18	454	1000	5	0.00	0.00	431	300	99	90	12	61	118
10/4/18	80	740	42	0.00	0.00	440	400	108	158	15	104	178
10/11/18	3500	603	7	1.13	0.00	800	410	215	206	10	160	198
10/18/18	11	780	50	0.00	0.00	590	210	144	396	14	317	269



**TABLE 2**  
**ST. JOSEPH RIVER WATER ANALYTICAL RESULTS**  
**MISHAWAKA WASTEWATER LABORATORY**

	Bittersweet Rd	Main St.	WWTP Outfall			Ironwood Rd	Angela Blvd (downstream)	Bittersweet	Main St.	WWTP Outfall	Ironwood Rd	Angela Blvd (downstream)
Sample Date	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	DAY BEFORE SAMPLING	DAY OF SAMPLING	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)
<b>IDEM Water Quality Standards 327 IAC 2-1.6(d)(3) = Full Body Contact Recreational Uses (April through October)</b>												
	Single Sample					Single Sample		Geometric Mean for Five Samples Over 30 days				
	235					235		125				
10/25/18	42	<b>602</b>	15	0.00	0.00	<b>538</b>	117	<b>142</b>	<b>732</b>	16	<b>545</b>	<b>261</b>
11/8/18	80	72	60	0.00	0.00	84	136	NA	NA	NA	NA	NA
11/20/18	84	200	20	0.00	0.00	<b>312</b>	80	NA	NA	NA	NA	NA
11/29/18	<b>1220</b>	<b>1680</b>	47	0.02	0.03	<b>1860</b>	<b>1920</b>	NA	NA	NA	NA	NA
12/6/18	152	112	78	0.00	0.00	212	<b>266</b>	NA	NA	NA	NA	NA
12/13/18	100	40	112	0.00	0.18	40	40	NA	NA	NA	NA	NA
12/21/18	112	88	<b>300</b>	0.00	0.08	69	100	NA	NA	NA	NA	NA
1/4/19	<b>436</b>	<b>900</b>	102	0.00	0.00	<b>924</b>	<b>720</b>	NA	NA	NA	NA	NA
1/17/19	89	41	32	0.01	0.00	25	31	NA	NA	NA	NA	NA
1/24/19	<b>1460</b>	<b>580</b>	73	0.49	0.00	<b>340</b>	120	NA	NA	NA	NA	NA
2/7/19	<b>1680</b>	<b>1040</b>	<b>312</b>	0.31	0.11	<b>960</b>	<b>2420</b>	NA	NA	NA	NA	NA
2/28/19	96	46	3	0.00	0.00	56	92	NA	NA	NA	NA	NA
3/14/19	120	200	10	0.11	0.31	88	104	NA	NA	NA	NA	NA
3/21/19	<b>240</b>	176	9	0.41	0.00	196	100	NA	NA	NA	NA	NA
3/28/19	50	17	2	0.00	0.03	22	56	NA	NA	NA	NA	NA
4/11/19	152	<b>308</b>	24	0.03	0.02	<b>300</b>	109	NA	NA	NA	NA	NA
4/17/19	195	200	3	0.00	0.00	170	<b>310</b>	NA	NA	NA	NA	NA
5/9/19	100	<b>525</b>	49	0.00	0.24	<b>310</b>	196	NA	NA	NA	NA	NA
5/16/19	52	44	8	0.00	0.05	52	100	NA	NA	NA	NA	NA
5/23/19	<b>1330</b>	<b>1330</b>	<b>318</b>	0.26	0.44	<b>1310</b>	<b>2990</b>	NA	NA	NA	NA	NA
6/5/19	42	144	3	0.00	0.17	82	<b>1600</b>	NA	NA	NA	NA	NA
6/13/19	200	<b>310</b>	15	0.00	0.75	210	<b>1040</b>	NA	NA	NA	NA	NA
6/21/19	<b>7500</b>	<b>3200</b>	20	0.47	0.00	<b>3600</b>	<b>7100</b>	NA	NA	NA	NA	NA
6/27/19	147	200	15	0.13	0.27	<b>300</b>	<b>580</b>	NA	NA	NA	NA	NA
7/11/19	64	125	53	0.01	0.00	110	150	NA	NA	NA	NA	NA
7/18/19	152	<b>400</b>	8	0.27	0.00	88	160	NA	NA	NA	NA	NA
7/26/19	120	144	64	0.00	0.00	140	88	NA	NA	NA	NA	NA
8/1/19	94	90	8	0.00	0.00	103	144	NA	NA	NA	NA	NA
8/8/19	84	124	18	0.00	0.18	110	<b>2680</b>	98	<b>152</b>	21	109	<b>241</b>
8/15/19	61	57	2	0.00	0.00	88	120	97	<b>130</b>	11	104	<b>231</b>

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	Bittersweet Rd	Main St.	WWTP Outfall			Ironwood Rd	Angela Blvd (downstream)	Bittersweet	Main St.	WWTP Outfall	Ironwood Rd	Angela Blvd (downstream)
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<b>IDEM Water Quality Standards 327 IAC 2-1.6(d)(3) = Full Body Contact Recreational Uses (April through October)</b>												
	Single Sample					Single Sample		Geometric Mean for Five Samples Over 30 days				
	235					235		125				
8/29/19	64	49	3	0.00	0.00	42	120	NA	NA	NA	NA	NA
9/5/19	40	28	29	0.00	0.00	33	46	NA	NA	NA	NA	NA
9/12/19	44	50	18	0.00	0.16	76	<b>328</b>	NA	NA	NA	NA	NA
9/19/19	50	38	18	0.00	0.00	50	86	NA	NA	NA	NA	NA
9/25/19	44	28	7	0.00	0.00	50	84	48	37	11	48	106
10/3/19	<b>660</b>	<b>640</b>	47	0.10	0.18	<b>510</b>	<b>640</b>	76	62	20	80	<b>147</b>
10/9/19	96	76	27	0.00	0.00	84	74	91	76	20	96	<b>162</b>
10/18/19	52	40	174	0.00	0.01	32	32	94	73	31	81	102
10/24/19	88	57	37	0.00	0.00	78	39	105	79	36	88	87
11/1/19	<b>2920</b>	<b>2800</b>	<b>841</b>	1.01	0.83	<b>2720</b>	<b>2600</b>	<b>243</b>	<b>199</b>	93	<b>196</b>	<b>173</b>
11/8/19	130	120	<b>1475</b>	0.00	0.00	120	150	<b>176</b>	<b>142</b>	<b>185</b>	<b>147</b>	<b>129</b>
11/22/19	208	<b>400</b>	136	0.30	0.06	82	74	NA	NA	NA	NA	NA
12/13/19	52	60	218	0.00	0.00	150	95	NA	NA	NA	NA	NA
1/9/20	<b>520</b>	<b>600</b>	160	0.00	0.00	<b>800</b>	<b>680</b>	NA	NA	NA	NA	NA
1/23/20	84	120	168	0.00	0.01	60	60	NA	NA	NA	NA	NA
1/31/20	120	190	<b>435</b>	0.00	0.00	155	115	NA	NA	NA	NA	NA
2/7/20	108	32	<b>2100</b>	0.00	0.07	72	52	NA	NA	NA	NA	NA
2/13/20	108	123	119	0.00	0.00	86	152	NA	NA	NA	NA	NA
2/21/20	105	<b>240</b>	25	0.00	0.00	100	72	104	117	<b>215</b>	90	83
3/6/20	40	90	<b>1300</b>	0.00	0.03	<b>250</b>	145	NA	NA	NA	NA	NA
3/13/20	100	110	12	0.00	0.01	108	220	NA	NA	NA	NA	NA
3/18/20	4	20	30	0.00	0.05	12	4	NA	NA	NA	NA	NA
3/26/20	30	35	105	0.01	0.00	20	50	NA	NA	NA	NA	NA
4/2/20	160	170	14	0.00	0.00	205	160	38	65	59	67	63
4/9/20	<b>624</b>	<b>260</b>	4	0.12	0.00	<b>268</b>	<b>328</b>	65	81	18	68	75
4/16/20	44	48	4	0.03	0.00	68	60	56	68	15	62	58
4/23/20	36	40	20	0.11	0.00	52	80	86	78	14	83	105
4/30/20	CG	CG	5	0.32	0.05	CG	CG	112	96	7	118	<b>126</b>
5/7/20	20	16	<b>3100</b>	0.01	0.00	24	44	67	53	22	69	91
5/21/20	200	<b>317</b>	7	0.00	0.00	<b>350</b>	<b>540</b>	NA	NA	NA	NA	NA

**TABLE 2**  
**ST. JOSEPH RIVER WATER ANALYTICAL RESULTS**  
**MISHAWAKA WASTEWATER LABORATORY**

	Bittersweet Rd	Main St.	WWTP Outfall			Ironwood Rd	Angela Blvd (downstream)	Bittersweet	Main St.	WWTP Outfall	Ironwood Rd	Angela Blvd (downstream)
Sample Date	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	DAY BEFORE SAMPLING	DAY OF SAMPLING	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)
<b>IDEM Water Quality Standards 327 IAC 2-1.6(d)(3) = Full Body Contact Recreational Uses (April through October)</b>												
	Single Sample					Single Sample		Geometric Mean for Five Samples Over 30 days				
	235					235		125				
5/28/20	84	100	7	0.07	0.52	300	100	NA	NA	NA	NA	NA
6/4/20	60	180	4	0.00	0.00	64	88	NA	NA	NA	NA	NA
6/12/20	126	86	16	0.10	0.01	76	133	NA	NA	NA	NA	NA
6/18/20	30	153	10	0.00	0.00	41	38	82	150	8	116	119
6/25/20	132	120	15	0.16	0.00	80	320	76	123	9	86	107
7/9/20	40	50	22	0.00	0.00	64	84	NA	NA	NA	NA	NA
7/16/20	44	200	25	0.66	0.61	240	1200	NA	NA	NA	NA	NA
7/23/20	23	32	24	0.00	0.00	66	120	NA	NA	NA	NA	NA
7/30/20	44	32	4	0.00	0.00	112	104	NA	NA	NA	NA	NA
8/6/20	12	8	12	0.00	0.00	36	68	29	38	14	84	154
8/13/20	44	32	74	0.00	0.00	28	72	30	35	18	71	149
8/20/20	40	33	20	0.00	0.00	62	122	29	24	18	54	94
8/27/20	20	56	13	0.00	0.06	48	80	28	27	16	51	87
9/3/20	42	45	14	0.00	0.00	80	150	28	29	20	47	94
9/17/20	17	26	12	0.00	0.00	8	58	NA	NA	NA	NA	NA
10/1/20	39	12	10	0.02	0.28	13	40	NA	NA	NA	NA	NA
10/8/20	10	20	25	0.00	0.00	5	36	NA	NA	NA	NA	NA
10/16/20	20	22	16	0.06	0.00	40	36	NA	NA	NA	NA	NA
10/23/20	92	16	28	0.38	0.17	24	100	NA	NA	NA	NA	NA
12/3/20	22	23	61	0.00	0.00	16	23	NA	NA	NA	NA	NA
12/10/20	16	12	219	0.00	0.00	20	26	NA	NA	NA	NA	NA
1/7/21	77	138	78	0.00	0.00	93	109	NA	NA	NA	NA	NA
1/14/21	58	28	54	0.00	0.09	31	22	NA	NA	NA	NA	NA
1/29/21	29	24	178	0.00	0.00	28	91	NA	NA	NA	NA	NA
2/4/21	46	26	40	0.08	0.01	29	88	NA	NA	NA	NA	NA
2/25/21	7	13	5	0.00	0.00	10	37	NA	NA	NA	NA	NA
3/4/21	55	33	6	0.00	0.00	24	26	NA	NA	NA	NA	NA
3/11/21	19	15	768	0.00	0.00	8	4	NA	NA	NA	NA	NA
3/25/21	35	65	<1	0.09	0.39	62	39	NA	NA	NA	NA	NA
4/16/21	17	12	326	0.00	0.00	22	29	NA	NA	NA	NA	NA

**TABLE 2**  
**ST. JOSEPH RIVER WATER ANALYTICAL RESULTS**  
**MISHAWAKA WASTEWATER LABORATORY**

	Bittersweet Rd	Main St.	WWTP Outfall			Ironwood Rd	Angela Blvd (downstream)	Bittersweet	Main St.	WWTP Outfall	Ironwood Rd	Angela Blvd (downstream)
Sample Date	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	DAY BEFORE SAMPLING	DAY OF SAMPLING	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)
<b>IDEM Water Quality Standards 327 IAC 2-1.6(d)(3) = Full Body Contact Recreational Uses (April through October)</b>												
	Single Sample					Single Sample		Geometric Mean for Five Samples Over 30 days				
	235					235		125				
4/22/21	23	14	2	0.01	0.00	17	20	NA	NA	NA	NA	NA
5/7/21	5	11	3	0.02	0.01	11	17	NA	NA	NA	NA	NA
5/13/21	228	<b>313</b>	34	0.00	0.00	219	<b>548</b>	NA	NA	NA	NA	NA
5/20/21	9	6	2	0.00	0.00	16	24	NA	NA	NA	NA	NA
5/27/21	14	34	6	0.31	0.09	44	135	NA	NA	NA	NA	NA
6/4/21	11	19	5	0.00	0.00	30	54	17	27	6	35	70
6/17/21	7	32	15	0.00	0.00	32	65	NA	NA	NA	NA	NA
6/24/21	53	104	40	0.00	0.00	104	126	NA	NA	NA	NA	NA
7/1/21	157	186	7	0.02	0.02	185	201	NA	NA	NA	NA	NA
7/15/21	<b>344</b>	167	<b>411</b>	0.00	0.00	123	161	NA	NA	NA	NA	NA
7/22/21	50	51	74	0.00	0.00	30	41	NA	NA	NA	NA	NA
7/30/21	<b>365</b>	<b>365</b>	16	0.16	0.00	41	79	NA	NA	NA	NA	NA
8/6/21	20	36	26	0.00	2.45	41	67	NA	NA	NA	NA	NA
8/12/21	<b>1046</b>	142	3	0.59	0.23	<b>345</b>	<b>1120</b>	<b>167</b>	<b>110</b>	33	73	<b>131</b>
8/19/21	47	24	21	0.00	1.20	37	66	112	74	18	58	110
9/3/21	14	16	20	0.00	0.00	23	46	NA	NA	NA	NA	NA
9/24/21	<b>261</b>	48	5	0.31	0.00	67	116	NA	NA	NA	NA	NA
9/30/21	46	30	<1	0.00	0.00	29	21	NA	NA	NA	NA	NA
10/20/21	71	71	3	0.00	0.03	36	52	NA	NA	NA	NA	NA
10/27/21	<b>&gt;2420</b>	<b>&gt;2420</b>	2	0.00	0.01	<b>&gt;2420</b>	<b>&gt;2420</b>	NA	NA	NA	NA	NA
11/4/21	55	49	26	0.01	0.00	51	86	NA	NA	NA	NA	NA
11/17/21	166	122	<b>1979</b>	0.27	0.21	150	148	NA	NA	NA	NA	NA
12/1/21	147	124	4	0.00	0.03	96	124	NA	NA	NA	NA	NA
12/15/21	130	99	29	0.00	0.18	161	219	NA	NA	NA	NA	NA
1/13/22	105	86	70	0.00	0.00	76	50	NA	NA	NA	NA	NA
1/27/22	No Sample	31	51	0.00	0.00	26	31	NA	NA	NA	NA	NA
2/10/22	58	55	55	0.13	0.00	34	46	NA	NA	NA	NA	NA
3/17/22	25	28	4	0.00	0.00	23	15	NA	NA	NA	NA	NA
3/24/22	<b>687</b>	214	1	0.49	0.10	201	210	NA	NA	NA	NA	NA
3/31/22	49	45	8	0.38	0.28	72	<b>649</b>	NA	NA	NA	NA	NA

**TABLE 2**  
**ST. JOSEPH RIVER WATER ANALYTICAL RESULTS**  
**MISHAWAKA WASTEWATER LABORATORY**

	Bittersweet Rd	Main St.	WWTP Outfall			Ironwood Rd	Angela Blvd (downstream)	Bittersweet	Main St.	WWTP Outfall	Ironwood Rd	Angela Blvd (downstream)
Sample Date	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	DAY BEFORE SAMPLING	DAY OF SAMPLING	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)	E. Coli (cfu/100ml)
<b>IDEM Water Quality Standards 327 IAC 2-1.6(d)(3) = Full Body Contact Recreational Uses (April through October)</b>												
	Single Sample					Single Sample		Geometric Mean for Five Samples Over 30 days				
	235					235		125				
4/13/22	22	16	4	0.00	0.57	23	16	NA	NA	NA	NA	NA
4/21/22	23	37	18	0.01	0.00	35	64	NA	NA	NA	NA	NA
4/28/22	25	38	40	0.00	0.00	25	50	NA	NA	NA	NA	NA
5/2/22	28	15	31	0.00	0.00	25	28	NA	NA	NA	NA	NA
5/26/22	55	41	16	0.00	0.00	44	<b>248</b>	NA	NA	NA	NA	NA
6/2/22	28	23	6	0.00	0.00	17	78	NA	NA	NA	NA	NA
6/9/22	<b>&gt;2419.6</b>	<b>461</b>	3	0.00	0.00	<b>260</b>	<b>435</b>	NA	NA	NA	NA	NA
6/16/22	104	101	15	0.00	0.00	65	147	NA	NA	NA	NA	NA
7/15/22	20	19	7	0.00	0.00	19	48	NA	NA	NA	NA	NA
8/1/22	52	20	3	0.00	0.00	30	50	NA	NA	NA	NA	NA
8/18/22	42	21	1	0.00	0.00	26	125	NA	NA	NA	NA	NA
8/25/22	30	17	1	0.00	0.00	21	93	NA	NA	NA	NA	NA
9/27/22	96	28	20	0.00	0.00	147	1	NA	NA	NA	NA	NA
10/4/22	13	14	1	0.00	0.00	6	31	NA	NA	NA	NA	NA
10/13/22	32	23	6	0.00	0.00	37	79	NA	NA	NA	NA	NA
10/25/22	7	55	<1	0.00	0.00	7	28	NA	NA	NA	NA	NA
11/1/22	21.6	29.4	2	0.00	0.00	35.9	36.4	NA	NA	NA	NA	NA
11/11/22	5.2	9.7	<b>461.1</b>	0.00	0.00	13.1	13.4	NA	NA	NA	NA	NA
11/29/22	139.6	82.3	<b>275.5</b>	0.00	0.00	82	146.7	NA	NA	NA	NA	NA
12/6/22	15	20	<b>1046</b>	0.00	0.00	21	111	NA	NA	NA	NA	NA
12/13/22	28.1	28.2	<b>387.3</b>	0.00	0.00	35	110.6	NA	NA	NA	NA	NA
12/20/22	41	66	55	0.00	0.00	64	77	NA	NA	NA	NA	NA

**Bold** values indicate the water quality standards are exceeded.

Note: In accordance with 327 IAC 2-1.6(d)(3): For full body contact recreational uses, E. coli bacteria must not exceed the following: A) One hundred twenty-five (125) colony forming units (cfu) or most probable number (MPN) per one hundred (100) milliliters as a geometric mean based on not less than five (5) samples equally spaced over a thirty (30) day period. (B) Two hundred thirty-five (235) cfu or MPN per one hundred (100) milliliters in any one (1) sample in a thirty (30) day period,

However, a single sample is used for making beach notification and closure decisions. If a geometric mean cannot be calculated because five (5) equally spaced samples are not available, then the criterion stated in clause (B) must be met.

All samples were collected from a bridge over the St. Joseph River, except for the WWTP Outfall location.