

DRAFT – February 27, 2023



**Water & Sewerage
Department**

**WEST CHICAGO AND SCHOOLCRAFT
Clean Water State Revolving Fund
Project Planning Document**

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Acronyms

BOWC – Board of Water Commissioners
CSO – Combined Sewer Overflow
CWSRF – Clean Water State Revolving Funds
DWSD – Detroit Water and Sewerage Department
EGLE – Michigan Department of Environment, Great Lakes and Energy
GLWA – Great Lakes Water Authority
GSI – Green Stormwater Infrastructure
HGL – Hydraulic Grade Line
H/H – Hydrologic/Hydraulic
IPaC – Intra-Governmental Payment and Collection
MDEQ – Michigan Department of Environmental Quality (Renamed EGLE)
MNFI – Michigan Natural Features Inventory
NPDES – National Pollutant Discharge Elimination System
NREPA – Natural Resources and Environmental Protection Act
PCSWMO – Post- Construction Stormwater Management Ordinance Fact Sheet
REU – Residential Equivalency Units
SECS – Soil Erosion and Sedimentation Control Program
SEMCOG – Southeast Michigan Council of Governments
SHPO – State Historic Preservation Offices
THPO – Tribal Historic Preservation Officers
URT – Upper Rouge Tunnel
USACE – United States Army Corps of Engineers
USFWS – United States Fish and Wildlife Services
WRRF – Water Resource Recovery Facility

1. BACKGROUND

Detroit Water and Sewage Department (DWSD) is submitting this Project Planning Document to apply for funding through the Clean Water State Revolving Fund (CWSRF) to design and construct a stormwater enhancement project to address combined sewer system overflows in two neighboring locations on the west side of the Rouge River. The project will reduce the frequency and volume of combined sewer overflows and meet several requirements of the National Pollutant Discharge Elimination System (NPDES) Permit No. MI0022802. The NPDES Permit can be found in Appendix B. The project planning document addresses four of the untreated CSO outfalls categorized in the permit as Limited Discharge Authorization. Table 1 below represents untreated CSOs that are non-core outfalls that will be required to be addressed under the adaptive management CSO correction program.

Table 1: Limited Discharge Authorization for Untreated CSOs under the Adaptive Management CSO Correction Program

PERMIT OUTFALL	LOCATION	LAT/LONG	RECEIVING STREAM
062	West Chicago (B063) West Chicago & Rouge River (West Shore)	42°21'46" 083°15'18"	Rouge River
063	Plymouth (B064) Plymouth & Rouge River	42°22'18" 083°15'21"	Rouge River
066	Schoolcraft (B070) Jeffries Freeway, I-96 & Rouge River	42°23'07" 083°16'02"	Rouge River
067	West Parkway (B069) Jeffries Freeway, I-96 & Rouge River	42°23'07" 083°16'02"	Rouge River

The Great Lakes Water Authority developed a Wastewater Master Plan in June 2020 that identified key locations in the local DWSD system to reduce frequent discharges of combined sewer overflows caused by downstream siphon size restrictions or clogging. Those untreated CSO outfall locations are in the West Chicago and Schoolcraft neighborhoods - B063, B064, B069 and B070 (CSO outfall Id based on GLWA/DWSD). Addressing the CSO outfalls in this area would optimize the performance of the existing system, including cleaning and unclogging the downstream system to increase the overall capacity of the combined system. The overall GLWA Wastewater Master plan completed in June 2020 can be found in Appendix E.

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1.1 STUDY AREA AND SERVICE AREAS

The City of Detroit is a 143 square mile community located north of the Detroit River in Wayne County that borders 21 communities. The study area is divided into two projects based on CSO outfall locations: West Chicago and Schoolcraft. The untreated CSO outfall locations are along the Rouge River, which ultimately outlets into the Detroit River.

Table 2: Project Location Summary

Project Area	Area (ac)	Untreated CSO	Receiving Stream
West Chicago North	58	B064	Rouge River
West Chicago South	63	B063	
Schoolcraft North	88	B070	Rouge River
Schoolcraft South	95	B069	

WEST CHICAGO (Figure 1): A residential neighborhood between US-24 and West Outer Drive and two blocks north of and three blocks south of Plymouth Road. This area encompasses approximately 800 houses and 29 businesses on Plymouth Road. The sanitary and stormwater needs are currently being serviced by a combined system that has two CSO overflows, B064 and B063, to the Rouge River. Flow from smaller storm events and dry weather sanitary flow are conveyed under the Rouge River via a siphon system that discharges to the Northwest Interceptor. This interceptor sewer flows south paralleling the Rouge River to the Hubbell/Southfield Combined Sewer Overflow facility. Flows from this facility are then passed downstream to the GLWA Water Resource Recovery Facility (WRRF).

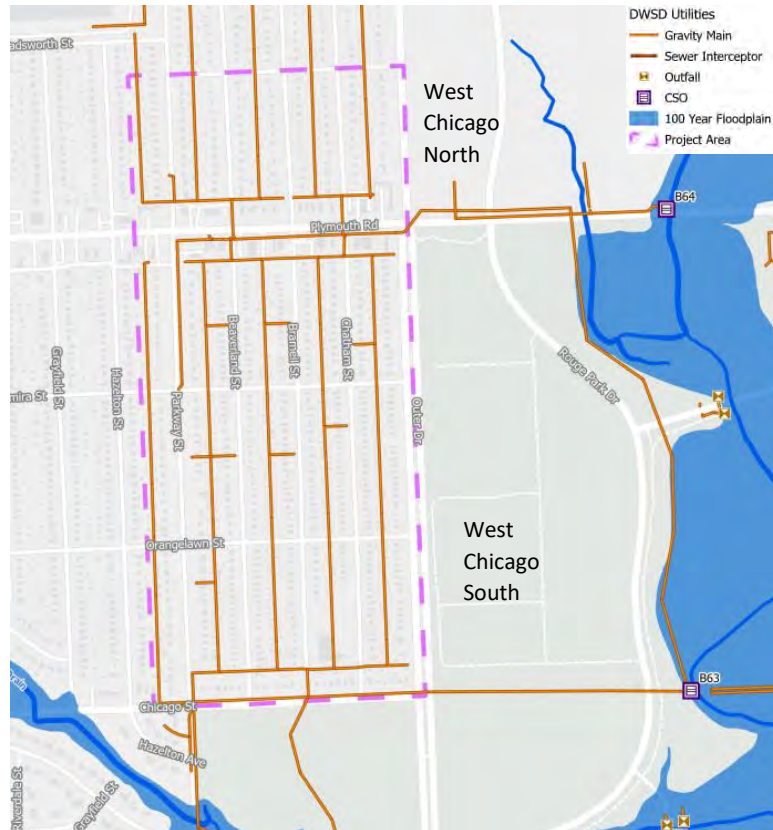


Figure 1: West Chicago Project Area

SCHOOLCRAFT (Figure 2): The Castle Rouge neighborhood is south of I-96 and east of Telegraph and is a predominantly residential neighborhood including an elementary school and St. Paul Church and Conference Center. This neighborhood has approximately 800 houses and 8 businesses; including the school and church. The sanitary and storm needs of this neighborhood are serviced through a combined sewer that converges at two CSO outfalls (B069/B070) near the intersection of Parkway Street and East Schoolcraft Road. Dry weather sanitary flow and small storm events pass under the Rouge River via a siphon system which drains north, under I-96 before ultimately flowing to Northwest Interceptor. This interceptor sewer then flows south paralleling the Rouge River to the Hubbell/Southfield Combined Sewer Overflow facility. Flows from this facility are then passed downstream to the GLWA WRRF.

This project location also includes a 23-acre parcel with apartment buildings in the southwest corner of Schoolcraft and Telegraph. This area includes approximately 80 apartment buildings. The apartment complex is currently being serviced by a combined sewer that outfalls into the Rouge River north of I-96.

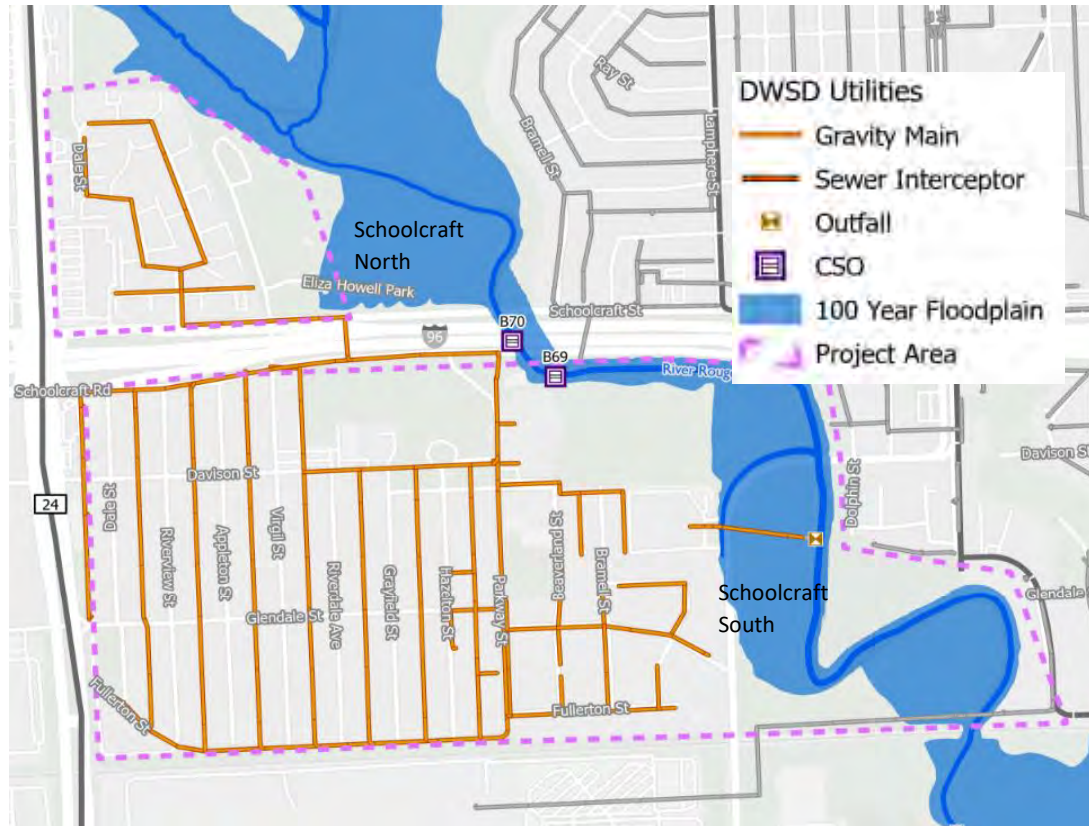


Figure 2: Schoolcraft Project Area

1.2 POPULATION

Since the 1960s, the population of Detroit has been steadily decreasing from its peak population of 1,850,000 (US Census) in the 1950s. The 2020 census data for the City of Detroit was 639,111 (US Census, 2020), which represents a nearly 65% decrease in population from the peak. The Southeast Michigan Council of Governments (SEMCOG) projects that in 2040 the population of the City of Detroit will be 675,608 (Appendix E). This is a projected 5.7% increase in population in the next 18 years.

1.3 EXISTING ENVIRONMENT EVALUATION

An environmental assessment was completed for both project areas in February 2023. The environmental assessment report can be found in Appendix G.

1.3.1 CULTURAL AND HISTORIC RESOURCES

Many of the homes in the City of Detroit are over 50 years old, see Figure 3 and Figure 4. The neighborhoods where the projects are proposed are not part of a Detroit historical district. DWSD is in the process of submitting the project areas to the State Historic Preservation Office (SHPO).

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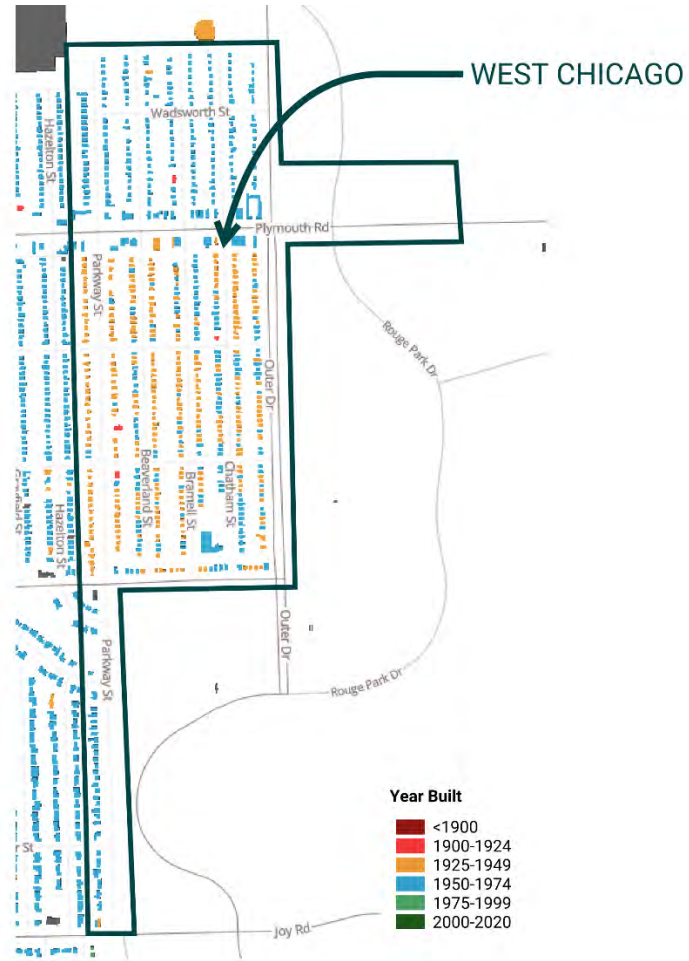


Figure 3: Age of Construction in West Chicago Project Area

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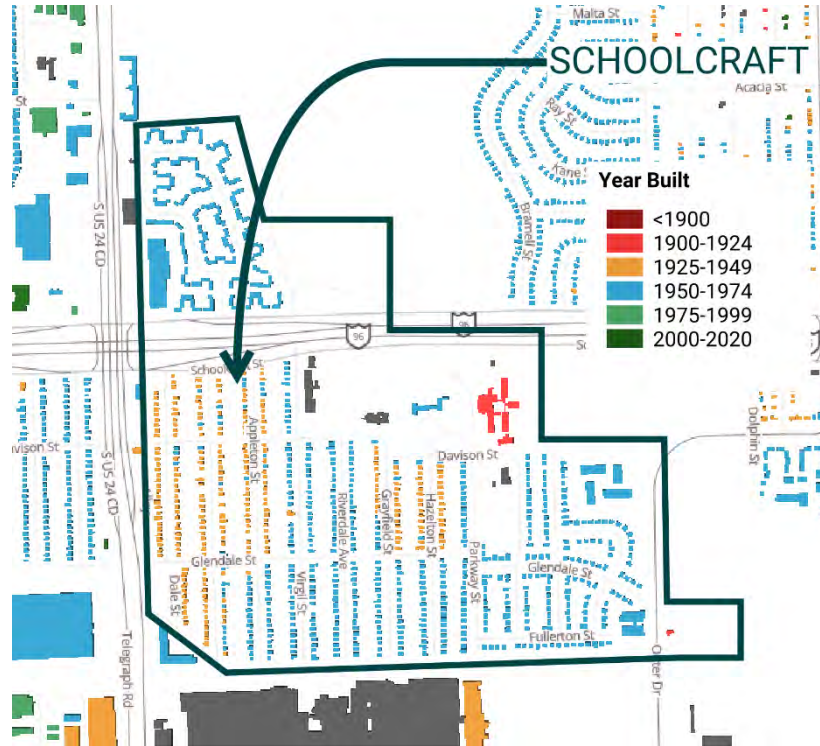


Figure 4: Age of Construction in the Schoolcraft Project Area

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Determinations were made as to the wetland type utilizing the Wetlands and Deepwater Habitats Classification System and its regulatory status determined per Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451. In depth review of specific site location can be found in Appendix G.

- **West Chicago Area 1** – Palustrine, Emergent, Phragmites australis, Seasonally Flooded (PEM5C) & Palustrine, Forested, Broad Leaved Deciduous, Seasonally Flooded (PFO1C). Regulated; Within 500 feet of the Rouge River and tributaries of the Rouge River.
- **West Chicago Area 2** – Palustrine, Emergent, Nonpersistent, Seasonally Flooded (PEM2C) and Palustrine, Forested, Broad-Leaved Deciduous, Semipermanently Flooded (PFO1F). Regulated; Area greater than 5 acres.
- **West Chicago Area 3** – Palustrine, Forested, Broad-Leaved, Deciduous (PFO1). Regulated; Within 500 feet of the Ashcroft-Sherwood Drain.



Figure 6: West Chicago - Wetland Delineation (green polygon)

- **Schoolcraft South Area 1** - Palustrine, Forested, Broad-Leaved Deciduous, Seasonally Flooded (PFO1C). Regulated; within 500 feet of the Rouge River.
- **Schoolcraft Area 2**- Palustrine, Forested, Broad-Leaved, Deciduous (PFO1). Regulated; within 500 feet of the Rouge River.



Figure 7: Schoolcraft – Wetland Delineation (green polygon)

1.3.4 GREAT LAKE SHORELANDS, COASTAL ZONES, AND COASTAL MANAGEMENT AREAS

The project areas are not located along the Great Lakes shoreline.

1.3.5 FLOODPLAINS

Along the banks of the Rouge River are several areas designated as within the 100-year floodplain. Maps of the floodplain can be found in Figure 8. Those areas are listed below.

- West Chicago Area 1 through 3 – Not within the 100 Year Floodplain.
- Schoolcraft Area 1 and 2 - Within 100 Year Floodplain.

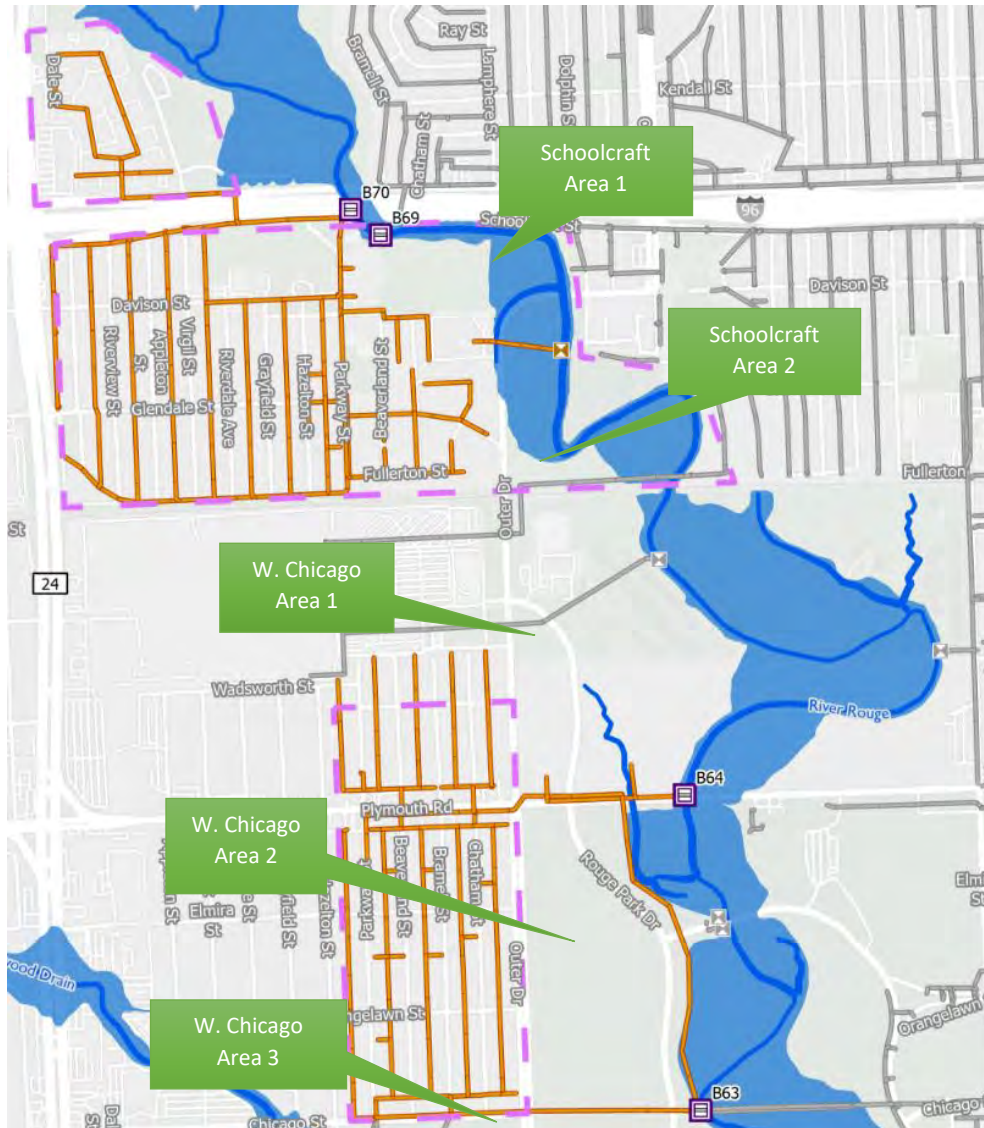


Figure 8: Project Areas - Floodplain

1.3.6 MAJOR SURFACE WATERS

The Upper Branch of the Rouge River is the primary waterbody in the project area. The Ashcroft/Sherwood Drain is a tributary to the Upper Rouge River with a confluence immediately southeast of the West Chicago project area.

1.3.7 NATURAL OR WILD AND SCENIC RIVERS

There are no Natural Rivers as designated by the Michigan Department of Natural Resources (MDNR) or Wild and Scenic Rivers as designated by the National Fisheries and Wildlife Service’s National and Scenic Rivers System in Detroit, Michigan.

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1.3.8 TOPOGRAPHY

The terrain in the study areas varies from flat parkland to gently sloping floodplain forest and forested upland areas along the Middle Rouge River.

1.3.9 GEOLOGY

Based on the EGLE Bedrock Geology GIS Portal, the project areas are labeled as Antrim Shale (Schoolcraft) and Traverse Group (West Chicago).

1.3.10 SOIL TYPES

Utilizing the Natural Resource Conservation Services Web Soil Survey the following soils were determined at each of the project areas.

- West Chicago Area 1 – Livonia sandy loam (LvnhbB), Plainfield-Urban land complex (PlfuaB), Kibbie sandy loam (KibhbB), Freesoil sandy loam (FrshaA)
- West Chicago Area 2 – Kibbie sandy loam (KibhbB)
- West Chicago Area 3 – Livonia sandy loam (LvnhbB)
- Schoolcraft Area 1 - Ceresco-Sloan complex (CeraaA)
- Schoolcraft Area 2 - Rapson-Kibbie sandy loams (RapheB), Sloan silt loam (SloabA)

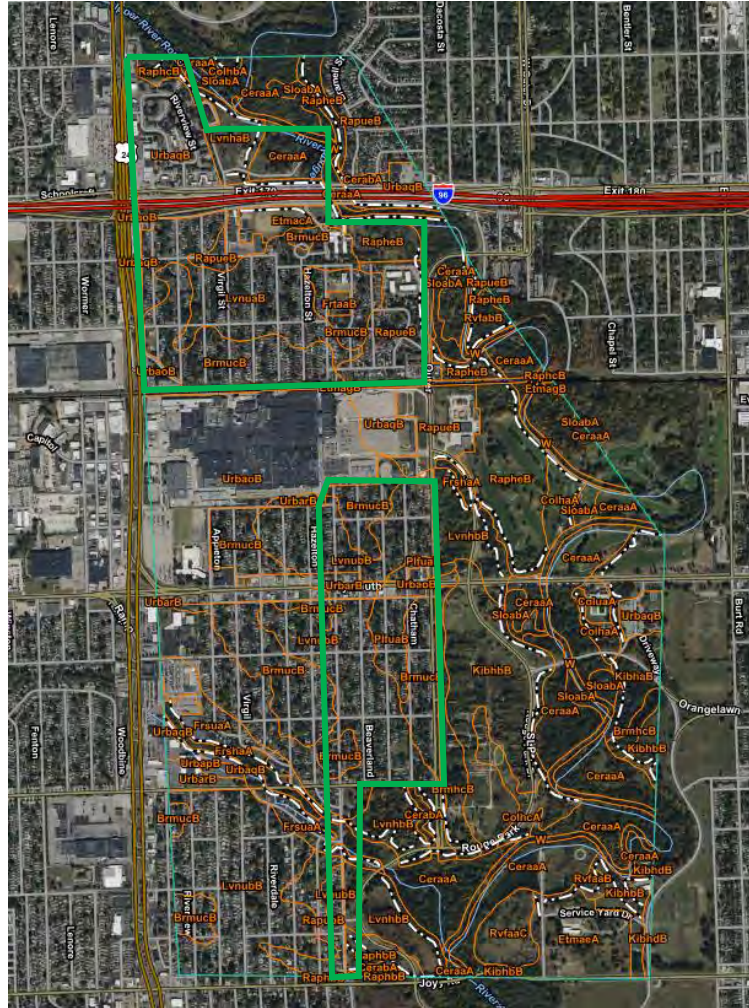


Figure 9: Natural Resources Conversation Service – Area of Interest (AOI) Soil Map

1.3.11 AGRICULTURAL RESOURCES

The project areas are not zoned as agricultural.

1.3.12 FAUNA AND FLORA

OHM has reviewed the Threatened and Endangered Species data provided by Michigan Natural Features Inventory (MNFI) Web Database Search as well as U.S. Fish and Wildlife Service’s (USFWS) Information for Planning and Consultation (IPaC) website. During this review, the project location was checked against known localities for State threatened, endangered, or species of special concern, which have been documented within the 1.5 mile project area buffers and it is possible that without proper management negative impacts will occur. Site specific determinations for Federal and State listed threatened and endangered species can be found in Appendix H.

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1.4 EXISTING SYSTEM

The City of Detroit's local combined sewer system is a member partner of the GLWA. The Detroit sewer system is over 600 miles of combined sewer that was built starting in the mid-1800s. The combined sewer networks in the proposed project sites were installed when the homes were built between 1928 and 1960. Ultimately, Detroit's sewer system drains to and is processed at the GLWA WRRF near Zug Island. Due to the nature and size of the regional system, more information regarding the entire DWSD system is outlined in the GLWA 2020 Wastewater Master Plan (Appendix E).

This area of the system which is focused on within this project planning document are the Schoolcraft and West Chicago drainage districts. These areas are generally located between the Rouge River (east) and western City limits on Detroit's west side. They are served by combined sewers which generally collect sanitary sewage from rear yard laterals. Residential properties within these neighborhoods generally include basements which include footing drains as well as some connected downspouts.

The combined sewers also collect runoff from public right of way within the project area. Runoff is collected via in-street catch basins which capture runoff from portions of residential buildings, driveways, and sidewalks and streets. There are also several large parcel apartment buildings and institutional structures within the project areas that are known to have combined sewers that collect building sewage and stormwater runoff.

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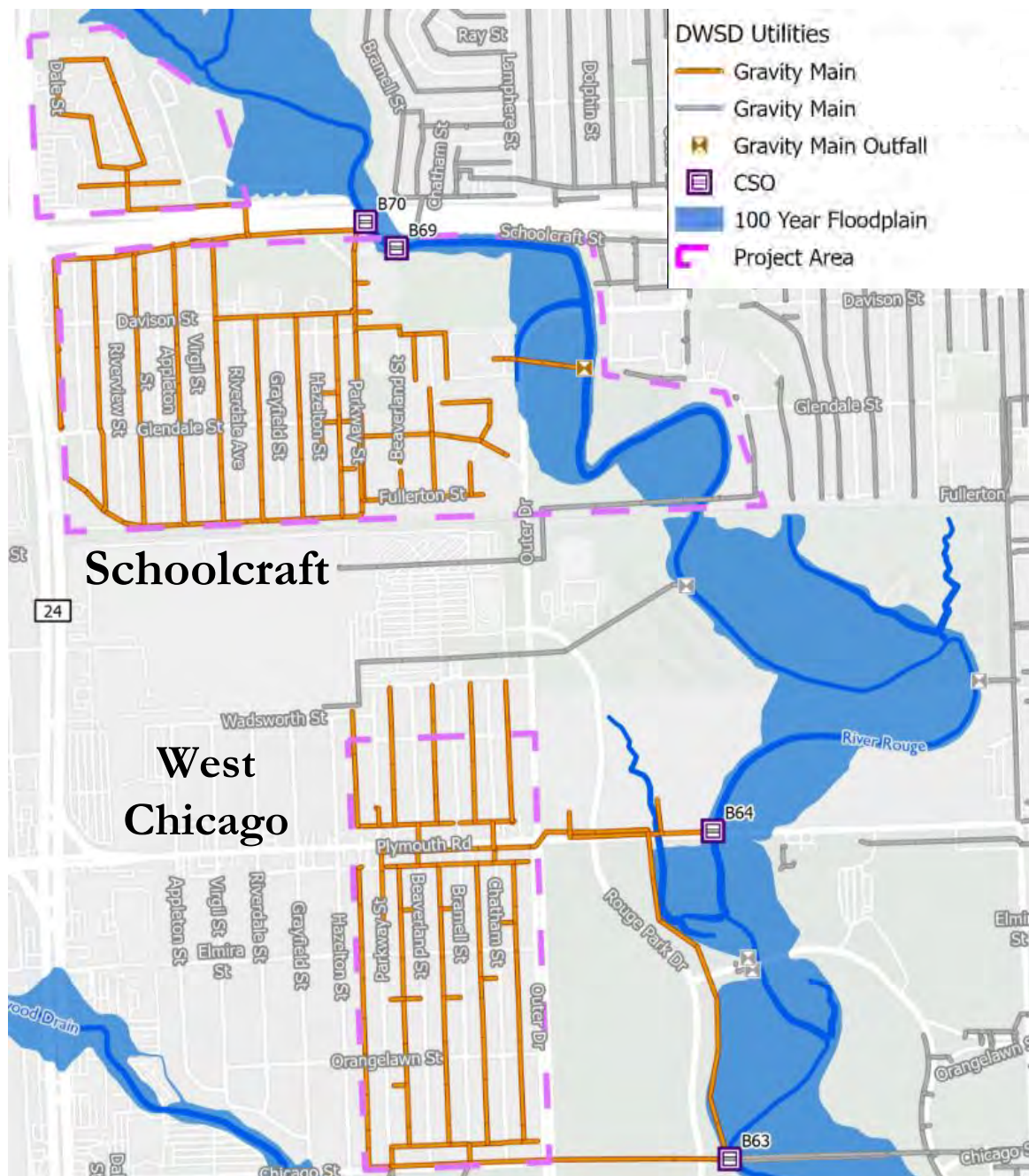


Figure 10: Schoolcraft and West Chicago Existing System

West Chicago

The West Chicago neighborhood is served by a combined sewer system with two untreated CSO outfalls at Plymouth Road (B064) and West Chicago (B063).

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Drainage area tributary to CSO B064

CSO B064 serves a drainage area north of Plymouth Road to the southerly fence line of the Detroit Diesel facility. The CSO also serves a small three city block area along the southwest corner of the Plymouth Road and Outer Drive intersection. The eastern limit is Outer Drive and the western limit is the rear yard of homes west of West Parkway (Detroit western City limit).

Storm and sanitary sewage from within the Plymouth Road drainage area is captured by a series of rear yard collector sewers which convey flow predominantly south towards a 54-inch combined sewer located on the south side of the Plymouth Road right of way (note that a small portion of drainage flows north of this combined sewer on the southeast corner of the drainage area). This sewer then passes to the north side of Plymouth Road and discharges into a junction chamber. During periods of dry weather, flow is directed via an in-system dam towards a 12-inch combined sewer which flows to the south. During significant wet weather events, flows overtop this dam and flow into a 48-inch combined sewer overflow to the Rouge River.

Drainage Area Tributary to CSO B063

CSO B063 serves the drainage area between West Chicago and Plymouth Road with the exception of three blocks on the northeast corner. The drainage area is bound by Outer Drive on the east and the rear yard of homes along West Parkway on the west (Detroit western City limit). The drainage area also includes homes along West Parkway between Joy Road and West Chicago.

Storm and sanitary sewage from within this drainage area is captured via rear yard combined sewers and conveyed south towards the 48-inch combined sewer within the West Chicago right of way. An additional 27-inch rear yard combined sewer conveys flow north to the West Chicago combined sewer from Joy Road. The West Chicago combined sewer conveys the combined sewer flow east and connects with the 12-inch combined sewer line from CSO B064. The combined flow is conveyed east towards a junction chamber which connects to a triple barrel siphon that passes under the Rouge River. All flow that cannot pass through the siphon is discharged to the Rouge River via CSO B063.

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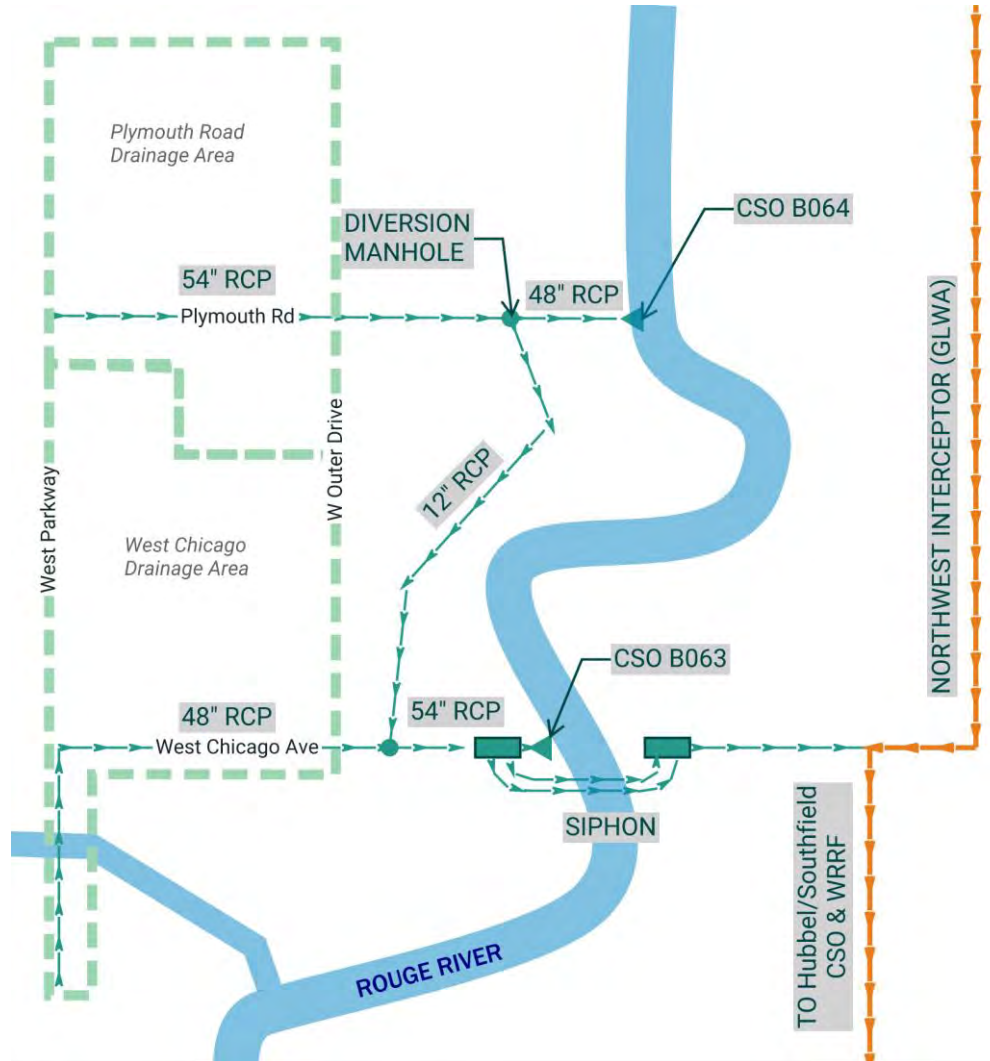


Figure 11: West Chicago Area Sewer Schematic

Schoolcraft

The Schoolcraft neighborhood is served by a combined sewer system with two untreated CSO outfalls (CSO B069 and CSO B070) on the south side of I-96. These CSOs manage flow from the several separate drainage areas and work in tandem to regulate flows.

Drainage Area Tributary to CSO B069

CSO B069 serves the southern portion of the Castle Rouge neighborhood. The drainage area generally extends south to the CSX railroad and north towards Glendale. The western portion of this drainage area is managed with rear yard combined sewers while the eastern portion has combined sewers within the street. Drainage is collected to a central 78-inch combined sewer along West Parkway which conveys flow north. This combined sewer also collects runoff from apartment complexes along Outer Drive on the east side of the drainage area. The flow is conveyed north with dry weather flow passing under the Rouge River via a dual 12-inch siphon system. Wet weather is managed by a

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78-inch CSO outfall to the Rouge River near the intersection of Schoolcraft and West Parkway.

Drainage Area Tributary to CSO B070

CSO B070 is directly connected to CSO B069 at Schoolcraft and West Parkway. The CSO manages a drainage area that includes combined sewers north and south of I-96. A large apartment complex (Riverview) with public streets is located on the north side of I-96 just west of Eliza Howell Park. This complex includes combined sewers within the streets which collect runoff from the adjacent parking lots and buildings. The combined sewers discharge to a single point and flow under I-96 via 36-inch combined sewer. Flow then converges with runoff from the northern portion of the Castle Rouge neighborhood which is collected via a 54-inch combined sewer. This flow ultimately comingles with that from the 78-inch combined sewer noted under the CSO B069 discussion.



Figure 12: Schoolcraft Area Sewer Schematic

1.5 NEED FOR PROJECT

For the past 25 years, the Detroit Water and Sewerage Department has worked to reduce wet weather flows to the Rouge River through a variety of projects. Several large, combined sewer overflow facilities along the Rouge River have been implemented to help reduce the frequency of overflows and treat those that must be released. To comply with the approved CSO Long-Term Control Plan and the NPDES permit MI0022802, DWSD and GLWA continue to improve the CSO outfall locations that discharge into the Rouge River. The Long-term CSO Control Plan implemented by the City in 1996 in response to the National Environmental Policy Act of 1969 and re-approved in 2010 has been delayed several times due to financial hardships faced by the City.

The most significant change occurred in 2013 when rate payer affordability and escalating construction costs resulted in DWSD suspending work on the Upper Rouge Tunnel (URT) project in favor of cost-effective Green Infrastructure projects. This initiative resulted in DWSD achieving a required spend of \$30M towards green infrastructure. This effort includes nineteen (19) projects within the URT drainage area and is culminating with the Far West Detroit Stormwater Improvement project which redirects stormwater flow from a 218-acre drainage area on Detroit's west side. Through analysis performed by DWSD on the 19 projects, it has been determined that the Far West Detroit project provides DWSD with the most cost beneficial project by removing the greatest volume of stormwater from the combined sewer system at the lowest cost.

As identified within the GLWA 2020 Wastewater Master Plan, there are 16 CSO locations that discharge into the Rouge River within the Upper Rouge tributary area. Several of these, including those within the West Chicago and Schoolcraft, areas were modeled with stormwater flows being directly routed to the Rouge River as part of Rouge and Detroit River 2 Model Scenario (Technical Memorandum 4C of the GLWA WWMP on Regional Collection System Alternatives Modeling). Modeling indicates that advancing these projects will help reduce regional combined sewer overflows and attain water quality goals for dry weather contact within the Rouge River.

The project planning document has identified four untreated CSO locations under the Limited Discharge Authorization category in the NPDES permit to be addressed. GLWA tracks and reports CSO volume and frequency for these locations. Table 3 summarizes the CSO volume and frequency from 2018 to 2022. From 2018 through 2022, the annual amount discharged through the four CSO outfalls targeted for storm sewer improvements ranged from 11.7 to 90.1 million gallons. The comparatively low overflow volume in 2022 is due to the year receiving lower precipitation than 2018 through 2021. Due to the annual volumes and frequencies of the untreated CSO outfall locations during wet weather events, these project areas have been identified as priority projects to reduce and/or eliminate untreated CSO outfalls into the Rouge River.

The projects in the West Chicago and Schoolcraft neighborhood will not only help with water quality in the Rouge River but they will improve capacity in the combined sewer system. The majority of the stormwater runoff will be redirected into the storm sewer

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pipe network, improving the capacity of the local DWSD combined system downstream of the project areas.

As part of a continuation of DWSD's successes with the Green Infrastructure Program, the projects will utilize the design and construction techniques advanced as part of the Far West Detroit Stormwater Improvement Project. This method along with potential grant and principal forgiveness will enable DWSD to advance this beneficial project despite the community's significantly overburdened status. The CSO Frequency and Volume report from GLWA is provided in Appendix C.

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Table 3: Data Collected and Report by GLWA for the untreated CSO Outfalls from 2018 to 2022

Location & Outfall	2018		2019		2020		2021		2022	
	Frequency (# per Year)	Volume (MG)	Frequency (# per Year)	Volume (MG)	Frequency (# per Year)	Volume (MG)	Frequency (# per Year)	Volume (MG)	Frequency (# per Year)	Volume (MG)
West Chicago North (Plymouth Rd B064)	31	11.4	24	10.3	25	9.3	90	10.6	14	1.1
West Chicago South (W. Chicago B063)	14	10.6	13	4.2	13	24.5	10	24.9	8	2.8
Schoolcraft North/South B069/070	37	68.1	37	67.5	24	12.7	28	29.7	23	7.8
Annual Totals		90.1		82.0		46.5		65.2		11.7

1.5.1 WATER QUALITY PROBLEMS

The Rouge River was designated as an Area of Concern under the Great Lakes Water Quality Agreement of 1987. Per the EPA Great Lakes AOCs, “The Rouge River watershed contains the oldest and most heavily populated and industrialized area in southeast Michigan. This has led to sediment and water contamination from industrial development and discharge, combined and sanitary sewer overflows, and nonpoint source pollution.” Table 4 below is a summary of the annual average volume and frequency of the untreated CSO outfalls in the project planning areas. Three of the four untreated CSO outfalls have more than 10 MG of untreated combined sewer discharged into the Rouge River. The most active CSO outfall location, B064, has an average volume of roughly 43 MG over the past five years.

Table 4: Untreated CSO Locations - Average Discharge and Volume from 2018 to 2022

Location	CSO Number	Average Volume (MG)	Average Frequency of Discharge per Year
West Chicago North (Plymouth Road)	B064	42.7	25
West Chicago South (West Chicago)	B063	13.4	12
Schoolcraft Street North	B070	0.2	1
Schoolcraft Street South	B069	37.2	30

The project areas will assist with the remediation and restoration work within the Rouge River AOC by reducing and/or eliminating the untreated CSO outfalls along the Rouge River.

Additionally, water quality will be addressed in the project areas by mechanical treatment devices and/or surface basins to meet the water quality requirements. To address increasing rainfall intensities, the practices are designed to handle the 1.25-inch rainfall event. This component of the design will also have a significant impact on the water quality along the Rouge River.

1.5.2 STORMWATER PROJECTS

Stormwater is currently collected in the combined sewer system and either transported to the GLWA WRRF for treatment or discharged through one of the four CSO locations listed in Table 4 during peak flow events.

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1.6 PROJECTED FUTURE NEEDS

The GLWA Wastewater Master Plan is an in-depth analysis of the overall regional system that has identified projects within the City of Detroit, including West Chicago and Schoolcraft to enhance and optimize the regional system over the next 20 years. The overall GLWA Wastewater Master Plan can be found in Appendix E.

2 ANALYSIS OF ALTERNATIVES

2.1 NO ACTION

As mentioned in previous sections, remediation of CSO discharge location issues is necessary to meet the requirements of the NPDES permit requirements and CSO Long-term control plans with EGLE. The CSO locations included in these projects have frequency and volume concerns that are leading to the increased pollution of the Upper Rouge River, which is an increased risk to public health and the environmental quality of the river. A “No Action” alternative would allow these conditions to continue to exist and have compounding negative effects on the environment and the residents of Detroit. Therefore, a “No Action” alternative is not considered viable and is not pursued any further.

2.2 OPTIMUM PERFORMANCE OF EXISTING SYSTEM

As part of the project planning document, optimization of the existing infrastructure must be considered. For both the West Chicago and Schoolcraft project area outfalls, the GLWA Master Plan Document states that there are frequent discharges with small volumes of overflow caused by downstream siphon size restrictions or clogging. The method considered as part of this project planning document to optimize the performance of the existing system includes cleaning and unclogging the downstream system if feasible to increase capacity. While this alternative can provide some improvement to the functionality of the existing system, it does not address the siphon size restrictions that limit the discharge during CSO events in the downstream system. Therefore, flooding and basement backups will still occur as the capacity within the combined sewer system is limited. Additionally, this alternative does not provide any remediation for CSOs and does not address the requirements of the CSO long-term control plans and NPDES permit requirements.

2.3 REGIONALIZATION

In the late 1950s, as a response to population growth in the City of Detroit and surrounding areas, regionalization of wastewater facilities began. By 2014, the GLWA was established and became fully operational in January of 2016. GLWA operates the regional wastewater collection system for communities in Wayne County, Macomb County and Oakland County (Figure 13). The City of Detroit and all the surrounding communities are serviced by GLWA, therefore, a regional alternative has already been implemented and is not considered as part of this plan.

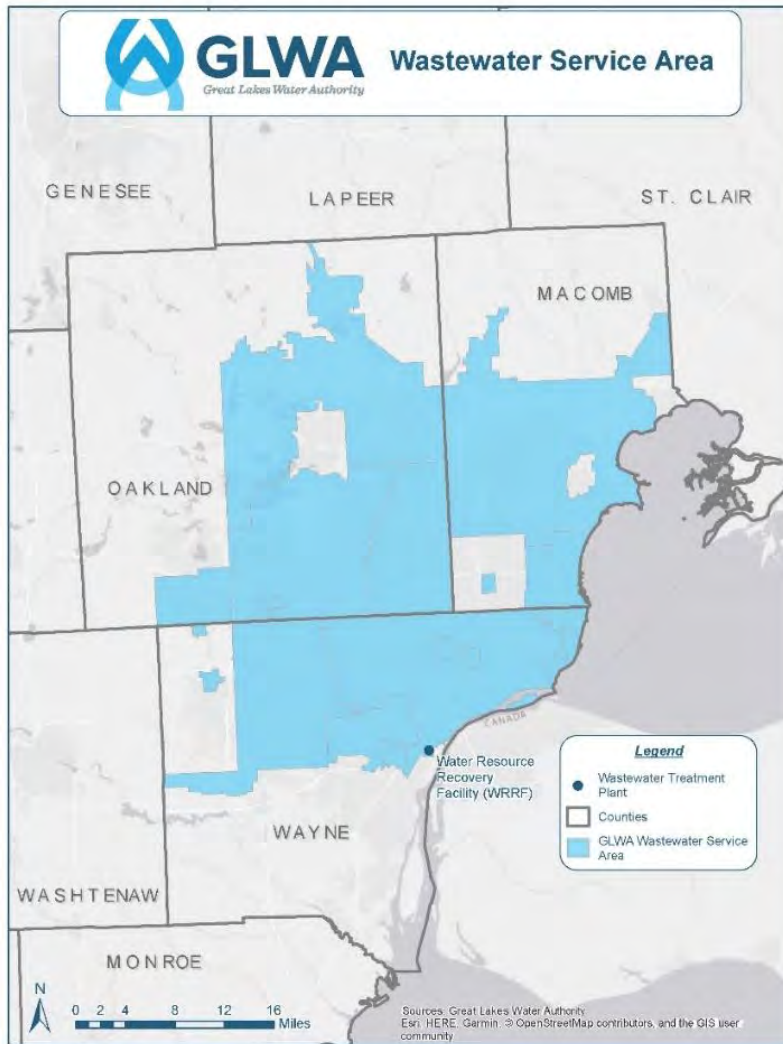


Figure 13: GLWA Wastewater Service Area Map¹

2.4 DESIGN ALTERNATIVE 1

In both project planning locations, a new stormwater collection system to manage the stormwater runoff from the public right-of-way and front yard portions of adjoining property is proposed as part of this alternative. The stormwater collection system will enhance the combined sewer capacity. It is a benefit to the public health and safety to install a new stormwater collection system to reduce flooding and basement backups from combined sewage.

¹ Source: [Wastewater System - Great Lakes Water Authority \(glwater.org\)](http://glwater.org)

WEST CHICAGO DESIGN ALTERNATIVE 1

The West Chicago Design Alternative 1 includes two new stormwater collection systems, West Chicago North and West Chicago South, to capture stormwater runoff within the project areas. Figure 14 below illustrates Alternative 1. Two outfalls are being proposed, one on the North side of Plymouth Road, east of Outer Drive for West Chicago North, and one to the south on West Parkway Street for West Chicago South. The two new stormwater outfalls will eventually discharge to the Rouge River. Each outfall will address water quality requirements before ultimately discharging into the Rouge River. This design alternative would repurpose the existing Plymouth Road CSO B064 location as a storm sewer outlet.

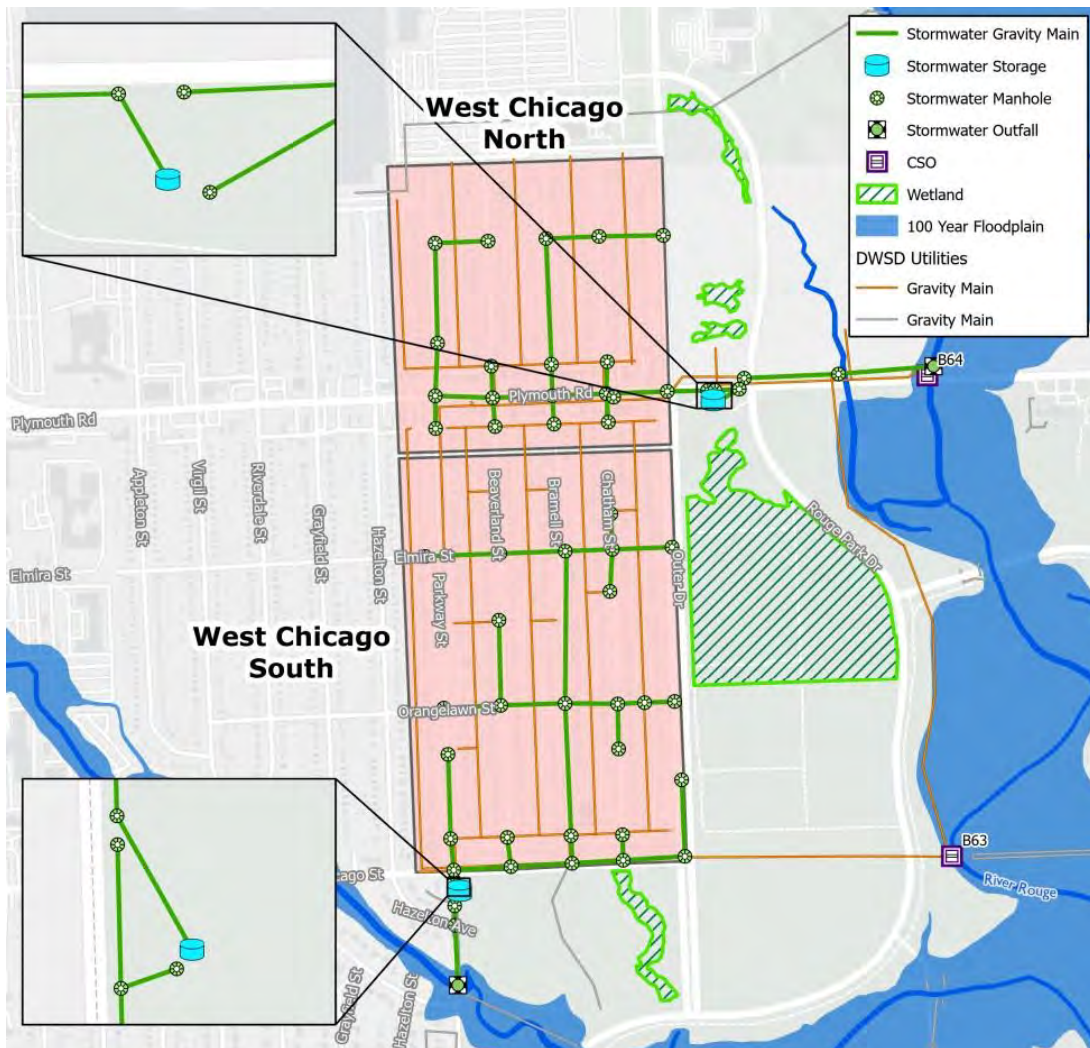


Figure 14: West Chicago Design Alternative 1

2.4.1 SCHOOLCRAFT DESIGN ALTERNATIVE 1

The Schoolcraft Design Alternative 1 includes two new stormwater collection systems, Schoolcraft North and Schoolcraft South, to capture stormwater runoff within the project area. Figure 15 illustrates the conceptual design for Schoolcraft

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Alternative 1. Two new stormwater outfalls are being proposed, one to the north on Eliza Howell Park (north of Schoolcraft) for Schoolcraft North, and one to the south near Fullerton Street for Schoolcraft South. The two new stormwater outfalls will eventually discharge to the Rouge River. Each outfall will address water quality requirements before ultimately discharging into the Rouge River.

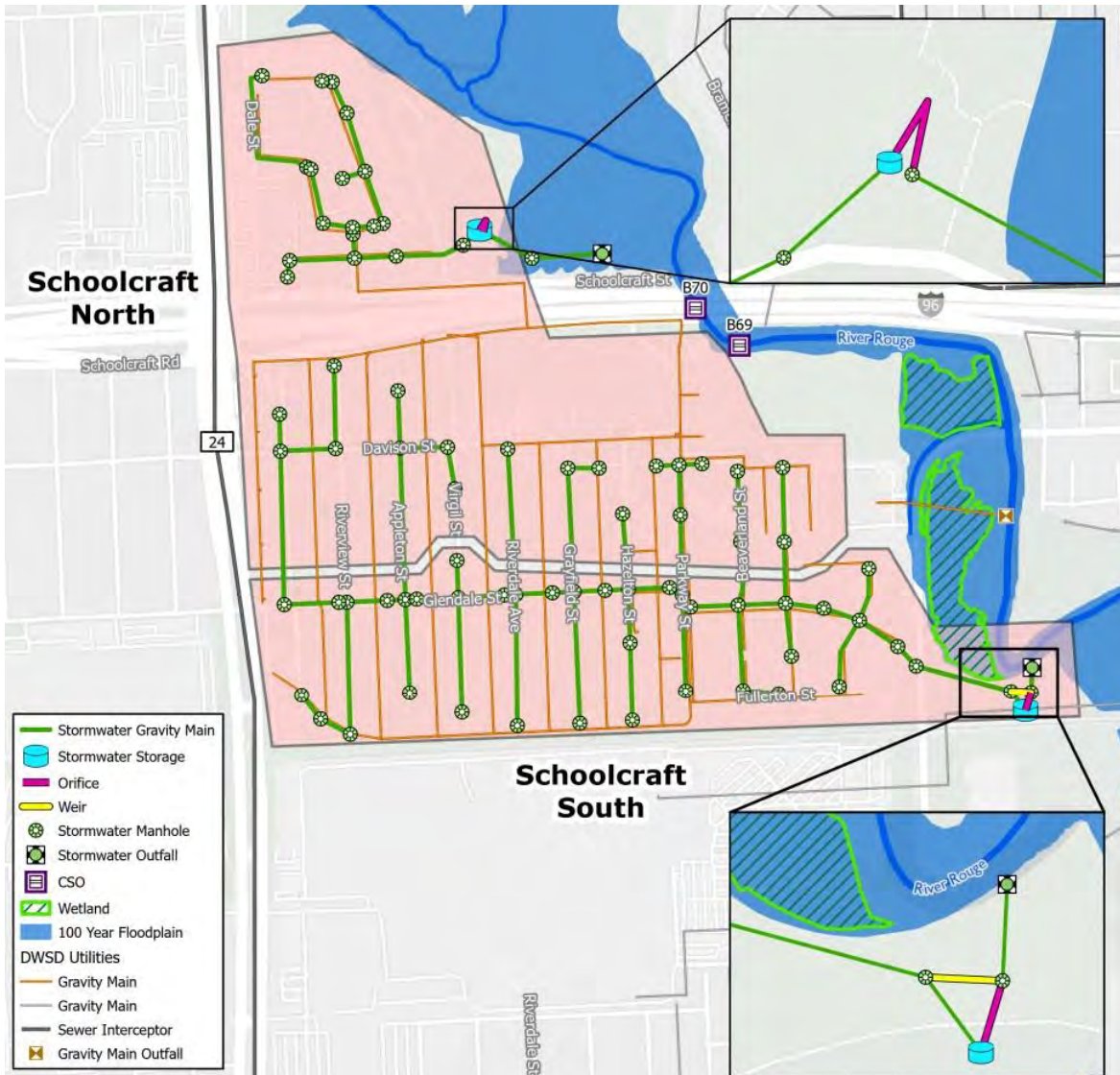


Figure 15: Schoolcraft Design Alternative 1

2.5 DESIGN ALTERNATIVE 2

Similar to Design Alternative 1, the basis of the design in both of the project planning locations include a new stormwater collection system to manage the stormwater runoff from the street and front yard areas and greatly reduce wet weather contributions to the combined system. Public health and safety will benefit from this project; however, the locations of the proposed stormwater collection system outfalls will have a negative

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impact on the wetlands in the project areas. The alternative design and outfall locations are described herein.

2.5.1 WEST CHICAGO ALTERNATIVE 2

A mainline storm sewer is proposed on Outer Drive with a storm sewer network branching off the mainline and into the neighborhood to the west. The location of the outfall being evaluated in this alternative is a single outfall into the Rouge River on West Parkway. This alternative does not eliminate the untreated CSO outfall, B064. Additionally, the project area for Alternative 2 cannot be divided by outfall location as this alternative only has one outfall at West Chicago. Figure 16 below illustrates Alternative 2 design.

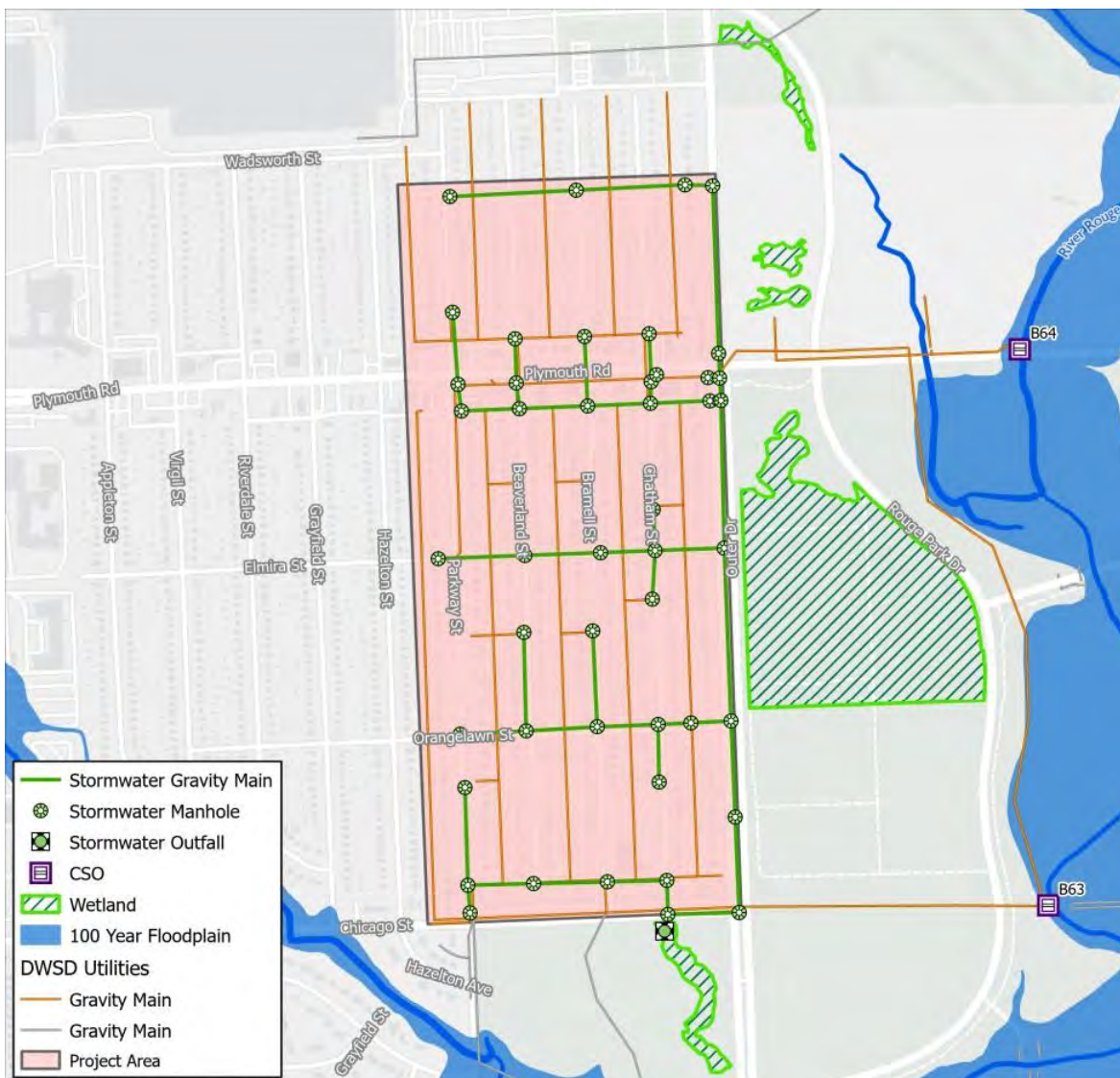


Figure 16: West Chicago Design Alternative 2

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2.5.2 SCHOOLCRAFT ALTERNATIVE 2

In this location, the main line storm sewer is proposed down Glendale Street. This potential design alternative's ultimate outlet was an open channel outfall in the right-of-way of Schoolcraft Street. The open channel outfall would eventually merge into the Rouge River. The conceptual design alternative is shown in Figure 17.

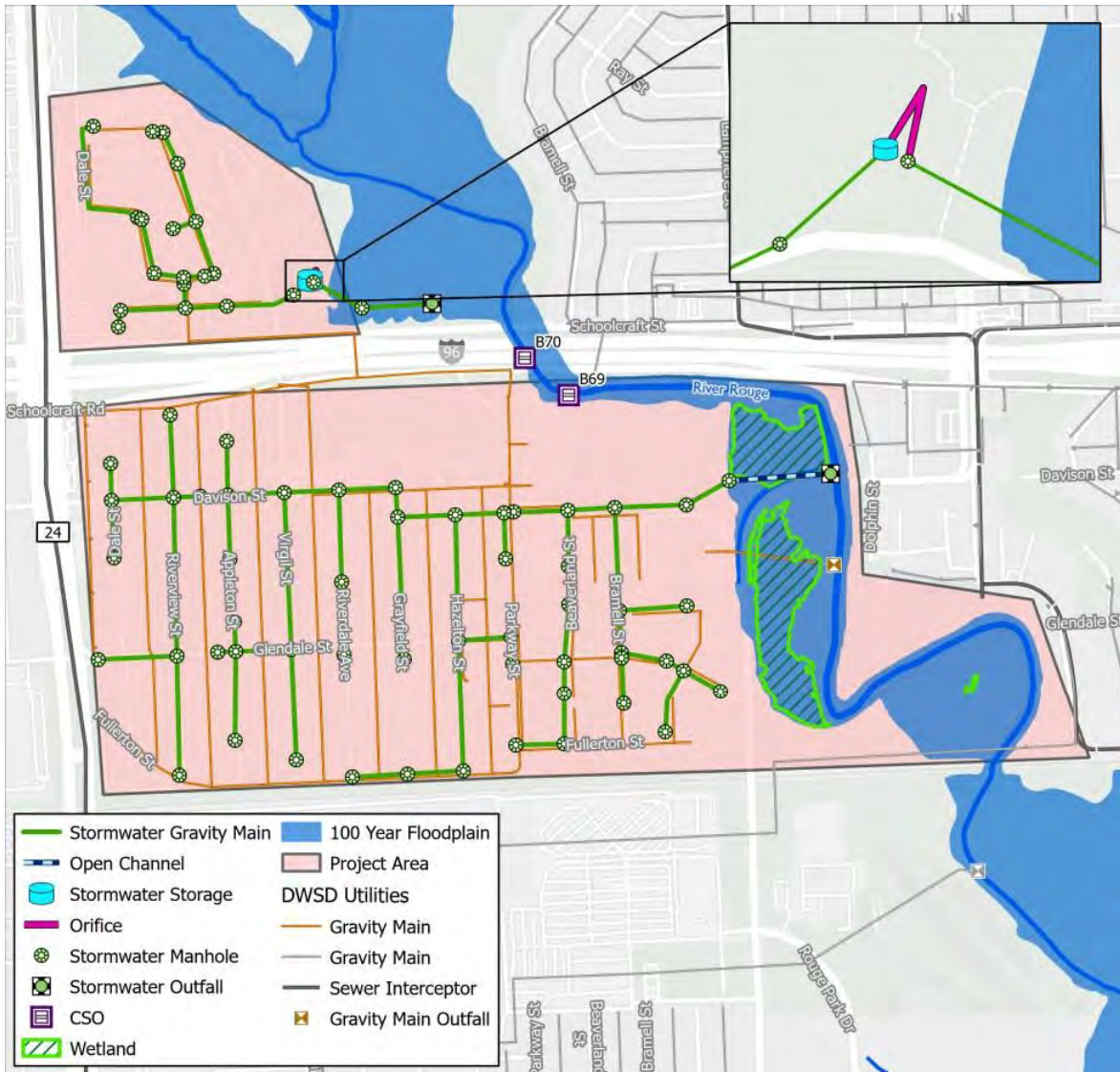


Figure 17: Schoolcraft Design Alternative 2

2.6 MONETARY EVALUATION

EGLE defines significantly overburdened communities as those households with annual incomes less than 125% of poverty level for a family of four (\$34,687) or the taxable value per capita for the community is less than \$15,200. The City of Detroit has a median

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average household income of \$34,762 and a taxable value per capita of \$10,647. With the current taxable value, the City of Detroit is considered **significantly overburdened**. The project planning document forms can be found in Appendix A.

2.6.1 *SUNK COSTS*

The sunk costs for Design Alternative 1 and Design Alternative 2 are equivalent and therefore not included in the monetary evaluation.

2.6.2 *PRESENT WORTH*

The cost factor that was considered for the present worth was the total capital costs for the design (Appendix D) minus the salvage value. A real interest rate of 2% was used, as published in OMB Circular No. A-94 Appendix C Revised December 12, 2022. Operation, maintenance, and replacement (OM&R) costs were considered equivalent for both Design Alternative 1 and 2 and are therefore not included in the present worth evaluation.

2.6.3 *SALVAGE VALUE*

The cost factor that was considered for the present worth was the total capital costs for the design (see Appendix D). A real interest rate of 2% was used to calculate the present worth of the salvage value of piping, manholes, and structures at the end of 20 years. The 2% interest rate was published in OMB Circular No. A-94 Appendix C Revised December 12, 2022.

2.6.4 *ESCALATION*

Land and energy costs are not included in the principal alternatives. No escalation of costs is necessary for the proposed projects.

2.6.5 *INTEREST DURING CONSTRUCTION*

The design will follow design bid build procedures and the costs per project will be fixed at time for bidding.

2.6.6 *USER COSTS*

DWSD is a significantly overburdened community; therefore, if the projects are not hundred percent (100%) grant funded, the City will not move forward with the design projects for West Chicago or Schoolcraft. It is assumed that each project will receive grant funding of \$20 Million to construct each project location. If necessary, DWSD is willing to spend \$1 to \$2 Million above the \$20 Million grant funded projects to implement the projects. The user costs for \$2 Million would represent an increase of \$0.65 per month on the wastewater bill per residential equivalent unit (REU) or an annual increase of \$7.80.

2.6.7 *PROJECT DELIVERY METHOD*

The projects will use a typical design-bid-build model. Alternative project delivery methods were not considered as part of this project planning document. A summary of the cost analysis for both alternatives is shown in the Table 5 below. A detailed analysis of project costs and user costs is shown in Appendix D.

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Table 5: Monetary Evaluation of Principal Alternative

Project Area	CSO Outfall	Alternative 1			Alternative 2		
		Capital Cost	PW of Salvage Value	Total PW	Capital Cost	PW of Salvage Value	Total PW
West Chicago North	B064	\$17,000,000	\$4,400,000	\$12,600,000	\$13,800,000	\$3,000,000	\$10,800,000
West Chicago South	B063	\$19,100,000	\$4,700,000	\$14,400,000	\$22,800,000	\$5,300,000	\$17,500,000
Schoolcraft North	B070	\$20,200,000	\$4,700,000	\$15,500,000	\$20,200,000	\$4,700,000	\$15,500,000
Schoolcraft South	B069	\$22,000,000	\$4,900,000	\$17,100,000	\$33,100,000	\$8,800,000	\$24,300,000

Note: The West Chicago Alternative 2 Preliminary Engineering Capital Cost is split 40/60 for outfall B064 and B063. West Chicago Alternative 2 cannot be completed as separate outfall projects, like West Chicago Alternative 1. The entire project would cost \$36,600,000, exceeding the \$20 Million maximum grant fund.

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2.7 ENVIRONMENTAL EVALUATION

The environmental evaluation for the different outfall locations is described in Section 1.3 Existing Environmental Evaluation. The Environmental Assessment Report, completed in February 2023, can be found in Appendix G. The comparison between the two design alternatives for West Chicago and Schoolcraft are described below.

2.7.1 WEST CHICAGO

ALTERNATIVE 1: Although there are two locations that are being proposed as outfalls, the Plymouth Road CSO B064 outfall in the Rouge River is being repurposed into a storm sewer outfall. By utilizing this outfall, a smaller sized pipe can be used to construct the outfall on West Parkway, causing less of a disturbance in the influence of the river. Additionally, the outfall on West Parkway will not affect any wetland areas.

ALTERNATIVE 2: Having one single outfall location for the proposed sewer network would require a larger sized outfall pipe to accommodate the sewer network. This would cause a larger disturbance of the wetland area that is required for constructing the outfall pipe.

2.7.2 SCHOOLCRAFT

ALTERNATIVE 1: This alternative is thought to have minimal lasting effects on the environment after the construction impacts are mitigated. Both proposed outfall locations are in the floodplain but will not disturb any delineated wetlands.

ALTERNATIVE 2: The location proposed for the open ditch outfall for the drainage area to the south of Schoolcraft is infeasible due to the existence of trash in the area. This area is also within a wetland area. Since the other areas near the downstream end of the system are already developed, there is not another feasible location for the open channel outfall.

3 SELECTED ALTERNATIVE

After careful consideration of environmental impacts, monetary impacts and social impacts, **Design Alternative 1** was selected for both West Chicago and Schoolcraft.

3.1 OVERALL DESIGN

3.1.1 WEST CHICAGO DESIGN ALTERNATIVE 1

The West Chicago Design Alternative 1 includes two new stormwater collection systems with two dedicated stormwater outfalls to capture stormwater runoff within the project area. The selected alternative figure for West Chicago can be found in Section 3.4 Project Maps. The two stormwater outfalls will eventually discharge to the Rouge River. This design alternative would repurpose the existing Plymouth Road untreated CSO outfall, B064, as a storm sewer outlet.

The first outfall will repurpose the existing Plymouth Road CSO outfall, B064, as a storm sewer outlet. The stormwater outfall will collect stormwater runoff from the drainage area along Plymouth Road, from the drainage areas along Grayfield Street just south of Plymouth Road, and from the area north of Plymouth Road. The total stormwater drainage area for this outfall is roughly 31 acres. The stormwater runoff will be diverted to a new 48-inch dedicated storm sewer along Plymouth Road. Due to the lack of available land within Rouge Park, it is envisioned that the project will use the land that is immediately adjacent to Outer Drive to provide water quality and peak flow control. Water quality control will be through use of a mechanical treatment system and an underground detention system with infiltration, and peak flow will be controlled using an orifice. This new stormwater collection system will eventually tie into the existing 48-inch combined sewer at Plymouth Road and Rouge Park Drive before discharging into the Rouge River. The existing 48-inch combined sewer will be repurposed as a dedicated stormwater sewer. This the 48-inch combined sewer is be repurposed as a storm sewer, the 12-inch combined sewer along Rouge Park Drive will be abandoned and a new 24-inch sanitary sewer will be constructed along Outer Drive flowing south to connect the existing 54-inch combined sewer to along West Chicago Ave.

The second outfall will collect stormwater runoff from the stormwater drainage area to the south of Plymouth Road, which is a total of roughly 45 acres. A new dedicated stormwater sewer system will convey flow south towards a main trunk line along West Chicago. A majority of the stormwater runoff will drain to a 60-inch storm sewer along Bramell Street. The main trunk line along West Chicago will convey the stormwater west and then south along West Parkway before discharging to a new stormwater outfall at the Ashcroft Drain. The Ashcroft Drain is approximately 870 feet upstream of the Rouge River. Water quality at the second outfall will be controlled through use of a mechanical treatment system and an underground detention system with infiltration, and peak flow will be controlled using an orifice.

The project area may also include right-of-way green infrastructure installations within the neighborhood to help attain water quality performance. This is generally envisioned to include the construction of street planters equipped with subgrade stormwater storage and tree plantings to help filter runoff and attenuate peak flows prior to discharge to the storm sewer system.

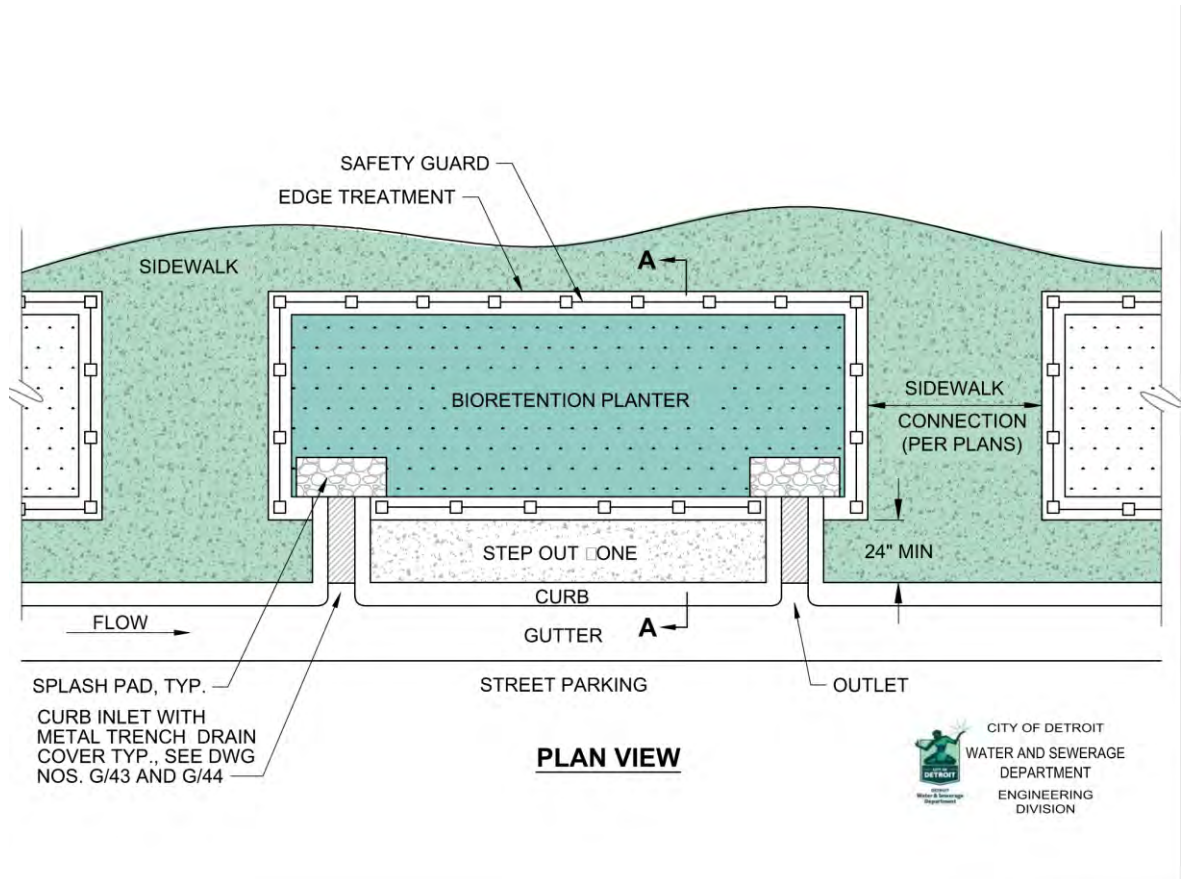


Figure 18: Potential Onsite Street GSI Planters

3.1.2 SCHOOLCRAFT DESIGN ALTERNATIVE 1

The Schoolcraft Design Alternative 1 includes two new stormwater collection systems and new outfalls to capture stormwater runoff within the project area. The selected alternative figure for Schoolcraft can be found in Section 3.4 Project Maps. One stormwater outfall is being proposed to the north on Eliza Howell Park (north of Schoolcraft) and one to the south near Fullerton Street. The two new stormwater outfalls will eventually discharge to the Rouge River.

The first stormwater outfall will collect stormwater runoff from the project area north of Schoolcraft. The new stormwater collection system will divert stormwater runoff south along Dale Street and Riverview Street into a 36-inch main trunk sewer that runs east along Eliza Howell Park. The total stormwater drainage area is roughly 12 acres. Water quality and peak flow within this

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drainage area will be controlled using an open detention pond and a restrictor pipe that is sized for the 10-year, 24-hour storm.

The second stormwater outfall will collect stormwater runoff from the project area south of Schoolcraft. The total stormwater drainage area is roughly 64 acres. The stormwater will be directed to a trunk sewer along Glendale Street. The 66-inch storm trunk sewer will cross Outer Drive West and then head southwest towards Fullerton Street before discharging to the Rouge River to the north. Similar to the West Chicago stormwater outfalls, water quality within these drainage areas will be controlled through use of a mechanical treatment system and an underground detention system with infiltration, and peak flow will be controlled using an orifice.

3.2 DESIGN PARAMETERS

The design intent of the selected project alternatives is to capture as much tributary drainage area as possible using gravity-based conveyance and discharging stormwater directly to the Rouge River. The projects will provide the following key benefits:

- Reduced flood potential.
- Reduced peak flows and flow volume to the combined sewer system, resulting in reduced wastewater treatment costs and lower risk of basement flooding due to sewer backups.
- Reduced CSO volume to the Rouge River.
- Enhanced water quality in the Rouge River.

Specifically, the design parameters and intent for each categorize are outlined below.

STORM SEWER

- Optimize capture area for each project. This generally will include all public right-of-way and portions of private property where feasible.
- Redirect parking lot catch basins away from the combined sewer when feasible.
- Provide stormwater conveyance with direct discharge to the Rouge River. Storm sewers will be designed to convey the upper end of the 90% Confidence Interval of the 10-year, 24-hour event from the NOAA Atlas 14 data. This method of design for climate resiliency helps to create a more conservative design. In the event that pipe surcharging is required, it will be held to at least 1 foot below the rim elevation.
- Provide water quality provisions attaining 80% TSS removal. This will be accomplished either through green infrastructure, surface basins or mechanical treatment devices.
 - The mechanical treatment systems proposed in the designs will treat runoff generated from anything less than or equal to the 1.25-inch design storm. The underground detention system is sized based on the total volume of runoff generated from the 1.25-inch design storm. The orifices are sized based on a 24-hour

draw down time for the 1.25-inch design storm. For both stormwater collection systems, runoff generated from storm events greater than the 1.25-inch design storm will be diverted directly to the stormwater outfall.

- While typical design standards call for water quality controls to be sized based on the 1-inch design storm, the 1.25-inch design storm was used as a proactive measure for designing for a changing climate. This results in a moderate increase in the rainfall depth, and thus a more conservative design with greater water quality and flow controls.

SANITARY SEWER

- Provide new sanitary sewer as needed to maintain neighborhood sewer flows. Sanitary sewers shall be designed to convey the 10-year event within the pipe. Surge shall be controlled to maintain the hydraulic grade line below basement elevations for the 25-year, 24-hour event.

INCIDENTAL CONSTRUCTION

- Replace all impacted pavements, sidewalks and lawns impacted by the work in accordance with requirements of the City of Detroit Department of Public Works.
- Replace impacted trees in accordance with City of Detroit ordinances.
- Replace impacted water main in accordance with AWWA/DWSD standards.
- Lead water services will be replaced when encountered during the construction of storm sewer.
- Provide traffic control in accordance with the Michigan Manual of Uniform Traffic Control Devices.
- Provide soil erosion control in accordance with Part 91, Soil Erosion and Sedimentation Control, of the Natural Resources and Environmental Protection Act (NREPA).

3.3 USEFUL LIFE

The weighted useful life for the West Chicago Alternative 1 northern drainage area and southern drainage area was calculated as 49 years for both areas. The weighted useful life for the Schoolcraft Alternative 1 northern drainage area and southern drainage area was calculated as 45 years and 44 years, respectively. The useful life for each asset included in the cost estimate was determined based on the values provided in the CWSRF Project Planning Document Preparation Guidance and Professional Engineer's opinion. The table below includes the useful life that was assumed for each asset included in the cost estimate.

Table 6: Useful Life of Assets

Asset	Useful Life (yrs)
Conveyance (sewers, manholes, inlets, outfalls, weirs)	50
Detention Basins	50
Water Quality Units	20
Green Stormwater Infrastructure	20

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3.4 PROJECT MAPS

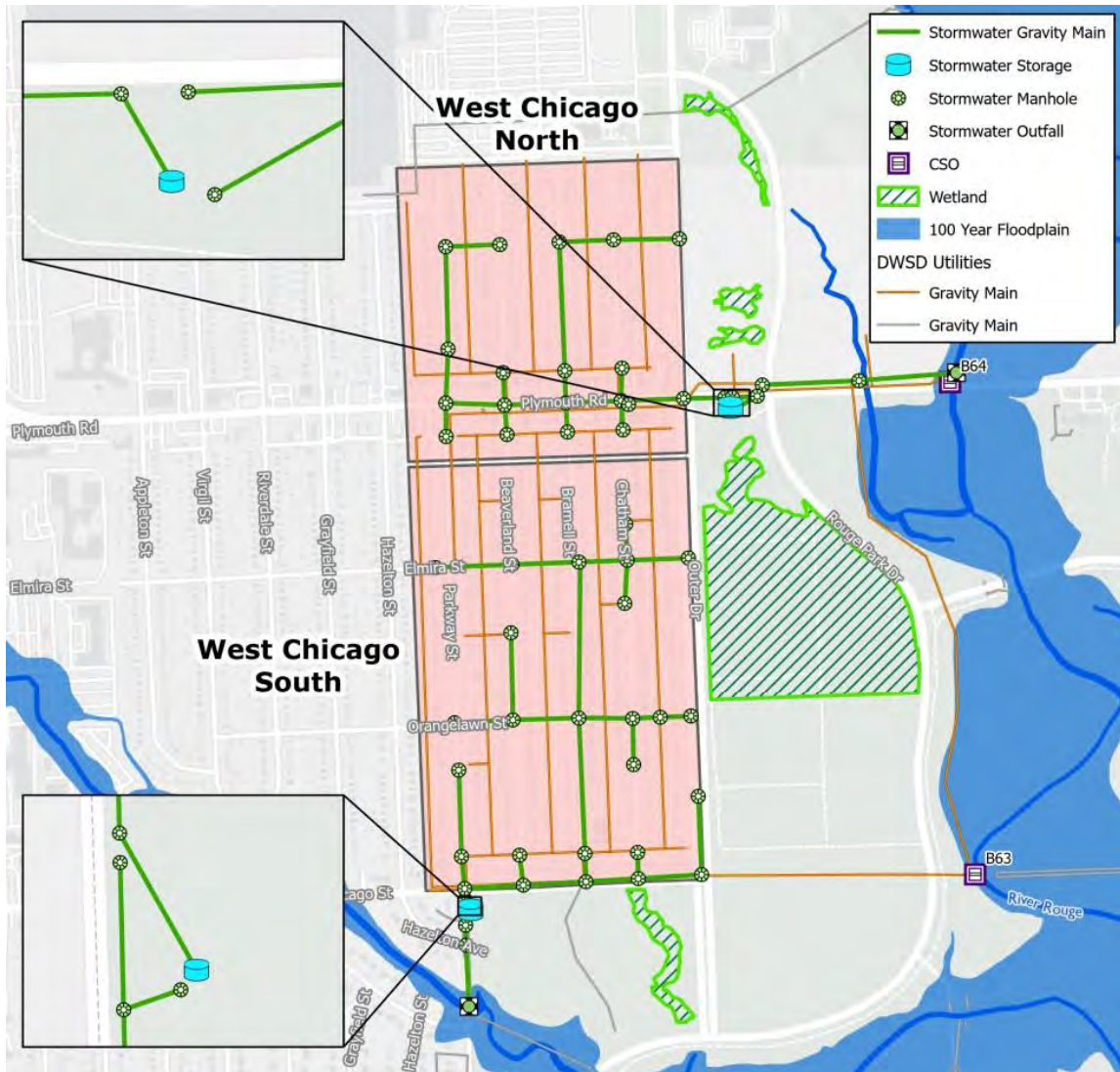


Figure 19: West Chicago Selected Alternative

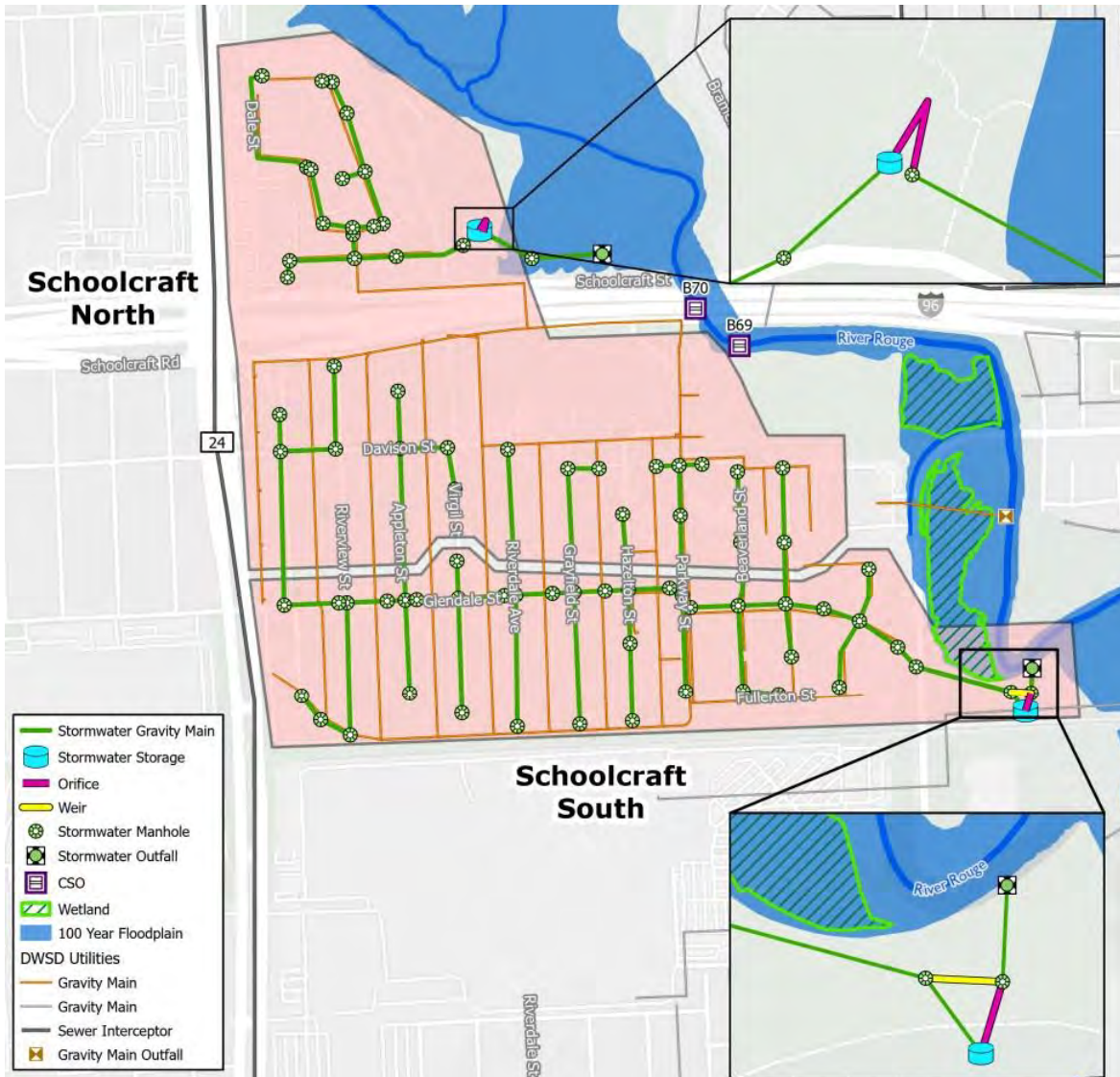


Figure 20: Schoolcraft Selected Alternative

3.5 WATER AND ENERGY EFFICIENCY

The selected projects will have a positive impact on reducing energy requirements, as stormwater will not be directed to the GLWA WRRF for treatment. The amount of chemicals required for treatment will also be reduced due to the reduction in stormwater volume from the combined system that is received at the WRRF.

3.6 SCHEDULE FOR DESIGN AND CONSTRUCTION

The proposed schedule of implementation for the selected alternative is shown in Table 7.

Table 7: Design Alternative 1 Proposed Schedule for West Chicago and Schoolcraft

Milestone	Date
<i>Phase I: Funding and Scoping</i>	
Project Initiation	January 13, 2023
Draft SRF Project Planning Document	February 22, 2023
Project Planning Document Presentation	March 15, 2023
Submit Final Project Planning Document to EGLE	April 30, 2023
<i>Phase II: Preliminary Engineering</i>	
Topographic Survey	April 30, 2023
Metering	Spring/Summer 2023
Field Sewer Evaluation	Spring 2023
Stakeholder Outreach	May 2023
30% Base Plans	June 30, 2023
Community Engagement	October 2023
<i>Phase III: Final Design and Construction Drawings²</i>	
EGLE Issues Draft IUP	August 2023
Environmental Assessment	September 2023
Community Engagement	September 2023
60% Plans	October 31, 2023
Permit Submittals ³	November 15, 2023
90% Plans and Permitting	December 15, 2023
<i>Phase IV: 100% Documents, Bidding Assistance and SRF Coordination</i>	
100% Bidding Plans	February 1, 2024
Transmittal of Bids to EGLE	May 2024
Loan Closing	August 2024
Contractor Notice to Proceed	October 2024
Construction Start Date	October 2024
Construction Substantial Completion	December 2026
Construction Final Completion	October 2027

² Note that the scheduled for Phase III and later will be modified based on the approved milestone schedule executed between DWSD and EGLE.

³ Note that external permits (EGLE Wetlands/Floodplain) will often take in excess of 90 days to process. Advance submittal is proposed to ensure that permits are in hand prior to bidding. All permits must be secured prior to transmittal of the bids to the EGLE SRF Loan Section.

3.7 COST SUMMARY

The West Chicago Selected Alternative 1 project includes a total of 15,710 feet of new storm sewers, with approximately 120 inlets and 67 stormwater manholes. A total of 2,400 feet of new combined sewer is included to repurpose the existing CSO into a stormwater outfall. There are two underground detention units with a total volume of 3,640 cubic yards and 4,410 cubic yards for the northern drainage area and southern drainage area, respectively. There are a total of 8 water quality units, 2 outfall structures, and 2 weir structures.

The Schoolcraft Selected Alternative 1 project includes a total of 24,960 feet of new storm sewers, with approximately 180 inlets and 90 stormwater manholes. There is one underground detention unit with a total volume of 6,950 cubic yards for the drainage area south of Schoolcraft. An open detention basin with a total volume of 2,300 cubic yards is included for the drainage area to the north of Schoolcraft. There are a total of 10 water quality units, 2 outfall structures, and 1 weir structure.

For both the West Chicago and Schoolcraft project areas, construction of storm sewer will require pavement removal, excavation by executing open cut or trenchless options like bore and jack, and pavement restoration is required to be completed with an aggregate base and restored pavement surface. Additionally, there will be utility conflicts within the proposed areas, as some proposed storm sewers coincide with the existing utilities. This will be resolved by relocation of existing utilities, abandonment of existing structures where they coincide with proposed structures, and construction of new assets where rerouting is required. An additional cost for green stormwater infrastructure (GSI) street planters is included for both projects.

A preliminary opinion of probable construction costs is provided in Table 8. This cost estimate is based on recent bids received for similar stormwater projects. The probable costs include a contingency of 20% and 20% for engineering. DWSD also has the capacity to utilize 1 to 2 million dollars toward the construction of these proposed projects that would be recuperated by increased user costs. For the sake of this analysis, each project location is broken into sections based on outfalls. The preliminary cost estimates for the selected alternatives can be found in Appendix D.

Table 8: Preliminary Opinion of Probable Cost of Selected Alternative by Outfall Location

Project Area	CSO Outfall	Selected Alternative Preliminary Cost Estimate
West Chicago North	B064	\$17,000,000
West Chicago South	B063	\$19,100,000
Schoolcraft North	B070	\$20,200,000
Schoolcraft South	B069	\$22,000,000

3.8 IMPLEMENTABILITY

With the available funds received from the SRF funding, DWSD would have the ability to design and bid these proposed projects for FY2024. The projects being proposed as part of this alternative are to be completed in the public rights-of-way, adding additional sewers and making changes to existing infrastructure that is all owned by DWSD or the City of Detroit. Therefore, other than funding, implementation of these projects is not expected to be an issue.

DWSD is a City-owned utility with broad statutory authority. Prior to GLWA assuming responsibility for operating and maintaining the regional water supply and wastewater system through the Bifurcation Agreement, DWSD had entered into contracts with its suburban customers, which establish the terms and conditions for providing water and wastewater services, and overseeing the operation and maintenance of the regional system. The Department has substantial experience in the financing of capital improvements under a variety of programs. It has a proven track record for using system revenues to retire its debt on new facilities.

The Great Lakes Water Authority (GLWA) will be the loan applicant on behalf of the City of Detroit Water and Sewerage Department (DWSD), the loan recipient.

4 ENVIRONMENTAL AND PUBLIC HEALTH IMPACTS

4.1 DIRECT IMPACTS

4.1.1 CONSTRUCTION IMPACTS

The construction impacts will be short-term impacts that will be mitigated or reversed through adequate restoration of the local roadway and City owned properties along the Rouge River. All work completed will be completed per the proper permits. The method of construction being proposed in both selected alternatives is open cut. This would include the removal and clearing of existing materials directly above the proposed storm pipe. In general, the storm pipe is expected to be constructed in the road rights-of-way between the curb and sidewalk. Due to the anticipated location of this pipe network and the construction method, there will be an impact on the vegetation and trees.

Impacts on traffic and social impacts are expected to be negligible. Since the study area is a residential neighborhood, it is anticipated that one lane of traffic can be maintained throughout the construction allowing for minimal disturbances in traffic flow. DWSD will notify the residents in advance and provide necessary traffic control during the construction of the projects.

- **West Chicago** –The selected alternative avoids delineated wetlands, threatened or endangered species, and the 100-year floodplain.
- **Schoolcraft** –The selected alternative will avoid the delineated wetlands and threatened and endangered species; however, the selected project area is within the 100-year floodplain. The Rouge River floodplain work will be permitted by EGLE and all work within the floodplain will be completed in a manner that will have minimal efforts on the wildlife and environment.

After the project planning document is submitted and ranked, contact with State Historic Preservation Office (SHPO), Tribal Historic Preservation Officers (THPO), U.S. Fish and Wildlife Service, Michigan Natural Features Inventory (MNFI) and EGLE Water Resources Division will be made to assess the impacts of the proposed projects and added to the final project planning document in Appendix H.

4.1.2 OPERATIONAL IMPACTS

The selected alternatives have four stormwater outfalls to the Rouge River. The outfall locations will require maintenance and erosion control measures. The new storm sewer network will be part of the DWSD Operational and Maintenance program.

4.1.3 SOCIAL IMPACTS

The qualitative determination of the social impact of the projects on the overall service area is positive; there are no known documented cases of negative social impacts due to the proliferation of stormwater enhancement projects. In general, incorporating stormwater enhancement projects into the community tends to enhance local aesthetics and improve quality of life (reduced basement backups).

4.2 INDIRECT IMPACTS

The selected alternative areas are built-out areas within the City of Detroit with little to no available land for development or densification. The land use in the project areas will be restored back to its pre-construction conditions. Additionally, the selected alternatives will have a positive indirect impact on the social and environmental impacts in the neighborhoods. The reduction of untreated CSO outfalls in the Rouge River will improve the water quality and quality of life around the Rouge River including recreational use.

4.3 CUMULATIVE IMPACTS

The selected alternatives will have an overall positive impact on the neighborhood and the Rouge River. The project areas are reducing and/or eliminating untreated CSO outfalls that discharge into the Rouge River. The reduction in untreated combined sewer flow into the Rouge River will improve the water quality, which will improve the social and environmental impacts in the West Chicago and Schoolcraft neighborhoods.

5 MITIGATION

5.1 *MIGITATION OF SHORT-TERM IMPACTS*

Environmental disruption will occur during construction. Guidelines will be established for cover vegetation removal, dust reduction, traffic control and accident prevention. Once construction is completed, those short-term effects will stop, and the area will be returned to the original conditions insofar as possible.

5.1.1 *GENERAL CONSTRUCTION*

Construction for the storm system improvement projects will be open cut and have an impact on traffic and mobility in the project neighborhoods. The project will require removal of local road pavement to install the storm sewers. Residents may lose temporary access to their driveways. The outfall location in Schoolcraft will require a floodplain permit with EGLE to construct the storm sewer pipe from Outer Drive to the Rouge River.

Normal construction activities have the potential to produce noise and dust.

5.2 *MIGITATION OF LONG-TERM IMPACTS*

The investment in non-recoverable resources committed to the SRF Project Plan would be traded for the restored and improved performance of the combined sewer system during the life of the system. The commitment of resources includes public capital, energy, labor and unsalvageable materials. These non-recoverable resources would be foregone for the provision of the proposed improvements. Construction accidents associated with this project may cause irreversible bodily injuries or death. Accidents may also cause damage to or destruction of equipment and other resources.

5.2.1 *SITING DECISIONS*

The selected alternatives were selected by the limited impact on the land type, environmental impact, and existing local infrastructure. The project area outfall locations avoid wetlands and threatened and endangered species. The outfalls that are within the 100-year floodplain will be permitted through EGLE.

5.2.2 OPERATIONAL IMPACTS

The selected alternatives will remove four CSO outfalls from the Rouge River. This will remove the potential for raw, untreated sewage to be discharged to the Rouge River. The removal of the CSO outfalls is anticipated to decrease the fecal coliforms and potential for E. coli to be discharged to the Rouge River. Additionally, the stormwater enhancement project outfalls will have a water quality treatment practice to address TSS. As described in the previous section, the overall environmental impact of the project will allow for water quality improvement.

5.3 MITIGATION OF INDIRECT IMPACTS

The selected alternative areas are built-out areas within the City of Detroit with little to no available land for development or densification. The construction in the 100-year floodplain will follow the requirements under the EGLE permit. The land use in the project areas will be restored back to its pre-construction conditions.

5.3.1 STAGING OF CONSTRUCTION

Environmental disruption will occur during construction. Guidelines will be established for cover vegetation removal, dust reduction, traffic control and accident prevention. Once construction is completed, those short-term effects will stop and the area will be returned to the original conditions insofar as possible

5.3.2 *ORDINANCES*

Growth from the project is not anticipated. However, the City of Detroit does have a Post-Construction Stormwater Management Ordinance (PCSWMO) that serves as a regulatory driver for stormwater management, defining the stormwater performance standards for the City of Detroit.

5.3.3 *BENEFICIAL AND ADVERSE*

The proposed project will significantly improve the capacity of the existing combined sewer network to service the needs of the community with minimal threat to sewer backup or CSO discharge into the Rouge River.

Temporary adverse effects of construction will be present during the construction of the new storm sewer network. The machinery used to dig and install the proposed storm pipes will generate noise. This noise will be mitigated by enforcing noise ordinances. Dust from digging and removing existing material to place the storm sewer will be mitigated using construction methods that keep dust at a minimum.

Spoils that are removed from the trenches will be subject to soil erosion and a Soil Erosion and Sedimentation Control (SESC) permit will need to be obtained. Soil erosion measures, such as catch basin filters, check dams and silt fence will be used to ensure that material does not erode into the drains and waterways. A sweeping schedule for the neighborhood road network and surrounding road networks will be required of the contractor and be enforced by the observation staff to mitigate the material that is being tracked in and out of the site.

6 PUBLIC PARTICIPATION

A public meeting will be scheduled to allow the public the opportunity to generate a better understanding and to address any concerns regarding this plan. As a requirement of the CWSRF funding EGLE guidelines, DWSD will invite the public to gain information and raise any concerns regarding this project planning document.

6.1 PUBLIC MEETING SUMMARY

DWSD will present the project plan during the Board of Water Commissioners (BOWC) meeting on Wednesday, March 15, 2023. The presentation will be recorded, and the transcript will be added to Appendix H. The public meeting advertisement will be published on the DWSD website, social media, available at City Hall, and in the local newspapers; Detroit Free Press and Detroit News. In addition to the public, all local, state, and federal agencies along with public and private parties that expressed interest in the project will be notified. The notification will be distributed no later than February 28, 2023; 15 days prior to the proposed meeting.

6.2 ADOPTION OF THE PROJECT PLANNING DOCUMENT

After conclusion of the public comments period following the meeting, an alternative will be selected by DWSD. A resolution document adopting this plan will be completed and attached at the end of the final project planning document.

DRAFT

6.3 PUBLIC MEETINGS COMMENTS RECEIVED AND ANSWERED

After completion of the public meeting, a summary of the meeting including the presentation, list of attendees, specific concerns and responses, public comments (written and spoken) will be included in the final version of this document (Appendix K). In the event that there is a change made to the plan based on the public comments, it will be adopted and described into the final project plan.

7 TECHNICAL CONSIDERATIONS

7.1 INFILTRATION AND INFLOW REMOVAL

In the project locations, inflow during wet weather events is a major component of the untreated CSO discharges into the Rouge River. Based on the data provided by GLWA, over the past five years, these untreated CSO locations are regularly discharging into the river indicated the majority of the flow into the combined sewer pipes in the project areas are from inflow. The selected alternatives reduce the inflow by conveying the stormwater runoff directly to the constructed storm sewer network where it is treated for water quality before discharging into the Rouge River.

7.2 SEWER SYSTEM EVALUATION SURVEY

This is not applicable to the project planning document.

7.3 STRUCTURAL INTEGRITY

This is not applicable to the project plan document.

7.4 FISCAL SUSTAINABILITY PLAN

Per the SRF Project Plan Document, a fiscal sustainability element is required for any SRF-funded portions of the wastewater system. The requirement includes an inventory of critical assets and an evaluation of condition and performance. It also requires certification that water and energy conservation efforts are integrated into the plan. The Project Plan Document should also include plans for maintaining, repairing/replacing and funding the SRF-funded treatment works.

This project planning document meets the requirements of the Fiscal Sustainability Plan, as the key components have been addressed through the physical inspection of the system, the hydraulic modeling of the system and the proposed focus on minimizing inflow which will reduce pumping and wastewater treatment volumes.

7.5 SPECIAL ASSESSMENT DISTRICT PROJECTS

This is not applicable to the project plan document.

DRAFT

Appendix A: Project Planning Document Forms



MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
**OVERBURDENED AND SIGNIFICANTLY OVERBURDENED COMMUNITY STATUS
DETERMINATION WORKSHEET**

The following data is required from each State Revolving Fund (SRF) applicant requesting a determination for overburdened and significantly overburdened community status.

The most recent census and tax data are available in a searchable table on EGLE's [State Revolving Fund – Overburdened Community Definition and Scoring Criteria Development](#) webpage along with an excel worksheet to help determine blended Median Annual Household Income (MAHI) and blended taxable value per capita for regional systems. The MAHI and taxable value per capita table will be used to make all FY24 determinations. Applicants are encouraged to visit this page prior to completing this form to see if they qualify based on MAHI (blended MAHI if applicable) or taxable value per capita (blended taxable value per capita if applicable) alone. If so, they only need to fill out lines 1 and 2 of this form, electronically sign it on page 2, and submit.

Alternately, if the applicant's MAHI or blended MAHI is above the state average - \$63,498 for FY24 – they cannot be determined as being overburdened or significantly overburdened for FY24 funding and should not complete or turn in this form.

For applicants whose MAHI or blended MAHI is below \$63,498 but do not automatically qualify based on MAHI or taxable value per capita alone, please complete the entire form and return to:

Mark Conradi
conradim@michigan.gov

Name of Applicant

DWSD

Please check the box indicating which funding source this determination is for:

DWSRF

CWSRF

1. Is this a regional system? A regional system refers to any system that serves more than one municipality (cities, townships, and/or villages)

Yes
No

If yes, refer to the instructions at the end of this form to complete calculations for a blended MAHI and blended taxable value per capita. Additionally, page 3 of this form will also need to be completed.

2. Median Annual Household Income from table on the overburdened webpage (blended if applicable)
\$34,762
3. Taxable Value Per Capita from table on the overburdened webpage (blended if applicable)
\$10,647
4. Total amount of anticipated debt for the proposed project (amount of loan requested for FY24 loan)
N/A
5. Annual payments on the existing debt for the system
N/A
6. Total operation, maintenance, and replacement expenses (OM&R) for the system on an annual basis
N/A
7. Number of residential equivalent users (REUs) in the system
N/A

***I (_____) hereby certify that the information in this form is complete, true, and correct to the best of my knowledge.**

Signature

Date

For determinations made using anticipated debt, a final determination will be made based upon the awarded loan amount and not the anticipated amount provided on this form.

**A RESOLUTION ADOPTING A FINAL PROJECT PLANNING DOCUMENT
FOR WASTEWATER SYSTEM IMPROVEMENTS OR
NPS POLLUTION CONTROL/STORMWATER IMPROVEMENTS
AND DESIGNING AN AUTHORIZED PROJECT REPRESENTATIVE**

WHEREAS, Great Lakes Water Authority and Detroit Water and Sewerage Department recognize the need to make improvements to its existing wastewater treatment and collection system or its existing NPS pollution control/stormwater treatment system; and

WHEREAS, Great Lakes Water Authority and Detroit Water and Sewerage Department authorized Orchard, Hiltz and McCliment, Advisors to prepare a Project Planning Document, which recommends the construction of West Chicago Stormwater Improvements and Schoolcraft Stormwater Improvements.

WHEREAS, said Project Planning Document was presented at the Public Meeting held on - Wednesday, March 15, 2023 and all public comments have been considered and addressed.

NOW THEREFORE BE IT RESOLVED, that Great Lakes Water Authority and Detroit Water and Sewerage Department formally adopts said Project Planning Document and agrees to implemented the selected alternative Design Alternative 1.

BE IT FURTHER RESOLVED, that the Detroit, Water and Sewerage Department Director , a position currently held by Gary Brown, is designated as the authorized representative for all activities associated with the project referenced above, including the submittal of said Project Planning Document as the first step in applying to the State of Michigan for a Clean Water State Revolving Fund Loan to assist in the implementation of the selected alternative

Yeas (names of Members voting Yes):

Nays (names of Members voting No):

I certify that the above Resolution was adopted by Great Lakes Water Authority and Detroit Water and Sewerage Department on _____.

BY: _____
Name (please print or type)

Title

Signature

Date

DRAFT

Appendix B: NPDES Permit

PERMIT NO. MI0022802



**STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENT, GREAT LAKES,
AND ENERGY**

**AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM**

In compliance with the provisions of the Federal Water Pollution Control Act, 33 U.S.C., Section 1251 *et seq.*, as amended; Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA); Part 41, Sewerage Systems, of the NREPA; and Michigan Executive Order 2011-1,

City of Detroit Water and Sewerage Department

735 Randolph
Detroit, MI 48226

and

Great Lakes Water Authority

735 Randolph
Detroit, MI 48226

are authorized to discharge from the **Great Lakes Water Authority Water Resource Recovery Facility** located at

9300 W. Jefferson
Detroit, MI 48209

designated as **GLWA WRRF**

to the receiving water named the Detroit River and the Rouge River, and from combined sewer overflow facilities to the receiving waters named the Detroit River, the Rouge River, and Conner Creek in accordance with effluent limitations, monitoring requirements, and other conditions set forth in this permit.

This permit is based on a complete application submitted on March 29, 2017 and amended through May 25, 2017.

This permit takes effect on July 1, 2019. The provisions of this permit are severable. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term in accordance with applicable laws and rules. On its effective date, this permit shall supersede National Pollutant Discharge Elimination System (NPDES) Permit No. MI0022802 (expiring October 1, 2017).

This permit and the authorization to discharge shall expire at midnight on **October 1, 2022**. In order to receive authorization to discharge beyond the date of expiration, the permittees shall submit an application that contains such information, forms, and fees as are required by the Michigan Department of Environment, Great Lakes, and Energy (Department) by **April 4, 2022**.

Issued: June 28, 2019

Original signed by Christine Alexander
Christine Alexander, Manager
Permits Section
Water Resources Division

PERMIT FEE REQUIREMENTS

In accordance with Section 324.3120 of the NREPA, the permittees shall make payment of an annual permit fee to the Department for each October 1 the permit is in effect regardless of occurrence of discharge. The permittees shall submit the fee in response to the Department's annual notice. The fee shall be postmarked by January 15 for notices mailed by December 1. The fee is due no later than 45 days after receiving the notice for notices mailed after December 1.

Annual Permit Fee Classification: Municipal Major, 500 MGD or greater (IP)

In accordance with Section 324.3132 of the NREPA, the permittees shall make payment of an annual biosolids land application fee to the Department if the permittees land applies biosolids. In response to the Department's annual notice, the permittees shall submit the fee, which shall be postmarked no later than January 31 of each year.

CONTACT INFORMATION

Unless specified otherwise, all contact with the Department required by this permit shall be made to the Southeast Michigan District Office of the Water Resources Division. The Southeast Michigan District Office is located at 27700 Donald Court, Warren, MI, 48092-2793, Telephone: 586-753-3700, Fax: 586-751-4690.

CONTESTED CASE INFORMATION

Any person who is aggrieved by this permit may file a sworn petition with the Michigan Administrative Hearing System within the Michigan Department of Licensing and Regulatory Affairs, c/o the Michigan Department of Environment, Great Lakes, and Energy, setting forth the conditions of the permit which are being challenged and specifying the grounds for the challenge. The Department of Licensing and Regulatory Affairs may reject any petition filed more than 60 days after issuance as being untimely.

PART I

Section A. Limitations and Monitoring Requirements

1. Effluent Limitations, Monitoring Point 049F

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittees are authorized to discharge treated municipal wastewater from Monitoring Point 049F through Outfall 049 (DRO). Outfall 049 (DRO) discharges to the Detroit River. Such discharge shall be limited and monitored by the permittees as specified below.

Until the initiation of operation of the Rouge River Outfall (RRO) Disinfection Project, this discharge shall consist of secondary treated municipal wastewater and additional primary treated municipal wastewater up to the hydraulic capacity of Outfall 049 (DRO). After initiation of operation of the RRO Disinfection Project, this discharge shall consist of secondary treated municipal wastewater typically, but primary treated municipal wastewater and additional secondary treated municipal wastewater up to the hydraulic capacity of Outfall 049 (DRO) during wet weather events. During such wet weather events, the permittees are approved to discharge primary treated municipal wastewater from 049A thorough Outfall 049 (DRO).

Whenever Outfall 049 (DRO) is out of service for repairs, the permittees may discharge through Outfall 050 (RRO). All effluent authorized for discharge from Outfall 049F, and the monitoring, limitations and other requirements specified below shall apply to the discharge through Outfall 050 (RRO) unless otherwise specified. At least 10 days in advance of scheduled maintenance and within 24-hours after initiation of diversion due to emergency conditions, the permittees shall notify the Department of the reason for the diversion and the expected duration of the diversion.

<u>Parameter</u>	<u>Maximum Limits for Quantity or Loading</u>				<u>Maximum Limits for Quality or Concentration</u>				<u>Monitoring Frequency</u>	<u>Sample Type</u>
	<u>Monthly</u>	<u>7-Day</u>	<u>Daily</u>	<u>Units</u>	<u>Monthly</u>	<u>7-Day</u>	<u>Daily</u>	<u>Units</u>		
Flow	(report)	---	(report)	MGD	---	---	---	---	Daily	Report Total Daily Flow
Fecal Coliform Bacteria	---	---	---	---	200	400	---	cts/100 ml	Daily	Grab
Total Residual Chlorine	---	---	---	---	---	---	0.11	mg/l	Daily	Grab
Oil & Grease	---	---	---	---	---	15	---	mg/l	Daily	Grab
Total Polychlorinated Biphenyls (PCBs)										
Aroclor 1016	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1221	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1232	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1242	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1248	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1254	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1260	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
					Maximum PCB Aroclor					
See I.A.1.g.	---	---	---	---	<0.1	---	---	µg/l	Monthly	See I.A.1.g.
Acute Toxicity	---	---	---	---	---	---	(report)	TU _A	Quarterly	24-Hr Composite
Carbonaceous Biochemical Oxygen Demand (CBOD5)										
	---	---	(report)	lbs/day	---	---	(report)	mg/l	Daily	24-Hr Composite
Ammonia Nitrogen (as N)		---	(report)	lbs/day	(report)	---	(report)	mg/l	Daily	24-Hr Composite
Available Cyanide	---	---	(report)	lbs/day	---	---	(report)	µg/l	Monthly	Grab

Perfluorooctane sulfonate (PFOS)	(report)	---	(report)	lbs/day	(report)	---	(report)	ng/l	Quarterly	Grab
Perfluorooctanoic acid (PFOA)	(report)	---	(report)	lbs/day	(report)	---	(report)	ng/l	Quarterly	Grab
Total Copper	---	---	(report)	lbs/day	---	---	(report)	µg/l	Quarterly	24-Hr Composite
					Minimum		Maximum			
					<u>Daily</u>		<u>Daily</u>			
pH	---	---	---	---	6.0	---	9.0	S.U.	Daily	Grab
Dissolved Oxygen	---	---	---	---	(report)	---	---	mg/l	Daily	Grab

The following design flow was used in determining the above limitations, but is not to be considered a limitation or actual capacity: a combined 930 MGD of secondary treated effluent.

- a. **Narrative Standard**
The receiving water shall contain no turbidity, color, oil films, floating solids, foams, settleable solids, or deposits as a result of this discharge in unnatural quantities which are or may become injurious to any designated use.
- b. **Sampling Locations**
The sampling locations for the pollutants indicated in Part I.A.1. of this permit shall be representative of the effluent and consistent with the locations approved by the Department. The Department may approve alternate sampling locations that are demonstrated by the permittees to be representative of the effluent.
- c. **Quarterly Monitoring**
Quarterly samples shall be taken during the months of January, April, July, and October. If the facility does not discharge during these months, the permittees shall sample the next discharge occurring during the period in question. If the facility does not discharge during the period in question, a sample is not required for that period. For any month in which a sample is not taken, the permittees shall enter "*G" on the Discharge Monitoring Report (DMR).
- d. **Total Residual Chlorine (TRC)**
Compliance with the TRC limit shall be determined on the basis of one or more grab samples. If more than one (1) sample per day is taken, the additional samples shall be collected in near equal intervals over approximately eight (8) hours. The samples shall be analyzed immediately upon collection and the average reported as the daily concentration. Samples shall be analyzed in accordance with Part II.B.2. of this permit.
- e. **Monitoring Frequency Reduction for Perfluorooctane Sulfonate (PFOS) and/or Perfluorooctanoic Acid (PFOA)**
After the submittal of 24 months of data, the permittee may request, in writing, Department approval of a reduction in monitoring frequency for PFOS and/or PFOA. This request shall contain an explanation as to why the reduced monitoring is appropriate. Upon receipt of written approval and consistent with such approval, the permittee may reduce the monitoring frequency indicated in Part I.A.1. of this permit. The monitoring frequency for PFOS and/or PFOA, shall not be reduced to less than annually. The Department may revoke the approval for reduced monitoring at any time upon notification to the permittee.
- f. **Analytical Methods and Quantification Levels for Available Cyanide and Total Copper**
The sampling procedures, preservation and handling, and analytical protocol for compliance monitoring for Available Cyanide shall be in accordance with EPA Method OIA-1677. The quantification level for Available Cyanide and Total Copper shall be 2.0 µg/l and 1.0 µg/l respectively unless a higher level is appropriate because of sample matrix interference. Justification for higher quantification levels shall be submitted to the Department within 30 days of such determination. Upon approval from the

Department, the permittees may use alternate analytical methods (for parameters with methods specified in Title 40 of the Code of Federal Regulations (CFR), Part 136, the alternate methods are restricted to those listed in 40 CFR, Part 136).

- g. Limits Below the Quantification Level – Total Polychlorinated Biphenyls (PCBs)
The sampling procedures, preservation and handling, and analytical protocol for compliance monitoring for Total PCBs shall be in accordance with EPA Method 608.3. Upon approval from the Department, the permittees may use alternate analytical methods (for parameters with methods specified in 40 CFR, Part 136, the alternate methods are restricted to those listed in 40 CFR, Part 136). The quantification level shall be 0.1 ug/l unless a higher level is appropriate because of sample matrix interference. Justification for a higher quantification level shall be submitted to the Department within 30 days of such determination.

The water quality-based effluent limitation for Total PCBs is 2.6×10^{-5} ug/l (2.0×10^{-4} lbs/day) maximum monthly average. This is less than the quantification level. Control requirements are therefore established consistent with R 323.1213. **The discharge of any individual aroclor at or above the quantification level of 0.1 ug/l is a specific violation of this permit.** If concentrations of all aroclors representing a monitoring period are less than their quantification levels, the permittees will be considered to be in compliance with the permit for the monitoring period that the analyses represent, provided that the permittees are also in full compliance with the Pollutant Minimization Program for Total PCBs set forth in Part I.A.10 of this permit. For the purpose of reporting on the Daily tab of the DMR, individual aroclor results less than the quantification level shall be reported as "<0.1." For the purpose of reporting on the Summary tab of the DMR, the value reported under "Maximum PCB Aroclor" shall be the highest aroclor concentration observed during the monitoring period. This permit condition does not authorize the discharge of PCBs at levels that are injurious to the designated uses of the waters of the state or that constitute a threat to the public health or welfare.

- h. Acute Toxicity Requirements
Test species shall include *Ceriodaphnia dubia*. Testing and reporting procedures shall follow procedures contained in EPA-821-R-02-012, "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (Fifth Edition). When the effluent ammonia nitrogen (as N) concentration is greater than 5 mg/l, the pH of the toxicity test shall be maintained at the pH of the effluent at the time of sample collection. The acute toxic unit (TU_A) value for **each species tested** shall be reported on the DMR. For **each species not tested**, the permittees shall enter "***W**" on the DMR. Completed toxicity test reports for each test conducted shall be retained by the permittees in accordance with the requirements of Part II.B.5. of this permit and shall be available for review by the Department upon request. Toxicity test data acceptability is contingent upon the validation of the test method by the testing laboratory. Such validation shall be submitted to the Department upon request.

The Department will review the toxicity data submitted by the permittees to determine if the acute toxicity requirements of R 323.1219 are being satisfied.

1) If the data indicate persistent exceedance of the acute toxicity requirements of R 323.1219, upon written notification by the Department, the following conditions apply. Within 90 days of the above notification, the permittees shall implement a Toxicity Reduction Evaluation (TRE). The objective of the TRE shall be to reduce the toxicity of the final effluent from Monitoring Point 049F to $<3.0 TU_A$ within three (3) years of notification. The following documents are available as guidance to reduce toxicity to acceptable levels: Phase I, EPA/600/6-91/003; Phase II, EPA/600/R-92/080; Phase III, EPA/600/R-92/081; and Publicly Owned Treatment Works, EPA/833B-99/002. The tests shall be conducted and reported as specified above. Upon approval from the Department, the acute toxicity tests may be performed using the more sensitive species identified in the acute toxicity database. If a more sensitive species cannot be identified, the acute toxicity tests shall be performed with both species. Annual progress reports shall be submitted to the Department within 30 days of the completion of the last test of each annual cycle.

2) This permit may be modified in accordance with applicable laws and rules to include additional whole effluent toxicity control requirements as necessary.

2. Effluent Limitations, Monitoring Point 049A

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittees are approved to discharge treated municipal wastewater and treated storm water runoff from Monitoring Point 049A through Outfall 049 (DRO). Outfall 049 (DRO) discharges to the Detroit River. Such discharge shall be limited and monitored by the GLWA as specified below.

Monitoring Point 049A is a primary treated effluent conduit. There shall be no discharge from Monitoring Point 049A directly to the Detroit River through Outfall 049 (DRO) unless the discharge from Monitoring Point 049B exceeds a peak hourly flow of 930 MGD (which includes recycle) or in accordance with an approved GLWA Wet Weather Operational Plan (see Part I.A.11.). Discharges from Monitoring Point 049A shall be limited and monitored by the permittees as specified below.

<u>Parameter</u>	<u>Maximum Limits for Quantity or Loading</u>			<u>Maximum Limits for Quality or Concentration</u>			<u>Monitoring Frequency</u>	<u>Sample Type</u>		
	<u>Monthly</u>	<u>Daily</u>	<u>Units</u>	<u>Monthly</u>	<u>Daily</u>	<u>Units</u>				
Flow	(report)	(report)	MGD	---	---	---	Daily	Report Total Daily Flow		
Carbonaceous Biochemical Oxygen Demand (CBOD ₅)	---	---	---	40	(report)	mg/l	Daily	24-Hr Composite		
Total Suspended Solids	---	---	---	70	(report)	mg/l	Daily	24-Hr Composite		
Total Phosphorus (as P)	---	---	---	1.5	(report)	mg/l	Daily	24-Hr Composite		
Ammonia Nitrogen (as N)	---	---	---	(report)	(report)	mg/l	Daily	24-Hr Composite		
Total Mercury										
– Corrected	(report)	(report)	lbs/day	(report)	(report)	ng/l	2x Monthly	Grab		
– Uncorrected	---	---	---	---	(report)	ng/l	2x Monthly	Grab		
– Field Duplicate	---	---	---	---	(report)	ng/l	2x Monthly	Grab		
– Field Corrected	---	---	---	---	(report)	ng/l	2x Monthly	Grab		
– Laboratory Method Blank	---	---	---	---	(report)	ng/l	2x Monthly	Grab		
	<u>12-Month Rolling Average</u>			<u>12-Month Rolling Average</u>						
Total Mercury	0.19	---	---	lbs/day	25	---	---	ng/l	Monthly	Calculation

- a. **Sampling Locations**
The sampling locations for the pollutants in Part 1.A.2. of this permit shall be representative of the effluent and consistent with the locations approved by the Department. Samples for CBOD₅, Total Suspended Solids, Ammonia Nitrogen, Total Mercury, and Total Phosphorus shall be taken prior to mixing with other waste streams. The Department may approve alternate sampling locations that are demonstrated by the permittees to be representative of the effluent
- b. **Sampling of Short-Term Wet Weather Events**
If the first calendar day of the discharge event through Monitoring Point 049A includes less than three hours of flow but continues into the next calendar day, the sampling can be included as a part of the subsequent event the following day.
- c. **Final Effluent Limitation for Total Mercury**
The final limit for total mercury is the Discharge Specific Level Currently Achievable (LCA) based on a multiple discharger variance from the WQBEL of 1.3 ng/l, pursuant to Rule 1103(9) of the Water Quality Standards. Compliance with the LCA shall be determined as a 12-month rolling average, the calculation of which may be done using blank-corrected sample results. The 12-month rolling average shall be determined by adding the present monthly average result to the preceding 11 monthly average results then dividing the sum by 12. For facilities with quarterly monitoring requirements for total mercury, quarterly monitoring shall be equivalent to three (3) months of monitoring in calculating the

12-month rolling average. Facilities that monitor more frequently than monthly for total mercury must determine the monthly average result, which is the sum of the results of all data obtained in a given month divided by the total number of samples taken, in order to calculate the 12-month rolling average. If the 12-month rolling average for any month is less than or equal to the LCA, the GLWA will be considered to be in compliance for total mercury for that month, provided the GLWA is also in full compliance with the Pollutant Minimization Program for Total Mercury, set forth in Part I.A.10. of this permit.

The permittee may choose to demonstrate that an alternate site-specific LCA is appropriate and request a permit modification. Such request and supporting documentation shall be submitted in writing to the Department. Supporting documentation shall include a minimum of 12 samples taken over 12-month period in accordance with EPA Method 1631. Upon approval, this permit may be modified in accordance with applicable laws and rules to incorporate the alternate site-specific LCA as the effluent limitation for Total Mercury.

After a minimum of 12 monthly data points have been collected, the permittees may request a reduction in the monitoring frequency for total mercury. This request shall contain an explanation as to why the reduced monitoring is appropriate and shall be submitted to the Department. Upon receipt of written approval and consistent with such approval, the permittees may reduce the monitoring frequency for total mercury indicated in Part I.A.2. of this permit. The Department may revoke the approval for reduced monitoring at any time upon notification to the permittees.

d. Total Mercury Testing and Additional Reporting Requirements

The analytical protocol for total mercury shall be in accordance with EPA Method 1631, Revision E, "Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry." The quantification level for total mercury shall be 0.5 ng/l, unless a higher level is appropriate because of sample matrix interference. Justification for higher quantification levels shall be submitted to the Department within 30 days of such determination.

The use of clean technique sampling procedures is required unless the permittees can demonstrate to the Department that an alternate sampling procedure is representative of the discharge. Guidance for clean technique sampling is contained in EPA Method 1669, Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels (Sampling Guidance), EPA-821-R96-001, July 1996. Information and data documenting the permittee's sampling and analytical protocols and data acceptability shall be submitted to the Department upon request.

In order to demonstrate compliance with EPA Method 1631E and EPA Method 1669, the permittees shall report, on the daily sheet, the analytical results of all field blanks and field duplicates collected in conjunction with each sampling event, as well as laboratory method blanks when used for blank correction. The permittees shall collect at least one (1) field blank and at least one (1) field duplicate per sampling event. If more than ten (10) samples are collected during a sampling event, the permittees shall collect at least one (1) additional field blank AND field duplicate for every ten (10) samples collected. Only field blanks or laboratory method blanks may be used to calculate a concentration lower than the actual sample analytical results (i.e., a blank correction). Only one (1) blank (field OR laboratory method) may be used for blank correction of a given sample result, and only if the blank meets the quality control acceptance criteria. If blank correction is not performed on a given sample analytical result, the permittees shall report under "Total Mercury – Corrected" the same value reported under "Total Mercury – Uncorrected." The field duplicate is for quality control purposes only; its analytical result shall not be averaged with the sample result.

3. Effluent Limitations, Monitoring Point 049B

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittees are authorized to discharge treated municipal wastewater from Monitoring Point 049B through Outfall 049 (DRO), or through Outfall 050 (RRO) when there is reduced hydraulic capacity through DRO or during wet weather, once the RRO Disinfection Project is completed. Outfall 049 (DRO) discharges to the Detroit River. Outfall 050 (RRO) discharges to the Rouge River. In addition, the permittees are authorized to discharge treated municipal wastewater from Monitoring Point 049B through Outfall 050 to the Rouge River as provided in Part I.A.4.

Outfall 049B is the combined secondary treated effluent conduit for all dry weather flows and all wet weather flows up to and including a peak hourly flow of 930 MGD (which includes recycle).

Discharges from Monitoring Point 049B shall be limited and monitored by the permittees as specified below.

Parameter	Maximum Limits for Quantity or Loading				Maximum Limits for Quality or Concentration				Monitoring Frequency	Sample Type
	Monthly	7-Day	Daily	Units	Monthly	7-Day	Daily	Units		
Flow (This flow measurement is all secondary flow minus recycle and buffer flows)	(report)	---	(report)	MGD	---	---	---	---	Daily	Report Total Daily Flow
Recycled Flow (Screened Final Effluent)	(report)	---	(report)	MGD	---	---	---	---	Daily	Report Total Daily SFE Flow
Buffer Flow	(report)	---	(report)	MGD	---	---	---	---	Daily	Report Total Daily Flow
Carbonaceous Biochemical Oxygen Demand (CBOD ₅)	194,000	310,000	---	lbs/day	25	40	(report)	mg/l	Daily	24-Hr Composite
Total Suspended Solids	233,000	349,000	---	lbs/day	30	45	---	mg/l	Daily	24-Hr Composite
Ammonia Nitrogen (as N)	---	---	---	---	(report)	---	(report)	mg/l	Daily	24-Hr Composite
Total Mercury										
– Corrected	(report)	---	(report)	lbs/day	(report)	---	(report)	ng/l	Quarterly	Grab
– Uncorrected	---	---	---	---	---	---	(report)	ng/l	Quarterly	Grab
– Field Duplicate	---	---	---	---	---	---	(report)	ng/l	Quarterly	Grab
– Field Corrected	---	---	---	---	---	---	(report)	ng/l	Quarterly	Grab
– Laboratory Method Blank	---	---	---	---	---	---	(report)	ng/l	Quarterly	Grab
	12 Month Rolling Average				12 Month Rolling Average					
Total Mercury	0.023	---	---	lbs/day	3.0	---	---	ng/l	Monthly	Calculation
					Minimum Daily		Maximum Daily			
pH	---	---	---	---	6.0	9.0	S.U.		Daily	Grab
Total Phosphorus (as P)	5400	---	---	lbs/day	0.7	---	(report)	mg/l	Daily	24-Hr Composite
	Six Month Average (April - Sept.)				Six Month Average (April - Sept.)					
Total Phosphorus	4600	---	---	lbs/day	0.6	---	---	mg/l	(see I.A.3.c)	Calculation

				Minimum Monthly					
CBOD ₅ Minimum % Removal	---	---	---	85	---	---	%	Monthly	Calculation
Total Suspended Solids Minimum % Removal			---	85	---	---	%	Monthly	Calculation

- a. **Sampling Locations**
Samples for CBOD₅, Total Suspended Solids, Ammonia Nitrogen, Total Phosphorus, Total Mercury and pH shall be taken prior to mixing with other waste streams. Samples for pH shall be collected only during periods of discharge from Monitoring Point 049A through Outfall 049 (DRO).
- b. **Percent Removal Requirements**
These requirements shall be calculated based on the monthly (30-day) effluent CBOD5 and TSS concentrations and the monthly influent concentrations for approximately the same period.
- c. **Total Phosphorus Six Month Average Limit (April - September)**
The six month average shall be determined by adding the six monthly average results from April through September and dividing the sum by six. For the purpose of reporting on the Discharge Monitoring Reports, the permittees shall calculate and report the six month average on the October Discharge Monitoring Report.
- d. **Final Effluent Limitation for Total Mercury**
The final limit for total mercury is the Discharge Specific Level Currently Achievable (LCA) based on a multiple discharger variance from the WQBEL of 1.3 ng/l, pursuant to Rule 1103(9) of the Water Quality Standards. Compliance with the LCA shall be determined as a 12-month rolling average, the calculation of which may be done using blank-corrected sample results. The 12-month rolling average shall be determined by adding the present monthly average result to the preceding 11 monthly average results then dividing the sum by 12. For facilities with quarterly monitoring requirements for total mercury, quarterly monitoring shall be equivalent to three (3) months of monitoring in calculating the 12-month rolling average. Facilities that monitor more frequently than monthly for total mercury must determine the monthly average result, which is the sum of the results of all data obtained in a given month divided by the total number of samples taken, in order to calculate the 12-month rolling average. If the 12-month rolling average for any month is less than or equal to the LCA, the permittees will be considered to be in compliance for total mercury for that month, provided the permittees are also in full compliance with the Pollutant Minimization Program for Total Mercury, set forth in Part I.A.10. of this permit.

The permittee may choose to demonstrate that an alternate site-specific LCA is appropriate and request a permit modification. Such request and supporting documentation shall be submitted in writing to the Department. Supporting documentation shall include a minimum of 12 samples taken over 12-month period in accordance with EPA Method 1631. Upon approval, this permit may be modified in accordance with applicable laws and rules to incorporate the alternate site-specific LCA as the effluent limitation for Total Mercury.

After a minimum of 12 monthly data points have been collected, the permittees may request a reduction in the monitoring frequency for total mercury. This request shall contain an explanation as to why the reduced monitoring is appropriate and shall be submitted to the Department. Upon receipt of written approval and consistent with such approval, the permittees may reduce the monitoring frequency for total mercury indicated in Part I.A.3. of this permit. The Department may revoke the approval for reduced monitoring at any time upon notification to the permittees.

- e. **Total Mercury Testing and Additional Reporting Requirements**
The analytical protocol for total mercury shall be in accordance with EPA Method 1631, Revision E, "Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry." The quantification level for total mercury shall be 0.5 ng/l, unless a higher level is appropriate because of sample matrix interference. Justification for higher quantification levels shall be submitted to the Department within 30 days of such determination.

The use of clean technique sampling procedures is required unless the permittees can demonstrate to the Department that an alternate sampling procedure is representative of the discharge. Guidance for clean technique sampling is contained in EPA Method 1669, Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels (Sampling Guidance), EPA-821-R96-001, July 1996. Information and data documenting the permittee's sampling and analytical protocols and data acceptability shall be submitted to the Department upon request.

In order to demonstrate compliance with EPA Method 1631E and EPA Method 1669, the permittees shall report, on the daily sheet, the analytical results of all field blanks and field duplicates collected in conjunction with each sampling event, as well as laboratory method blanks when used for blank correction. The permittees shall collect at least one (1) field blank and at least one (1) field duplicate per sampling event. If more than ten (10) samples are collected during a sampling event, the permittees shall collect at least one (1) additional field blank AND field duplicate for every ten (10) samples collected. Only field blanks or laboratory method blanks may be used to calculate a concentration lower than the actual sample analytical results (i.e., a blank correction). Only one (1) blank (field OR laboratory method) may be used for blank correction of a given sample result, and only if the blank meets the quality control acceptance criteria. If blank correction is not performed on a given sample analytical result, the permittees shall report under "Total Mercury – Corrected" the same value reported under "Total Mercury – Uncorrected." The field duplicate is for quality control purposes only; its analytical result shall not be averaged with the sample result.

4. Interim Effluent Limitations, Monitoring Point 050A

During the period beginning on the effective date of this permit and lasting until initiation of operation of the RRO Disinfection Project, the permittees are approved to discharge treated municipal wastewater and treated storm water runoff from Monitoring Point 050A through Outfall 050 (RRO). Normally, the discharge may consist of only primary treated effluent when the discharge is necessary due to hydraulic constraints resulting from wet weather events. There shall be no discharge from Monitoring Point 050A unless the discharge from Monitoring Point 049B exceeds a peak hourly flow of 930 MGD (which includes recycle) or in accordance with an approved GLWA WRRF Wet Weather Operational Plan (see Part I.A.11.). Discharge from Outfall 050 (RRO) is not allowed unless hydraulically or structurally necessary. Outfall 050 (RRO) discharges to the Rouge River.

Other options for discharge from Outfall 050 include, 1) when Outfall 049 (DRO) is out-of-service, the discharge may consist of secondary or secondary and primary treated wastewater, 2) when Outfall 049 (DRO) has reduced hydraulic capacity the discharge may consist of secondary or secondary and primary treated wastewater, and 3) when there is department approved limited secondary capacity when Outfall 049 cannot be used due to construction, the discharge may consist of secondary or secondary and primary treated wastewater. Discharges from Monitoring Point 050A shall be limited and monitored by the permittees as specified below.

<u>Parameter</u>	<u>Maximum Limits for Quantity or Loading</u>				<u>Maximum Limits for Quality or Concentration</u>				<u>Monitoring Frequency</u>	<u>Sample Type</u>
	<u>Monthly</u>	<u>7-Day</u>	<u>Daily</u>	<u>Units</u>	<u>Monthly</u>	<u>7-Day</u>	<u>Daily</u>	<u>Units</u>		

Limitations and monitoring requirements in effect when Outfall 049 is out-of-service and prior to initiation of operation of the RRO Disinfection Project:

All limitations and monitoring specified in Part I.A.1. apply except for the Available Cyanide monitoring requirement, Total Residual Chlorine requirement, and the Fecal Coliform Bacteria limitations, which are replaced with the limitations and monitoring requirements specified below with the Total Residual Chlorine monitoring and limitation removed:

Available Cyanide	---	---	---	---	---	---	89	µg/l	Daily	Grab
Fecal Coliform Bacteria	---	---	---	---	(report)	(report)	---	cts/100 ml	Daily	Grab

a. **Sampling of Short-Term Wet Weather Events**

If the first calendar day of the discharge event through Monitoring Point 050A includes less than three hours of flow but continues into the next calendar day, the sampling can be included as a part of the subsequent event the following day.

4. Interim Effluent Limitations, Monitoring Point 050A (continued)

<u>Parameter</u>	<u>Maximum Limits for Quantity or Loading</u>				<u>Maximum Limits for Quality or Concentration</u>				<u>Monitoring Frequency</u>	<u>Sample Type</u>
	<u>Monthly</u>	<u>7-Day</u>	<u>Daily</u>	<u>Units</u>	<u>Monthly</u>	<u>7-Day</u>	<u>Daily</u>	<u>Units</u>		
<u>Limitations and monitoring requirements in effect during other periods of discharge from Monitoring Point 050A and prior to Initiation of operation of the RRO Disinfection Project:</u>										
Flow	(report)	---	(report)	MGD	---	---	---	---	Daily	Report Total Daily Flow
Carbonaceous Biochemical Oxygen Demand (CBOD ₅)	---	---	---	---	40	---	(report)	mg/l	Daily	24-Hr Composite
Total Suspended Solids	---	---	---	---	70	---	(report)	mg/l	Daily	24-Hr Composite
Total Phosphorus (as P)	---	---	---	---	1.5	---	(report)	mg/l	Daily	24-Hr Composite
Available Cyanide	---	---	---	---	---	---	89	µg/l	Daily	Grab
Fecal Coliform Bacteria	---	---	---	---	(report)	---	(report)	cts/100 ml	Daily	Grab
Ammonia Nitrogen (as N)	---	---	---	---	(report)	---	(report)	mg/l	Daily	24-Hr Composite
Total Copper	---	---	---	---	---	---	(report)	µg/l	Daily	24-Hr Composite
Total Polychlorinated Biphenyls (PCBs)										
Aroclor 1016	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1221	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1232	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1242	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1248	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1254	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1260	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
					Maximum PCB					
					<u>Aroclor</u>					
See I.A.4.e.	---	---	---	---	(report)	---	---	µg/l	Monthly	See I.A.4.e.
					<u>Minimum Daily</u>		<u>Maximum Daily</u>			
pH	---	---	---	---	6.0		9.0	S.U.	Daily	Grab
Dissolved Oxygen	---	---	---	---	(report)		---	mg/l	Daily	Grab

- a. Narrative Standard
The receiving water shall contain no turbidity, color, oil films, floating solids, foams, settleable solids, or deposits as a result of this discharge in unnatural quantities which are or may become injurious to any designated use.
- b. Sampling Locations
The sampling locations for the pollutants in Part 1.A.4. of this permit shall be representative of the effluent and consistent with the locations approved by the Department. The Department may approve alternate sampling locations that are demonstrated by the GLWA to be representative of the effluent.

- c. **Sampling of Short-Term Wet Weather Events**
If the first calendar day of the discharge event through Monitoring Point 050A includes less than three hours of flow but continues into the next calendar day, the sampling can be included as a part of the subsequent event the following day.
- d. **Analytical Methods and Quantification Levels for Available Cyanide and Total Copper**
The sampling procedures, preservation and handling, and analytical protocol for compliance monitoring for Available Cyanide shall be in accordance with EPA Method OIA-1677. The quantification levels for Available Cyanide and Total Copper shall be 2.0 µg/l and 1.0 µg/l respectively unless a higher level is appropriate because of sample matrix interference. Justification for higher quantification levels shall be submitted to the Department within 30 days of such determination. Upon approval of the Department, the permittees may use alternate analytical methods (for parameters with methods specified in 40 CFR 136, the alternate methods are restricted to those listed in 40 CFR 136).
- e. **Limits Below the Quantification Level – Total Polychlorinated Biphenyls (PCBs)** The sampling procedures, preservation and handling, and analytical protocol for compliance monitoring for Total PCBs shall be in accordance with EPA Method 608.3. Upon approval from the Department, the permittees may use alternate analytical methods (for parameters with methods specified in 40 CFR, Part 136, the alternate methods are restricted to those listed in 40 CFR, Part 136). The quantification level shall be 0.1 ug/l unless a higher level is appropriate because of sample matrix interference. Justification for a higher quantification level shall be submitted to the Department within 30 days of such determination.

For the purpose of reporting on the Daily tab of the DMR, individual aroclor results less than the quantification level shall be reported as "<0.1." This permit condition does not authorize the discharge of PCBs at levels that are injurious to the designated uses of the waters of the state or that constitute a threat to the public health or welfare.

5. Final Effluent Limitations, Monitoring Point 050A

Upon initiation of operation of the RRO Disinfection Project, the permittees are approved to discharge secondary treated municipal wastewater and primary treated municipal wastewater when hydraulically necessary from Monitoring Point 050A through Outfall 050 (RRO). Outfall 050 (RRO) discharges to the Rouge River. Discharge from Outfall 050 (RRO) is approved when the hydraulic capacity of Outfall 049 (DRO) is not sufficient to meet the approved GLWA wet weather operational plan (see Part I.A.11.). Such discharge shall be limited and monitored by the permittees as specified below.

Parameter	Maximum Limits for Quantity or Loading				Maximum Limits for Quality or Concentration				Monitoring Frequency	Sample Type
	Monthly	7-Day	Daily	Units	Monthly	7-Day	Daily	Units		
Flow	(report)	---	(report)	MGD	---	---	---	---	Daily	Report Total Daily Flow
Available Cyanide	---	---	---	---	---	---	44	µg/l	Daily	Grab
Total Copper	---	---	---	---	---	---	(report)	µg/l	Monthly	24-Hr Composite
Fecal Coliform Bacteria	---	---	---	---	200	400	---	cts/100 ml	Daily	Grab
Total Residual Chlorine	---	---	---	---	---	---	38	µg/l	Daily	Grab
Oil & Grease	---	---	---	---	---	15	---	mg/l	Daily	Grab
Total Polychlorinated Biphenyls (PCBs)										
Aroclor 1016	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1221	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1232	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1242	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1248	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1254	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Aroclor 1260	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
Maximum PCB Aroclor										
See I.A.5.f.	---	---	---	---	<0.1	---	---	µg/l	Monthly	See I.A.5.f.
Minimum Daily Maximum Daily										
pH	---	---	---	---	6.0	---	9.0	S.U.	Daily	
Dissolved Oxygen	---	---	---	---	3.0	---	---	mg/l	Daily	Grab

- a. Narrative Standard
The receiving water shall contain no turbidity, color, oil films, floating solids, foams, settleable solids, suspended solids, or deposits as a result of this discharge in unnatural quantities which are or may become injurious to any designated use.
- b. Sampling Locations
The sampling locations for the pollutants in Part I.A.5. of this permit shall be representative of the effluent and consistent with the locations approved by the Department. The Department may approve alternate sampling locations that are demonstrated by the permittees to be representative of the effluent.
- c. Sampling of Short-Term Wet Weather Events
If the first calendar day of the discharge event includes less than three hours of flow but continues into the next calendar day, the sampling can be included as part of the subsequent event the following day.

- d. Total Residual Chlorine (TRC)
Compliance with the TRC limit shall be determined on the basis of one or more grab samples. If more than one (1) sample per day is taken, the additional samples shall be collected in near equal intervals over approximately eight (8) hours. The samples shall be analyzed immediately upon collection and the average reported as the daily concentration. Samples shall be analyzed in accordance with Part II.B.2. of this permit.
- e. Analytical Methods and Quantification Levels for Available Cyanide and Total Copper
The sampling procedures, preservation and handling, and analytical protocol for compliance monitoring for Available Cyanide shall be in accordance with EPA Method OIA-1677. The quantification levels for Available Cyanide and Total Copper shall be 2.0 µg/l and 1.0 µg/l, respectively, unless a higher level is appropriate because of sample matrix interference. Justification for higher quantification levels shall be submitted to the Department within 30 days of such determination. Upon approval of the Department, the permittees may use alternate analytical methods (for parameters with methods specified in 40 CFR 136, the alternate methods are restricted to those listed in 40 CFR 136).
- f. Limits Below the Quantification Level – Total Polychlorinated Biphenyls (PCBs)
The sampling procedures, preservation and handling, and analytical protocol for compliance monitoring for Total PCBs shall be in accordance with EPA Method 608.3. Upon approval from the Department, the permittees may use alternate analytical methods (for parameters with methods specified in 40 CFR, Part 136, the alternate methods are restricted to those listed in 40 CFR, Part 136). The quantification level shall be 0.1 ug/l unless a higher level is appropriate because of sample matrix interference. Justification for a higher quantification level shall be submitted to the Department within 30 days of such determination.

The water quality-based effluent limitation for Total PCBs is 2.6×10^{-5} µg/l (2.0×10^{-4} lbs/day) maximum monthly average. This is less than the quantification level. Control requirements are therefore established consistent with R 323.1213. **The discharge of any individual aroclor at or above the quantification level of 0.1 ug/l is a specific violation of this permit.** If concentrations of all aroclors representing a monitoring period are less than their quantification levels, the permittees will be considered to be in compliance with the permit for the monitoring period that the analyses represent, provided that the permittees are also in full compliance with the Pollutant Minimization Program for Total PCBs set forth in Part I.A.10 of this permit. For the purpose of reporting on the Daily tab of the DMR, individual aroclor results less than the quantification level shall be reported as "<0.1." For the purpose of reporting on the Summary tab of the DMR, the value reported under "Maximum PCB Aroclor" shall be the highest aroclor concentration observed during the monitoring period. This permit condition does not authorize the discharge of PCBs at levels that are injurious to the designated uses of the waters of the state or that constitute a threat to the public health or welfare.

- g. Schedule of Implementation
The permittees shall implement the following for Outfall 050 (RRO) Disinfection Program:
- 1) On or before February 1, 2010 (submitted), the permittees shall submit for review and approval a basis of design report for the previously proposed Outfall 084 (RRO2).
 - 2) On or before March 1, 2011 (submitted), the permittees shall submit for review and approval complete plans and specifications for Segment 1 of the previously proposed Outfall 084 (RRO2) project. Segment 1 consists of improvements undertaken at the WRRF consistent with the approved Basis of Design report.
 - 3) On or before July 1, 2012 (submitted), the permittees shall commence construction of Segment 1, consistent with the approved plans and specifications.
 - 4) On or before July 1, 2013 (submitted), the permittees shall submit a construction progress report for Segment 1 of the previously proposed Outfall 084 (RRO2).
 - 5) On or before March 1, 2015, (completed) the permittees shall complete construction of Segment 1 of the previously proposed Outfall 084 (RRO2) project.

- 6) On or before June 1, 2016, (submitted) the permittees shall submit for review and approval a complete basis of design report, and complete plans and specifications, for the Outfall 050 (RRO) Disinfection Project (if design, bid, build). Alternatively, if DWSD chooses to pursue design-build for the Outfall 050 (RRO) Disinfection Project, DWSD shall submit on or before June 1, 2016, (submitted) a detailed engineering report for the overall project, a permitting plan (that includes a description of the construction segments), a timetable for Part 41 permit application submittal, and sufficient project schematics for the overall project.
- 7) On or before November 1, 2016, (completed) the permittees shall submit complete plans and specifications for at a minimum the first segment to be construction under a design-build contract.
- 8) On or before April 1, 2017, (commenced) the permittees shall commence construction of the RRO Disinfection Project, consistent with the approved plans and specifications.
- 9) On or before April 1, 2018, (submitted) the permittees shall submit a construction progress report for RRO Disinfection Project.
- 10) On or before April 1, 2019, (completed) the permittees shall complete construction of RRO Disinfection Project and place into full operation the facilities to achieve final effluent limits specified in Part I.A.5.

6. Combined Sewer Overflow Retention Treatment Basin Discharge Authorization, Monitoring Points 101A, 102A, 103A, 104A, 108A and 109A

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittees are authorized to discharge treated combined sewage from the Hubbell/Southfield Combined Sewer Overflow (CSO) Retention Treatment Basin (RTB), Monitoring Point 101A, through Outfall 101; from the Puritan/Fenkell CSO RTB, Monitoring Point 102A, through Outfall 102; from the Seven Mile CSO RTB, Monitoring Point 103A, through Outfall 103; from the Belle Isle RTB, Monitoring Point 108A, through Outfall 108; from the Oakwood RTB, Monitoring Point 109A, through Outfall 109; and from the Conner Creek CSO RTB Monitoring Point 104A, through Outfall 104 when the basins are full and wastewater flows exceed downstream interceptor capacity. Outfall 101, Outfall 102, Outfall 103, and Outfall 109 discharge to the Rouge River. Outfall 108 discharges to the Detroit River. Outfall 104 discharges to Conner Creek. Such discharges shall be limited and monitored by the permittees as specified below:

<u>Influent Characteristics</u>	<u>Maximum Limits for Quantity or Loading</u>				<u>Maximum Limits for Quality or Concentration</u>				<u>Monitoring Sample</u>	
	<u>Monthly</u>	<u>7-Day</u>	<u>Daily</u>	<u>Units</u>	<u>Monthly</u>	<u>7-Day</u>	<u>Event</u>	<u>Units</u>	<u>Frequency</u>	<u>Type</u>
Flow	(report)	---	(report)	MGD	---	---	---	---	Daily	Report Total Daily Flow
Effluent Characteristics										
Flow	(report)	---	(report)	MGD	---	---	---	---	Daily	Report Total Daily Flow
Carbonaceous Biochemical Oxygen Demand (CBOD ₅)	---	---	---	---	(report)	---	(report)	mg/l	Event	Composite
Total Suspended Solids	---	---	---	---	(report)	---	(report)	mg/l	Event	Composite
Ammonia Nitrogen (as N)	---	---	---	---	(report)	---	(report)	mg/l	Event	Composite
Total Phosphorus (as P)	---	---	---	---	(report)	---	(report)	mg/l	Event	Composite
Fecal Coliform Bacteria										
May 1 – October 31	---	---	---	---	---	---	400 cts/100 ml		See I.A.6.a.	Grab
November 1 – April 30	---	---	---	---	---	---	1000 cts/100 ml		See I.A.6.a.	Grab
					<u>Event Average</u>		<u>Event Maximum</u>			
Total Residual Chlorine										
Any Event	---	---	---	---	(report)	---	(report)	mg/l	See I.A.6.a.	Grab
(See additional controls specified in Part I.A.8.)										

Effluent Characteristics	Maximum Limits for Quantity or Loading				Maximum Limits for Quality or Concentration				Monitoring Frequency	Sample Type
	Monthly	7-Day	Daily	Units	Monthly	7-Day	Event	Units		
Oil & Grease (Monitoring Point 109A only)	---	---	---	---	(report)	---	(report)	mg/l	Daily During Discharge	Grab
					<u>Event Minimum</u>		<u>Event Maximum</u>			
pH	---	---	---	---	(report)	---	(report)	S.U.	Daily During Discharge	Grab
Dissolved Oxygen	---	---	---	---	(report)	---	---	mg/l	Daily During Discharge	Grab

a. Retention Basin Monitoring and Reporting

The permittee shall conduct retention basin monitoring and report consistent with the requirements of Part II.C.2. of this permit. The permittee shall supply the results of each sample analyzed during each discharge period.

An Event starts when combined sewage is discharged into a facility, and ends when effluent flow (if any) ceases and does not resume within 24 hours.

Influent flow shall be reported for all wet weather events where combined sewage is discharged into the facility. Influent flow reporting shall also indicate the component of the total influent flow that is dewatered to the interceptor from the facility during an event and shall be reported in the comment section of the monthly Discharge Monitoring Reports (DMR). Alternate procedures may be approved by the Department.

Effluent flow shall be reported for all events that cause discharge from the facility to the receiving waters.

Effluent sampling for CBOD₅, TSS, Ammonia Nitrogen (as N), and Total Phosphorus (as P) shall be by effluent flow-weighted composite sampling over the entire event. Alternate procedures for determining an event composite may be approved by the Department if existing equipment cannot reliably determine a flow-weighted composite. For purposes of reporting for a discharge event that occurs on multiple calendar days, the composite pollutant concentrations for the event shall be reported on the day the discharge event ended. Individual events shall be determined by a lack of effluent discharge for 24 hours.

For **effluent pH**, report the maximum value of any individual sample taken during the month in the "Maximum" column under "Quality or Concentration" on the monthly DMRs and the minimum value of any individual sample taken during the month in the "Minimum" column under "Quality or Concentration" on the monthly DMRs. The individual values taken during the month shall be reported on the daily DMRs.

For **effluent dissolved oxygen**, report the lowest concentration of any individual sample in the "Minimum" column under the "Quantity or Concentration" on the monthly DMRs. The individual values taken during the month shall be reported on the daily DMRs.

For **effluent Fecal Coliform Bacteria and Total Residual Chlorine**, grab samples shall be collected every two (2) hours for the first six (6) hours of the discharge and every four (4) hours thereafter for the duration of the discharge; the first sample shall be collected as soon as practical after the discharge begins. For fecal coliform, the "event maximum" shall be reported on the daily DMRs as the geometric mean of all samples taken during an event, provided that three (3) or more samples are collected. For TRC, report the average of all samples in an event as the "Event Average" and the maximum individual sample in an event as the "Event Maximum" on the daily DMRs. The goal of the effluent sampling program is to collect at least three samples during each discharge event, and samples shall be collected at shorter intervals at the onset of the event, if the permittee estimates that the event duration may be less than six hours. For purposes of reporting for a discharge event that occurs on multiple calendar days, the pollutant concentrations for the event shall be reported on the day the discharge event ended. The highest event averages for Fecal Coliform and TRC shall also be reported in the "Maximum" columns under "Quality and Concentration" on the monthly DMRs.

b. Retention Treatment Basin Dewatering

The retention treatment basin shall be promptly dewatered as in accordance with the Department Approved Consolidated Annual Report following the need to divert flow to the basin and shall be maintained in readiness for use. The discharge of sludge or residual accumulations from the basin to the surface waters is prohibited. These sludges shall be promptly removed and disposed in accordance with procedures approved by the Department.

For this permit while the Regional Operational Plan is being revised, if up to 930 MGD (including recycle) is being processed with secondary treatment at the WRRF and no primary flow is being discharged, then tributary combined or sanitary storage basins in the GLWA system may be dewatered. Such dewatering will not be considered a violation of this permit, even if contrary to the Wet Weather Event definition (see Part II.A.). Once a revised Regional Operation Plan is developed, it shall be implemented once reviewed and approved by the Department.

c. Narrative Standard

The receiving water shall contain no turbidity, color, oil films, floating solids, foams, settleable solids, or deposits as a result of this discharge in unnatural quantities which are or may become injurious to any designated use.

d. Operation and Maintenance Plan

The permittee shall assure that discharges only occur in response to rainfall (or snowmelt) events and cease soon thereafter. Any rehabilitation and maintenance needs shall be addressed to ensure adequate sewer capacity and functionality. This may be accomplished through continued implementation of the approved Operation and Maintenance Plan.

7. Combined Sewer Overflow Screening and Disinfection Facilities Discharge Authorization, Monitoring Points 105A, 106A and 107A

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittees are authorized to discharge treated combined sewage from the Leib Combined Sewer Overflow (CSO) Screening and Disinfection Facility Monitoring Point 105A through Outfall 105, from the St. Aubin CSO Screening and Disinfection Facility Monitoring Point 106A through Outfall 106, and from the Baby Creek CSO Screening and Disinfection Facility Monitoring Point 107A through Outfall 107 when the wastewater flows exceed downstream interceptor capacities. Outfall 105 and Outfall 106 discharge to the Detroit River. Outfall 107 discharges to the Rouge River. Such discharges shall be limited and monitored by the permittees as specified below:

<u>Effluent Characteristics</u>	<u>Maximum Limits for Quantity or Loading</u>				<u>Maximum Limits for Quality or Concentration</u>				<u>Monitoring Frequency</u>	<u>Sample Type</u>
	<u>Monthly</u>	<u>7-Day</u>	<u>Daily</u>	<u>Units</u>	<u>Monthly</u>	<u>7-Day</u>	<u>Daily</u>	<u>Units</u>		
Flow	(report)	---	(report)	MGD	---	---	---	---	Daily	Report Total Daily Flow
Carbonaceous Biochemical Oxygen Demand (CBOD5)	---	---	---	---	(report)	---	(report)	mg/l	Quarterly	Grab
Total Suspended Solids	---	---	---	---	(report)	---	(report)	mg/l	Quarterly	Grab
Ammonia Nitrogen (as N)	---	---	---	---	(report)	---	(report)	mg/l	Quarterly	Grab
Total Phosphorus (as P)	---	---	---	---	(report)	---	(report)	mg/l	Quarterly	Grab
Oil & Grease (Baby Creek CSO Screening & Disinfection Facility, only)	---	---	---	---	(report)	---	(report)	mg/l	Daily During Discharge	Grab
							<u>Event Maximum</u>			
Fecal Coliform Bacteria										
May 1 – October 31	---	---	---	---	---	---	400	cts/100 ml	See I.A.7.a.	Grab
November 1 – April 30	---	---	---	---	---	---	1000	cts/100 ml	See I.A.7.a.	Grab
					<u>Event Average</u>		<u>Event Maximum</u>			
Total Residual Chlorine	---	---	---	---	(report)	---	(report)	mg/l	See I.A.7.a.	Grab
Any Event (see additional controls specified in Part 1.A.8.)										
					<u>Event Minimum</u>		<u>Event Maximum</u>			
pH	---	---	---	---	(report)	---	(report)	S.U.	Daily During Discharge	Grab
Dissolved Oxygen	---	---	---	---	(report)	---	---	mg/l	Daily During Discharge	Grab

- a. Screening and Disinfection Facilities Monitoring and Reporting
The permittees shall monitor screening and disinfection facilities performance and report the monitoring consistent with the requirements of Part II.C.2. of this permit. The permittees shall supply the results of each sample taken during each discharge period.

Effluent flow shall be reported for all events that cause discharge from the facility to the receiving waters.

For **effluent pH**, report the maximum value of any individual sample taken during the month in the "Maximum" column under "Quality or Concentration" on the monthly DMRs and the minimum value of any individual sample taken during the month in the "Minimum" column under "Quality or Concentration" on the monthly DMRs. The individual values taken during the month shall be reported on the daily DMRs.

For **effluent dissolved oxygen**, report the lowest concentration of any individual sample in the "Minimum" column under the "Quantity or Concentration" on the monthly DMRs. The individual values taken during the month shall be reported on the daily DMRs.

For **effluent Fecal Coliform Bacteria and Total Residual Chlorine**, grab samples shall be collected every two (2) hours for the first six (6) hours of the discharge and every four (4) hours thereafter for the duration of the discharge; the first sample shall be collected as soon as practical after the discharge begins. For fecal coliform, the "event maximum" shall be reported on the daily DMRs as the geometric mean of all samples taken during an event, provided that three (3) or more samples are collected. For TRC, report the average of all samples in an event as the "Event Average" and the maximum individual sample in an event as the "Event Maximum" on the daily DMRs. The goal of the effluent sampling program is to collect at least three samples during each discharge event, and samples shall be collected at shorter intervals at the onset of the event, if the permittees estimate that the event duration may be less than six hours. For purposes of reporting for a discharge event that occurs on multiple calendar days, the pollutant concentrations for the event shall be reported on the day the discharge event ended. The highest event averages for Fecal Coliform and TRC shall also be reported in the "Maximum" columns under "Quality and Concentration" on the monthly DMRs.

- b. **Narrative Standard**
The receiving water shall contain no turbidity, color, oil films, floating solids, foams, settleable solids, or deposits as a result of this discharge in unnatural quantities which are or may become injurious to any designated use.
- c. **Sampling Locations**
The sampling locations for the pollutants indicated in Part I.A.7 of this permit shall be representative of the effluent and consistent with the locations approved by the Department.
- d. **Operation and Maintenance Plan**
The permittees shall assure that discharges only occur in response to rainfall (or snowmelt) events and cease soon thereafter. Any rehabilitation and maintenance needs shall be addressed to ensure adequate sewer capacity and functionality. This may be accomplished through continued implementation of the approved Operation and Maintenance Plan.
- e. **Treatment Facility Dewatering**
The treatment facility shall be promptly dewatered (if applicable) in accordance with the Department Approved Consolidated Annual Report possible following the need to divert flow to the facility and shall be maintained in readiness for use. The discharge of sludge or residual accumulations from the facility to the surface waters is prohibited.

For this permit while the Regional Operational Plan is being revised, if up to 930 MGD (including recycle) is being processed with secondary treatment at the WRRF and no primary flow is being discharged, then tributary combined or sanitary storage basins in the GLWA system may be dewatered. Such dewatering will not be considered a violation of this permit, even if contrary to the Wet Weather Event definition (see Part II.A). Once a revised Regional Operation Plan is developed, it shall be implemented once reviewed and approved by the Department.

8. Total Residual Chlorine Minimization Program

The goal of the Total Residual Chlorine (TRC) Minimization Program is operate the CSO RTBs and the CSO screening and disinfection facilities in a manner that will provide consistent, effective disinfection while minimizing the discharge of TRC, recognizing the overall goal is compliance with the TRC Final Acute Value of 0.038 mg/l at any point in the receiving stream, unless it is determined by the Department by a permit action that a higher level is acceptable.

In addition, the Operational Goals for this facility are 1.5 mg/l TRC as an event average value and 2.0 mg/l (November – April) or 3.0 mg/l (May – October) TRC as an event instantaneous maximum value.

a. TRC Minimization Assessment (Assessment) (submitted)

The permittees shall prepare and conduct a program to assess the capability of each of the 5 CSO RTBs and screening and disinfection facilities as agreed to (a subset of those listed in Part I.A.6. and Part I.A.7.), to minimize the discharge of TRC. Each Assessment shall be conducted according to a schedule acceptable to the Department. Compliance with the Fecal Coliform Bacteria effluent limits set forth in Part I.A.6. and Part I.A.7. of this permit shall be maintained during each Assessment. Each Assessment shall include an evaluation of various operational practices under a variety of wet weather events to identify measures which can be taken to reduce TRC discharge concentrations. Upon notification by the Department, the permittees shall begin conducting each Assessment over an 18-month period and shall submit a report summarizing the results to the Department within 60 days of completion. An extension of an Assessment period beyond 18 months may be requested by the permittees for approval by the Department in the event that a sufficient number of CSO discharge events have not occurred to allow for an adequate assessment of operational procedures.

Each Assessment report shall include the expected achievable TRC discharge concentrations, recommendations as to specific protocols to be used to manage sodium hypochlorite (NaOCl) dosage rates under various conditions to achieve the Operational Goals, and recommended facility modifications to enhance the ability to control TRC levels while maintaining compliance with the Fecal Coliform Bacteria limits. Specific procedures for adjustment of NaOCl feed rates to minimize the discharge of TRC shall be submitted as part of the Operational Plan (and revised as appropriate in annual updates), as required by Part I.A.15.e. of this permit. The TRC minimization procedures, developed as part of each Assessment, shall be implemented upon approval by the Department.

b. Operational Goals

Upon completion of each Assessment, the permittees shall operate the facility with a goal of 1.5 mg/l TRC as an event average value and a goal of 2.0 mg/l (November – April) or 3.0 mg/l (May – October) TRC as an event instantaneous maximum value. If upon completion of an Assessment, the permittees determine the facility can achieve lower TRC goals than those specified above, then the permittees shall operate the facility to achieve the lower TRC levels. If either TRC goal is exceeded for a CSO discharge event, the permittees shall submit a written report to the Department within seven (7) days explaining the cause of the exceedance and describing the corrective measures that will be undertaken to prevent a future recurrence.

c. In-Stream TRC Effluent Plume Evaluation (submitted)

The permittees shall conduct an evaluation of the in-stream TRC effluent plume attributable to each of the agreed-to 5 CSO RTBs screening and disinfection facility discharges. The evaluation shall identify the location and size of the TRC effluent plume during and after CSO discharge events and identify the maximum TRC concentrations in-stream at various downstream locations. Upon notification by the Department to begin conducting each Assessment (Part I.A.8.a.), the permittees shall have 60 days to submit a TRC effluent plume work plan describing the proposed evaluation including sampling locations and a proposed implementation schedule such that the In-Stream TRC Effluent Plume Evaluation shall occur after completion of each Assessment and when the operational goals begin. The permittees shall implement the In-Stream TRC Effluent Plume Evaluation following the schedule upon Department approval of the TRC effluent plume work plan. The permittees shall submit a report documenting the results of the TRC Effluent Plume Evaluation within 90 days after completion of the field work.

d. Permit Re-Opener Clause

Upon completion of each TRC Minimization Assessment and each In-Stream TRC Effluent Plume Evaluation, the Department may reevaluate the need for TRC effluent limitations. This permit may be

modified in accordance with applicable laws and rules to incorporate such revisions as may be necessary to comply with Water Quality Standards at the time of discharge.

- e. Best Management Practices/Operator Coordination Work Group (Work Group)
The permittees shall attend and participate in at least quarterly Work Group meetings with representatives from other CSO facilities in Southeast Michigan to exchange information and share experiences relating to the operation and maintenance of CSO control facilities. Such Work Group meetings shall be used to develop Best Management Practices (BMPs) relating to CSO RTB operation, with an initial focus on actions to minimize the TRC discharge levels. At a minimum, the Work Group shall include representatives of the following CSO facilities: Birmingham CSO RTB, Bloomfield Village CSO RTB, Dearborn CSO, GLWA WRRF CSO Facilities, Inkster-Dearborn Heights CSO, Oakland County-Acacia Park (Acacia Park CSO Drainage District, Village of Beverly Hills, City of Birmingham), Redford Township CSO, River Rouge CSO, Wayne County – Dearborn Heights CSO, Wayne County – Inkster CSO, Wayne County – Inkster – Dearborn Heights CSO, and Wayne County – Redford – Livonia CSO. The Work Group shall submit an annual report summarizing the meetings and BMPs developed to the Department by March 1st of each year.

9. Additional Monitoring Requirements

As a condition of this permit, the permittees shall monitor the discharge from monitoring points 049F and 050A for the constituents identified below. This monitoring is an application requirement of 40 CFR 122.21(j), effective December 2, 1999. Testing shall be conducted in October 2019, May 2020, March 2021, and August 2021. Grab samples shall be collected for total phenols, and the Volatile Organic Compounds identified below. For all other parameters, 24-hour composite samples shall be collected.

Test species for whole effluent toxicity monitoring shall include fathead minnow **and** *Ceriodaphnia dubia*. If the permittees have received Department approval to conduct chronic toxicity testing using the more sensitive species identified in the toxicity database, the first three (3) tests required above may be performed using the more sensitive species. The last (4th) test shall be conducted using both species. Testing and reporting procedures shall follow procedures contained in EPA-821-R-02-013, "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (Fourth Edition). When the effluent ammonia nitrogen (as N) concentration is greater than 3 mg/l, the pH of the toxicity test shall be maintained at a pH of 8 Standard Units. Acute and chronic toxicity data shall be included in the reporting for the toxicity test results. Toxicity test data acceptability is contingent upon the validation of the test method by the testing laboratory. Such validation shall be submitted to the Department upon request.

For selected parameters required under this section, the maximum acceptable quantification levels and analytical methods shall be as specified under Quantification Levels and Analytical Methods for Selected Parameters, below, unless a higher quantification level is appropriate because of sample matrix interference. Justification for higher quantification levels shall be submitted to the Department within 30 days of such determination.

The results of such additional monitoring shall be submitted with the application for reissuance (see the cover page of this permit for the application due date). The permittees shall notify the Department within 14 days of completing the monitoring for each month specified above in accordance with Part II.C.5. Additional reporting requirements are specified in Part II.C.11. The permittees shall report to the Department any whole effluent toxicity test results greater than 1.0 TU_A or 1.0 TU_C within five (5) days of becoming aware of the result. If, upon review of the analysis, it is determined that additional requirements are needed to protect the receiving waters in accordance with applicable water quality standards, the permit may then be modified by the Department in accordance with applicable laws and rules.

Whole Effluent Toxicity
chronic toxicity

Hardness
calcium carbonate

Metals (Total Recoverable), Cyanide and Total Phenols

antimony	arsenic	barium	
beryllium	boron	cadmium	chromium
copper	lead	nickel	
selenium	silver	thallium	zinc
total phenolic compounds			

Volatile Organic Compounds

acrolein	acrylonitrile	benzene	bromoform
carbon tetrachloride	chlorobenzene	chlorodibromomethane	chloroethane
2-chloroethylvinyl ether	chloroform	dichlorobromomethane	1,1-dichloroethane
1,2-dichloroethane	trans-1,2-dichloroethylene	1,1-dichloroethylene	1,2-dichloropropane
1,3-dichloropropylene	ethylbenzene	methyl bromide	methyl chloride
methylene chloride	1,1,2,2,-tetrachloroethane	tetrachloroethylene	toluene
1,1,1-trichloroethane	1,1,2-trichloroethane	trichloroethylene	vinyl chloride

Acid-Extractable Compounds

4-chloro-3-methylphenol	2-chlorophenol	2,4-dichlorophenol	2,4-dimethylphenol
4,6-dinitro-o-cresol	2,4-dinitrophenol	2-nitrophenol	4-nitrophenol
Pentachlorophenol	phenol	2,4,6-trichlorophenol	

Base/Neutral Compounds

acenaphthene	acenaphthylene	anthracene	benzidine
benzo(a)anthracene	benzo(a)pyrene	3,4-benzofluoranthene	benzo(ghi)perylene
benzo(k)fluoranthene	bis(2-chloroethoxy)methane	bis(2-chloroethyl)ether	bis(2-chloroisopropyl)ether
bis(2-ethylhexyl)phthalate	4-bromophenyl phenyl ether	butyl benzyl phthalate	2-chloronaphthalene
4-chlorophenyl phenyl ether	chrysene	di-n-butyl phthalate	di-n-octyl phthalate
dibenzo(a,h)anthracene	1,2-dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene
3,3'-dichlorobenzidine	diethyl phthalate	dimethyl phthalate	2,4-dinitrotoluene
2,6-dinitrotoluene	1,2-diphenylhydrazine	fluoranthene	fluorene
Hexachlorobenzene	hexachlorobutadiene	hexachlorocyclo-pentadiene	hexachloroethane
indeno(1,2,3-cd)pyrene	isophorone	naphthalene	nitrobenzene
n-nitrosodi-n-propylamine	n-nitrosodimethylamine	n-nitrosodiphenylamine	phenanthrene
pyrene	1,2,4-trichlorobenzene		

Quantification Levels and Analytical Methods for Selected Parameters

Parameter	Quantification Level	Analytical Method
1,2-Diphenylhydrazine (as Azobenzene)	3.0 ug/l	
2,4,6-Trichlorophenol	5.0 ug/l	
2,4-Dinitrophenol	19 ug/l	
3,3'-Dichlorobenzidine	1.5 ug/l	EPA Method 605
4-chloro-3-methylphenol	7.0 ug/l	
4,4'-DDD	0.05 ug/l	EPA Method 608
4,4'-DDE	0.01 ug/l	EPA Method 608
4,4'-DDT	0.01 ug/l	EPA Method 608
Acrylonitrile	1.0 ug/l	
Aldrin	0.01 ug/l	EPA Method 608
Alpha-Hexachlorocyclohexane	0.01 ug/l	EPA Method 608
Antimony, Total	1 ug/l	
Arsenic, Total	1 ug/l	
Barium, Total	5 ug/l	
Benidine	0.1 ug/l	EPA Method 605
Beryllium, Total	1 ug/l	
Beta-Hexachlorocyclohexane	0.01 ug/l	EPA Method 608

Parameter	Quantification Level		Analytical Method
Bis (2-Chloroethyl) Ether	1.0	ug/l	
Boron, Total	20	ug/l	
Cadmium, Total	0.2	ug/l	
Chlordane	0.01	ug/l	EPA Method 608
Chromium, Hexavalent	5	ug/l	
Chromium, Total	10	ug/l	
Copper, Total	1	ug/l	
Cyanide, Available	2	ug/l	EPA Method OIA 1677
Cyanide, Total	5	ug/l	
Delta-Hexachlorocyclohexane	0.01	ug/l	EPA Method 608
Dieldrin	0.01	ug/l	EPA Method 608
Di-N-Butyl Phthalate	9.0	ug/l	
Endosulfan I	0.01	ug/l	EPA Method 608
Endosulfan II	0.01	ug/l	EPA Method 608
Endosulfan Sulfate	0.01	ug/l	EPA Method 608
Endrin	0.01	ug/l	EPA Method 608
Endrin Aldehyde	0.01	ug/l	EPA Method 608
Fluoranthene	1.0	ug/l	
Heptachlor	0.01	ug/l	EPA Method 608
Heptachlor Epoxide	0.01	ug/l	EPA Method 608
Hexachlorobenzene	0.01	ug/l	EPA Method 612
Hexachlorobutadiene	0.01	ug/l	EPA Method 612
Hexachlorocyclopentadiene	0.01	ug/l	EPA Method 612
Hexachloroethane	5.0	ug/l	
Lead, Total	1	ug/l	
Lindane	0.01	ug/l	EPA Method 608
Lithium, Total	10	ug/l	
Mercury, Total	0.5	ng/l	EPA Method 1631E
Nickel, Total	5	ug/l	
PCB-1016	0.1	ug/l	EPA Method 608.3
PCB-1221	0.1	ug/l	EPA Method 608.3
PCB-1232	0.1	ug/l	EPA Method 608.3
PCB-1242	0.1	ug/l	EPA Method 608.3
PCB-1248	0.1	ug/l	EPA Method 608.3
PCB-1254	0.1	ug/l	EPA Method 608.3
PCB-1260	0.1	ug/l	EPA Method 608.3
Pentachlorophenol	1.8	ug/l	
Perfluorooctane sulfonate (PFOS)	2.0	ng/l	ASTM D7979 or an isotope dilution method (sometimes referred to as Method 537 modified)
Perfluorooctanoic acid (PFOA)	2.0	ng/l	ASTM D7979 or an isotope dilution method (sometimes referred to as Method 537 modified)
Phenanthrene	1.0	ug/l	
Selenium, Total	1.0	ug/l	

Parameter	Quantification Level	Analytical Method
Silver, Total	0.5 ug/l	
Strontium, Total	1000 ug/l	
Sulfide, Dissolved	20 ug/l	
Thallium, Total	1 ug/l	
Toxaphene	0.1 ug/l	EPA Method 608
Vinyl Chloride	0.25 ug/l	
Zinc, Total	10 ug/l	

10. Pollutant Minimization Program for Total Mercury and PCBs

The goal of the Pollutant Minimization Program is to maintain the effluent concentration of total mercury at or below 1.3 ng/l and the final effluent limitations for Total Polychlorinated Biphenyls (PCBs). The permittees shall continue to implement the Pollutant Minimization Program approved on November 9, 1995, and updated in October, 1996, and modifications thereto, to proceed toward the goal. The Pollutant Minimization Program includes the following:

- a. an annual review and semi-annual monitoring of potential sources of mercury and PCBs entering the wastewater collection system, including wet weather sources such as runoff/contributions from contaminated sites in the collection area;
- b. a program for quarterly monitoring of influent and periodic monitoring of sludge for mercury and PCBs; and
- c. implementation of reasonable cost-effective control measures when sources of mercury and/or PCBs are discovered. Factors to be considered include significance of sources, economic considerations, and technical and treatability considerations.

On or before October 1st of each year, the permittees shall submit a status report for the previous calendar year to the Department that includes 1) the monitoring results for the previous year, 2) an updated list of potential mercury and/or PCB sources, and 3) a summary of all actions taken to reduce or eliminate identified sources of mercury and/or PCBs.

Any information generated as a result of the Pollutant Minimization Program set forth in this permit may be used to support a request to modify the approved program or to demonstrate that the Pollutant Minimization Program requirement has been completed satisfactorily.

A request for modification of the approved program and supporting documentation shall be submitted in writing to the Department for review and approval. The Department may approve modifications to the approved program (approval of a program modification does not require a permit modification), including a reduction in the frequency of the requirements under items a. and b.

This permit may be modified in accordance with applicable laws and rules to include additional mercury and/or PCB conditions and/or limitations as necessary.

11. Water Resource Recovery Facility Wet Weather Operational Plan

The approved Water Resource Recovery Facility Wet Weather Operational Plan provides the protocol for operations during the interim period before full completion of the Long-term CSO Control Plan. This plan details the necessary requirements to maximize wet weather treatment at the WRRF, while complying with effluent limits and all other conditions of this permit, and minimizing untreated combined sewage discharges in the tributary collection system.

The GLWA WRRF Wet Weather Operational Plan shall be coordinated with the Collection System and CSO Treatment Facilities Operational Plan that is required in accordance with Part I.A.15.d. of this permit. Annually, on or before April 1st, the permittees shall submit an update of the Water Resource Recovery Facility Wet Weather Operational Plan in conjunction with the Collection System and CSO Treatment Facilities Operational Plan update as part of the Consolidated Annual Report to the Department for review and approval.

12. Facilities Improvement Program

The permittees shall continue to meet the sludge dewatering, conveyance, and final disposal requirements; submit and implement the solids disposal plans; correct the alum sludge issue; submit the WRRF shutdown schedules; and develop and implement the asset management program as detailed below.

a. WRRF Solids Processing Requirements and Corrections

- 1) Capacity for sludge dewatering, conveyance, and final disposal; Required maximum solids inventory loads.

The permittees shall ensure that sludge dewatering equipment, sludge conveyance equipment, and final sludge disposal capability is available at the GLWA WRRF as follows:

- a) The permittees shall ensure that the WRRF sludge dewatering equipment, sludge conveyance equipment, and final sludge disposal capability are maintained for use; and in good operational working order to meet the following requirements:
 - (1) Average capacity of 500 dry tons per day (dtpd), calculated as a calendar monthly average;
 - (2) Peak capacity of 850 dtpd, calculated as a 10-day average;
 - (3) The peak 10-day average shall be available during any wet weather event when the WRRF is operated in the "Storm Period" of the currently approved WRRF Wet Weather Operational Plan as required by Part I.A.11.

The permittees shall also:

- (4) Notify the Department within one business day if solids are recycled from the gravity thickeners to the head of the WRRF for more than 72 hours and provide an explanation for the recycled solids. Recycled solids are defined as a TSS overflow concentration of 1000 mg/l or greater from Complex A thickeners;
- (5) Maintain a monthly average solids inventory of less than 750 dtpd, when there are less than 5 days of discharge from Outfall 049A during the month, and maintain a calendar quarterly average solids inventory not to exceed 1000 dtpd. Solids inventory is defined as the total solids in gravity thickener complexes A and B, determined daily in dtpd;
- (6) This Section will be reviewed during the next NPDES reissuance based on WRRF performance; and
- (7) The permittees are allowed to submit to the Department for review and approval a request to modify the numerical levels specified in Part I.A.12.a. of this permit. This modification request shall include supporting rationale for the revised numerical levels.

2) Long-Term Solids Disposal Plan

- a) The permittees submitted to the Department for review and approval a Long-Term Solids Disposal Plan (LTSDP). This Solids Disposal Plan is designed to ensure the availability of sufficient sludge dewatering equipment and sludge disposal capability to meet the capacity requirements specified in Parts I.A.12.a.1).a).(1)&(2) of this permit. The permittees shall implement the LTSDP in accordance with the following schedule:

- (1) On or before December 31, 2018, (submitted) the permittees shall submit for approval, a disposal plan for 250 dtpd. This requirement is based on the LTSDP approved on September 24, 2013. Upon notification from the Department, the permittees shall implement the approved disposal plan;
- (2) On or before December 31, 2025, the permittees shall complete implementation of the approved plan referenced in item (1) above;

- b) The GLWA are advised that implementation of individual elements of the LTSDP may require Part 41 wastewater construction permits or may require other Department approvals.

3) Alum Sludge Correction

The permittees shall continue to implement the approved plan to correct the solids dewatering concerns at the WRRF due to alum sludge discharges from GLWA water treatment plants (WTPs) into the collection system.

Annually, on or before September 1st the permittees shall submit a report to the Department describing if the implemented plan continued to meet the conditions specified above for the preceding fiscal year (July 1 – June 30).

Part 41 construction permits at the WRRF and/or Act 399 construction permits at the specific WTPs may be needed depending on the components of the approved plan.

b. WRRF Quarterly Shutdown Schedules

On or before December 1, March 1, June 1, and September 1, the permittees shall submit quarterly WRRF Shutdown Schedules, until notified in writing by the Department. Consistent with the quarterly dates indicated above, these schedules shall be submitted to the Department in a mutually agreeable format one month prior to the start of each calendar quarter for review and approval. Each quarterly schedule shall detail the primary treatment capacity, secondary treatment capacity, and sludge processing capacity that is planned to be available during the upcoming quarter, considering coordinated shutdowns necessary to complete all rehabilitation and other projects. The shutdown schedules shall be proposed to minimize environmental impact and maximize available treatment during construction of all projects, consistent with the requirements of the rules associated with Act 451, Part 41, being 299.2943 and 299.2955(1) and (3).

c. Operation, Maintenance & Replacement/Asset Management

The permittees shall at all times properly operate and maintain all facilities (i.e., sewer system, treatment works, as defined in Part 41 of Act 451, 1994 as amended, and control systems) that are installed or used by the permittees to operate the treatment works and sewer system and achieve and maintain compliance with the conditions of this permit. The requirements of an asset management program contain goals of effective performance, adequate funding, and adequate operator staffing and training. Asset management is a planning process focused on gaining optimum value for each asset and providing the financial resources to rehabilitate and replace them when necessary; Asset management is centered on a framework of five (5) core elements: the current state of the assets, the required sustainable level of service, the assets critical to sustained performance, the best-value life-cycle costs, and the best long-term funding strategy.

- 1) The permittees shall continue to implement the approved Asset Management Program that addresses the following items:

- A comprehensive fixed asset inventory that is maintained, managed, and updated within a computerized maintenance management system (CMMS),

- A comprehensive inventory of the collection system fixed assets and collection system map,
- A Preventive Maintenance Program that may include predictive and reliability centered maintenance,
- A Needs Assessment updated every five years as part of the Project Plan (due on or before October 1, 2021), including condition assessment and evaluation of service level,
- An assessment of asset criticality and risk management,
- A capital planning process,
- A Scheduled Replacement Program (SRP) for assets,
- Monitoring and periodic performance evaluation through Key Performance Indicators (KPIs),
- Management oversight of system performance.

The permittees' Asset Management Program submitted on January 1, 2014, was approved on January 14, 2014, and substantially revised on September 29, 2017.

2) An Annual Report covering implementation of the Asset Management Program during the prior Fiscal Year (July 1 – June 30) shall be prepared by the permittees and submitted to the Department on or before October 1st. The Annual Report shall include:

- a) A description and evaluation of the sufficiency of the staffing levels maintained during the year,
- b) A description and evaluation of the sufficiency and adequacy of inspections and maintenance activities conducted and corrective actions taken during the previous year,
- c) Expenditures for collection system maintenance activities, treatment works maintenance activities, corrective actions, and capital investment during the previous year, compared with budgeted/projected expenditures, including an evaluation of the sufficiency of expenditures,
- d) A summary of asset/areas identified for inspection/action (including capital improvement) in the upcoming year based on the five (5) core elements and the criticality and risk analysis,
- e) A maintenance budget and capital improvement budget for the upcoming year, based on implementation of an effective asset management program that meets the five (5) core elements,
- f) An updated estimate of the revenue necessary to complete anticipated OM&R activities, the associated rate schedule impact, and an assessment of the adequacy of the revenue to perform necessary OM&R work, and
- g) A description of the progress made towards completion of the outstanding tasks as described in the previous year's Asset Management Annual Report and an updated schedule for completion of any outstanding tasks.

d. Staffing Plan

A Staffing Plan, as required by ACO-00131, has been approved by the Department. The GLWA shall provide an adequate staffing level, in accordance with the approved Staffing Plan, to carry out the operation, maintenance, repair, and testing functions required to ensure compliance with the terms and conditions of this permit. During the term of ACO-00131, a change in the minimum staffing level may be requested by the GLWA by submittal of a revised Staffing Plan, including training requirements, and may be revised only by mutual agreement in writing between the GLWA and the Department. Should ACO-00131 be terminated, then the staffing plan shall be updated as required by the Operations and Maintenance Manual (Part II.C.14 of this permit), and an up to date copy of the manual shall be kept at the WRRF. The Department may review the manual in whole or in part (i.e. staffing) at their discretion and require modifications to it if portions are determined to be inadequate.

- e. Key Performance Indicator Monthly Report
The permittee shall update the Key Performance Indicator (KPI) report monthly. If Administrative Consent Order No. ACO-000131, as amended, is terminated, the KPI report shall be submitted by the last day of the month following the termination of the ACO.
- f. Public Participation
The permittees will participate in Department initiated public outreach meetings during the term of this permit as resources allow and provided there is adequate notification by the Department.

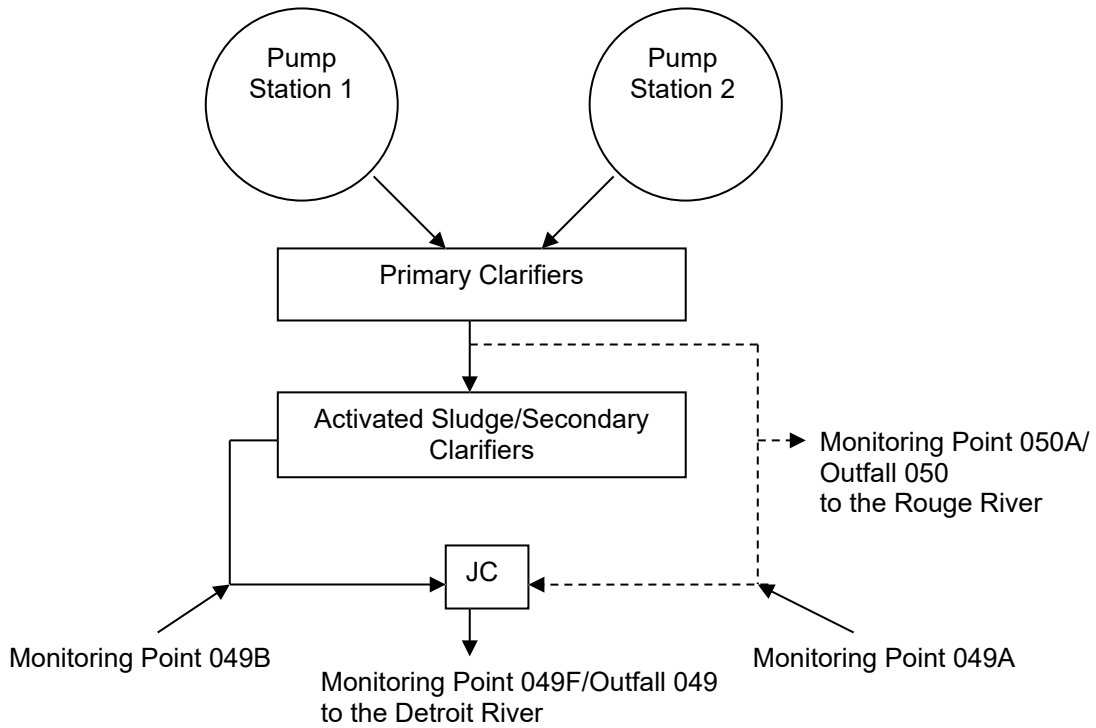
13. Reopener for Primary and Secondary Treatment Capacity

The permittees are required to maintain a wet weather primary treatment capacity of 1700 MGD (raw) and wet weather secondary treatment capacity of 930 MGD (which includes recycle). When the elevation of the influent wet well is greater than 85 feet and the facility is not pumping at 1700 MGD (raw), the discharge from untreated combined sewage overflow (CSO) upstream of the facility are not authorized, unless caused by localized storm conditions.

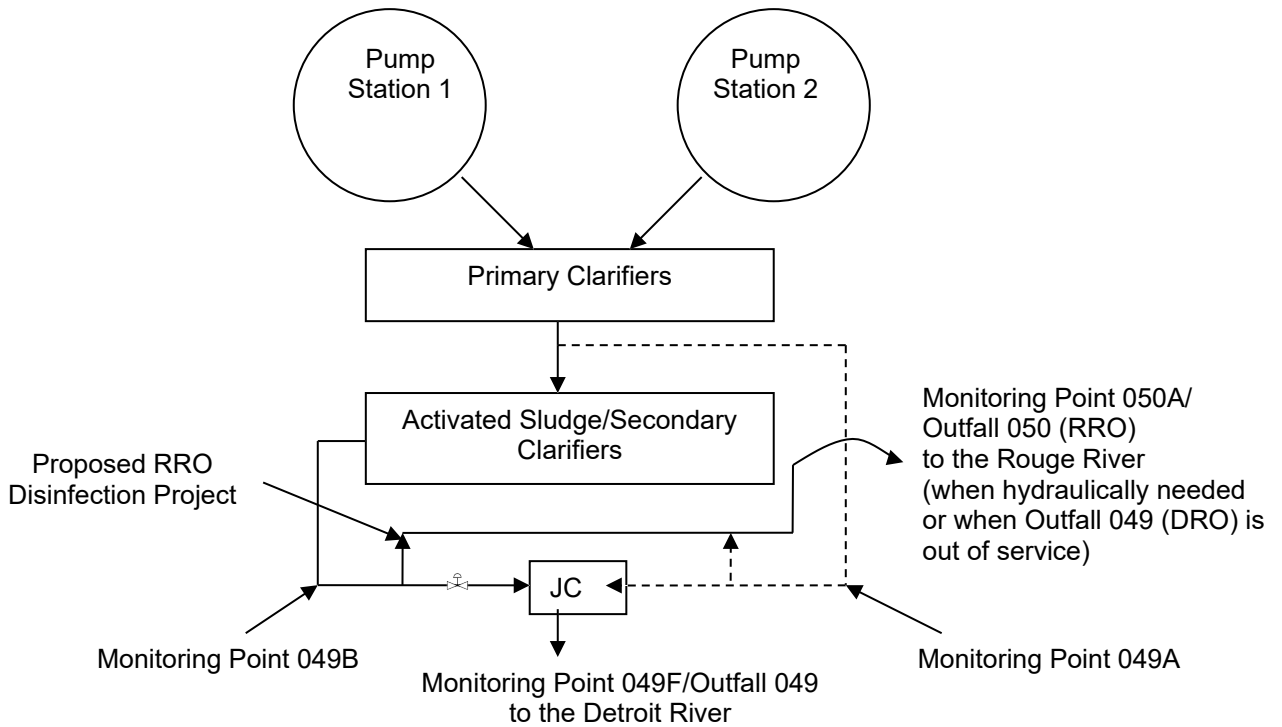
These required wet weather treatment capacities may be revised if new/altered wet weather conditions (such as initiation of operation of upstream CSO facilities, etc.) indicate that either less or more flow can be effectively processed. The criteria used to determine whether the required wet weather primary treatment capacities should be revised must include additional plant evaluation under the updated conditions, using testing procedures approved by the Department.

For reference, outfall/monitoring point designations are shown on the following diagrams:

Prior to Initiation of Operation of RRO Disinfection Project



After Initiation of Operation of RRO Disinfection Project



14. Outfalls Prohibited from Discharge to Combined Sewer System

The following Outfalls are prohibited from discharge except as provided for in Part II.C.9.:

<u>OUTFALL</u>	<u>LOCATION</u>	<u>LAT/LONG</u>	<u>RECEIVING STREAM</u>
004	Fairview (DWF) Pump Station (P28 through P31) Parkview & Detroit River - Emergency only	42°21'20" 082°58'01"	Discharge to Detroit River (Stop-logged)
014	Dubois (B12) Dubois & Detroit River	42°20'01" 083°01'19"	Detroit River
051	Carbon (B46) Carbon & Rouge River	42°17'07" 083°08'17"	Rouge River
054	Fort St. (DWSD Northwest) Interceptor) (B50) South Fort St. & Rouge River (West Shore)	42°17'25" 083°08'35"	Rouge River
056	Fort St. (Oakwood District) (B49) South Fort St. & Rouge River (West Shore)	42°17'27" 083°08'33"	Rouge River
080	Fox Creek Backwater Gates (B01) East Jefferson & Fox Creek.	42°22'28" 082°56'27"	Fox Creek to Detroit River

The permittees shall provide for ongoing monitoring (Flow, Duration) for these outfalls should they discharge. This monitoring shall be used to comply with the requirements of Section 324.3112(a) of The Michigan Act (See Part I.A.16.).

15. Discharges from Combined Sewer System

a. Limited Discharge Authorization

The permittees are required to utilize, to the maximum extent practicable, available sewerage system transportation capabilities for the delivery of combined sewage to treatment facilities. For an interim period during which the amended Long-Term CSO Control Plan is to be implemented, the permittees are authorized to discharge during wet weather events (see Part II.A.) combined sewage from the outfalls and locations listed below in accordance with the following conditions:

- 1) a flow rate equivalent to the peak dry weather flow rate has been conveyed to the secondary treatment facilities for treatment without bypass,
- 2) the total sewerage system storage and transportation capacity for conveyance of wet weather flows to the treatment facilities for treatment has been utilized within the hydraulic design constraints of the system,
- 3) all primary treatment plant capacity and secondary treatment plant capacity has been utilized in accordance with the approved WRRF Wet Weather Operation Plan (Part 1.A.11.), unless a storm event is localized to the extent that the hydraulic capacity of a portion of the collection system (considering storage) is exceeded prior to reaching plant capacities, and
- 4) the permittees are in full compliance with all requirements as set forth in Part I.A.16. Combined Sewer Overflow discharges to the Rouge River, the Detroit River, and the Old Channel of the Rouge River are authorized until prohibited, eliminated, or adequately treated to meet water quality standards at times of discharge in accordance with the requirements below, and as specified in Part 1.A.15.f. and g.
- 5) the outfalls that immediately follow this paragraph are included in the Limited Discharge Authorization. There are some untreated CSO outfalls that appear to discharge only during extreme events. Extreme is defined as; (a) no more than one untreated discharge in ten years from a CSO outfall during the April 1 through October 31 growth period, (b) modeled to not discharge at the 25 year – 24 hour event (during growth period, with normal soil moisture, rainfall distributed to a SCS Type II distribution), or (c) monitored to occur only at rainfalls greater than 4 inches in a 24 hour period. The Department does not intend to require construction of treatment facilities at the following outfalls should they continue to only discharge at the extreme event. This addresses CSO outfalls consistently with SSO outfalls according to the 2002 SSO Policy and 2003 Clarification Statement. The list of untreated CSO outfalls that only discharge at the extreme event is flexible and may be adjusted with the adaptive management CSO correction program.

<u>OUTFALL</u>	<u>LOCATION</u>	<u>LAT/LONG</u>	<u>RECEIVING STREAM</u>
029	Rosa Parks (B27) Rosa Parks & Detroit River	42°19'13" 083°03'56"	Detroit River
030	Vermont (B28) Vermont (extended) & Detroit River	42°19'06" 083°04'09"	Detroit River
037	McKinstry (B35) McKinstry & Detroit River	42°18'19" 083°05'13"	Detroit River
042	Campbell (B40) Campbell & Detroit River	42°18'01" 083°05'30"	Detroit River
048	Pulaski (B59A &B) Pulaski & Rouge River	42°17'21" 083°07'11"	Old Channel Rouge River

6) the outfalls that immediately follow this paragraph are also included in the Limited Discharge Authorization. There are some untreated CSOs that appear to discharge at a minimal frequency and volume. Minimal discharge is defined as actual monitoring of a volume less than 0.3 MG of discharge over a five year period. The Department does not intend to require construction of treatment facilities at the following outfalls should they continue to only discharge at this minimal frequency and volume. The list of untreated CSO outfalls that only discharge at a minimal frequency and volume is flexible and may be adjusted with the adaptive management CSO correction program.

<u>OUTFALL</u>	<u>LOCATION</u>	<u>LAT/LONG</u>	<u>RECEIVING STREAM</u>
024	Griswold (B22) Griswold & Detroit River	42°19'35" 083°02'28"	Detroit River
032	Twenty-First St. (B30) Twenty-First St. & Detroit River	42°18'53" 083°04'31"	Detroit River
034	West Grand Blvd. (B32) West Grand Blvd. & Detroit River	42°18'41" 083°04'50"	Detroit River
035	Swain (B33) Swain & Detroit River	42°18'35" 083°04'56"	Detroit River
036	Scotten (B34) Scotten & Detroit River	42°18'31" 083°05'02"	Detroit River
041	Junction (B39) Junction & Detroit River	42°18'07" 083°05'25"	Detroit River
043	Dragoon (Livernois Relief) (B41) Dragoon (extended) & Detroit River	42°17'49" 083°05'41"	Detroit River
047	Dearborn St. (B45) Dearborn St. & Rouge River	42°17'26" 083°06'59"	Old Channel Rouge River
073	Riverdale (B79) Florence & Rouge River	42°24'36" 083°16'13"	Rouge River

7) the outfalls that immediately follow this paragraph are also included in the Limited Discharge Authorization. These are untreated CSOs that represent the remaining non-core outfalls that will be required to be addressed under the adaptive management CSO correction program. They include the high-priority non-core CSOs. Note that the list of untreated CSO outfalls is flexible and may be adjusted with the adaptive management CSO correction program.

<u>OUTFALL</u>	<u>LOCATION</u>	<u>LAT/LONG</u>	<u>RECEIVING STREAM</u>
005	McClellan (B03) McClellan (extended) & Detroit River	42°21'20" 082°58'02"	Detroit River
006	Fischer (B04) Fischer & Detroit River	42°21'16" 082°59'15"	Detroit River
007	Iroquois (B05) Iroquois & Detroit River	42°21'14" 082°59'21"	Detroit River
008	Helen (B06) Helen & Detroit River	42°20'40" 083°00'06"	Detroit River
009	Mt. Elliott (B07) Mt. Elliott & Detroit River	42°20'24" 083°00'28"	Detroit River
011	Adair (B09) Adair & Detroit River	42°20'16" 083°00'41"	Detroit River
012	Joseph Campau (B10) Joseph Campau & Detroit River	42°10'08" 083°01'02"	Detroit River
016	Orleans Relief (B15) Orleans (Eastside of) & Detroit River	42°19'54" 083°01'36"	Detroit River
017	Orleans (B14) Orleans (Westside of) & Detroit River	42°19'53" 083°01'37"	Detroit River
018	Riopelle (B16) Riopelle & Detroit River	42°19'52" 083°01'42"	Detroit River
019	Rivard (B17) Rivard & Detroit River	42°19'48" 083°01'55"	Detroit River
020	Hastings (B18) Schweizer Place & Detroit River	42°19'46" 083°02'03"	Detroit River
021	Randolph (B19) Randolph & Detroit River	42°19'29" 083°02'26"	Detroit River
022	Bates (B20) Bates & Detroit River	42°19'38" 083°02'32"	Detroit River
023	Woodward (B21) Woodward & Detroit River	42°19'37" 083°02'35"	Detroit River
025	First-Hamilton (B23) First (extended) & Detroit River	42°19'30" 083°02'57"	Detroit River
026	Third St. (B24) Third St. & Detroit River	42°19'28" 083°03'07"	Detroit River

<u>OUTFALL</u>	<u>LOCATION</u>	<u>LAT/LONG</u>	<u>RECEIVING STREAM</u>
027	Cabacier (B25) Brooklyn (extended) & Detroit River	42°19'24" 083°03'26"	Detroit River
028	Eleventh St. (B26) Eleventh St. & Detroit River	42°19'17" 083°03'46"	Detroit River
031	Eighteenth St. (B29) Eighteenth St. & Detroit River	42°18'57" 083°04'31"	Detroit River
033	Twenty-Fourth St. (B31) Twenty-Fourth St. & Detroit River	42°18'47" 083°04'42"	Detroit River
038	Summit-Clark (B36) Summit & Detroit River	42°18'14" 083°05'18"	Detroit River
039	Ferdinand (B37) Ferdinand & Detroit River	42°18'13" 083°05'19"	Detroit River
040	Morrell (B38) Morrell & Detroit River	42°18'10" 083°05'22"	Detroit River
044	Schroeder (B42) Schroeder & West Jefferson	42°17'32" 083°06'00"	Detroit River
046	Cary (B44) Cary & Rouge River	42°17'29" 083°06'47"	Old Channel Rouge River
059	Warren (B54) West Warren & Rouge River	42°20'34" 083°14'57"	Rouge River
060	Tireman (B56, 57 & 58) Tireman & Rouge River	42°20'59" 083°14'51"	Rouge River
061	West Chicago (B60, 61 & 62) West Chicago & Rouge River (East Shore)	42°21'46" 083°14'56"	Rouge River
062	West Chicago (B63) West Chicago & Rouge River (West Shore)	42°21'52" 083°15'18"	Rouge River
063	Plymouth (B64) Plymouth & Rouge River	42°22'18" 083°15'21"	Rouge River
064	Glendale Relief (B65) Rouge Park Golf Course	42°22'33" 083°14'52"	Rouge River
065	Lahser (Dolson) (B67 & 68) Lahser & Rouge River	42°22'52" 083°15'23"	Rouge River
066	Schoolcraft (B70) Jeffries Freeway, I-96 & Rouge River	42°23'07" 083°16'02"	Rouge River

<u>OUTFALL</u>	<u>LOCATION</u>	<u>LAT/LONG</u>	<u>RECEIVING STREAM</u>
067	West Parkway (B69) Jeffries Freeway, I-96 & Rouge River	42°23'07" 083°16'02"	Rouge River
068	Brammel (B71) Ray & Rouge River	42°23'30" 083°15'56"	Rouge River
069	Lyndon (B72) Lyndon & Rouge River	42°23'35" 083°15'57"	Rouge River
072	Puritan (B77) Puritan & Rouge River (East Shore)	42°24'28" 083°16'14"	Rouge River
074	McNichols (B80 & 81) West McNichols & Rouge River	42°24'52" 083°15'59"	Rouge River
075	Glenhurst (B82) Glenhurst & Rouge River	42°25'32" 083°16'19"	Rouge River
077	Seven Mile (B85) West Seven Mile & Rouge River (East Shore)	42°25'44" 083°16'09"	Rouge River
079	Pembroke (B87) Frisbee & East Shore Rouge River	42°26'02" 083°16'24"	Rouge River

Nothing in this section of the permit shall be construed to limit the State of Michigan's ability to pursue remedies under the Michigan Act.

- b. **Qualified Operations and Maintenance Manager for CSO Discharges**
The permittees shall place the wastewater collection system under the supervision of a qualified Operations and Maintenance Manager who shall serve as the contact person for the Department regarding combined sewer discharges. The permittees may replace the manager at any time and shall notify the Department within ten days after the replacement.
- c. **Disconnection of Eaves Troughs and Roof Downspouts**
The permittees shall eliminate direct connections of eaves troughs and roof downspouts to the sewer system throughout the service area tributary to the Upper Rouge CSO outfalls (Outfalls 059-069, 072-075, 077, and 079). This requirement shall be completed for residential property and commercial and industrial properties or as approved by the Department consistent with the permittees' implementation of the Green Storm Water Infrastructure program. In addition, the permittees shall eliminate direct connections of eave troughs and roof downspouts in the service areas tributary to the CSO RTBs, to the CSO Screening & Disinfection Facilities, and to the remaining untreated CSOs based upon the plan detailed in the revised Long-term Control Program. This requirement does not apply if the permittees demonstrates that the disconnection of eaves troughs and roof downspouts is not a cost-effective means of reducing the frequency or duration of combined sewer overflows or of maintaining compliance with this permit. Such a demonstration and supporting documentation shall be submitted to the Department for approval.
- d. **Collection System and CSO Treatment Facilities Operational Plan**
The permittees shall continue implementation of the approved Collection System and CSO Treatment Facilities Operational Plan (Operational Plan). The implementation of the Operational Plan shall be coordinated with the WRRF Wet Weather Operational Plan that is required for development and implementation in accordance with Part I.A.11. of this permit.

On or before April 1 (annually), the permittees shall submit a revised Operational Plan for Department review and approval, which incorporates all changes made to the plan during the last calendar year (items 1-12 below), and supplies the annual discharge documentation (item 13 below). Any changes to the Operational Plan that affect the rate, volume, or characteristics of the discharge, or the system

storage and transportation for conveyance of wet weather flows, shall be submitted to the Department and approved prior to implementation. The operational plan shall define the hydraulic design constraints of the system during both dry and wet weather operation.

The plan shall include:

- 1) the procedures utilized at the permittees' CSO RTBs and Screening & Disinfection Facilities for adjustment of NaOCl disinfectant feed rates to minimize the discharge of total residual chlorine,
- 2) the procedures and schedule for sampling/monitoring the stored NaOCl disinfectant at the permittees' CSO RTBs and Screening & Disinfection Facilities to determine the concentration of available chlorine and assure that the stored NaOCl is of sufficient strength to provide effective disinfection,
- 3) the procedures for sampling/monitoring the available chlorine concentration of each load of NaOCl delivered to the permittees' CSO RTBs and Screening & Disinfection Facilities,
- 4) if applicable, the procedures utilized at the permittees' CSO RTBs and Screening & Disinfection Facilities for adjustment of dehalogenating reagent feed rates to minimize the discharge of excess reagent,
- 5) the procedures to ensure that the collection and treatment systems are operated to maximize treatment,
- 6) the procedures to ensure that all dry weather flows are conveyed to the treatment facilities for treatment without bypass,
- 7) the hydraulic profile and hydraulic operational elevations for system pump stations, regulators, diversion devices, gates, level sensors, interceptors, etc., to ensure the conveyance of all dry weather flows to the treatment facilities for treatment without bypass,
- 8) the procedures to ensure that the sewerage system hydraulic and storage capacity is identified and fully utilized during wet weather events with eventual treatment of stored flows,
- 9) the procedures to ensure that the greatest quantity of wet weather flow is conveyed to the treatment facilities for treatment to minimize untreated wastewater discharges within the region tributary to the GLWA WRRF,
- 10) the hydraulic profile and hydraulic operational elevations for system pump stations, regulators, diversion devices, gates, level sensors, interceptors, etc., to ensure that the greatest quantity of wet weather flow is conveyed to the treatment facilities for treatment to minimize combined sewage discharges,
- 11) the procedures for ongoing inspection of the sewer system within the permittees' jurisdiction for excessive inflow and infiltration and, where necessary, reduction of the excessive infiltration and inflow sources, and the elimination of unauthorized sewer system connections, and
- 12) identification of the location of the rain gauges.
- 13) The permittees shall submit annual reports that supply the documentation of rainfall and the frequency, duration, and volume of all discharge events during the previous 12-month period (from January 1st through December 31st of the previous year).

The permittees shall continue to pursue the coordination of operational plans (Regional Operational Plan) with tributary communities with the intent of maximizing flow conveyance to the GLWA system and minimizing regional CSOs. Once the Regional Operational Plan is approved by the Department, it shall be implemented.

e. New Wastewater Flows

Increased levels of discharge of sanitary sewage from the combined sewer overflow outfalls listed in Part I.A.15.a. of this permit, the CSO RTBs (see Part I.A.6. of this permit), and the CSO Screening and Disinfection Facilities (see Part I.A.7. of this permit) are prohibited unless:

- 1) the increased discharges are the result of new sanitary wastewater flows which, on the basis of sound professional judgment, are within design peak dry weather transportation capacity, or
- 2) the permittees have officially adopted and are timely implementing a definite program, satisfactory to the Department, leading to the construction and operation of necessary collection, transportation, or treatment devices.

f. CSO Control Projects

1) Pertinent CSO Program History

The permittees are continuing to implement CSO Control Programs for the various CSO outfalls that discharge to the Rouge River and the Detroit River. Depending upon the particular CSO Control Program and outfall, the permittees are required to provide for the prohibition, elimination, or adequate treatment of combined sewage discharges containing raw sewage, to comply with the Water Quality Standards at times of discharge.

For the CSO outfalls discharging to the Rouge River, the development and implementation of the CSO Control Programs for the various outfalls was initially established based upon the goals of the Rouge River Remedial Action Plan (RAP), which called for a phased approach to solving the water quality problems of the river. Phase I of the Rouge River RAP extended to 1993 and included 1) monitoring and optimization of the existing combined sewer system, 2) detailed local planning for CSO controls and 3) resolution of financing and institutional problems. Phase II of the Rouge River RAP extended to 2005 (2012 for a few limited outfalls) and called for facility construction based on the goal of protection of public health through the elimination of raw sewage discharges and the control of toxic pollutants. Phase III of the Rouge River RAP follows completion of Phase II facilities and includes further improvements, if necessary, to comply with water quality standards at the time of discharge. Due to the demonstrated financial capability of the permittees for City of Detroit residents in 2009, 2012 and 2017, the CSO Control Program for the CSOs discharging to the Rouge River has been revised as reflected below.

For the CSO outfalls discharging to the Detroit River and the Old Channel of the Rouge River, Department approval of the CSO Control Programs is determined on a case-by-case basis with considerations for environmental impacts, public health impacts, technical feasibility, and economic affordability. As was the case for the Rouge River program, the demonstrated financial capability of the permittees for City of Detroit residents in 2009, 2012 and 2017 also affected the CSO Control Program for the Detroit River and the Old Channel of the Rouge River, and has been revised as reflected below.

In addition, the CSO Control Program now includes significant Green Storm water Infrastructure (GSI) requirements that are an important component of the approved Long-Term CSO Control Program.

Previous Long-Term CSO Control Program Documents include:

- Original Long-Term CSO Control Plan (1996)
- Long-Term CSO Control Plan Update (2002)
- Amendment Rouge (2008)
- Amendment Detroit (2008)
- Evaluation of CSO Control Alternative (for the Upper Rouge Outfalls) (December 15, 2009)

- Supplemental Report on Alternative CSO Controls for the Upper Rouge Outfalls) (April 30, 2010)

The implementation and completion of the CSO Control Program indicated in Part I.A.15.f. and g. are a necessary and essential requirement of this permit.

2) CSO Correction Program Moving Forward

The permittees shall control remaining combined sewer discharges, that are not classified as either extreme or minimal (see Part 1.A.15.a.5) & 6)), to eliminate the discharges or provide adequate treatment of the combined sewage discharges to comply with Water Quality Standards at times of discharge. Upon completion of the RRO disinfection project at the GLWA WRRF and commencing final use of Outfall 050A, the permittees will have completed core elements of their CSO control program and will have achieved a very high level of CSO control. It has been determined that this core level of control has routinely achieved adequate treatment of 95% of the annual combined sewer volume to the collection system. While additional CSO control measures are needed to fully comply with Michigan's Water Quality Standards, as the permittees moves into the final phases of the CSO control program it is appropriate to plan and schedule the remaining control measures, taking into account what has been put in place to date and lessons learned, the unique technical and financial situation of the city of Detroit, and the nature of the remaining CSO challenges.

Based on the foregoing, the permittees shall proceed with remaining CSO corrections using an adaptive management approach. This means that as new information is gained from: (1) evaluation of existing CSO projects and new treatment technologies, (2) evaluation of real-time collection system controls, (3) more accurate and complete data on CSO discharge frequency and volume, (4) benefits of less flow to the collection system from green storm water infrastructure (GSI), (5) benefits of less flow to the collection system due to the City's drainage charge program and new storm water ordinance, (6) benefits of less flow to the collection system as the City continues its sewer rehabilitation program, and (7) any other pertinent information, future CSO controls can be adapted to best provide cost-effective elimination of discharges, adequate treatment of discharges, or classification of discharges as minimal or extreme. Note that for purposes of designing CSO correction projects, minimal discharge is defined as less than 0.3 MG of discharge over a five year period, and extreme is defined as; (a) no more than one untreated discharge in ten years from a CSO outfall during the April 1 through October 31 growth period, (b) modeled to not discharge at the 25 year – 24 hour event (during growth period, with normal soil moisture, rainfall distributed to a SCS Type II distribution), or (c) monitored to occur only at rainfalls greater than 4 inches in a 24 hour period. The performance standard can be based on actual monitoring data normalized for a typical and representative 10-year period of rainfall record or predictively determined based on a calibrated and verified continuous model using a typical and representative 10-year period of rainfall record or other method as determined acceptable by the Department.

The permittees shall propose the non-core CSO correction projects to be designed, constructed, and operated to provide CSO elimination or adequate treatment during the subsequent five-year permit cycle, with each permit reapplication beginning in April 2022. High priority non-core outfalls should generally be addressed first, and outfalls thought of as high priority can change at any time due to implementation of the adaptive management approach. City of Detroit residents within the DWSD service area are "high burden" status based on sewer fees paid as a percentage of median annual household income. Planning of CSO control measures may reflect the permittees' financial capacity for City of Detroit residents determined in the Financial Capability Evaluation that is submitted with each permit reapplication. Based on current and projected CSO capital revenue requirements, and the current average cost per Detroit household for wastewater treatment and CSO control as a percentage of Detroit median household income, the Department does not expect the permittees to propose non-core CSO correction projects with this permit. The permittees shall next propose non-core CSO correction projects for review and approval with the permit reapplication required by April 4, 2022 (and then on April 4, 2027, and April 4, 2032). However, this first tier of non-core projects during 2023 through 2027 is expected to be relatively low cost. Discussion between the permittees and the Department have determined that low cost projects can include connection of CSO discharges to existing CSO treatment facilities, limited storage projects based on the performance standard with no disinfection, outfall gates and in-system storage projects, increased regulator flow capacity, separation projects that use smaller sanitary pipes in existing larger combined sewers to carry sanitary sewage to

GLWA interceptors while the existing combined sewer becomes a storm sewer, and others. At each application submittal in 2022, 2027, and 2032, the project proposal shall include an updated Financial Capability Evaluation that may also include other financial factors as appropriate. Reissued permits will then be drafted and issued with schedules for approved CSO correction projects that provide continuing progress toward meeting water quality standards. The permittees shall prepare an evaluation of Financial Capability, consistent with state and federal guidance, and shall submit the evaluation with the applications for reissuance of this permit (see the cover page of this permit for the next application due date). The Financial Capability Report shall be in the form of previous reports utilizing the EPA Financial Capability Guidance Document (USEPA 832-B-97-004; February, 1997), and updated with information as may be available in order to assess the permittees' ability to undertake future capital improvement projects related to the Long-Term CSO Control Program. This permit may be modified in accordance with applicable law and rules to incorporate revisions to conform to pertinent laws or rules, or as necessary to address prevailing situations.

Based on information currently available, the following are lists by water body that are high priority CSOs that require control. These outfalls can be revised at any time by the permittees or the Department, reflecting adaptive management considerations. While either the permittees or Department can propose changes at any time, an agreement between the two parties is required and shall be made in writing. The goal will be to complete projects fully addressing all high priority outfalls before October 1, 2037.

Rouge River non-core CSOs (these can be changed by mutual agreement between the permittees and the Department)

High Priority Outfalls
059, 061, 064, 065, 074

Detroit River non-core CSOs (these can be changed by mutual agreement between the permittees and the Department)

High Priority Outfalls
005, 007, 009, 012, 022, 025, 031, 038

3) Adaptive Management Program for this Permit

The adaptive management approach for this permit, before beginning relatively low cost CSO correction projects from 2023-2027, looks at the (1) evaluation of existing CSO projects and new treatment technologies, (2) evaluation of real-time collection system controls, (3) more accurate and complete data on CSO discharge frequency and volume, (4) benefits of less flow to the collection system from green storm water infrastructure (GSI), (5) benefits of less flow to the collection system due to the City's drainage charge program and new storm water ordinance, (6) benefits of less flow to the collection system as the City continues its sewer rehabilitation program, and (7) any other pertinent information. The permittees shall use the above measures, as appropriate, to further reduce untreated CSO discharges on an ongoing basis from the collection system before starting CSO projects from 2023 - 2037.

On or before April 1st (annually starting in 2020), the permittees shall prepare a joint Progress Report that summarizes; 1) significant real time controls that occurred during the preceding calendar year, 2) GSI implementation work during the preceding year that has been undertaken and completed, including a work plan for GSI implementation projects for the next year, documentation of the annual expenditure for the preceding year, and documentation of a cumulative total-spent-to-date on the GSI program, 3) benefits from the new storm water ordinance and green credit program, and 4) benefits from the City sewer rehabilitation program. The report shall summarize the total benefits from all programs by including; a) an updated estimate of the annual volume of wet weather flow that has been removed from the combined sewer system, b) the resulting frequency, volume and duration of CSO discharges (based on actual monitoring), and c) the predicted change modeled continuously and at design events to frequency, volume and duration of CSO discharges based on the calibrated hydraulic model developed in the Master Plan effort. The report shall reference the CSO discharge report submitted under Part I.A.15.d.(13) of this permit and include the pertinent data as a reference. As part of this reporting process, it shall be documented that an average of \$3 million dollars per fiscal year was spent for 2018

and 2019, and \$2 million dollars per year for 2020, 2021, and 2022 for the GSI program (these expenditures are an enforceable requirement of this permit).

A more complete description of the adaptive management approach includes:

a) Real-time Control

The GLWA is in the process of determining if real-time control can be used to help further minimize or even eliminate some untreated CSO discharges. One real-time control discussion currently taking place is the Interim Wet Weather Operations Plan (IWOP). The operational changes agreed to between the permittees and the Department in the IWOP will be reported in the Operational Plan Annual Update (Part 1.A.15 d.). The IWOP is evaluating if critical system regulators, gates, pumps, etc., can be adjusted to allow for more treated CSO, and less untreated CSO from the remaining CSO outfalls. Approved adjustments will be at least acceptable until completion of all non-core CSO correction projects and shall be included in Operational Plan Annual Updates. The evaluation shall include all necessary supporting documentation, including hydraulic model runs if appropriate.

b) Green Storm Water Infrastructure (GSI)

For the west side of the City, there is a GSI program in the tributary area to Rouge River Outfalls 059-069, 072-075, 077, and 079. DWSD has developed and is implementing a Department approved GSI Plan for this area consistent with the "Evaluation of CSO Control Alternatives" report dated December 15, 2009. The GSI Plan describes a process for locating, designing, constructing, operating, and evaluating GSI in these sewersheds. GSI implementation shall be planned to capture, reduce, or otherwise control wet weather flows that would otherwise flow into the sewer system and contribute to CSOs, at the permittees' direction. The Plan includes the following elements:

- (1) Provisions for disconnection of residential downspouts and disconnection of commercial and industrial downspouts where feasible (see Part I.A.15.c.).
- (2) Provisions for demolition and removal of vacant structures and replacement with pervious land cover. Where demolition is planned and implemented at sites that will be re-purposed for GSI, the demolition specifications shall ensure that basements and other impervious surfaces at the sites are removed, that the site is raked to remove large rocks and construction debris, and that engineered soils consisting of an appropriate mix of topsoil, compost, and sand is applied following the demolition to support plant growth and promote infiltration.
- (3) Provisions for installation of bioswales along roadways and parking lots to intercept runoff and reduce storm water inputs to the combined sewer system from impervious surfaces.
- (4) Provisions for installation of GSI and/or BMPs at commercial and residential properties to capture and retard storm water runoff.
- (5) Provisions for tree planting for uptake and evapotranspiration along roadways and open spaces.
- (6) Provisions for other GSI implementation projects as determined to be appropriate.
- (8) Processes for public outreach and public participation in selecting sites and implementing GSI practices.
- (9) Procedures/methods for tracking GSI implementation and measuring effects.
- (10) Provisions for ensuring appropriate maintenance of sites where GSI has been implemented, including roles and schedules for maintenance.
- (11) Provisions for ensuring storm water management (runoff reduction) benefits associated with GSI implementation continue over time, even as redevelopment may occur in the sewersheds.

The permittees shall continue to implement GSI in these sewersheds. The investment in GSI in these sewersheds shall be an average of 3 million dollars per fiscal year for the ten-year period ending 2019

(for a total of \$30 million), and an average of 2 million dollars per year for the following 10 years (for a total of \$20 million). GSI implementation will be in accordance with the GSI Plan.

For the near-east side of the City, there has been another GSI program in the tributary area to Detroit River Outfalls 005 - 009, 011, and 012. Because of the potential for some larger-scale green projects due to a relatively large amount of vacant land in the area, it may be possible to eliminate or reduce the size of some previously envisioned CSO treatment facilities for this area using the combination of GSI implementation along with possible sewer separation, and other engineering solutions. With GSI implementation now spreading across the city, it is acceptable for the city to use one-third (1/3) of the total GSI expenditures on projects upstream of untreated CSOs other than Rouge River Outfalls 059-069, 072-075, 077, and 079.

c) Storm Water Control

1) On or before April 1, 2018, (submitted) the permittees shall submit to the Department for review and approval a storm water control requirement for areas of new development and/or redevelopment. This storm water control requirement is primarily a focus within the Rouge Sewer District and Central Sewer District, as it is these two Districts that have untreated CSOs. Therefore, the permittees shall propose a level of storm water control for new development and redevelopment in these two sewer districts, and for the circumstances stated above, that is designed to help further reduce the volume and frequency of untreated CSO discharges, and a procedure and schedule for implementing this control requirement.

2) Storm water runoff from new development and redevelopment that will be conveyed through storm sewers to DWSD's combined sewers will require control to help further reduce volume and frequency of untreated CSO discharges. These are projects that will require construction plan review by the permittees, and a Part 41 construction permit issued by the Department. Please note that in most cases, new combined sewers will no longer be permitted under Part 41 (except for combined sewer relocation projects). Note that this is not a requirement for storm sewers subject to Permit No. MIS040000 issued to the City of Detroit, as the storm sewers under MIS040000 discharge directly to surface waters and are not owned by the DWSD.

d) City Sewer Rehabilitation

DWSD is currently working on a more robust annual program to remove infiltration/inflow (I/I) from its combined collection system. It is the Department's understanding that this program has a budget of about \$20 million per year.

g. Combined Sewer Overflow Control Program Schedule

1) West-side Model; Rouge River Outfalls 059-069, Outfalls 072-075, Outfall 077, and Outfall 079. For untreated combined sewer overflows from Outfalls 059-069, Outfalls 072-075, Outfall 077, and Outfall 079, the permittees shall determine the accurate frequency and volume of untreated CSO discharges and amend the "Supplemental Report on Alternative CSO Controls for the Upper Rouge River," dated April 30, 2010 according to the following schedule:

- a) The work plan has been approved by the Department that (1) sets forth the monitoring of the 17 CSOs that will be accomplished to accurately determine the frequency and volume of these untreated CSO discharges, (2) uses this monitoring along with the current Ovation monitoring as appropriate in a calibrated and verified model to accurately detail the volume and frequency of the 17 CSOs during a representative and typical 10-year period of rainfall record, and (3) to determine the peak hour flow at the 10 yr – 1 hr event of each of the 17 CSOs. The permittees shall continue to implement the approved work plan.
- b) On or before April 15, 2019, (submitted) the permittees shall submit a report to the Department for review and approval that summarizes the determination and provides the volume and frequency of these 17 CSOs over a representative and typical 10-year period of rainfall record and provides the peak hour flow at the 10 yr – 1 hr event for each of these 17 CSOs;

- c) On or before November 15, 2022, the permittees shall submit an amendment for Department review and approval to the "Supplemental Report on Alternative CSO Controls for the Upper Rouge River" (dated April 30, 2010) that describes any changes to the recommended long-term CSO control projects for the 17 CSOs. This plan may propose an alternative to the use of 10 minutes of detention at the 10 year – 1 hour event, at the permittees' discretion;
- 2) Near eastside; Detroit River Outfalls 005-009, 011, and 012. The permittees shall develop a revised CSO Control Plan for this tributary area in accordance with the following schedule:
- On or before November 15, 2022, the permittees shall submit to the Department for review and approval an update to their Long-term CSO Control program (Detroit update 2008) for providing elimination or adequate treatment of CSO Outfalls 005-009, Outfall 011, and Outfall 012 to meet water quality standards at times of discharge. This plan shall consider the GI recommendations and potential for storm water reduction from the completed 205(j) report for this area. This plan may propose an alternative control requirement for the Long-term CSO control program.
- 3) The permittees may choose to offer an entire updated Long-term CSO Control program for all Detroit River CSOs. This updated plan can include a totally revised Detroit update (2008) for all remaining CSOs. Note that CSOs can be prohibited, eliminated, or adequately treated to meet water quality standards at times of discharge. If the permittees decide to pursue this approach, then the revised plan is due on or before November 15, 2022, for Department review and approval.

Following implementation of any phase of any of the approved Control Programs contained in Part I.A.15.f. and g. of this permit, the Control Program(s) may be reevaluated by the permittees or the Department. Future permits may include requirements to conduct water quality evaluations designed to verify that the overall CSO control program is providing adequate treatment to meet water quality standards. This permit may be modified in accordance with applicable laws and rules, to incorporate revisions necessary to conform to pertinent rules or laws, or as necessary to address prevailing situations, such as technical or financial constraints.

h. Notification and Testing Requirements

The federal rule promulgated by the United States Environmental Protection Agency in 40 CFR Part 122 establishing the public notification requirements for CSO discharges to the Great Lakes basin took effect February 7, 2018.

On or before August 7, 2018, (submitted) the permittees shall submit to the Department for approval, a public notification plan in accordance with 40 CFR 122.38(c). Additionally, on or before April 4, 2022, with the application for reissuance, the permittees shall submit to the Department for approval, an updated public notification plan.

Beginning November 7, 2018, all permittees authorized to discharge untreated or treated CSO to the Great Lakes Basin must provide public notification of CSO discharges in accordance with 40 CFR 122.38(a) and the approved public notification plan. The requirements include but are not limited to the following: notification of the local public health department, other potentially affected public entities and the public; and signage, where feasible at discharge points and other potentially impacted public access areas. In addition, in accordance with Section 324.3112a of the NREPA, the permittees shall provide notification to a newspaper of general circulation in the county in which the discharge occurred or is occurring. To the extent that a conflict may arise between Part I.A.15.h. and Part I.A.16., the Department approved Public Notification Plan shall govern.

16. Untreated or Partially Treated Sewage Discharge Reporting and Testing Requirements

In accordance with Section 324.3112a of the NREPA, if untreated or partially treated sewage is directly or indirectly discharged from a sewer system onto land or into the waters of the state, the entity responsible for the sewer system shall immediately, but not more than 24 hours after the discharge begins, notify, by telephone, the Department, local health departments, a daily newspaper of general circulation in the county in which the permittees are located, and a daily newspaper of general circulation in the county or counties in which the municipalities whose waters may be affected by the discharge are located that the discharge is occurring.

The permittees shall also annually contact municipalities, including the superintendent of a public drinking water supply with potentially affected intakes, whose waters may be affected by the permittees' discharge of untreated or partially treated sewage, and, if those municipalities wish to be notified in the same manner as specified above, the permittees shall provide such notification. Such notification shall also include a daily newspaper in the county of the affected municipality.

At the conclusion of the discharge, written notification shall be submitted in accordance with and on the "Report of Discharge Form" available via the internet at: <http://www.deq.state.mi.us/csosso/>, or, alternatively for combined sewer overflow discharges, in accordance with notification procedures approved by the Department.

In addition, in accordance with Section 324.3112a of the NREPA, each time a discharge of untreated or partially treated sewage occurs, the permittees shall test the affected waters for *Escherichia coli* to assess the risk to the public health as a result of the discharge and shall provide the test results to the affected local county health departments and to the Department. The testing shall be done at locations specified by each affected local county health department but shall not exceed ten (10) tests for each separate discharge event. The affected local county health department may waive this testing requirement, if it determines that such testing is not needed to assess the risk to the public health as a result of the discharge event. The results of this testing shall be submitted with the written notification required above, or, if the results are not yet available, submitted as soon as they become available. This testing is not required, if the testing has been waived by the local health department, or if the discharge(s) did not affect surface waters.

Permittees accepting sanitary or municipal sewage from other sewage collection systems are encouraged to notify the owners of those systems of the above reporting and testing requirements.

17. Pollutant Minimization and Source Evaluation Program for Perfluorooctane Sulfonate (PFOS) and/or Perfluorooctanoic Acid (PFOA)

The goal of the Pollutant Minimization and Source Evaluation Program is to identify and address sources of perfluorooctane sulfonate (PFOS) and/or perfluorooctanoic acid (PFOA) and to reduce and maintain the effluent concentrations of PFOS and/or PFOA at or below the water quality standards (WQS) and/or the Water Quality-Based Effluent limit (WQBEL). The WQS is 11 ng/L for PFOS and the WQBEL for PFOA is 8.04 ug/l.

On or before October 1, 2019, the permittee shall submit an approvable Pollutant Minimization and Source Evaluation Program for PFOS and/or PFOA to proceed toward the goal. The Pollutant Minimization and Source Evaluation Program shall continue work under the IPP Interim Initiative and shall include the following at a minimum:

- a. Identification of and strategies to identify any additional potential and probable PFOS and/or PFOA sources
- b. Monitoring plan for the permitted facility's influent and effluent and effluent from potential sources
- c. Implemented measures thus far to eliminate, reduce, and/or control sources, and an assessment of the degree of success and the strategies used to measure success
- d. Proposed measures and implementation schedules for elimination, control, and/or reduction of the identified sources (prioritizing highest loadings and concentrations), and the strategies that will be used to measure success

The Pollutant Minimization and Source Evaluation Program shall be implemented upon approval by the Department.

On or before May 1 of each year following Pollutant Minimization and Source Evaluation Program implementation, the permittee shall submit to the Department a status report for the previous calendar year. Upon written notification by the Department, the permittee may be required to submit more frequent status reports. Status reports at a minimum shall include:

- a. Complete listing of PFOS and/or PFOA sources
- b. Summary of influent and effluent monitoring data
- c. Summary of monitoring data from known or potential sources
- d. History and compliance status for sources
- e. Implemented measures to eliminate, reduce, or control sources, (prioritizing highest loadings and concentrations), and an assessment of the degree of success and the strategies used to measure success
- f. Proposed measures and schedules for elimination, control, or reduction of any newly identified PFOS and/or PFOA sources (prioritizing highest loadings and concentrations), and the strategies that will be used to measure success
- g. Barriers to implementation and revisions to the implementation schedule
- h. Laboratory reports, if not previously supplied

Any information generated as a result of the Pollutant Minimization and Source Evaluation Program set forth in this permit may be used to support a request to modify the Pollutant Minimization and Source Evaluation Program or to demonstrate that the requirement has been completed satisfactorily.

A request for modification of the approved Pollutant Minimization and Source Evaluation Program shall be submitted in writing to the Department along with supporting documentation for review and approval. The Department may approve modifications to the approved Pollutant Minimization and Source Evaluation Program, including a reduction in the frequency of the influent and known or potential source monitoring requirements. Approval of a Pollutant Minimization and Source Evaluation Program modification does not require a permit modification.

This permit may be modified in accordance with applicable laws and rules to include additional PFOS and/or PFOA conditions and/or limitations as necessary.

18. Collection System Contingency Plan

An emergency condition at the WRRF might occur that requires reduced (or even no) influent flows to the WRRF. Under Rule 299.2959 of Part 41, the permittee is required to minimize discharge of excessive pollutants. On or before July 1, 2020, the permittee shall submit to the Department for review and approval, a report that documents how the collection system and WRRF would be operated if an emergency condition required reduced influent flow (or no flow) to the WRRF to minimize discharge of excessive pollutants per Rule 299.2959 of Part 41 of PA 451. This could involve in-system storage of flows, use of Retention Treatment Basins for storage and potentially treated discharge, rerouting of flow, use of portions of the WRRF as appropriate, etc. The report shall evaluate operation of the collection system and WRRF, considering at least two hypothetical conditions with no influent flow to the WRRF; a duration of six (6) hours of no influent flow, and a duration of 24 hours of no influent flow.

19. Facility Contact

The "Facility Contact" was specified in the application. The permittees may replace the facility contact at any time, and shall notify the Department in writing within 10 days after replacement (including the name, address and telephone number of the new facility contact).

- a. The facility contact shall be (or a duly authorized representative of this person):
 - for a corporation, a principal executive officer of at least the level of vice president; or a designated representative if the representative is responsible for the overall operation of the facility from which the discharge originates, as described in the permit application or other NPDES form,
 - for a partnership, a general partner,
 - for a sole proprietorship, the proprietor, or
 - for a municipal, state, or other public facility, either a principal executive officer, the mayor, village president, city or village manager or other duly authorized employee.
- b. A person is a duly authorized representative only if:
 - the authorization is made in writing to the Department by a person described in paragraph a. of this section; and
 - the authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the facility (a duly authorized representative may thus be either a named individual or any individual occupying a named position).

Nothing in this section obviates the permittees from properly submitting reports and forms as required by law.

20. Monthly Operating Reports

Part 41 of Act 451 of 1994 as amended, specifically Section 324.4106 and associated R 299.2953, requires that the permittees file with the Department, on forms prescribed by the Department, operating reports showing the effectiveness of the treatment facility operation and the quantity and quality of liquid wastes discharged into waters of the state.

Within thirty (30) days of the effective date of this permit, the permittees shall submit to the Department a revised treatment facility monitoring program to address monitoring requirement changes reflected in this permit, or submit justification explaining why monitoring requirement changes reflected in this permit do not necessitate revisions to the treatment facility monitoring program. The permittees shall implement the revised treatment facility monitoring program upon approval from the Department. Applicable forms and guidance are available on the Department's web site at http://www.michigan.gov/deq/0,1607,7-135-3313_44117---,00.html. The permittees may use alternate forms if they are consistent with the approved treatment facility monitoring program. Unless the Department provides written notification to the permittees that monthly submittal of operating reports is required, operating reports that result from implementation of the approved treatment facility monitoring program shall be maintained on site for a minimum of three (3) years and shall be made available to the Department for review upon request.

21. Discharge Monitoring Report – Quality Assurance Study Program

The permittees shall participate in the Discharge Monitoring Report – Quality Assurance (DMR-QA) Study Program. The purpose of the DMR-QA Study Program is to annually evaluate the proficiency of all in-house and/or contract laboratory(ies) that perform, on behalf of the facility authorized to discharge under this permit, the analytical testing required under this permit. In accordance with Section 308 of the Clean Water Act (33 U.S.C. § 1318); and R 323.2138 and R 323.2154 of Part 21, Wastewater Discharge Permits, promulgated under Part 31 of the NREPA, participation in the DMR-QA Study Program is required for all major facilities, and for minor facilities selected for participation by the Department.

Annually and in accordance with DMR-QA Study Program requirements and submittal due dates, the permittees shall submit to the Michigan DMR-QA Study Program state coordinator all documentation required by the DMR-QA Study. DMR-QA Study Program participation is required only for the analytes required under this permit and only when those analytes are also identified in the DMR-QA Study.

If the permitted facility's status as a major facility should change, participation in the DMR-QA Study Program may be reevaluated. Questions concerning participation in the DMR-QA Study Program should be directed to the Michigan DMR-QA Study Program state coordinator.

All forms and instructions required for participation in the DMR-QA Study Program, including submittal due dates and state coordinator contact information, can be found at <http://www.epa.gov/compliance/discharge-monitoring-report-quality-assurance-study-program>.

Section B. Storm Water Pollution Prevention

This section is not required.

PART I**Section C. Industrial Waste Pretreatment Program****1. Federal Industrial Pretreatment Program**

- a. The permittees shall implement the Federal Industrial Pretreatment Program approved on June 26, 1997, and any subsequent modifications approved up to the issuance of this permit. Approval of substantial program modifications after the issuance of this permit shall be incorporated into this permit by minor modification in accordance with 40 CFR 122.63.
- b. The permittees shall comply with R 323.2301 through R 323.2317 of the Michigan Administrative Code (Part 23 Rules), the General Pretreatment Regulations for Existing and New Sources of Pollution (40 CFR Part 403), and the approved Federal Industrial Pretreatment Program.
- c. The permittees shall have the legal authority and necessary interjurisdictional agreements that provide the basis for the implementation and enforcement of the approved Federal Industrial Pretreatment Program throughout the service area. The legal authority and necessary interjurisdictional agreements shall include, at a minimum, the authority to carry out the activities specified in R 323.2306(a).
- d. The permittees shall develop procedures which describe, in sufficient detail, program commitments which enable implementation of the approved Federal Industrial Pretreatment Program, 40 CFR Part 403, and the Part 23 Rules in accordance with R 323.2306(c).
- e. The permittees shall establish an interjurisdictional agreement (or comparable document) with all tributary governmental jurisdictions. Each interjurisdictional agreement shall contain, at a minimum, the following:
 - 1) identification of the agency responsible for the implementation and enforcement of the approved Federal Industrial Pretreatment Program within the tributary governmental jurisdiction's boundaries; and
 - 2) the provision of the legal authority which provides the basis for the implementation and enforcement of the approved Federal Industrial Pretreatment Program within the tributary governmental jurisdiction's boundaries.
- f. The permittees shall prohibit discharges that:
 - 1) cause, in whole or in part, the permittees, failure to comply with any condition of this permit or the NREPA;
 - 2) restrict, in whole or in part, the permittee's management of biosolids;
 - 3) cause, in whole or in part, operational problems at the treatment facility or in its collection system;
 - 4) violate any of the general or specific prohibitions identified in R 323.2303(1) and (2);
 - 5) violate categorical standards identified in R 323.2311; and
 - 6) violate local limits established in accordance with R 323.2303(4).
- g. The permittees shall maintain a list of its nondomestic users that meet the criteria of a significant industrial user as identified in R 323.2302(cc).
- h. The permittees shall develop an enforcement response plan which describes, in sufficient detail, program commitments which will enable the enforcement of the approved Federal Industrial Pretreatment Program, 40 CFR Part 403, and the Part 23 Rules in accordance with R 323.2306(g).

- i. The Department may require modifications to the approved Federal Industrial Pretreatment Program which are necessary to ensure compliance with 40 CFR Part 403 and the Part 23 Rules in accordance with R 323.2309.
- j. The permittees shall not implement changes or modifications to the approved Federal Industrial Pretreatment Program without notification to the Department. Any substantial modification shall be subject to Department public noticing and approval in accordance with R 323.2309.
- k. The permittees shall maintain an adequate revenue structure and staffing level for effective implementation of the approved Federal Industrial Pretreatment Program.
- l. The permittees shall develop and maintain, for a minimum of three (3) years, all records and information necessary to determine nondomestic user compliance with 40 CFR Part 403, Part 23 Rules and the approved Federal Industrial Pretreatment Program. This period of retention shall be extended during the course of any unresolved enforcement action or litigation regarding a nondomestic user or when requested by the Department or the United States Environmental Protection Agency. All of the aforementioned records and information shall be made available upon request for inspection and copying by the Department and the United States Environmental Protection Agency.
- m. The permittees shall evaluate the approved Federal Industrial Pretreatment Program for compliance with the 40 CFR Part 403, Part 23 Rules and the prohibitions stated in item f. (above). Based upon this evaluation, the permittees shall propose to the Department all necessary changes or modifications to the approved Federal Industrial Pretreatment Program no later than the next Industrial Pretreatment Program Annual Report due date (see item o. below).
- n. The permittees shall develop and enforce local limits to implement the prohibitions listed in item f above. Local limits shall be based upon data representative of actual conditions demonstrated in a maximum allowable headworks loading analysis. An evaluation of whether the existing local limits need to be revised shall be submitted to the Department by June 1, 2021. The submittal shall provide a technical evaluation of the basis upon which this determination was made which includes information regarding the maximum allowable headworks loading, collection system protection criteria, and worker health and safety, based upon data collected since the last local limits review.

The following pollutants shall be evaluated:

- 1) Arsenic, Cadmium, Chromium, Copper, Cyanide, Lead, Mercury, Nickel, Silver, and Zinc;
 - 2) Pollutants that are subject to limits or monitoring in this permit;
 - 3) Pollutants that have an existing local limit; and,
 - 4) Other pollutants of concern which would reasonably be expected to be discharged or transported by truck or rail or otherwise introduced into the POTW.
- o. On or before April 1 of each year, the permittees shall submit to the Department, as required by R 323.2310(8), an Industrial Pretreatment Program Annual Report on the status of program implementation and enforcement activities. The reporting period shall begin on January 1 and end on December 31. At a minimum, the Industrial Pretreatment Program Annual Report shall include:
- 1) the Pretreatment Program Report data identified in Appendix A to 40 CFR part 127 – NPDES Electronic Reporting;
 - 2) a summary of changes to the approved IPP that have not been previously reported to the Department;

- 3) a summary of results of all the sampling and analyses performed of the WRRF's influent, effluent, and biosolids conducted in accordance with approved methods during the reporting period. The summary shall include the monthly average, daily maximum, quantification level, and number of samples analyzed for each pollutant. At a minimum, the results of analyses for all locally limited parameters for at least one monitoring event that tests influent, effluent and biosolids during the reporting period shall be submitted with each report, unless otherwise required by the Department. Sample collection shall be at intervals sufficient to provide pollutant removal rates, unless the pollutant is not measurable; and;
 - 4) any other relevant information requested by the Department.
- p. The permittee is required under this permit and R 323.2303(4) of the Michigan Administrative Code to review and update their local limits when:
- 1) New pollutants are introduced.
 - 2) New pollutants that were previously unevaluated are identified
 - 3) New water quality or biosolids standards are established or additional information becomes available about the nature of pollutants, such as removal rates and accumulation in biosolids. Substantial increases of pollutants are proposed as required in the notification of new or increased uses in accordance with the provisions of 40 CFR 122.42.

2. Schedule for Notification to Contributing Jurisdictions

On or before May 1st and November 1st of each year, the permittees shall submit to the Department a report demonstrating the efforts and progress toward achieving the requirement of having all contributing jurisdictions adopt a legal authority that is equivalent to or more restrictive than the permittees', including the revised local limits to be incorporated by the permittees as result of the requirements of Part I.C.2. of this permit. This legal authority includes the provisions of Ordinance 08-05 (Detroit City Code Chapter 56, Article III. Division 3) and subsequent revisions to the local limits. These progress reports shall be submitted every six months until the requirement is achieved. The biannual progress reports shall contain:

- a. a listing of all contributing jurisdictions,
- b. the status of each contributing jurisdiction's adoption of adequate legal authority, and
- c. for contributing jurisdictions who have not yet adopted adequate legal authority, a description of the steps/actions the permittees have taken to assure progress toward the contributing jurisdiction's adoption of adequate legal authority.

The permittees shall, to the best of its ability, work with those contributing jurisdictions who did not adopt adequate legal authority by January 1, 2008, to obtain such legal authority.

PART I**Section D. Residuals Management Program****1. Residuals Management Program for Land Application of Biosolids**

The permittees are authorized to land-apply bulk biosolids or prepare bulk biosolids for land application in accordance with the permittees' approved Residuals Management Program (RMP) approved on April 22, 2008, and approved modifications thereto, in accordance with the requirements established in R 323.2401 through R 323.2418 of the Michigan Administrative Code (Part 24 Rules). The approved RMP, and any approved modifications thereto, are enforceable requirements of this permit. Incineration, landfilling and other residual disposal activities shall be conducted in accordance with Part II.D.7. of this permit. The Part 24 Rules can be obtained via the internet (<http://www.michigan.gov/deq/> and on the left side of the screen click on Water, Biosolids & Industrial Pretreatment, Biosolids then click on Biosolids Laws and Rules Information which is under the Laws & Rules banner in the center of the screen).

a. Annual Report

On or before October 30 of each year, the permittees shall submit an annual report to the Department for the previous fiscal year of October 1 through September 30. The report shall be submitted electronically via the Department's MiWaters system at <https://miwaters.deq.state.mi.us>. At a minimum, the report shall contain:

- 1) a certification that current residuals management practices are in accordance with the approved RMP, or a proposal for modification to the approved RMP; and
- 2) a completed Biosolids Annual Report Form, available at <https://miwaters.deq.state.mi.us>.

b. Modifications to the Approved RMP

Prior to implementation of modifications to the RMP, the permittees shall submit proposed modifications to the Department for approval. The approved modification shall become effective upon the date of approval. Upon written notification, the Department may impose additional requirements and/or limitations to the approved RMP as necessary to protect public health and the environment from any adverse effect of a pollutant in the biosolids.

c. Record Keeping

Records required by the Part 24 Rules shall be kept for a minimum of five years. However, the records documenting cumulative loading for sites subject to cumulative pollutant loading rates shall be kept as long as the site receives biosolids.

d. Contact Information

RMP related submittals to the Department shall be to the Southeast Michigan District Supervisor of the Water Resources Division. The Southeast Michigan District Office is located at 27700 Donald Court, Warren Michigan, 48092-2793, Telephone: 586-753-3750, Fax: 586-753-3751.

PART II

Part II may include terms and /or conditions not applicable to discharges covered under this permit.

Section A. Definitions

Acute toxic unit (TU_A) means $100/LC_{50}$ where the LC_{50} is determined from a whole effluent toxicity (WET) test which produces a result that is statistically or graphically estimated to be lethal to 50% of the test organisms.

Annual monitoring frequency refers to a calendar year beginning on January 1 and ending on December 31. When required by this permit, an analytical result, reading, value or observation shall be reported for that period if a discharge occurs during that period.

Authorized public agency means a state, local, or county agency that is designated pursuant to the provisions of section 9110 of Part 91 of the NREPA to implement soil erosion and sedimentation control requirements with regard to construction activities undertaken by that agency.

Best management practices (BMPs) means structural devices or nonstructural practices that are designed to prevent pollutants from entering into storm water, to direct the flow of storm water, or to treat polluted storm water.

Bioaccumulative chemical of concern (BCC) means a chemical which, upon entering the surface waters, by itself or as its toxic transformation product, accumulates in aquatic organisms by a human health bioaccumulation factor of more than 1000 after considering metabolism and other physiochemical properties that might enhance or inhibit bioaccumulation. The human health bioaccumulation factor shall be derived according to R 323.1057(5). Chemicals with half-lives of less than 8 weeks in the water column, sediment, and biota are not BCCs. The minimum bioaccumulation concentration factor (BAF) information needed to define an organic chemical as a BCC is either a field-measured BAF or a BAF derived using the biota-sediment accumulation factor (BSAF) methodology. The minimum BAF information needed to define an inorganic chemical as a BCC, including an organometal, is either a field-measured BAF or a laboratory-measured bioconcentration factor (BCF). The BCCs to which these rules apply are identified in Table 5 of R 323.1057 of the Water Quality Standards.

Biosolids are the solid, semisolid, or liquid residues generated during the treatment of sanitary sewage or domestic sewage in a treatment works. This includes, but is not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment processes and a derivative of the removed scum or solids.

Bulk biosolids means biosolids that are not sold or given away in a bag or other container for application to a lawn or home garden.

Certificate of Coverage (COC) is a document, issued by the Department, which authorizes a discharge under a general permit.

Chronic toxic unit (TU_C) means $100/MATC$ or $100/IC_{25}$, where the maximum acceptable toxicant concentration (MATC) and IC_{25} are expressed as a percent effluent in the test medium.

Class B biosolids refers to material that has met the Class B pathogen reduction requirements or equivalent treatment by a Process to Significantly Reduce Pathogens (PSRP) in accordance with the Part 24 Rules. Processes include aerobic digestion, composting, anaerobic digestion, lime stabilization and air drying.

Combined sewer system is a sewer system in which storm water runoff is combined with sanitary wastes.

Daily concentration is the sum of the concentrations of the individual samples of a parameter divided by the number of samples taken during any calendar day. If the parameter concentration in any sample is less than the quantification limit, regard that value as zero when calculating the daily concentration. The daily concentration will be used to determine compliance with any maximum and minimum daily concentration limitations (except for pH and dissolved oxygen). When required by the permit, report the maximum calculated daily concentration for the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the Discharge Monitoring Reports (DMRs).

For pH, report the maximum value of any *individual* sample taken during the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs and the minimum value of any *individual* sample taken during the month in the "MINIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs. For dissolved oxygen, report the minimum concentration of any *individual* sample in the "MINIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs.

Daily loading is the total discharge by weight of a parameter discharged during any calendar day. This value is calculated by multiplying the daily concentration by the total daily flow and by the appropriate conversion factor. The daily loading will be used to determine compliance with any maximum daily loading limitations. When required by the permit, report the maximum calculated daily loading for the month in the "MAXIMUM" column under "QUANTITY OR LOADING" on the DMRs.

Daily monitoring frequency refers to a 24-hour day. When required by this permit, an analytical result, reading, value or observation shall be reported for that period if a discharge occurs during that period.

Department means the Michigan Department of Environment, Great Lakes, and Energy.

Detection level means the lowest concentration or amount of the target analyte that can be determined to be different from zero by a single measurement at a stated level of probability.

Discharge means the addition of any waste, waste effluent, wastewater, pollutant, or any combination thereof to any surface water of the state.

EC₅₀ means a statistically or graphically estimated concentration that is expected to cause 1 or more specified effects in 50% of a group of organisms under specified conditions.

Fecal coliform bacteria monthly

FOR WWSLs THAT COLLECT AND STORE WASTEWATER AND ARE AUTHORIZED TO DISCHARGE ONLY IN THE SPRING AND/OR FALL ON AN INTERMITTENT BASIS – Fecal coliform bacteria monthly is the geometric mean of all daily concentrations determined during a discharge event. Days on which no daily concentration is determined shall not be used to determine the calculated monthly value. The calculated monthly value will be used to determine compliance with the maximum monthly fecal coliform bacteria limitations. When required by the permit, report the calculated monthly value in the "AVERAGE" column under "QUALITY OR CONCENTRATION" on the DMR. If the period in which the discharge event occurred was partially in each of two months, the calculated monthly value shall be reported on the DMR of the month in which the last day of discharge occurred.

FOR ALL OTHER DISCHARGES – Fecal coliform bacteria monthly is the geometric mean of all daily concentrations determined during a reporting month. Days on which no daily concentration is determined shall not be used to determine the calculated monthly value. The calculated monthly value will be used to determine compliance with the maximum monthly fecal coliform bacteria limitations. When required by the permit, report the calculated monthly value in the "AVERAGE" column under "QUALITY OR CONCENTRATION" on the DMR.

Fecal coliform bacteria 7-day

FOR WWSLs THAT COLLECT AND STORE WASTEWATER AND ARE AUTHORIZED TO DISCHARGE ONLY IN THE SPRING AND/OR FALL ON AN INTERMITTENT BASIS – Fecal coliform bacteria 7-day is the geometric mean of the daily concentrations determined during any 7 consecutive days of discharge during a discharge event. If the number of daily concentrations determined during the discharge event is less than 7 days, the number of actual daily concentrations determined shall be used for the calculation. Days on which no daily concentration is determined shall not be used to determine the value. The calculated 7-day value will be used to determine compliance with the maximum 7-day fecal coliform bacteria limitations. When required by the permit, report the maximum calculated 7-day geometric mean value for the month in the “MAXIMUM” column under “QUALITY OR CONCENTRATION” on the DMRs. If the 7-day period was partially in each of two months, the value shall be reported on the DMR of the month in which the last day of discharge occurred.

FOR ALL OTHER DISCHARGES – Fecal coliform bacteria 7-day is the geometric mean of the daily concentrations determined during any 7 consecutive days in a reporting month. If the number of daily concentrations determined is less than 7, the actual number of daily concentrations determined shall be used for the calculation. Days on which no daily concentration is determined shall not be used to determine the value. The calculated 7-day value will be used to determine compliance with the maximum 7-day fecal coliform bacteria limitations. When required by the permit, report the maximum calculated 7-day geometric mean for the month in the “MAXIMUM” column under “QUALITY OR CONCENTRATION” on the DMRs. The first calculation shall be made on day 7 of the reporting month, and the last calculation shall be made on the last day of the reporting month.

Flow-proportioned sample is a composite sample with the sample volume proportional to the effluent flow.

General permit means a National Pollutant Discharge Elimination System permit issued authorizing a category of similar discharges.

Geometric mean is the average of the logarithmic values of a base 10 data set, converted back to a base 10 number.

Grab sample is a single sample taken at neither a set time nor flow.

IC₂₅ means the toxicant concentration that would cause a 25% reduction in a nonquantal biological measurement for the test population.

Illicit connection means a physical connection to a municipal separate storm sewer system that primarily conveys non-storm water discharges other than uncontaminated groundwater into the storm sewer; or a physical connection not authorized or permitted by the local authority, where a local authority requires authorization or a permit for physical connections.

Illicit discharge means any discharge to, or seepage into, a municipal separate storm sewer system that is not composed entirely of storm water or uncontaminated groundwater. Illicit discharges include non-storm water discharges through pipes or other physical connections; dumping of motor vehicle fluids, household hazardous wastes, domestic animal wastes, or litter; collection and intentional dumping of grass clippings or leaf litter; or unauthorized discharges of sewage, industrial waste, restaurant wastes, or any other non-storm water waste directly into a separate storm sewer.

Individual permit means a site-specific NPDES permit.

Inlet means a catch basin, roof drain, conduit, drain tile, retention pond riser pipe, sump pump, or other point where storm water or wastewater enters into a closed conveyance system prior to discharge off site or into waters of the state.

Interference is a discharge which, alone or in conjunction with a discharge or discharges from other sources, both: 1) inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and 2) therefore, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or, of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent state or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including Title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including state regulations contained in any state sludge management plan prepared pursuant to Subtitle D of the SWDA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act. [This definition does not apply to sample matrix interference].

Land application means spraying or spreading biosolids or a biosolids derivative onto the land surface, injecting below the land surface, or incorporating into the soil so that the biosolids or biosolids derivative can either condition the soil or fertilize crops or vegetation grown in the soil.

LC₅₀ means a statistically or graphically estimated concentration that is expected to be lethal to 50% of a group of organisms under specified conditions.

Maximum acceptable toxicant concentration (MATC) means the concentration obtained by calculating the geometric mean of the lower and upper chronic limits from a chronic test. A lower chronic limit is the highest tested concentration that did not cause the occurrence of a specific adverse effect. An upper chronic limit is the lowest tested concentration which did cause the occurrence of a specific adverse effect and above which all tested concentrations caused such an occurrence.

Maximum extent practicable means implementation of best management practices by a public body to comply with an approved storm water management program as required by a national permit for a municipal separate storm sewer system, in a manner that is environmentally beneficial, technically feasible, and within the public body's legal authority.

MGD means million gallons per day.

Monthly concentration is the sum of the daily concentrations determined during a reporting period divided by the number of daily concentrations determined. The calculated monthly concentration will be used to determine compliance with any maximum monthly concentration limitations. Days with no discharge shall not be used to determine the value. When required by the permit, report the calculated monthly concentration in the "AVERAGE" column under "QUALITY OR CONCENTRATION" on the DMR.

For minimum percent removal requirements, the monthly influent concentration and the monthly effluent concentration shall be determined. The calculated monthly percent removal, which is equal to 100 times the quantity [1 minus the quantity (monthly effluent concentration divided by the monthly influent concentration)], shall be reported in the "MINIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs.

Monthly loading is the sum of the daily loadings of a parameter divided by the number of daily loadings determined during a reporting period. The calculated monthly loading will be used to determine compliance with any maximum monthly loading limitations. Days with no discharge shall not be used to determine the value. When required by the permit, report the calculated monthly loading in the "AVERAGE" column under "QUANTITY OR LOADING" on the DMR.

Monthly monitoring frequency refers to a calendar month. When required by this permit, an analytical result, reading, value or observation shall be reported for that period if a discharge occurs during that period.

Municipal separate storm sewer means a conveyance or system of conveyances designed or used for collecting or conveying storm water which is not a combined sewer and which is not part of a publicly-owned treatment works as defined in the Code of Federal Regulations at 40 CFR 122.2.

Municipal separate storm sewer system (MS4) means all separate storm sewers that are owned or operated by the United States, a state, city, village, township, county, district, association, or other public body created by or pursuant to state law, having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under state law, such as a sewer district, flood control district, or drainage district, or similar entity, or a designated or approved management agency under Section 208 of the Federal Act that discharges to the waters of the state. This term includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. The term does not include separate storm sewers in very discrete areas, such as individual buildings.

National Pretreatment Standards are the regulations promulgated by or to be promulgated by the Federal Environmental Protection Agency pursuant to Section 307(b) and (c) of the Federal Act. The standards establish nationwide limits for specific industrial categories for discharge to a POTW.

No observed adverse effect level (NOAEL) means the highest tested dose or concentration of a substance which results in no observed adverse effect in exposed test organisms where higher doses or concentrations result in an adverse effect.

Noncontact cooling water is water used for cooling which does not come into direct contact with any raw material, intermediate product, by-product, waste product or finished product.

Nondomestic user is any discharger to a POTW that discharges wastes other than or in addition to water-carried wastes from toilet, kitchen, laundry, bathing or other facilities used for household purposes.

Outfall is the location at which a point source discharge enters the surface waters of the state.

Part 91 agency means an agency that is designated by a county board of commissioners pursuant to the provisions of section 9105 of Part 91 of the NREPA; an agency that is designated by a city, village, or township in accordance with the provisions of section 9106 of Part 91 of the NREPA; or the Department for soil erosion and sedimentation activities under Part 615, Part 631, or Part 632 pursuant to the provisions of section 9115 of Part 91 of the NREPA.

Part 91 permit means a soil erosion and sedimentation control permit issued by a Part 91 agency pursuant to the provisions of Part 91 of the NREPA.

Partially treated sewage is any sewage, sewage and storm water, or sewage and wastewater, from domestic or industrial sources that is treated to a level less than that required by the permittees' National Pollutant Discharge Elimination System permit, or that is not treated to national secondary treatment standards for wastewater, including discharges to surface waters from retention treatment facilities.

Point of discharge is the location of a point source discharge where storm water is discharged directly into a separate storm sewer system.

Point source discharge means a discharge from any discernible, confined, discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, or rolling stock. Changing the surface of land or establishing grading patterns on land will result in a point source discharge where the runoff from the site is ultimately discharged to waters of the state.

Polluting material means any material, in solid or liquid form, identified as a polluting material under the Part 5 Rules (R 324.2001 through R 324.2009 of the Michigan Administrative Code).

POTW is a publicly owned treatment work.

Pretreatment is reducing the amount of pollutants, eliminating pollutants, or altering the nature of pollutant properties to a less harmful state prior to discharge into a public sewer. The reduction or alteration can be by physical, chemical, or biological processes, process changes, or by other means. Dilution is not considered pretreatment unless expressly authorized by an applicable National Pretreatment Standard for a particular industrial category.

Public (as used in the MS4 individual permit) means all persons who potentially could affect the authorized storm water discharges, including, but not limited to, residents, visitors to the area, public employees, businesses, industries, and construction contractors and developers.

Public body means the United States; the state of Michigan; a city, village, township, county, school district, public college or university, or single-purpose governmental agency; or any other body which is created by federal or state statute or law.

Qualified Personnel means an individual who meets qualifications acceptable to the Department and who is authorized by an Industrial Storm Water Certified Operator to collect the storm water sample.

Qualifying storm event means a storm event causing greater than 0.1 inch of rainfall and occurring at least 72 hours after the previous measurable storm event that also caused greater than 0.1 inch of rainfall. Upon request, the Department may approve an alternate definition meeting the condition of a qualifying storm event.

Quantification level means the measurement of the concentration of a contaminant obtained by using a specified laboratory procedure calculated at a specified concentration above the detection level. It is considered the lowest concentration at which a particular contaminant can be quantitatively measured using a specified laboratory procedure for monitoring of the contaminant.

Quarterly monitoring frequency refers to a three month period, defined as January through March, April through June, July through September, and October through December. When required by this permit, an analytical result, reading, value or observation shall be reported for that period if a discharge occurs during that period.

Regional Administrator is the Region 5 Administrator, U.S. EPA, located at R-19J, 77 W. Jackson Blvd., Chicago, Illinois 60604.

Regulated area means the permittee's urbanized area, where urbanized area is defined as a place and its adjacent densely-populated territory that together have a minimum population of 50,000 people as defined by the United States Bureau of the Census and as determined by the latest available decennial census.

Secondary containment structure means a unit, other than the primary container, in which significant materials are packaged or held, which is required by State or Federal law to prevent the escape of significant materials by gravity into sewers, drains, or otherwise directly or indirectly into any sewer system or to the surface or ground waters of this state.

Separate storm sewer system means a system of drainage, including, but not limited to, roads, catch basins, curbs, gutters, parking lots, ditches, conduits, pumping devices, or man-made channels, which is not a combined sewer where storm water mixes with sanitary wastes, and is not part of a POTW.

Significant industrial user is a nondomestic user that: 1) is subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; or 2) discharges an average of 25,000 gallons per day or more of process wastewater to a POTW (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process waste stream which makes up five (5) percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the permittees as defined in 40 CFR 403.12(a) on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's treatment plant operation or violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

Significant materials Significant Materials means any material which could degrade or impair water quality, including but not limited to: raw materials; fuels; solvents, detergents, and plastic pellets; finished materials such as metallic products; hazardous substances designated under Section 101(14) of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (see 40 CFR 372.65); any chemical the facility is required to report pursuant to Section 313 of Emergency Planning and Community Right-to-Know Act (EPCRA); polluting materials as identified under the Part 5 Rules (R 324.2001 through R 324.2009 of the Michigan Administrative Code); Hazardous Wastes as defined in Part 111 of the NREPA; fertilizers; pesticides; and waste products such as ashes, slag, and sludge that have the potential to be released with storm water discharges.

Significant spills and significant leaks means any release of a polluting material reportable under the Part 5 Rules (R 324.2001 through R 324.2009 of the Michigan Administrative Code).

Special-use area means secondary containment structures required by state or federal law; lands on Michigan's List of Sites of Environmental Contamination pursuant to Part 201, Environmental Remediation, of the NREPA; and/or areas with other activities that may contribute pollutants to the storm water for which the Department determines monitoring is needed.

Stoichiometric means the quantity of a reagent calculated to be necessary and sufficient for a given chemical reaction.

Storm water means storm water runoff, snow melt runoff, surface runoff and drainage, and non-storm water included under the conditions of this permit.

Storm water discharge point is the location where the point source discharge of storm water is directed to surface waters of the state or to a separate storm sewer. It includes the location of all point source discharges where storm water exits the facility, including *outfalls* which discharge directly to surface waters of the state, and *points of discharge* which discharge directly into separate storm sewer systems.

SWPPP means the Storm Water Pollution Prevention Plan prepared in accordance with this permit.

Tier I value means a value for aquatic life, human health or wildlife calculated under R 323.1057 of the Water Quality Standards using a tier I toxicity database.

Tier II value means a value for aquatic life, human health or wildlife calculated under R 323.1057 of the Water Quality Standards using a tier II toxicity database.

Total maximum daily loads (TMDLs) are required by the Federal Act for waterbodies that do not meet water quality standards. TMDLs represent the maximum daily load of a pollutant that a waterbody can assimilate and meet water quality standards, and an allocation of that load among point sources, nonpoint sources, and a margin of safety.

Toxicity reduction evaluation (TRE) means a site-specific study conducted in a stepwise process designed to identify the causative agents of effluent toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity.

Water Quality Standards means the Part 4 Water Quality Standards promulgated pursuant to Part 31 of the NREPA, being R 323.1041 through R 323.1117 of the Michigan Administrative Code.

Weekly monitoring frequency refers to a calendar week which begins on Sunday and ends on Saturday. When required by this permit, an analytical result, reading, value or observation shall be reported for that period if a discharge occurs during that period.

Wet Weather Flow is the wastewater flow (domestic, industrial, commercial and institutional) including infiltration and inflow that occurs as the result of a precipitation or snowmelt event.

Wet Weather Event, for the interim period, is defined as those days on which an average 0.10 inches or more of precipitation was recorded by six strategically located rainfall gauges (as defined in Part I.9.c.(10) of the Operational Plan) in the WRRF's service area, plus two days immediately following days of 0.10 inch to 1.00 inch days of precipitation or three days following days of 1.00 inch or more precipitation. Rainfall days are further limited to those days in which the air temperature exceeds 32° F (0° C) for at least an eight hour period. The permittee may demonstrate that certain events such as snowmelt, and other unforeseen events will be considered rainfall days.

The above definition of wet weather event is not adequate on a long term basis, or for the purposes of planning, designing, or implementing the combined sewer overflow improvements required in this permit. For purposes of planning and designing future CSO improvements, the permittee shall consider the effect of dewatering tributary storage basins on overall system recovery, both at the WRRF and CSO overflow points in the collection system.

For this permit while the Regional Operational Plan is being revised, if up to 930 MGD (including recycle) is being processed with secondary treatment at the WRRF and no primary flow is being discharged, then tributary combined or sanitary storage basins in the GLWA system may be dewatered. Such dewatering will not be considered a violation of this permit, even if contrary to the above Wet Weather Event definition. Once a revised Regional Operation Plan is developed, it shall be implemented once reviewed and approved by the Department.

Upon approval of the Department, an alternate "wet weather event" definition may be used.

WWSL is a wastewater stabilization lagoon.

WWSL discharge event is a discrete occurrence during which effluent is discharged to the surface water up to 10 days of a consecutive 14 day period.

3-portion composite sample is a sample consisting of three equal-volume grab samples collected at equal intervals over an 8-hour period.

7-day concentration

FOR WWSLs THAT COLLECT AND STORE WASTEWATER AND ARE AUTHORIZED TO DISCHARGE ONLY IN THE SPRING AND/OR FALL ON AN INTERMITTENT BASIS – The 7-day concentration is the sum of the daily concentrations determined during any 7 consecutive days of discharge during a WWSL discharge event divided by the number of daily concentrations determined. If the number of daily concentrations determined during the WWSL discharge event is less than 7 days, the number of actual daily concentrations determined shall be used for the calculation. The calculated 7-day concentration will be used to determine compliance with any maximum 7-day concentration limitations. When required by the permit, report the maximum calculated 7-day concentration for the WWSL discharge event in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the DMR. If the WWSL discharge event was partially in each of two months, the value shall be reported on the DMR of the month in which the last day of discharge occurred.

FOR ALL OTHER DISCHARGES – The 7-day concentration is the sum of the daily concentrations determined during any 7 consecutive days in a reporting month divided by the number of daily concentrations determined. If the number of daily concentrations determined is less than 7, the actual number of daily concentrations determined shall be used for the calculation. The calculated 7-day concentration will be used to determine compliance with any maximum 7-day concentration limitations in the reporting month. When required by the permit, report the maximum calculated 7-day concentration for the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the DMR. The first 7-day calculation shall be made on day 7 of the reporting month, and the last calculation shall be made on the last day of the reporting month.

7-day loading

FOR WWSLs THAT COLLECT AND STORE WASTEWATER AND ARE AUTHORIZED TO DISCHARGE ONLY IN THE SPRING AND/OR FALL ON AN INTERMITTENT BASIS – The 7-day loading is the sum of the daily loadings determined during any 7 consecutive days of discharge during a WWSL discharge event divided by the number of daily loadings determined. If the number of daily loadings determined during the WWSL discharge event is less than 7 days, the number of actual daily loadings determined shall be used for the calculation. The calculated 7-day loading will be used to determine compliance with any maximum 7-day loading limitations. When required by the permit, report the maximum calculated 7-day loading for the WWSL discharge event in the “MAXIMUM” column under “QUANTITY OR LOADING” on the DMR. If the WWSL discharge event was partially in each of two months, the value shall be reported on the DMR of the month in which the last day of discharge occurred

FOR ALL OTHER DISCHARGES – The 7-day loading is the sum of the daily loadings determined during any 7 consecutive days in a reporting month divided by the number of daily loadings determined. If the number of daily loadings determined is less than 7, the actual number of daily loadings determined shall be used for the calculation. The calculated 7-day loading will be used to determine compliance with any maximum 7-day loading limitations in the reporting month. When required by the permit, report the maximum calculated 7-day loading for the month in the “MAXIMUM” column under “QUANTITY OR LOADING” on the DMR. The first 7-day calculation shall be made on day 7 of the reporting month, and the last calculation shall be made on the last day of the reporting month.

24-hour composite sample is a flow-proportioned composite sample consisting of hourly or more frequent portions that are taken over a 24-hour period. In accordance with the Department Approved Wet Weather Operational Plan (See Part I.A.11.), alternate requirements for 24-hour composite sampling may be utilized to satisfy the monitoring requirements of this permit.

PART II

Section B. Monitoring Procedures

1. Representative Samples

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. Test Procedures

Test procedures for the analysis of pollutants shall conform to regulations promulgated pursuant to Section 304(h) of the Federal Act (40 CFR Part 136 – Guidelines Establishing Test Procedures for the Analysis of Pollutants), unless specified otherwise in this permit. **Test procedures used shall be sufficiently sensitive to determine compliance with applicable effluent limitations.** Requests to use test procedures not promulgated under 40 CFR Part 136 for pollutant monitoring required by this permit shall be made in accordance with the Alternate Test Procedures regulations specified in 40 CFR 136.4. These requests shall be submitted to the Section Manager of the Permits Section, Water Resources Division, Michigan Department of Environment, Great Lakes, and Energy, P.O. Box 30458, Lansing, Michigan, 48909-7958. The permittees may use such procedures upon approval.

The permittees shall periodically calibrate and perform maintenance procedures on all analytical instrumentation at intervals to ensure accuracy of measurements. The calibration and maintenance shall be performed as part of the permittees' laboratory Quality Control/Quality Assurance program.

3. Instrumentation

The permittees shall periodically calibrate and perform maintenance procedures on all monitoring instrumentation at intervals to ensure accuracy of measurements.

4. Recording Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittees shall record the following information: 1) the exact place, date, and time of measurement or sampling; 2) the person(s) who performed the measurement or sample collection; 3) the dates the analyses were performed; 4) the person(s) who performed the analyses; 5) the analytical techniques or methods used; 6) the date of and person responsible for equipment calibration; and 7) the results of all required analyses.

5. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years, or longer if requested by the Regional Administrator or the Department.

PART II

Section C. Reporting Requirements

1. Start-up Notification

If the permittees will not discharge during the first 60 days following the effective date of this permit, the permittees shall notify the Department within 14 days following the effective date of this permit, and then 60 days prior to the commencement of the discharge.

2. Submittal Requirements for Self-Monitoring Data

Part 31 of the NREPA (specifically Section 324.3110(7)); and R 323.2155(2) of Part 21, Wastewater Discharge Permits, promulgated under Part 31 of the NREPA, allow the Department to specify the forms to be utilized for reporting the required self-monitoring data. Unless instructed on the effluent limitations page to conduct "Retained Self-Monitoring," the permittees shall submit self-monitoring data via the Department's MiWaters system.

The permittees shall utilize the information provided on the MiWaters website, located at <https://miwaters.deq.state.mi.us>, to access and submit the electronic forms. Both monthly summary and daily data shall be submitted to the Department no later than the 20th day of the month following each month of the authorized discharge period(s). The permittees may be allowed to submit the electronic forms after this date if the Department has granted an extension to the submittal date.

3. Retained Self-Monitoring Requirements

If instructed on the effluent limits page (or otherwise authorized by the Department in accordance with the provisions of this permit) to conduct retained self-monitoring, the permittees shall maintain a year-to-date log of retained self-monitoring results and, upon request, provide such log for inspection to the staff of the Department. Retained self-monitoring results are public information and shall be promptly provided to the public upon request.

The permittees shall certify, in writing, to the Department, on or before January 10th (April 1st for animal feeding operation facilities) of each year, that: 1) all retained self-monitoring requirements have been complied with and a year-to-date log has been maintained; and 2) the application on which this permit is based still accurately describes the discharge. With this annual certification, the permittees shall submit a summary of the previous year's monitoring data. The summary shall include maximum values for samples to be reported as daily maximums and/or monthly maximums and minimum values for any daily minimum samples.

Retained self-monitoring may be denied to permittees by notification in writing from the Department. In such cases, the permittees shall submit self-monitoring data in accordance with Part II.C.2., above. Such a denial may be rescinded by the Department upon written notification to the permittees. Reissuance or modification of this permit or reissuance or modification of an individual permittees' authorization to discharge shall not affect previous approval or denial for retained self-monitoring unless the Department provides notification in writing to the permittees.

4. Additional Monitoring by Permittees

If the permittees monitor any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report. Such increased frequency shall also be indicated.

Monitoring required pursuant to Part 41 of the NREPA or Rule 35 of the Mobile Home Park Commission Act (Act 96 of the Public Acts of 1987) for assurance of proper facility operation shall be submitted as required by the Department.

5. Compliance Dates Notification

Within 14 days of every compliance date specified in this permit, the permittees shall submit a *written* notification to the Department indicating whether or not the particular requirement was accomplished. If the requirement was not accomplished, the notification shall include an explanation of the failure to accomplish the requirement, actions taken or planned by the permittees to correct the situation, and an estimate of when the requirement will be accomplished. If a written report is required to be submitted by a specified date and the permittees accomplish this, a separate written notification is not required.

6. Noncompliance Notification

Compliance with all applicable requirements set forth in the Federal Act, Parts 31 and 41 of the NREPA, and related regulations and rules is required. All instances of noncompliance shall be reported as follows:

- a. **24-Hour Reporting**
Any noncompliance which may endanger health or the environment (including maximum and/or minimum daily concentration discharge limitation exceedances) shall be reported, verbally, within 24 hours from the time the permittees becomes aware of the noncompliance. A written submission shall also be provided within five (5) days.
- b. **Other Reporting**
The permittees shall report, in writing, all other instances of noncompliance not described in a. above at the time monitoring reports are submitted; or, in the case of retained self-monitoring, within five (5) days from the time the permittees become aware of the noncompliance.

Written reporting shall include: 1) a description of the discharge and cause of noncompliance; and 2) the period of noncompliance, including exact dates and times, or, if not yet corrected, the anticipated time the noncompliance is expected to continue, and the steps taken to reduce, eliminate and prevent recurrence of the noncomplying discharge.

7. Spill Notification

The permittees shall immediately report any release of any polluting material which occurs to the surface waters or groundwaters of the state, unless the permittees have determined that the release is not in excess of the threshold reporting quantities specified in the Part 5 Rules (R 324.2001 through R 324.2009 of the Michigan Administrative Code), by calling the Department at the number indicated on the second page of this permit (or, if this is a general permit, on the COC); or, if the notice is provided after regular working hours, call the Department's 24-hour Pollution Emergency Alerting System telephone number, 1-800-292-4706 (calls from **out-of-state** dial 1-517-373-7660).

Within ten (10) days of the release, the permittees shall submit to the Department a full written explanation as to the cause of the release, the discovery of the release, response (clean-up and/or recovery) measures taken, and preventive measures taken or a schedule for completion of measures to be taken to prevent reoccurrence of similar releases.

8. Upset Noncompliance Notification

If a process "upset" (defined as an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittees) has occurred, the permittees who wishes to establish the affirmative defense of upset, shall notify the Department by telephone within 24 hours of becoming aware of such conditions; and within five (5) days, provide in writing, the following information:

- a. that an upset occurred and that the permittees can identify the specific cause(s) of the upset;
- b. that the permitted wastewater treatment facility was, at the time, being properly operated and maintained (note that an upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation); and
- c. that the permittees has specified and taken action on all responsible steps to minimize or correct any adverse impact in the environment resulting from noncompliance with this permit.

No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

In any enforcement proceedings, the permittees, seeking to establish the occurrence of an upset, has the burden of proof.

9. Bypass Prohibition and Notification

- a. Bypass Prohibition
Bypass is prohibited, and the Department may take an enforcement action, unless:
 - 1) bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
 - 2) there were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass; and
 - 3) the permittees submitted notices as required under 9.b. or 9.c. below.
- b. Notice of Anticipated Bypass
If the permittees know in advance of the need for a bypass, it shall submit prior notice to the Department, if possible at least ten (10) days before the date of the bypass, and provide information about the anticipated bypass as required by the Department. The Department may approve an anticipated bypass, after considering its adverse effects, if it will meet the three (3) conditions listed in 9.a. above.
- c. Notice of Unanticipated Bypass
The permittees shall submit notice to the Department of an unanticipated bypass by calling the Department at the number indicated on the second page of this permit (if the notice is provided after regular working hours, use the following number: 1-800-292-4706) as soon as possible, but no later than 24 hours from the time the permittees becomes aware of the circumstances.

- d. **Written Report of Bypass**
A written submission shall be provided within five (5) working days of commencing any bypass to the Department, and at additional times as directed by the Department. The written submission shall contain a description of the bypass and its cause; the period of bypass, including exact dates and times, and if the bypass has not been corrected, the anticipated time it is expected to continue; steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass; and other information as required by the Department.
- e. **Bypass Not Exceeding Limitations**
The permittees may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to ensure efficient operation. These bypasses are not subject to the provisions of 9.a., 9.b., 9.c., and 9.d., above. This provision does not relieve the permittees of any notification responsibilities under Part II.C.11. of this permit.
- f. **Definitions**
- 1) Bypass means the intentional diversion of waste streams from any portion of a treatment facility.
 - 2) Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

10. Bioaccumulative Chemicals of Concern (BCC)

Consistent with the requirements of R 323.1098 and R 323.1215 of the Michigan Administrative Code, the permittees are prohibited from undertaking any action that would result in a lowering of water quality from an increased loading of a BCC unless an increased use request and antidegradation demonstration have been submitted and approved by the Department.

11. Notification of Changes in Discharge

The permittees shall notify the Department, in writing, as soon as possible but no later than 10 days of knowing, or having reason to believe, that any activity or change has occurred or will occur which would result in the discharge of: 1) detectable levels of chemicals on the current Michigan Critical Materials Register, priority pollutants or hazardous substances set forth in 40 CFR 122.21, Appendix D, or the Pollutants of Initial Focus in the Great Lakes Water Quality Initiative specified in 40 CFR 132.6, Table 6, which were not acknowledged in the application or listed in the application at less than detectable levels; 2) detectable levels of any other chemical not listed in the application or listed at less than detection, for which the application specifically requested information; or 3) any chemical at levels greater than five times the average level reported in the complete application (see the first page of this permit, for the date(s) the complete application was submitted). Any other monitoring results obtained as a requirement of this permit shall be reported in accordance with the compliance schedules.

12. Changes in Facility Operations

Any anticipated action or activity, including but not limited to facility expansion, production increases, or process modification, which will result in new or increased loadings of pollutants to the receiving waters must be reported to the Department by a) submission of an increased use request (application) and all information required under R 323.1098 (Antidegradation) of the Water Quality Standards or b) by notice if the following conditions are met: 1) the action or activity will not result in a change in the types of wastewater discharged or result in a greater quantity of wastewater than currently authorized by this permit; 2) the action or activity will not result in violations of the effluent limitations specified in this permit; 3) the action or activity is not prohibited by the requirements of Part II.C.10.; and 4) the action or activity will not require notification pursuant to Part II.C.11. Following such notice, the permit or, if applicable, the facility's COC may be modified according to applicable laws and rules to specify and limit any pollutant not previously limited.

13. Transfer of Ownership or Control

In the event of any change in control or ownership of facilities from which the authorized discharge emanates, the permittees shall submit to the Department 30 days prior to the actual transfer of ownership or control a written agreement between the current permittees and the new permittees containing: 1) the legal name and address of the new owner; 2) a specific date for the effective transfer of permit responsibility, coverage and liability; and 3) a certification of the continuity of or any changes in operations, wastewater discharge, or wastewater treatment.

If the new permittees are proposing changes in operations, wastewater discharge, or wastewater treatment, the Department may propose modification of this permit in accordance with applicable laws and rules.

14. Operations and Maintenance Manual

For wastewater treatment facilities that serve the public (and are thus subject to Part 41 of the NREPA), Section 4104 of Part 41 and associated Rule 2957 of the Michigan Administrative Code allow the Department to require an Operations and Maintenance (O&M) Manual from the facility. An up-to-date copy of the O&M Manual shall be kept at the facility and shall be provided to the Department upon request. The Department may review the O&M Manual in whole or in part at its discretion and require modifications to it if portions are determined to be inadequate.

At a minimum, the O&M Manual shall include the following information: permit standards; descriptions and operation information for all equipment; staffing information; laboratory requirements; record keeping requirements; a maintenance plan for equipment; an emergency operating plan; safety program information; and copies of all pertinent forms, as-built plans, and manufacturer's manuals.

Certification of the existence and accuracy of the O&M Manual shall be submitted to the Department at least sixty days prior to start-up of a new wastewater treatment facility. Recertification shall be submitted sixty days prior to start-up of any substantial improvements or modifications made to an existing wastewater treatment facility.

15. Signatory Requirements

All applications, reports, or information submitted to the Department in accordance with the conditions of this permit and that require a signature shall be signed and certified as described in the Federal Act and the NREPA.

The Federal Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance, shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

The NREPA (Section 3115(2)) provides that a person who at the time of the violation knew or should have known that he or she discharged a substance contrary to this part, or contrary to a permit, COC, or order issued or rule promulgated under this part, or who intentionally makes a false statement, representation, or certification in an application for or form pertaining to a permit or COC or in a notice or report required by the terms and conditions of an issued permit or COC, or who intentionally renders inaccurate a monitoring device or record required to be maintained by the Department, is guilty of a felony and shall be fined not less than \$2,500.00 or more than \$25,000.00 for each violation. The court may impose an additional fine of not more than \$25,000.00 for each day during which the unlawful discharge occurred. If the conviction is for a violation committed after a first conviction of the person under this subsection, the court shall impose a fine of not less than \$25,000.00 per day and not more than \$50,000.00 per day of violation. Upon conviction, in addition to a fine, the court in its discretion may sentence the defendant to imprisonment for not more than 2 years or impose probation upon a person for a violation of this part. With the exception of the issuance of criminal complaints, issuance of warrants, and the holding of an arraignment, the circuit court for the county in which the violation occurred has exclusive jurisdiction. However, the person shall not be subject to the penalties of this subsection if the discharge of the effluent is in conformance with and obedient to a rule, order, permit, or COC of the Department. In addition to a fine, the attorney general may file a civil suit in a court of competent jurisdiction to recover the full value of the injuries done to the natural resources of the state and the costs of surveillance and enforcement by the state resulting from the violation.

16. Electronic Reporting

Upon notice by the Department that electronic reporting tools are available for specific reports or notifications, the permittees shall submit electronically all such reports or notifications as required by this permit, on forms provided by the Department.

PART II

Section D. Management Responsibilities

1. Duty to Comply

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit, more frequently than, or at a level in excess of, that authorized, shall constitute a violation of the permit.

It is the duty of the permittees to comply with all the terms and conditions of this permit. Any noncompliance with the Effluent Limitations, Special Conditions, or terms of this permit constitutes a violation of the NREPA and/or the Federal Act and constitutes grounds for enforcement action; for permit or Certificate of Coverage (COC) termination, revocation and reissuance, or modification; or denial of an application for permit or COC renewal.

It shall not be a defense for permittees in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

2. Operator Certification

The permittees shall have the waste treatment facilities under direct supervision of an operator certified at the appropriate level for the facility certification by the Department, as required by Sections 3110 and 4104 of the NREPA. Permittees authorized to discharge storm water shall have the storm water treatment and/or control measures under direct supervision of a storm water operator certified by the Department, as required by Section 3110 of the NREPA.

3. Facilities Operation

The permittees shall, at all times, properly operate and maintain all treatment or control facilities or systems installed or used by the permittees to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance includes adequate laboratory controls and appropriate quality assurance procedures.

4. Power Failures

In order to maintain compliance with the effluent limitations of this permit and prevent unauthorized discharges, the permittees shall either:

- a. provide an alternative power source sufficient to operate facilities utilized by the permittees to maintain compliance with the effluent limitations and conditions of this permit; or
- b. upon the reduction, loss, or failure of one or more of the primary sources of power to facilities utilized by the permittees to maintain compliance with the effluent limitations and conditions of this permit, the permittees shall halt, reduce or otherwise control production and/or all discharge in order to maintain compliance with the effluent limitations and conditions of this permit.

5. Adverse Impact

The permittees shall take all reasonable steps to minimize or prevent any adverse impact to the surface waters or groundwaters of the state resulting from noncompliance with any effluent limitation specified in this permit including, but not limited to, such accelerated or additional monitoring as necessary to determine the nature and impact of the discharge in noncompliance.

6. Containment Facilities

The permittees shall provide facilities for containment of any accidental losses of polluting materials in accordance with the requirements of the Part 5 Rules (R 324.2001 through R 324.2009 of the Michigan Administrative Code). For a Publicly Owned Treatment Work (POTW), these facilities shall be approved under Part 41 of the NREPA.

7. Waste Treatment Residues

Residuals (i.e. solids, sludges, biosolids, filter backwash, scrubber water, ash, grit, or other pollutants or wastes) removed from or resulting from treatment or control of wastewaters, including those that are generated during treatment or left over after treatment or control has ceased, shall be disposed of in an environmentally compatible manner and according to applicable laws and rules. These laws may include, but are not limited to, the NREPA, Part 31 for protection of water resources, Part 55 for air pollution control, Part 111 for hazardous waste management, Part 115 for solid waste management, Part 121 for liquid industrial wastes, Part 301 for protection of inland lakes and streams, and Part 303 for wetlands protection. Such disposal shall not result in any unlawful pollution of the air, surface waters or groundwaters of the state.

8. Right of Entry

The permittees shall allow the Department, any agent appointed by the Department, or the Regional Administrator, upon the presentation of credentials and, for animal feeding operation facilities, following appropriate biosecurity protocols:

- a. to enter upon the permittee's premises where an effluent source is located or any place in which records are required to be kept under the terms and conditions of this permit; and
- b. at reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect process facilities, treatment works, monitoring methods and equipment regulated or required under this permit; and to sample any discharge of pollutants.

9. Availability of Reports

Except for data determined to be confidential under Section 308 of the Federal Act and Rule 2128 (R 323.2128 of the Michigan Administrative Code), all reports prepared in accordance with the terms of this permit, shall be available for public inspection at the offices of the Department and the Regional Administrator. As required by the Federal Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Federal Act and Sections 3112, 3115, 4106 and 4110 of the NREPA.

10. Duty to Provide Information

The permittees shall furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or the facility's COC, or to determine compliance with this permit. The permittees shall also furnish to the Department, upon request, copies of records required to be kept by this permit.

Where the permittees become aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information.

PART II

Section E. Activities Not Authorized by This Permit

1. Discharge to the Groundwaters

This permit does not authorize any discharge to the groundwaters. Such discharge may be authorized by a groundwater discharge permit issued pursuant to the NREPA.

2. POTW Construction

This permit does not authorize or approve the construction or modification of any physical structures or facilities at a POTW. Approval for the construction or modification of any physical structures or facilities at a POTW shall be by permit issued under Part 41 of the NREPA.

3. Civil and Criminal Liability

Except as provided in permit conditions on "Bypass" (Part II.C.9. pursuant to 40 CFR 122.41(m)), nothing in this permit shall be construed to relieve the permittees from civil or criminal penalties for noncompliance, whether or not such noncompliance is due to factors beyond the permittee's control, such as accidents, equipment breakdowns, or labor disputes.

4. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittees from any responsibilities, liabilities, or penalties to which the permittees may be subject under Section 311 of the Federal Act except as are exempted by federal regulations.

5. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittees from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 510 of the Federal Act.

6. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other Department of Environment, Great Lakes, and Energy permits, or approvals from other units of government as may be required by law.

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Appendix C: CSO Frequency and Volume

Annual Discharge Frequency and Volume (2018 - 2022)

Outfalls B063, B064, B067,
B069, and B070

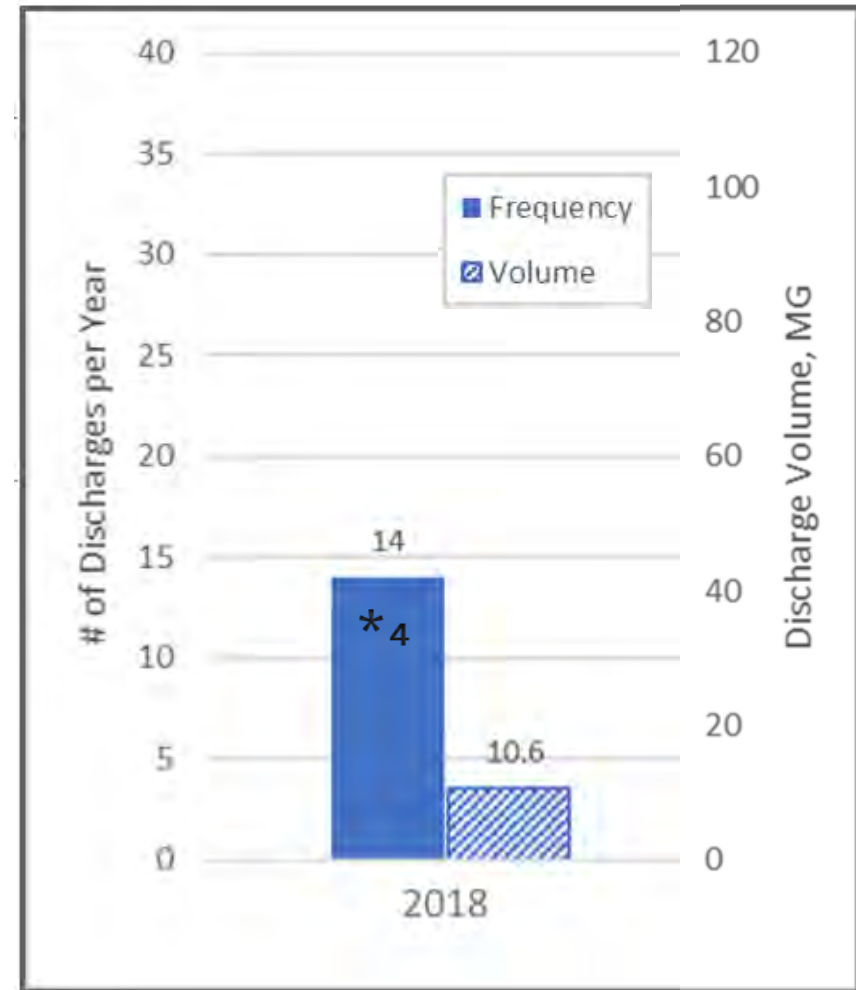
Date: February 6, 2023



Annual CSO Discharge Frequency and Volume - Example

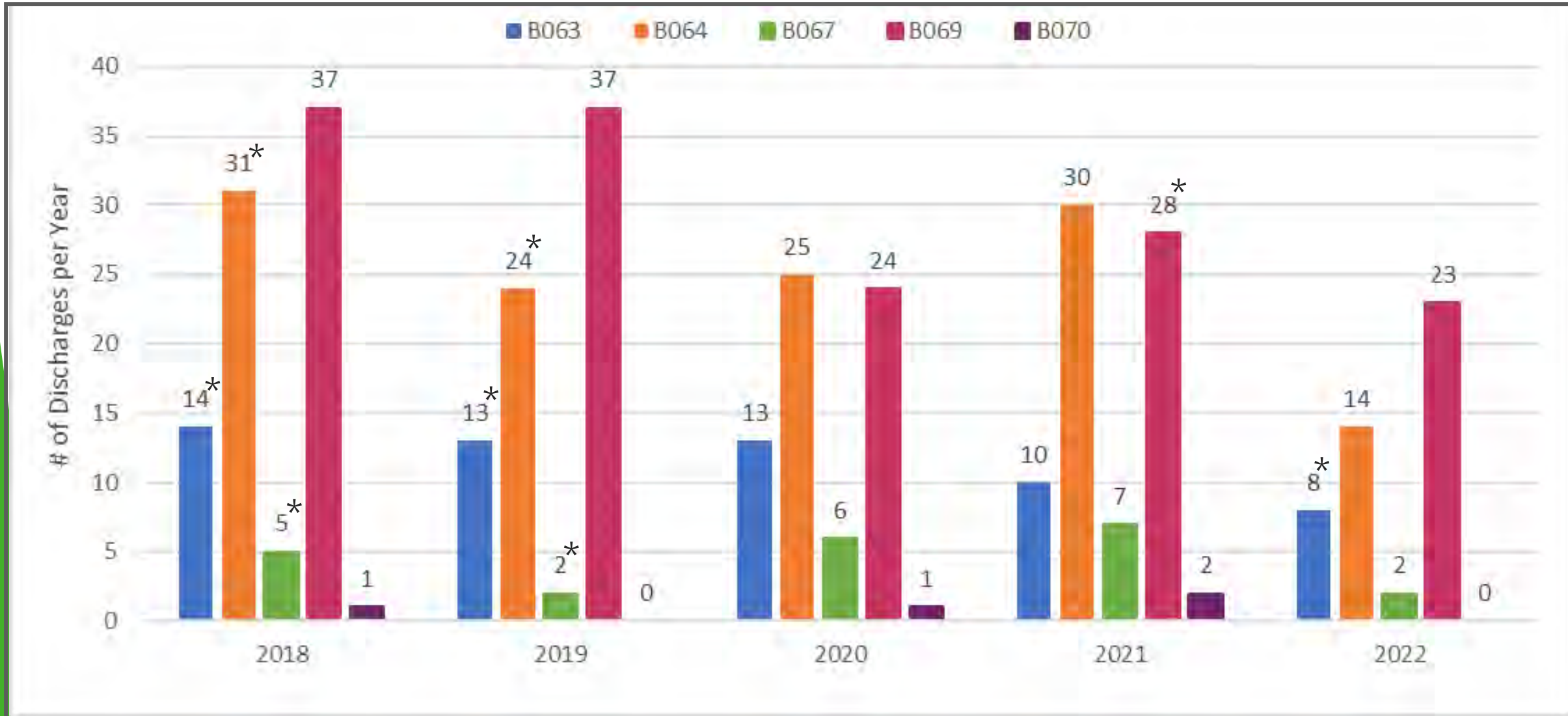
This Example Chart is provided to assist in properly interpreting the CSO discharge data

- There were a total of 14 reported Discharge Events in 2018
- 4 of those 14 Events had instrument errors for which a discharge volume could not be calculated
- The 10.6 MG of reported CSO discharge reflects 10 of the total 14 reported Discharge Events



Annual Discharge Frequency for 2018 -2022

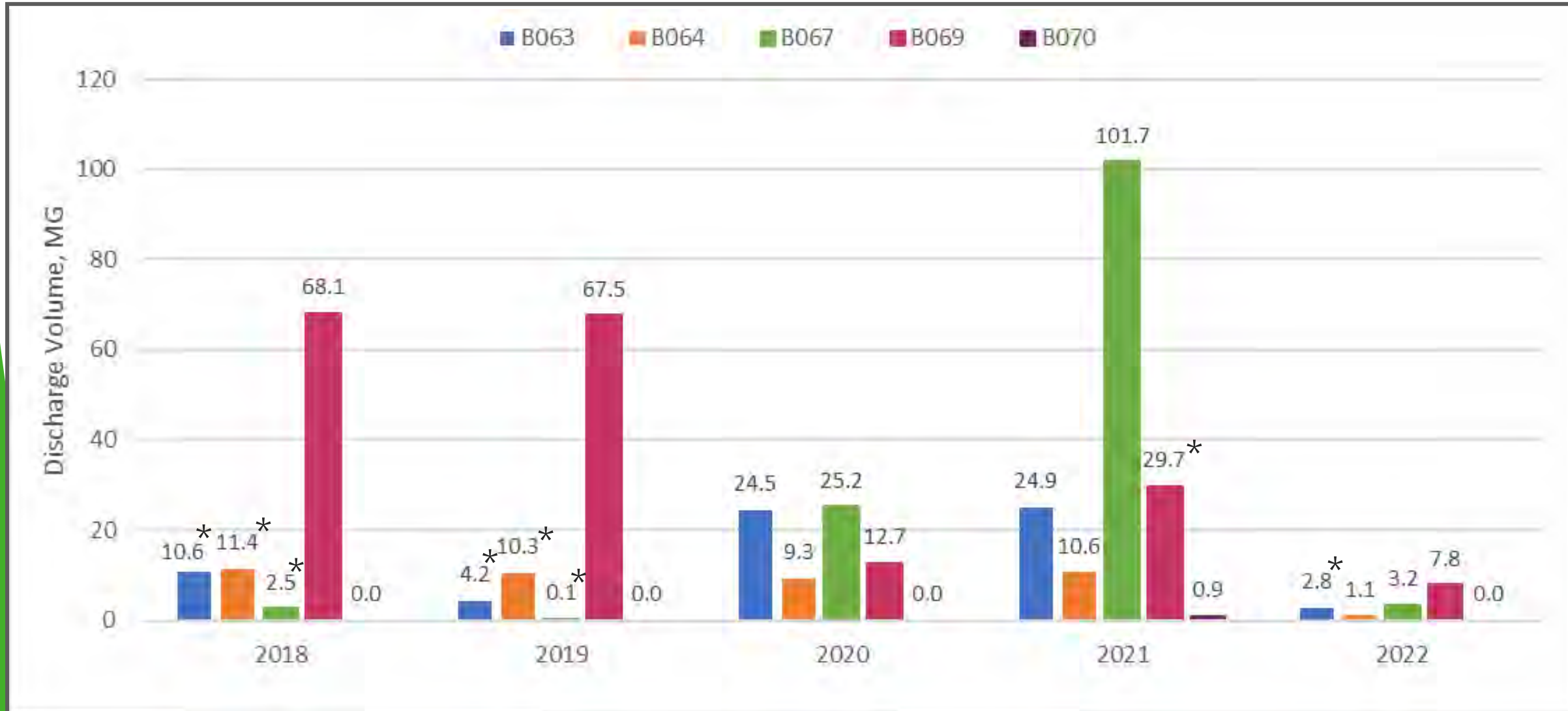
B063, B064, B067, B069, B070



*Count includes discharges with instrumentation error

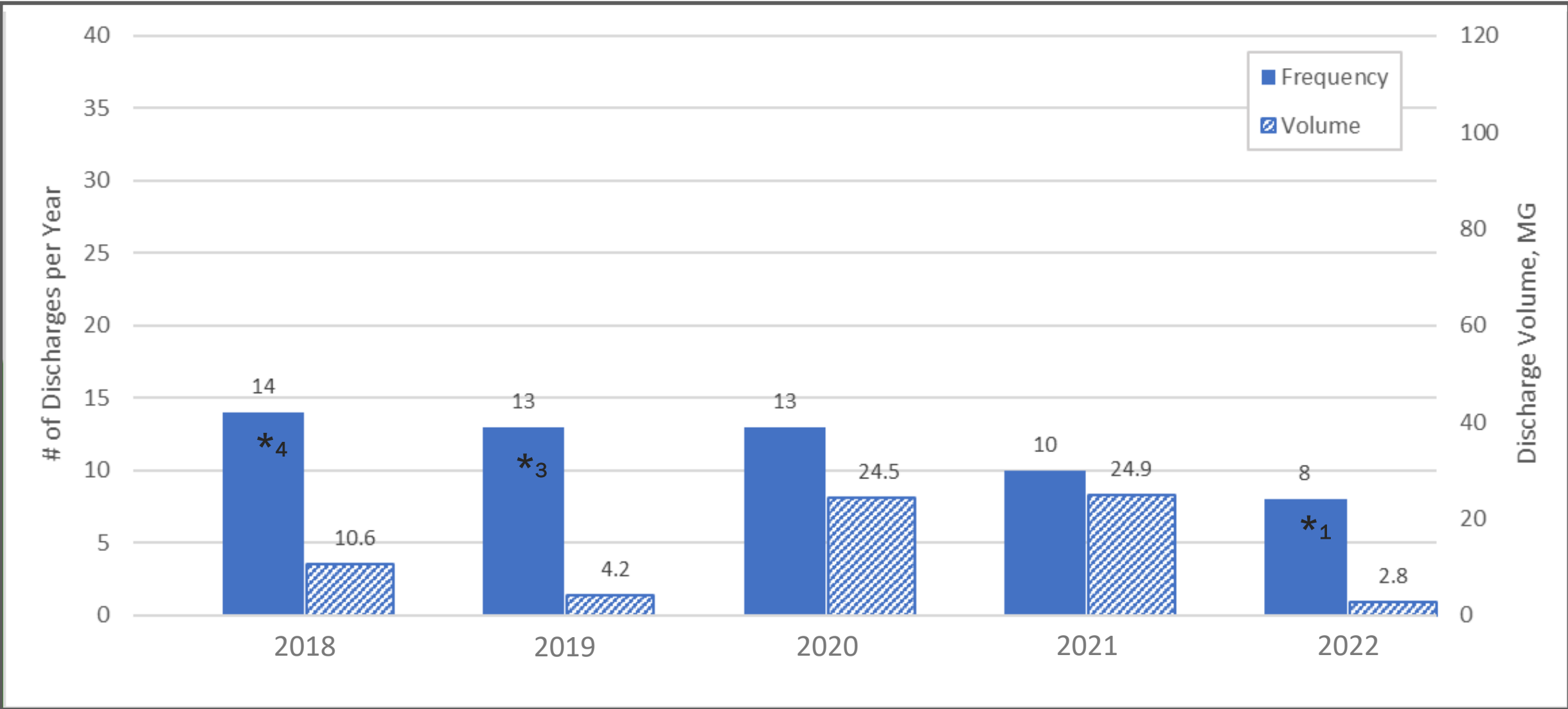
Annual Discharge Volume for 2018 -2022

B063, B064, B067, B069, B070



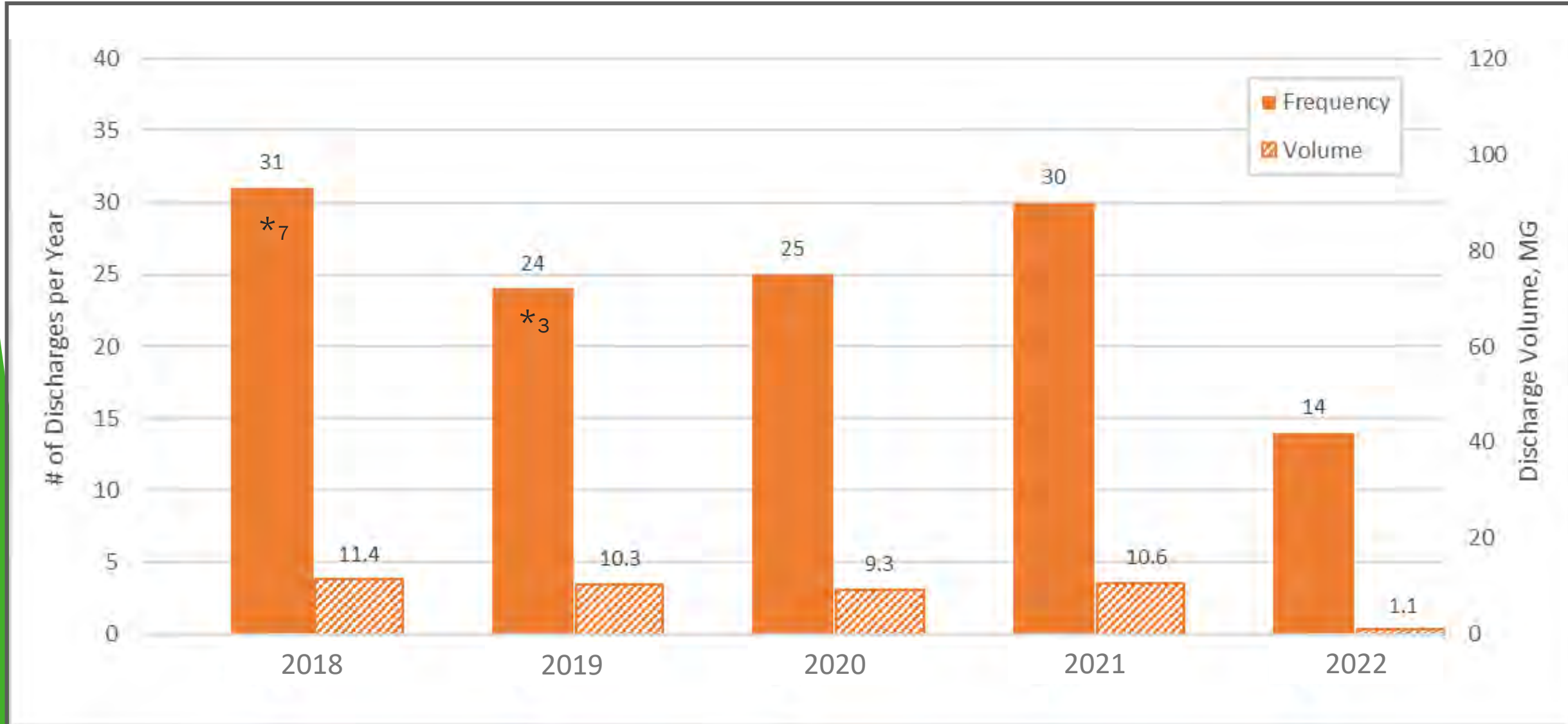
*Instrumentation error: volume is not recorded for discharges with instrumentation error

B063: CSO Discharge Frequency and Volume 2018 - 2022



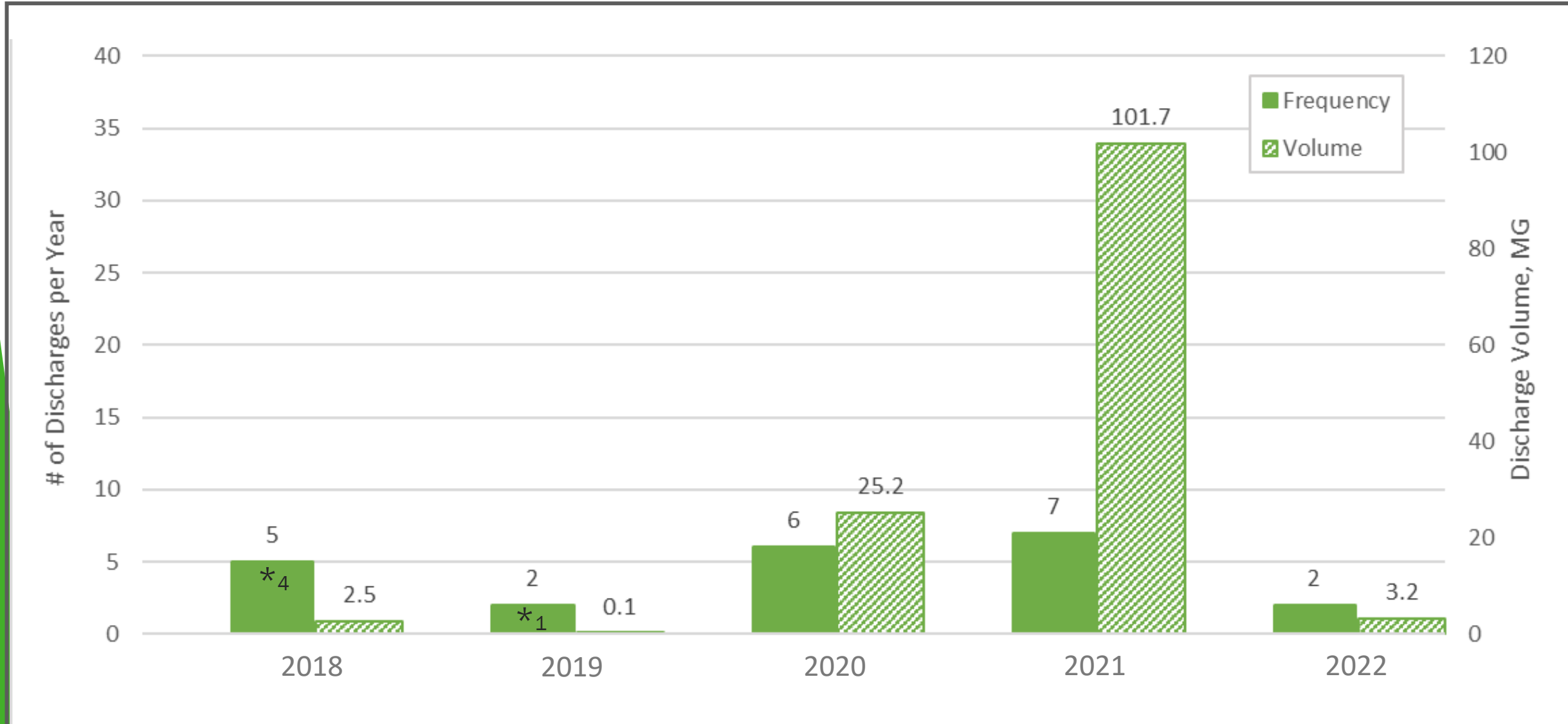
*Count includes discharges with instrumentation error. Discharge volume is not recorded for discharges with instrumentation error.

B064: CSO Discharge Frequency and Volume 2018 - 2022



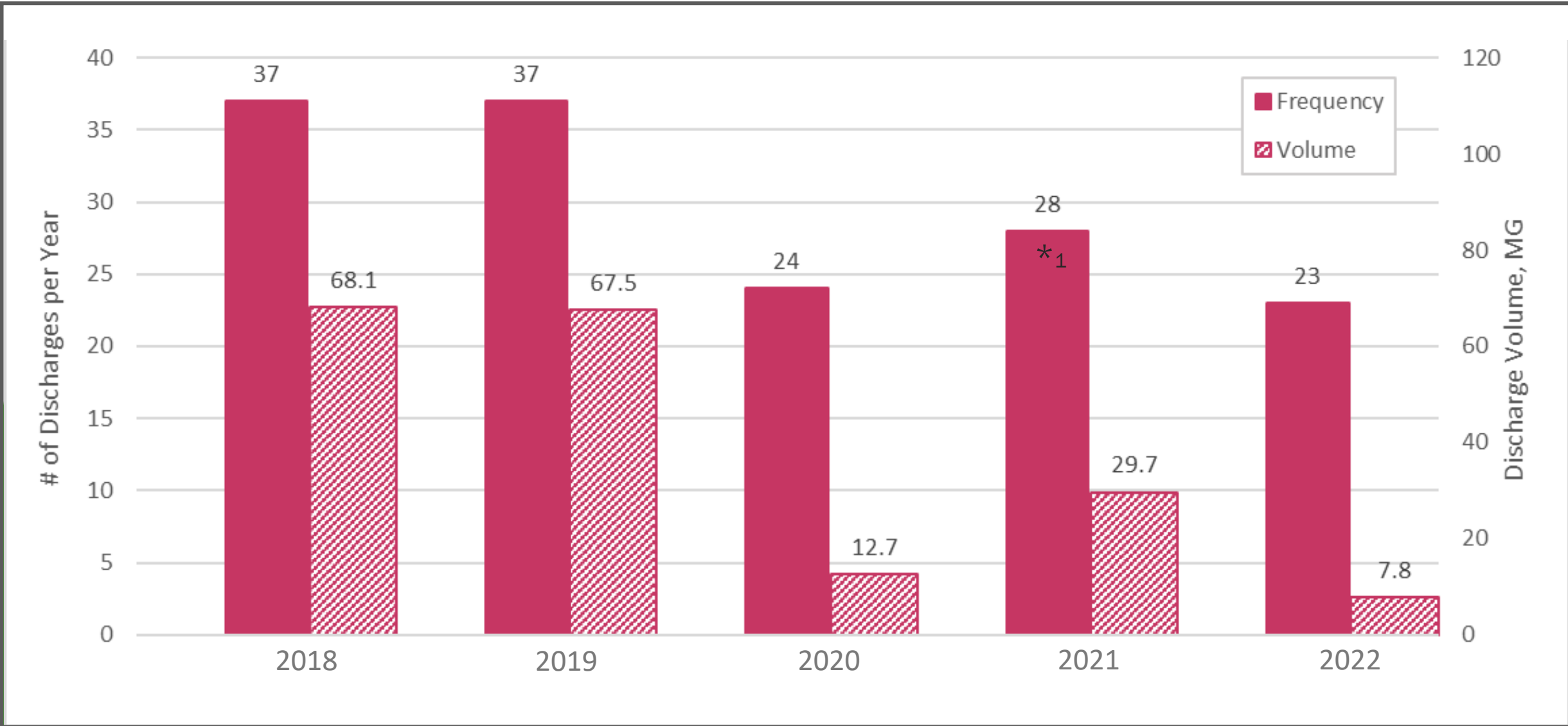
*Count includes discharges with instrumentation error. Discharge volume is not recorded for discharges with instrumentation error.

B067: CSO Discharge Frequency and Volume 2018 - 2022



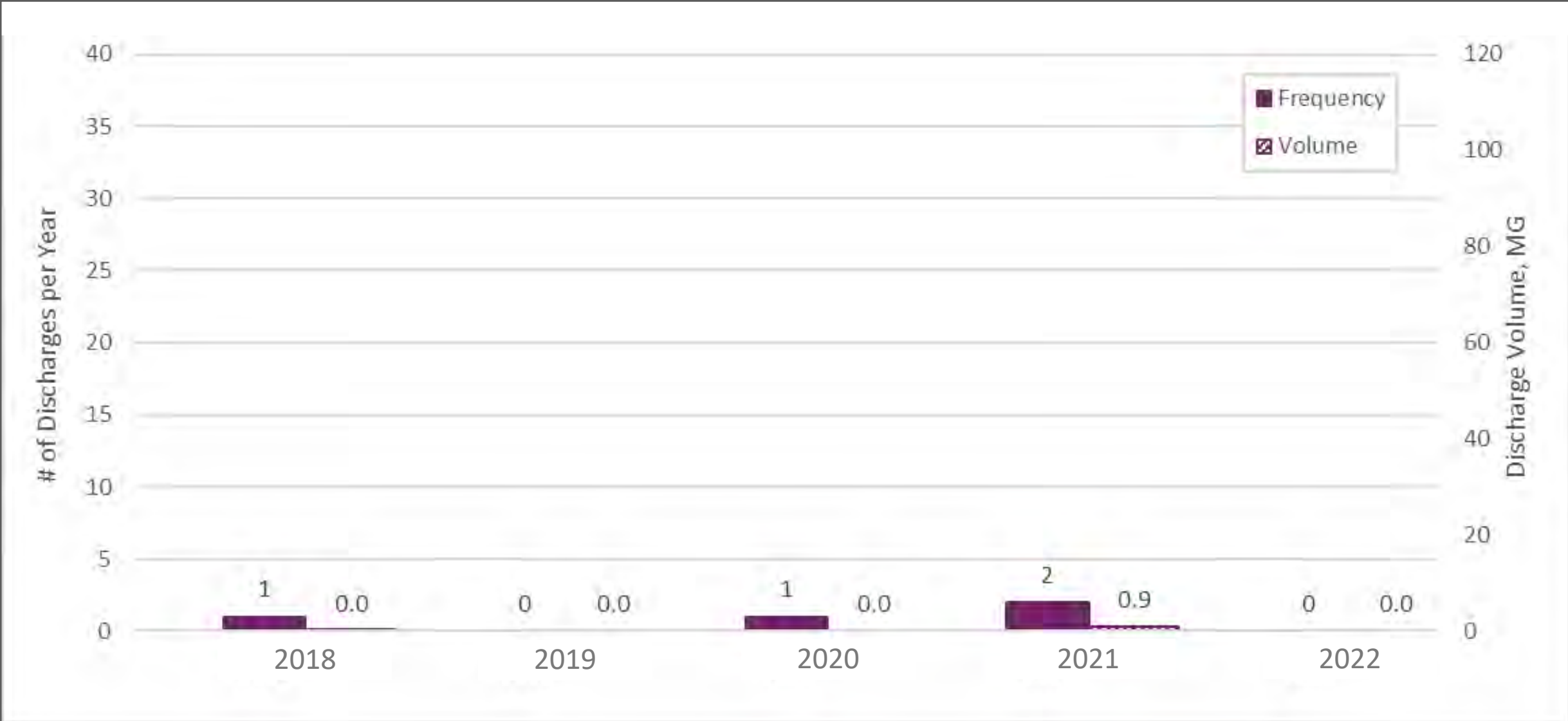
*Count includes discharges with instrumentation error. Discharge volume is not recorded for discharges with instrumentation error.

B069: CSO Discharge Frequency and Volume 2018 - 2022



*Count includes discharges with instrumentation error. Discharge volume is not recorded for discharges with instrumentation error.

B070: CSO Discharge Frequency and Volume 2018 - 2022



Questions?

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Appendix D: Preliminary Cost Estimates

ENGINEER'S OPINION OF PROBABLE COST



Project: West Chicago - Alternative 1 B063 (South Area)
 JN: 0051-19-0011
 Phase: Preliminary (5% Design)
 Estimator: AMB
 Checked PMD
 Date: 2/21/2023

Assumptions:

- 1 Unit pricing based on PC808 as-bid costs.
- 2 Restoration includes removal and replacement of streets and adjoining sidewalks and turf grass areas.
- 3 Stormwater detention assumes supplemental underground volume to attenuate peak flows.
- 4 Inlet pricing includes catch basin, covers and 12" storm sewer lateral connections to manholes
- 5 Outfall stabilization assumes riprap and minor channel stabilization within the Ashcroft/Sherwood Drain.

Item	Description	Quantity	Unit	Unit Price	Total Price
1	Mobilization	1	LS	\$ 750,000.00	\$ 750,000.00
2	Soil Erosion and Sedimentation Control	1	LS	\$ 70,000.00	\$ 70,000.00
3	Maintenance of Traffic	1	LS	\$ 140,000.00	\$ 140,000.00
4	Materials Testing Allowance	1	LS	\$ 100,000.00	\$ 100,000.00
5	Storm Sewer (12") with Restoration	24	ft	\$ 525.00	\$ 12,600.00
6	Storm Sewer (24") with Restoration	2312	ft	\$ 675.00	\$ 1,560,600.00
7	Storm Sewer (36") with Restoration	1,036	ft	\$ 800.00	\$ 828,800.00
8	Storm Sewer (42") with Restoration	877	ft	\$ 875.00	\$ 767,375.00
9	Storm Sewer (48") with Restoration	1,549	ft	\$ 1,050.00	\$ 1,626,450.00
10	Storm Sewer (54") with Restoration	236	ft	\$ 1,200.00	\$ 283,200.00
11	Storm Sewer (60") with Restoration	2,950	ft	\$ 1,500.00	\$ 4,425,000.00
13	Manholes	40	each	\$ 12,000.00	\$ 480,000.00
14	Weir Structures	1	each	\$ 20,000.00	\$ 20,000.00
15	Inlets	72	each	\$ 4,000.00	\$ 288,000.00
16	Stormwater Detention	120,000	cft	\$ 12.00	\$ 1,440,000.00
17	Clearing and grubbing	1	lsum	\$ 25,000.00	\$ 25,000.00
18	Outfall Structure	1	each	\$ 25,000.00	\$ 25,000.00
19	Utility Relocation	10	each	\$ 15,000.00	\$ 150,000.00
20	Water Quality Unit	5	each	\$ 40,000.00	\$ 200,000.00
21	Intersection Green Infrastructure	5	each	\$ 50,000.00	\$ 250,000.00
22	Outfall Stabilizaiton	1	each	\$ 200,000.00	\$ 200,000.00
CONSTRUCTION SUBTOTAL					\$ 13,642,000.00
Contingency (20%)					\$ 2,730,000.00
Engineering & Legal (20%)					\$ 2,728,400.00
TOTAL					\$ 19,100,400.00

ENGINEER'S OPINION OF PROBABLE COST



www.ohm-advisors.com
11145 Griswold, Suite 20
Detroit, MI 48226

Project: West Chicago - Alternative 1 B064 (North Area)
 JN: 0051-19-0011
 Phase: Preliminary (5% Design)
 Estimator: AMB
 Checked PMD
 Date: 2/21/2023

Assumptions:

- 1 Unit pricing based on PC808 as-bid costs.
- 2 Restoration includes removal and replacement of streets and adjoining sidewalks and turf grass areas.
- 3 Stormwater detention assumes supplemental underground volume to attenuate peak flows.
- 4 Inlet pricing includes catch basin, covers and 12" storm sewer lateral connections to manholes
- 5 The existing CSO at Plymouth Road will be repurposed as a stormwater outfall. The junction chamber upstream will be modified.
- 6 Sanitary Sewer Construction includes construction of manholes and connections at Plymouth Road and West Chicago.

Item	Description	Quantity	Unit	Unit Price	Total Price
1	Mobilization	1	LS	\$ 500,000.00	\$ 500,000.00
2	Soil Erosion and Sedimentation Control	1	LS	\$ 70,000.00	\$ 70,000.00
3	Maintenance of Traffic	1	LS	\$ 140,000.00	\$ 140,000.00
4	Materials Testing Allowance	1	LS	\$ 100,000.00	\$ 100,000.00
5	Storm Sewer (12") with Restoration	185	ft	\$ 525.00	\$ 97,125.00
6	Storm Sewer (24") with Restoration	1,017	ft	\$ 675.00	\$ 686,475.00
7	Storm Sewer (36") with Restoration	1,013	ft	\$ 800.00	\$ 810,400.00
8	Storm Sewer (48") with Restoration	2,771	ft	\$ 1,050.00	\$ 2,909,550.00
9	Storm Sewer (60") with Restoration	1,744	ft	\$ 1,500.00	\$ 2,616,000.00
12	Sanitary Sewer (24") with Restoration	2,400	ft	\$ 850.00	\$ 2,040,000.00
10	Manholes	27	each	\$ 12,000.00	\$ 324,000.00
11	Weir Structures	1	each	\$ 20,000.00	\$ 20,000.00
12	Inlets	48	each	\$ 4,000.00	\$ 192,000.00
13	Stormwater Detention	98,000	cft	\$ 12.00	\$ 1,176,000.00
14	Clearing and grubbing	1	lsum	\$ 25,000.00	\$ 25,000.00
15	Outfall Modifications and Combined Sewer Rerouting	1	each	\$ 25,000.00	\$ 25,000.00
16	Utility Relocation	5	each	\$ 5,000.00	\$ 25,000.00
17	Water Quality Unit	3	each	\$ 40,000.00	\$ 120,000.00
18	Green Infrastructure	5	each	\$ 50,000.00	\$ 250,000.00
CONSTRUCTION SUBTOTAL					\$ 12,127,000.00
Contingency (20%)					\$ 2,430,000.00
Engineering & Legal (20%)					\$ 2,425,400.00
TOTAL					\$ 16,982,400.00

ENGINEER'S OPINION OF PROBABLE COST



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Project: Schoolcraft - Alternative 1 B069 (South Area)
 JN: 0051-19-0011
 Phase: Preliminary (5% Design)
 Estimator: AMB
 Checked PMD
 Date: 2/21/2023

Assumptions:

- 1 Unit pricing based on PC808 as-bid costs.
- 2 Restoration includes removal and replacement of streets and adjoining sidewalks and turf grass areas.
- 3 Stormwater detention assumes supplemental underground volume to attenuate peak flows.
- 4 Inlet pricing includes catch basin, covers and 12" storm sewer lateral connections to manholes
- 5 Sanitary Sewer Construction includes installation of manholes and lateral connections.

Item	Description	Quantity	Unit	Unit Price	Total Price
1	Mobilization	1	LS	\$ 750,000.00	\$ 750,000.00
2	Soil Erosion and Sedimentation Control	1	LS	\$ 70,000.00	\$ 70,000.00
3	Maintenance of Traffic	1	LS	\$ 11,000.00	\$ 11,000.00
4	Materials Testing Allowance	1	LS	\$ 100,000.00	\$ 100,000.00
5	Storm Sewer (24") with Restoration	4,929	ft	\$ 675.00	\$ 3,327,075.00
6	Storm Sewer (30") with Restoration	559	ft	\$ 750.00	\$ 419,250.00
7	Storm Sewer (36") with Restoration	667	ft	\$ 800.00	\$ 533,600.00
8	Storm Sewer (48") with Restoration	141	ft	\$ 1,050.00	\$ 148,050.00
9	Storm Sewer (54") with Restoration	2,403	ft	\$ 1,200.00	\$ 2,883,600.00
10	Storm Sewer (60") with Restoration	773	ft	\$ 1,500.00	\$ 1,159,500.00
11	Storm Sewer (66") with Restoration	938	ft	\$ 1,600.00	\$ 1,500,800.00
12	Sanitary Sewer (12") with Restoration	1,400	ft	\$ 750.00	\$ 1,050,000.00
13	Manholes	45	each	\$ 12,000.00	\$ 540,000.00
14	Weir Structures	1	each	\$ 15,000.00	\$ 15,000.00
15	Inlets	83	each	\$ 4,000.00	\$ 332,000.00
16	Stormwater Detention	120,000	cft	\$ 12.00	\$ 1,440,000.00
17	Clearing and grubbing	1	lsum	\$ 50,000.00	\$ 50,000.00
18	Outfall Structures	1	each	\$ 15,000.00	\$ 15,000.00
19	Utility Relocation	10	each	\$ 5,000.00	\$ 50,000.00
20	Water Main Relocation	1500	ft	\$ 400.00	\$ 600,000.00
21	Water Quality Unit	5	each	\$ 40,000.00	\$ 200,000.00
22	Intersection GSI	10	each	\$ 50,000.00	\$ 500,000.00
CONSTRUCTION SUBTOTAL					\$ 15,695,000.00
Contingency (20%)					\$ 3,140,000.00
Engineering & Legal (20%)					\$ 3,139,000.00
TOTAL					\$ 21,974,000.00

ENGINEER'S OPINION OF PROBABLE COST



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 Detroit, MI 48226

Project: Schoolcraft - Alternative 1 B070 (North Area)
 JN: 0051-19-0011
 Phase: Preliminary (5% Design)
 Estimator: AMB
 Checked PMD
 Date: 2/21/2023

Assumptions:

- 1 Unit pricing based on PC808 as-bid costs.
- 2 Restoration includes removal and replacement of streets and adjoining sidewalks and turf grass areas.
- 3 Stormwater detention assumes supplemental underground volume to attenuate peak flows.
- 4 Inlet pricing includes catch basin, covers and 12" storm sewer lateral connections to manholes
- 5 Parking lot catch basins within apartment complex will be redirected to storm sewers.

Item	Description	Quantity	Unit	Unit Price	Total Price
1	Mobilization	1	LS	\$ 500,000.00	\$ 500,000.00
2	Soil Erosion and Sedimentation Control	1	LS	\$ 70,000.00	\$ 70,000.00
3	Maintenance of Traffic	1	LS	\$ 140,000.00	\$ 140,000.00
4	Materials Testing Allowance	1	LS	\$ 100,000.00	\$ 100,000.00
5	Storm Sewer (24") with Restoration	9,083	ft	\$ 675.00	\$ 6,131,025.00
6	Storm Sewer (30") with Restoration	1,950	ft	\$ 750.00	\$ 1,462,500.00
7	Storm Sewer (36") with Restoration	3,090	ft	\$ 800.00	\$ 2,472,000.00
8	Storm Sewer (66") with Restoration	420	ft	\$ 1,600.00	\$ 672,000.00
9	Manholes	45	ea	\$ 12,000.00	\$ 540,000.00
10	Inlets	98	ea	\$ 4,000.00	\$ 392,000.00
11	Stormwater Detention	120,000	cft	\$ 12.00	\$ 1,440,000.00
12	Clearing and grubbing	1	LS	\$ 25,000.00	\$ 25,000.00
13	Outfall Structures	1	Ea	\$ 15,000.00	\$ 15,000.00
14	Utility Relocation	2	Ea	\$ 10,000.00	\$ 20,000.00
15	Water Main Relocation	3	Ea	\$ 15,000.00	\$ 45,000.00
16	Water Quality Unit	5	Ea	\$ 40,000.00	\$ 200,000.00
17	Intersection GSI	4	ea	\$ 50,000.00	\$ 200,000.00
CONSTRUCTION SUBTOTAL					\$ 14,425,000.00
Contingency (20%)					\$ 2,890,000.00
Engineering & Legal (20%)					\$ 2,885,000.00
TOTAL					\$ 20,200,000.00

ENGINEER'S OPINION OF PROBABLE COST



Project: West Chicago - Alternative 2 Total
 JN: 0051-19-0011
 Phase: Preliminary (5% Design)
 Estimator: AMB
 Checked: PMD
 Date: 2/21/2023

Assumptions:

- 1 Unit pricing based on PC808 as-bid costs.
- 2 Restoration includes removal and replacement of streets and adjoining sidewalks and turf grass areas.
- 3 Stormwater detention assumes supplemental underground volume to attenuate peak flows.
- 4 Inlet pricing includes catch basin, covers and 12" storm sewer lateral connections to manholes
- 5 Outfall stabilization assumes riprap and minor channel stabilization within the Open Ditch in Park

Item	Description	Quantity	Unit	Unit Price	Total Price
1	Mobilization	1	LS	\$ 1,250,000.00	\$ 1,250,000.00
2	Soil Erosion and Seidmentation Control	1	LS	\$ 140,000.00	\$ 140,000.00
3	Maintenance of Traffic	1	LS	\$ 280,000.00	\$ 280,000.00
4	Materials Testing Allowance	1	LS	\$ 200,000.00	\$ 200,000.00
5	Storm Sewer (12") with Restoration	239	ft	\$ 525.00	\$ 125,475.00
6	Storm Sewer (24") with Restoration	3,236	ft	\$ 675.00	\$ 2,184,300.00
7	Storm Sewer (36") with Restoration	1,919	ft	\$ 800.00	\$ 1,535,200.00
8	Storm Sewer (42") with Restoration	1,598	ft	\$ 875.00	\$ 1,398,250.00
9	Storm Sewer (48") with Restoration	2,401	ft	\$ 1,050.00	\$ 2,521,050.00
10	Storm Sewer (54") with Restoration	1,375	ft	\$ 1,200.00	\$ 1,650,000.00
11	Storm Sewer (60") with Restoration	3,374	ft	\$ 1,500.00	\$ 5,061,000.00
12	Storm Sewer (66") with Restoration	870	ft	\$ 1,600.00	\$ 1,392,000.00
13	Storm Sewer (72") with Restoration	780	ft	\$ 1,800.00	\$ 1,404,000.00
14	Sanitary Sewer (24") with Restoration	2,400	ft	\$ 825.00	\$ 1,980,000.00
15	Manholes	60	each	\$ 12,000.00	\$ 720,000.00
16	Weir Structures	1	each	\$ 20,000.00	\$ 20,000.00
17	Inlets	115	each	\$ 4,000.00	\$ 460,000.00
18	Detention Basin	230,000	cft	\$ 12.00	\$ 2,760,000.00
19	Clearing and grubbing	1	lsum	\$ 50,000.00	\$ 50,000.00
20	Outfall Structures	1	each	\$ 25,000.00	\$ 25,000.00
21	Utility Relocation	12	each	\$ 15,000.00	\$ 180,000.00
22	Water Quality Unit	8	each	\$ 40,000.00	\$ 320,000.00
23	Green Infrastructure	10	each	\$ 50,000.00	\$ 500,000.00

CONSTRUCTION SUBTOTAL	\$ 26,156,000.00
Contingency (20%)	\$ 5,230,000.00
Engineering & Legal (20%)	\$ 5,230,000.00
TOTAL	\$ 36,616,000.00

ENGINEER'S OPINION OF PROBABLE COST



Project: West Chicago - Alternative 2 B063 (South Area)
 JN: 0051-19-0011
 Phase: Preliminary (5% Design)
 Estimator: AMB
 Checked: PMD
 Date: 2/21/2023

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 Detroit, MI 48226

Assumptions:

- 1 Unit pricing based on PC808 as-bid costs.
- 2 Restoration includes removal and replacement of streets and adjoining sidewalks and turf grass areas.
- 3 Stormwater detention assumes supplemental underground volume to attenuate peak flows.
- 4 Inlet pricing includes catch basin, covers and 12" storm sewer lateral connections to manholes
- 5 Outfall stabilization assumes riprap and minor channel stabilization within the Open Ditch in Park

6 60% of Alternative 2 Total Cost

Item	Description	Quantity	Unit	Unit Price	Total Price
1	Mobilization	1	LS	\$ 625,000.00	\$ 625,000.00
2	Soil Erosion and Seidmentation Control	1	LS	\$ 70,000.00	\$ 70,000.00
3	Maintenance of Traffic	1	LS	\$ 140,000.00	\$ 140,000.00
4	Materials Testing Allowance	1	LS	\$ 100,000.00	\$ 100,000.00
5	Storm Sewer (12") with Restoration	143	ft	\$ 525.00	\$ 75,285.00
6	Storm Sewer (24") with Restoration	1,942	ft	\$ 675.00	\$ 1,310,580.00
7	Storm Sewer (36") with Restoration	1,151	ft	\$ 800.00	\$ 921,120.00
8	Storm Sewer (42") with Restoration	959	ft	\$ 875.00	\$ 838,950.00
9	Storm Sewer (48") with Restoration	1,441	ft	\$ 1,050.00	\$ 1,512,630.00
10	Storm Sewer (54") with Restoration	825	ft	\$ 1,200.00	\$ 990,000.00
11	Storm Sewer (60") with Restoration	2,024	ft	\$ 1,500.00	\$ 3,036,600.00
12	Storm Sewer (66") with Restoration	522	ft	\$ 1,600.00	\$ 835,200.00
13	Storm Sewer (72") with Restoration	468	ft	\$ 1,800.00	\$ 842,400.00
14	Sanitary Sewer (24") with Restoration	2,400	ft	\$ 825.00	\$ 1,980,000.00
15	Manholes	36	each	\$ 12,000.00	\$ 432,000.00
16	Weir Structures	1	each	\$ 20,000.00	\$ 20,000.00
17	Inlets	69	each	\$ 4,000.00	\$ 276,000.00
18	Detention Basin	138,000	lsum	\$ 12.00	\$ 1,656,000.00
19	Clearing and grubbing	1	each	\$ 50,000.00	\$ 30,000.00
20	Outfall Structures	1	each	\$ 25,000.00	\$ 25,000.00
21	Utility Relocation	7	each	\$ 15,000.00	\$ 108,000.00
22	Water Quality Unit	5	each	\$ 40,000.00	\$ 192,000.00
23	Green Infrastructure	6	each	\$ 50,000.00	\$ 300,000.00

CONSTRUCTION SUBTOTAL	\$ 16,317,000.00
Contingency (20%)	\$ 3,260,000.00
Engineering & Legal (20%)	\$ 3,260,000.00
TOTAL	\$ 22,837,000.00

ENGINEER'S OPINION OF PROBABLE COST



Project: West Chicago - Alternative 2 B064 (North Area)
 JN: 0051-19-0011
 Phase: Preliminary (5% Design)
 Estimator: AMB
 Checked PMD
 Date: 2/21/2023

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 Detroit, MI 48226

Assumptions:

- 1 Unit pricing based on PC808 as-bid costs.
- 2 Restoration includes removal and replacement of streets and adjoining sidewalks and turf grass areas.
- 3 Stormwater detention assumes supplemental underground volume to attenuate peak flows.
- 4 Inlet pricing includes catch basin, covers and 12" storm sewer lateral connections to manholes
- 5 Outfall stabilization assumes riprap and minor channel stabilization within the Open Ditch in Park
- 6 40% of Alternative 2 Total Cost

Item	Description	Quantity	Unit	Unit Price	Total Price
1	Mobilization	1	LS	\$ 625,000.00	\$ 625,000.00
2	Soil Erosion and Seidmentation Control	1	LS	\$ 70,000.00	\$ 70,000.00
3	Maintenance of Traffic	1	LS	\$ 140,000.00	\$ 140,000.00
4	Materials Testing Allowance	1	LS	\$ 100,000.00	\$ 100,000.00
5	Storm Sewer (12") with Restoration	96	ft	\$ 525.00	\$ 50,190.00
6	Storm Sewer (24") with Restoration	1,294	ft	\$ 675.00	\$ 873,720.00
7	Storm Sewer (36") with Restoration	768	ft	\$ 800.00	\$ 614,080.00
8	Storm Sewer (42") with Restoration	639	ft	\$ 875.00	\$ 559,300.00
9	Storm Sewer (48") with Restoration	960	ft	\$ 1,050.00	\$ 1,008,420.00
10	Storm Sewer (54") with Restoration	550	ft	\$ 1,200.00	\$ 660,000.00
11	Storm Sewer (60") with Restoration	1,350	ft	\$ 1,500.00	\$ 2,024,400.00
12	Storm Sewer (66") with Restoration	348	ft	\$ 1,600.00	\$ 556,800.00
13	Storm Sewer (72") with Restoration	312	ft	\$ 1,800.00	\$ 561,600.00
14	Sanitary Sewer (24") with Restoration	0	ft	\$ 825.00	\$ -
15	Manholes	24	each	\$ 12,000.00	\$ 288,000.00
16	Inlets	46	each	\$ 4,000.00	\$ 184,000.00
17	Detention Basin	92,000	cft	\$ 12.00	\$ 1,104,000.00
18	Clearing and grubbing	0.4	each	\$ 50,000.00	\$ 20,000.00
19	Outfall Structures	0	each	\$ 25,000.00	\$ -
20	Utility Relocation	5	each	\$ 15,000.00	\$ 72,000.00
21	Water Quality Unit	3	each	\$ 40,000.00	\$ 128,000.00
22	Green Infrastructure	4	each	\$ 50,000.00	\$ 200,000.00

CONSTRUCTION SUBTOTAL	\$ 9,840,000.00
Contingency (20%)	\$ 1,970,000.00
Engineering & Legal (20%)	\$ 1,970,000.00
TOTAL	\$ 13,780,000.00

ENGINEER'S OPINION OF PROBABLE COST



Project: Schoolcraft - Alternative 2 B069 (South Area)
 JN: 0051-19-0011
 Phase: Preliminary (5% Design)
 Estimator: AMB
 Checked PMD
 Date: 2/21/2023

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Assumptions:

- 1 Unit pricing based on PC808 as-bid costs.
- 2 Restoration includes removal and replacement of streets and adjoining sidewalks and turf grass areas.
- 3 Stormwater detention assumes supplemental underground volume to attenuate peak flows.
- 4 Inlet pricing includes catch basin, covers and 12" storm sewer lateral connections to manholes
- 5 Sanitary Sewer Construction includes installation of manholes and lateral connections.

Item	Description	Quantity	Unit	Unit Price	Total Price
1	Mobilization	1	LS	\$ 750,000.00	\$ 750,000.00
2	Soil Erosion and Sedimentation Control	1	LS	\$ 70,000.00	\$ 70,000.00
3	Maintenance of Traffic	1	LS	\$ 11,000.00	\$ 11,000.00
4	Materials Testing Allowance	1	LS	\$ 100,000.00	\$ 100,000.00
5	Storm Sewer (24") with Restoration	4,313	ft	\$ 675.00	\$ 2,911,275.00
6	Storm Sewer (30") with Restoration	658	ft	\$ 750.00	\$ 493,500.00
7	Storm Sewer (36") with Restoration	2,359	ft	\$ 800.00	\$ 1,887,200.00
8	Storm Sewer (42") with Restoration	4,724	ft	\$ 875.00	\$ 4,133,500.00
9	Storm Sewer (48") with Restoration	2,530	ft	\$ 1,050.00	\$ 2,656,500.00
10	Storm Sewer (54") with Restoration	1,736	ft	\$ 1,200.00	\$ 2,083,200.00
11	Storm Sewer (60") with Restoration	2,787	ft	\$ 1,500.00	\$ 4,180,500.00
12	Manholes	64	ft	\$ 12,000.00	\$ 768,000.00
13	Inlets	161	each	\$ 4,000.00	\$ 644,000.00
14	Open Channel w/ Environmental Remediation	1	each	\$ 2,000,000.00	\$ 2,000,000.00
15	Clearing and grubbing	1	each	\$ 50,000.00	\$ 50,000.00
16	Outfall Structures	1	cft	\$ 15,000.00	\$ 15,000.00
17	Utility Relocation	10	lsum	\$ 5,000.00	\$ 50,000.00
18	Water Quality Unit	6	each	\$ 40,000.00	\$ 240,000.00
19	Intersection GSI	12	each	\$ 50,000.00	\$ 600,000.00

CONSTRUCTION SUBTOTAL	\$ 23,644,000.00
Contingency (20%)	\$ 4,730,000.00
Engineering & Legal (20%)	\$ 4,730,000.00
TOTAL	\$ 33,104,000.00

ENGINEER'S OPINION OF PROBABLE COST



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Project: Schoolcraft - Alternative 2 B070 (North Area)
 JN: 0051-19-0011
 Phase: Preliminary (5% Design)
 Estimator: AMB
 Checked PMD
 Date: 2/21/2023

Assumptions:

- 1 Unit pricing based on PC808 as-bid costs.
- 2 Restoration includes removal and replacement of streets and adjoining sidewalks and turf grass areas.
- 3 Stormwater detention assumes supplemental underground volume to attenuate peak flows.
- 4 Inlet pricing includes catch basin, covers and 12" storm sewer lateral connections to manholes
- 5 Parking lot catch basins within apartment complex will be redirected to storm sewers.

Item	Description	Quantity	Unit	Unit Price	Total Price
1	Mobilization	1	LS	\$ 500,000.00	\$ 500,000.00
2	Soil Erosion and Sedimentation Control	1	LS	\$ 70,000.00	\$ 70,000.00
3	Maintenance of Traffic	1	LS	\$ 140,000.00	\$ 140,000.00
4	Materials Testing Allowance	1	LS	\$ 100,000.00	\$ 100,000.00
5	Storm Sewer (24") with Restoration	9,083	ft	\$ 675.00	\$ 6,131,025.00
6	Storm Sewer (30") with Restoration	1,950	ft	\$ 750.00	\$ 1,462,500.00
7	Storm Sewer (36") with Restoration	3,090	ft	\$ 800.00	\$ 2,472,000.00
8	Storm Sewer (66") with Restoration	420	ft	\$ 1,600.00	\$ 672,000.00
9	Manholes	45	ea	\$ 12,000.00	\$ 540,000.00
10	Inlets	98	ea	\$ 4,000.00	\$ 392,000.00
11	Stormwater Detention	120,000	cft	\$ 12.00	\$ 1,440,000.00
12	Clearing and grubbing	1	LS	\$ 25,000.00	\$ 25,000.00
13	Outfall Structures	1	Ea	\$ 15,000.00	\$ 15,000.00
14	Utility Relocation	2	Ea	\$ 10,000.00	\$ 20,000.00
15	Water Main Relocation	3	Ea	\$ 15,000.00	\$ 45,000.00
16	Water Quality Unit	5	Ea	\$ 40,000.00	\$ 200,000.00
17	Intersection GSI	4	ea	\$ 50,000.00	\$ 200,000.00
CONSTRUCTION SUBTOTAL					\$ 14,425,000.00
Contingency (20%)					\$ 2,890,000.00
Engineering & Legal (20%)					\$ 2,885,000.00
TOTAL					\$ 20,200,000.00

SALVAGED VALUE



Project: West Chicago - Alternative 1 B063 (South Area)
 JN: 0051-19-0011
 Phase: Preliminary (5% Design)
 Estimator: KT
 Checked PMD
 Date: 2/22/2023

OHM Advisors Inc.

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11145 Griswold, Suite 20

Detroit, MI 48226

Assumptions:

- 1 Unit pricing based on PC808 as-bid costs.
- 2 Restoration includes removal and replacement of streets and adjoining sidewalks and turf grass areas.
- 3 Stormwater detention assumes supplemental underground volume to attenuate peak flows.
- 4 Inlet pricing includes catch basin, covers and 12" storm sewer lateral connections to manholes
- 5 Outfall stabilization assumes riprap and minor channel stabilization within the Ashcroft/Sherwood Drain.

Item	Description	Quantity	Unit	Unit Price	Total Cost	Useful Life (YRS)	Salvaged Value
5	Storm Sewer (12") with Restoration	24	ft	\$ 525	\$ 12,600	50	\$ 7,560
6	Storm Sewer (24") with Restoration	2,312	ft	\$ 675	\$ 1,560,600	50	\$ 936,360
7	Storm Sewer (36") with Restoration	1,036	ft	\$ 800	\$ 828,800	50	\$ 497,280
8	Storm Sewer (42") with Restoration	877	ft	\$ 875	\$ 767,375	50	\$ 460,425
9	Storm Sewer (48") with Restoration	1,549	ft	\$ 1,050	\$ 1,626,450	50	\$ 975,870
10	Storm Sewer (54") with Restoration	236	ft	\$ 1,200	\$ 283,200	50	\$ 169,920
11	Storm Sewer (60") with Restoration	2,950	ft	\$ 1,500	\$ 4,425,000	50	\$ 2,655,000
13	Manholes	40	each	\$ 12,000	\$ 480,000	50	\$ 288,000
14	Weir Structures	1	each	\$ 20,000	\$ 20,000	50	\$ 12,000
15	Inlets	72	each	\$ 4,000	\$ 288,000	50	\$ 172,800
16	Stormwater Detention	120,000	cft	\$ 12	\$ 1,440,000	50	\$ 864,000
18	Outfall Structure	1	each	\$ 25,000	\$ 25,000	20	\$ -
20	Water Quality Unit	5	each	\$ 40,000	\$ 200,000	20	\$ -
21	Intersection Green Infrastructure	5	each	\$ 50,000	\$ 250,000	20	\$ -
					\$ 12,207,025		\$ 7,039,215
Present Worth							\$ 4,737,000
Using 2% real interest rate							

SALVAGED VALUE



Project: West Chicago - Alternative 1 B064 (North Area)
 JN: 0051-19-0011
 Phase: Preliminary (5% Design)
 Estimator: KT
 Checked PMD
 Date: 2/21/2023

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Detroit, MI 48226

Assumptions:

- 1 Unit pricing based on PC808 as-bid costs.
- 2 Restoration includes removal and replacement of streets and adjoining sidewalks and turf grass areas.
- 3 Stormwater detention assumes supplemental underground volume to attenuate peak flows.
- 4 Inlet pricing includes catch basin, covers and 12" storm sewer lateral connections to manholes
- 5 The existing CSO at Plymouth Road will be repurposed as a stormwater outfall. The junction chamber upstream will be modified.
- 6 Sanitary Sewer Construction includes construction of manholes and connections at Plymouth Road and West Chicago.

Item	Description	Quantity	Unit	Unit Price	Total Cost	Useful Life (YRS)	Salvaged Value
5	Storm Sewer (12") with Restoration	185	ft	\$ 525	\$ 97,125	50	\$ 58,275
6	Storm Sewer (24") with Restoration	1017	ft	\$ 675	\$ 686,475	50	\$ 411,885
7	Storm Sewer (36") with Restoration	1013	ft	\$ 800	\$ 810,400	50	\$ 486,240
9	Storm Sewer (48") with Restoration	2771	ft	\$ 1,050	\$ 2,909,550	50	\$ 1,745,730
11	Storm Sewer (60") with Restoration	1744	ft	\$ 1,500	\$ 2,616,000	50	\$ 1,569,600
12	Sanitary Sewer (24") with Restoration	2400	ft	\$ 850	\$ 2,040,000	50	\$ 1,224,000
13	Manholes	27	each	\$ 12,000	\$ 324,000	50	\$ 194,400
14	Weir Structures	1	each	\$ 20,000	\$ 20,000	50	\$ 12,000
15	Inlets	48	each	\$ 4,000	\$ 192,000	50	\$ 115,200
16	Stormwater Detention	98000	cft	\$ 12	\$ 1,176,000	50	\$ 705,600
18	Outfall Structure	1	each	\$ 25,000	\$ 25,000	20	\$ -
20	Water Quality Unit	3	each	\$ 40,000	\$ 120,000	20	\$ -
21	Intersection Green Infrastructure	5	each	\$ 50,000	\$ 250,000	20	\$ -
					\$ 11,266,550		\$ 6,522,930

Present Worth \$ 4,390,000

Using 2% real interest rate

SALVAGED VALUE



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11145 Griswold, Suite 20

Detroit, MI 48226

Project: Schoolcraft - Alternative 1 B069 (South Area)
 JN: 0051-19-0011
 Phase: Preliminary (5% Design)
 Estimator: KT
 Checked: PMD
 Date: 2/22/2023

Assumptions:

- 1 Unit pricing based on PC808 as-bid costs.
- 2 Restoration includes removal and replacement of streets and adjoining sidewalks and turf grass areas.
- 3 Stormwater detention assumes supplemental underground volume to attenuate peak flows.
- 4 Inlet pricing includes catch basin, covers and 12" storm sewer lateral connections to manholes
- 5 Sanitary Sewer Construction includes installation of manholes and lateral connections.

Item	Description	Quantit Unit	Unit Price	Total Cost	Useful Life (YRS)	Salvaged Value
5	Storm Sewer (24") with Restoration	4929 ft	\$ 675	\$ 3,327,075	50	\$ 1,996,245
6	Storm Sewer (30") with Restoration	559 ft	\$ 750	\$ 419,250	50	\$ 251,550
7	Storm Sewer (36") with Restoration	667 ft	\$ 800	\$ 533,600	50	\$ 320,160
8	Storm Sewer (48") with Restoration	141 ft	\$ 1,050	\$ 148,050	50	\$ 88,830
9	Storm Sewer (54") with Restoration	2,403 ft	\$ 1,200	\$ 2,883,600	50	\$ 1,730,160
10	Storm Sewer (60") with Restoration	773 ft	\$ 1,500	\$ 1,159,500	50	\$ 695,700
11	Storm Sewer (66") with Restoration	938 ft	\$ 1,600	\$ 1,500,800	50	\$ 900,480
12	Sanitary Sewer (12") with Restoration	1400 ft	\$ 750	\$ 1,050,000	50	\$ 630,000
13	Manholes	45 each	\$ 12,000	\$ 540,000	50	\$ 324,000
14	Weir Structures	1 each	\$ 15,000	\$ 15,000	50	\$ 9,000
15	Inlets	83 each	\$ 4,000	\$ 332,000	20	\$ -
16	Detention Basin	120,000 cft	\$ 12	\$ 1,440,000	20	\$ -
18	Outfall Structures	1 each	\$ 15,000	\$ 15,000	20	\$ -
20	Water Main Relocation	1,500 ft	\$ 400	\$ 600,000	50	\$ 360,000
21	Water Quality Unit	5 each	\$ 40,000	\$ 200,000	20	\$ -
22	Intersection Green Infrastructure	10 each	\$ 50,000	\$ 500,000	20	\$ -
				\$ 14,663,875		\$ 7,306,125

Present Worth \$4,917,000.00
 Using 2% real interest rate

SALVAGED VALUE



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11145 Griswold, Suite 20

Detroit, MI 48226

Project: Schoolcraft - Alternative 1 B070 (North Area)
Number: 0051-19-0011
Phase: Preliminary (5% Design)
Estimator: KT
Checked: PMD
Date: 2/22/2023

Assumptions:

- 1 Unit pricing based on PC808 as-bid costs.
- 2 Restoration includes removal and replacement of streets and adjoining sidewalks and turf grass areas.
- 3 Stormwater detention assumes supplemental underground volume to attenuate peak flows.
- 4 Inlet pricing includes catch basin, covers and 12" storm sewer lateral connections to manholes
- 5 Parking lot catch basins within apartment complex will be redirected to storm sewers.

Item	Description	Quantity	Unit	Unit Price	Total Cost	Useful Life (YRS)	Salvaged Value
5	Storm Sewer (24") with Restoration	9,083	ft	\$ 675	\$ 6,131,025	50	\$ 3,678,615
6	Storm Sewer (30") with Restoration	1,950	ft	\$ 750	\$ 1,462,500	50	\$ 877,500
7	Storm Sewer (36") with Restoration	3,090	ft	\$ 800	\$ 2,472,000	50	\$ 1,483,200
8	Storm Sewer (66") with Restoration	420	ft	\$ 1,600	\$ 672,000	50	\$ 403,200
9	Manholes	45	ea	\$ 12,000	\$ 540,000	50	\$ 324,000
10	Inlets	98	ea	\$ 4,000	\$ 392,000	20	\$ -
11	Stormwater Detention	120,000	cft	\$ 12	\$ 1,440,000	20	\$ -
13	Outfall Structures	1	Ea	\$ 15,000	\$ 15,000	20	\$ -
15	Water Main Relocation	3	Ea	\$ 15,000	\$ 45,000	50	\$ 27,000
16	Water Quality Unit	5	Ea	\$ 40,000	\$ 200,000	50	\$ 120,000
17	Intersection Green Infrastructure	4	ea	\$ 50,000	\$ 200,000	20	\$ -
					\$ 13,569,525		\$ 6,913,515

Present Worth \$ 4,653,000

Using 2% real interest rate

SALVAGED VALUE



Project: West Chicago - Alternative 2 B063 (South Area)
 JN: 0051-19-0011
 Phase: Preliminary (5% Design)
 Estimator: KT
 Checked PMD
 Date: 2/22/2023

Assumptions:

- 1 Unit pricing based on PC808 as-bid costs.
- 2 Restoration includes removal and replacement of streets and adjoining sidewalks and turf grass areas.
- 3 Stormwater detention assumes supplemental underground volume to attenuate peak flows.
- 4 Inlet pricing includes catch basin, covers and 12" storm sewer lateral connections to manholes
- 5 Outfall stabilization assumes riprap and minor channel stabilization within the Ashcroft/Sherwood Drain.

Item	Description	Quantity	Unit	Unit Price	Total Cost	Useful Life (YRS)	Salvaged Value
5	Storm Sewer (12") with Restoration	143	ft	\$ 525	\$ 75,285	50	\$ 45,171
6	Storm Sewer (24") with Restoration	1,942	ft	\$ 675	\$ 1,310,580	50	\$ 786,348
7	Storm Sewer (36") with Restoration	1,151	ft	\$ 800	\$ 921,120	50	\$ 552,672
8	Storm Sewer (42") with Restoration	959	ft	\$ 875	\$ 838,950	50	\$ 503,370
9	Storm Sewer (48") with Restoration	1,441	ft	\$ 1,050	\$ 1,512,630	50	\$ 907,578
10	Storm Sewer (54") with Restoration	825	ft	\$ 1,200	\$ 990,000	50	\$ 594,000
11	Storm Sewer (60") with Restoration	2024	ft	\$ 1,500	\$ 3,036,600	50	\$ 1,821,960
12	Storm Sewer (66") with Restoration	522	ft	\$ 1,600	\$ 835,200	50	\$ 501,120
13	Storm Sewer (72") with Restoration	468	ft	\$ 1,800	\$ 842,400	50	\$ 505,440
14	Sanitary Sewer (24") with Restoration	2,400	ft	\$ 825	\$ 1,980,000	50	\$ 1,188,000
15	Manholes	36	each	\$ 12,000	\$ 432,000	50	\$ 259,200
16	Weir Structures	1	each	\$ 20,000	\$ 20,000	50	\$ 12,000
17	Inlets	69	each	\$ 4,000	\$ 276,000	50	\$ 165,600
18	Detention Basin	138,000	cft	\$ 12	\$ 1,656,000	20	\$ -
20	Outfall Structures	1	each	\$ 25,000	\$ 15,000	20	\$ -
22	Water Quality Unit	5	each	\$ 40,000	\$ 192,000	20	\$ -
23	Green Infrastructure	6	each	\$ 50,000	\$ 300,000	20	\$ -
					\$ 15,233,765		\$ 7,842,459

Present Worth \$ 5,278,000
 Using 2% real interest rate

SALVAGED VALUE

Project: West Chicago - Alternative 2 B064 (North Area)
 JN: 0051-19-0011
 Phase: Preliminary (5% Design)
 Estimator: KT
 Checked PMD
 Date: 2/22/2023



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Detroit, MI 48226

Assumptions:

- 1 Unit pricing based on PC808 as-bid costs.
- 2 Restoration includes removal and replacement of streets and adjoining sidewalks and turf grass areas.
- 3 Stormwater detention assumes supplemental underground volume to attenuate peak flows.
- 4 Inlet pricing includes catch basin, covers and 12" storm sewer lateral connections to manholes
- 5 The existing CSO at Plymouth Road will be repurposed as a stormwater outfall. The junction chamber upstream will be modified.
- 6 Sanitary Sewer Construction includes construction of manholes and connections at Plymouth Road and West Chicago.

Item	Description	Quantity	Unit	Unit Price	Total Cost	Useful Life (YRS)	Salvaged Value
5	Storm Sewer (12") with Restoration	96 ft		\$ 525	\$ 50,190	50	\$ 30,114
6	Storm Sewer (24") with Restoration	1,294 ft		\$ 675	\$ 873,720	50	\$ 524,232
7	Storm Sewer (36") with Restoration	768 ft		\$ 800	\$ 614,080	50	\$ 368,448
9	Storm Sewer (42") with Restoration	639 ft		\$ 875	\$ 559,300	50	\$ 335,580
11	Storm Sewer (48") with Restoration	960 ft		\$ 1,050	\$ 1,008,420	50	\$ 605,052
12	Storm Sewer (54") with Restoration	550 ft		\$ 1,200	\$ 660,000	50	\$ 396,000
13	Storm Sewer (60") with Restoration	1350 ft		\$ 1,500	\$ 2,024,400	50	\$ 1,214,640
14	Storm Sewer (66") with Restoration	348 ft		\$ 1,600	\$ 556,800	50	\$ 334,080
15	Storm Sewer (72") with Restoration	312 ft		\$ 1,800	\$ 561,600	50	\$ 336,960
15	Manholes	24 each		\$ 12,000	\$ 288,000	50	\$ 172,800
17	Inlets	46 each		\$ 4,000	\$ 184,000	50	\$ 110,400
18	Detention Basin	92,000 cft		\$ 12	\$ 1,104,000	20	\$ -
22	Water Quality Unit	3 each		\$ 40,000	\$ 120,000	20	\$ -
23	Green Infrastructure	4 each		\$ 50,000	\$ 200,000	20	\$ -
					\$ 8,804,510		\$ 4,428,306

Present Worth \$ 2,980,000

Using 2% real interest rate

SALVAGED VALUE



Project: Schoolcraft - Alternative 2 B069 (South Area)
 JN: 0051-19-0011
 Phase: Preliminary (5% Design)
 Estimator: KT
 Checked: PMD
 Date: 2/22/2023

OHM Advisors Inc.

www.ohm-advisors.com

11145 Griswold, Suite 20

Detroit, MI 48226

Assumptions:

- 1 Unit pricing based on PC808 as-bid costs.
- 2 Restoration includes removal and replacement of streets and adjoining sidewalks and turf grass areas.
- 3 Stormwater detention assumes supplemental underground volume to attenuate peak flows.
- 4 Inlet pricing includes catch basin, covers and 12" storm sewer lateral connections to manholes
- 5 Parking lot catch basins within apartment complex will be redirected to storm sewers.

Item	Description	Quantit Unit	Unit Price	Total Cost	Useful Life (YRS)	Salvaged Value
5	Storm Sewer (24") with Restoration	4,313 ft	\$ 675	\$ 2,911,275	50	\$ 1,746,765
6	Storm Sewer (30") with Restoration	658 ft	\$ 750	\$ 493,500	50	\$ 296,100
7	Storm Sewer (36") with Restoration	2,359 ft	\$ 800	\$ 1,887,200	50	\$ 1,132,320
8	Storm Sewer (42") with Restoration	4,724 ft	\$ 875	\$ 4,133,500	50	\$ 2,480,100
9	Storm Sewer (48") with Restoration	2,530 ft	\$ 1,050	\$ 2,656,500	50	\$ 1,593,900
10	Storm Sewer (54") with Restoration	1,736 ft	\$ 1,200	\$ 2,083,200	50	\$ 1,249,920
11	Storm Sewer (60") with Restoration	2,787 ft	\$ 1,500	\$ 4,180,500	50	\$ 2,508,300
12	Manholes	64 ft	\$ 12,000	\$ 768,000	50	\$ 460,800
13	Inlets	161 each	\$ 4,000	\$ 644,000	50	\$ 386,400
14	Open Channel w/ Environmental Remediation	1 each	\$ 2,000,000	\$ 2,000,000	50	\$ 1,200,000
16	Outfall Structures	1 each	\$ 15,000	\$ 15,000	20	\$ -
18	Water Quality Unit	6 each	\$ 40,000	\$ 240,000	20	\$ -
19	Intersection GSI	12 each	\$ 50,000	\$ 600,000	20	\$ -
				\$ 22,612,675		\$ 13,054,605

Present Worth \$ 8,785,000

Using 2% real interest rate

SALVAGED VALUE



Project: Schoolcraft - Alternative 2 B070 (North Area)
 PS#: 0051-19-0011
 Phase: Preliminary (5% Design)
 Estimator: KT
 Checked: PMD
 Date: 2/22/2023

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Assumptions:

- 1 Unit pricing based on PC808 as-bid costs.
- 2 Restoration includes removal and replacement of streets and adjoining sidewalks and turf grass areas.
- 3 Stormwater detention assumes supplemental underground volume to attenuate peak flows.
- 4 Inlet pricing includes catch basin, covers and 12" storm sewer lateral connections to manholes
- 5 Parking lot catch basins within apartment complex will be redirected to storm sewers.

Item	Description	Quantity	Unit	Unit Price	Total Cost	Useful Life (YRS)	Salvaged Value
5	Storm Sewer (24") with Restoration	9,083	ft	\$ 675	\$ 6,131,025	50	\$ 3,678,615
6	Storm Sewer (30") with Restoration	1,950	ft	\$ 750	\$ 1,462,500	50	\$ 877,500
7	Storm Sewer (36") with Restoration	3,090	ft	\$ 800	\$ 2,472,000	50	\$ 1,483,200
8	Storm Sewer (66") with Restoration	420	ft	\$ 1,600	\$ 672,000	50	\$ 403,200
9	Manholes	45	ea	\$ 12,000	\$ 540,000	50	\$ 324,000
10	Inlets	98	ea	\$ 4,000	\$ 392,000	20	\$ -
11	Stormwater Detention	120,000	cft	\$ 12	\$ 1,440,000	20	\$ -
13	Outfall Structures	1	Ea	\$ 15,000	\$ 15,000	20	\$ -
15	Water Main Relocation	3	Ea	\$ 15,000	\$ 45,000	50	\$ 27,000
16	Water Quality Unit	5	Ea	\$ 40,000	\$ 200,000	50	\$ 120,000
17	Intersection Green Infrastructure	4	ea	\$ 50,000	\$ 200,000	20	\$ -
					\$ 13,569,525		\$ 6,913,515

Present Worth \$ 4,653,000

Using 2% real interest rate

DRAFT

Appendix E: GLWA Wastewater Master Plan

Section 4

Regulatory Requirements

4.1 Overview

This chapter describes the history of water quality regulatory programs of state and federal agencies and compliance by the Great Lakes Water Authority (GLWA) and its customers. The key regulatory milestones and initiatives that have preceded this master plan are described, as well as the current status of National Pollutant Discharge Elimination System (NPDES) permits and administrative consent orders. Customers served by GLWA (Members) have played a significant role in shaping the history of regulatory compliance, and highlights of Member-led achievements are presented throughout this chapter.

This chapter is presented in three major sections. First, a history of regulation and compliance is presented. Second, the current status of regulatory compliance is described. And third, potential future regulation and evolving policy for wet weather regulatory compliance are examined. The history of regulations and compliance is outlined in the following report sections:

- Great Lakes Water Quality Agreement
- Clean Water Act
- Consent Decree and Federal Oversight
- Rouge River National Wet Weather Demonstration Project
- Water Resource Recovery Facility
- Combined Sewer Overflows
- Sanitary Sewer Overflows
- Michigan Drain Code

The current regulations and compliance are documented in the following report sections:

- Formation of the Great Lakes Water Authority
- NPDES Permits in the Region
- Administrative Consent Orders in the Region
- Long-term Combined Sewer Overflow (CSO) Plan
- Industrial Waste Management
- Green Stormwater Infrastructure
- Municipal Separate Storm Systems

The final part of this chapter includes considerations for the future regulatory compliance landscape and options for GLWA and its Members to pursue under the US EPA Integrated Planning Framework and State of Michigan watershed permits, and to prepare for in terms of potential future regulations.

4.2 History of Regulations and Compliance

There are number of significant events in the past that have had a major influence on pollution control throughout the state, but particularly in the highly populated area of Southeast Michigan. Collectively, these historical events provide the foundation for the current regulatory framework that the master plan examined while developing recommendations to meet the region's needs over the next 40 years.

Michigan water pollution control efforts preceded those of the federal government with the passage of the Water Resources Commission Act in 1929. However, since the federal government passed the Clean Water Act (CWA) in 1972, Michigan has primarily been responding to changes in federal laws and regulations to maintain its delegated authority by the U.S. Environmental Protection Agency (U.S. EPA) under the National Pollutant Discharge Elimination System (NPDES) program. Table 4-1 below establishes the dates for significant events related to water pollution control in Southeast Michigan. Note the frequency of significant events has increased since the CWA's passage, particularly during the period from 2013 to the present.

Table 4-1. Significant Events in Michigan

Water Pollution Management	
1927	Michigan Water Resources Commission, PA 245 of 1929
1956	Michigan Drain Code Codification, PA 40 of 1956
1972	Clean Water Act of 1972 and creation of U.S. EPA
1973	U.S. EPA Delegation of NPDES Program to Michigan
1977	Federal Court Consent Decree U.S. EPA/Michigan v. City/Detroit Water and Sewerage Department (DWSD)
1978	U.S./Canada Great Lakes Water Quality Agreement (GLWQA)
1983	U.S. EPA Rules for Industrial Discharges (pretreatment program)
1992	National Wet Weather Demonstration Project (Rouge Project)
1994	National Combined Sewer Overflows (CSO) policy
2004	Michigan Watershed Alliance Law, PA 517 of 2004
2006	Alliance of Rouge Communities (ARC)
2013	Federal district court oversight of DWSD ends, and Detroit files for Chapter 9 bankruptcy
2014	Federally funded Rouge Project ends
2015	New Michigan stormwater regulations to meet federal requirements
2016	Great Lakes Water Authority begins operation

4.2.1 Great Lakes Water Quality Agreement

The 1978 Great Lakes Water Quality Agreement (GLWQA) is administered through the International Joint Commission in cooperation with U.S. and Canadian federal governments, eight Great Lakes states, and two Canadian provinces to restore and protect Great Lakes waters. The

stated purpose in the agreement is to restore and maintain the chemical, physical, and biological integrity of the Great Lakes Basin ecosystem. The agreement provides a framework for identifying binational priorities and implementing actions that protect and improve Great Lakes water quality. Early work between the two countries dates back to the *Treaty Relating to the Boundary Waters and Questions Arising Along the Border Between Canada and the United States* signed on January 11, 1909. The GLWQA was one of several driving forces behind the CWA.

A governing body of the agreement, known as the Great Lakes Executive Committee, is comprised of representatives from the U.S. EPA and Environment and Climate Change Canada. Additional members include indigenous representatives and local public government organizations. The goal of the membership structure is to represent local community perspectives in remedial actions and implementation of water quality protection on a regional scale. The executive committee meets two or more times a year to establish priorities and review and report on progress made in each country.

The 1987 GLWQA amendments established Lakewide Action and Management Plans (LAMPs) and remedial action plans (RAPs) as systematic and comprehensive ecosystem approaches to address the Great Lakes as a whole and specific areas of concern throughout the lakes, respectively. The LAMP and RAP documents also provide an historical record of assessments of critical pollutants, proposed remedial actions and methods of implementation, changes in environmental conditions as a result of remedial actions, and significant milestones in restoring beneficial uses of the lakes.

Over time, the GLWQA has been amended and has expanded its focus. The following timeline highlights past and current focus areas:

- 1972: Phosphorus loadings and visible pollutants
- 1978: Persistent toxic substances and ecosystem approach to lake management
- 1983: Updated phosphorus reduction strategies
- 1987: RAPs, areas of concern, and LAMPs
- 2012: Modernized, enhanced governance and new and expanded annexes (e.g., habitat protection)

Each of these amendments are briefly reviewed below.

The original 1972 GLWQA targeted the reduction of algae. The U.S. and Canada agreed on a coordinated approach to limiting phosphorus inputs, actions were taken to reduce excess algae growth, and phosphorus levels in the Great Lakes declined significantly during the 1970s and 1980s. This was an unprecedented success in demonstrating the benefit of binational cooperation to achieve measurable environmental improvements.

In 1978, the GLWQA was revised to reflect a broadened goal “to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin ecosystem.”¹ The two significant shifts of the 1978 GLWQA were the introduction of the ecosystem approach—

¹ Great Lakes Water Quality Agreement of 1978, United States/Canada, International Joint Commission, signed November 22, 1978.

the notion of taking the whole ecosystem into account (and not just certain parts)—and the call for virtual elimination of toxic pollution.

In 1983, a supplement was added to the GLWQA to further limit phosphorus discharges, and Canada and the United States committed to preparing and implementing new plans for reducing phosphorus.

The GLWQA was amended again in 1987 to incorporate new commitments to reduce toxic pollutants through development and implementation of LAMPs for each lake and to clean up areas of concern through the implementation of RAPs. These plans emphasize citizen and local government engagement to restore water quality and rapidly reduce the levels of toxic pollutants in the lake ecosystem.

The GLWQA specifically defines areas of concern as "geographic areas that fail to meet the general or specific objectives of the agreement, where such failure has caused or is likely to cause impairment of beneficial use of the area's ability to support aquatic life."² The goal of the agreement is to restore and maintain the chemical, physical, and biological integrity of the Great Lakes Basin ecosystem through a concerted set of interventions that are targeted at areas of concern. Because each waterway has a unique set of characteristics that have contributed to its ecological impairment, a RAP has been developed to identify the causes of impairment. The goal of each RAP is to bring about the delisting of the waterway from the list of areas of concern and to restore individual waterways by guiding local action.

The latest amendment to the agreement in 2012 added preventative measures to address issues that have arisen since the 1987 amendment. The 2012 change invited additional organizations to participate in policy formation and remediation as well as created the GLWQA Nutrients Annex Subcommittee that will help target a recurring algal bloom in Lake Erie that continues to persist from uncontrolled phosphorus inputs that require binational coordination.

4.2.2 Clean Water Act

The 1972 amendments to the Federal Water Pollution Control Act of 1948 are commonly referred to as the Clean Water Act.^{3 4} The amendments are:

- Structured regulations to control discharges to the waters of the United States
- Authorized the U.S. EPA to implement wastewater standards
- Maintained existing water quality standards for all contaminants in surface waters
- Required permits for all point source pollutant discharges
- Funded sewage treatment plants under a construction grants program
- Recognized the need for planning to address pollution problems posed by nonpoint pollution sources

² Revised Great Lakes Water Quality Agreement of 1978, as amended by Protocol, signed November 18, 1987 and consolidated by the International Joint Commission.

³ USEPA: National Pollutant Discharge Elimination System (NPDES). 2018. (On line accessed 3/09/2018) Available <https://www.epa.gov/npdes>

⁴ Michigan Department of Environmental Quality. 2018 (On line accessed 3/9/2018) Available <https://www.mi.gov/deqnpdes>

Michigan had been issuing orders controlling discharges to the waters of the state since the passage of the Water Resource Commission Act of 1929. The state received formal delegated authority from the U.S. EPA in October of 1973 to administer the federal NPDES permit program. Michigan was one of the first states to receive delegated authority under the CWA and has maintained this authority for the program ever since. Today, this delegated authority for the U.S. EPA NPDES program resides in the Michigan Department of Environmental Quality (MDEQ).

The CWA established the following principles:

- The discharge of pollutants to navigable waters is not a right
- A discharge permit is required to use public resources for waste disposal and limits the amount of pollutants that may be discharged
- Wastewater must be treated with the best treatment technology economically achievable regardless of the condition of the receiving water
- Effluent limits must be based on treatment technology performance, but more stringent limits may be imposed if the technology-based limits do not prevent violations of water quality standards in the receiving water

The first round of NPDES permits issued by Michigan between 1973 and 1976 focused on five-day biochemical oxygen demand (BOD₅), total suspended solids (TSS), pH, oil and grease, and some metals, by requiring the use of the best practicable control technology (BPT) then available. The CWA established a July 1, 1977, deadline for all facilities to be in compliance with BPT. Additionally, the act established the compliance deadline for installing best available technology economically achievable (BAT) by July 1, 1983.

The concept of BAT controls was clarified and expanded to include toxic pollutants. The conventional pollutants (BOD₅, TSS, pH, fecal coliform, and oil and grease) controlled by BPT in the first round of permitting became subject to a new level of control, termed best conventional pollutant control technology (BCT). The federal compliance deadline for meeting both expanded BAT and new BCT controls was July 1, 1984.

Further amendments to the CWA in 1981 streamlined and improved capabilities of municipal treatment plants constructed with federal funds. In 1987, other changes to the CWA phased out the construction grants program and replaced it with the State Water Pollution Control Revolving Fund, which required state match for subsidized construction loans to municipalities for pollution control facilities. The 1987 CWA amendments, sometimes referred to as the Water Quality Act of 1987, also outlined a strategy to accomplish the goal of meeting water quality standards set by the states throughout the country. Michigan water quality standards are designed to not only protect aquatic life (fishable) and recreation (swimmable), but also to ensure safety in other uses of the receiving waters, including agriculture, public and industrial water supply, and navigation.

For the first time, the 1987 amendments established new schedules for industrial and municipal stormwater discharges to be regulated by NPDES permits. Industrial stormwater discharges under the amendments must achieve the equivalent of BCT/BAT effluent quality, and municipal separate storm sewer systems (MS4) must require controls to reduce the discharge of pollutants to the maximum extent practicable. The 1987 amendments once again extended the time to meet BAT and BCT effluent limitations, with a new compliance deadline of March 31, 1989.

The passage of other federal laws has since modified parts of the CWA, most notably the Great Lakes Critical Programs Act of 1990 that adopted certain provisions of the GLWQA. This 1990 law required the U.S. EPA to establish criteria limits for 29 toxic pollutants to assure that water discharges were safe for humans, wildlife, and aquatic life. The law also designated 43 Areas of Concern (AOC), geographic areas where significant impairment of beneficial uses has occurred as a result of human activities at the local level. The Rouge River was designated as an AOC under the GLWQA and a RAP has been prepared to address nine beneficial use impairments (BUIs) identified. Based upon substantial improvements achieved over the last 15 years, a number of the original BUIs are being considered for formal delisting under the GLWQA.⁵

Current criteria of Section 303(d) of the CWA, require all states to identify waters that are not expected to meet water quality standards (nonattainment areas) after technology-based controls on point sources have been imposed. States must then prepare an individual control strategy that would include Total Maximum Daily Loads (TMDLs) for permitted point sources contributing pollutants related to the nonattainment status. Among other measures, these plans were expected to address control of pollutants beyond technology-based levels.⁶ While a significant portion of the upper Rouge River watershed in the GLWA service area now meets Michigan water quality standards, a number of downstream areas, although significantly improved, do not yet meet standards for full-body contact activities like swimming or minimum dissolved oxygen levels designed to protect fish and aquatic organisms. Wet weather sanitary sewer, combined sewer and stormwater discharges within other portions of the GLWA service area also prevent attainment of water quality standards in downstream areas.

4.2.3 Michigan Drain Code

The Michigan Drain Code, which has a long history in Southeast Michigan where, two centuries ago, many thought the area was too wet to support development. The stressors that drainage projects often place on the aquatic community, although gradual and not always visible, are often profound unless mitigated. Under the CWA, the U.S. EPA issued regulations governing stormwater runoff, known as Phase II regulations. Briefly, Phase II makes use of a “best management practice” (BMP) approach (see Section 4.3.6).

The state laws establishing the authority for drains, drainage districts, and assessing properties for improvements under county drain commissioners was codified in Act 40 of the Public Acts of 1956 into the Michigan Drain Code (Drain Code) that was subsequently amended in 1970, 1973, and 1982.⁷

Chapters 20 and 21 of the Drain Code authorize the generation of funds to support capital improvement and operations of conveyances and treatment facilities to protect public health. Interagency agreements are used in conjunction with drainage district petitions to define the roles and responsibilities of the drainage district and the cooperating public agencies as well as the apportionment of capital and operating costs among drainage district members. The interagency agreements establish the mechanism for creating a drainage board composed of public entities being served as well as the board’s decision-making role.

⁵The Rouge River Area of Concern – Beneficial Use Impairments Delisting Strategy 2012. Alliance of Rouge Communities. (On line accessed 3/9/2018). Available <http://www.allianceofrougecommunities.com/PDFs/PI/Final%20Revised%20Strategy%20Report050812.pdf>

⁶U.S. EPA: Impaired Waters and TMDLs 2017. (On line accessed 3/9/2018). Available <https://www.epa.gov/tmdl/program-overview-impaired-waters-and-tmdls>

⁷ State of Michigan Legislature. The Drain Code of 1956, Act 40, 1956. (On line accessed 3/9/2018) Available [http://www.legislature.mi.gov/\(S\(z3xyta55ko23eyv254oltt55\)\)/documents/mcl/pdf/mcl-Act-40-of-1956.pdf](http://www.legislature.mi.gov/(S(z3xyta55ko23eyv254oltt55))/documents/mcl/pdf/mcl-Act-40-of-1956.pdf)

In Michigan, a county drain commissioner is generally an elected position. However, in very small counties, there is the option for county road commissions to assume the duties of the drain commissioner; in very large counties that elect a county executive, the county charter determines who assumes the duties of the drain commissioner. In counties that establish a department of public works, the authority of a drain commissioner resides with the elected public works director. In some Michigan counties, the title of drain commissioner is no longer used in favor of a title reflecting the broader responsibilities of the individual or county office (e.g., Water Resources Commissioner), but the statutory authority for carrying out the responsibilities of the county drain commissioner under state law is specifically assigned to an individual in each county under the Michigan Drain Code.

Once established, the interagency agreements accompanying the formation of a drainage district define the role of participating local units of government in decisions related to the drainage district's operation. The interagency agreements allocate costs, but usually leave it to local units of government in the district to determine how best to meet each unit's financial obligations (e.g., the local governmental unit may choose to use locally generated ad valorem taxes, rates/fees, special assessments, or some combination of revenue generation).

In Southeast Michigan, the significant population growth and urban sprawl following World War II in former rural areas surrounding Detroit and the relatively quick formation of new small cities, villages, and charter townships made the creation of sanitary sewer districts under the Michigan Drain Code an attractive alternative for many communities. This urgent need for sanitary sewer infrastructure to serve an expanding population as well as county capital-borrowing advantages encouraged the formation of sanitary sewer districts in Oakland, Macomb, and Wayne Counties. While some long-established cities and larger newer cities had the resources to expand or build their own sanitary and stormwater sewer systems, the smaller cities, newer cities, villages, and rapidly growing townships chose to use the Michigan Drain Code to meet urgent infrastructure needs.

The Wayne County Department of Environment, operating under the Michigan Drain Code, provides sewer services that involve the transport of stormwater and wastewater from local cities and townships located in the north, west, and central portions of the county outside of Detroit city limits through an interceptor system for eventual treatment and discharge by the GLWA. Wayne County also operates, under the Michigan Drain Code, and has a separate wastewater transport and treatment system for downriver communities not connected to the GLWA system.

Similarly, in Oakland and Macomb Counties, the Drain Code was used to establish sanitary waste drainage districts for cities, townships, and villages. The districts contract for the transport and treatment of sanitary wastewater through interceptors connected to the GLWA/DWSD system. Some districts in these counties operate detention and treatment facilities on their own during major storm events.

Prior to the 1950s, the DWSD primarily served the city of Detroit and the residents of Gratiot Township (Harper Woods), Grosse Pointe City, Grosse Pointe Farms, Grosse Pointe Park, Grosse Pointe Woods, Hamtramck, Highland Park, Redford Township, St. Clair Shores, Southfield Township, and Warren Township. However, in the mid-1950s the DWSD began promoting expansion to add both water and sewer customers. Drainage districts already established in Wayne, Oakland, and Macomb Counties were encouraged to send their waste to the DWSD facilities. In addition, expanding or newly forming sanitary wastewater districts created under the Drain Code in parts of these three counties closest to Detroit found the option of sending their

sanitary wastewater to the DWSD more cost effective than building and operating their own treatment facilities.⁸

4.2.4 Consent Decree and Federal Oversight

Beginning in the mid 1970s, the U.S. EPA and state regulatory agencies began enforcing actions throughout the U.S. district court system to force compliance with CWA requirements. At the same time, the U.S. EPA began administration, primarily through the states, of federal grant and aid programs to help reduce costs for construction and upgrades to publicly owned collection and treatment systems. These federal funds were often supplemented with state matching grants and/or subsidized loans.

Following hearings before the U.S. District Court for the Eastern District of Michigan, the U.S. EPA, in collaboration with the State of Michigan, entered into a consent decree with the DWSD and the City of Detroit specifying actions required by the city and the DWSD in order to achieve compliance with the CWA and related Michigan water pollution laws and regulations. This 1977 consent decree established federal district court oversight of DWSD and began a series of activities by the City, the DWSD, the State of Michigan, and U.S. EPA under the guidance of the federal district court-appointed master to achieve compliance with the federal and state water pollution control laws and regulations.

Progress in resolving the compliance issues identified in the 1977 consent decree was substantially assisted by grant funding included with the passage of the federal Rouge River National Wet Weather Demonstration Project (Rouge Project). This federal demonstration grant program was successfully advocated before the United States Congress and passed with bipartisan support from Michigan's congressional representatives, and subsequently administered by the Wayne County Department of Environment. The contributions made through the Rouge Project in addressing CSO discharges to the Rouge River is detailed in subsequent sections.

During the course of the U.S. district court hearings on how best to address CSOs and separated sewer system overflows (SSOs), documentation was presented to the court that demonstrated that even if these overflows were successfully resolved, the Rouge River would not likely achieve the water quality standards established under the CWA. The court initially favored the creation of an intercounty drainage district under the Michigan Drain Code to be administered jointly by Wayne, Washtenaw, and Oakland Counties to address illicit sanitary discharges and other sources of pollution from stormwater discharges to the Rouge River.

The court's suggestion was objected to by the three counties and the cities, villages, and townships whose stormwater drained to the Rouge River. The court accepted the alternative proposed by the areas, an organization called the Assembly of Rouge Communities (later formally established under state statute as the Alliance of Rouge Communities) that would collectively and cooperatively address stormwater and other nonpoint pollution sources. The role of the alliance in addressing stormwater issues in the GLWA service area as well as the role of the Rouge Project in helping address stormwater issues in Michigan and throughout the country are discussed in a following section.

In March 2013, Federal Judge Sean Cox lifted the federal oversight saying:

⁸ Detroit Water and Sewer Department – The First 300 years. The Detroit Water and Sewerage Department. (On line accessed 3/13/2018) Available http://dwsd.org/downloads_n/about_dwsd/history/complete_history.pdf

“The court concludes that, after more than 35 years of federal oversight, the DWSD has achieved substantial compliance with its NPDES permit and the Clean Water Act. This court shall therefore terminate the second amended consent judgment and close this case because the existing administrative consent order is a sufficient mechanism to address future issues regarding compliance with the DWSD’s NPDES permit and the Clean Water Act.”

4.2.5 Rouge River National Wet Weather Demonstration Project

The Rouge Project was directed by Wayne County Department of Environment following funding by the U.S. Congress in 1992. Initially, Rouge Project funding focused on the construction of ten CSO treatment facilities for previously untreated discharges to the Rouge River. Nine of these facilities, the design and construction of which preceded the publication of the U.S. EPA’s national CSO policy, began operation between 1997 and 2000 and were the subject of intensive study for their first two years of operation (U.S. EPA 1994). The basins located in the Rouge watershed being studied serve drainage areas as large as 14,400 acres and as small as 360 acres. The facilities were constructed under terms of negotiated consent agreements with the MDEQ.

The Rouge Project facilities were intended to demonstrate effective treatment of wet weather flows to protect public health with the secondary function as a retention facility to reduce pollutant loading to the river. Protection of public health involves two key aspects: (1) elimination of raw sewage and (2) disinfection of discharges. Seven basins were designed to treat flows from one-year, one-hour storms (approximately 1.0”); two basins were designed for ten-year, one-hour storms (approximately 1.7”); and one basin was built within site constraints. The facilities were designed to provide screening, skimming, and settling in order to remove raw sewage, and were designed with disinfection capability, including chemical dosing systems and volume for residence times in the basins from 20–30 minutes at the peak-hour flow associated with the design storm. The basins are composed of multiple compartments. Some of these compartments may act as capture facilities for the first flush. Some facilities are equipped with shunt channels to allow for bypass flow if necessary (or desired) to prevent washout of accumulated solids. As a result of these investments, approximately 89 of the 127 miles of stream in the Rouge River watershed are now free of the adverse impacts of uncontrolled CSO discharges.

Although control of CSOs was identified as a major priority, it had been previously demonstrated in federal district court that CSO control alone would be insufficient to achieve water quality standards. Discharges from sanitary sewer overflows (SSOs), stormwater runoff, illicit connections, discharges from failed onsite sewage disposal systems, and other pollution sources needed to be addressed. Even if all these varied sources of pollution were brought under control, it was also clear that natural stream flows, wetlands, upland habitat, and over-enriched lakes needed attention if the fishery, wildlife, and other natural resources valued by the public were to be restored. The focus of the Rouge Project became holistic and considered the impacts from all sources of pollution and use impairments in receiving waters. The Rouge Project reflected this holistic watershed approach in its administration of grants to local governments and nonprofits for enhancement of the Rouge River watershed.

In 1997, the MDEQ promulgated rules to implement a unique watershed approach to stormwater management that was developed by the communities and counties participating in the Rouge Project as a response to both the mandates of the federal district court and the pending U.S. EPA Phase I and II NPDES stormwater regulations. The local participants in the Rouge Project under its informal memorandum of agreement formed the Assembly of Rouge Communities in 2003 and supported the passage of a new state law authorizing the formation of watershed alliances in

2005 (PA 517 of 2004). The Assembly of Rouge Communities ARC was formally established under state law in 2006 as the Alliance of Rouge Communities (ARC) and played a large role in implementing the Rouge Project in cooperation with Wayne County. The ARC is a 501(c)3c non-profit as well as a governmental entity and routinely seeks and acquires state, federal, and private grant funds to match member contributions to supporting the projects for environmental improvement activities of its members and partners, non-profit environmental organization. By 2007, there were 40 communities, three counties, and the Wayne County Airport Authority that had adopted the ARC bylaws in order to become members, and in 2017, there were 44 members.

In 2008, the ARC updated and consolidated seven Rouge River subwatershed management plans developed under the Rouge Project into one sustainable Rouge River Watershed Management Plan (WMP). This plan was built on the successful Rouge Project grant-supported demonstrations and laid the groundwork for future improvements in water quality. The plan was approved by MDEQ in July 2012 as it met the U.S. EPA's Section 319 nonpoint source requirements, which made local projects that were consistent with the plan eligible for state and federal grant funding.

The Rouge Project ended in 2014 following the end of federal funding. The ARC continues to thrive, however, providing support to local township, village, city, county, and other public agency members for nonpoint pollution control efforts; assisting in meeting stormwater NPDES requirements; and coordinating public education and information on ways to protect and enhance water quality and related natural resources in the watershed.

The final 2013 *Rouge River Ecosystem Monitoring and Assessment Report* of the Rouge Project, prepared by Wayne County, documents the improvements in Rouge River water quality, including substantial improvements in dissolved oxygen levels and presence of E. coli compared to the previous 16 years. This comparison was based upon extensive monitoring supported under the Rouge Project.

4.2.6 Combined Sewer Overflows

DWSD's efforts to minimize CSO discharges to the Detroit River reach back to the mid-1970s when 144 level sensors were installed within the combined sewer system to develop an understanding of how the system reacted to rain events and provide insights into potential approaches for wet weather in-system storage. This was followed in the early 1980s by the installation of two sets of in-system storage inflatable fabric dams, one within the Livernois relief sewer at Ranspach Street and the other at the CSO discharge of the Hubbell-Southfield sewer into the Detroit-Dearborn channel of the Rouge River.

In response to the NPDES permit issued to DWSD in 1989, DWSD developed its initial Long-term CSO Control Plan in July 1996. The permit required the elimination or adequate treatment of combined sewer discharges at CSOs along the Detroit and Rouge Rivers. That report, submitted to the MDEQ on July 1, 1996, recommended a preferred plan, which outlined the necessary steps that DWSD would take for controlling CSOs. It reflected the fact that the collection system is very large and flow rates and directions within it vary depending on the intensity and spatial/temporal distribution of storm events. The preferred plan centered on four primary control areas: rain water control, in-system storage, additional wastewater treatment plant capacity, and end-of-pipe treatment.

The 1996 control plan was modified and updated, then resubmitted on November 30, 2001, as the Long-term CSO Control Plan for the Detroit and Rouge Rivers. The 2001 control plan was updated again in 2008. Soon after, the national financial collapse of 2008 began, and Detroit recognized that it was in the midst of a major economic crisis. The subsequent declaration of bankruptcy by

General Motors and Chrysler Corporation, two of Detroit’s largest employers, as well as adverse impacts to nearly all other employers, created depression-level unemployment. Many customers were simply unable to pay their water and sewerage bills.

As the economic crisis worsened, it became clear that Detroit lacked the resources and revenue to complete the CSO program as originally proposed. Detroit led the nation at nearly 30 percent unemployment by July 2009. Faced with rising unemployment, shrinking household income, continued loss of population, and huge revenue shortfalls, DWSD was compelled to terminate the Upper Rouge Tunnel to minimize the financial burden and worked with the MDEQ to extend the CSO control completion schedule of remaining untreated outfalls.

Finding a balance between incurring additional debt and developing a CSO control program that meets the MDEQ standard for elimination or adequate treatment, DWSD and MDEQ agreed to a revised approach that coupled stormwater flow reduction through green stormwater infrastructure (GSI) with a more affordable capital construction program. This program was implemented until Detroit was declared bankrupt and placed into receivership.

Acknowledging the ongoing significant economic hardship and continued high-burden status reflected in the 2012 financial capability evaluation, MDEQ worked with DWSD in preparing the NPDES permit that delayed major noncore CSO control construction projects until the permit reapplication, which is required by April 1, 2022. In the interim, DWSD proceeded with projects involving the rehabilitation of the Hubbell-Southfield retention treatment basin (RTB), the renovation of in-system storage gates, and completion of the Oakwood pump station and RTB. Further, the permit did include a requirement to continue progress on providing disinfection of treated discharge flows through the Rouge River Outfall by April 2019, while also focusing on the following CSO program elements:

- Reduction of stormwater flow into the combined sewer system through implementation of GSI
- The introduction of an adaptive management approach to evaluate and address the remaining future CSO controls based on information gained from:
 1. Evaluation of existing CSO projects
 2. Evaluation of new treatment technologies and real-time collection system controls
 3. More accurate and complete data on CSO discharge frequency and volume
 4. Performance results as benefits from GSI are realized
 5. Water quality assessments
 6. Any other pertinent information
- Continued monitoring and analysis of the conveyance system, CSO control elements, and flow meters during wet weather events to assess and more accurately determine the frequency, volume, and duration of CSO discharges from the outfalls along the Detroit River
- New George W. Kuhn RTB started in 2001—upgraded from original 1973 RTB

Additional details on the control plan are described in Section 4.3.4.

4.3 Current Regulations and Compliance

4.3.1 Formation of the Great Lakes Water Authority

As a part of the city of Detroit's federal bankruptcy proceedings, an historic agreement was reached between the mayor of the city of Detroit; the chief executive of Wayne, Oakland, and Macomb Counties; and Governor Rick Snyder to create the Great Lakes Water Authority. With nearly three million residents of the state relying on the DWSD to provide water and sanitary wastewater services, the agreement helped resolve Detroit's bankruptcy and assured future essential services to over a third of the state's population.

The agreement included payments by the municipalities to Detroit for a long-term lease of the regional wastewater interceptor and treatment system to the newly created GLWA, as well as a new governance for GLWA composed of two members appointed by the mayor of Detroit and one appointed from each Wayne, Oakland, Macomb Counties and one by the governor. The agreement was subsequently approved by the governing bodies of the three counties, the Detroit City Council, the State of Michigan, and the federal bankruptcy court.

On January 1, 2016, the DWSD completed the bifurcation process forming two new entities: the GLWA (operator of the regional water and wastewater conveyance and treatment facilities) and the new DWSD (responsible for the operation and maintenance of Detroit's local water and sewer infrastructure). Prior to January 1, 2016, DWSD was both the owner and operator of the regional and local systems. In 2017, the newly formed GLWA initiated a process to cooperatively develop, under the guidance of its steering committee (i.e., regional community and county customers, state regulators, and other regional system users), the *Comprehensive Regional 40-year Wastewater Master Plan* (GLWA Master Plan) for the new organization.

4.3.2 NPDES Permits

The GLWA and DWSD are jointly authorized to discharge from the WRRF under the five-year NPDES permit number MI0022802, which was issued on March 1, 2013, to the receiving waters of the Detroit River and the Rouge River, and from combined sewer overflow facilities to the receiving waters of the Detroit River, the Rouge River, and Conner Creek in accordance with effluent limitations, monitoring requirements, and other conditions set forth in the permit. This five-year joint NPDES permit expires in 2018 and the conditions of the reissued permit are under negotiation between the GLWA, the DWSD and the MDEQ. NPDES discharge requirements for the WRRF are presented in Section 4.3.6.

Table 4-2 summarizes the other 13 NPDES permits issued to first tier GLWA customers. First tier customers include county sanitary or intercounty drains established under the Michigan Drain Code as well as the City of Dearborn. The NPDES permits cover 45 outfalls of which 14 are currently served by retention and treatment basins (RTB) during wet weather overflows. Many of the 5-year NPDES permits were issued more than five years ago and have been extended as actions continue by communities and sanitary districts to separate sewers, design, construct, and evaluate RTBs, or take other actions to eliminate the discharge of untreated combined or sanitary sewers primarily during wet weather events. As indicated in Table 4-2, three NPDES were reissued during 2016 and 2017 with expiration dates in 2021. It appears that many of these projected dates for control may not be possible and alternative approaches and control dates are being evaluated.

Table 4-2. NPDES GLWA Regional System - NPDES and CSO Summary

Permittees	First Tier Member/Sewer District	NPDES Number	Facility/RTB	Effective	Expires	Status	RTB Capacity	Outfall Number	Currently Controlled/Treated? (Yes/No/Stormwater)	Receiving Surface Water
Southeast Macomb Sanitary District and 8 1/2 Mile Relief Drain Drainage District (MCPWC)	NE Wayne	MI0025453	Martin RTB	12/1/2009	10/1/2014	Extended	8.6 MG	Outfall 001 (RTB)	Yes	Lake St. Clair
Southeast Macomb Sanitary District and 8 1/2 Mile Relief Drain Drainage District (MCPWC)	NE Wayne	MI0025585	Chapaton RTB	12/1/2009	10/1/2014	Extended	28 MG	Outfall 001 (RTB)	Yes	Lake St. Clair
								Outfall 002 (RTB)	Yes	Lake St. Clair
Oakland County WRC and George W. Kuhn Drainage District	SE Oakland	MI0026115	George W Kuhn CSO RTB	5/6/2014	10/1/2015	Extended	130 MG	Outfall 001 (RTB)	Yes	Red Run Drain
Milk River Intercounty Drainage Board	NE Wayne	MI0025500	Milk River CSO RTB	3/6/2008	10/1/2009	Extended	18.8 MG	Outfall 001 (RTB)	Yes	Milk River
Acacia Park CSO Drainage District (Oakland County WRC), Beverly Hills, and City of Birmingham	EFSDS	MI0037427	Acacia Park CSO RTB	1/1/2017	10/1/2021	In Effect	4.4 MG	Outfall 103 (RTB)	Yes	Rouge River
Birmingham CSO Drainage District (Oakland County WRC), and City of Birmingham	EFSDS	MI0025534	Birmingham CSO RTB	1/1/2017	10/1/2021	In Effect	5.5 MG	Outfall 101 (RTB)	Yes	Rouge River via Luz & Nichols
Bloomfield Village CSO Drainage District (WRC), City of Bloomfield Hills, City of Birmingham, and Bloomfield Charter Township	EFSDS	MI0048046	Bloomfield Village CSO RTB	10/1/2007	10/1/2011	Extended	10 MG	Outfall 102 (RTB)	Yes	Rouge River via Luz & Nichols
City of Dearborn	Dearborn	MI0025542	RTB C4 RTB C6 RTB C7 RTB C8	7/1/2014	10/1/2016	Extended	RTB C4: 3.4 MG RTB C6: 7.9 MG RTB C7: 6.2 MG RTB C8: 7.5 MG	Outfall 001 (Will be separated by 2020)	No	Rouge River, Lower Branch
								Outfall 002 (Separated, waiting for PPC)	Storm Only	Rouge River, Lower Branch
								Outfall 003 (Will be separated by 2020)	No	Rouge River, Lower Branch
								Outfall 004 (Will be separated by 2020)	No	Rouge River, Lower Branch
								Outfall 005 (Separated, waiting for PPC)	Storm Only	Rouge River, Lower Branch
								Outfall 013 (Active, Working with MDEQ)	No	Rouge River
								Outfall 014 (Active, Working with MDEQ)	No	Rouge River
								Outfall 019 (Separated)	Storm Only	Rouge River, Lower Branch
								Outfall 020 (Separated)	Storm Only	Rouge River, Lower Branch
								Outfall 021 (Miller PS Emergency Overflow)	No	Rouge River
								Outfall 115 (RTB C4)	Yes	Rouge River
								Outfall 117 (RTB C6)	Yes	Rouge River
Outfall 106 (RTB C7)	Yes	Rouge River, Lower Branch								

Permittees	First Tier Member/Sewer District	NPDES Number	Facility/RTB	Effective	Expires	Status	RTB Capacity	Outfall Number	Currently Controlled/Treated? (Yes/No/Stormwater)	Receiving Surface Water
								Outfall 108 (RTB C8)	Yes	Rouge River, Lower Branch
City of Dearborn Heights and Wayne County Department of Environment	RVSDS	MI0051489	City of Dearborn Heights Combined Sewer Overflow RTB	10/1/2007	10/1/2011	Extended	2.7 MG	Outfall 001 (RTB)	Yes	Rouge River, Middle Branch
								Outfall U1	No	Rouge River, Upper Branch
								Outfall M13	No	Rouge River, Middle Branch
								Outfall M14	No	Rouge River, Middle Branch
								Outfall L43 (Separated)	Storm Only	Rouge River, Lower Branch
Wayne County Department of Environment, Charter Township of Redford, and City of Livonia	RVSDS	MI0051535	Redford Township Combined Sewer Overflow Retention Treatment Basin	11/1/2016	10/1/2021	In Effect	1.9 MG	Outfall 001 (RTB)	Yes	Rouge River, Upper Branch
								Outfall U2 (to be controlled by 2025)	No	Ashcroft-Sherwood Drain
								Outfall U3 (to be controlled by 2025)	No	Rouge River, Bell Branch of Upper Branch
								Outfall U4 (to be controlled by 2025)	No	Rouge River, Bell Branch of Upper Branch
								Outfall U5 (to be controlled by 2025)	No	Rouge River, Bell Branch of Upper Branch
								Outfall U9 (to be controlled by 2025)	No	Rouge River, Bell Branch of Upper Branch
								Outfall U10 (to be controlled by 2025)	No	Rouge River, Bell Branch of Upper Branch
Outfall U11 (to be controlled by 2025)	No	Rouge River, Bell Branch of Upper Branch								
City of Inkster	RVSDS	MI0051837	City of Inkster/City of Dearborn Heights Combined Sewer Overflow	10/1/2007	10/1/2011	Extended	n/a	Outfall 011 (to be controlled by 2025)	No	Rouge River, Lower Branch via Butler Drain
Wayne County Department of Environment and City of Inkster	RVSDS	MI0051471		10/1/2007	10/1/2011	Extended	3.1 MG	Outfall 001 (Inkster Rd CSO RTB)	Yes	Rouge River, Lower Branch

Permittees	First Tier Member/Sewer District	NPDES Number	Facility/RTB	Effective	Expires	Status	RTB Capacity	Outfall Number	Currently Controlled/Treated? (Yes/No/Stormwater)	Receiving Surface Water
			Inkster Combined Sewer Overflow Retention Treatment Basin					Outfall 10 (to be controlled by 2025)	No	Rouge River, Lower Branch
								Outfall L49 (Separated)	Storm Only	Rouge River, Lower Branch
Wayne County Department of Environment, City of Inkster, and City of Dearborn Heights	RVSDS	MI0051462	Wayne County/City of Inkster/City of Dearborn Heights Combined Sewer Overflow	10/1/2007	10/1/2011	Extended	n/a	Outfall L41 (to be controlled by 2025)	No	Rouge River, Lower Branch
								Outfall L42 (Only Inkster Portion has been Separated)	No	Rouge River, Lower Branch

4.3.3 Administrative Consent Orders in the Region

Typically, Administrative Consent Orders (ACOs) are entered into between the regulated entity and the state/federal agency where violations of permits conditions or specific rules/regulations have occurred, and the issues can be resolved between the parties short of a court action.

In July of 2011, the DWSD entered into an ACO with the MDEQ to resolve violations of the city's NPDES permit including stipulated penalties for past violations as well as for a future failure to meet the compliance program requirements outlined in the ACO. This ACO between the MDEQ and the DWSD was amended in 2012 with minor changes in compliance requirements and deadlines for completion of certain actions. In 2016, this ACO was amended a second time to incorporate the GLWA as jointly and severally liable with the City of Detroit and the DWSD for compliance with the ACO. In June 2017 the GLWA entered into an ACO with stipulated penalties for violation of its state issued air pollution control permit at the WRRF for exceeding limits for sulfur dioxide emissions. It is expected that the current ACO with respect to operations under the joint GLWA/DWSD NPDES permit will end once the new joint NPDES permit is issued in 2018.

ACOs have been used by MDEQ to successfully address overflows from separate sanitary systems (SSOs). These discharges of untreated sanitary waste are a result of variety of issues related to pump failures, pipe obstructions, valve malfunctions, infiltration of ground and stormwater, etc. Table 4-3 summarizes the most current ACOs associated with control of SSO discharges in the GLWA service area. In many cases, as shown in Table 4-4, the SSO discharges have been eliminated.

4.3.4 Long-term CSO Control Plan

In response to the requirements outlined in the NPDES permit, the DWSD developed a Long-term CSO Control Plan that addresses the control of discharges from combined sewer outfalls to the Detroit River and the Rouge River. In 2008, the Southeast Michigan Council of Governments estimated that approximately \$2.4 billion is being invested in Southeast Michigan to reduce combined sewer overflows and help improve water quality.⁹ The results of this investment include reduced sewer overflows, improved aquatic life, and local government collaboration to solve water quality issues. While tremendous achievements have been made to reduce combined sewer overflows, they are only part of the water quality solution.

The current Plan of Record is described below. The Plan of Record will be evaluated in comparison to other alternatives in Phase 2 of the wastewater master plan. The Plan of Record is presented here to document the CSO control technologies and control levels that it proposed in 2012.

The plan update reflected disposable in-line nets with disinfection for six of the seven subject Detroit River outfalls. Outfall B-07 Mt. Elliot is to be diverted to the Leib screening and disinfection facility and the existing outfall, which is monitored to document the frequency of discharge due to connections downstream to establish the level of control required.

For the six nets with disinfection facilities, the nets were grouped into two sizes: large nets having a 62.5 cubic feet per second (cfs) capacity/net and small nets having a 50 cfs capacity/net. A peak design flow rate representing 125 percent of the outfall's gravity sewer capacity was established with flow rates more than the total net capacity being screened by bar screens.

⁹ Investment in Reducing Combined Sewer Overflows Pays Dividends, Southeast Michigan Council of Governments, 2008.

Table 4-3. Administrative Consent Order Summary

Community	Sewer District	Original ACO Number	Name and Date of Most Recent ACO		Summary	Location of SSO
			Number	Date		
Allen Park	Allen Park	Consent Judgement Docket # 05-1491-CE	05-1491-CE	12/21/2005	SSOs were eliminated by constructing a pump station and storage tunnel to send flow from the City into the surcharged NWI in wet weather. PPC project plan was submitted to MDEQ for approval according to the City.	SSOs Eliminated
Center Line	Center Line	AFCO-SW01-006	AFO-SW07-001	n/a	Center Line reported SSOs in their sewerage system starting in 2000. On August 24, 2001, AFCO-SW01-006 was entered for Center Line to eliminate their SSOs at various locations and to remain within their total peak flow contract capacity. Center Line requested an increase of Contract Capacity to 13 cfs in 2014. They converted their 24-inch gravity outlet to a forcemain and installed an electric valve actuator at the SSO gate to further reduce SSOs into the Lorraine Drain. The City continues to have SSOs and did not certify the project. The City is currently working on a Corrective Action Program.	SSOs into the Lorain Drain via the Stephens Road Drain from the electronically actuated control structure located at the southeast corner of Van Dyke and Stephens Road.
Oakland County/COSDS	COSDS	DCA-OCWRC-2009-01	n/a	n/a	There were reported SSO events in 2004 and concern from MDEQ that the COSDS interceptor cannot convey wet weather flow without overflows. Oakland County Water Resources Commissioner installed a diversion to send 30 percent of flow to the Pontiac WWTP. Model has been accepted by the MDEQ. In final stages of completing minor requirements. Letter will be issued to close out DCA in December 2017.	SSOs Eliminated
Oakland County/EFSDS	EFSDS	FOA 2098	AFO-SW08-006	3/24/2009	EFSDS interceptor system and RTB regulator improvements were needed throughout the drainage district to mitigate SSOs. Phase 1 of projects include hydraulic improvements, Stonycroft Relief Sewer, and Wattles Road Linear Storage for the north evergreen interceptor. The projects were completed in July 2016, August 2016, and August 2017, respectively. Phase II Projects must be completed by 2022 and certified in 2023. EFSDS community ACOs are associated with the Oakland County ACO and will follow the same schedule.	SSOs at the Walnut Lake Pump Station Number 1 (located west of Inkster Road and north of 14 Mile Road off the Rouge River) and the 8 Mile Road and Evergreen Road intersection.
Beverly Hills	EFSDS	n/a	AFO-SW09-002	n/a		
Bloomfield Hills	EFSDS	n/a	AFO-SW09-004	n/a		
Bloomfield Township	EFSDS	FOA 2099	AFO-SW09-003	3/25/2009		
Farmington	EFSDS	n/a	ACO-SW09-005	n/a		
Farmington Hills	EFSDS	n/a	ACO-SW09-006	n/a		
Lathrup Village	EFSDS	n/a	AFO-SW09-2007	n/a		
Troy	EFSDS	n/a	ACO-SW09-006	10/1/2011		
West Bloomfield	EFSDS	n/a	ACO-SW09-005	n/a		
Clinton Township	MIDDD	ACO-SW00-002	AACO-000028	2/5/2014	Clinton Township has been working to eliminate SSOs from seven overflow pumps in two sewer districts since the early 2000s. They have completed I/I reduction projects including sewer lining, manhole rehab, and footing drain disconnection pilot projects. Clinton Township has since installed several relief sewers and corrected hydraulic restrictions and spent approximately 23.5 million in construction costs. The Township has requested additional capacity in the Macomb Interceptor. The Township shall submit Sanitary Sewer PPC Program report for District A by Feb 1, 2018 and District E by Feb 1, 2021.	SSOs at the overflow discharge points from Emergency Bypass Pump Stations PS-1, PS-2, PS-3, PS-4, PS-5, PS-6, and PS-9 in Drainage Districts A and E. See SSO map for Pump Station Locations
Fraser	MIDDD	ACO numbers are not known			The City of Fraser entered into an ACO with MDEQ in 2002. The MDEQ closed the ACO on July 19, 2016. Fraser completed the Hayes Masonic sanitary interceptor in 2011. Macomb county increased Fraser's Contract capacity, with the intent that Fraser would complete additional I/I as part of their 2016 SRF sewer rehab program and AMP.	SSOs Eliminated
Wayne County	RVSDS	FOA 2117	AACO-000031	7/29/2015	Reduce I/I and surcharging within the RVSDS. Construction projects are going on throughout the Sewer District. ACO in progress. Construction needs to be completed by Dec 30, 2022. PPC Program report due in 2023. RVSDS community ACOs are tied into the Wayne County ACO and will follow the same compliance schedule. ACO addresses City of Westland SSO points M-21, M-22, and M-25.	City of Westland SSOs at Regulators M-21, M-22, and M-25 along the Middle Rouge River. Other SSO locations within the RVSDS communities and RVSDS interceptors are unknown
City of Wayne	RVSDS	n/a	n/a	n/a		
Garden City	RVSDS	FOA 2097	AACO-000035	9/23/2015		
Northville	RVSDS	FOA 2096	AACO-000032	9/21/2015		
Plymouth	RVSDS	FOA 2095	AACO-000033	1/25/2016		
Westland	RVSDS	FOA 2114	AACO-000034	09/25/15		

Community	Sewer District	Original ACO Number	Name and Date of Most Recent ACO		Summary	Location of SSO
			Number	Date		
Melvindale	Melvindale	ACO-SW04-005	AFO-SW10-002	2/9/2010	Sanitary Pump station with one MG retention basin was constructed in 2006 to hold excess flow until pump station is capable of pumping flows into GLWA interceptor. The City was supposed to send the PPC report in 2014, and CAP in 2015 if SSO requirements were not met. There has been no action since 2014 and there have not been any SSOs in the City's system.	SSOs Eliminated
Milk River (CSO RTB)	NE Wayne	ACO-000114	ACO-000114	2/7/2014	Rehabilitation of the Milk River CSO RTB to meet dissolved oxygen water quality requirements. ACO is in progress.	None
Macomb Interceptor Drain Drainage District	MIDDD	ACO-004875	ACO-004875	9/18/2017	SSOs occurred due to December 2016 15 Mile Road Sinkhole.	SSOs Eliminated
Wayne County	NE Wayne	ACO-000115	ACO-000115	11/7/2011	Southeast Macomb Sanitary District was not able to discharge 102 cfs contract capacity through Marter Road Pump Station during several rainfall events. Upgrades were completed to Marter Road Booster Station and Kerby Road Pump Station to increase pumping capacity. Construction and PPC are complete. ACO is currently being closed.	SSOs Eliminated

Small facilities (i.e., design flow <250 cfs) are designed with netting capacities equal to or greater than the peak design flow. For these facilities, the manual bar screen is intended for emergency conditions if the nets become blinded and are unable to pass flow. For large facilities (i.e., design flow >250 cfs), the width of the facility is a key factor in determining the number of nets. For these facilities, the width of the chamber is consistent with the existing outfall width to fit the facility within the existing site, limit expansions and contractions to minimize hydraulic impacts, and limit the number of nets to a maximum of 20 per facility. Thus, some large facilities have a netting capacity less than the peak design flow. In these cases, the manual bar screen is sized to screen the peak flows and for emergency conditions. Table 4-4 below shows a summary of proposed netting facilities for the near east side area outfalls.

Table 4-4. GLWA LTCSO Plan of Record for Near East Side Detroit River

Outfall	Peak Design Flow (cfs)	Number/Size of Nets	Net Capacity
005 (B-03) McClellan/Cadillac	313	6 – L	375
006 (B-04) Fischer	1,600	20 – L	1,250
007 (B-05) Iroquois	633	10 – L	625
008 (B-06) Helen	400	6 – L	375
011 (B-09) Adair	91	2 – S	100
012 (B-10) Joseph Campau	1,238	8 – L	500

In a letter dated May 19, 2010, the MDEQ approved recommended revisions to the Long-term CSO Control Plan for the Rouge River. The specific elements of the program as approved by the MDEQ, as well as their current status, are presented in Table 4-5.

Table 4-5. GLWA LTCSO Plan of Record for Rouge River

Rouge River CSO Control Program		
Approved Program Element	Rouge River Location	Status
Completion of Oakwood Pump Station and RTB	Lower Main Rouge	Complete
Baby Creek CSO Facility Improvements	Lower Main Rouge	Complete
Carbon, Fort St. CSO Elimination	Lower Main Rouge	Complete
Hubbell-Southfield RTB Reinvestment (rehab)	Lower Main Rouge	Complete
TRC Minimization and Stream Monitoring	Lower Main Rouge	Complete
Existing CSO Facility Reinvestment (rehab)	Lower Main Rouge	Complete
Oakwood Sewers Segment 2	Lower Main Rouge	Complete
Oakwood Sewers Segment 3	Lower Main Rouge	Under reevaluation for need
Oakwood Sewers Segment 4	Lower Main Rouge	Under reevaluation for need
RRO2 Segment 1 work—WRRF	Lower Main Rouge	Complete
RRO2 Segment 2 work—Conduit	Lower Main Rouge	RRO disinfection progressive design build— in progress
Task 1 In-system Gates Reinvestment (rehab)	Upper Main Rouge	Complete
Seven First Flush Tanks (With Disposable Nets, In-pipe Disinfection)	Upper Main Rouge	Pending WSCS M&M Program, GI, and WWMP evaluation*

Rouge River CSO Control Program		
Pembroke First Flush Pilot (With Disposable Nets, In-pipe Chlorination or Alt) disinfection)	Upper Main Rouge	Pending WSCS M&M Program, GI, and WWMP evaluation
Seven Mile East First Flush Pilot (With Disposable Nets, In-pipe Chlorination or Alt Disinfection)	Upper Main Rouge	Pending WSCS M&M Program, GI, and WWMP evaluation
Glenhurst CSO PS/Diversion	Upper Main Rouge	Pending WSCS M&M Program, GI, and WWMP evaluation
Green Infrastructure Program	Upper Main Rouge	In progress

*WSCS M&M Program—West Side Collection System Monitoring and Modelling Program

*GI—Green Infrastructure Program

*WWMP—Wastewater Master Plan

The May 19, 2010, approval of the Rouge River Long-term CSO Control Plan was based on the following two reports submitted by DWSD:

- Evaluation of CSO Control Alternatives, December 15, 2009
- Supplemental Report on Alternative CSO Controls for the Upper Rouge River Outfalls, April 30, 2010

The December 15, 2009, Evaluation of CSO Control Alternatives report proposed that the three north outfalls (Pembroke, Seven Mile, and Glenhurst) be controlled separately from the 14 southern outfalls extending from Warren Avenue to McNichols Road. It was recommended that the smaller Pembroke and Seven Mile outfalls be controlled using first flush basins with disposable nets and in-pipe chlorination or alternative disinfection. Since this technology had not been previously employed, it was proposed that the facilities be constructed and piloted to demonstrate that the objectives could be accomplished prior to proceeding with the remaining facilities. The Glenhurst outfall would be addressed by redirecting flow via piping or a pump station. The 14 southern outfalls were to be controlled by the Upper Rouge Tunnel 2 (URT2), a smaller version of the originally recommended 30-foot diameter 201 million gallon storage capacity Upper Main Rouge Tunnel.

The MDEQ accepted the controls proposed for the northern outfalls, but expressed concerns over the smaller RRT2 control approach, which would reduce untreated CSO discharges from these outfalls to less than 3.2 events per year on average. The MDEQ requested that DWSD reevaluate alternatives for controlling the 14 southern outfalls.

Based on the previous paragraph, DWSD performed additional detailed analyses and alternatives evaluation, and prepared the Supplemental Report on Alternative CSO Controls for the Upper Main Rouge River Outfalls. Alternative 3B in that report was ultimately selected as the recommended control approach for the 14 outfalls extending from Warren Avenue to McNichols Road. In summary, Alternative 3B recommended the following:

- 7 first flush capture basins
- 11 in-pipe disinfection facilities (required at all outfalls not proposed to be closed)

- 11 disposable net facilities (required at all outfalls not proposed to be closed)
- Outfalls to be closed
- Conveyance from remote outfall sites by means of gravity sewers as opposed to pump stations
- Total first flush volume approximately 31 million gallons

Alternative 3B also included provision for additional peak flows up to 546 cfs from adjoining combined sewer areas in Redford and Dearborn Heights. The three outfall locations and the corresponding suburban community peak flows were estimated as follows:

- West Warren Siphon—76 cfs from Dearborn Heights
- West Chicago Siphon—345 cfs (45 cfs from Dearborn Heights and 300 cfs from Redford Twp.)
- Lyndon Brammel—125 cfs from Redford Township

A summary of the CSO control measures proposed at each of the 17 outfall locations in the Upper Main Rouge River based on the recommendations presented in the two reports are shown in Table 4-6.

Table 4-6. GLWA LTCSO Plan of Record for Upper Main Rouge River Outfalls

Outfall	NPDES ID	CSO Control Measure
West Warren Siphon	059	Diversion to Trinity-Tireman In-pipe Disinfection Facility Disposable Net Facility (eight nets, two tiers)
Trinity-Tireman	060	First Flush Capture Basin—5.9 MG In-pipe Disinfection Facility Disposable Net Facility (ten nets, two tiers)
West Chicago	061	First Flush Capture Basin—6.2 MG In-pipe Disinfection Facility Disposable Net Facility (ten nets, two tiers)
West Chicago Siphon	062	Diversion to West Chicago In-pipe Disinfection Facility Disposable Net Facility (eight nets, two tiers)
Plymouth	063	Diversion to West Chicago Siphon Bulkhead Outfall
Glendale	064	First Flush Capture Basin—2.7 MG In-pipe Disinfection Facility Disposable Net Facility (ten nets, two tiers)
Lasher-Dolson	065	First Flush Capture Basin—3.1 MG In-pipe Disinfection Facility Disposable Net Facility (eight nets, two tiers)
Schoolcraft/West Parkway	066/067	Diversion to Lasher-Dolson In-pipe Disinfection Facility Disposable Net Facility (five nets, two tiers)
Brammel (Ray)	068	Diversion to Lyndon Bulkhead Outfall
Lyndon	069	First Flush Capture Basin—3.5 MG In-pipe Disinfection Facility Disposable Net Facility (14 nets, two tiers)
Puritan	072	First Flush Capture Basin—1.3 MG In-pipe Disinfection Facility Disposable Net Facility (ten nets, two tiers)
Florence (Riverdale)	073	Diversion to Puritan Bulkhead Outfall

Outfall	NPDES ID	CSO Control Measure
McNichols/Six Mile Relief	074	First Flush Capture Basin—8.2 MG In-pipe Disinfection Facility Disposable Net Facility (40 nets, two tiers)
Glenhurst	075	Diversion to NWI Bulkhead Outfall
Seven Mile	077	First Flush Capture Basin—2.2 MG In-pipe Disinfection Facility Disposable Net Facility (ten nets, two tiers)
Pembroke	079	First Flush Capture Basin—1.5 MG In-pipe Disinfection Facility Disposable Net Facility (ten nets, two tiers)

The MDEQ’s program approval also recognized a phased implementation of the Rouge River CSO Control Plan that will span 25 years and include a reassessment of DWSD’s financial capacity for this plan, which will be submitted with each NPDES permit renewal application.

4.3.5 Industrial Wastewater Management

The national industrial pretreatment program was initiated by the U.S. EPA in 1983 with the promulgation of the general pretreatment regulations under the CWA. The purpose of the program was to control the discharge of industrial waste into publicly owned treatment works (POTWs) that could result in the following:

- Blocking waste transport system or creating potential for fire or explosion in the POTW
- Disrupting biological or chemical treatment in the POTW, damaging physical integrity, or causing corrosion of transport or treatment elements of the POTWs
- Worker exposure to hazardous substances at the industrial facility or those working in the POTWs
- Environmental pollution due to pass through discharge of toxic substances that are not controlled/treated within the POTWs system
- Increased cost or restrictions in management or disposal of biosolids generated at POTWs

Enforcement of the industrial pretreatment program (IPP) in Michigan is based upon rules promulgated by the state and incorporated into the NPDES permits of POTWs. POTWs typically enforce permit requirements through locally adopted ordinances regulating wastewater customers or through contracts and interagency agreements with other public wastewater collection entities. In general, an IPP requires routine monitoring and reporting of certain chemicals and characteristics of waste discharges from industrial sources.

Local POTWs may choose to regulate smaller industrial dischargers under rules that allow for less rigorous monitoring and reporting requirements for nonsignificant categorical industrial users (NSCIU) and categorical industrial users (CIU). Typically, a significant industrial user (SIU) monitors the discharge of heavy metals, and other specified hazardous substances, pH levels, oils, total volume of discharge, and other waste characteristics and provides reports to the POTW available for review by the MDEQ. Industrial facilities are subject to onsite inspections to determine compliance with standardized sampling and analysis protocols.

The GLWA summarized its IPP results in 2017 and reported by standard industrial classification code discharges to its transport and treatment system. See Table 4-7. There were 274 reporting

SIUs within the DWSD/GLWA service area in 2017, with a total average flow of 26.98 million gallons per day (mgd). This is in sharp contrast to the 56.88 mgd reported for 418 separate SIU dischargers in the same service area for 2006—a nearly 50 percent reduction in total average SIU flows and number of SIU facilities. The decline in number and volume of discharges from SIUs in the DWSD/GLWA service area most likely began just before 2007 through 2009. The SIU character and sources also changed dramatically in the period between 2002 and 2017. In 2002, there were 403 separate SIU dischargers with the top 5 percent contributing 52 percent of the total annual average of 44 mgd. Of the 20 top dischargers, 18 were manufacturing facilities. In 2017, the GLWA SIU reports indicated that the top 20 dischargers represented 59 percent of the total annual average of 27 mgd and that only 13 were classified as manufacturing, the other seven being utilities, hospitals, and transportation facilities.

Table 4-7. Annual Wastewater Flows from Significant Industrial Users

Year	Average mgd	Number of SIUs
2001	45	403
2006	56.88	418
2009	28.19	302
2012	21.93	280
2017	26.98	275

In the 2003 DWSD master plan, it was noted that industries had already begun to alter their manufacturing processes, resulting in less-polluted and lower-volume discharges through recycling water and enhanced pretreatment. While there has been an increase in recycling and reuse of process water by industries in the service area that could account for some of the reduction in flows between 2006 and 2009, a significant portion of the reduction in discharges from SIUs appears to be due to decreased production and facility closures. Between 2009 and 2017, the number of SIUs in the DWSD/GLWA service area has remained relatively stable based upon data compiled for years 2009, 2012, and 2017. Data from these same three years shows the number of reporting SIUs has ranged from 275 to 302 and the total annual discharge volumes have ranged from 21.93 mgd to 28.19 mgd. There are several thousand small (non-SIU) industrial/commercial facilities that collectively represent a small fraction of the total discharges that are not significant contributors and often are not continuous.

The number and volume of SIU discharges projected in 2003 for 2020 (41.5 mgd), in what is now the GLWA's service area, is much greater than that measured in 2018 (26.98 mgd). It is unlikely that SIU discharges will exceed 30.00 mgd anytime in the near future and the discharges from SIUs could be significantly less if there is a decrease in demand for automobiles and other manufactured goods produced in Southeast Michigan.

4.3.6 Water Resource Recovery Facility

The Great Lakes Water Authority and the City of Detroit Water and Sewerage Department are regulated by the National Pollutant Discharge Elimination System (NPDES) permit (#MI0022802) issued by the State of Michigan Department of Environmental Quality. This permit authorizes the discharge of effluent from the WRRF to the Detroit River and the Rouge River, and from combined sewer overflow facilities to the Detroit River, the Rouge River, and Conner Creek. The current permit was issued on March 1, 2013, modified on June 22, 2015, and again on January 1, 2016. The modified permit expires in 2018 and the new permit is currently under negotiations.

There are currently four monitoring points for final effluent at the WRRF: 049F, 049A, 049B and 050A, discharging through two outfalls, the Detroit River outfall (DRO 049) and the Rouge River outfall (RRO 050) as shown schematically in Figure 4-1 below.

Monthly effluent limits are summarized in Table 4-8 below. As noted, upon initiation of operation of the RRO Disinfection project, fecal coliform, total residual chlorine, dissolved oxygen and PCB limits for the RRO come into effect.

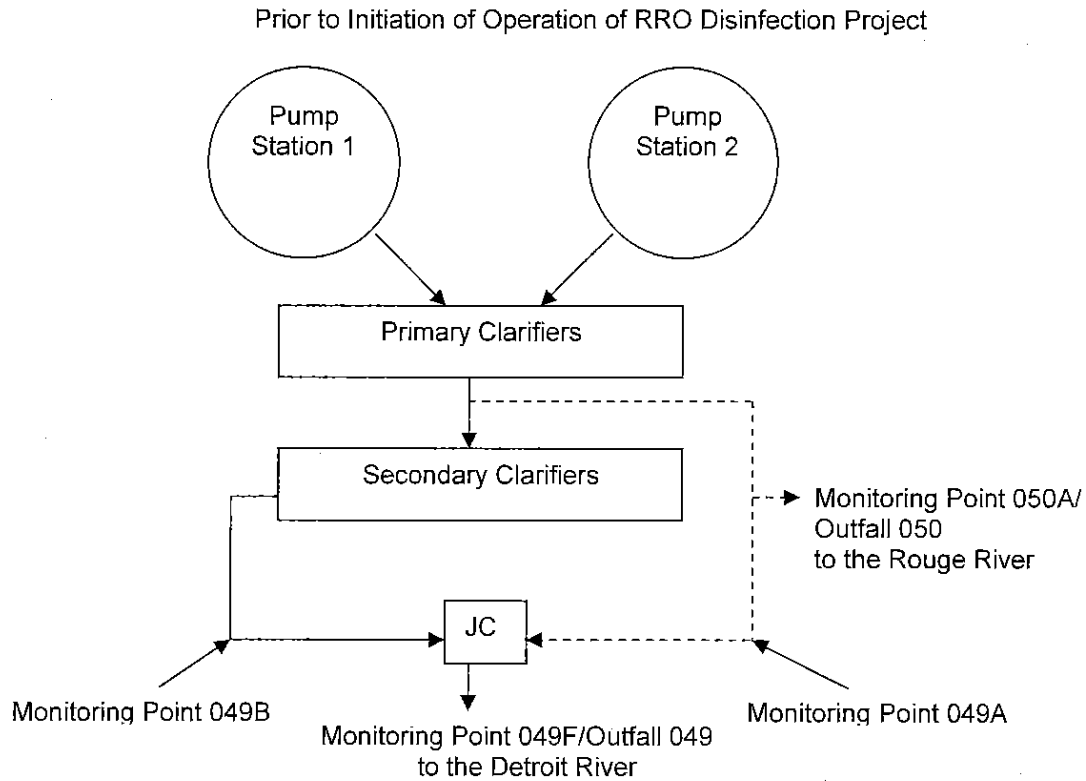


Figure 4-1. Four Monitoring Points for Final Effluent at the WRRF

Table 4-8. Current NPDES Permit Limits for WRRF Effluent

Parameter	049F	049A	049B	050A	050A*
Flow (mgd)	report	report	report	report	report
Recycled Flow (mgd)	--	--	report	--	--
Buffer Flow (mgd)	--	--	report	--	--
Fecal Coliform (cts/100 ml)	200	--	--	report	200
Total Residual Chlorine (mg/L)	0.11	--	--	--	0.038
PCBs (ug/L)	2.6×10^{-5}	--	--	report	2.6×10^{-5}
cBOD ₅ (mg/L)	--	40	25	40	40
TSS (mg/L)	--	70	30	70	70
Total Phosphorus (mg/L)					

Parameter	049F	049A	049B	050A	050A*
April - September	--	1.5	0.7	1.5	1.5
October - March	--	1.5	0.6	1.5	1.5
Ammonia Nitrogen (mg/L)	--	report	Report	report	report
Available Cyanide (ug/L)	--	--	--	89	89
Total Copper (ug/L)	--	--	--	--	--
Total Mercury (ng/L)	--	36	10	--	--
pH	6.5 to 9.0	--	6.0 to 9.0	6.5 to 9.0	6.5 to 9.0
Dissolved Oxygen (mg/L)	report	--		report	3

Notes:

Total residual chlorine is a daily maximum limit

Total Mercury is a 12-month rolling average;

Cyanide is a daily maximum limit;

Copper shall be reported daily

*Upon completion of the RRO disinfection project

The NPDES permit also sets effluent limits and reporting requirements for the Combined Sewer Overflow Retention Treatment Basin Discharges (101A, 102A, 103A, 104A, 108A and 109A) and Screening and Disinfection Facilities (105A, 106A and 107A). The RTBs and SDFs shall report flow, cBOD₅, TSS, ammonia nitrogen, total phosphorus, total residual chlorine, oil & grease, pH and dissolved oxygen and shall meet a fecal coliform limit of 400 cts/100 ml, May through October, and 1,000 cts/100 ml November through April. The total residual chlorine minimization program is designed to operate the CSO RTBs and SDFs in a manner that will provide consistent, effective disinfection while minimizing the discharge of TRC, recognizing the overall goal is compliance with the TRC Final Acute Value of 0.038 mg/L at any point in the receiving stream, unless it is determined that a higher level is acceptable.

GLWA also has limited discharge authorization for discharges from a number of combined sewer overflows assuming, to the maximum extent practicable, the available sewerage system conveyance capacity for the delivery of combined sewage to the treatment facility is utilized.

4.3.6.1 Residuals Management Program

The national standards for the use or disposal of sewage sludge is governed by 40 CFR Part 503. This includes land application standards (subpart B) and incineration standards (subpart E). The distribution and disposal of pellets from the Biosolids Drying facility are also governed by the 503 regulations. GLWA is authorized to land apply bulk biosolids or prepare bulk biosolids for land application in accordance with the Residual Management Program approved in April 2008 including all modifications in accordance with the Michigan Administrative Code (Part 24 Rules)

4.3.6.2 Air Permit

In accordance with the Clean Air Act (Part 55 of Michigan Act 451) GLWA currently operated under a Title V air permit which addresses air emissions from Complex I and Complex II incinerators, the Biosolids Drying Facility, as well as four boilers, 17 emergency generators, incinerator ash storage and conveying systems, lime storage operations and the lime pad, all located at the treatment plant site. New, more stringent emissions guidelines for Sewage Sludge Incinerators (SSI) recently became effective in March, 2016. As a result, GLWA decommissioned the six Complex I incinerators (and replaced with the Biosolids Drying Facility) and made

significant upgrades to the eight Complex II incinerators to meet the emissions limits in *40 CFR Part 62 Federal Plan Requirements for Sewage Sludge Incineration Units Constructed on or Before October 14, 2010*.

Emissions from the Complex II incinerators are controlled through a venture scrubber followed by an impingement tray wet scrubber and mist eliminator. Improvements included an upgraded impingement tray scrubber followed by a new venture scrubber and mist eliminator. Treated exhaust from the incinerators exhaust to a flue (stack). Flues for incinerators 7-10 are enclosed in tall stack II and flues for incinerators 11-14 are enclosed in tall stack III. Emissions from BDF include a three-stage impingement tray scrubber followed by a regenerative thermal oxidizer and a packed tower liquid counter flow scrubber. Emissions from the recycle bin are controlled with a fabric filter collector.

4.3.7 Green Stormwater Infrastructure

As part of Adaptive Management and the Green Stormwater Infrastructure (GSI) Initiative, Part I, Section a.15.d.9 of the NPDES permit requires alternative control of stormwater runoff from new development and redevelopment (that would otherwise be conveyed to combined sewers) to help reduce the volume and frequency of untreated CSO discharges. To address this requirement, the City of Detroit has prepared a postconstruction stormwater control ordinance that will be presented to Detroit City Council for adoption. In addition, the stormwater drainage charge and credit programs that levy charges to address runoff from impervious surfaces are expected to result in considerable stormwater flow reduction to the combined sewer system. Further, the City of Detroit has undertaken a review of the existing city codes to identify and remove barriers to GSI practices that will be required by proposed postconstruction stormwater management regulations or incent the creation of multifunctioning landscapes within commercial/industrial developments. Included as Appendix II, is the DWSD submittal dated April 1, 2017, addressing the permit requirement for stormwater control for new development and redevelopment, inclusive of a procedure and schedule for implementation.

While GLWA focuses on operation of the regional systems to maximize treatment of wet weather flows introduced to the combined sewer system, DWSD is focused on reducing or eliminating wet weather flows from the combined sewer system where feasible. To accomplish this, DWSD is fully committed to implementing GSI.

DWSD believes that implementation of effective GSI strategies will result in significant reduction of stormwater into combined sewers. The sheer number of completed and planned building demolitions within the subject tributary area have significantly changed imperviousness and hydrology since the preparation of the Long-term CSO Control Plan for Detroit River outfalls. The potential for additional stormwater reduction is expected to be even more significant through the adoption of the new stormwater ordinance and implementation of the drainage charge and credits programs in the city of Detroit.

4.3.8 Municipal Separate Storm Sewer Systems (MS4)

Under the amendments to the CWA in 1987 that regulated stormwater discharges from municipal separate storm sewer systems, the U.S. EPA, through the states, required that stormwater discharges from MS4s be permitted under the NPDES. The NPDES program for stormwater, at first, required that MS4s implement the six minimum control measures (MCMs) to the maximum extent practicable. These MCMs include:

1. Public outreach and education

2. Public involvement
3. Postconstruction runoff control (new development and redevelopment best management practice requirements)
4. Pollution prevention and good housekeeping (municipal operations)
5. Construction site runoff control
6. Illicit discharge detection and elimination

The NPDES MS4 program was separated into Phase I (communities greater than 250,000 persons or groups of communities comprising a municipal region greater than 250,000 persons) and Phase II (communities with fewer than 250,000 persons). Phase I was implemented beginning in 1990 and Phase II began in 2003. The NPDES permits had five-year cycles, with additional requirements added to the permits during renewal if receiving water impairments continued or were detected.

4.3.9 Total Maximum Daily Loads (TMDLs)

The U.S. EPA's CWA Section 303(d) program assists states, territories, and authorized tribes in submitting lists of impaired waters and developing a TMDL—the maximum load of a pollutant that can enter a receiving water from all sources that will not result in the receiving water being impaired. The TMDL is to take into account naturally occurring sources and then determine—through monitoring, modeling, and other best available science—the maximum load of a specific pollutant that those controllable discharge sources can contribute each day that will not result in impairment of the receiving water.

The TMDLs are amendments to the water quality control plans for the receiving waters. Water quality control plans define the beneficial uses and water quality criteria necessary to achieve or maintain the uses of those receiving waters. These water quality control plans are the defining documents for a receiving water that are used to set NPDES permit conditions. If receiving waters are impaired as defined in that water body's water quality control plan, then, under Section 303(d) of the CWA, the U.S. EPA, through state action, has the option to amend the water quality control plan with a TMDL. The establishment of many of these TMDLs in Southeast Michigan was accelerated due to litigation by third parties that believed adequate response actions were taking too long. In some parts of the U.S., TMDLs have been adopted and loads are being incorporated into NPDES permits for stormwater and wastewater. This is changing stormwater NPDES permits from a maximum extent practicable standard (i.e., a technology-based effluent limit standard) to a mass loading or water quality-based effluent limit standard.

4.4 Future Regulatory Compliance Landscape

The regulatory compliance history and status described in sections 4.2 and 4.3 demonstrate the constantly evolving and adaptive nature of clean water policy implementation at the federal, state, and local level. Appropriately, adaptive management practices serve an important role in driving progress towards water quality goals, while providing the flexibility needed to adjust to changing economic conditions, technological advances, compliance obligations, or jurisdictional responsibilities. This section describes recent developments in clean water policy implementation, potential future regulatory requirements, and other future compliance options that are being considered in the development of the GLWA service area wastewater master plan.

4.4.1 Regional Approach to Achieving Clean Water Goals

Following the City of Detroit's agreement to the long-term lease of its sewerage and water supply system to the GLWA, and subsequent approval of the GLWA Articles of Incorporation under Michigan PA 233 of 1955 by the three counties and the city of Detroit, the GLWA became the lease holder (owner) of the sewerage and water supply system and the DWSD became the operator of the wastewater collection system and water distribution system in the City of Detroit. As owners and operators under state and federally delegated pollution control laws, the GLWA and the DWSD are jointly responsible for meeting permitting and related ACO's requirements under a joint NPDES permit.

Including the three counties, with the city of Detroit, as part of the governance of the GLWA has been a major first step in building a consensus on regional wastewater master planning and coordinated achievement of water pollution control goals based on holistic planning principles. However, major work remains to fully integrate regional efforts and compliance strategies to achieve the various state water quality compliance program requirements across the GLWA service area.

Communities or sanitary wastewater districts (operating under the Drain Code) with contracts with the GLWA for wastewater services have separate obligations for obtaining construction permits and/or NPDES discharge permits for facilities each owns and/or operates. There are currently 13 separate NPDES permits, in addition to the joint permit for GLWA/DWSD, with four wastewater drainage districts and the cities of Dearborn and Inkster encompassing a total of over 30 outfall discharges. Most of these discharges involve retention and treatment of wet weather CSOs.

These multiple permits and related administrative orders of consent impede local efforts to integrate long-term planning and implementation for a comprehensive wastewater management system for the region encompassed by the GLWA service area. Further complicating planning and operation of integrated comprehensive wastewater management for the region are state/federal NPDES requirements for industry and public agencies for the regulation of stormwater and related nonpoint pollution sources.

Consolidation of all point source discharges into a single, comprehensive permit, regional coordination of nonpoint/stormwater programs, and/or adoption of the U.S. EPA's Regional Planning Framework as implemented in other areas of the country have all been considered as approaches to better coordinate and integrate regional efforts to achieve the desired outcomes identified in Section 2.6.

4.4.2 Consolidation of Point Source Discharge Permits (Single Regional NPDES Permit)

The GLWA provides broad authority for two or more municipalities to join together for the purpose of managing all aspects of water or wastewater facilities¹¹. Nothing within Act 233 precludes the GLWA from entering into new expanded agreements. Public entities, currently contracted GLWA customers, could enter into agreements similar to one between the GLWA and

¹¹ State of Michigan Legislature. Excerpt Michigan Natural Resources and Environmental Protection Act Michigan Legislature - Act 233 of 1955, Municipal Sewage and Water Supply Systems. 124.282 Incorporation of authority by municipalities; purpose; adoption of articles of incorporation; endorsement; territory; publishing and filing articles of incorporation; effective date; presumption of validity. (On line accessed 4/12/2018). Available [http://www.legislature.mi.gov/\(S\(pg0ziiul1kqfrof4vry02sn\)\)/mileg.aspx?page=getObject&objectName=mc1-124-282](http://www.legislature.mi.gov/(S(pg0ziiul1kqfrof4vry02sn))/mileg.aspx?page=getObject&objectName=mc1-124-282)

the city of Detroit, such that the GLWA could become a sole or joint owner/operator of all sanitary transport and treatment facilities currently served by the GLWA regional system. New legal arrangements detailing ownership; financial obligations for operation; and capital costs, including debt responsibilities, general liability, and related issues between the GLWA and each primary customer (i.e., municipality and sanitary wastewater district) would need to be negotiated and agreed upon.

While the provisions of Article Three in the GLWA Articles of Incorporation¹² would not exclude broadening the scope of the GLWA to include other facilities, changes embodying the new legal arrangements would need to be incorporated into a revised document submitted to and approved by the participating local units of government. However, if the operation and ownership of treatment and transport systems remained separated as they are now between the GLWA and the DWSD, the issuance of a single regional NPDES permit would still be problematic.

Although this option appears to have potential to consolidate required permits, it is not very attractive as a short-term approach since it would require extensive time to negotiate and resolve the interagency funding and legal responsibilities of the public entities involved. It is more complex than options in past negotiations of the current GLWA lease arrangement with the city of Detroit and the three county/city agreement on the operation of the GLWA that was facilitated through the U.S. bankruptcy court.

The public entities currently part of the GLWA as well as its public wastewater service customers could negotiate an entirely new alternative approach to the management of sanitary wastewater to achieve the preferred outcomes identified in this plan. Under this new approach, a single regional governmental entity, such as an expanded GLWA, could have the technical and financial resources and authority to implement integrated regional responses to state and federal mandated requirements that could be more cost effective and efficient.

This new approach would require state legislation. If consensus among the local governmental entities affected could be achieved for governance under such a new regional authority, bipartisan state legislative support for such a new law is likely, given the collective political power of the region. The broad legislative support and quick passage of the Watershed Alliance legislation (Act 451 of 1994) at the urging of Southeast Michigan's Rouge River communities is an example of how consensus among diverse communities in Southeast Michigan can result in bipartisan support for enabling state legislation.

4.4.3 Coordination of Nonpoint Source (Stormwater) Water Pollution Control Programs

In response to a growing recognition that control of nonpoint sources of water pollution was an essential component in achieving water quality standards and responding to rapidly expanding state and federal programs for stormwater regulation, local communities within the Rouge River watershed proposed a then-unique watershed approach to stormwater management. The watershed approach to stormwater management was established by the Rouge River Watershed

¹² Articles of Incorporation of Great Lakes Water Authority (Excerpt)

Article 3 Purpose

The Authority is incorporated for the purpose of acquiring, owning, leasing, improving enlarging, extending, financing, refinancing, and operating a water supply system and a sewage disposal system, including a stormwater collection and treatment system, or a combination of such systems, and for exercising any of the powers of the authority under these articles and for purposes authorized under Article 7, Section 28 of the Michigan Constitution, the Act (Act 233 of 1955) and other Michigan law.

Local Management Assembly that included three counties and 38 local communities under memorandum of agreement. The communities and counties formally established the Alliance Rouge Communities following the passage of Act 451 of 1994¹³, and the ARC was used by Wayne County to administer stormwater management demonstration projects implemented by governmental agencies and not-for-profit organizations using Rouge Project federal funds and local matching dollars. In 2003, Michigan initiated a watershed-based stormwater permit option to meet federal stormwater permit requirements and the ARC members sought coverage using the results of the federally and locally funded subwatershed plans and demonstration projects.

Unfortunately, Michigan's 2003 watershed-based stormwater permit program encountered implementation issues between the state and particularly the public agency members of the ARC. In 2008, a new general stormwater permit was issued by the state. Eventually, 73 public entities in Southeast Michigan filed for contested hearings to resolve disputes involving both permits. Concurrently, there was litigation in state court concerning the state-issued stormwater permits. Michigan issued new stormwater permit requirements in 2016 following federal guidelines that did not include a watershed-wide approach. The contested hearings involving the 2003 and 2008 stormwater permits were never resolved.

Despite this, the current ARC has over 40 full members representing 95 percent of public entities eligible for membership in the three counties and a number of associate members. The ARC still performs the function of assisting member organizations in meeting stormwater permit requirements and coordinates other cooperative efforts and funding to improve the water quality, riverine wildlife habitat, and recreational benefits within the Rouge River watershed. Without question, this voluntary association of local governments, public educational institutions, and nonprofit partners has provided a model for a comprehensive, coordinated approach to the control of nonpoint sources of pollution. The cost savings and efficiencies in cooperative approaches compared to individual, compartmentalized efforts have been substantial. Most importantly the results have demonstrated how, by working together, substantial improvements in the quality and uses of the Rouge River have been achieved in a cost-effective manner more so than working alone.

The ARC model could be effectively applied to the remaining portions of the GLWA service area not part of the Rouge River watershed without any change to existing laws or regulations. As a minimum, to establish a watershed alliance under the state statute, a watershed plan, a map identifying the watershed boundaries, and a list of participating governmental units would need to be developed.

Since watershed alliances under state law are voluntary, only communities that determine a cooperative stormwater management program to be beneficial, would join together. Communities, like Detroit, in which virtually all stormwater runoff finds its way to the city's combined sewer and treatment system would likely not join a watershed alliance. Those current customers of the GLWA that have runoff and stormwater discharges to the Clinton River or to Lake St. Clair may find using the RPO model valuable in addressing nonpoint and stormwater pollution sources and meeting state/federal permit requirements.

¹³ State of Michigan Legislature. Excerpt Michigan Natural Resources and Environmental Protection Act Michigan Legislature - Act 451 of 1994. 324.31202 Watershed Alliance. (On line accessed 3/13/2018). Available [http://www.legislature.mi.gov/\(S\(oliisfrok44feol3pco3pwyr\)\)/mileg.aspx?page=getobject&objectname=mcl-324-31202](http://www.legislature.mi.gov/(S(oliisfrok44feol3pco3pwyr))/mileg.aspx?page=getobject&objectname=mcl-324-31202)

4.4.4 U.S. EPA Integrated Planning Framework

In response to the increasing costs of controlling discharges from CSOs, SSOs, and MS4s, public entities subject to these regulatory programs requested that the U.S. EPA consider an alternative approach to the siloed enforcement mechanisms that had been traditionally employed. The utilities claimed that investing in CSO and SSO controls may cost more for each pound of pollutant load removed than if they were to implement MS4 controls; therefore, they sought a more integrated and holistic approach to prioritizing receiving water quality improvement efforts across all compliance requirements.

In 2011, the U.S. EPA announced an initiative to develop an integrated approach to more holistically address the various CWA compliance requirements. The U.S. EPA October 27, 2011, memorandum titled *Achieving Water Quality through Integrated Municipal Stormwater and Wastewater Plans* acknowledged that many local governments face difficult financial conditions in meeting all CWA obligations and outlined a framework by which local governments could prioritize their stormwater and wastewater investments in a manner that maximizes water quality gains, including taking advantage of green stormwater infrastructure practices.

In June of 2012, the U.S. EPA published the final *Integrated Municipal Stormwater and Wastewater Planning Approach framework*. The Integrated Planning Framework (IPF) states that this approach does not reduce the requirements of the CWA, nor does it extend the time for compliance. The framework does, however, encourage communities to focus resources on the most apparent needs across enforcement mechanisms in order to get the most benefit for investments in capital improvements, operation, and maintenance.

While neither lowering water quality requirements nor extending compliance deadlines, according to the U.S. EPA, this integrated planning framework is intended to provide flexibility to NPDES permittees in addressing their most pressing water quality improvement needs for municipal wastewater and stormwater management. The following summary of overarching principles, guiding principles, and key elements have been identified as guidance by the U.S. EPA for municipalities and communities who chose to implement an integrated planning approach.

Overarching Principles

- Maintain existing regulatory standards that protect public health and water quality.
- Allow a municipality to balance CWA requirements in a manner that addresses the most pressing public health and environmental protection issues first.
- Responsibility to develop an initial integrated plan rests with the municipality
- The U.S. EPA and/or State will determine appropriate responses, including developing requirements and schedules in enforceable documents.
- Innovative technologies, including green infrastructure, are important tools that can generate multiple benefits, and form the foundation for integrated plans.

Guiding Principles

- Reflect state requirements and planning efforts and incorporate state input on priority setting and other key implementation issues.

- Meet water quality standards and other CWA obligations by utilizing existing flexibilities in the CWA and its implementing regulations, policies, and guidance.
- Maximize the effectiveness of funds through analysis of alternatives and the selection and sequencing of actions needed to address human health and water quality-related challenges and noncompliance.
- Evaluate and incorporate, where appropriate, effective sustainable technologies, approaches, and practices, particularly including green infrastructure measures, in integrated plans where they provide more sustainable solutions for municipal wet weather control.
- Evaluate and address community impacts and consider disproportionate burdens resulting from current approaches as well as proposed options
- Ensure that existing requirements to comply with technology-based and core requirements are not delayed.
- Ensure that a financial strategy is in place, including appropriate fee structures.
- Provide appropriate opportunity for meaningful stakeholder input throughout the development of the plan.

Integrated Plan—Key Elements

- Description of the water quality, human health, and regulatory issues to be addressed in the plan
- Description of existing wastewater and stormwater systems under consideration and summary information describing the systems' current performance
- Process that opens and maintains channels of communication with relevant community stakeholders in order to give full consideration of the views of others in the planning process and during implementation of the plan
- Process for identifying, evaluating, and selecting alternatives and proposing implementation schedules
- Measuring success—As the projects identified in the plan are being implemented, utilize a process for evaluating the performance of projects identified in a plan, which may include evaluation of monitoring data, information developed by pilot studies, and other studies and other relevant information.
- Improvements to the plan

The U.S. EPA provides additional guidance for implementation of the integrated plans once they are developed. They recommend that the plans be implemented through incorporation into the NPDES permits of the respective communities/utilities or through an enforcement action such as administrative or court decrees issued by consent.

The IPF aligns well with the GLWA service area's complex regulatory landscape and goals to achieve water quality objectives through holistic, watershed wide, and receiving water quality-based approaches. Applicable elements of the IPF for the GLWA service area include:

- WRRF improvements to meet future anticipated NPDES requirements
- Combined Sewer Overflows
- Sanitary Sewer Overflows
- Capacity Management and Operation and Maintenance (CMOM)
- Long Term Operation and Maintenance
- Asset Management
- Stormwater Management
- Prioritization of all needs to achieve improvements in receiving water quality
- Affordability to establish the scheduling of improvements

The wastewater master plan is a comprehensive and regional plan structured to address many elements of the IPF. As a result, the master plan development is proceeding with the evaluation of preliminary concepts, alternatives and implementation timelines consistent with the IPF principles and the GLWA NPDES permit.

4.4.5 Great Lakes CSO Notification Policy

In January 2018 the EPA published the final rule in the Central Register regarding public notification requirements for CSOs discharged to the Great Lakes. The requirements address signage, notification of local public health departments, and other potentially affected public entities, notification to the public and annual notice. The final rule became effective on February 7, 2018. The rule is intended to provide timely notification to reduce the public's potential exposure to pathogens. The final rule includes the following:

- Develop a public notification plan by August 7, 2018
- Implementation of signage requirements by November 7, 2018
- Begin annual notice requirements by February 7, 2019 (or alternate date specified by the Director) which allows permittee time to collect data for the first year
- Initial notice be provided, as soon as possible, but no later than four hours after becoming aware that a CSO discharge has occurred
- Within seven days of becoming aware of the event, supplemental information shall be provided included the estimated volume of the discharge and the approximate time that the discharge ended.

It should be noted that untreated and partially treated CSOs are both included under this policy, one public notification for multiple discharges into the same water body is allowed and signage requirements may be waived if no public access to the water body exists.

4.4.6 Potential Future WRRF Regulations

Future permit limits are difficult to speculate, however, four areas for GLWA to monitor (and influence) over time with respect to the WRRF discharge permit include nutrient limits,

disinfection limits, emerging contaminants wet weather regulations for wastewater treatment plants. In addition, regulations related to the notification of CSOs and land application of biosolids should also be monitored. A brief description of each follows:

4.4.6.1 Nutrients

The Michigan Department of Environmental Quality has worked in partnership with US EPA for decades and continues to advance the protection of surface waters from excessive nitrogen and phosphorus pollution. In the past the focus has been on point sources, such as the GLWA WRRF, and because of those efforts point source pollution has been greatly reduced. Today, the major surface water quality issues can be attributed to discharges associated with wet weather pollution including CSOs, failing septic systems, soil erosion, farming operations and storm water. The current NPDES permit requires GLWA to achieve 0.6/0.7 mg/L TP (depending on season) on a monthly average basis from outfall 0049B, and 1.5 mg/L TP on a monthly average basis for primary effluent discharged to either the Detroit River or the Rouge River. Understand, however, that although the primary effluent limit is a monthly average, the limit should be taken as a maximum daily limit, since there may only have one day in the month when primary effluent is discharged. The current permit only requires that GLWA report ammonia nitrogen in the effluent.

For the purpose of this Master Plan we have assumed that GLWA will not receive a numeric limit for ammonia or total nitrogen within the planning period. With respect to total phosphorus, we have assumed that GLWA will endeavor to achieve the best possible TP removal within the existing infrastructure, e.g. no add-on processes will be evaluated to achieve lower phosphorus limits.

4.4.6.2 Disinfection

In recent years there has been a push to investigate the linkage (or lack thereof) of coliphage in recreational waters and incident of illness. If a linkage is found this could result in the need for significant modifications in wastewater treatment plant disinfection and monitoring, that would require the deactivation of viruses in addition to bacteria (e.g. fecal coliform, *E. coli*). GLWA should continue to be kept abreast of this issue to ensure that EPAs next steps regarding this issue are scientifically valid and will achieve environmentally beneficial results commensurate with the cost to achieve any new requirements. It is likely that the permit will move from fecal coliform as an indicator organism for bacteria to *E. coli* as has been done in other parts of the country, however this modification should not significantly impact the existing facility's ability to achieve this limit given the current disinfection technology.

4.4.6.3 Emerging Contaminants

Similarly, regulatory standards around emerging contaminants ebb and flow. Whether the issue is pharmaceuticals and personal care products, endocrine disruptors, or more recently the ubiquitous PFOS/PFOAs, GLWA should remain up to date on current trends to understand the potential impact of new regulations on the Authority's CIP.

The presence of poly- and perfluoroalkyl substances (PFAS) in water resource recovery facilities (WRRFs) has been widely reported. However, comprehensive quantitative data on specific PFAS compounds, their fate and phase partitioning through WRRF treatment processes, and the factors that control PFAS distribution in finished biosolids remain poorly understood. The absence of this fundamental information is a critical barrier for utilities to effectively manage and respond to a rapidly evolving public perception and regulatory climate related to PFAS.

Under the Safe Drinking Water Act (SDWA) EPA currently has not established maximum contaminant levels (MCLs) for PFAS chemicals. However, EPA has issued a health advisory for PerFluoroOctanoic Acid (PFOA) and PerFluoroOctaneSulfonic acid (PFOS) of 70 parts per trillion (ppt). States, therefore, have been taking the lead in PFAS regulations. Michigan's Department of Energy, Great Lakes and Environment (EGLE), has been at the forefront of state-led regulatory standards for PFAS in drinking water. In 2018 EGLE conducted a state-wide sampling program of public, school and tribal water supplies for PFAS. Subsequently, EGLE has proposed some of the most stringent limits in the nation and has established proposed MCLs for these contaminants in the single digit parts per trillion.

On the wastewater side, EGLE's Water Resources Division is investigating an Industrial Pretreatment Program (IPP) PFAS initiative to develop means for initial screening, monitoring plans, probable source monitoring and sampling and analysis protocol as well as source reduction. In addition, GLWA's most recent NPDES permit requires quarterly monitoring and reporting of PFAS in the effluent.

GLWA is an active participant in ongoing and planned research related to PFAS occurrence, fate and mass distribution in WRRFs. The complex phase behavior exhibited by PFAS, including sorption to solids, colloidal attachment, uptake at the air-water interface, and fate of volatile PFAS compounds is not well understood, yet these all play an important role in understanding the discharge from WRRFs and the nature and levels of PFAS in finished biosolids and is the subject of the upcoming Water Research Foundation (WRF) project 5031. The release of PFAS from applied biosolids has received increased public and regulatory scrutiny, and regulatory decisions made here could significantly impact how GLWA manages biosolids in the future. GLWA is currently participating in a WRF project with CDM Smith and Purdue University to better understand PFAS in biosolids. Continuing to participate in and educate regulators and the legislature on the emerging research on the fate and transport of PFAS at WRRFs, as well as the environmental and health impacts of these compounds is a critical role for GLWA in the upcoming years. In addition, encouraging source control of these contaminants before they enter the water and wastewater systems is paramount.

4.4.6.4 Blending Policy

On April 17, 2018 EPA announced it will begin a new rulemaking process to provide certainty surrounding the use of "blending" by wastewater treatment plants. They will be looking to engaging partners on the state and local level to design a rule that offers a common-sense approach to protecting public health and safely managing the nation's wastewater. GLWA should keep abreast of the ongoing discussions related to blending as it could have significant implications on future upgrades to the facility.

4.4.6.5 Residuals Management Program

As an industry, utilities are moving to produce Class A biosolids vs. Class B biosolids, as a means to increase the potential for beneficial reuse and to increase the revenue of the final product. As more Class A products hit the market, the market for Class B biosolids could diminish. Regardless, it is important for GLWA to maintain a portfolio of biosolids treatment processes and provide options, as exists today, for various outlets for biosolids. GLWA should remain abreast of biosolids regulations that could impact the economics of treatment and reuse/disposal of biosolids. These include:

- Potential update to 503 regulations to include emerging contaminants (including PFOS and PFOA)

- Land application rates of phosphorus (biosolids managed differently than manures)
- The Global Gap, which prohibits international sale of food products grown in biosolids.

Section 6

Collection System

6.1 Overview

This section describes process used to identify and evaluate alternatives for collection system improvements and water quality protection from combined sewer overflows and sanitary sewer overflows. A wide range of solutions was identified based on previous studies and new investigations underway by GLWA and its Members. The wide range of solutions was narrowed to a shorter list based on screening criteria and an analysis of the root causes for overflows upstream of each CSO outfall in the City of Detroit. Following this screening process, selected alternatives were evaluated using the regional wastewater collection system model and river water quality models to compare the relative water quality benefits of the selected alternatives. In addition, the selected alternatives were compared in a decision support scoring framework based on the 5 outcomes identified in Section 2.

This section also describes the analysis of collection system capacity, condition assessment and long-term redundancy requirements. GLWA's leased trunk sewer, interceptors, and pump stations generally have capacity for a 10-year 24-hour design storm. Condition assessment and rehabilitation projects have been recently completed by GLWA on pump stations, condition assessments for CSO facilities is underway in project CS-299. Long term collection system redundancy requirements were analyzed based on the ability to convey dry weather flow during interceptor rehabilitation.

Cost estimates for alternatives are presented at a summary level in this section. Detailed cost estimates are presented in Technical Memorandum 7, Appendix A.

6.2 Identification of Alternatives for Wet Weather Water Quality Protection

As noted in Section 3, the GLWA and its Members in the regional service area have constructed substantial infrastructure and developed operational practices to control over 95 percent of wet weather flow on an annual basis. Many types of control technologies are well understood in the region, and a series of previous Long Term CSO Control Plans from 1996 to 2010 and engineering studies of sanitary sewer overflow controls have examined a range of solutions for remaining uncontrolled CSO and SSOs.

Table 6-1 presents terminology and categories of CSO control technologies. Wet weather regulatory compliance requires the use of a variety of infrastructure improvements and operational practices designed to address specific causes of overflow within the service area. Cost-effective compliance solutions typically include a combination of the following control technologies:

- Green Infrastructure and Inflow Source Control

- Operational Optimization
- Infrastructure Optimization
- Asset Management
- Grey Infrastructure

Table 6-1. Categories of Technology for Combined Sewer Overflow Control

<p>Non-Structural Regional Optimization & Coordination</p> <p style="text-align: center;">IWOP</p> <p style="text-align: center;">Real Time Control</p> <p style="text-align: center;">Weir and Regulator Modifications</p> <p style="text-align: center;">In-System Storage</p> <p style="text-align: center;">Contract Capacity Change</p> <p style="text-align: center;">CMOM (Inspections & Cleaning)</p> <p style="text-align: center;">IDEP</p> <p style="text-align: center;">Water Quality</p> <p style="text-align: center;">Monitoring</p>	<p style="text-align: center;">Regional Collection & Conveyance System</p>		
	<p style="text-align: center;">Green Infrastructure & Inflow Controls</p> <p style="text-align: center;">Green Infrastructure</p> <p style="text-align: center;">Sewer Separation</p> <p style="text-align: center;">Catch Basin Restrictors</p> <p style="text-align: center;">River Inflow Controls</p> <p style="text-align: center;">Downspout & Footing Drain Disconnection</p> <p style="text-align: center;">DCIA Reduction</p>	<p style="text-align: center;">Conveyance Rehab</p> <p style="text-align: center;">Pipeline Rehabilitation</p> <p style="text-align: center;">Manhole Rehabilitation</p> <p style="text-align: center;">Outfall Rehabilitation</p> <p style="text-align: center;">Pump Station Rehabilitation</p> <p style="text-align: center;">Regulator Rehabilitation</p>	<p style="text-align: center;">New Conveyance</p> <p style="text-align: center;">New Pipelines</p> <p style="text-align: center;">Major Pipeline Reconstruction</p> <p style="text-align: center;">Outfall Relocation</p>
	<p style="text-align: center;">Regional Treatment System</p>		
	<p style="text-align: center;">WRRF Upgrades & Rehabilitation</p> <p style="text-align: center;">Pumping</p> <p style="text-align: center;">Preliminary Treatment</p> <p style="text-align: center;">Secondary Treatment</p> <p style="text-align: center;">Disinfection</p> <p style="text-align: center;">Biosolids</p> <p style="text-align: center;">Plant Utilities</p>	<p style="text-align: center;">Remote Facility Expansion & Rehab</p> <p style="text-align: center;">RTB and SDF Service Area Expansion</p> <p style="text-align: center;">RTB & SDF Improvements</p>	<p style="text-align: center;">New Treatment Storage Facility</p> <p style="text-align: center;">New RTB and SDF</p> <p style="text-align: center;">In-Line Disinfection</p> <p style="text-align: center;">Netting</p> <p style="text-align: center;">Dechlorination</p>
	<p style="text-align: center;">Legend</p> <p style="text-align: center;"><i>Blue-Asset Management</i></p> <p style="text-align: center;"><i>Red-Optimization</i></p> <p style="text-align: center;"><i>Orange-Low Cost Controls</i></p> <p style="text-align: center;"><i>Green-GSI/Inflow Control</i></p> <p style="text-align: center;"><i>Grey -Grey Infrastructure</i></p>		

Based on the application of CSO control technologies and results of previous studies, the Wastewater Master Plan began its analysis of alternatives by identifying candidate solutions for specific locations.

Candidate solutions are capital projects or operation and maintenance activities within the categories above, and at specific locations, that are designed to reduce the impact of wet weather discharges. Each candidate solution has a performance impact, such as a reduction in untreated wet weather discharge volume, frequency of occurrence or reduction in wet weather discharge pollutant load. Candidate solutions can apply to stormwater discharges, sanitary sewer overflows, combined sewer overflows, and treatment facilities. Combinations of candidate solutions were identified by water body to create alternatives. These candidate solutions are listed in Tables 6-2 to 6-5 organized by water body.

Table 6-2. Preliminary Identification of Alternatives for the Clinton River and Lake St Clair*

Impacted Waterbody	Preliminary Alternative Name and Location	Original Idea for Preliminary Alternative	Type of Alternative	Discharges Controlled
Lake St. Clair	Expand Chapaton RTB	Macomb County	Retention Treatment Basin	Chapaton RTB
Lake St. Clair	Water Fowl Management	Macomb County	Regional Operating Plan	
Lake St. Clair	CMOM SEMSD	WWMP	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Lake St. Clair	CMOM Grosse Pointe Farms	WWMP	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Lake St. Clair	IDEP SEMSD	WWMP	IDEP	Separated Storm Drains
Lake St. Clair	IDEP Grosse Pointe Farms	WWMP	IDEP	Separated Storm Drains
Clinton River East Subwatershed	CMOM Centerline	WWMP	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Clinton River East Subwatershed	IDEP Centerline	WWMP	IDEP	Separated Storm Drains
Clinton River Red Run Subwatershed	Habitat Restoration on Red Run Drain	WWMP	Green Infrastructure	
Clinton River Red Run Subwatershed	GWK District Green Infrastructure	WWMP	Green Infrastructure	B-23, B-07
Clinton River Red Run Subwatershed	Additional Treatment for GWK RTB	MCDPW	Retention Treatment Basin	GWK RTB
Clinton River Red Run Subwatershed	Peak Stream Flow Management	CRWA	Regional Operating Plan	
Clinton River Red Run Subwatershed	CMOM GWK	WWMP	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Clinton River Red Run Subwatershed	IDEP GWK	WWMP	IDEP	Separated Storm Drains
Impacted Waterbody	Preliminary Alternative Name and Location	Original Idea for Preliminary Alternative	Type of Alternative	Discharges Controlled

*Red text indicates that these outfalls are designated as Priority Non-Core in the NPDES Permit

Table 6-3. Preliminary Identification of Alternatives for the Detroit River*

Impacted Waterbody	Preliminary Alternative Name and Location	Original Idea for Preliminary Alternative	Type of Alternative	Discharges Controlled
Detroit River Downtown	Near East Side Sewer Separation	WWMP	Sewer Separation	B-07, B-010

Impacted Waterbody	Preliminary Alternative Name and Location	Original Idea for Preliminary Alternative	Type of Alternative	Discharges Controlled
Detroit River Downtown	I-375 Sewer Separation	WWMP	Sewer Separation	B-18
Detroit River Downtown	Near East Side Sewer Separation	WWMP	Sewer Separation	B-08
Detroit River Downtown	I-94 Sewer Separation	WWMP	Sewer Separation	B-03 to B-020
Detroit River Downtown	OCWRC EFSD Footing Drain Disconnections	WWMP	Footing Drain Disconnection	B-23, B-07
Detroit River Downtown	Relocate Outfall B-25 for West Riverfront Park	WWMP	Outfall Relocation	B-25
Detroit River Downtown	Relocate Outfall B-26 for West Riverfront Park	WWMP	Outfall Relocation	B-26
Detroit River Downtown	Relocate Outfall B-27 for West Riverfront Park	WWMP	Outfall Relocation	B-27
Detroit River Downtown	Maintenance Connection of DRI to NIEA	DR-226/WWMP	New Pipelines	Multiple Outfalls
Detroit River Downtown	B-29 Pumping, Screening & Disinfection Facility (Phase 1)	WWMP	Retention Treatment Basin	Multiple Outfalls
Detroit River Downtown	B-29 Add High Rate Clarification to Facility (Phase 2)	WWMP	Retention Treatment Basin	Multiple Outfalls
Detroit River Downtown	Jos. Campau Netting Facility	Plan of Record	Netting Facility	B-10
Detroit River Downtown	Orleans Netting Facility	Plan of Record	Netting Facility	B-14 and B-15
Detroit River Downtown	Riopelle Netting Facility	Plan of Record	Netting Facility	B-16
Detroit River Downtown	Rivard Netting Facility	Plan of Record	Netting Facility	B-17
Detroit River Downtown	Hastings Netting Facility	Plan of Record	Netting Facility	B-18
Detroit River Downtown	Randolph Netting Facility	Plan of Record	Netting Facility	B-19
Detroit River Downtown	Bates Netting Facility	Plan of Record	Netting Facility	B-20
Detroit River Downtown	Woodward Netting Facility	Plan of Record	Netting Facility	B-21
Detroit River Downtown	1st Hamilton Netting Facility	Plan of Record	Netting Facility	B-23
Detroit River Downtown	3rd Street Netting Facility	Plan of Record	Netting Facility	B-24
Detroit River Downtown	Cabacier Netting Facility	Plan of Record	Netting Facility	B-25
Detroit River Downtown	11th Netting Facility	Plan of Record	Netting Facility	B-26
Detroit River Downtown	Vermont Netting Facility	Plan of Record	Netting Facility	B-28

Impacted Waterbody	Preliminary Alternative Name and Location	Original Idea for Preliminary Alternative	Type of Alternative	Discharges Controlled
Detroit River Downtown	Add Dechlorination at Leib SDF	WWMP	Screening & Disinfection Facility	105
Detroit River Downtown	Add Dechlorination at St Aubin SDF	WWMP	Screening & Disinfection Facility	106
Detroit River Downtown	18th Netting Facility	Plan of Record	Netting Facility	B-29
Detroit River Downtown	24th Netting Facility	Plan of Record	Netting Facility	B-31
Detroit River Downtown	Jos. Campau Disinfection Facility	Plan of Record	Inline Disinfection Facility	B-10
Detroit River Downtown	Rivard Disinfection Facility	Plan of Record	Inline Disinfection Facility	B-17
Detroit River Downtown	24th Street Disinfection Facility	Plan of Record	Inline Disinfection Facility	B-31
Detroit River Downtown	Construct New RTB Under I-375 Improvements	WWMP	Retention Treatment Basin	B-017
Detroit River Downtown	Brush Sewer -- Bates and Woodridge Streets 4.83 million gal	LTCSSO Work Group 1996	In-System Storage	B-20
Detroit River Downtown	In-System Storage at NE Pump Station	Regional Operating Plan	In-System Storage	B-07
Detroit River Downtown	Remote Activation of VR-15 and VR-16	Quick Win	Interim Wet Weather Operating Plan	B-07
Detroit River Downtown	Fairview PS Diversion to Conner RTB	Regional Operating Plan	Interim Wet Weather Operating Plan	104
Detroit River Downtown	DRI Regulator Improvements	Quick Win	Interim Wet Weather Operating Plan	B-05 to B-28
Detroit River Downtown	CMOM Highland Park	WWMP	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Detroit River Downtown	CMOM Hamtramack	WWMP	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Detroit River Downtown	IDEP Highland Park	WWMP	IDEP	Separated Storm Drains
Detroit River Downtown	IDEP Hamtramack	WWMP	IDEP	Separated Storm Drains
Detroit River Downtown	Increase Capacity of WRRF by 500 CFS	WWMP	WRRF Pumping Improvements	Multiple Outfalls
Detroit River East	Meldrum District Connection to Lieb SDF	Plan of Record	RTB and SDF Service Area Expansion	B-07

Impacted Waterbody	Preliminary Alternative Name and Location	Original Idea for Preliminary Alternative	Type of Alternative	Discharges Controlled
Detroit River East	Dredge Conner Creek Channel to Restore Outlet Capacity	WWMP	RTB and SDF Service Area Expansion	104
Detroit River East	Grosse Pointe Farms Sewer Separation	WWMP	Sewer Separation	Conner RTB (104)
Detroit River East	Fischer District Sewer Separation	WWMP	Sewer Separation	B-03, B-05
Detroit River East	Old English Village Sewer Separation	WWMP	Sewer Separation	Conner RTB (104)
Detroit River East	Fischer District Sewer Separation	WWMP	Sewer Separation	B-04, B-06
Detroit River East	McClellan (Parkview) Netting Facility	Plan of Record	Netting Facility	B-03
Detroit River East	Fischer Netting Facility	Plan of Record	Netting Facility	B-04
Detroit River East	Iroquois Netting Facility	Plan of Record	Netting Facility	B-05
Detroit River East	Helen Netting Facility	Plan of Record	Netting Facility	B-06
Detroit River East	Adair Netting Facility	Plan of Record	Netting Facility	B-09
Detroit River East	Add Dechlorination at Conner Creek RTB	WWMP	Retention Treatment Basin	104
Detroit River East	Add Dechlorination at Belle Isle RTB		Retention Treatment Basin	
Detroit River East	Add 240 MGD High Rate Clarification at Conner RTB	Regional Operating Plan	Retention Treatment Basin	104
Detroit River East	Fischer Disinfection Facility	Plan of Record	Inline Disinfection Facility	B-04, B-03, B-05
Detroit River East	Helen Disinfection Facility	Plan of Record	Inline Disinfection Facility	B-06
Detroit River East	Conner 5.27 Million Gallons CC2A	CS-1329 June 2000	In-System Storage	Near East Side Outfalls
Detroit River East	Ashland Relief 3.14 Million Gallons AR1A	CS-1329 June 2000	In-System Storage	Near East Side Outfalls
Detroit River East	Ashland Relief 3.77 Million Gallons AR2	CS-1329 June 2000	In-System Storage	Near East Side Outfalls
Detroit River East	Ashland Relief 3.18 Million Gallons AR1	CS-1329 June 2000	In-System Storage	Near East Side Outfalls
Detroit River East	Ashland 2.67 Million Gallons ASHL1A	CS-1329 June 2000	In-System Storage	Near East Side Outfalls

Impacted Waterbody	Preliminary Alternative Name and Location	Original Idea for Preliminary Alternative	Type of Alternative	Discharges Controlled
Detroit River East	CMOM Grosse Pointe	WWMP	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Detroit River East	CMOM Grosse Pointe Park	WWMP	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Detroit River East	IDEP Grosse Pointe	WWMP	IDEP	Separated Storm Drains
Detroit River East	IDEP Grosse Pointe Park	WWMP	IDEP	Separated Storm Drains
Detroit River East	Macomb County Footing Drain Disconnections	WWMP	Footing Drain Disconnection	B-23, B-07
Detroit River West	Conner and Freud Pumping Station Improvements (CS-120)	GLWA CIP	Pump Station Rehabilitation	Conner RTB 104
Detroit River West	Rehabilitation of the Detroit River Interceptor (DB-226)	GLWA CIP	Pipeline Rehabilitation	Multiple Outfalls
Detroit River West	Ghib Area Sewer Separation	WWMP	Sewer Separation	B-37, B-38, B-42
Detroit River West	McKinstry Netting Facility	Plan of Record	Netting Facility	B-35
Detroit River West	Summit-Clark/Ferdinand Netting Facility	Plan of Record	Netting Facility	B-36 and B-37
Detroit River West	Morrel Netting Facility	Plan of Record	Netting Facility	B-38
Detroit River West	Schroeder Netting Facility	Plan of Record	Netting Facility	B-42
Detroit River West	Morrel In-System Storage Facility	Quick Win	In-System Storage	B-38
Detroit River West	Calvary In-System Storage Facility	Quick Win	In-System Storage	TBD
Detroit River West	Clark In-System Storage Facility	Quick Win	In-System Storage	B-36, B-37
Detroit River West	Upper Livernois Relief In-System Storage	Quick Win	In-System Storage	TBD
Detroit River West	Ghib Dewatering Control	WWMP	Regional Operating Plan	B-37, B-38, B-42

*Red text indicates Priority Non-Core in the NPDES Permit

Table 6-4. Preliminary Identification of Alternatives for the Rouge River*

Impacted Waterbody	Preliminary Alternative Name and Location	Original Idea for Preliminary Alternative	Type of Alternative	Discharges Controlled
Ashcroft-Sherwood Drain	Redford Township Sewer Separation	WWMP	Sewer Separation	U3, U4, U5, U9, U10, U11
Ashcroft-Sherwood Drain	Redford Township Green Infrastructure	WWMP	Green Infrastructure	U3, U4, U5, U9, U10, U11
Ashcroft-Sherwood Drain	Redford Township Expand Service Area of RTB	WWMP	Retention Treatment Basin	45A, U2, U1
Ashcroft-Sherwood Drain	Redford Township New RTB	WWMP	Retention Treatment Basin	45A, U2, U1
Lower Rouge River	Inkster Sewer Separation	WWMP	Sewer Separation	10, 11, L41, L42
Lower Rouge River	Inkster Green Infrastructure	WWMP	Green Infrastructure	10, 11, L41, L42
Lower Rouge River	Inkster Expand Service Area of Middlebelt RTB	WWMP	Retention Treatment Basin	10, 11, L41, L42
Main Rouge River Between Upper and Lower Rouge Rivers	West Warren Siphon Improvements	Quick Win	Pipeline Rehabilitation	B-054
Main Rouge River Between Upper and Lower Rouge Rivers	Warren Siphon District Sewer Separation	WWMP	Sewer Separation	B-054
Main Rouge River Between Upper and Lower Rouge Rivers	West Chicago and Plymouth Sewer Separation	WWMP	Sewer Separation	B-063, B-064
Main Rouge River Between Upper and Lower Rouge Rivers	Additional Sewer Separation West of New NWI South of I-96	WWMP	Sewer Separation	Multiple Outfalls
Main Rouge River Between Upper and Lower Rouge Rivers	Green Infrastructure for Warren Siphon	DWSD GSI Program	Green Infrastructure	B-054
Main Rouge River Between Upper and Lower Rouge Rivers	Remove River Inflow -- West Chicago West of River	Quick Win	River Inflow Control	B-063
Main Rouge River Between Upper and Lower Rouge Rivers	Remove River Inflow -- Plymouth	Quick Win	River Inflow Control	B-064
Main Rouge River Between Upper and Lower Rouge Rivers	Remove River Inflow -- West Chicago East of River	Quick Win	River Inflow Control	B-060, B-061, B-062

Impacted Waterbody	Preliminary Alternative Name and Location	Original Idea for Preliminary Alternative	Type of Alternative	Discharges Controlled
Main Rouge River Between Upper and Lower Rouge Rivers	Backwater Gate at B-063	Quick Win	River Inflow Control	B-063
Main Rouge River Between Upper and Lower Rouge Rivers	Lyndon Bramell First Flush Basin & Associated Influent Sewers	Plan of Record	Retention Treatment Basin	B-070, B-071
Main Rouge River Between Upper and Lower Rouge Rivers	Lahser Dolson First Flush Basin & Associated Influent Sewers	Plan of Record	Retention Treatment Basin	B-067, B-068
Main Rouge River Between Upper and Lower Rouge Rivers	W. Chicago First Flush Basin & Associated Influent Sewers	Plan of Record	Retention Treatment Basin	B-060, B061, B-062
Main Rouge River Between Upper and Lower Rouge Rivers	Trinity Tireman First Flush Basin & Associated Influent Sewers	Plan of Record	Retention Treatment Basin	B-056, B-057, B-058
Main Rouge River Between Upper and Lower Rouge Rivers	Schoolcraft / West Parkway Netting Facility	Plan of Record	Netting Facility	B-069
Main Rouge River Between Upper and Lower Rouge Rivers	Lahser Dolson Netting Facility	Plan of Record	Netting Facility	B-067, B-068
Main Rouge River Between Upper and Lower Rouge Rivers	Glendale Netting Facility	Plan of Record	Netting Facility	B-065
Main Rouge River Between Upper and Lower Rouge Rivers	W. Chicago Siphon Netting Facility	Plan of Record	Netting Facility	B-060, B061, B-062
Main Rouge River Between Upper and Lower Rouge Rivers	W. Chicago Netting Facility	Plan of Record	Netting Facility	B-060, B061, B-062
Main Rouge River Between Upper and Lower Rouge Rivers	Trinity Tireman Netting Facility	Plan of Record	Netting Facility	B-056, B-057, B-058
Main Rouge River Between Upper and Lower Rouge Rivers	Warren Netting Facility	Plan of Record	Netting Facility	B-054

Impacted Waterbody	Preliminary Alternative Name and Location	Original Idea for Preliminary Alternative	Type of Alternative	Discharges Controlled
Main Rouge River Between Upper and Lower Rouge Rivers	Pulaski Netting Facility	Plan of Record	Netting Facility	048 (No B-#)
Main Rouge River Between Upper and Lower Rouge Rivers	Schoolcraft / West Parkway Disinfection Facility	Plan of Record	Inline Disinfection Facility	B-069
Main Rouge River Between Upper and Lower Rouge Rivers	Lahser Dolson Disinfection Facility	Plan of Record	Inline Disinfection Facility	B-067, B-068
Main Rouge River Between Upper and Lower Rouge Rivers	Glendale Disinfection Facility	Plan of Record	Inline Disinfection Facility	B-065
Main Rouge River Between Upper and Lower Rouge Rivers	W. Chicago Siphon Disinfection Facility	Plan of Record	Inline Disinfection Facility	B-060, B061, B-062
Main Rouge River Between Upper and Lower Rouge Rivers	W. Chicago Disinfection Facility	Plan of Record	Inline Disinfection Facility	B-060, B061, B-062
Main Rouge River Between Upper and Lower Rouge Rivers	Trinity Tireman Disinfection Facility	Plan of Record	Inline Disinfection Facility	B-056, B-057, B-058
Main Rouge River Between Upper and Lower Rouge Rivers	Warren Disinfection Facility	Plan of Record	Inline Disinfection Facility	B-054
Main Rouge River Between Upper and Lower Rouge Rivers	Optimize VR-9	IWOP/Quick Win	Interim Wet Weather Operating Plan	Multiple Outfalls
Main Rouge River Between Upper and Lower Rouge Rivers	Rehabilitate In System Storage Tributary to Rouge River	Quick Win	In-System Storage	Multiple Outfalls
Main Rouge River Downstream of Lower Rouge River	NWI Diversion to Oakwood RTB	DWSD 2014	RTB and SDF Service Area Expansion	SSO Dearborn & RVSD
Main Rouge River Downstream of Lower Rouge River	Dearborn CSO 01, 03, 04 Sewer Separation	Dearborn CSO Rvsd BOD	Sewer Separation	01, 03, 04

Impacted Waterbody	Preliminary Alternative Name and Location	Original Idea for Preliminary Alternative	Type of Alternative	Discharges Controlled
Main Rouge River Downstream of Lower Rouge River	Dearborn CS013-014 First Flush Basin and SDF	Dearborn CSO Rvsd BOD	Retention Treatment Basin	013, 014
Main Rouge River Downstream of Lower Rouge River	Add Dechlorination at Baby Creek	WWMP	Retention Treatment Basin	
Main Rouge River Downstream of Lower Rouge River	Add Dechlorination at Oakwood	WWMP	Retention Treatment Basin	
Main Rouge River Downstream of Lower Rouge River	Add Dechlorination at Hubbell-Southfield	WWMP	Retention Treatment Basin	
Main Rouge River Downstream of Lower Rouge River	Wyoming In-System Storage Facility	Quick Win	In-System Storage	TBD
Main Rouge River Downstream of Lower Rouge River	Optimize VR-8	IWOP/Quick Win	Interim Wet Weather Operating Plan	101
Main Rouge River Downstream of Lower Rouge River	CMOM RVSDS	WWMP	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Main Rouge River Downstream of Lower Rouge River	CMOM Dearborn	WWMP	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Main Rouge River Downstream of Lower Rouge River	CMOM Melvindale	WWMP	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Main Rouge River Downstream of Lower Rouge River	CMOM Allen Park	WWMP	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Main Rouge River Downstream of Lower Rouge River	IDEP RVSDS	WWMP	IDEP	Separated Storm Drains
Main Rouge River Downstream of Lower Rouge River	IDEP Dearborn	WWMP	IDEP	Separated Storm Drains

Impacted Waterbody	Preliminary Alternative Name and Location	Original Idea for Preliminary Alternative	Type of Alternative	Discharges Controlled
Main Rouge River Downstream of Lower Rouge River	IDEF Melvindale	WWMP	IDEF	Separated Storm Drains
Main Rouge River Downstream of Lower Rouge River	IDEF Allen Park	WWMP	IDEF	Separated Storm Drains
Main Rouge River Downstream of Lower Rouge River	North Interceptor West Arm		New Pipelines	
Main Rouge River Upstream of Upper Rouge River	OCWRC 57 CFS to POR 6 Mile Basin	WWMP	RTB and SDF Service Area Expansion	EFSDS SSO
Main Rouge River Upstream of Upper Rouge River	Additional Sewer Separation West of New NWI North of I-96	WWMP	Sewer Separation	Multiple Outfalls
Main Rouge River Upstream of Upper Rouge River	Florence and Ridge District Sewer Separation	WWMP	Sewer Separation	B-079
Main Rouge River Upstream of Upper Rouge River	Schoolcraft Siphon/Ray/Brammel District Sewer Separation	WWMP	Sewer Separation	B-069/B-070
Main Rouge River Upstream of Upper Rouge River	Glenhurst Siphon District Sewer Separation	WWMP	Sewer Separation	B-082
Main Rouge River Upstream of Upper Rouge River	27 Million Gallons of GSI with Weir Modification	WWMP	Green Infrastructure	B-54 to B-87
Main Rouge River Upstream of Upper Rouge River	OCWRC 57 CFS to Optimized Southfield Sewer	WWMP	Sewer Separation	EFSDS SSO
Main Rouge River Upstream of Upper Rouge River	Remove River Inflow -- Lyndon	Quick Win	River Inflow Control	B-072
Main Rouge River Upstream of Upper Rouge River	Remove River Inflow -- Glenhurst	Quick Win	River Inflow Control	B-082
Main Rouge River Upstream of Upper Rouge River	OCWRC 57 CFS to New NWI	WWMP	New Pipelines	EFSDS SSO
Main Rouge River Upstream of Upper Rouge River	Six Mile First Flush Basin and Collector Sewers (McNichols)	Plan of Record	Retention Treatment Basin	B-080, B-081
Main Rouge River Upstream of Upper Rouge River	Puritan Riverdale First Flush Basin and Collector Sewers	Plan of Record	Retention Treatment Basin	B-077

Impacted Waterbody	Preliminary Alternative Name and Location	Original Idea for Preliminary Alternative	Type of Alternative	Discharges Controlled
Main Rouge River Upstream of Upper Rouge River	Glendale First Flush Basin & Associated Influent Sewers	Plan of Record	Retention Treatment Basin	B-065
Main Rouge River Upstream of Upper Rouge River	Six Mile Netting Facility (McNichols)	Plan of Record	Netting Facility	B-080, B-081
Main Rouge River Upstream of Upper Rouge River	Puritan Riverdale Netting Facility	Plan of Record	Netting Facility	B-077
Main Rouge River Upstream of Upper Rouge River	Lyndon Bramell Netting Facility	Plan of Record	Netting Facility	B-070, B-071
Main Rouge River Upstream of Upper Rouge River	Six Mile Disinfection Facility (McNichols)	Plan of Record	Inline Disinfection Facility	B-080, B-081
Main Rouge River Upstream of Upper Rouge River	Puritan Riverdale Disinfection Facility	Plan of Record	Inline Disinfection Facility	B-077
Main Rouge River Upstream of Upper Rouge River	Lyndon Bramell Disinfection Facility	Plan of Record	Inline Disinfection Facility	B-070, B-071
Main Rouge River Upstream of Upper Rouge River	Expand Puritan Fenkell RTB to Serve Area East of River	WWMP	Retention Treatment Basin	102
Main Rouge River Upstream of Upper Rouge River	Expand Puritan Fenkell RTB to Serve Part of Redford Township	WWMP	Retention Treatment Basin	102
Main Rouge River Upstream of Upper Rouge River	Expand Seven Mile RTB to Serve Area East of River	WWMP	Retention Treatment Basin	103
Main Rouge River Upstream of Upper Rouge River	Add High Rate Clarification to OCWRC 57 CFS Alternatives	WWMP	Retention Treatment Basin	EFSDS SSO
Main Rouge River Upstream of Upper Rouge River	OCWRC Sanitary Retention Basins	OWRC LTCAP	Sanitary Retention Basin	EFSDS SSO
Main Rouge River Upstream of Upper Rouge River	Add Dechlorination at Seven Mile	WWMP	Retention Treatment Basin	103
Main Rouge River Upstream of Upper Rouge River	Add Dechlorination at Puritan Fenkell	WWMP	Retention Treatment Basin	102
Main Rouge River Upstream of Upper Rouge River	Weir Modifications at 6-Mile and Hubbell	WWMP	Weir and Regulator Modifications	B-080/B-081
Main Rouge River Upstream of Upper Rouge River	Automate Shiawassee Gate	Quick Win	Interim Wet Weather Operating Plan	102,103
Main Rouge River Upstream of Upper Rouge River	Improve Operational Control at PF and 7-Mile RTBs	Quick Win	Interim Wet Weather Operating Plan	102, 103

Impacted Waterbody	Preliminary Alternative Name and Location	Original Idea for Preliminary Alternative	Type of Alternative	Discharges Controlled
Main Rouge River Upstream of Upper Rouge River	CMOM EFSDS	WWMP	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Main Rouge River Upstream of Upper Rouge River	CMOM Farmington	WWMP	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Main Rouge River Upstream of Upper Rouge River	IDEP EFSDS	WWMP	IDEP	Separated Storm Drains
Main Rouge River Upstream of Upper Rouge River	IDEP Farmington	WWMP	IDEP	Separated Storm Drains
Middle Rouge River	Dearborn Heights Sewer Separation	WWMP	Sewer Separation	L-43, M-13, M-14
Middle Rouge River	Dearborn Heights Green Infrastructure	WWMP	Green Infrastructure	L-43, M-13, M-14

*Red text indicates Priority Non-Core in the NPDES Permit

Table 6-5. Preliminary Identification of Alternatives for Multiple Water Bodies*

Impacted Waterbody	Preliminary Alternative Name and Location	Original Idea for Preliminary Alternative	Type of Alternative	Discharges Controlled
Multiple/All	Wayne County LTCAP Phase 1	RVSD LTCAP	Pipeline Rehabilitation	RVSD SSO
Multiple/All	Rehabilitate NWI	WWMP	Pipeline Rehabilitation	Multiple Outfalls
Multiple/All	Rehabilitate Trunk Sewers: Eliminate PACP Scores 4 and 5	WWMP	Pipeline Rehabilitation	Multiple Outfalls
Multiple/All	2020 to 2030	WWMP	Pipeline Rehabilitation	Multiple Outfalls
Multiple/All	2031 to 2040	WWMP	Pipeline Rehabilitation	Multiple Outfalls
Multiple/All	2041 to 2050	WWMP	Pipeline Rehabilitation	Multiple Outfalls
Multiple/All	2051 to 2060	WWMP	Pipeline Rehabilitation	Multiple Outfalls
Multiple/All	Rehabilitate Interceptors: Eliminate PACP Scores 4 and 5	WWMP	Pipeline Rehabilitation	Multiple Outfalls
Multiple/All	2020 to 2030	WWMP	Pipeline Rehabilitation	Multiple Outfalls
Multiple/All	2031 to 2040	WWMP	Pipeline Rehabilitation	Multiple Outfalls
Multiple/All	2041 to 2050	WWMP	Pipeline Rehabilitation	Multiple Outfalls
Multiple/All	2051 to 2060	WWMP	Pipeline Rehabilitation	Multiple Outfalls
Multiple/All	Downspout Disconnection	NPDES Permit	DCIA Reduction	Multiple Outfalls
Multiple/All	Private Property GSI in Detroit	DWSD Storm Credit	Green Infrastructure	Multiple Outfalls
Multiple/All	Downspout Disconnections in Detroit	NPDES Permit	DCIA Reduction	Multiple Outfalls
Multiple/All	Catch Basin Restrictors in Detroit Tributary to Detroit River	WWMP	Catch Basin Restrictors	Multiple Outfalls
Multiple/All	Downspout Disconnection Tributary to Rouge River	NPDES Permit	DCIA Reduction	Multiple Outfalls
Multiple/All	MDOT Stormwater Removal from Southfield Sewer	WWMP	Green Infrastructure	Multiple Outfalls
Multiple/All	DWSD Stormwater Removal from Southfield Sewer	WWMP	Green Infrastructure	Multiple Outfalls
Multiple/All	Rouger River Log Jam Management	GLWA CIP	River Inflow Control	Multiple Outfalls
Multiple/All	River Inflow Management Program	WWMP	River Inflow Control	Multiple Outfalls
Multiple/All	Phase 2 CSO Control Conduit 8 mile to Warren	WWMP	New Pipelines	Multiple Outfalls

Impacted Waterbody	Preliminary Alternative Name and Location	Original Idea for Preliminary Alternative	Type of Alternative	Discharges Controlled
Multiple/All	Sanitary Floatables Skimmer Watercraft	WWMP	Netting Facility	Multiple Outfalls
Multiple/All	Wayne County LTCAP Phase 2 -- SRB in Livonia	RVSD LTCAP	Sanitary Retention Basin	RVSD SSO
Multiple/All	Dynamic Real Time Control	R&I	Real Time Control	Multiple Outfalls
Multiple/All	Clean Regulators to Increase Flow to Interceptor	Quick Win	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Multiple/All	Update Head Discharge Curves for Detroit River Outfalls	Quick Win	Interim Wet Weather Operating Plan	Multiple Outfalls
Multiple/All	Reduce Pre-Storm Wet Well Level in PS1 and PS2 to EI 73	Quick Win	Interim Wet Weather Operating Plan	Multiple Outfalls
Multiple/All	Establish HGL and Reconcile Contract Capacity for RVSD	RVSD LTCAP	Interim Wet Weather Operating Plan	RVSD SSO
Multiple/All	Regional Water Quality Monitoring Program Phase 1	WWMP	Regional Operating Plan	Multiple Outfalls
Multiple/All	Regional Water Quality Monitoring Program Phase 2	WWMP	Regional Operating Plan	Multiple Outfalls
Multiple/All	Improvements for Climate Resilience	WWMP	Regional Operating Plan	Multiple Outfalls
Multiple/All	Rehabilitate In System Storage Tributary to Detroit River	Quick Win	In-System Storage	Multiple Outfalls
Multiple/All	CMOM DWSD Rouge River	WWMP	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Multiple/All	CMOM DWSD Detroit River	WWMP	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Multiple/All	CMOM OMIDD	WWMP	CMOM BMP (Inspections & Cleaning)	Multiple Outfalls
Multiple/All	IDEP DWSD Rouge River	WWMP	IDEP	Separated Storm Drains
Multiple/All	IDEP DWSD Detroit River	WWMP	IDEP	Separated Storm Drains
Multiple/All	IDEP OMIDD	WWMP	IDEP	Separated Storm Drains
Multiple/All	New Detroit River Interceptor	WWMP	New Pipelines	B-03 to B-045
Multiple/All	Regional Sewer Separation		Sewer Separation	Multiple Outfalls

*Red text indicates Priority Non-Core in the NPDES Permit

6.3 Root Cause Analysis

A root cause analysis was performed to analyze the hydraulic and hydrologic features of the combined sewer service areas in the GLWA and DWSD collection systems. Previous studies were reviewed along with early results of collection system modeling to identify the root causes of combined sewer discharges. In all cases, combined sewer overflows occur when the dry weather flow and wet weather flow exceeds interceptor conveyance capacity. However, each trunk sewer, tributary area, and interceptor connection point has unique characteristics that result in a variety of types of root causes. The results are presented in Table 6-6.

Table 6-6 Root Cause Analysis of Tributary Area Characteristics and Conveyance Capacity that Cause Combined Sewer Overflows.

Table 6-6. GLWA/DWSD Outfall Root Cause Analysis

GLWA Outfall	Location	Existing Regulatory Status	Potential CSO Control Solutions	Root Cause
B-001	Fox Creek	Prohibited	Continue to monitor, take corrective action as necessary	Emergency Overflow. Only intended to discharge in extreme events
B-003	McClellan Cadillac	Priority	Regulator improvements, sewer separation by converting existing relief sewers to separated storm drains, screening or netting and disinfection	Large trunk sewers and relief trunk sewers designed for 10-year storm and intended to overflow when regulator capacity to DRI is exceeded. Stormwater from I-94 is discharged through outfalls B-003, B-004 and B-006.
B-004	Fischer	Remaining		
B-005	Iroquois	Priority		
B-006	Helen	Remaining		
B-007	Meldrum	Priority	Meldrum Sewer diversion to Leib SDF	Discharges when capacity of NIEA is exceeded and when storm flows in tributary area south of NIEA exceed regulator capacity to the DRI is exceeded.
B-009	Adair	Remaining	Regulator improvements to maximize flow routing to WRRF, sewer separation by converting existing relief sewers to separate storm drains, screening or netting and disinfection	Large trunk sewers and relief trunk sewers designed for 10-year storm and intended to overflow when regulator capacity to DRI is exceeded.
B-010	Joseph Campau	Priority		
B-014	Orleans	Remaining		
B-015	Orleans Relief	Remaining		
B-016	Riopelle	Remaining		
B-017	Rivard	Remaining		
B-018	Hastings	Remaining		
B-019	Randolph	Remaining		
B-020	Bates/Brush	Priority		
B-021	Woodward	Remaining		
B-022	Griswold	Minimal		
B-023	First Street	Priority	Screening or netting and disinfection.	Discharges when capacity of NIEA is exceeded and when storm flows in tributary area south of NIEA exceed regulator capacity to the DRI is exceeded.
B-024	Third Street	Remaining	Netting and disinfection and/or relocate for construction of Ralph C Wilson Jr Park	Medium diameter trunk sewers intended to overflow when regulator capacity to DRI is exceeded.
B-025	Sixth Street	Remaining		

GLWA Outfall	Location	Existing Regulatory Status	Potential CSO Control Solutions	Root Cause
B-026	Eleventh Street	Remaining		
B-027	Rosa Parks Boulevard	Extreme	Relocate for construction of Ralph C Wilson Jr Park	Emergency Overflow. Only intended to discharge in extreme events
B-028	Sixteenth Street	Extreme	Pilot for Netting Facility of Relocated Outfalls	
B-029	Eighteenth Street	Priority	Regulator improvements, sewer separation, screening or netting and disinfection	Medium diameter trunk sewer intended to overflow when regulator capacity to DRI is exceeded.
B-030		Minimal	Continue to monitor, take corrective action as necessary	Changes in tributary area land use and drainage area now produce minimal volume during larger storm events.
B-031	Twenty-Fourth Street	Remaining	Regulator improvements, sewer separation, screening or netting and disinfection	Medium diameter trunk sewer intended to overflow when regulator capacity to DRI is exceeded
B-032		Minimal	Continue to monitor, take corrective action as necessary	Changes in tributary area land use and drainage area now produce minimal volume during larger storm events.
B-033		Minimal		
B-034		Minimal		
B-035		Extreme		Emergency Overflow. Only intended to discharge in extreme events.
B-036	Summit-Clark	Priority	Regulator improvements, sewer separation, screening or netting and disinfection	Medium diameter trunk sewer intended to overflow when regulator capacity to DRI is exceeded.
B-037	Ferdinand	Remaining		
B-038	Morrell	Remaining		
B-039		Minimal	Continue to monitor, take corrective action as necessary	Changes in tributary area land use and drainage area now produce minimal volume during larger storm events.
B-040	Campbell	Extreme	Continue to monitor, take corrective action as necessary	Emergency Overflow. Only intended to discharge in extreme events.
B-041	Livernois	Minimal	Continue to monitor, take corrective action as necessary	Changes in tributary area land use and drainage area now produce minimal volume during larger storm events.
B-042	Schroeder	Remaining	Regulator improvements, sewer separation, screening or netting and disinfection	Medium diameter trunk sewers intended to overflow when regulator capacity to DRI is exceeded.
B-044	Cary	Remaining		

GLWA Outfall	Location	Existing Regulatory Status	Potential CSO Control Solutions	Root Cause
B-045	Dearborn Street, Old Rouge	Minimal	Continue to monitor, take corrective action as necessary	Changes in tributary area land use and drainage area now produce minimal volume during larger storm events.
B-059	Pulaski Street, Old Rouge	Extreme	Continue to monitor, take corrective action as necessary	Emergency Overflow. Only intended to discharge in extreme events.
B-046	Carbon Street	Prohibited	Continue to monitor, take corrective action as necessary	Emergency Overflow. Only intended to discharge in extreme events
B-049	South Fort Street	Prohibited	Continue to monitor, take corrective action as necessary	Emergency Overflow. Only intended to discharge in extreme events.
B-050	South Fort Street	Prohibited	Continue to monitor, take corrective action as necessary	Emergency Overflow. Only intended to discharge in extreme events
B-054	Warren	Priority	Sewer separation with green infrastructure or first flush capture, screening or netting, and disinfection.	Frequent discharges with small volumes of overflow caused by downstream siphon size restriction or clogging
B-056, 057, 058	Tireman Avenue	Remaining	In-system storage or first flush capture basin with netting or screening and disinfection. New facility sizes could be reduced with green stormwater infrastructure.	Frequent overflows and high overflow volumes due to downstream capacity restrictions in the NWI and Hubbell and Southfield sewers.
B-060, 061, 062	West Chicago (East Shore)	Priority	In-system storage or first flush capture basin with netting or screening and disinfection. New facility sizes could be reduced with green stormwater infrastructure.	Frequent overflows and high overflow volumes due to downstream capacity restrictions in the NWI and Hubbell and Southfield sewers.
B-063	West Chicago (West Shore)	Remaining	Sewer separation with green infrastructure or first flush capture, screening or netting, and disinfection.	Frequent discharges with small volumes of overflow caused by downstream siphon size restriction or clogging
B-064	Plymouth	Remaining	Sewer separation with green infrastructure or first flush capture, screening or netting, and disinfection.	Frequent discharges with small volumes of overflow caused by downstream siphon size restriction or clogging
B-065	Glendale Relief	Priority	In-system storage or first flush capture basin with netting or screening and disinfection. New facility sizes could be reduced with green stormwater infrastructure.	Frequent overflows and high overflow volumes due to Hubbell and Southfield sewer capacity or weir heights
B-067. 068	Lahser (Dolson)	Priority	Relief sewer, in-system storage or first flush capture basin with netting or screening and disinfection. New facility sizes could be reduced with green stormwater infrastructure.	Infrequent overflows due to capacity downstream in NWI, and in-system storage for most storms.
B-069	West Parkway	Remaining	Sewer separation with green infrastructure or first flush capture, screening or netting, and disinfection.	Frequent discharges with small volumes of overflow caused by downstream siphon size restriction or clogging
B-070	Schoolcraft	Remaining	Sewer separation with green infrastructure or first flush capture, screening or netting, and disinfection.	Frequent discharges with small volumes of overflow caused by downstream siphon size restriction or clogging

GLWA Outfall	Location	Existing Regulatory Status	Potential CSO Control Solutions	Root Cause
B-071	Brammell	Remaining	Relief sewer, in-system storage, or first flush capture basin with netting or screening and disinfection. New facility sizes could be reduced with green stormwater infrastructure.	Infrequent overflows due to capacity in the NWI, and in-system storage for most storms.
B-072	Lyndon	Remaining	Sewer separation or first flush basin with netting and disinfection.	Infrequent overflows due to capacity downstream NWI and in-system storage for most storms.
B-075	Fenkell (East Shore)	Remaining	Sewer separation or first flush basin with netting and disinfection.	Medium diameter trunk sewer with limited volume for in-system storage.
B-077	Puritan (East Shore)	Remaining	Relief sewer and/or sewer separation projects	Sufficient NWI downstream capacity for most storms, in-system storage and small service areas
B-079	Florence and Ridge	Minimal	Continue to monitor, take corrective action as necessary	Infrequent overflows due to downstream NWI capacity and in-system storage for most storms.
B-080, 081	McNichols	Priority	In-system storage or first flush capture basin with netting or screening and disinfection. New facility sizes could be reduced with green stormwater infrastructure.	Frequent overflows and high overflow volumes due to downstream capacity restrictions in the NWI and Hubbell and Southfield sewers.
B-082	Glenhurst	Remaining	Relief sewer and/or sewer separation projects	Infrequent overflow due to capacity in NWI for small storms, in-system storage and small service area.
B-085	Seven Mile (East Shore)	Remaining	In-system storage or first flush capture basin with netting or screening and disinfection. New facility sizes could be reduced with green stormwater infrastructure.	Frequent overflows and high overflow volumes due to downstream NWI capacity restrictions.
B-087	Pembroke	Remaining	In-system storage or first flush capture basin with netting or screening and disinfection. New facility sizes could be reduced with green stormwater infrastructure.	Frequent overflows and high overflow volumes due to downstream NWI capacity restrictions.

6.4 Screening of Candidate Solutions

The list of candidate solutions was reviewed with the Steering Team, Technical Interest Groups, and the Regional Collaboration Group over a series of meetings in 2018 and 2019. Screening was performed to select the most promising candidate solutions for simulation by modeling with the RWCS model and the receiving water models.

Screening criteria were identified and evaluated based on the factors presented in Table 6-7. In the table below, the term “candidate solution” refers to a project that would create an operational change or a physical infrastructure change to the collection system.

In some locations, particularly for the GLWA Members Redford Township, Dearborn Heights and Inkster, there are multiple candidate solutions, but only one was selected for regional modeling. Using the example of the Redford Township central sewer district which is tributary to the Bell Branch of the Rouge River. This sewer district has five feasible solutions:

1. Sewer Separation
2. Outfall consolidation and routing of overflow to a new first flush tank with screening and disinfection
3. Outfall consolidation and routing of overflow to the GLWA Puritan Fenkell Retention Treatment Basin
4. A combination of 1 and 2, or 1 and 3.
5. Use of green stormwater infrastructure to reduce the scale of new grey infrastructure for 1, 2, 3 and 4.

Selection of one of the five solutions for the regional modeling does not preclude the implementation of a different solution. At the master planning level, each solution provides similar water quality benefits in terms of reduction of pathogens, reduction in oxygen-demanding pollutants, and prevention of discharging sanitary debris. The receiving water quality modeling performed for the evaluation of alternatives shows the relative impact of CSO controls and provided guidance for the relative timing of when controls should be implemented in conjunction with other stormwater management and CMOM initiatives. Therefore, even though only one of the five feasible solutions for the Redford Township Bell Branch CSOs was modeled, any of the five could be implemented and designed to achieve the same water quality result.

Table 6-7 Screening Criteria to Select Candidate Solutions for Modeling within Regional Alternatives

Category	Screening Criteria
Infiltration Inflow Management	The solution would reduce excessive infiltration inflow.
Member Level of Service	The solution helps to meet level of service requirements identified in Member survey or service contracts
Regional Capacity Management	The solution enables GLWA to improve regional capacity management for wet weather flows
Critical Hydraulic Grade Line Management	The solution provides additional control of flows or treatment capacity to reduce wet weather surcharging/

Category	Screening Criteria
Asset Management	The solution is consistent with the goals of GLWA's Strategic Asset Management Plan
Energy Efficiency	The solution reduces reliance on pumping, particularly repeated sequential pumping, in the regional collection system
Redundancy and Reliability	The solution improve redundancy for emergency purposes, and for efficiency of system rehabilitation solutions.
Climate Resiliency	The solution adds resiliency for potentially higher Detroit River, more intense rainfall and/or warmer temperatures
Optimizes	The solution optimizes the performance of existing facilities.
Committed Projects	The solution is already committed by GLWA or a Member to be implemented within the early years of the planning period.
Removal of Stormwater from Combined Sewers	The solution removes highway storm water from combined sewers in conjunction with highway modernization solutions
Green Infrastructure	The solution is driven by development ordinances that require stormwater controls including green infrastructure.
Beneficial infrastructure or recreational improvements to communities impacted by CSOs	The solution provides multiple benefits to communities impacts by CSO, or construction to control CSO. Multiple benefits, besides improved water quality, include new streetscapes, new recreational features, and new green infrastructure.
Affordability	The solution can be implemented as one step in sequence of integrated solutions that yield progressive water quality benefits at an investment pace that is affordable to the region.
Root cause	The solution addresses the root cause in the combined sewer infrastructure

6.5. Modeling of Regional Alternatives

The candidate solutions that remained after the screening process were incorporated into the collection system and receiving water quality modeling process. The Regional Wastewater Collection System (RWCS) SWMM model was used as the basis of modeling. Individual SWMM models were created to show progressive steps toward water quality improvement that could be achieved with phased implementation. At the end of the progressive steps, there are four complete regional alternatives that are designed to meet Michigan Water Quality Standards. Table 6-8 shows the assignment of candidate solutions to the individual models. The assignment of candidate solutions was performed in consultation with the Regional Collaboration Group, and the goal was to create models that represent regionally manageable and measurable implementation steps.

Table 6-8. Assignment of Candidate Solutions for Modeling in Regional Alternatives

Model Acronym	Builds On	Model Name	Candidate Solutions Simulated in Each Modeled Progression and Alternative
EXC		Existing Conditions	Actual operating conditions in 2018 (Used time series data from pump stations and VR operating rules in 2018.)
FUT	EXC	Future Conditions	MDOT's proposed projects including new GSI, sewer separation, and stormwater storage for Gordie Howe International Bridge, I-375 Improvements, I-75 South of 8 Mile, and I-75 North of 8 Mile

Model Acronym	Builds On	Model Name	Candidate Solutions Simulated in Each Modeled Progression and Alternative
			<p>Partial sewer separation for outfalls B018 and B042 performed in conjunction with MDOT projects</p> <p>Redevelopment-driven GSI in the City of Detroit based on ordinance requirements</p> <p>Modeled Fairview PS to maintain DRI level at 9 feet</p> <p>WRRF pump ON/OFF levels per NPDES Permit</p> <p>All In-System Storage Devices (ISDs) operating at 100% of design depth</p>
CM1	FUT	Phase 1 Collection System and MS4 Best Practices	Phase 1 Collection System and MS4 Best Practices to achieve dry weather dissolved oxygen standards and dry weather partial body contact standards.
NST	CM1	Non-Structural Optimization	<p>Regulator openings enlarged at 36 locations along the Detroit River Interceptor as proposed in the Interim Wet Weather Operating Plan (IWOP)</p> <p>VR-08 throttled to 86 cfs as proposed in the IWOP</p> <p>Increased operating level at ISD 005</p> <p>VR-17 operating rules updated per IWOP</p>
NBL	NST	New Baseline	<p>MCPWO Chapaton Basin Expansion</p> <p>Dearborn first flush capture and screening and disinfection facility at CSO-14</p> <p>Dearborn sewer separation at CSO-01, -03, and -04</p> <p>Fairview PS improvements (seven new 40 MGD pumps)</p> <p>RVSDS river inflow mitigated in accordance with the implementation of the Wayne County Long Term Corrective Action Plan</p> <p>Completion of remaining committed GSI projects by DWSD in Detroit</p>
OPT	NBL	Optimized Facilities	<p>NWI diversion to Oakwood RTB</p> <p>Meldrum Sewer connected to Leib SDF</p> <p>VR-15 and VR-16 programmed to close at high WRRF wet well levels (EI 85) to divert flow from NIEA to Leib SDF.</p>
RD1	OPT	Rouge and Detroit Phase 1	<p>Dearborn Heights Ashcroft Drain area sewer separation</p> <p>Sewer separation for outfall B054 (West Warren) on the Rouge River and outfalls B003, B004, B005 and B006 (Fischer District) on the Detroit River</p> <p>Sewer separation at B018</p> <p>Phase 1 in-system storage on the Rouge River with nine new ISDs on the east side of the Rouge River</p> <p>Pilot Netting Facilities B-020 and B-023</p>

Model Acronym	Builds On	Model Name	Candidate Solutions Simulated in Each Modeled Progression and Alternative
CM2	RD1	Phase 2 Collection System and MS4 Best Practices	Phase 2 Collection System and MS4 Best Practices to achieve dry weather dissolved oxygen standards and dry weather full body contact standards.
RD2	CM2	Rouge and Detroit Phase 2	<p>Redford Ashcroft Drain CSO outfall consolidation, first flush capture and screening and disinfection facility</p> <p>Six Redford Township CSOs on Bell Branch routed to Puritan Fenkell RTB</p> <p>Inkster and Dearborn Heights Lower Rouge Separation and/or Extend RTB Service Areas</p> <p>New Phase 2 CSO Control Conduit for Rouge River</p> <p>Sewer separation on the Detroit River (B007, B009, B010, and B017) and Rouge River (Glenhurst (B082), Ray & Brammel (B071), Lyndon (B072), Schoolcraft and Outer Drive (B069/B070), Puritan (B077), Plymouth (B064), West Chicago (B063), Florence & Ridge (B079))</p> <p>Sewer separation in Detroit east of Rouge River in the service areas tributary to the Puritan, Fenkell and Lyndon CSO outfalls.</p>
CM3	RD2	Phase 3 Collection System and MS4 Best Practices	Phase 3 Collection System and MS4 Best Practices to achieve all water quality standards.
RD3	CM3	Rouge and Detroit Phase 3 (Recommended Plan, plus adaptive elements from RDA)	Installation of netting and in-line disinfection for remaining CSO outfalls that exceed regulatory criteria for Extreme Event or Minimum Volume discharges.
POR	NBL, CM3	Plan of Record 2008 LTCSO Plan and 2010 Supplement	Construction of first flush basins, netting facilities and in-line disinfection for Rouge River CSO outfalls in accordance with the 2010 LTCSO Plan Supplement. Construction of the Meldrum Sewer diversion to the Leib SDF; construction of netting and in-line disinfection facilities for Detroit River CSO outfalls in accordance with the 2008 LTCSO Plan. CSO outfalls designated as Minimum Volume or Extreme Event only discharges subsequent to 2010 LTCSO plan would not have new controls.
CON	OPT, CM3	New Conveyance Alternative	New relief conduits to provide additional capacity to convey wet weather flow at the WRRF, new Pump Station 3 and high rate clarification at the WRRF.
GSI	RD1	Maximum GSI	Construction of 15,300 acres of GSI within public rights of way on Detroit's West, Central, and East Districts.
RDA	GSI	Maximum GSI and Reduced DWII	DWII reduced by 50% by improvements to DWSD distribution mains and GLWA water transmission mains, reductions in river inflow, and excessive I/I in Member systems
SEP	FUT CM3	Full Separation	Separation of all 233 acres of combined sewer area in the GLWA regional system.

6.6 Collection System Alternatives Scoring Methodology

A scoring methodology was developed to evaluate collection system alternatives. The methodology derives from the 5 desired outcomes developed for the Wastewater Master Plan as

discussed in Section 2. In comparing costs and benefits of alternatives, the 5 desired outcomes represent benefits, and the scoring methodology provides the means to measure the benefits. This section describes the development and application of the scoring methodology.

The seven-month period of April 1 through October 31, 2018 was selected as the continuous simulation period because it is a recent period with a large amount of system operation and monitoring data. This seven-month interval is the period of the year that is of most interest for examining compliance with water quality standards given partial and full body contact recreation during these months. This period in 2018 was a relatively wet period with 10 storms exceeding 1-inch depth and a total of 28.5 inches of rainfall. This time period had been used to document the performance of the West Side Model in a recent deliverable to EGLE and continuous river boundary conditions were available for modeling.

6.6.1 Attainment Measures

A set of attainment measures was developed in consultation with the Steering Team and Regional Collaboration Group. Meetings with EGLE were held to obtain input on how the attainment measures could be interpreted for regulatory compliance.

The attainment measures indicate progress toward achieving the 5 desired outcomes. Higher attainment measure scores indicate a greater degree of progress toward the respective desired outcomes. Table 6-9 provides a list of the attainment measures and the computational method. A description of each attainment measure is presented below. Additional detail is provided in Technical Memorandum 6A.

6.6.2 Percent of Time Achieving Partial Body Contact Use

The Attainment Measure for Partial Body Contact Use is calculated by the receiving water quality model. The score is based on *E. coli* compliance calculated as the percentage of time meeting the partial body (1,000 cfu/100 ml) water quality standards. The statistics are calculated for each model segment and all model timesteps, where the percentage of time is the number of timesteps meeting each standard compared against the total model timesteps. These metrics are aggregated into a single number for each receiving water, weighted by river mile, and then into a single regional weighted value by the relative length of river in the Detroit and Rouge systems.

6.6.3 Percent of Time Achieving Full Body Contact Use

The attainment measure for Full Body Contact Use is calculated by the receiving water quality model. The score is based on *E. coli* compliance calculated as the percentage of time meeting the partial body (300 cfu/100 ml) water quality standards. The statistics are calculated for each model segment and all model timesteps, where the percentage of time is the number of timesteps meeting each standard compared against the total model timesteps. These metrics are aggregated into a single number for each receiving water, weighted by river mile, and then into a single regional weighted value by the relative length of river in the Detroit and Rouge systems.

Table 6-9. Attainment Measures

Desired Outcome	Attainment Measure	Key Objective	Computational Method Simulation Period
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Protect Public Health and Safety	% of Time achieving Partial Body Contact Use	Meet Water Quality Standards	% of time <i>E. Coli</i> ≤ 1000 (River Mile Weighted)
Protect Public Health and Safety	% of Time Achieving Full Body Contact Use	Meet Water Quality Standards	% of time <i>E. Coli</i> ≤ 300 (River Mile Weighted)
Preserve and Enhance Natural Resources	% of Time Achieving Aquatic Life Use	Meet Water Quality Standards	% of time D.O. > 5 (Rouge) % of time D.O. > 7 (Detroit) (River Mile Weighted)
Preserve and Enhance Natural Resources	% of Rouge River Outfalls with First Flush Capture	Meet Water Quality Standards	Inventory of outfalls protected by first flush capture facilities
Protect Public Health and Safety Maintain High Quality Service	% of Time achieving Critical Hydraulic Grade Line	Reduce the Risk of Sanitary Sewer Overflow and Basement Flooding	% of time HGL below critical elevations for all areas monitored to protect from SSO and basement flooding.
Provide Value for Investment Maintain High Quality Service	% Wet Weather Flow Capture	Minimize Sewer Overflows	% of CSO and SSO volume treated during precipitation events
Provide Value for Investment	% of Existing CSO Facility Design Capacity Utilized	Maximize Use of Existing Treatment Facilities	% of Overflow events when remote treatment facilities utilize more than 80% of design capacity
Provide Value for Investment Maintain High Quality Service	Value-Added Improvements to Existing Facilities	Maximize Improvements to Existing Infrastructure	% of Potential Improvements to Existing Facilities
Contribute to Economic Prosperity	Value-Added Benefits for Impacted Communities	Maximize Benefits to Impacted Communities	% of Potential Benefits for Tributary Area

6.6.4 Percent of Time Achieving Aquatic Life Use

The Attainment Measure for Aquatic Life Use is calculated by the receiving water quality model. It is only measured for the Rouge River, because CSO discharges do not impact dissolved oxygen in the Detroit River. The score is based on the percentage of time that each segment meets the 5 mg/l dissolved oxygen standard. The statistics are calculated for each model segment and all model timesteps, where the percentage of time is the number of timesteps meeting each standard compared against the total model timesteps. These metrics are aggregated into a single number weighted by river mile, and then into a single regional weighted value over the length of the Rouge River.

Water quality scores are computed for the entire model simulation period (not just during the NPDES permit defined Wet Weather events).

6.6.5 Percent of Rouge River Outfalls with First Flush Capture

The Attainment Measure for Rouge River Outfalls with First Flush Capture is calculated by a count of the outfalls and their respective CSO control technology. The percentage of outfalls is based on the total All existing CSO control facilities on the Rouge River include first flush controls, except

for the Baby Creek Screening and Disinfection Facility. Existing uncontrolled CSOs with an NPDES permit category of Minimal Volume and Extreme Event Only were not counted in the percentage. Where sewer separation is included in an alternative, then the separated CSO outfall is counted as achieving first flush capture.

6.6.6 Percent of Time Achieving Critical Hydraulic Grade Line

The Attainment Measure for Critical Hydraulic Grade Line is calculated by the hydrology and hydraulic model (Regional Wastewater Collection System Model, or RWCS Model). The critical hydraulic grade line protection score is calculated as the percentage of time that the HGL at designated critical locations is below an elevation threshold measured with the NAVD88 datum. This statistic is computed for the entire simulation period, not just the wet weather events. The measure calculated so that a day is considered an “exceedance” if any node within the critical nodes exceeds a critical elevation. Most HGL thresholds are set to the pipe crown, with several locations along the Northwest Interceptor set to allow ten feet of surcharge. Critical hydraulic grade line elevations were reviewed with Member representatives of the Regional Collaboration Group.

6.6.7 Percent Capture of Wet Weather Flow

The Attainment Measure for Percent Capture is calculated by the hydrology and hydraulic model (Regional Wastewater Collection System Model, or RWCS Model). Percent capture is defined as the percentage of stored or treated wet weather flow volume during wet weather events. The events are defined in the GWLA/DWSD NPDES permit:

For the interim period, is defined as those days on which an average 0.10 inches or more of precipitation was recorded by six strategically located rainfall gauges (as defined in Part I.9.c.(10) of the Operational Plan) in the WRRF’s service area, plus two days immediately following days of 0.10 inch to 1.00 inch days of precipitation or three days following days of 1.00 inch or more precipitation. Rainfall days are further limited to those days in which the air temperature exceeds 32° F (0° C) for at least an eight-hour period. The permittee may demonstrate that certain events such as snowmelt, and other unforeseen events will be considered rainfall days.

6.6.8 Percent of Existing CSO Facilities Activated During Wet Weather Events

The attainment measure for Percent of Existing CSO Facilities Activated is calculated by the hydrologic and hydraulic model (Regional Wastewater Collection System Model, or RWCS Model). A facility capacity activation is counted if the peak flow exceeds 0.1 cfs. For each wet weather event, the number of existing CSO facilities activated was divided by the total number of existing CSO facilities as listed in Table 6-10.

Table 6-10 Design Capacities Used for Calculating Percent of Capacity Utilized

Facility Name	Volume Capacity (Million Gallons)	Peak Flow Capacity (Cubic Feet Per Second)
Belle Isle RTB	0.3	66
Leib SDF	9.94	1,550
St Aubin SDF	2.43	250
Baby Creek SDF	28	5,100

Facility Name	Volume Capacity (Million Gallons)	Peak Flow Capacity (Cubic Feet Per Second)
Milk River RTB	18.8	1,920
Chapaton RTB	28	1,545
Martin RTB	8.6	410
Acacia Park RTB	4.4	290
Birmingham RTB	5.5	330
Bloomfield Village RTB	10	700
George W Kuhn RTB	92	6,700
Inkster RTB	3.1	500
Middlebelt Road RTB	1.3	405
Dearborn Heights RTB	2.7	500
Redford Township RTB	1.7	190
Dearborn C4	2.4	Capture Shaft, no treatment capacity
Dearborn C7	6.2	936
Dearborn C8	7.5	1,047
Oakwood RTB	9	1,660
Conner Creek RTB	31.5	13,962
Hubbell-Southfield RTB	22	2,200
Puritan-Fenkell RTB	2.8	655
Seven Mile RTB	2.2	494
Dearborn C6	6.5	1,867

6.6.9 Asset Management Score

The Attainment Measure for Asset Management is a qualitative measure of the way each alternative or alternative step improves existing infrastructure. Each alternative or alternative step is rated on the following scale, with 5 being the highest potential value:

- 1 = Maintains existing condition of infrastructure
- 2 = Improves the frequency of inspection of existing infrastructure
- 3 = Rehabilitates existing infrastructure in conjunction with new wet weather controls
- 4 = Repurposes or optimizes existing infrastructure to improve wet weather controls
- 5 = Supports early investment to improve existing infrastructure

The scoring was assigned as a value-added metric. Improvements to the condition of existing wastewater infrastructure are being prioritized by GLWA and its Members. Maximum scores were given to progressive steps along the adaptive integrated plan that minimize near term costs for new facilities, and thus allow use of GLWA capital improvement resources for rehabilitation of existing facilities.

Scores for pre-planning period time steps are based on judgment from the Regional Collaboration Group. Prior to the recession of 2008, particularly when more grant funding was available and the

infrastructure was newer, the judgment was that wastewater assets were sufficiently maintained. During the recession that began in 2008, expenditures for inspection and rehabilitation were reduced, which jeopardized the condition of existing infrastructure. The creation of GLWA in 2016 established new policies and funding priorities for asset management and re-investment.

6.6.10 Contribution to Economic Prosperity

The attainment measure for Contribution to Economic Prosperity is a qualitative measure of the way each alternative provides benefits to communities impacted by local wet weather water quality and level of service of existing infrastructure. Each alternative is rated on the following scale, with 5 representing the highest potential value:

- 1 = Maintains existing level of service and local community features
- 2 = Provides improvements early in the planning period to impacted communities
- 3 = Improves streets and level of service
- 4 = Adds green stormwater infrastructure and other development improvements
- 5 = Supports progressive expenditures consistent with regional affordability

The scoring was assigned as a value-added metric. These scores were assigned based on the qualitative guidance provided by the US EPA publication: *Characterizing the Value of Water to Inform Decision-Making*. August 2017. This document examines the challenges that urban areas face in operating wastewater and stormwater infrastructure under Clean Water Act (CWA) requirements and financial constraints. Agencies with multiple CWA obligations must prioritize their investments. The integrated planning process allows for systematically identifying and prioritizing actions and projects to meet CWA obligations. A fundamental premise of prioritizing actions is the value that water resource improvements create for communities currently impacted by impaired water quality. The US EPA document characterizes the value of water and applies that value to inform integrated wastewater and stormwater planning.

The US EPA document uses examples cities and counties in Missouri to develop measures for comprehensive integrated planning. These measures include:

- Economic value of major commercial water users – Blue Economy
- Economic value of water-related recreation
- Improvement in property values and related new development
- Value of green infrastructure in the impacted areas

These generic measures were applied more specifically to the needs of GLWA's service area through the 1 to 5 scale cited earlier. These measures are consistent with the goals of the existing Green Infrastructure Program of the NPDES permit for GLWA and DWSD.

6.6.11 Weighting Factors for Attainment Measures

Each Attainment Measure has an associated weighting factor that is used to calculate a total Desired Outcome Progress Score for each alternative and each progression step. The weighting factors were developed in consultation with the Regional Collaboration and Steering Team. A series of “what-if” scenarios were demonstrated to show the impact of changing weighting factors.

6.7 Scoring Results

Attainment scores were developed in an iterative process by performing the continuous simulations, reviewing results with the Regional Collaboration Group, making model refinements and re-simulating. The iterative process facilitated detailed interaction with GLWA staff and Members. The process also allowed for continuing improvements to operating rules and model physical representation of the collection system.

The modeling results for September 2019 are shown in Decision Support Framework Table 6-11. A future version of this report will present a final set of November 2019 model results.

Table 6-11. Decision Support Framework Scoring of Regional Alternatives

Decision Support Framework Scoring December 31, 2019					Past Progress					Future Baseline	Phase 1 Collection System and MS4 Best Practices	Progressive Near Term System-Wide Control Steps			Phase 1 CSO Controls	Phase 2 Collection System and MS4 Best Practices	Phase 2 CSO Controls	Phase 3 Collection System and MS4 Best Practices	Phase 3 CSO Controls	Guidance for Adaptive Elements		Other Alternatives to Meet the Water Quality Requirements				
					1980 to 1989	1990 to 1999	2000 to 2009	2010 to 2019	Existing Conditions (EXC)	Future Conditions (FUT)	Base Flow & Stormwater Improved for Dry Weather Partial Body Contact (CM1)	IWOP / ROP (NST)	Committed Projects (NBL)	Wet Weather Facility Optimization (OPT)	Public Health Protection for Small Storms (RD1)	Base Flow & Stormwater Improved for Dry Weather Full Body Contact (CM2)	Extend Protection for Public Health and Aquatic Species (RD2)	Base Flow & Stormwater Improved for all Water Quality Standards (CM3)	Extend Protection for Extreme Wet Weather Events (RD3)	Maximum GSI (GSI)	Max GSI + Reduced DWII (RDA)	Plan of Record with Collection System and MS4 Best Practices (POR)	New Larger Interceptors and Increased Treatment at WRRF (CON)	Complete Sewer Separation (SEP)		
Health & Safety	Natural Resources	Quality Service	Value of Investment	Economic Prosperity	Attainment Measure	Weighting Factor					EXC	FUT	CM1	NST	NBL	OPT	RD1	CM2	RD2	CM3	RD3	GSI	RDA	POR	CON	SEP
					% of Time achieving Partial Body Contact Use	5%	45%	50%	65%	66%	66%	66%	91.3%	91.3%	92%	92%	92.2%	99.5%	99.5%	99.7%	99.9%	92.8%	92.7%	99.9%	99.9%	100%
					% of time achieving Full Body Contact Use	5%	8%	15%	24%	24.8%	24.8%	24.8%	39.2%	39.3%	39.5%	39.5%	38.9%	84.4%	84.4%	98.7%	99.9%	39.8%	39.6%	99.9%	99.9%	100%
					% of Time achieving Aquatic Life Use (DO WQS)	10%	80%	85%	90%	94.6%	94.6%	94.6%	94.7%	96.7%	95.2%	95.2%	95.4%	96.7%	96.8%	96.8%	96.8%	95.4%	95.5%	95.9%	96.8%	96.8%
					% of Rouge River Outfalls with First Flush Capture	10%	0%	6.7%	20%	35%	35%	35%	35%	35%	35%	35%	73.3%	73.3%	100%	100%	100%	73.3%	73.3%	100%	100%	100%
					Asset Management Score	15%	60%	50%	25%	30%	35%	37.2%	39.4%	50.6%	61.7%	72.8%	83.9%	95%	97.2%	99.4%	99.9%	99.4%	99.9%	77.2%	77.2%	24.4%
					% of Existing CSO Facility Activated during Wet Weather Events	10%	45%	45%	50%	70.5%	70.5%	70.2%	70.2%	70.3%	70.8%	70.5%	70.3%	70.3%	70.3%	70.3%	70.3%	67%	67.7%	70.8%	70.3%	70.3%
					% of time achieving Critical HGL Protection	15%	70%	75%	85%	87.6%	87.6%	87.7%	87.7%	90.2%	90.7%	91.2%	91.3%	91.3%	91.3%	91.3%	91.3%	92.1%	93%	90.2%	89%	89%
					% Capture	20%	60%	85%	95%	96.5%	96.5%	96.4%	96.4%	96.7%	97.9%	98.1%	98.8%	98.8%	99.2%	100%	100%	99.3%	99.3%	100%	96.7%	100%
					Economic Prosperity Score	10%	50%	50%	25%	25%	30%	32.2%	34.4%	45.6%	56.7%	67.8%	78.9%	90%	94.4%	96.7%	96.7%	92.2%	94.4%	72.2%	72.2%	24.4%

Decision Support Framework Scoring
December 31, 2019

Desired Outcomes					Past Progress						Future Baseline	Progressive Near Term System-Wide Control Steps			Phase 1 CSO Controls	Phase 2 Collection System and MS4 Best Practices	Phase 2 CSO Controls	Phase 3 Collection System and MS4 Best Practices	Phase 3 CSO Controls	Guidance for Adaptive Elements		Other Alternatives to Meet the Water Quality Requirements				
					Attainment Measure	Weighting Factor	1980 to 1989	1990 to 1999	2000 to 2009	2010 to 2019	Existing Conditions (EXC)	Future Conditions (FUT)	Base Flow & Stormwater Improved for Dry Weather Partial Body Contact (CM1)	IWOP / ROP (NST)	Committed Projects (NBL)	Wet Weather Facility Optimization (OPT)	Public Health Protection for Small Storms (RD1)	Base Flow & Stormwater Improved for Dry Weather Full Body Contact (CM2)	Extend Protection for Public Health and Aquatic Species (RD2)	Base Flow & Stormwater Improved for all Water Quality Standards (CM3)	Extend Protection for Extreme Wet Weather Events (RD3)	Maximum GSI (GSI)	Max GSI + Reduced DWII (RDA)	Plan of Record with Collection System and MS4 Best Practices (POR)	New Larger Interceptors and Increased Treatment at WRRF (CON)	Complete Sewer Separation (SEP)
Health & Safety	Natural Resources	Quality Service	Value of Investment	Economic Prosperity				EXC	FUT	CM1	NST	NBL	OPT	RD1	CM2	RD2	CM3	RD3	GSI	RDA	POR	CON	SEP			
					Outcome Progress Score	100%	51.7%	57%	56.5%	60.5%	61.7%	62.3%	64.8%	68.2%	71.3%	74.1%	77.1%	82.6%	83.5%	84.9%	85%	80.7%	81.2%	79%	78.2%	66.2%
					Incremental Capital Cost (2019 \$ Millions)		\$318	\$702	\$1,762	\$653	\$ -	\$3	\$6	\$14	\$267	\$213	\$450	\$10	\$1,156	\$20	\$150	\$4,640	\$2,500	\$1,859	\$3,384	\$15,000
					Cumulative Capital Cost (2019 \$ Millions)		\$318	\$1,020	\$2,782	\$3,436	\$ -	\$3	\$9	\$23	\$290	\$503	\$952	\$962	\$2,118	\$2,138	\$2,288	\$5,173	\$7,673	\$2,156	\$3,627	\$15,039
					Incremental Annual Cost (2019 \$ Millions)		\$ -		\$ -	\$ -	\$ -	\$0	\$11	\$0	\$2	\$2	\$1	\$10	\$3	\$10	\$3	\$1	\$9	\$29	\$29	\$10
					Cumulative Annual Cost (2019 \$ Millions)		\$ -	\$ -	\$ -	\$ -	\$ -	\$0	\$11	\$11	\$13	\$15	\$16	\$26	\$29	\$39	\$42	\$36	\$45	\$51	\$51	\$41
					Incremental Life Cycle Present Worth (2019 \$ Millions)		\$318	\$702	\$1,762	\$653	\$ -	\$3	\$177	\$10	\$129	\$161	\$190	\$174	\$513	\$184	\$177	\$4,308	\$1,222	\$1,727	\$2,023	\$5,039
					Historical Perspective: Cumulative Life Cycle (2019 \$ Millions)		\$318	\$1,020	2,782	\$3,436	\$ 3,436	\$3,438	\$3,615	\$3,625	\$3,754	\$3,915	\$4,105	\$4,279	\$ 4,792	\$4,976	\$5,152	\$8,580	\$9,803	\$5,649	\$5,977	\$9,011
					No Pre-Planning Period Costs: Cumulative Life Cycle (2019 \$ Millions)						\$ -	\$3	\$ 180	\$189	\$319	\$480	\$670	\$843	\$ 1,356	\$1,540	\$1,717	\$5,145	\$6,367	\$2,213	\$2,541	\$5,575

Figure 6-1 shows the costs and benefits for the four alternatives that meet the Michigan water quality standards. These four alternatives are:

1. Separate the sewers in the 233 square mile combined sewer service area (SEP).
2. Expand pumping and treatment capacity at the WRRF for additional wet weather flow and construct major relief sewers to carry first flush wet weather flow to the WRRF (CON); install netting and disinfection at outfalls that exceed NPDES limit criteria for Minimal Volume or Extreme Event discharge.
3. Implement the Plan of Record (POR) as presented in the 2008 Long Term CSO Control Plan and its 2010 Supplement. This plan would construct 7 new RTBs along the Rouge River and a series of netting and inline disinfection facilities.
4. Maximize the use of green stormwater infrastructure (GSI) by constructing over 8,500 acres of sewer separation, disconnecting 90% of downspouts, and constructing over 15,300 acres of GSI in public rights-of-way.
5. Implement an Integrated Adaptive Management solution (RD3) that creates water quality improvement for each step of implementation, and implementation can be paced at the affordability of the region.

The costs shown in Figure 6-1 represent the estimated capital costs for each alternative. The desired outcome progress score represents the weighted value of all attainment measures. All five alternatives include the programs for Collection Systems and Separate Storm Drain Best Practices to provide dry weather and MS4 water quality protection.

The Integrated Adaptive Management alternative has the lowest present worth cost and the highest Desired Outcome Progress Score.

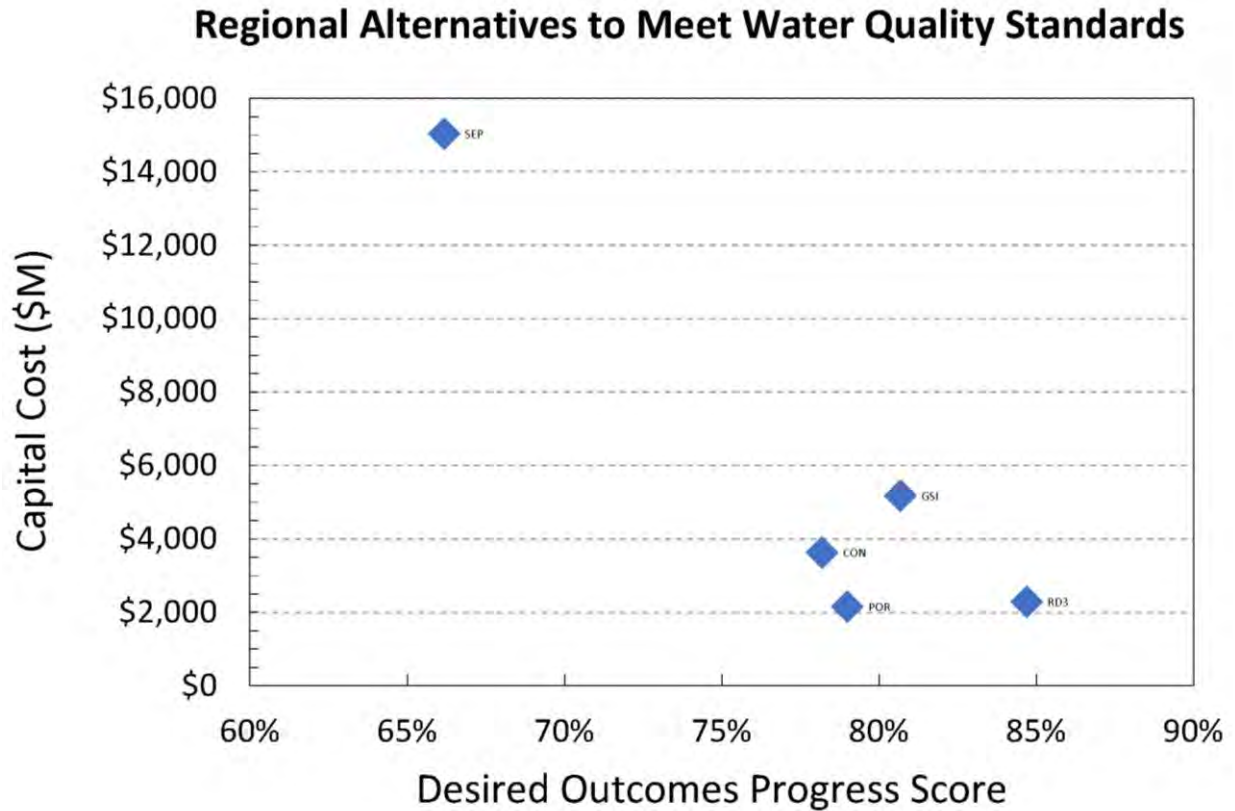


Figure 6-1. Cost and Benefit Curve for Regional Collection System Alternatives that Meet Michigan Water Quality Standards

Figure 6-2 shows the costs and benefits for each step of the progression that implements the Integrated Adaptive Management alternative. The cost-benefit curve displays a “knee of the curve” inflection point which is typical for wet weather water quality control programs. RD1, which is the completion of Phase 1 optimization, in-system storage and sewer separation, To the left of the knee of the curve, progress toward the Desired Outcomes is attained at a rate that exceeds the increases in cost to improve the Desired Outcome score. To the right of the knee of the curve, progress toward the Desired Outcomes proceeds at diminishing rates, while the costs increase at higher rates.

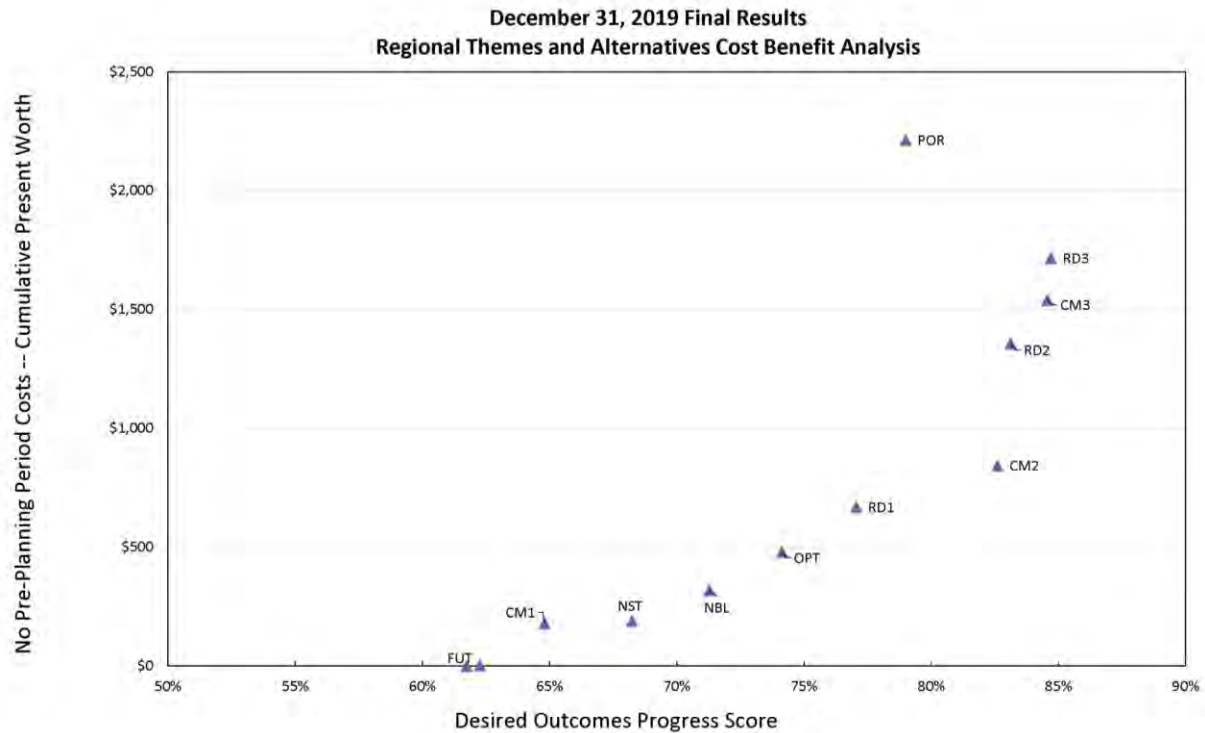


Figure 6-2. Cost and Benefit Curve for Progressive Steps along the Integrated Adaptive Management Alternative to Meet Michigan Water Quality Standards

6.8 Phasing of Proposed Projects

The scoring results shown in Table 6-11 and the graphical representation in Figure 6-2 provide guidance for sequencing of regional water quality protection projects. Programming the projects in three major phases is envisioned, as shown in Table 6-12.

Table 6-12. Phasing of Proposed Projects

Phase	Water Quality Goals	Major Projects
Phase 1		<ul style="list-style-type: none"> Scheduled asset management projects by GLWA and Members
Rouge River	Achieve Dry Weather DO and Partial Body Contact Standards Reduce Public Health Risks and DO drops by Small Storm Capture	<ul style="list-style-type: none"> Committed CSO control projects IWOP recommendations for operating rules and Detroit River Interceptor regulator improvements. Regional Operating Plan and Regional Water Quality Monitoring Program
Detroit River	Reduce Public Health Risks by Small Storm Capture with Improved Conveyance Capacity	<ul style="list-style-type: none"> Northwest Interceptor Diversion to Oakwood RTB Meldrum Sewer Diversion to Leib Screening and Disinfection Facility In-System Storage on DWSD Trunk Sewers Tributary to the Rouge River Sewer Separation for designated areas where collaborative opportunities with MDOT and Member partners

Phase	Water Quality Goals	Major Projects
		<ul style="list-style-type: none"> Pilot netting facilities on Detroit River outfalls upstream of Ralph C. Wilson Jr. Centennial Park
Assess water quality trends, priority problem areas, advances in private property and public GSI implementation, CSO percent capture. Update the Phase 2 plan based on results achieved in Phase 1.		
Phase 2		
Rouge River	Achieve Full Body Contact Standards during Dry Weather Achieve Aquatic Species Protection during Wet Weather	<ul style="list-style-type: none"> Rouge River CSO Control Conduit Suburban CSO control projects in Redford Township, Dearborn, Dearborn Heights and Inkster Continue sewer separation projects in City of Detroit
Detroit River	Public health and sanitary trash protection for priority recreational areas	
Assess water quality trends, priority problem areas, advances in private property and public GSI implementation, CSO percent capture. Update the Phase 2 plan based on results achieved in Phase 1.		
Phase 3		
Rouge River	Attain full water quality standards	Netting and disinfection for outfalls with discharges that exceed NPDES criteria for Minimal Volume or Extreme Events
Detroit River		Complete sewer separation projects in City of Detroit

6.9 Collection System Capacity Assessment

The first of the five planning Outcomes is to “Protect Public Health and Safety”. Managing the collection system capacity and managing the hydraulic grade line at critical locations are fundamental operating requirement in meeting this first Outcome.

Reducing the risk of basement flooding is a shared responsibility of property owners, each municipality, each County wastewater conveyor, and GLWA. This Wastewater Master Plan included an investigation of GLWA’s critical assets to determine if the capacity, operation, or condition of the asset poses a risk of basement flooding now or over the 40-year planning period.

The analysis of needs for GLWA’s role in basement flooding risk management was performed through the following series of tasks:

1. Level of Service Goal
2. Potential Impacts of Climate Change
3. Critical Hydraulic Grade Elevations at Major Connection Points
4. Estimate of Trunk Sewer and Interceptor Capacity

6.9.1 Level of Service Goal

The interceptors and trunk sewers leased by GLWA are located within the municipal limits of Detroit, Dearborn, Hamtramck and Highland Park. The trunk sewers leased by GLWA were

generally designed to convey flow for a 10-year 1-hour storm. (There are some exceptions to the 10-year storm level of service as described later). Interceptors were designed to convey 2 to 3 times the average dry weather flow from the tributary area.

A 10-year 1-hour storm event will generally be used as the level of service goal for GLWA leased trunk sewers.

A 10-year 1-hour storm event will be used as the basis of design for planning new storm sewer capacity for separation projects.

Interceptor surcharging is generally relieved by overflows through combined sewer outfalls.

The level of service goal for operation of interceptors will be to provide sufficient pump redundancy, optimization of regulator capacities, and active control points to maintain hydraulic grade lines in the regional collection system at or below critical elevations

6.9.2 Potential Impacts of Climate Change

A Detroit River elevation of El 98.0 has traditionally been used for design conditions for WRRF capacity and pumping requirements. However, the Detroit River reached El 98.6 in July 2019. Basement flooding protection will be assessed relative to the historic El 98.0 design elevation, and projected new levels of El 99.0 and El 99.5.

6.9.3 Critical Hydraulic Grade Line Elevations

Table 6-13 presents a preliminary identification of Critical Hydraulic Grade Elevations at Member Billing Meters, within the DWSD wastewater collection system, and at GLWA regional and CSO control facilities. These elevations were the basis for scoring the Attainment Measure of Critical Hydraulic Grade Control in the evaluation of alternatives for the Wastewater Master Plan. These elevations were reviewed and adjusted based on Member and GLWA comments received between April and January 2020.

Starting in the year 2020, these critical locations and elevations should be reviewed annually based on annual performance of the system and recordings of level sensors at or near these locations. The critical elevations should be updated as needed to improve regional system performance.

Table 6-13. Critical Elevations

Member	Meter(s) or Location (Model Junction ID)	Interceptor or Trunk Sewer Name	Cross Streets	Elevation (Feet) (NAVD88)			Criteria for Critical HGL
				Interceptor Invert	Critical	Ground	
MEMBER BILLING METER LOCATIONS							
Allen Park	AP-S-1 (SMH62496)	Northwest Interceptor	Enterprise Drive and South Dearborn Drive	556.8	578.5	599.7	Pump Station Design Criteria
	AP-S-2 (SMH62566)	Northwest Interceptor	Fairlane Drive and Fairlane Circle	557.4	580.0	586.8	Tributary area is industrial park without basements. 6-feet below grade.
Center Line	CL-S-1 (SMH16630)	Van Dyke Interceptor	8 Mile and Van Dyke	604.4	611.2	621.3	Crown of Pipe
Dearborn	DN-S-2 (SFIT0014)	Northwest Interceptor	Greenfield Road and Butler Street	556.0	574.25	589.4	Greenfield Pump Station Design Criteria
	DN-S-4 (SMH62452)	Northwest Interceptor	Southfield Freeway and Hubbard Drive	562.8	591.9	600.2	Crown of Pipe
	DN-S-5 (JCT-982)	Northwest Interceptor	Southfield Freeway 1,000 feet north of Garage Road	561.9	576.5	600.2	
	DN-S-6 (JCT-428)	Northwest Interceptor	Michigan Avenue 700 feet west of American Drive	560.5	584.6	598.6	Invert of 12" sewer u/s of meter on Dearborn Record Drawing 533793 Detail B
	DN-S-7 (JCT-1392)	Northwest Interceptor	Ford Rd and Altar Rd	567.2	592.8	611.7	Invert of 12" sewer d/s of meter at drop connection to NWI
	DN-S-8 (20319)			300 ft NW of Miller Rd and Bland St	569	572.5	585.0
Farmington	FA-S-1 (JCT-2176)	NWI	8 Mile and Berg Rd	613.87	620.87	640.95	Crown of Pipe
Grosse Pointe	GP-S-1 (FCMH11)	Fox Creek Enclosure	Charlevoix St and Neff Rd	562.77	574.35	580.46	Crown of Pipe
Grosse Pointe Farms	GPF-S-1 (SFIT3070)	Grosse Pointe Interceptor	Chalfonte Ave and Kerby Rd	565.2	569.2	582.2	Crown of Pipe
Grosse Pointe Park	GK-S-1,2 (SFIT0083)	Fox Creek Enclosure	Jefferson Ave and Maryland Street	559.7	567.7	578.3	Crown of Pipe
Melvindale	ME-S-1 (SMH62563)	Northwest Interceptor	Greenfield Road 800 feet east of	555.2	571.3	583.9	Pump Station Design Criteria

Member	Meter(s) or Location (Model Junction ID)	Interceptor or Trunk Sewer Name	Cross Streets	Elevation (Feet) (NAVD88)			Criteria for Critical HGL
				Interceptor Invert	Critical	Ground	
			Prospect Street				
Oakland County: Evergreen-Farmington	OC-S-1 (SOT136017)	First Hamilton Relief Sewer	Southfield Rd and West Haven Ave	618.3	636.6	657.9	Crown of Pipe
Oakland County: SE Oakland	SE-S-1 (SCH00080)	8 Mile and Dequindre St	Conant-Mt. Elliot Sewer	589.6	598.6	629.8	Crown of Pipe
Oakland Macomb Interceptor Drain	NES-S-DWP,1,2,4,5,6 (SMH10962)	NIEA	2,600 feet SW of 8 Mile Road and Hoover Street	574.7	592.2	619.3	Crown of Pipe
Southeast Macomb Sanitary District	Kerby Road Pump Station (Kerby Magmeter)	Kerby Rd Interceptor	Chalfonte Avenue and Kerby Road		576.75		Crown of Fox Creek Enclosure
Southeast Macomb Sanitary District	WM-S-1 (SFIT3070)	Gross Pointe Interceptor	Chalfonte Avenue and Kerby Road	565.2	569.2	582.2	Crown of Pipe
Wayne County: Rouge Valley	WC-S-1 (3005)	Northwest Interceptor	Fort St W and S Oakwood Blvd	554.4	569.2	583.3	WRRF PS1 and PS2 wet well
	WC-S-2 (JCT-1788)	Northwest Interceptor	Evergreen Rd and Ford Road	568.2	587.0	615.6	At Wayne County JC-18A
	WC-S-3 (JCT-982)	Northwest Interceptor	500 feet west of North Rd and West Road	561.9		600.2	
DWSD COLLECTION SYSTEM LOCATIONS							
	L033 (SMH05262)	Mack Ave Sewer	Mack Ave Kensington Ave	551.5	560.8	582.0	Crown of Pipe
	L063 (SFIT0079)	7 Mile Sewer	7 Mile Road Van Dyke Street	595.1	608.1	621.9	Crown of Pipe
	L098 (ISD013_US)	7 Mile Sewer	7 Mile Road Maine St	604.3	615.8	629.7	Crown of Pipe
	L118 (DR02_US)	Livernois Sewer	Livernois Ave Ranspach Street	565.9	576.4	588.3	Crown of Pipe
	L156 (SMH32696)	Joy Sewer	Joy Road Epworth Street	586.4	600.4	618.5	Crown of Pipe
	L168 (SMH40948)	Wyoming Sewer	Wyoming St Pelton Street	583.7	595.2	605.8	Crown of Pipe

Member	Meter(s) or Location (Model Junction ID)	Interceptor or Trunk Sewer Name	Cross Streets	Elevation (Feet) (NAVD88)			Criteria for Critical HGL
				Interceptor Invert	Critical	Ground	
	L172 (SMH47489)	Wyoming Sewer	Littlefield Blvd Freda Street	570.9	585.9	602.2	Crown of Pipe
OTHER GLWA REGIONAL CONTROL POINTS							
	Conner RTB Level for Opening Emergency Relief Gates (RTB_ConnerCreek)	DRI and Conner Creek Enclosure	Clairpointe St and Conner Street		578.25	587.15	RTB Operations
	Hubbell-Southfield RTB Crown Elevation of Hubbell-Southfield Outlet Sewer at Inflatable Dam (3601/36011)	Hubbell Sewer and Southfield Sewer	2,000 feet south of Michigan Ave and the American Road	571.79	583.25	599.79	Inflatable Dam Crest
	7 Mile RTB Utility Tunnel Invert Elevation (RTB_7Mile)	9-foot diameter influent sewer	650 feet south of Shiawassee Drive and Verdun Street		614.25	625.25	Prevent Flooding of Utility Tunnel
	Puritan-Fenkell RTB Service Tunnel Invert Elevation (RTB_PF)	12-foot diameter influent sewer	Fenkell St and Riverview Street		608.25	622.89	Prevent Flooding of Service Tunnel
	Oakwood RTB Highest Storm Pump ON Wet Well Level (PS_Oakwood)	Liddesdale Sewer	Liddesdale Street and Sanders Street		557.25	578.87	RTB and PS Operations
	Belle Isle RTB Storm Pump Design Wet Well Level (BelleisleWet Well)	Un-named 4.5-foot sewer	Mroch Dr and Sunset Drive		568.75	578.76	RTB and PS Operations
	Baby Creek SDF Level Upstream of Screens for Opening the Emergency Bypass Gates	Elmer Ternes Sewer	Dix Ave and Amazon St		578.25	584.75	SDF Operations at Normal Detroit River Level (Critical HGL increases to 580.25 when Detroit River is at Detroit Datum)

Member	Meter(s) or Location (Model Junction ID)	Interceptor or Trunk Sewer Name	Cross Streets	Elevation (Feet) (NAVD88)			Criteria for Critical HGL
				Interceptor Invert	Critical	Ground	
	(SDF_BabyCreekInfluent)						El 99.0 at Windmill Point)
	Leib SDF Incoming Crown Elevation of Conant Mt Elliot Sewer (MH49)	Conant-Mt Elliot Sewer	Mt Elliot St and Waterloo Street	573.47	589.72	617.45	Incoming Crown Elevation of the CME Sewer
	St. Aubin SDF Dubois Diversion Chamber Top Elevation of Inflatable Dam (SCH02082)	Un-named 5-foot sewer	Atwater St and Dubois Street	571.25	579.25	581.35	Dubois Diversion Chamber, Inflatable Dam Crest
	Conner Storm PS Wet Well (PS_Conner)	DRI	Jefferson Ave and Conner Street	523.75	558.25	589.25	High design wet well level for storm pumps
	Conner Sanitary PS Wet Well (CON_SanDisChamber)	DRI	Jefferson Ave and Conner Street	525.75	553.75	584.75	Incoming crown elevation of East Jefferson Relief Sewer
	WRRF (WRRF_PS1)	Multiple	Jefferson Ave 2,500 feet NE of Victoria Street	534.25	564.3	575.75	PS1 and PS2 Wet Well NPDES Permit

6.9.4 Analysis of Trunk Sewer, Interceptor and Pump Station Capacity

A collection system model simulation was performed using the 10-year 1-hour storm to determine locations on the regional system where surcharging occurs for 30-minutes or more to 6-feet or less below the ground surface. Results are shown in Figure 6-3 using the Optimized Conditions (OPT) model. These results are consistent with historic data from DWSD and GLWA regarding target areas for continued monitoring of trunk sewer, interceptor and outfall capacity. No immediate capital improvements are proposed for these sewer reaches.

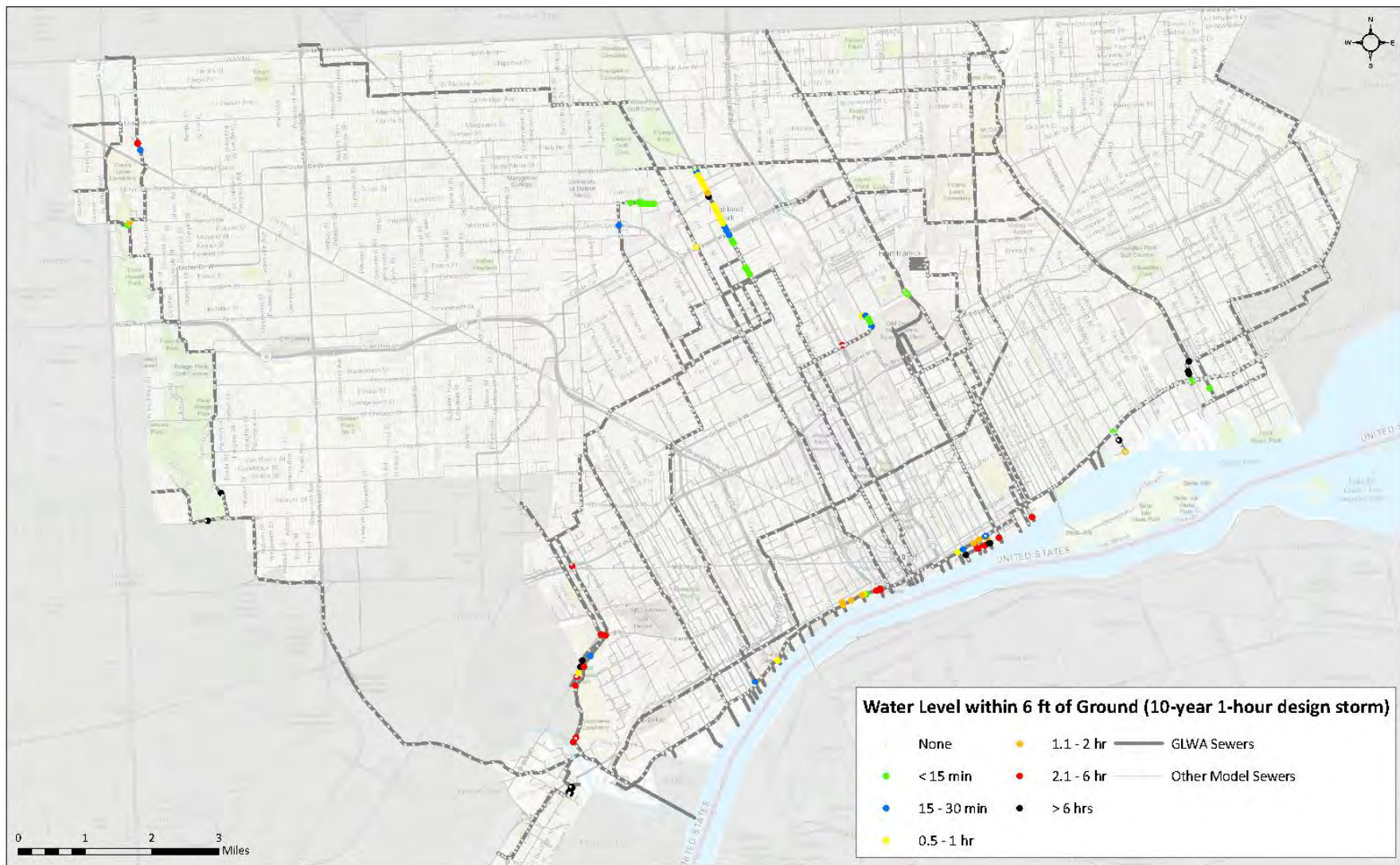


Figure 6-3. Water Level within 6 feet of Ground (10-year 1-hour Design Storm)

Table 6-14 shows modeling results that compare pump station capacity to simulated flows from the 10-year 1-hour and 10-year 24-hour design storm. The table shows pump stations are leased by GLWA as well as those that are owned by DWSD but operated by GLWA.

Table 6-14. Analysis of Pumping Station Capacity for 10-year 1-hour and 10-year 24 hour Design Storms

Pump Station		Capacity (cfs)	10-yr 1-hr storm Peak Influent Flow (cfs)		10-yr 24-hr storm Peak Influent Flow (cfs)	
			No Areal Reduction	Areal Reduction	No Areal Reduction	Areal Reduction
Belle Isle	Sanitary	3.5	100	65	120	110
	Storm	32				
Blue Hill	Sanitary	20	970	770	1,030	1,000
	Storm	1,367				
Conner	Sanitary	350	927	570	1,500	1,450
	Storm	3,500				
Fairview	All	525	460	460	460	460
Freud	Sanitary	80	3,300	2,750	3,450	3,450
	Storm	3,600				
Oakwood	Sanitary	20	700	550	780	750
	Storm	1,660				
Woodmere	All	765	600	500	590	560

All storm pumping stations have capacity for projected 10-year design storm flows.

6.10 Collection System Condition Assessment

GLWA performed a system wide condition assessment of its 183 miles of trunk sewers and interceptors in 2017 and 2018. The Wastewater Master Plan reviewed and geo-coded PACP condition ratings collected by GLWA. Results are summarized on Figure 6-4, and additional detail is presented in Technical Memorandum 6A.

A major design-build project to rehabilitate the Detroit River Interceptor was initiated in 2017, and GLWA is performing a series of other priority rehabilitation projects on segments of trunk sewers and interceptors.

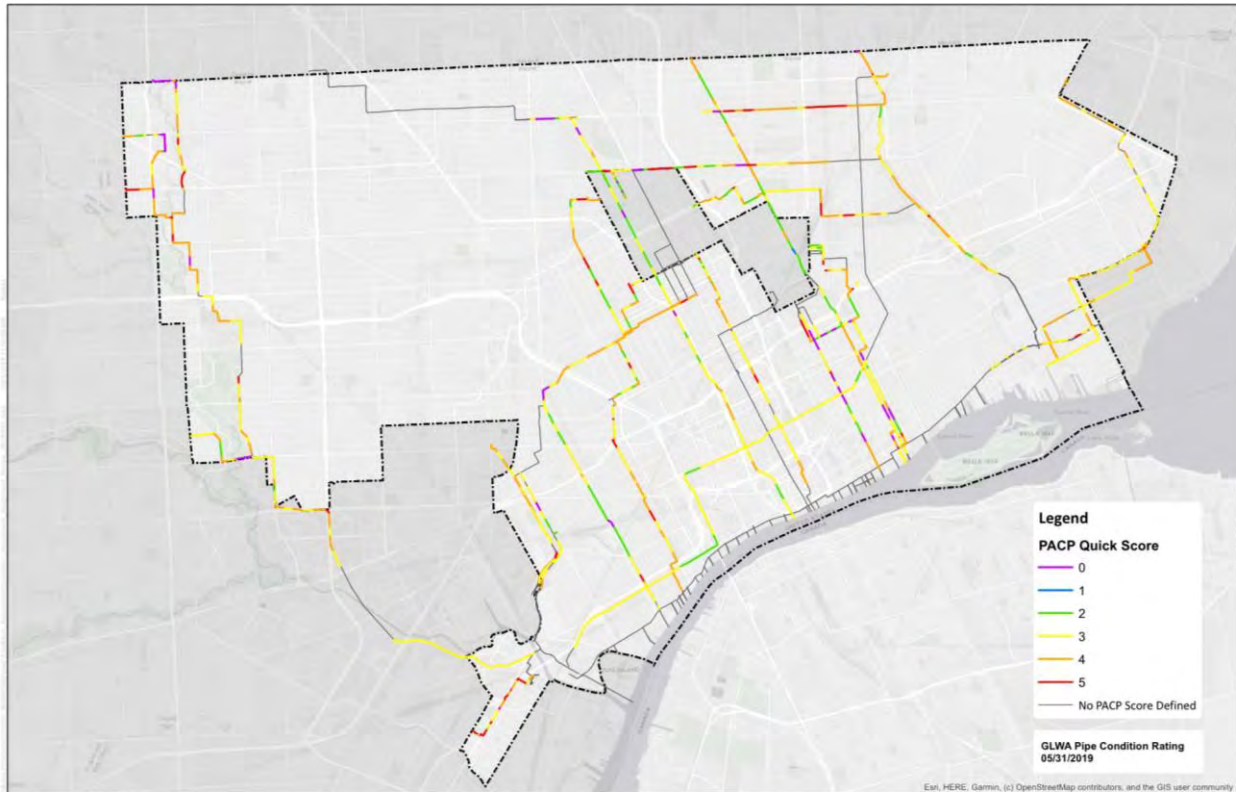


Figure 6-4. GLWA Trunk Sewer and Interceptor PACP Ratings

Technical Memorandum 6A presents discussions of pipeline and outfall condition assessment, river inflow monitoring and control, and pipeline rehabilitation needs over the planning period.

6.11 Collection System Redundancy Assessment

Needs for collection system redundancy were evaluated by the ability to bypass dry weather flow during pipeline rehabilitation projects or during emergency repairs. Each interceptor is discussed below.

Table 6-15. Interceptor Redundancy Requirements

Interceptor Segment	Dry Weather Flow Redundancy Needs
Northwest Interceptor north of Warren Pierson Gate	Dry weather flow can be pumped or diverted to DWSD trunk sewers to bypass rehabilitation or repair reaches. No additional conveyance capacity is needed.
Northwest Interceptor downstream of cross-over of Wayne County Rouge Valley Interceptor	Dry weather flow can be diverted to the Rouge Valley Interceptor for inspection or rehabilitation of the Northwest Interceptor.
Northwest Interceptor between Warren Avenue and cross-over of the Wayne County Rouge Valley Interceptor.	An additional pipeline is needed to convey dry weather flow in this reach.

Interceptor Segment	Dry Weather Flow Redundancy Needs
North Interceptor East Arm (NIEA)	Prior to construction of the NIEA, flows within the City of Detroit were conveyed to the Detroit River Interceptor (DRI). Certain connections to the DRI were bulk-headed, others are gated. Bulk-headed connection at 7-Mile Road can be converted to a gate to allow for diversion of dry weather flow to the DRI.
Detroit River Interceptor	<p>Connections to the NIEA and segments of parallel pipelines are required to bypass dry weather flows for inspection and rehabilitation of the DRI. The NIEA connections and parallel pipes are:</p> <p>Gravity connection to NIEA at West Grand Boulevard (This connection is being evaluated by GLWA).</p> <p>Gravity connection to NIEA at Concord Street.</p> <p>Pumped connection to NIEA at Mack and Gratiot through a new pipeline from new Conner Sanitary Pump Station</p> <p>Parallel pipe along Lafayette east of I-375 with flow direction to the east.</p> <p>Parallel pipe along Lafayette west of I-375 with flow direction to the west.</p>

Figure 6-4 shows conceptual alignments for dry weather flow redundancy. Additional information on the proposed pipelines for dry weather flow redundancy is presented in Technical Memorandum 6A.

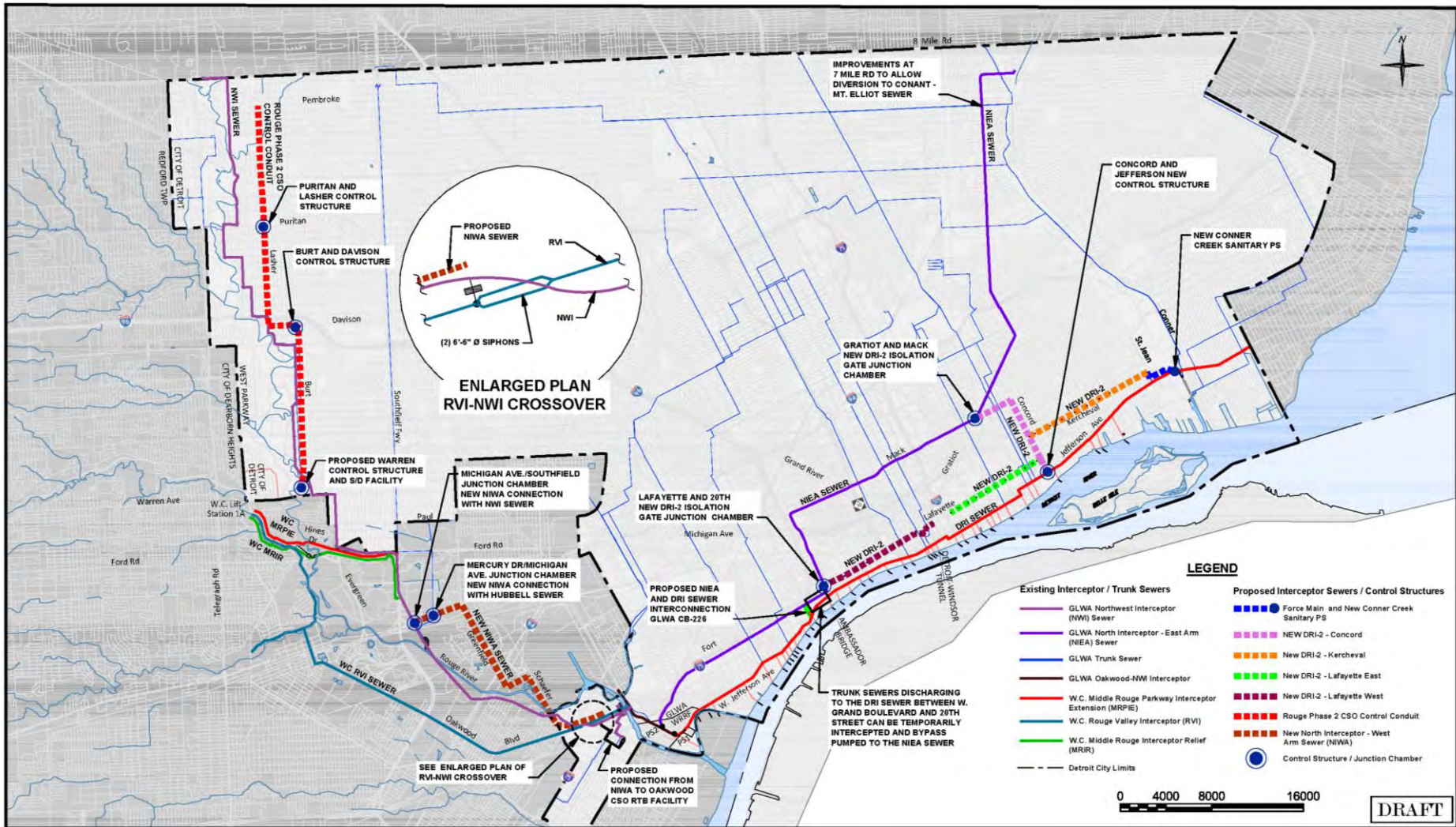


Figure 6-5. Conceptual Alignments for Dry Weather Flow Redundancy

Section 8

Proposed Plan

8.1 Overview

This Section describes the major proposed projects of the Wastewater Master Plan with emphasis on the projects for the regional collection system and compliance with water quality standards. Section 7 describes proposed projects for the Water Resource Recovery Facility. Section 9 describes processes for implementation of the proposed plan. The proposed plan elements discussed in Section 8 include:

- An overview of proposed GLWA CSO controls for Phases 1, 2 and 3
- Description of major GLWA and Member CSO Controls for Phase 1 and 2
- Hub Utility Programs for the Regional Operating Plan, Regional Wastewater Collection System Model, Regional Water Quality Monitoring Program, Best Practices for Collection Systems and MS4 Systems
- Long Term Regional Collection System Improvements

Cost estimates for the capital projects and new operational programs are presented in Technical Memorandum 7.

8.2 GLWA CSO Controls

Tables 8-1 and 8-2 present the proposed controls for remaining untreated CSO outfalls on the Rouge River and Detroit River. The tables identify the CSO outfall identification, the street location from the NPDES permit. The existing regulatory status is described based on categories for CSO control established in the NPDES permit. Estimates of overflow frequency and volume are based on a 5-year review of the Post Event Report data from 2014 to 2018. The estimates of frequency and volume are qualitatively described as high, moderate, and low based on analysis of the 5-year frequencies and volume show in Figure 8-1.

Tables 8-1 and 8-2 also propose the relative sequence of future CSO control improvements based on three phases. These phases are based on planning level assessments of projected water quality improvements, financial capability, and relationship to highway collection system pipeline projects that are prerequisite to cost-effective CSO controls.

The CSO controls and phasing proposed from this Wastewater Master Plan are developed at the concept level based on the evaluation of alternatives described in Section 6. These concepts and phasing will be further examined during the upcoming GLWA Long Term CSO Control Plan scheduled for completion in November 2022.

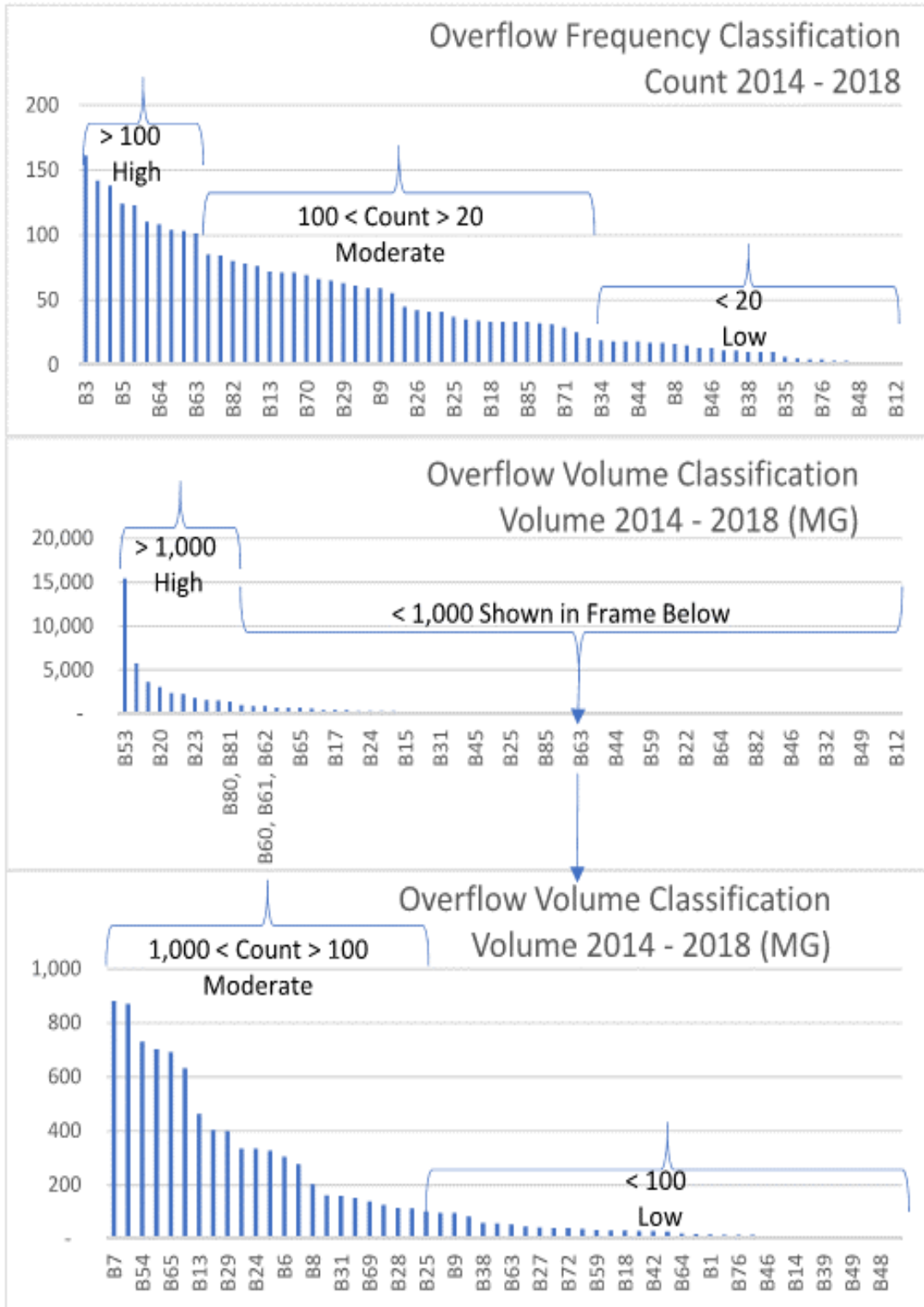


Figure 8-1. Classification of CSO Frequency and Volume

Table 8-1. Proposed Plan for CSO Controls for the Rouge River

GLWA Outfall	Location	Existing Regulatory Status	Overflow Frequency	Overflow Volume	Phase 1 Recommendations	Phase 2 Recommendations	Phase 3 Recommendations
B-046	Carbon Street	Prohibited	Low	Low	Continue to monitor. Make corrective action if status changes.		
B-049	So. Fort Street	Prohibited	Low	Low	Continue to monitor for overflow and river inflow. Make corrective action if status changes		
B-050	So. Fort Street	Prohibited	Low	Moderate	Continue to monitor. Make corrective action if status changes		
B-054	Warren	Priority	High	Moderate	Sewer separation with new storm drains, GSI and partial sewer separation underway by DWSD.		
B-056, 057, 058	Tireman	Remaining	Moderate	High	In-system storage devices to capture first flush in small storms – approximately 1” storm.	CSO Control Conduit to capture first flush in larger storms.	Add netting and in-line disinfection if this outfall exceeds criteria for Minimum Volume or Extreme Event
B-060, 061, 062	West Chicago (East Shore)	Priority	Moderate	Moderate	In-system storage devices to capture first flush in small storms – approximately 1” storm.	CSO Control Conduit to capture first flush in larger storms.	Add netting and in-line disinfection if this outfall exceeds criteria for Minimum Volume or Extreme Event
B-063	West Chicago (West Shore)	Remaining	High	Low		Perform phased sewer separation, including early investigations to determine if cost-effective near-term reductions in overflow frequency can be achieved.	

GLWA Outfall	Location	Existing Regulatory Status	Overflow Frequency	Overflow Volume	Phase 1 Recommendations	Phase 2 Recommendations	Phase 3 Recommendations
B-064	Plymouth	Remaining	High	Low	Perform phased sewer separation, including early investigations to determine if cost-effective near-term reductions in overflow frequency can be achieved.		
B-065	Glendale Relief	Priority	High	Moderate	In-system storage devices to capture first flush in small storms – approximately 1” storm.	CSO Control Conduit to capture first flush in larger storms.	Add netting and in-line disinfection if this outfall exceeds criteria for Minimum Volume or Extreme Event
B-067.068	Lahser (Dolson)	Priority	Moderate	Moderate	In-system storage devices to capture first flush in small storms – approximately 1” storm.		
B-070	Schoolcraft	Remaining	Moderate	Low		Perform phased sewer separation, including early investigations to determine if cost-effective near-term reductions in overflow frequency can be achieved	
B-069	West Parkway	Remaining	High	Moderate			
B-071	Brammell	Remaining	Moderate	Moderate		Perform phased sewer separation, including early investigations to determine if cost-effective near-term reductions in overflow frequency can be achieved	
B-072	Lyndon	Remaining	Low	Low			

GLWA Outfall	Location	Existing Regulatory Status	Overflow Frequency	Overflow Volume	Phase 1 Recommendations	Phase 2 Recommendations	Phase 3 Recommendations
B-075	Fenkell (East Shore)	Remaining	Low	Low		Perform phased sewer separation, including early investigations to determine if cost-effective near-term reductions in overflow frequency can be achieved.	
B-077	Puritan (East Shore)	Remaining	Moderate	Low			
B-080, 081	McNichols	Priority	Moderate	Moderate	In-system storage devices to capture first flush in small storms – approximately 1” storm.	CSO Control Conduit to capture first flush in larger storms.	Add netting and in-line disinfection if this outfall exceeds criteria for Minimum Volume or Extreme Event
B-082	Glenhurst	Remaining	Moderate	Low		Perform phased sewer separation, including early investigations to determine if cost-effective near-term reductions in overflow frequency can be achieved	
B-085	Seven Mile (East Shore)	Remaining	Moderate	Low	In-system storage devices to capture first flush in small storms – approximately 1” storm.	CSO Control Conduit to capture first flush in larger storms.	Add netting and in-line disinfection if this outfall exceeds criteria for Minimum Volume or Extreme Event
B-087	Pembroke	Remaining	Moderate	Moderate	In-system storage devices to capture first flush in small storms – approximately 1” storm.	CSO Control Conduit to capture first flush in larger storms.	Add netting and in-line disinfection if this outfall exceeds criteria for Minimum Volume or Extreme Event

Table 8-2. Proposed Plan for CSO Controls for the Detroit River

Outfall	Location	Existing Regulatory Status	Overflow Frequency	Overflow Volume	Phase 1 Recommendations	Phase 2 Recommendations	Phase 3 Recommendations
B-001	Fox Creek	Prohibited	Low	Low	Continue to monitor. Take corrective action if frequency increases.		
B-003	McClellan Cadillac	Priority	High	High	Sewer Separation by converting relief sewer to separate storm drain. Collaborate with MDOT in removing stormwater from combined sewers during the I-94 Modernization Project. Sewer Separation by converting relief sewer to separate storm drain. Collaborate with MDOT in removing stormwater from combined sewers during the I-94 Modernization Project.		
B-004	Fischer	Remaining	Moderate	High	Sewer Separation by converting relief sewer to separate storm drain. Collaborate with MDOT in removing stormwater from combined sewers during the I-94 Modernization Project. Sewer Separation by converting relief sewer to separate storm drain. Collaborate with MDOT in removing stormwater from combined sewers during the I-94 Modernization Project.	Proceed with sewer separation in Phase 1, because the Fischer Sewer will become a principal new stormwater outlet for the MDOT I-94 project. If the separation plan is changed during Phase 2, consider in-system storage at Fischer and Goethe, with netting and disinfection for Phase 3.	

Outfall	Location	Existing Regulatory Status	Overflow Frequency	Overflow Volume	Phase 1 Recommendations	Phase 2 Recommendations	Phase 3 Recommendations
B-005	Iroquois	Priority	Moderate	Moderate	Sewer Separation by converting relief sewer to separate storm drain. Collaborate with MDOT in removing stormwater from combined sewers during the I-94 Modernization Project. Sewer Separation by converting relief sewer to separate storm drain. Collaborate with MDOT in removing stormwater from combined sewers during the I-94 Modernization Project.		
B-006	Helen	Remaining	Moderate	Moderate	Sewer Separation by converting relief sewer to separate storm drain. Collaborate with MDOT in removing stormwater from combined sewers during the I-94 Modernization Project. Sewer Separation by converting relief sewer to separate storm drain. Collaborate with MDOT in removing stormwater from combined sewers during the I-94 Modernization Project.		
B-007	Meldrum	Priority	Moderate	Moderate	Meldrum Sewer diversion to Leib SDF	Sewer separation of area downstream of Leib SDF diversion	
B-009	Adair	Remaining	Moderate	Low		Sewer Separation by converting relief sewers to separate storm drain.	

Outfall	Location	Existing Regulatory Status	Overflow Frequency	Overflow Volume	Phase 1 Recommendations	Phase 2 Recommendations	Phase 3 Recommendations
B-010	Joseph Campau	Priority	Moderate	High	Sewer Separation by converting relief sewers to separate storm drain. Establish a schedule for sewer separation.	If DWSD cannot begin this work until Phase 2, then consider installing in-system storage at Jos. Campau and Waterloo streets as an interim measure in Phase 1, until separation can be completed.	
B-014	Orleans	Remaining	Low	Low		Anticipate volume and frequency reduction after regulator improvements. Interconnected with B-017 service area. Study for coordinated solution in Phase 2	
B-015	Orleans Relief	Remaining	Moderate	Moderate			
B-016	Riopelle	Remaining	Low	Low			
B-017	Rivard	Remaining	Moderate	Moderate	Collaborate with MDOT I-375 project to remove storm water from the combined sewer system. After MDOT project, monitor overflow frequency reclassify to Extreme or Minimal discharge overflow, or complete sewer separation.		
B-018	Hastings	Remaining	Moderate	Low	Collaborate with MDOT I-375 project to remove storm water from the combined sewer system. After MDOT project, monitor overflow frequency reclassify to Extreme or Minimal discharge overflow, or complete sewer separation.		

Outfall	Location	Existing Regulatory Status	Overflow Frequency	Overflow Volume	Phase 1 Recommendations	Phase 2 Recommendations	Phase 3 Recommendations
B-019	Randolph	Remaining	Moderate	Moderate		Anticipate volume and frequency reduction after regulator improvements	
B-020	Bates/Brush	Priority	Moderate	High	Pilot for Netting Facility	Consider in-system storage at Brush and Montcalm and Brush and Bates in Phase 2 or Phase 3, if water quality impacts or maintenance of nets warrant a reduction in frequency	Add in-line disinfection if volume and frequency exceed criteria for Minimal or Extreme outfalls.
B-021	Woodward	Remaining	Moderate	Moderate		Anticipate volume and frequency reduction after regulator improvements	Add netting and in-line disinfection if volume and frequency exceed criteria for Minimal or Extreme outfalls.
B-022	Griswold	Minimal	Low	Low	Continue to monitor, take corrective action as necessary		
B-023	First Street	Priority	Moderate	High	Pilot for Netting Facility		Add in-line disinfection if volume and frequency exceed criteria for Minimal or Extreme outfalls.
B-024	Third Street	Remaining	Moderate	Moderate	Continue to monitor		Add netting and in-line disinfection if volume and frequency exceed criteria for Minimal or Extreme outfalls.
B-025	Sixth Street	Remaining	Moderate	Moderate	Continue to monitor		Add netting and in-line disinfection if volume and frequency exceed criteria for Minimal or Extreme outfalls.

Outfall	Location	Existing Regulatory Status	Overflow Frequency	Overflow Volume	Phase 1 Recommendations	Phase 2 Recommendations	Phase 3 Recommendations
B-026	Eleventh St.	Remaining	Moderate	Low	Continue to monitor		Add netting and in-line disinfection if volume and frequency exceed criteria for Minimal or Extreme outfalls.
B-027	Rosa Parks Boulevard	Extreme	Moderate	Low	Continue to monitor, take corrective action as necessary		
B-028	Sixteenth St.	Extreme	Moderate	Moderate	Continue to monitor, take corrective action as necessary		
B-029	Eighteenth Street	Priority	Moderate	Moderate	Pilot for Netting Facility	Add netting and in-line disinfection if volume and frequency exceed criteria for Minimal or Extreme outfalls.	
B-030		Minimal	Low	Low	Continue to monitor, take corrective action as necessary		
B-031	Twenty-Fourth Street	Remaining	Moderate	Moderate	Anticipate volume and frequency reduction after optimization of DRI regulators.		Add netting if volume and frequency exceed criteria for Minimal or Extreme outfalls.
B-032		Minimal	Low	Low	Continue to monitor, take corrective action as necessary		
B-033		Minimal	Low	Low			
B-034		Minimal	Low	Low			
B-035		Extreme	Low	Low			
B-036	Summit-Clark	Priority	Moderate	High	Pilot for Netting Facility		Add netting and in-line disinfection if volume and frequency exceed criteria for Minimal or Extreme outfalls.
B-037	Ferdinand	Remaining	Low	Low	Discharges to B-036; see control for B-036	Continue to monitor	Add netting and in-line disinfection if volume and frequency exceed criteria for Minimal or Extreme outfalls.

Outfall	Location	Existing Regulatory Status	Overflow Frequency	Overflow Volume	Phase 1 Recommendations	Phase 2 Recommendations	Phase 3 Recommendations
B-038	Morrell	Remaining	Low	Low	Anticipate volume and frequency reduction after NWI Diversion to Oakwood	Continue to monitor. Evaluate in-system storage at Morrell and Dix in conjunction with netting and disinfection in Phase 3.	Add netting and in-line disinfection if volume and frequency exceed criteria for Minimal or Extreme outfalls.
B-039	Junction	Minimal	Low	Low	Continue to monitor, take corrective action as necessary	Continue to monitor, if frequency increases, consider adding an in-system storage device in Phase 2 or 3.	
B-040	Campbell	Extreme	Low	Low	GHIB Partial Sewer Separation	Continue to monitor	
B-041	Livernois	Minimal	Low	Low	GHIB Partial Sewer Separation	Continue to monitor	
B-042	Schroeder	Remaining	Low	Low	GHIB Partial Sewer Separation	Continue to monitor	Add netting and in-line disinfection if volume and frequency exceed criteria for Minimal or Extreme outfalls.
B-044	Cary	Remaining	Low	Low	Anticipate volume and frequency reduction after NWI Diversion to Oakwood and other HGL optimization.	Continue to monitor	Add netting and in-line disinfection if volume and frequency exceed criteria for Minimal or Extreme outfalls.
B-045	Dearborn, Old Rouge	Minimal	Moderate	Moderate	Continue to monitor, take corrective action as necessary		
B-059	Pulaski, Old Rouge	Extreme	Low	Low	Continue to monitor, take corrective action as necessary		

8.3 Major Phase 1 GLWA CSO Control Projects

The major Phase 1 GLWA CSO control projects include implementation of the Regional Operating Plan, construction of regulator improvements on the Detroit River Interceptor proposed in the Interim Wet Weather Operating Plan, diversion of the Meldrum Sewer to the Leib Screening and Disinfection Facility, construction of a new control gate and diversion from the Northwest Interceptor to the Oakwood Retention Treatment Basin, construction of CSO netting facilities on four Detroit River outfalls, construction of new in-system storage devices along DWSD trunk sewers tributary to the Rouge River, and sewer separation in parts of the DWSD service area where separation was found to be cost-effective.

The proposed projects to CSO netting and to divert the Meldrum Sewer to the Leib Screening and Disinfection Facility and construct of a new control gate and diversion from the Northwest Interceptor to the Oakwood Retention Treatment Basin are described in Technical Memorandum 6A, where concept basis of design information is presented. The proposed sewer separation projects are also described in Technical Memorandum 6A. The proposed Phase 1 in-system storage concept is described below.

8.3.1 In-System Storage Concept for Rouge River Outfalls

The existing large DWSD/GLWA sewers in the West Side of Detroit have a significant amount of in-system storage that is not always filled prior to CSO occurring from the seventeen (17) CSO outfalls along the Rouge River. It is desired that this in-system storage be filled to capture the first flush of combined wastewater for smaller storms using new in-system storage devices (ISDs). Capturing the first flush for the smaller storms is expected to have a large benefit to the water quality in the Rouge River.

GLWA has ISDs at 15 locations in the large combined sewer system. These devices are all inflatable dams, and most of the dams are installed in-line in the sewers. The use of in-system storage has been shown to be effective in reducing CSO frequency – especially for small storm events. The in-system storage is utilized whenever large sewers do not flow completely full for smaller storm events.

New ISDs are recommended at nine locations shown on Figure 8-2. The total in-system storage in the upstream large combined sewers is estimated on Table 8-3. Not all of this in-system storage will be utilized for first-flush capture because the dry weather flow and the existing diversion dams at the CSO outfalls fill some of this storage. However, a significant amount of additional in-system storage will be available and is expected to reduce the frequency and volumes of CSO as indicated by the RCWS modeling results.

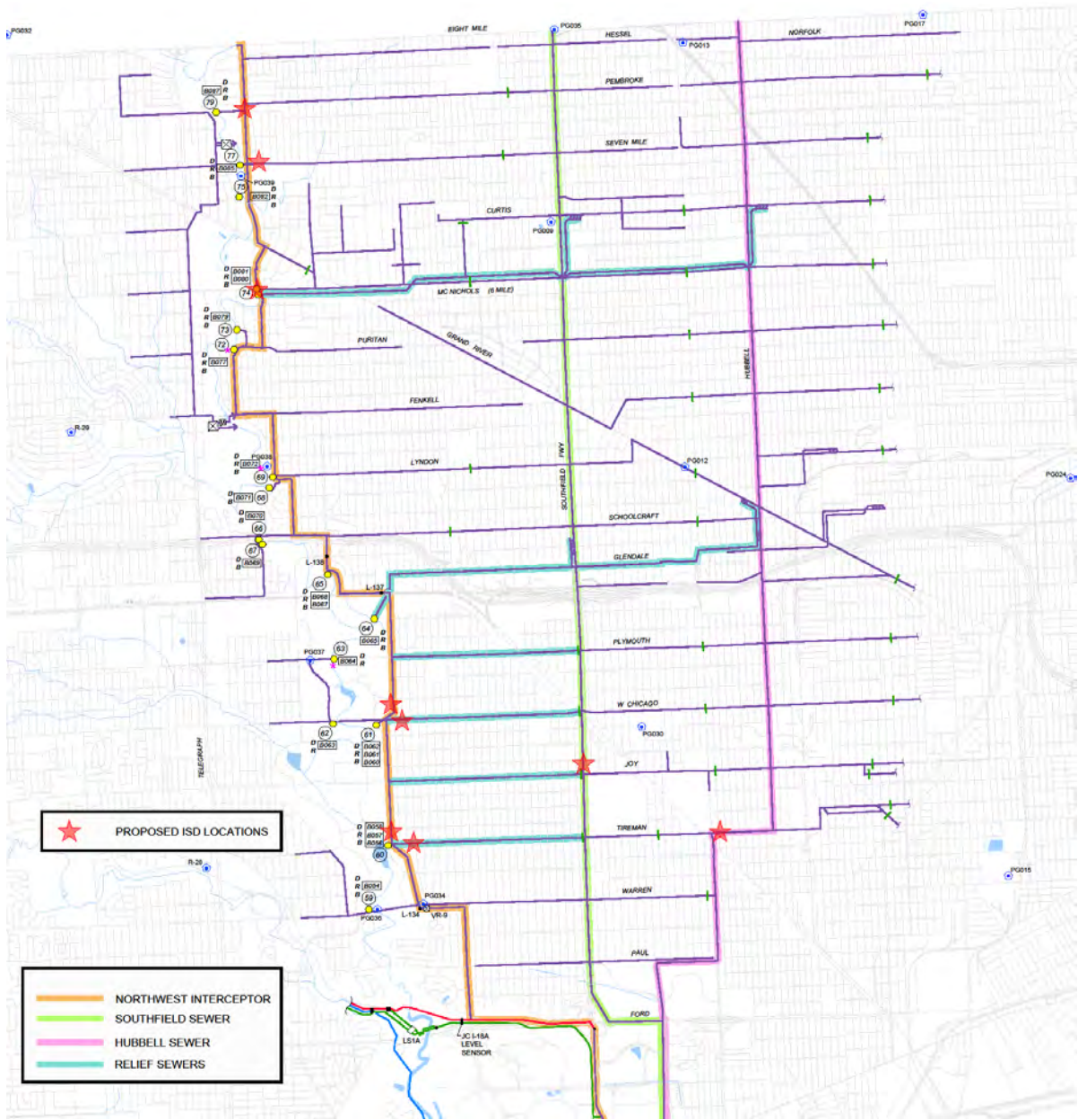
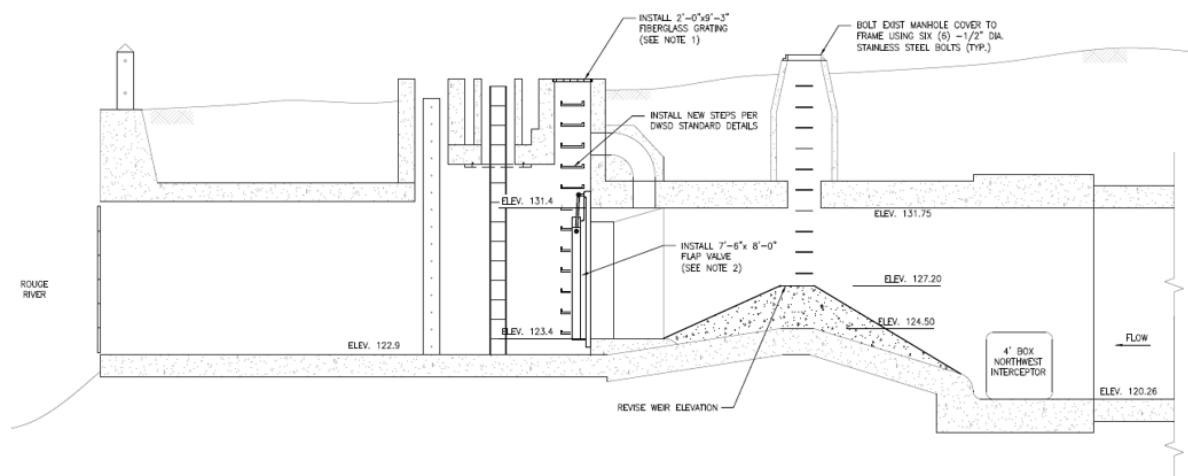


Figure 8-2. Proposed New ISD Locations

Table 8-3. Estimated In-System Storage at New ISD Locations

In-System Storage Device Location	Sewers Providing Storage	Total Storage Volume (MG)
Berg south of Pembroke	Northwest Interceptor, Pembroke and Hessel Sewers	2.6
Seven Mile east of Berg	Seven Mile Sewer	1.5
Six Mile and Beaverland on CSO Outfalls	Northwest Interceptor, McNichols & McNichols Relief Sewers	12.3
Burt north of West Chicago	Northwest Interceptor and Plymouth Sewer	2.5
West Chicago east of Burt	West Chicago Sewer	2.9
Trinity north of Tireman	Northwest Interceptor and Joy Sewer	3.7
Tireman east of Trinity	Tireman Sewer	2.9
Southfield north of Joy	Southfield Sewer	3.2
Tireman east of Greenfield	Hubbell Sewer	5.0
Total		36.6

The Six Mile and Six Mile Relief CSO outfall is one of the locations recommended to have new ISDs. Figure 8-3 shows a cross-section through the Six Mile Relief sewer outfall. This CSO outfall has six (6) sections of diversion dam and six (6) parallel backwater gates. Six (6) ISDs may be required at this location. The ISDs at Six Mile may be like the Task 1 gates previously constructed in-place of the backwater gates under PC-698. The Task 1 gates were later removed, and backwater gates were re-installed under PC-788. Also, the concrete diversion dams were raised about 2.7-feet under PC-788. Alternatively, inflatable dams may be installed on top of the diversion dams at the Six Mile and Six Mile Relief sewer CSO outfall.

**Figure 8-3. Section Through Six Mile Relief CSO Outfall**

One ISD is likely to be required at the other eight (8) locations. Four (4) of these are along the Northwest Interceptor, and four (4) are on large combined sewers in the West Side of Detroit.

The new ISDs may be constructed using a variety of dams or gates. Alternatives include inflatable dam within a new structure, inflatable dam within existing trunk sewer, double leaf gates, single leaf gates, weir wall with orifice, weir wall with gate, radial gate, Bascule gate, butterfly gate.

The following next steps for further analysis are recommended to be included in the LTCSO Plan.

- Determine access and control vault/building locations for the ISDs
- Survey the sewer locations and related CSO outfalls
- Inspect the condition of the sewers at ISD locations
- Determine required sewer repairs (if any)
- Measure dry and wet weather flow rates at ISD locations
- Estimate available in-system storage at ISDs
- Review upstream lateral sewer connections and approximate basement elevations
- Develop critical upstream HGLs for ISD operations
- Evaluate ISD alternatives
- Perform hydraulic analyses, evaluate the risk of exceeding critical HGLs and estimate the expected CSO reduction
- Develop I&C concepts for the ISDs
- Estimate construction and O&M costs
- Develop conceptual designs and design criteria for the ISDs

8.3.2 GLWA Member CSO Control Projects in Phase 1

Dearborn, Dearborn Heights, Inkster, and Redford Township are developing CSO control projects for uncontrolled outfalls in their service districts. These projects are shown in Figure 8-4. These projects are planned to start in Phase 1 but anticipated to be fully implemented over Phase 1 and Phase 2. See Section 9 for additional information on these projects in relationship to other regional water quality projects and phases.

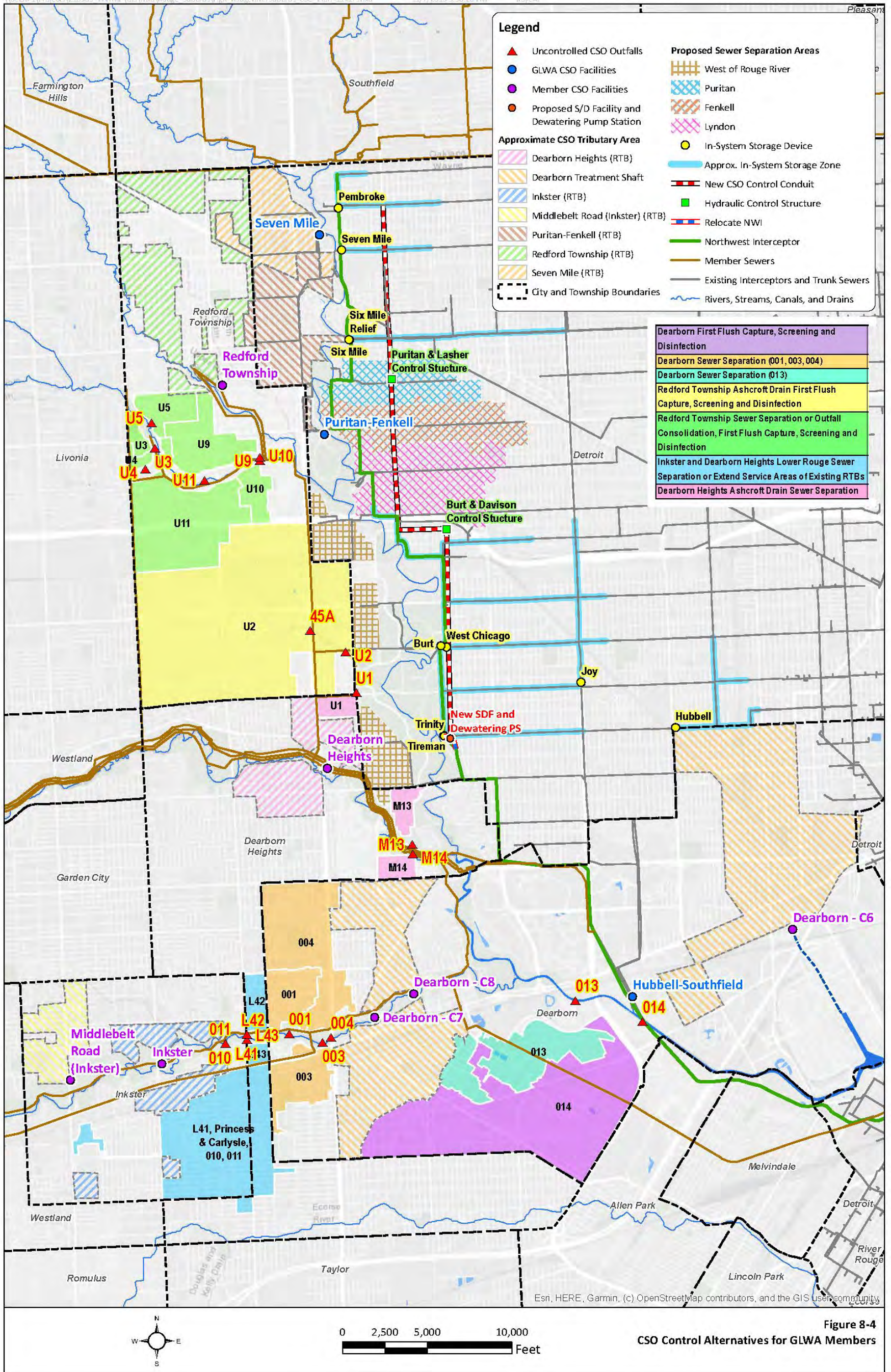


Figure 8-4. Rouge River Suburbs

8.3.3 Evaluation of GLWA CSO Operations Staffing

As GLWA completes the assessment of its CSO control assets under project CS-299, an assessment of staffing levels for its CSO program should also be performed. The level of staffing for GLWA CSO control facilities was reviewed with respect to staffing levels by Members and other wastewater utilities. In October 2019, GLWA CSO Operations Group had 25 staff and contractor positions for operation and maintenance of 9 CSO control facilities. GLWA Field Services Group has 32 budgeted positions for pump station operation and maintenance. The GLWA Field Services Group assists the CSO Operations Group on in the operation and maintenance of large pumps. All of the staff numbers cited above are inclusive of supervisor positions.

Macomb County Public Works operates and maintains two retention treatment basins with 9 staff, and Oakland County Water Resource Commission operates 4 retention treatment basins with 15 staff. When considering the number of O&M staff per 1,000 CFS of treatment capacity, of the CSO control facilities, the following numbers

- GLWA: 1.0 staff per 1,000 CFS
- MCPWO: 6.4 staff per 1,000 CFS
- OCWRC: 1.9 staff per 1,000 CFS

The Massachusetts Water Resource Authority (MWRA) has 80 staff positions for the operation of 4 CSO control facilities, 3 headworks facilities (screening and grit removal) and 12 wastewater pumping stations. The MWRA pools its field staff as needed to operate and maintain all remote facilities, so pumping station staff can assist to perform O&M on CSO control facilities when needed.

Comparisons of staffing levels between organizations are difficult to make without detailed information on job descriptions. In the report titled “Optimization of Regional Operations” prepared as part of this Wastewater Master Plan, an assessment of staffing levels is proposed for GLWA and all Members participating in the Regional Operation Plan. It is recommended that GLWA complete the staffing needs assessment proposed under the Regional Operating Plan.

8.4 Major Phase 2 and 3 GLWA CSO Control Projects

8.4.1 General

Phase 2 CSO control projects for GLWA include the continuation of proposed sewer separation projects started in Phase 1 and evaluation of the needs for additional first flush storage along the Rouge River. Phase 3 projects include the completion of sewer separation projects, the continued adaptation to changes in runoff rates due to green infrastructure implementation on private and public property. Phase 3 also includes the installation of CSO nets and inline disinfection for any remaining outfalls that exceed NPDES permit thresholds for frequency and volume of discharge and therefore require control. Section 9 describes the process of 5-year of water quality assessments, optimization, and adaptive management of new green infrastructure that should be considered in the evaluation of future Phase 2 facilities.

8.4.2 Rouge River CSO Control Conduit

A CSO Control Conduit is proposed to provide CSO control for larger storms from the combined sewer system in the West Side of Detroit. The horizontal and vertical alignment of the proposed CSO Control Conduit is shown on Figures 8-5 and 8-6.

The CSO Control Conduit is proposed to be built after the new West Side in-system storage devices (ISDs) have been installed and are in-service. The CSO Control Conduit will capture CSO after the in-system storage is full. Once the CSO conduit is full, it will operate as a flow-through tunnel with a screening/disinfection (S/D) facility at its downstream end.

The CSO Control Conduit is proposed to be a 6.5-mile-long, 14-foot diameter tunnel built as shallow as possible in soft ground. The upstream end is proposed to be at Lahser and Pembroke Roads and it will run to the south along Lahser Road to Davison Road. At Davison Road, the tunnel will turn to the east and run along Davison to Burt Road. The CSO Control Conduit will then run to the south along Burt Road to Tireman Avenue. A screening and disinfection facility is proposed to be built south of Burt and Tireman Avenue with a new outfall to the Rouge River. The Northwest Interceptor (NWI) will be relocated around the screening and disinfection facility from Trinity Street and Tireman Avenue to a point along Pierson Street north of Sawyer.

Two control structures are proposed along the CSO Control Conduit at Burt and Davison and at Lahser and Plymouth. The concept for the control structures is shown on Figure 8.7. Without the control structures, the conduit would only partially fill before it would start to discharge out of the proposed S/D facility at the downstream end. A flap gate is proposed on the divider wall so that the upstream tunnel segment can be partly filled from the downstream segment. Gates also are proposed on the divider wall that will be used to dewater the store wastewater and flush the tunnel.

The two control structures break the tunnel into three segments. The upper segment of the tunnel has a storage elevation of 604.25 feet (125 feet – Detroit datum) and a storage volume of 11.9 million gallons. The middle segment has a storage elevation of 594.25 feet (115 feet – Detroit datum) and a storage volume of 13.2 million gallons. The lower segment has a storage elevation of 582.75 feet (103.5 feet – Detroit datum) and a storage volume of 14.9 million gallons. The total storage volume of the proposed CSO Control Conduit is approximately 40 million gallons.

The screening and disinfection facility and new outfall to the Rouge River is proposed at the downstream end of the tunnel near Burt Street and Tireman Avenue. The existing B056/057/058 outfall at Tireman Avenue is proposed to be bulk-headed. A concept for the screening and disinfection facility is shown on Figure 8.8. The CSO Control Conduit will discharge to the river once the storage in the tunnel is full and the wastewater level is higher than the river level. Overflow will be screened and disinfected before it discharges to the river. Dewatering pumps will be installed in this shaft to dewater the tunnel into the NWI.

Overflow structures are proposed between the existing large combined sewers as shown on Figures 1 and 2. In total, there are twelve overflow structures that are proposed to allow overflow into the CSO Control Conduit, and preliminary concept design criteria are presented in Table 8-4.

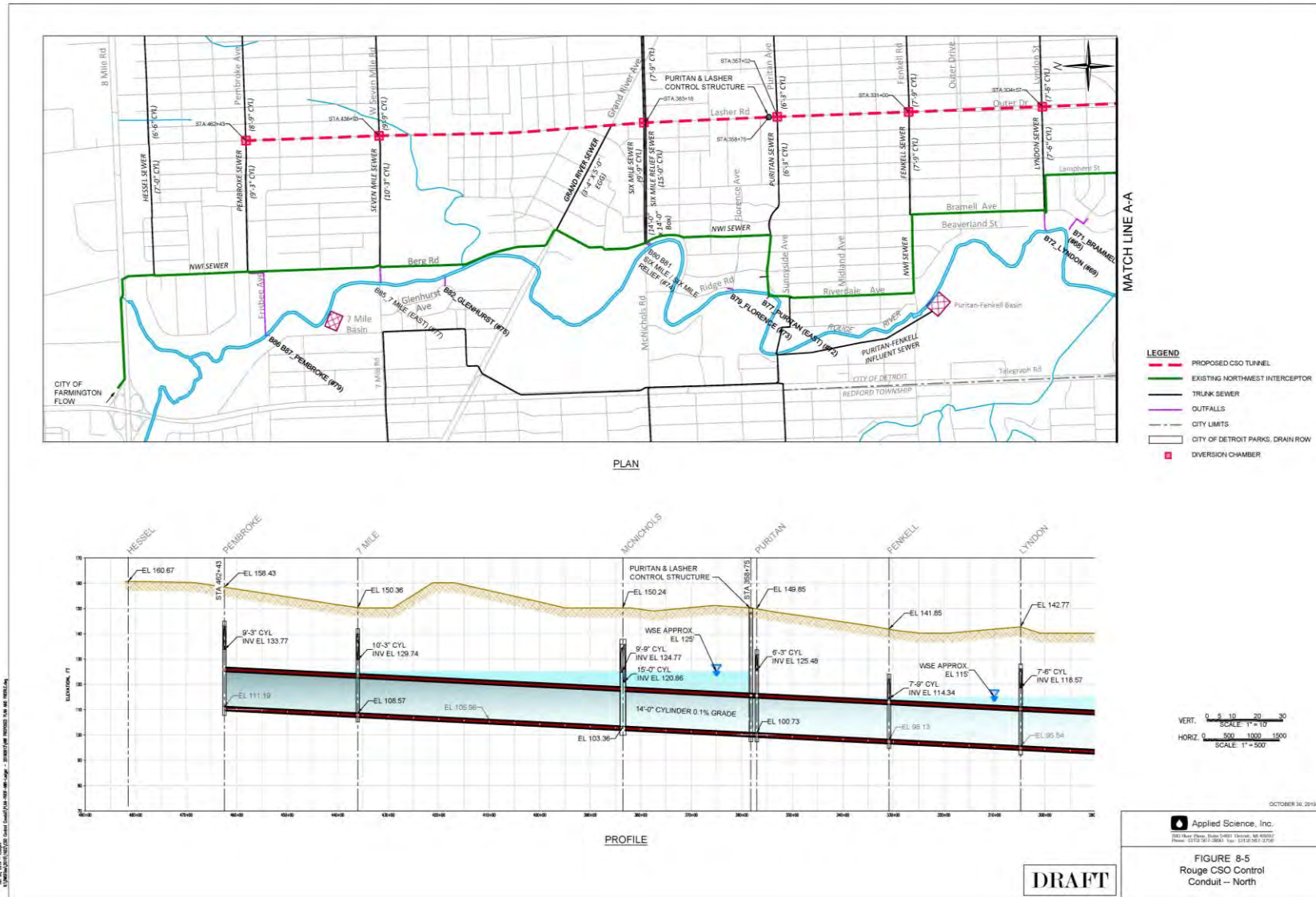


Figure 8-5. Rouge CSO Control Conduit -- North



Figure 8-6. Rouge CSO Control Conduit -- South

Table 8-4. Proposed Overflow Structure Summary

Location	Overflow Weir Length (ft)	Overflow Weir Elevation (ft)
Pembroke	100	616.5
Seven Mile	100	611.6
Six Mile	100	607.9
Puritan	20	609.8
Fenkell	20	605.0
Lyndon	20	603.9
Schoolcraft	100	595.9
Glendale	200	591.4
Plymouth	100	590.4
W. Chicago	100	590.2
Joy	100	585.9
Trinity	100	585.9
Tireman	100	585.9

A typical overflow structure concept is shown below in Figure 8.9. The overflow weir elevations at each structure were set to work in conjunction with the ISDs in order to maximize the existing in-system storage in the trunk sewers before overflow in wet weather would occur. Stop logs/gates can be used to divert dry weather flows into the CSO Control Conduit.

At some locations, the ISD upstream target levels can be increased once the CSO Control Conduit was put in-service. The following preliminary ISD adjustments are proposed:

- Trinity and Tireman (on the NWI) increased to the pipe crown,
- Tireman and Trinity (on the Tireman sewer) increased to the pipe crown, and
- Pembroke and Berg raised one foot.

The CSO Control Conduit will provide some redundancy for the NWI. Dry weather flows may be diverted into the CSO Control Conduit and conveyed to the downstream end if the NWI requires repairs. The dry weather flows diverted into the CSO Control Conduit will be pumped into the NWI. Therefore, it is expected that it only be used during repairs or emergency situations.

Based on the RCWS model results for 2018 monitoring period, overflow is predicted to occur three (3) times in a seven (7) month period with the new ISDs, some sewer separation and the CSO Control Conduit in-place.

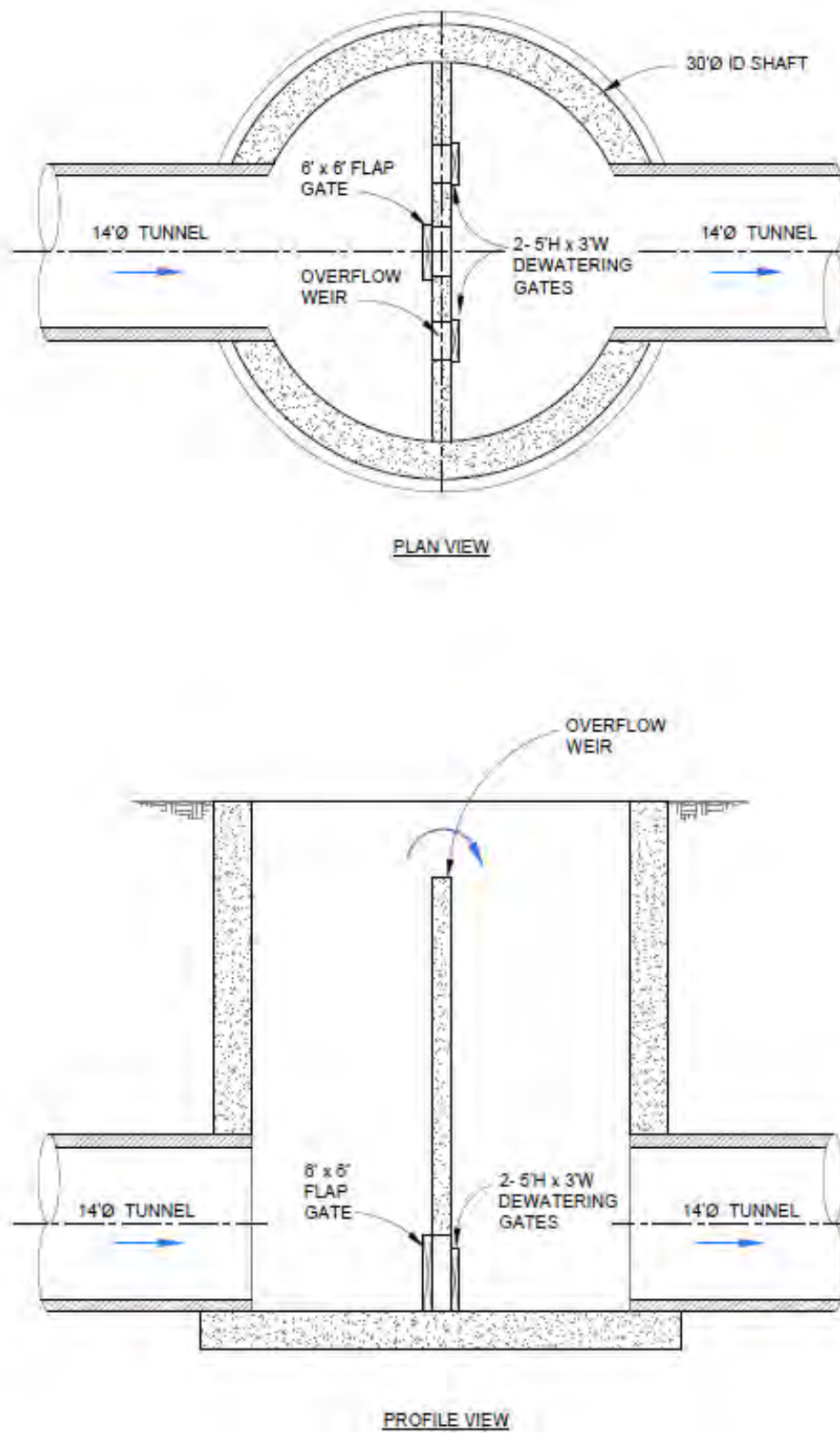


Figure 8-7. Typical Control Structure

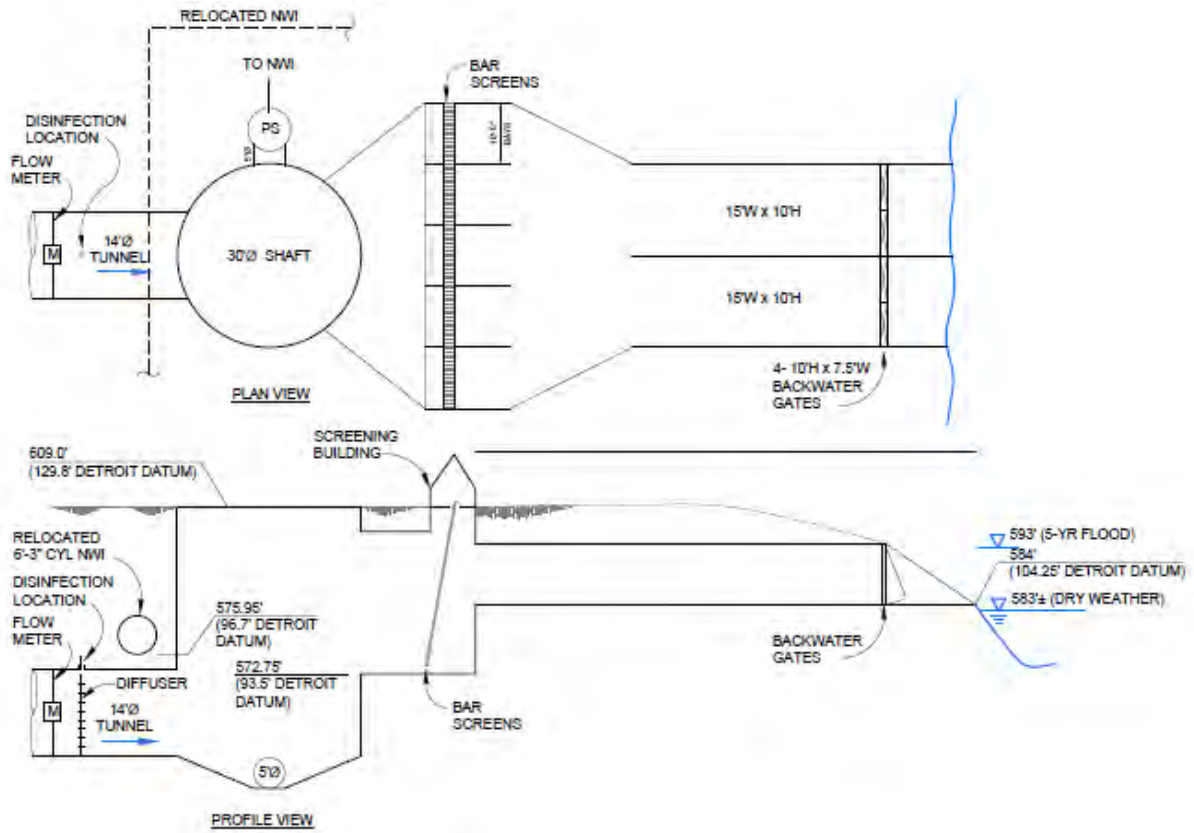


Figure 8-8. Downstream Screen and Disinfection Facility

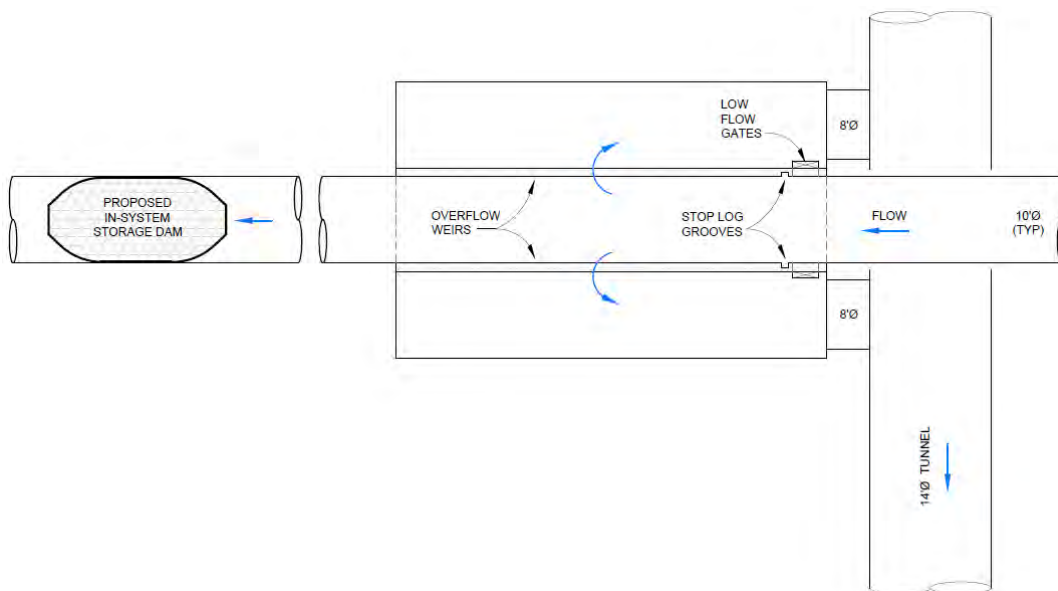


Figure 8-9. Typical Overflow Structure

8.4.3 Phase 3 CSO Netting and In-Line Disinfection

CSO outfall netting and in-line disinfection is proposed for any remaining outfalls that continue to discharge at frequencies and volumes that exceed the NPDES criteria for Limited or Extreme Event classification. CSO outfall netting is proposed for four outfalls in Phase 1: B-020, B-023, B-029, and B-036. GLWA will develop operating experience with net technology during Phase 1 and Phase 2. See Technical Memorandum 6A for more information on proposed CSO netting facilities.

The City of Dearborn is proposing to implement in-line disinfection for its CSO 013/014 CSO screening, disinfection and first flush capture facility. The operation experience of the City of Dearborn will be valuable to GLWA when it plans for Phase 3 in-line disinfection.

In-line disinfection systems require complex operating procedures to meet standards for bacteria reduction and total chlorine residual. In-line disinfection systems also require the construction of geographically distributed structures for chlorine injection, chemical storage, and residual monitoring. Consequently, operation and maintenance costs are significant and O&M activities have impacts in neighborhoods in which facilities are located. For these reasons, in-line disinfection is proposed for a limited number of locations after other control technologies and optimization have been applied.

8.5 Hub Utility Programs

The proposed “Hub Utility” programs include leadership of the Regional Operating Plan, maintenance and of the Regional Wastewater Collection System Model, implementation of the Regional Water Quality Monitoring Program, facilitation of Tier 1 and Tier 2 Member Collection System and MS4 Best Practices, and long term coordination with the Michigan Department of Transportation and the Detroit Water and Sewerage Department regarding sewer separation and removal of highway stormwater from the combined sewer system. The goals of these Hub Utility programs are described in this Section. In Section 9, there is further discussion of how these programs will drive the implementation of this Wastewater Master Plan.

8.5.1 Regional Operating Plan

The goal of the Regional Operating Plan is to improve the performance of the regional collection system through new tools for real time controls, regional pre-storm planning, post-storm event analysis, a regional storage dewatering plan, and the use of the Regional Wastewater Collection System Model in conjunction with SCADA data from the GLWA and Member operations. Development of the Regional Operating Plan is described in the report “Optimization of Regional Operations”, which is a part of this Wastewater Master Plan. A separate report “Regional Operating Plan” provides the essential information regarding regional operations that is intended to be referenced in future NPDES permits for GLWA and its Members.

8.5.2 Regional Wastewater Collection System Model

A new Regional Wastewater Collection System (RWCS) Model was developed as part of the Wastewater Master Plan project. This is a SWMM Version 5 hydrologic and hydraulic model that updates the former Greater Detroit Regional Sewer System (GDRSS) model and extends it with new, more detailed models of Detroit’s West Side and GLWA Member models. Receiving water quality models were developed to be used in conjunction with the RWCS model, so that CSO and

stormwater loadings can be analyzed by water quality impact. Development of the RWCS and associated receiving water quality models is described in Technical Memorandum 4A, 4B, 4C, and 4D.

GLWA has provided the RWCS model for use in other major projects, including MDOT highway improvement projects and the DWSD Collection System Modeling project, that impact wastewater and stormwater in its regional service area. It is anticipated that the RWCS model will continue to be shared with other parties to coordinate regional planning, and that the RWCS model will be continually improved with more detailed representations of new wastewater and stormwater infrastructure.

8.5.3 Regional Water Quality Monitoring

GLWA is committed to leading regional efforts to protect its receiving waters by controlling CSO and SSO discharges, fostering green infrastructure and MS4 compliance, and increasing resource recovery and operational efficiency at the WWRF. Development of a regional water quality monitoring program for all major receiving waters will demonstrate and quantify the benefits of these efforts, identify long term trends, inform regional investment priorities, and provide value in public education and outreach.

The proposed comprehensive water quality monitoring program will further advance regional water quality goals to measure progress and identify remaining impairments by characterizing ambient conditions and long-term trends. The program is intended to be collaborative, with cooperating partners such as the USGS, GLWA Members, EGLE, and watershed groups contributing funding and resources. The monitoring program will work in concert with water quality modeling tools. Together, monitoring and modeling will provide GLWA and Members with cause and effect insights to support progressive, adaptive, and cost-effective compliance strategies that are directly aligned with regional water quality conditions and goals.

GLWA service area receiving waters include the Clinton River, Lake St. Clair, the Detroit River, and the Rouge River. A detailed discussion of the Regional Water Quality Monitoring Program is presented in Technical Memorandum 6A. Locations for monitoring sites are shown in Figures

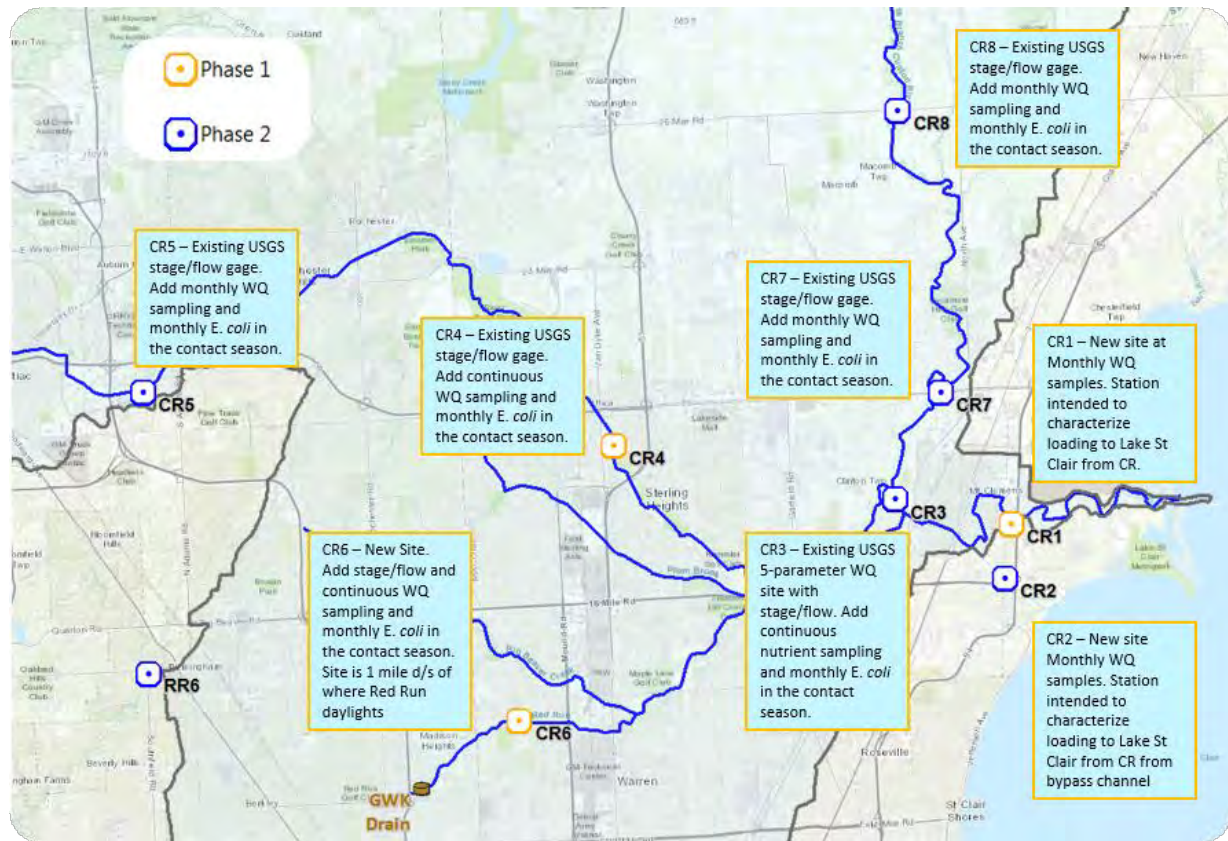


Figure 8-10. Clinton River Water Quality Sampling Sites

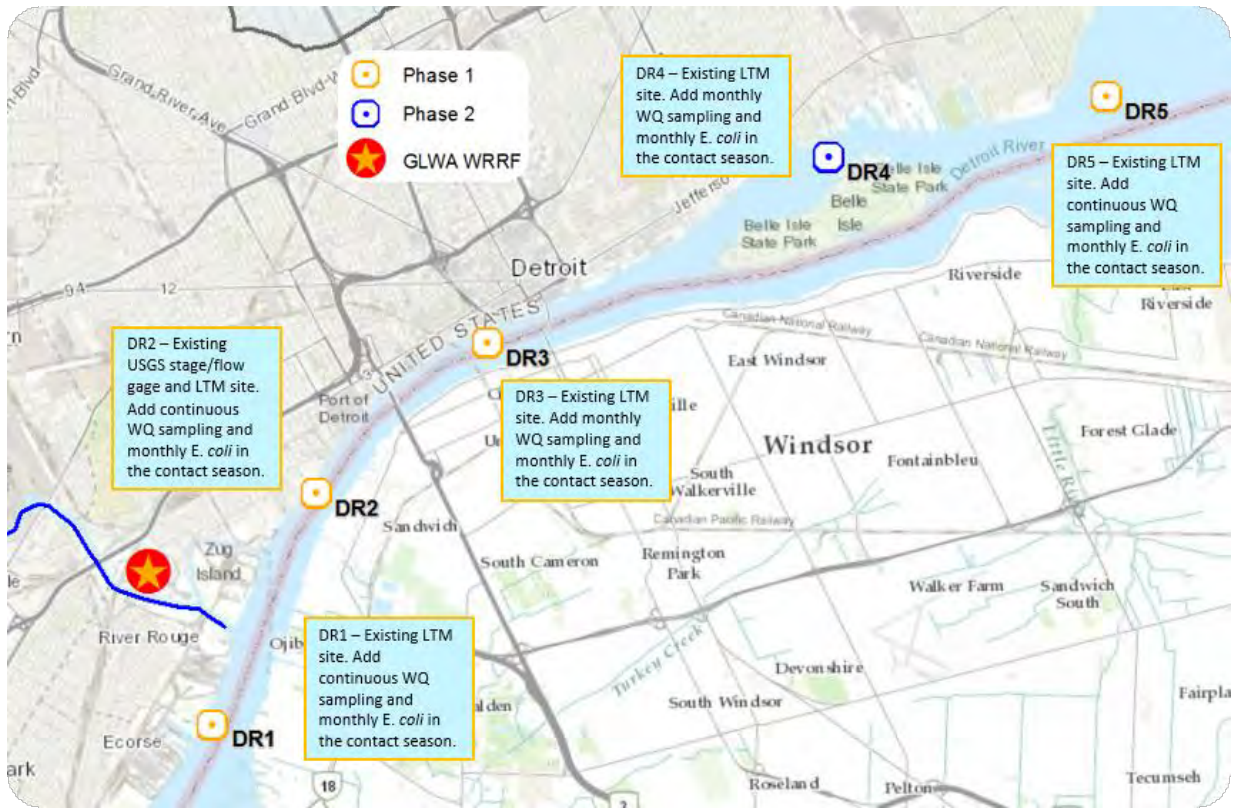


Figure 8-11. Detroit River Water Quality Sampling Sites

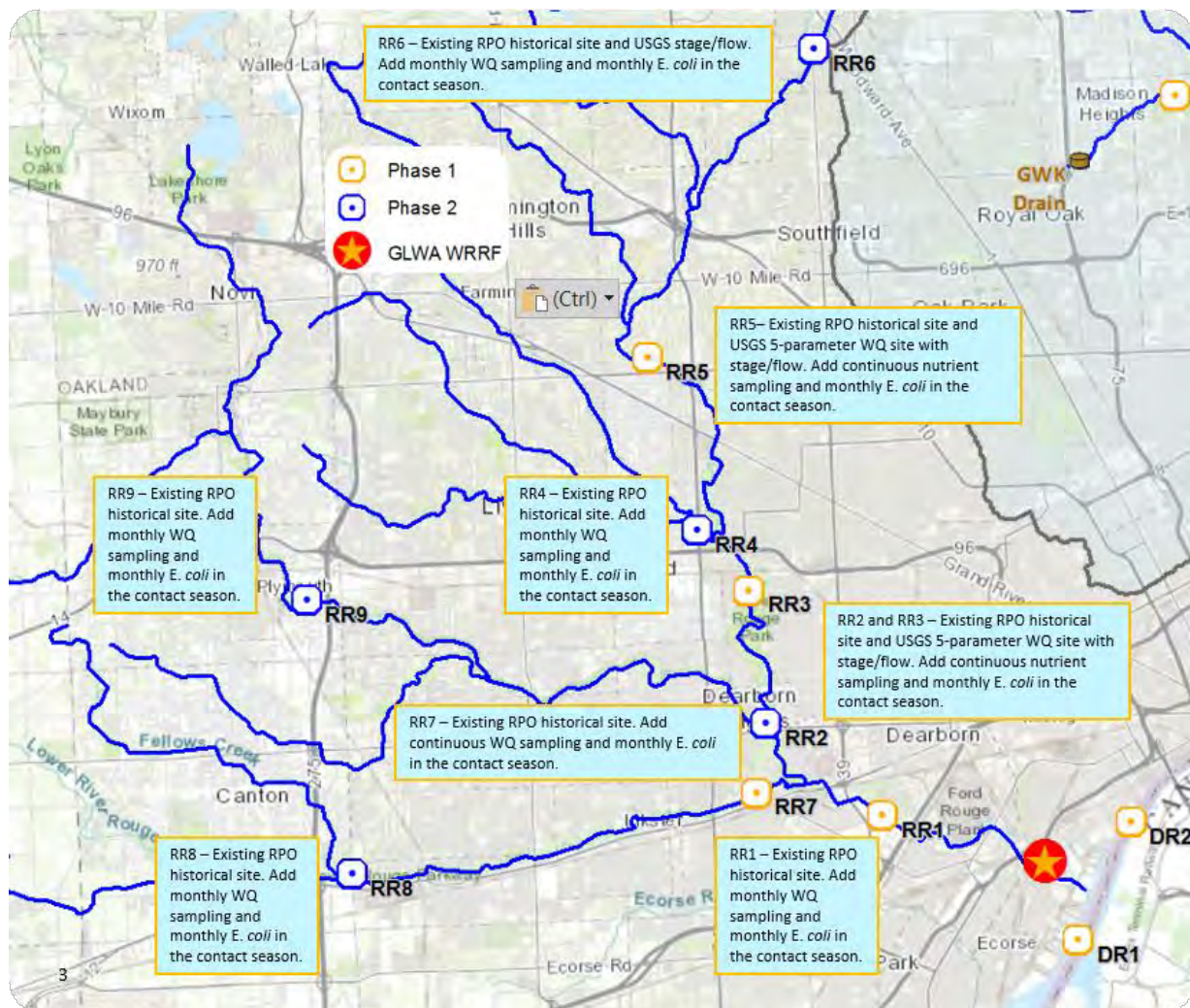


Figure 8-12. Rouge River Water Quality Sampling Sites

8.5.4 Collection System and MS4 Best Practices

The Collection System and MS4 Best Practices Program is a proposed new initiative for GLWA and its Members. This new program is designed to leverage GLWA’s “Hub Utility” role and its One Water Partnership to guide all Members (first and second tier) to apply best practices for wastewater collection system and separate storm water system inspection and maintenance.

This GLWA program is designed to complement the proposed new Contributing Municipality Collection System General Permit to be implemented by Michigan EGLE in 2020. The new General Permit applies to separated sanitary sewer systems that discharge to a wastewater treatment plant not owned by the municipality and have been determined by Michigan not to need an individual NPDES permit. The new General Permit establishes requirements for:

1. Proper Operation and Maintenance

2. Asset Management Program Requirements
3. Capacity and Management Requirements
4. Inspection Frequency
5. Fiscal Responsibility
6. Submittals and Reporting

Another related initiative in 2020 will be Michigan House Bill 4100 to enable the creation of stormwater utilities in the state. Enactment of this legislation would provide additional institutional and funding resources for GLWA Members which elect to form a stormwater utility to improve flood protection and stormwater quality.

The GLWA Collection System and MS4 Best Practices Program is proposed to be implemented starting in 2020 through a new collaborative workgroup of GLWA Members tentatively called the “Watershed Work Group”. Initial activities of Collection System and MS4 Best Practices Program are proposed to include:

1. Annual voluntary reporting of inspections, maintenance, sewer cleaning, catch basin cleaning, infiltration/inflow studies, and rehabilitation.
2. Development of a pilot program to identify cost-effective improvements to regional practices that will improve dry weather water quality.

The proposed form and initial set of content questions for the annual voluntary reporting of collection system and MS4 best practices is presented Tables 8-5 to 8-7. The annual survey is intended to be an on-line form with a database so that previous year information that remains applicable does not need to be re-entered. The 5-year assessments of system performance discussed later in this section would include summary level progress on Member Collection System and MS4 Best Practices.

Table 8-5. Preliminary Annual Self-Reporting Form: Inventory of Existing Collection System and Storm Sewers

Member Name: _____			
Reporting Period: July 1, 2020 to June 30, 2021			
Inventory	Asset Type	Unit	Quantity
	Tributary Street Length	Feet	
	Sanitary Sewer Length (4' diameter and less)	Feet	
	Sanitary Sewer Length (over 4' diameter)	Feet	
	Combined Sewer Length (4' diameter and less)	Feet	
	Combined Sewer Length (over 4' diameter)	Feet	
	Separate Storm Sewer Length (4' diameter or less)	Feet	
	Separate Storm Sewer Length (over 4' diameter)	Feet	
	Service Connections	Number	
	Service Connections with Footing Drains	Number	

Member Name: _____			
Reporting Period: July 1, 2020 to June 30, 2021			
Inventory	Asset Type	Unit	Quantity
	Catch Basins	Number	
	Manholes	Number	
	Pump Stations	Number	
	Retention Treatment Basin	Number	
	Sanitary Retention Basin	Number	
	In-System Storage Devices	Number	
	Emergency Gates	Number	
	Regulator and Backwater Gates	Number	
	Permitted Combined Sewer Overflows	Number	
	Permitted MS4 Stormwater Outfalls	Number	
	Critical HGL Relief Points	Number	
	Percentage of Sewers with NASSCO PACP Ratings	Percentage	
	Percentage of System Documented in GIS	Percentage	
	Percentage of System Maintained in CMMS	Percentage	

Table 8-6. Preliminary Annual Self-Reporting Form: Practices for Capacity Management Operation and Maintenance

Member Name: _____			
Reporting Period: July 1, 2020 to June 30, 2021			
Preventive Maintenance	Activity Type	Unit	Quantity
Inspections	Manholes	Number	
	Sewers	Feet	
	H ₂ S Corrosion	Feet	
	Regulators and Backwater Gates	Number	
	MS4 Outfalls Inspected	Number	
	MS4 Outfalls Sampled	Number	
Cleaning	Catch Basins	Number	
	Sewers	Feet	
	Sanitary Retention Basins	Number	
	Retention Treatment Basins	Number	
	Volume of Material Removed	Cubic Yards	
Investigations	Infiltration/Inflow	Sq. Miles Studied	
	Excessive I/I Criteria	Gallon/Person/Day	
	Area with Excessive I/I	Square Miles	

Member Name: _____			
Reporting Period: July 1, 2020 to June 30, 2021			
Preventive Maintenance	Activity Type	Unit	Quantity
Corrective Activity	Activity Type	Number	
	Blockages Removed	Number	
	Collapses and Sink Holes Repaired	Number	
	Vandalism and Other Repairs	Number	
	Emergency Repairs	Number	
	SSO Volume Reported to EGLE	Million Gallons	
	Manhole Lining	Number	
	Sewer Lining	Feet, Type, Diam.	
	Sewer Replacements	Feet, Type, Diam.	

Table 8-7. Preliminary Annual Self-Reporting Form: New Facilities for Capacity Management Operation and Maintenance

Member Name: _____			
Reporting Period: July 1, 2020 to June 30, 2021			
	Activity Type	Unit	Quantity
	Sewer Extensions	Feet	
	New Pumping Stations	Number	
	New Service Connections	Number	

The preceding information is proposed to be submitted digitally. An online data base would be created for Members to enter the information once, then provide annual updates. The online data base would include reporting features to summarize annual CMOM activity by GLWA Members.

8.5.5 Stream Debris and Obstruction Removal

Stream debris and obstructions, including log jams and woody debris, have impacted hydraulic conditions on portions of the Rouge River and Clinton River in the past and continue in the present. On the Rouge River, there are significant dry-weather flow impacts on channel hydraulics. The largest impacts during wet-weather are at bridges where the log jams can stretch both sides of the channel and bridge abutments. A major woody debris management program was performed on the Clinton River in 2007.

It is possible that GLWA will consider actions in collaboration with other organizations to clear some of the log jams on the Rouge River in the coming years. GLWA may have limited jurisdictional authority for stream debris removal and will need to facilitate actions by those agencies with

authority. As such actions occur, they will be discussed with the ROP Leadership Team, and future versions of the ROP could be updated accordingly.

Stream debris and obstruction removal is important for release of wet weather flows from combined sewer systems, prevention of collection system back-ups, stream mixing and natural assimilation of wet weather discharges, and local ground surface or roadway flooding.

8.5.5.1 Large Woody Debris Management in River Corridors

This section presents a survey of current practice for Large Woody Debris (LWD) management in river and stream corridors. This survey of current practices is intended to provide GLWA and its Member with guidance as an LWD management plan is developed for targeted river reaches in the GLWA service area.

LWD, sometimes referred to as log jams or debris dams, is the buildup of logs, sticks, and sediment along the edges of streams. In recent years, many agencies across the country have moved away from completely removing LWD from rivers and streams and are moving towards environmentally friendly management techniques. Recent studies have found that LWDs have multiple benefits by helping to reduce erosion and providing habitats for fish and wildlife. However, if a log or debris jam becomes large enough, it will have a negative impact on the flow and shape of the river. Therefore, proper maintenance of LWD is important to the health of the river and nearby infrastructure.

8.5.5.1.1 LWD Removal and Maintenance Practices

While many agencies are moving away from completely removing LWD from rivers, they all follow the same methodologies for removing log jams. The Massachusetts' Clean Water Tool Kit for Woody Debris Management emphasizes the need for a plan that documents the existing conditions of both the channel and the obstruction. The plan should also include access points, the size of logs being removed, the location for where removed debris will be placed, and the permits required.

To determine if permits will be required, the City of Rochester Hills', *A Primer on LWD Management* gives a general rule of thumb that if "any activity that does disturb the streambed and bank or places a new structure in the floodway (including an LWD structure) does require a MDEQ permit." Therefore, if the removal plan includes logs embedded in the streambank or bottom, a permit will be required. Removal plans that include the use of heavy equipment will likely also require a permit.

Subsequent communications with EGLE indicated that a permit would not be required if the removal action is not disturbing the bottom. Cutting off logs at the bottom of a stream is a potential method to avoid permitting in some situations. Case by case decisions should be made in conjunction with representatives of EGLE.

The Clinton River Watershed's Field Manual on Maintenance of LWD recommends that the physical removal of accumulated woody debris begins on the upstream side with the smaller pieces. Once those have been removed and properly disposed of, the larger logs should be cut into manageable pieces and moved to a predetermined location. This location should be outside of the river bank's full channel and far enough away that future storms do not move it back into the river. Once all the larger logs have been removed, the trash and smaller debris should be properly disposed of offsite.

For LWD that does not require removal, the Riparian Corridor Management Technical Advisory Committee developed *The Woody Debris Management 101: Clean and Open Method Guide*. The step by step preventative maintenance guide focuses on removing trash and creating an opening for water to more easily flow through LWD. This methodology was designed such that no permit is required, and volunteers can do the work in groups of two.

The Clinton River Watershed’s Field Manual on Maintenance of LWD includes several preventative maintenance guides. Future flooding and erosion issues may be prevented by reorienting or anchoring existing LWD. These practices have the potential to disturb the river bank and a permit may be required for these scenarios.

Structural countermeasures are another approach used by many agencies to minimize debris accumulation and improve maintenance operations. Structural measures include features to intercept and collect debris, deflectors to minimize the potential of clogging, and systems to orient the debris in the flow stream to facilitate passage through a structure.

8.5.5.1.2 When to Perform Maintenance

As woody debris is an important component to a river’s health, it should not be removed without an assessment of how each structure is affecting the river. The Massachusetts’ Clean Water Tool Kit recommends that “the actual removal [of LWD] should be the last resort” due to the benefits they are providing to the river. They recommend that LWD should be removed only if it has the potential to cause serious flooding, erosion, or a biological impact to a stream.

It can be difficult to look at an LWD structure and determine if it is going to create flooding or have a negative biological impact. To help determine when LWD should be managed, the Southeast Michigan District staff at EGLE put together an informal flow chart. The flow chart indicates that any naturally occurring wood

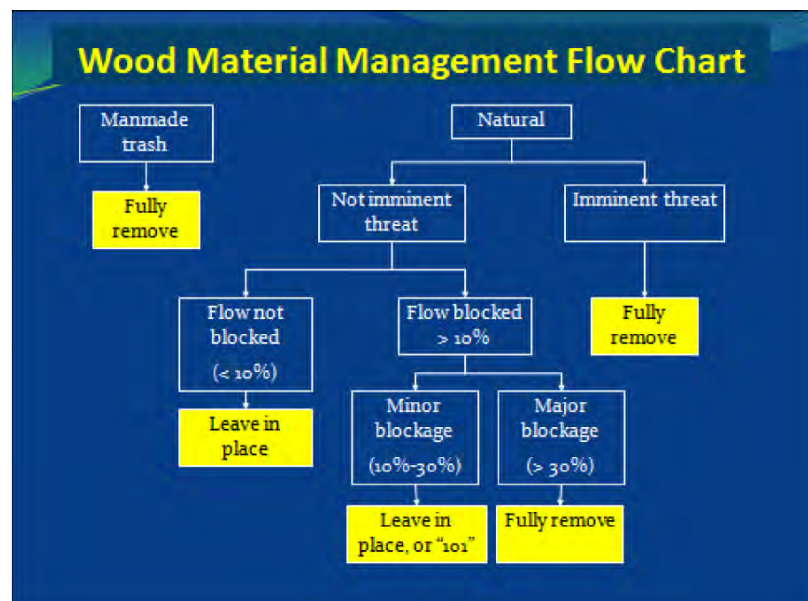


Figure 8-13. Decision Chart for LWD Management

material that causes an imminent threat should be fully removed from the river. Examples provided of imminent threat included “erosion that threatens someone’s house or a major jam on the upstream side of a bridge that could result in bridge failure.”

The flow chart also recommends preventative maintenance should be taken for when LWD is blocking more than 30% of the stream bed. When the flow is not significantly reduced or the LWD is a minor blockage, little maintenance or the Clean and Open method is recommended. The term “101” refers to an instructional course by Michigan DNR called “Woody Debris Management 101” that advocates for minimalist approaches to handling minor stream blockages.

The Northeast Ohio Regional Sewer District (NEORS) has a robust program to assess and maintain the open channel drainage system. In general, debris is removed when the percent blockage is greater than 25% or when streamflow is negatively impacting (or threatening) other infrastructure. This includes debris causing a backwater effect to a local outfall. NEORS conducts physical condition assessment of high priority areas after major storm events and is starting to use hydrologic/hydraulic model results in sensitive areas to refine their decision framework.

The need for maintenance can also be determined using the definition of a “mass of wood debris.” The Indiana DNR Regulatory Guide for Removal of a Logjam or a Mass of Wood Debris from a Floodway, defines mass of wood debris as an “accumulation of lodged trees or other wood debris that is any of the following:

1. Causing or threatening to cause flooding on a road or private property.
2. Impeding navigation by a boat.
3. Reducing the capacity of a waterway to transport water.

These scenarios can be used in tandem with the flow chart to determine if maintenance or removal is required. The Ohio DNR recommends maintenance and debris removal be performed “during low flow periods, which typically occur late summer, autumn and winter.” They also recommend that stream inspections should happen twice a year and after large storms. This will help develop an inventory of woody debris on the river and record what type and how quickly materials are accumulating.

For log jams that occur on private property, the Massachusetts’ Clean Water Tool Kit recommends that the property owner be asked if they share a similar concern about the LWD at their site and if they concur with any maintenance that needs to be performed. In Indiana and Ohio, the responsibility of log jam removal is for the most part, left to the landowners. Unless the obstruction is located on property owned by the DNR or if the obstruction is threatening a bridge, no department has the jurisdiction to remove log jams. In these states, watershed and volunteer groups have developed programs to manage woody debris, however finding adequate funding for these programs can create issues.

8.5.5.2 Potential Funding

Watershed and volunteer groups raise most of their river management funds through grants. The National Fish and Wildlife Foundation and EGLE (formally MDEQ) offer grants that provide funding for projects focused on enhancing habitats and volunteer based clean ups. The grant programs tend to be highly competitive but also very helpful in cleaning up rivers. A successful log jam removal on Deer Creek, was funded by the Lake and River Enhancement (LARE) Program Grant Program put together by the Indiana DNR.

Another possible form of funding could be generated using the State of Michigan Drain Code (Act 40 of 1956). Under the Drain Code, routine maintenance such as woody debris removal may be performed and assessed to the land owners in the drainage district. The Drain Code only applies to designated county drains; drains become designated through a petition process.

An example of using the Drain Code can be found on the Looking Glass River. A portion of the river was established as an intercounty drain in 1886 and the drainage district to the river was delineated. The Clinton Conservation District's FAQs indicate that maintenance costs for this portion of the river will be assessed to "those who benefit from the existence and operation of the drain" including MDOT, railroads, and landowners in the drainage district in accordance with the Michigan Drain Code. The Drain Code also limits the cost of maintenance to \$5,000 per mile of drain per year.

Regional sewer districts such as the Northeast Ohio Regional Sewer District (NEORS) and Milwaukee Metropolitan Sewerage District (MMSD) both have jurisdiction or responsibility of open channels rivers in their regions. Therefore, they are able to use their money to fund debris removal projects along their rivers. Specifically, NEORS implemented a stormwater fee in their region where the revenue from the fee is used to address flooding, erosion, and water quality throughout the region's streams and rivers.

There are also funding options available for studies of the flood plain. The US Army Corps of Engineers offers a program called Planning Assistance to States (PAS). This program provides money to state and local governments to fund flood impact studies. These studies would be helpful in determining where LWD maintenance is crucial and could also be used to start setting up an inventory of LWD. The Corp can be involved in flood risk reduction and ecosystem restoration projects infrastructure improvement projects when funding is appropriated through Congress.

8.5.6 Use of Metering and Modeling for Estimating CSO Volumes

8.5.6.1 Introduction

Wastewater utilities with combined sewer systems are required to report combined sewer overflow (CSO) discharges under the NPDES permit program to applicable regulatory agencies. The requirements for reporting CSOs vary by municipality and state regulatory agency. This section documents the way that utilities address the regulatory reporting requirements including how they develop or measure estimates of CSO discharge and quality assurance practices applied prior to submittal to the regulators.

CSO outfalls are generally located at complex regulating structures bordering receiving waters. These conditions can lead to variability in backwater-impacted flow conditions. If the regulatory requirements require only monitoring activation and duration statistics, monitoring may provide more accurate results as compared to use of a hydraulic model. If discharge volumes are also required, then hydraulic models may be useful, especially where accurate estimates of cross-sectionally averaged velocity or weir flow estimates cannot be reliably obtained with monitoring equipment.

Two approaches have generally been used for estimating overflow volumes for regulatory reporting: direct measurement of discharges and predicted estimates using a hydraulic model. Both approaches (monitoring and modeling) can be and are used to report discharges to regulatory agencies. In smaller systems, it may be more cost-effective to directly monitor a few outfalls as opposed to implementing and maintaining a hydraulic model for reporting purposes. In contrast, large systems with many outfalls and advanced modeling resources may be better handled with modeling in combination with monitoring. New cloud-based information technology enables

hydraulic models to operate in near real-time with SCADA systems, and this creates a new technique called “digital twinning” that can be used for continuous improvement to CSO volume estimates.

The following sections present case studies of the use of modeling and metering for CSO volume estimates. After the case studies, the development of digital twin technology for GLWA is presented.

8.5.6.2 Case Studies

Toledo, Ohio

The City of Toledo operates a combined sewer system that covers approximately 11,300 acres and 27 combined sewer discharge points. The City maintains a hydraulic model that covers the combined and separate sanitary sewer system. The model includes all known outfalls and have been calibrated to temporary flow metering efforts. The City also maintains a complex supervisory control and data acquisition (SCADA) system level sensors or depth/velocity meters at each combined sewer outfall to detect when CSO activity occurs and quantify the volume, frequency and duration of discharge. At CSO outfalls using level sensor technology, the CSO discharge is calculated from a depth measurement over a weir. At locations that are influenced by elevated river levels, a depth/velocity meter is used to calculate CSO discharge.

The City reviews data in the SCADA system to confirm the validity of the overflow data. The overflow data is compared to a series of permanent rain gauges to confirm that recorded overflow data was valid. If anomalies occur, the site is visited by operations and maintenance staff to confirm is maintenance is required. If the data is determined to be valid, it is reported to the State of Ohio on a monthly basis. The overflow data are also available to the general public via the Toledo Waterways Initiative website.

Metropolitan Sewer District of Greater Cincinnati, Ohio

Metropolitan Sewer District of Greater Cincinnati (MSDGC) operates a wastewater collection and treatment system that provides service to more than 850,000 residents and business across 290+ square miles. MSDGC maintains approximately 3,000 miles of sanitary and combined sewers and operates seven major wastewater treatment plants, more than 100 pump stations, two package treatment plants and several high-rate treatment facilities. Approximately 160 million gallons of wastewater is treated daily.

The City maintains an extensive remote sensing program for the wastewater collection system that includes approximately 600 level sensors and depth/velocity meters. Each CSO discharge point is monitored via a depth or depth/velocity sensors. The City maintains two types of hydraulic models for the combined sewer system. The System-Wide Model (SWM) is a comprehensive hydraulic model that represents flows from all part of the combined and sanitary sewer system. MSDGC also maintains simplified hydraulic models for each combined sewer regulator. The simplified CSO models include a detailed representation to the local regulator hydraulics and have been calibrated to available data.

The simplified CSO models are used for regulatory reporting purposes. MSDGC has developed a system that links the CSO models to ground-truthed radar rainfall data to automatically run each model and generate CSO statistics.

MSDGC maintains multiple contracts with vendors to maintain the flow and level metering equipment. MSDGC's data collection system includes alerting to identify when meters have been damaged or require maintenance. MSDGC also contract with a third-party provider of radar rainfall data to provide accurate spatially distributed rainfall data across the service area.

MSDGC also sponsors a CSO notification program to alert Hamilton County residents when existing or predicted weather conditions are likely to cause CSOs into local creeks and rivers, or sewer backups into buildings. MSDGC issues alerts when a rainfall of 1/4 inch or more is predicted or recorded for Hamilton County, or when water levels in area rivers and streams are elevated.

Louisville and Jefferson County Metropolitan Sewer District, Kentucky

The Louisville and Jefferson County Metropolitan Sewer District (MSD) provides sanitary, drainage, and flood protection services for the Louisville Metropolitan area in Kentucky. MSD currently operates and maintains the sanitary and combined sewer system located in Jefferson County and small areas in Oldham County, Kentucky. The sanitary sewer collection system includes over 3,200 miles of sewers, over 60,000 manholes, and nearly 100 CSO locations.

MSD maintains a network of flow and level instruments throughout the sewer system and each CSO is monitored using either a level sensors or flow meter. Data from these instruments is collected in near real time utilizing wireless technology. The collected data is populated to a database which is programmed to generate overflow reports for illicit discharge notification to the Kentucky Department of Water. Data verification is accomplished utilizing both manual and automated methods typically based on site configuration to establish criteria for when an overflow may occur (i.e. level above that of the weir, gate position, redundant instrumentation, ...) Discharge volumes are established based on measured or calculated flow rates depending on the data available at a given site. During flood events, flood gates may be closed to prevent river water intrusion to the combined sewer system. In this situation, Flood Pump Stations are utilized to discharge excess flow volumes to the river to prevent surface and residential flooding. Overflow volumes are then calculated utilizing Flood Pump Station data collected via the MSD SCADA system.

MSD also provides public notification of overflow via their website and customers can sign up to receive these notifications directly.

Sanitation District 1 of Northern Kentucky

Sanitation District 1 of Northern Kentucky (SD1) operates a mixed combined and separate sanitary sewer collection and treatment system. SD1 maintains a hydraulic model of the collection system that has been calibrated to available flow metering data. SD1 use the hydraulic model to simulate observed rainfall data from permanent rain gauge network to quantify CSO and SSO statistics for regulatory reporting.

SD1 implements a rigorous field investigation program to inspect CSO discharge locations following potential overflow events. The field investigation data are used to validate model overflow predictions for reporting purposes.

Metropolitan District Commission, Hartford, Connecticut

Hartford MDC has monitored all of its CSO outfalls since 2002. The MDC's 2012 LTCP Update report the following: *"The District also installed an Overflow Alarm and Monitoring System, which continually measures depth at the 83 active CSO and all active SSO regulators... This system is an excellent tool for monitoring the operation of the CSS and helping to diagnose surcharge issues. The meters can identify when an overflow occurs by measuring depth of flow compared to the height of the weir or overflow pipe. The majority of the meters were installed in 2002, with additional monitoring sites added more recently to monitor structural SSO regulators in West Hartford, Newington and Windsor..."*

The monitoring system reports depth in sewers and outfalls. CSO volume is calculate via rating curve equations, and many of those equations have been refined using the results of SWMM modeling. Efforts to improve the consistency of model and metering results have led to improvements in the fundamentals of the SWMM model. For example, SWMM recently added an option to have a weir coefficient vary with depth, which is important at very low flow depths.

New York City

New York City performed a study of the accuracy of CSO metering in 2015. (<http://mcwrs.org/Documents/WERF2P13%20%20NYCDEP%20CSO.pdf>). The study concluded:

"NYCDEP has not found the system to be reliable enough for automated, real-time use. However, NYCDEP has found that installation of temporary flow monitoring systems is insightful when combined with calibrated hydraulic models and existing telemetry. The resulting comparative analysis provides a holistic look at the CSO drainage area and allows for a better understanding of the inter-relationship between drainage area characteristics and overflow discharge volumes."

Some of the problems they identified were due to tide and the difficulty in accurately metering over a wide range of flows, and labor and costs for meter inspection and maintenance.

Massachusetts Water Resources Authority

The Massachusetts Water Resources Authority (MWRA) reports CSO annually based on a mix of modeling and metering. The model is updated annually based on system modifications, permanent metering in key sewers, and temporary metering. The MWRA's 2018 report is presented at this link: <http://www.mwra.com/cso/annual-discharge-estimates/cy2018.pdf>

Gary Sanitary District, Indiana

The Gary Sanitary District (GSD) in Indiana has traditionally used monitoring to measure and report CSOs. In recent years, GSD has moved to a hybrid approach of using their collection system

SWMM model to develop a CSO discharge curves to estimate CSO volume discharged at each outfall based on rainfall event characteristics. This methodology entails the following steps:

- CSO discharge hydrographs were simulated at GSD CSO outfalls using the model for a multi-year period to include a wide variety of rainfall event characteristics.
- For each CSO outfall, regressions were developed comparing various rainfall statistics and resulting CSO volume discharges and durations, including rainfall characteristics such as event duration versus average intensity, total rainfall depth versus peak intensity, and total rainfall depth versus rainfall duration.
- Based on the information developed above, a user-friendly table was developed that enables GSD staff to efficiently look-up rainfall statistics and to estimate the volume of CSO discharge for each CSO outfall as a result of rainfall events characteristics.

8.5.6.3 Digital Twin Technology for GLWA

During the period March to June 2020, the Wastewater Master Plan project team worked with GLWA to develop a “digital twin” of the regional collection system. The concept of a “digital twin” was first introduced to industry and utilities at the Society of Manufacturing Engineers Conference in 2002 in Troy, Michigan. A digital twin, in the context of a wastewater utility with combined sewers, starts with a model representation of the infrastructure assets for conveyance, outfalls, pumping, and flow controls structures of the collection and treatment system, as well as the hydraulic boundary conditions of the receiving waters.

The Regional Wastewater Collection System (RWCS) Model, developed using SWMM hydrologic and hydraulic model, is used as the model of the infrastructure assets. The RWCS SWMM model in December 2019, was comprised of 15,803 conduits, 1,606 hydraulic structures, 237 pumps, and 4,418 sub-catchments.

The other aspect of the digital twin is representation of the factors that influence the regional model. These factors include wastewater flows, rainfall and weather conditions river levels drivers that influence the behaviors. The digital twin uses real time data from 3 National Weather Service stations, 36 rain gages, and 64 river stage gauges to drive the model response. The rainfall data is processed by a radar rainfall service over the 944 square mile service area into 1 km square pixels and calculated for each of the 4,418 sub-catchments as a series of 5-minute rainfall depths. The river stage data are used to establish hydraulic boundary conditions for CSO outfalls. In-system storage is imposed during times of high river stage when high river elevations prevent the opening of adjacent back water gates on CSO outfalls.

The data described above are integrated through an Applications Program Interface (API) each night. The performance of the Regional Wastewater Collection System in conveying wastewater to the Water Resource Recovery Facility (WRRF) is greatly influenced by the operating protocols of Pump Station 1 and Pump Station 2 at the WRRF and by the Fairview Pump Station located on Jefferson Street on the east side of Detroit. Accordingly, in the digital twinning process, the RWCS model uses the actual recorded 5-minute data from the GLWA SCADA system for PS1, PS2 and Fairview pump operations in the modeled representation.

Each night the RWCS model is run with the pump station operating records and the rainfall data. The RWCS model results are compared graphically for the preceding 24-hour period to the measured results for wastewater depth and flow, activation of CSO treatment facilities, and operations of in-system storage devices and flow diversion gates. There are approximately 400 points in the regional system where measured to modeled data can be compared for each day and for trend analyses over multiple days or storm events. These points include flow meters, level sensors and critical HGL elevations, pump operations at RTBs, inflatable dam operations, and CSO overflow volumes.

The RWCS Digital Twin is intended to provide GLWA with a tool that compares modeled to measured results for regional system performance. The analysis of model results to measured results over multiple wet weather events will identify parts of the RWCS model that require additional calibration. Conversely, where data for Post Event Reports (PERs) are limited due to available instrumentation measurements, model result can be used to estimate overflow volumes. As GLWA develops experience with the digital twinning tool, there are future applications that could be developed, such as:

- Extension of the modeling to include the river water quality models
- Running future 5-day weather forecasts to assess potential system response
- Simulating multiple versions of the RWCS model, such as an alternative for future improvements, to demonstrate how the future improvements would increase CSO capture during a recent wet weather event.
- Post-construction compliance evaluations typically rely on the use of a hydraulic model to provide a mechanism to index the current system performance to a historical typical period of record. Digital twinning expands the capability of the hydraulic model to include new and existing flow monitoring and water surface elevation measurements into the post-construction compliance evaluation.

The GLWA Member Outreach Portal provides a series of presentations to the Best Practices Work Group and Water Analytics Task Force with results of the digital twinning process in the first half of 2020.

8.6 Regional Collection System Improvements

This Wastewater Master Plan focuses on improvements for CSO and SSO water quality compliance and for long term strategies for resource recovery at the Water Resource Recovery Facility. In parallel with this Master Plan, GLWA was engaged in other projects for condition assessment of its 183 miles of trunk sewers and interceptors, its CSO outfalls, CSO treatment facilities, wastewater pumping stations, and development of a Strategic Asset Management Plan. Information and findings from these concurrent projects were incorporated into this Master Plan.

Table 8-8 presents long term recommendations of the Wastewater Master Plan and proposed continuing points of coordination with asset management and pumping station improvement projects in Phase 1, Phase 2 and Phase 3.

Figure 8-14 presents a summary map showing the general location of projects proposed in this Wastewater Master Plan. Also shown on Figure 8-13 are projects underway and committed projects by GLWA Members that support the desired outcomes of the plan.

Table 8-8. Proposed Plan for Collection System Improvements

	Hub Utility Activities	Asset Management	Level of Service and Redundancy
PHASE 1	Initiate Pilot Phase of the Regional Operating Plan	Implement recommendations of CS-299 CSO Treatment Facilities Condition Assessment	Improve regional hydraulic grade control with construction of the Northwest Interceptor diversion to Oakwood RTB and the Meldrum Sewer diversion to the Leib SDF.
	Facilitate annual self-reporting of CMOM and MS4 activities performed by individual Members. Facilitate discussions with Wayne County Rouge Valley CSO communities Redford, Dearborn, Inkster regarding the scheduling of CSO control investigations based on the findings of this Master Plan.	Reinspect leased trunk sewers, interceptors and outfalls again between 2025 and 2030, then every 10 years, except higher risk sections more frequently Perform trunk sewer, interceptor and outfall rehabilitation based upon pipeline condition assessment findings prioritized by probability of failure and consequence of failure. Existing level of rehabilitation of \$20 million per year is estimated to increase to \$25 million per year during Phase 1.	Implement a phased dry weather flow interceptor redundancy in incremental projects when cost effective relative to rehabilitation or level of service requirements. An initial gravity flow segment is being considered from the DRI to NIEA at West Grand Boulevard as part of DB-226
	Implement Phase 1 of the Regional Water Quality Monitoring Program	Improvements to the Conner and Freud storm pump stations are being studied by others. The WWMP team’s understanding of the project is that improvements to be made to the Freud Sanitary and Storm Pump and Conner Sanitary pump stations have been determined. The Freud improvements are proceeding to design. The Conner Storm pump improvements will be decided after additional physical hydraulic modeling has been completed by 1Q20.	Design the new Conner Sanitary PS to allow for a future change in its discharge condition for discharge to the NIEA. See future improvements related to the Conner Sanitary PS described in Phase 2 and Phase 3

	Hub Utility Activities	Asset Management	Level of Service and Redundancy
		Maintain other pumping stations at existing capacity; perform condition assessments at 10-year intervals and respond to condition assessment needs.	
PHASE 2	Work with Wayne County Rouge Valley CSO communities Redford, Dearborn, Inkster to support in negotiations on NPDES timing for CSO control	<p>Reinspect leased trunk sewers, interceptors and outfalls every 10 years; inspect higher risk sections more frequently</p> <p>Perform trunk sewer, interceptor and outfall rehabilitation based upon pipeline condition assessment findings prioritized by probability of failure and consequence of failure. Annual pipeline rehabilitation costs are estimated to increase to \$30 million per year during Phase 2.</p>	Continue to implement phased dry weather flow interceptor redundancy in incremental projects when cost effective relative to rehabilitation or level of service requirements. The proposed gravity flow connection on Concord Street from the DRI to the NIEA will provide substantial ability for GLWA to divert upstream flows from the DRI for future rehabilitation in the downtown area.
PHASE 3		<p>Reinspect leased trunk sewers and interceptor again between 2025 and 2030, then every 10 years, except higher risk sections more frequently</p> <p>Perform trunk sewer, interceptor and outfall rehabilitation based upon pipeline condition assessment findings prioritized by probability of failure and consequence of failure. Annual pipeline rehabilitation costs are estimated to increase to \$35 million per year during Phase 3.</p>	Downsize the Fairview PS after new Conner Sanitary PS routed to NIEA

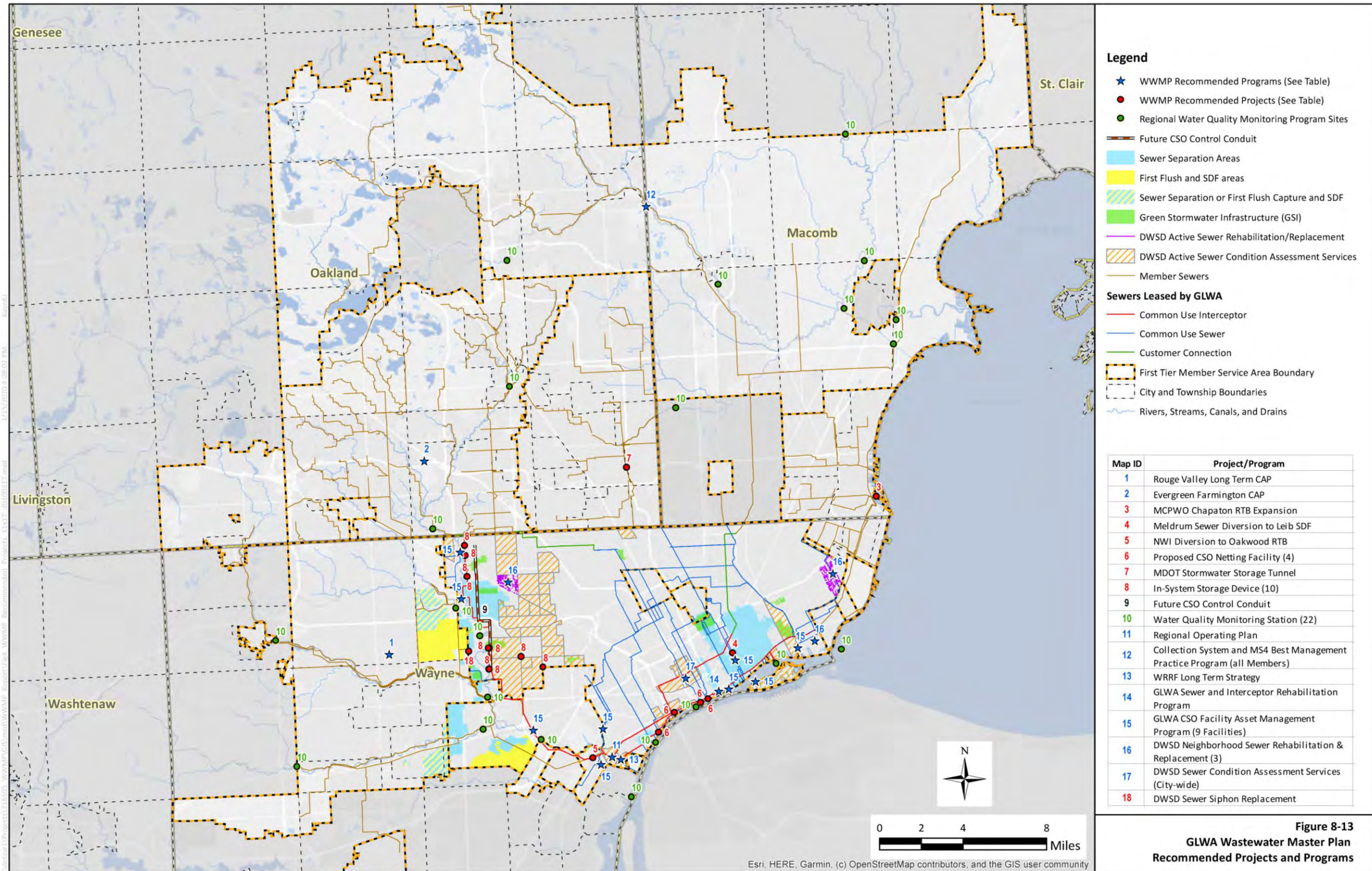


Figure 8-14. GLWA Wastewater Master Plan Recommended Projects and Programs

Figure 8-13
GLWA Wastewater Master Plan
Recommended Projects and Programs

Section 9

Implementation

9.1 Overview

This section outlines the general process for implementing the programs and capital improvement projects proposed in this Wastewater Master Plan. The development of the Wastewater Master Plan was a regionally collaborative effort of GLWA, its Members, SEMCOG, regional stakeholders, Michigan EGLE and Michigan DOT. This collaborative process affirmed that pipes and waterways don't know jurisdictional boundaries and that the region can accomplish more for less by applying a regionally integrated planning framework. Accordingly, implementation of the plan requires cooperative efforts by all parties. GLWA proposes to lead implementation with its new capital projects, operational improvements, and new programs. Through its role as the regional hub utility, GLWA will also facilitate collaboration with its Members, Michigan DOT and regional stakeholders.

The implementation process described in this section is designed to guide cost effective progress toward the 5 desired outcomes. This includes progressive improvement towards water quality standard attainment using a phased and adaptive approach targeting specific incremental water quality milestones. The phased and adaptive approach will be guided by a new program to continuously monitor dry and wet weather water quality for all receiving waters within the GLWA regional service area. Current data characterizing water quality conditions and improvements will support all NPDES permit holders and Michigan EGLE in prioritizing actions and schedules to achieve water quality goals for the region.

This section includes the following implementation tools and strategies:

- Phased and Adaptive Implementation Strategy
- Regionally Coordinated Regulatory Compliance Sequence
- Collection System and MS4 Best Practices
- Regional Operating Plan
- Regional Water Quality Monitoring Program
- Coordination with the Regional Transportation Plan and MDOT Highway Improvements
- Using GSI as an Adaptive Management Strategy
- 5-Year Assessments of Water Quality, System Performance, and Resiliency
- Annual Capital Improvement Planning
- External Funding
- Framework for Addressing Affordability

- Communication Plan
- Advanced Planning

9.2 Phased and Adaptive Implementation Strategy

Three major implementation phases of the Wastewater Master Plan have been identified based on progressive cost effective attainment of water quality goals within the receiving waters of the GLWA service area. The three phases are based on an adaptive framework that uses progress assessments and plan refinements to maximize the value of future investments. Projects and programs that can produce the most regional water quality benefit and other triple bottom line benefits for the least cost are planned for Phase 1. Phase 1 projects focus on maximizing the use of existing assets and controlling the amount of stormwater that enters combined sewers through green inflow reduction projects. Phase 2 and Phase 3 projects are identified as adaptive, in that they might be refined following assessment of the progress achieved and lessons learned realized through Phase 1. Figure 9-1 shows the steps along the phased implementation pathway. These projects are discussed in more detail in Section 8. Table 9-1 presents the three phases with specific water quality milestones and asset management priorities for existing infrastructure at the WRRF and within the regional collection system.

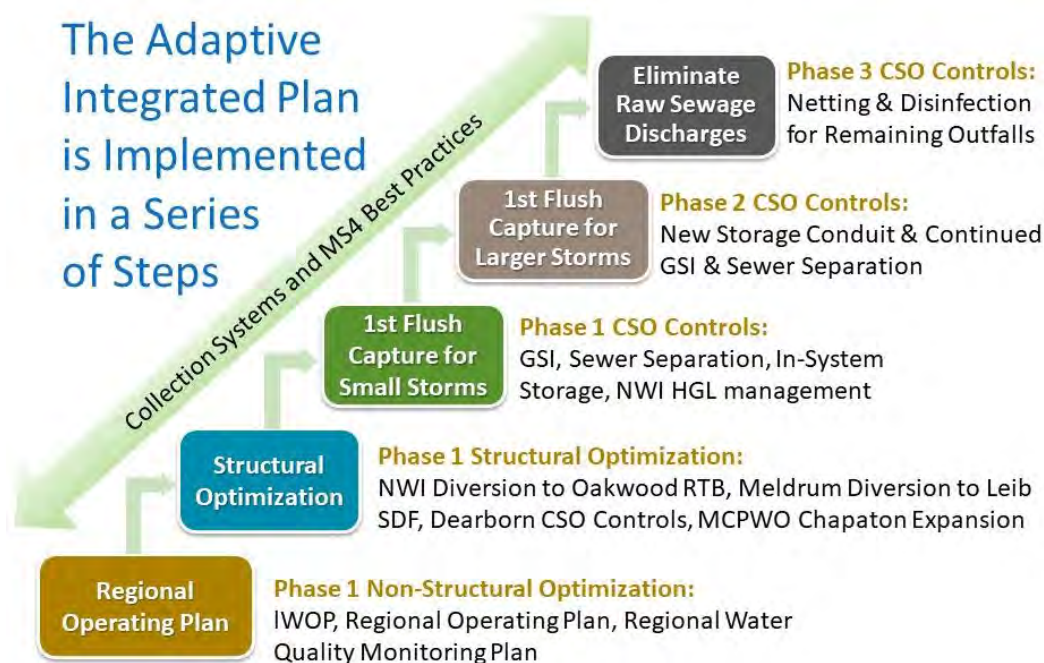


Figure 9-1. Steps Along the Phased and Adaptive Implementation Pathway

EGLE has suggested a potential fourth phase could be required to meet Categorical Standards. Categorical Standards establish requirements for secondary treatment of flow from separated sanitary sewer systems. GLWA's regional collection system includes a mix of separated sewer systems and combined sewer systems, and the North Interceptor East Arm was designed to convey many of the separated sewer systems to secondary treatment at the WRRF.

Approximately 94 percent of all dry and wet weather flow from the GLWA region received secondary treatment during the 7-month 2018 continuous simulation period used in this Wastewater Master Plan for evaluation of alternatives. Michigan EGLE currently evaluates compliance with secondary treatment requirements by monitoring the highest peak hour dry weather flow in April each year. Using that criteria, GLWA currently meets requirements for secondary treatment. (Additional information is provided in Section 5). Cumulative improvements in system optimization and new facilities are anticipated to increase the percentage of flow receiving secondary treatment by the end of Phase 3. GLWA plans to continue monitoring this and consider Phase 4 activities if necessary, in the future.

Table 9-1. Implementation Phases

Phase	Water Quality Goals	Collection System and WRRF Infrastructure Goals	Water Resource Recovery Goals
Phase 1 Optimize	Achieve Dry Weather DO and Partial Body Contact Standards Reduce Public Health Risks and Dissolved Oxygen drops below 5 mg/l by CSO capture of small storm (1-month return frequency events	Continue on-going condition assessment inspections and needs assessments for facilities. Perform improvements to existing assets to renew service life, improve performance for new needs. Optimize existing collection system facilities to use available capacity, expand real time control capabilities. Complete Committed Projects by GLWA Members.	Reduce energy consumption through identified energy saving measures. Reduce ferric chloride use through Enhance Biological Phosphorus Removal, improvements at chemical application points, and real time monitoring to control chemical dosing rates. Expand the use of screened final effluent to reduce potable water purchases for process water.
Phase 2 Adapt	Achieve Full Body Contact Standards during Dry Weather Achieve Aquatic Species Protection during wet weather	Adapt, upgrade or add new assets where a high return on investment can be achieved. Continue on-going condition assessment inspections and needs assessments for facilities.	Convert from chlorine gas to sodium hypochlorite or another disinfection process. Evaluate next generation biosolids options by 2035.
Phase 3 Sustain	Attain Full Water Quality Standards	Completion of proposed wet weather controls for remaining CSO outfalls that exceed NPDES criteria for extreme or limited discharge. Continue on-going condition assessment inspections and needs assessments for facilities.	Implement transformative projects for energy recovery from biosolids, phosphorus recovery, and reduction in volume of biosolids for disposal.

New capital projects, operational improvements and programs during each phase will be coordinated annually by GLWA and its Members through the GLWA Capital Improvement Program (CIP) process. The GLWA CIP process provides 5 and 10-year project forecast from which Members can plan their respective improvements. The development of the GLWA CIP coordinates between water and wastewater infrastructure improvements. It is recommended that GLWA and Members also coordinate projects in each phase with regional transportation projects, as discussed later in this section.

9.3 Regionally Coordinated Regulatory Compliance Sequence

Realizing the cost and prioritization efficiencies associated with regionally integrated planning requires a regionally integrated schedule that strategically sequences projects. Projects that produce the most regional benefit for the least cost are scheduled first. Adaptive projects that might be refined based on the effectiveness of earlier projects should be sequenced accordingly, so that lessons learned can be applied and cost optimization can be achieved through adaptive implementation practices. Figure 9-2 shows a preliminary sequence for the GLWA service area, including consideration of regional water quality projects and MDOT construction projects. MDOT's large highway projects include stormwater storage, green stormwater infrastructure, and sewer separation that are integral with CSO control projects within the service areas of the GWK Drainage District, DWSD, and GLWA. Figure 9-2 is intended to show the sequence and inter-relationship of projects and not actual start and completion dates. Dates for wet weather compliance projects in Phase 1 and Phase 2 will be developed during the GLWA Long Term CSO Control Plan.

Figure 9-2. Regional Compliance Schedule by Phase

	PLANNING		PHASE 1						PHASE 2						PHASE 3		
GLWA PROGRAMS																	
<i>Permitting, Planning, and Reporting</i>																	
<i>West Side Model</i>																	
<i>Wastewater Master Plan and Regional Operating Plan</i>																	
<i>LTCISO Control Plan</i>																	
System Optimization and Water Quality Monitoring																	
<i>IWOP Development and Approval</i>																	
<i>IWOP Control Rules Implementation</i>																	
<i>Regional Operating Plan Initial Period Goals</i>																	
<i>Regional Water Quality Monitoring and Regional Model Updates</i>								Assess		Assess			Assess			Assess	
<i>Voluntary Reporting of Best Practices for MS4 and Collection Systems</i>																	
Upper Rouge River High Priority Non-Core LTCISO Control Projects																	
<i>Quick Wins -- Backwater Gates, SCADA Improvements</i>																	
<i>NWI Diversion to Oakwood RTB</i>																	
<i>Phase 1 In-System Storage on Trunk Sewers East Side of Rouge River</i>																	
<i>Phase 1 Sewer Separation in Priority Outfalls West Side of Rouge River</i>																	
Near East Side Detroit River High Priority Non-Core LTCISO Control Projects																	
<i>IWOP Detroit River Interceptor Regulator Improvements</i>																	
<i>Phase 1 Pilot Netting Facilities at B-020 and B-023</i>																	
<i>Phase 1 Meldrum Sewer Diversion to Leib SDF</i>																	
<i>Phase 1 Fischer District Sewer Separation</i>																	
Remaining Non-Core Projects -- Rouge River																	
<i>Phase 2 Sewer Separation Projects</i>																	
<i>Phase 2 CSO Control Conduit</i>																	
<i>Phase 3 Netting and Disinfection</i>																	
Remaining Non-Core Projects -- Detroit River																	
<i>Phase 2 Sewer Separation Projects</i>																	
<i>Phase 3 Netting and Disinfection</i>																	
GLWA WRRF Improvements Presented Separately in Section 7																	
DWSD																	
<i>DWSD Green Infrastructure</i>																	
<i>DWSD Condition Assessment and Sewer Rehabilitation Program</i>																	
Dearborn																	
<i>Dearborn Sewer Separation Lower Rouge</i>																	
<i>Dearborn CSO 013/014 First Flush Capture and SDF Main Rouge</i>																	
Dearborn Heights																	
<i>Ashcroft Drain Consolidation to Dearborn Heights RTB or Separation</i>																	
Redford Township																	
<i>Bell Branch CSO Consolidation and RTB or Sewer Separation</i>																	

9.3.1 Implementation Pathways and GLWA Hub Utility Leadership

The Adaptive Integrated Plan developed by GLWA and its Members leverages the power of regional optimization and the flexibility of adaptive management to cost effectively achieve the shared desired outcomes at a pace that manages affordability. This is accomplished through an implementation strategy spanning multiple regionally integrated parallel paths with GLWA integrating and coordinating as the hub utility (see Figure 9-2). These implementation pathways will

IMPLEMENTATION PATHWAYS

- Member Committed Projects
- Asset Management
- System Optimization
- WRRF Improvements
- Long Term CSO Control Plan
- Green Infrastructure
- Sewer Separation
- Regionally Integrated Planning

GLWA Hub Will Integrate Regional Activities and Guide Adaptive Management



Figure 9-2. The Adaptive Integrated Plan Leverages GLWA Hub Utility Leadership and Regional Partnerships

proceed in parallel and complement one another based on cost optimized prioritization of activities that will be adaptively reviewed, updated, and informed by water quality monitoring and implementation progress. GLWA will update the regionally coordinated regulatory compliance sequence through continued coordination with Member and other regional partners such as MDOT throughout implementation. This coordination will be important to maximizing the cost optimization opportunities associated with the Adaptive Integrated Plan.

9.3.2 Coordination of Wayne County Rouge Valley Corrective Actions with CSO Control Programs for Redford Township, Dearborn Heights, and Inkster

There is a major inter-relationship between MDOT projects and future sewer separation projects proposed within the DWSD service area along the Detroit River. An inter-relationship also exists between the Wayne County Rouge Valley Long Term Corrective Action Program (Rouge Valley LTCAP) and the CSO control projects by the cities of Inkster and Dearborn Heights, and Redford Township. Phase 1 of the Rouge Valley LTCAP includes a pilot program to throttle combined sewer regulator connections from Inkster, Dearborn Heights and Redford.

The goal of the pilot program is to assess the effectiveness of reducing the flow contribution from the combined areas to the interceptors during significant wet weather events to allow preferential flow from separated sewer systems. The increase in CSO during peak wet weather flows is intended to be offset by providing more capacity for combined sewer flows during non-critical wet weather periods. This strategy requires new automated control structures and an advanced real time logic system.

Regulator modifications for CSO throttling as part of the Rouge Valley LTCAP consist of adding a control gate to the interceptor sewer connection on the downstream side of the CSO regulator structure. Under normal dry weather and most wet weather rain event conditions, the control gate would be left fully open, allowing the regulated flow discharge to the interceptor as designed.

During significant rain events, the control gates would be closed to bypass the regulated flow to the river with the CSO discharge, thereby reducing flow in the interceptor during the critical periods. An automated control system consisting of interceptor level sensors and flow meters would be used to identify critical system conditions for closing and re-opening the gates, with automated controls via the RVSDS SCADA system to close the gates only when necessary.

The pilot program for CSO regulator controls in the Phase 1 Rouge Valley LTCAP will begin in 2020. Planning and design for long term CSO controls by Inkster, Dearborn Heights and Redford Township will need to consider the impacts of these new CSO regulator controls.

9.4 Collection System and MS4 Best Practices Program

The Collection System and MS4 Best Practices Program is a proposed new initiative for GLWA and its Members. This new program is designed to leverage GLWA's "Hub Utility" role and its One Water Partnership to guide all Members (first and second tier) to apply best practices for wastewater collection system and separate storm water system inspection and maintenance.

This GLWA program is designed to complement the proposed new Contributing Municipality Collection System General Permit to be implemented by Michigan EGLE in 2020. The new General Permit applies to separated sanitary sewer systems that discharge to a wastewater treatment plant not owned by the municipality and have been determined by Michigan not to need an individual NPDES permit. The new General Permit establishes requirements for:

1. Proper Operation and Maintenance
2. Asset Management Program Requirements
3. Capacity and Management Requirements
4. Inspection Frequency
5. Fiscal Responsibility
6. Submittals and Reporting

Another related initiative in 2020 will be Michigan House Bill 4100 to enable the creation of stormwater utilities in the state. Enactment of this legislation would provide additional institutional and funding resources for GLWA Members which elect to form a stormwater utility to improve flood protection and stormwater quality.

The GLWA Collection System and MS4 Best Practices Program is proposed to be implemented starting in 2020 through a new collaborative workgroup of GLWA Members tentatively called the "Watershed Work Group". Initial activities of Collection System and MS4 Best Practices Program are proposed to include:

1. Annual voluntary reporting of inspections, maintenance, sewer cleaning, catch basin cleaning, infiltration/inflow studies, and rehabilitation.
2. Development of a pilot program to identify cost-effective improvements to regional practices that will improve dry weather water quality.

The proposed form and initial set of content questions for the annual voluntary reporting of collection system and MS4 best practices is presented in Section 8. The annual survey is intended to be an on-line form with a database so that previous year information that remains applicable does not need to be re-entered. The 5-year assessments of system performance discussed later in this section would include summary level progress on Member Collection System and MS4 Best Practices.

9.4.1 Pilot Study for Dry Weather Water Quality Improvement

Section 6 discusses the significance of pollutant loads from stormwater, dry weather discharges from blocked sewers, and contamination of stream flow from non-point sources entering the boundaries of the GLWA regional system. These dry weather sources of pollution need to be managed through source control, inspections, preventive maintenance, and compliance with development and redevelopment permits.

A three-phase program is proposed to manage dry weather pollution sources in the first two phases and manage separate stormwater quality in the third phase:

- Phase 1: Reduce pathogen concentrations to meet partial body contact standards in dry weather, and reduce organic materials to meet dry weather dissolved oxygen protection for aquatic species
- Phase 2: Further reduce pathogen concentrations to meet full body contact standards in dry weather, and maintain dry weather dissolved oxygen to protect aquatic species
- Phase 3: Maintain dry weather protections and meet water quality standards for separate stormwater discharges in wet weather

It is proposed that GLWA design a pilot study for Phase 1 as one of the initial activities of the new Watershed Work Group. This should be a collaborative program that engages representatives of Tier 1 and Tier 2 Members with responsibilities under the MS4 regulations and the new Contributing Municipality Collection System General Permit.

The pilot study should include research into similar dry weather source control and collection system maintenance programs in other areas. For example, along the Merrimack River in Massachusetts, a successful program was implemented among several communities focusing on six key areas:

1. Adequate Staffing
2. Preventive Maintenance
3. Infiltration/Inflow Control
4. Collection System Mapping
5. Collection System O&M Plan
6. Annual Reporting

9.5 Regional Operating Plan

The goal of the Regional Operating Plan is to improve the performance of the regional collection system through new tools for real time controls, regional pre-storm planning, post-storm event analysis, a regional storage dewatering plan, and the use of the Regional Wastewater Collection System Model in conjunction with SCADA data from the GLWA and Member operations.

Development of the Regional Operating Plan is described in the report “Optimization of Regional Operations”, which is a part of this Wastewater Master Plan. A separate report “Regional Operating Plan” provides the essential information regarding regional operations intended for reference in future NPDES permits for GLWA and its Members.

The Regional Operating Plan will be implemented in a pilot phase beginning in 2020 and extending to the end of 2022. Specific objectives are established for the first three years, and at the end of the pilot phase new objectives will be established for future years.

9.6 Regional Water Quality Monitoring Program

This Wastewater Master Plan provides water quality monitoring findings and proposes a regional plan for attaining Michigan’s water quality standards. The regional plan is designed to protect water quality during dry weather and wet weather and includes specific water quality attainment goals for each phase. An on-going Regional Water Quality Monitoring Program will provide the data necessary to adaptively align water quality protection project priorities for each phase with compliance priorities by watershed.

Progress towards attainment of water quality standard milestones will be measured using data gathered through the proposed Regional Water Quality Monitoring Program described in Section 8 and Technical Memorandum 6A. The GLWA System Control Center began implementation of the Regional Water Quality Monitoring Program in the fall of 2019. Initial planning-level contacts were made with USGS to develop a cooperative agreement to establish and operate the monitoring sites, and to establish data communications with GLWA. Implementation of the first phase of the program is anticipated to begin during 2020. Data collected through the year 2022 should be considered for use in conjunction with the preparation of the next GLWA NPDES permit renewal in 2023.

9.7 Collaboration with Regional Transportation Plan and MDOT Highway Improvements

9.7.1 Regional Transportation Plan

SEMOG is responsible for developing and implementing a long-range vision for transportation in the seven-county Southeast Michigan region. This vision is designed to maintain a transportation system that is safe, accessible, reliable and contributes to a high quality of life for the region’s citizens. The transportation infrastructure (roads, bridges, nonmotorized pathways, transit routes, and facilities) and the people and vehicles that use it impact the physical landscape. It is important to consider this interaction when planning, designing, constructing, and maintaining the transportation system. With that in mind, SEMCOG has developed a regional analysis of impacts of planned transportation projects on the environment and a series of guidelines for mitigating those impacts.

SEMCOG has defined and identified environmentally sensitive resources in the region and analyzed the likelihood of planned transportation projects impacting those resources. The goal is to balance transportation needs with environmental protection by constructing and maintaining a transportation system that minimizes negative impacts, and where possible, increases appropriate public access to environmental resources. Where impacts cannot be avoided, mitigation activities should be considered. To that end, SEMCOG promotes good planning practices via a series of guidelines for consideration by road and transit implementing agencies.

First, overall guidelines are presented that should be considered for all types of projects, regardless of the resource impacted. Then, guidelines specific to each type of resource are presented. The resource-specific guidelines present an introduction highlighting the importance of the resource and reasons the resource should be preserved; a summary of how the existence of the resource is identified and the types of activities that would be considered to have an impact; specific mitigation activities that should be considered during the planning and design phases as well as the construction and maintenance phases; and information sources for reference.

SEMCOG continues to develop data, technical tools, and planning techniques necessary to facilitate a better understanding of the interaction between transportation and the environment and the possible benefits and drawbacks of current and future transportation plans. SEMCOG prepares an annual forecast of the next 5-years of transportation projects in the region called the Transportation Improvement Program (TIP). There are numerous categories of projects by different layers and this covers the entire 7 county region for MDOT and all federal-aid projects through the counties and the cities, that have been approved through Federal Aid Committees and SEMCOG's Transportation Coordinating Council.

As part of the FHWA transportation planning requirements, SEMCOG must complete an Environmental Sensitivity Analysis for all projects submitted for the Regional Transportation Plan TIP. The Environmental Sensitivity Analysis is evolving to include project locations in relation to combined sewer areas. GLWA should continue discussion with SEMCOG in 2020 regarding more detailed procedures to integrating the TIP and criteria for the Environmental Sensitivity Analysis with the capital improvement programs of GLWA, DWSD and other GLWA Members.

9.7.2 Coordination with MDOT Projects in the Region

The Adaptive Integrated Plan relies on important partnerships with MDOT to manage stormwater entering the combined sewer system as they advance their own infrastructure improvement projects. Coordinated planning of projects will help maximize the value from these opportunities to cost effectively reduce sewer overflows as was demonstrated through the substantial coordination between MDOT, DWSD and EGLE achieved during the Wastewater Master Plan development process. A series of discussions and preliminary permitting procedures were completed for:

- Gordie Howe International Bridge
- I-375 Improvements
- I-94 Modernization Project
- M-39 Flood Control and Climate Resiliency Study

- I-75 Improvements

Table 9-2 presents a list of major coordination activities between the Wastewater Master Project and MDOT projects. This tabulation of activities includes work activities directly with the Wastewater Master Plan project. There were other meetings with DWSD, GLWA and EGLE regarding permit issues that are not included on this list.

An important element of coordination between GLWA and MDOT is sharing of the Regional Wastewater Collection System RWCS hydraulic and hydrologic model. All major MDOT project teams for the major highway projects are using the RWCS model and associated GIS data.

Table 9-2. Master Plan Coordination Activities with MDOT Projects

Date	Master Plan Coordination Activity
July 2017	Initiated communication with the MDOT GIS and Asset Management Group to obtain information on MDOT storm water drainage facilities for major state highways in the GLWA service area. Ultimately led to model representation of MDOT's connections to the GLWA regional collection system over several months.
October 2017	Coordinated with the West Side Model team in scheduling the meeting with MDOT to review the modeling of stormwater drainage from MDOT highways to the DWSD and GLWA collection systems.
November 2017	Prepared a summary graphic of the routing of MDOT highway drainage for review by MDOT and for scheduling a meeting with the Department in December.
December 2017	Held a meeting with MDOT to review the modeling of storm water drainage from MDOT highways to the DWSD and GLWA collection systems. Developed an approach for working with MDOT to resolve questions on MDOT's existing and proposed drainage facilities.
January 2018	Obtained additional drainage infrastructure data from MDOT based on the approach developed at the December 7, 2017 meeting with MDOT.
March 2018	Initiated coordination with SEMCOG and MDOT regarding a scope of services for evaluation of climate resiliency and flood control for highways based on a pilot area in Dearborn, Michigan.
August 2018	Communicated with the AECOM, SEMCOG and Bridging North America project teams regarding the release and sharing of hydraulic models of the regional collection system and collected metering data.
August 2018	Held a meeting with MDOT project managers on August 7, 2018, to collect information regarding stormwater management.
October 2018	Met with representatives of MDOT, AECOM, DWSD and MDEQ on October 30, 2018 to provide the current Regional Collection System Model to MDOT so that MDOT and its consultant can establish the hydrologic and hydraulic criteria for the surface storage basins at the Gordie Howe International Bridge point of entry facilities.
December 2018	Participated in a project start-up meeting on December 20, 2018, for the SEMCOG and MDOT Climate Resiliency and Flood Management Study. The Climate Resiliency task will provide planning criteria applicable to highway drainage for the SEMCOG planning area. The Flood Management task will focus on the M-39 corridor.
December 2018	Prepared for and attended a meeting with representatives of MDOT, DWSD and GLWA to discuss the I-375 Improvement Project on December 12, 2018. As a result of this meeting, there is a potential sewer separation project that could be performed in conjunction with the I-375 Improvements to eliminate CSO outfall B018.

Date	Master Plan Coordination Activity
January 2019	As a result of the meeting with MDOT and SEMCOG on December 20, 2018, GLWA and DWSD prepared a letter to MDOT seeking discussion of a policy to remove highway drainage from combined sewer systems in conjunction with major highway improvement projects.
January 2019	Prepared follow-up information for transmittal to MDOT for the I-375 Improvement Project. Made requests to GLWA and DWSD for GIS data showing easements, water, and sewer pipelines. Initiated capacity analysis for B-017 for stormwater only.
February 2019	Began discussions with the MDOT I-94 Improvement Project regarding their Drainage Plan on February 20, 2019.
February 2019	On February 13 and 25, 2019, communicated with Bridging North America, MDOT, GLWA and DWSD regarding their questions on the GHIB Point of Entry site drainage design and the model of the GLWA regional collection system provided on October 30, 2018.
April 2019	Participated in a meeting on April 9, 2019, related to the Gordie Howe International Bridge (GHIB) Project. This meeting included a review of the proposed drainage plan, DWSD permitting requirements, and use of the RWCS Model.
April 2019	Outfall capacity assessment for I-375
May 2019	Communications with Gordie Howe International Bridge (GHIB) Project. This meeting included a review of the proposed drainage plan, DWSD permitting requirements, and use of the RWCS Model.
June 2019	Reviewed the Hydrologic Design Report Gordie Howe International Bridge (GHIB) Project and provided comments on June 24, 2019.
July 2019	Meeting on I-375 Improvement Project regarding alternatives for roadway alignments, existing sewers, and sewer separation
August 2019	Technical discussions, drawings, GIS data, outfall capacities
October 2019	Conference call with representatives of GLWA, SEMCOG, MDOT and Tetra Tech on October 22, 2019, to discuss findings of the M-39 Flood Mitigation Study. CDM Smith will provide hourly rainfall data for the August 11, 2014 storm event to Tetra Tech as an action item from this conference call.
October 2019	Reviewed the Supplemental Draft EIS for the MDOT I-94 Modernization Project and prepared comments on behalf of GLWA on October 18, 2019.
October 2019	Prepared for and attended a conference call with representatives of GLWA, SEMCOG, MDOT and Tetra Tech on October 22, 2019, to discuss findings of the M-39 Flood Mitigation Study. CDM Smith will provide hourly rainfall data for the August 11, 2014 storm event to Tetra Tech as an action item from this conference call.
December 2019	GHIB conference call on December 12 – questions of how to use the RWCS model, boundary conditions, and simulation and design criteria for stormwater discharges to CSO outfalls downstream of the DRI
December 2019	M-39 meeting on December 11 regarding coordination of M-39 highway and drainage improvements with GLWA NWI to Oakwood RTB diversion and the sealing of manhole in the underpass at Hubbard Drive
December 2019	I-94 meeting on December 18 – MDOT presented the results of the I-94 Drainage Study

Regular meetings between MDOT, DWSD and GLWA should continue as the highway projects move into design and construction phases, or as new projects are identified during implementation of the Adaptive Integrated Plan. Building upon these cooperative partnerships should generate more cost optimization opportunities over the 40-year planning period of the wastewater master plan that

should be leveraged to progressively manage the cost of CSO control and achievement of water quality standards.

9.8 Using GSI as an Adaptive Management Strategy

Green stormwater infrastructure (GSI) is being implemented by GLWA Members as a CSO control measure, and by property owners, developers, and Michigan DOT in a variety of projects throughout the GLWA service area. Construction of GSI features in new developments, municipal capital improvement projects, and highway projects is driven by compliance with stormwater ordinances and by public interest in sustainability and more attractive public landscapes. Another driver of GSI implementation is improved resiliency for potential climate change. This section discusses strategies to optimize the beneficial impacts of GSI to reduce the scale of future grey infrastructure.

9.8.1 Measurement of Effectiveness

Several approaches can be considered to measure the effectiveness of GSI that is implemented. These approaches are listed below in order of increasing complexity. These are not mutually exclusive measures.

- **Geographic Metrics.** Estimated reductions in directly connected impervious area have been shown in the scientific literature to be strongly correlated to many water quality and aquatic ecosystem impacts. Impervious cover may be considered “non-directly connected” if it is removed, diverted to a pervious area of sufficient size and infiltration capacity, or diverted to GSI. Other relatively simple geographic metrics may include the total surface footprint or vegetated footprint of GSI systems in a particular area, and the total area of tree canopy over impervious surfaces. Many co-benefits are related to these metrics.
- **Measured/Estimated Water Budget Component Trends.** Estimates of the amount of rainfall that is apportioned into infiltration, evapotranspiration, untreated runoff, and detained/treated runoff is another useful effectiveness measure. Water budget components can be estimated at the site scale using monitoring data and at the watershed/sewer system scale using calibrated models. Results can be compared to design and performance criteria.
- **Estimated Pollutant Load Reductions.** Pollutant load reductions can be estimated based on water budget components using the academic/professional literature on pollutant concentrations in treated and untreated stormwater. Pollutants of interest may be driven by regulatory requirements such as CSO and MS4 regulations/permits and TMDLs. Estimated loads of sediment, trash, and debris removed from stormwater may also be of interest in urban areas for both water quality and community objectives. Direct measurements of pollutant concentrations at the local scale tend to be highly variable and may be best thought of as a longer-term research activity to contribute to existing national literature.
- **Measured/Estimated Reductions in Peak Runoff Rate.** This can be directly measured at the site scale and/or estimated at the watershed/sewer system scale using calibrated models. Results can be compared to design and performance criteria.

- **Public Opinion Surveys and Estimates of Co-benefits.** Some co-benefits can be measured directly (e.g., urban temperature and air quality) while others can be estimated (e.g., physical and mental health improvement due to greenery). Some communities and utilities have chosen to study co-benefits in a formal benefit-cost framework, while others have chosen to simply track a range of metrics without expressing them in monetary terms. Depending on local goals and objectives articulated through the planning process, formal measurement of community perceptions and responses to GSI may be performed by planners or social scientists.
- **Measurements and Estimates of Stream Channel Erosion.** Measurements and estimates of stream channel erosion and deposition in response to GSI implementation are challenging but may be desirable to address regulatory requirements or goals set by stakeholders.

Any of the metrics discussed above may be combined with estimated or actual cost data to create cost-effectiveness metrics. Estimates of capital (design and construction), annual maintenance, and life cycle cost (design, construction, and maintenance over the life of the project) may be incorporated.

9.8.2 Target Areas for GSI Implementation

Target areas for implementation of GSI include areas of new development, primarily outside Detroit, and areas of projected redevelopment, primarily inside Detroit. In areas of new development, stormwater ordinances are a primary strategy being employed to realize water quality, channel protection, and peak flow control benefits. In areas of redevelopment, strategies include DWSD's 2018 stormwater requirements for private property; fees, credits, and incentives to encourage voluntary implementation on private property; targeted investment in the drainage area originally identified for the Upper Rouge Tunnel, and a potential to focus investment in other areas with a concentration of vacant and abandoned property projected to undergo redevelopment.

9.8.3 Strategies for Vacant Lots

Studies of vacant land in the City of Detroit indicate up to 40 square miles of vacant land out of a total area of 143 square miles (Gallagher, 2010), comprising approximately 150,000 properties, with about one-third currently containing buildings (Detroit Future City, 2012).

The Detroit Water and Sewer Department NPDES permit (MDEQ, 2019) and GSI plan (DWSD, 2014) describe a strategy for vacant lots. In summary, the plan is to remove impervious cover and leave soil conditions that will tend to minimize surface runoff. This approach meets multiple environmental objectives, including reducing or preventing increases in runoff volume, pollutant loads, and peak runoff that may contribute to urban flooding. Sites may be suitable for interim or permanent land uses such as community gardens and are left in a condition suitable for future development under the terms of the city's stormwater ordinance and other applicable codes. There is also a potential to target public infrastructure investments, such as street repaving and sewer separation, in these areas to facilitate both environmental and economic revitalization goals. The NPDES permit (MDEQ, 2019) describes these requirements:

Provisions for demolition and removal of vacant structures and replacement with pervious land cover. Where demolition is planned and implemented at sites that will be

re-purposed for GSI, the demolition specifications shall ensure that basements and other impervious surfaces at the sites are removed, that the site is raked to remove large rocks and construction debris, and that engineered soils consisting of an appropriate mix of topsoil, compost, and sand is applied following the demolition to support plant growth and promote infiltration...

For the near-east side of the City, there has been another GSI program in the tributary area to Detroit River Outfalls 005 - 009, 011, and 012. Because of the potential for some larger-scale green projects due to a relatively large amount of vacant land in the area, it may be possible to eliminate or reduce the size of some previously envisioned CSO treatment facilities for this area using the combination of GSI implementation along with possible sewer separation, and other engineering solutions. With GSI implementation now spreading across the city, it is acceptable for the city to use one-third (1/3) of the total GSI expenditures on projects upstream of untreated CSOs other than Rouge River Outfalls 059-069, 072-075, 077, and 079.

GLWA should evaluate the measures of GSI effectiveness discussed above, select one or more of these measures to include in the 5-year assessments discussed later in this section. Tracking GSI progress at 5-year intervals will provide a basis for improving the Regional Wastewater Collection System Model to better predict GSI benefits in stormwater runoff reduction.

9.9 Five-Year Adaptive Management Assessments of Water Quality, System Performance and Resiliency

Periodic reviews and revisions are a fundamental component of the Adaptive Integrated Plan implementation framework. This approach provides the flexibility needed to manage uncertainties and leverage cost optimization opportunities. Adaptive management assessments should include reviews and updates to planning tools, data, and assumptions as unknowns become known and decision support systems are advanced over the implementation time frame. In particular, as projects are implemented and new cost and performance data become available, assessments should be made to characterize system performance, water quality progress, and the cost efficiency of implemented technologies. The key findings from these assessments should then be applied to refine and potentially re-prioritize next steps.

The Regional Water Quality Monitoring Program is an important tool in the assessment and refinement process, as water quality is a direct measure for multiple desired outcomes. After several years of data are collected from the Regional Water Quality Monitoring Program, then cumulative assessments are proposed on 5-year intervals aligned with NPDES permit renewals. (Quarterly and annual publication of water quality data is also proposed, as discussed in Section 8.) The 5-year cumulative assessments should present trends for each water quality monitoring station, trends for each river, and trends for major public swimming and recreational areas. These cumulative assessments should address the performance measures for water quality discussed in Section 2 for the Five Outcomes of the Wastewater Master Plan.

The Five Outcomes for the Wastewater Master Plan also include regional system performance metrics for attainment of critical hydraulic grade line elevations, percent capture of wet weather flow, and annual volumes of flow provided primary and secondary treatment at the WRRF. Annual

reporting from the Regional Operating Plan should be used for the 5-year cumulative assessments of these system performance metrics.

The 5-year interval should also be used to monitor system resiliency measures related to the annual cycles of Great Lakes elevations and trends in rainfall, intensity and duration. Section 5 on Planning Criteria provides information on Great Lakes water level cycles and on mid-century and end of century climate models. Other regional, state and federal agencies, as well as universities will also be monitoring resiliency trends, and collaborative assessments are recommended.

The Climate Resiliency Study underway by SEMCOG and MDOT analyzes rainfall trends for southeast Michigan. This study considered using global climate models, and in consultation with the University of Michigan and University of Wisconsin, they analyzed a suite of six regional climate models. The regional climate models consider greenhouse gas emissions, air temperature and precipitation intensity and this study provides a baseline for future periodic assessments of rainfall duration and intensity trends. Great Lakes levels are correlated to the balance between regional precipitation and evaporation. 5-year assessment of trends should consider:

- Projected precipitation and air temperature using one or more of the regional climate models identified in the SEMCOG and MDOT Climate Resiliency Study.
- For the critical summer season, examine the historical record to identify periods of time when precipitation and air temperature were within this range.
- Identify a range of water surface elevations at relevant points of interest for planning applications (e.g., points on Lake St. Clair and/or the Detroit River) that occurred under these precipitation and temperature conditions. A range is expected because lake levels respond to a variety of hydrologic and hydraulic factors in addition to precipitation and evaporation.
- Assess the results relative to the peak elevation of El 577 NAVD88 (El. 99 Detroit Datum) on Lake St. Clair at Windmill Point, Detroit, for this Wastewater Master Plan, a representative water surface elevation to be used as a boundary condition.

9.10 Annual Capital Improvement Planning

GLWA's capital improvement planning process provides an annual opportunity for setting priorities for each upcoming fiscal year and for aligning 5-year and 10-year capital improvement and financial forecasts. The annual capital planning process can also be a time to consider changes to ownership of regional facilities and concurrent implementation of smaller projects and operational Quick Wins. This process is an important element of the proposed adaptive implementation framework.

9.10.1 FY2021 Capital Improvement Program

In August 2019, members of the Wastewater Master Plan project team worked with GLWA managers to prepare Business Case Evaluations and cost estimates for proposed capital improvement projects for FY2021. Recommendations from the Wastewater Master Plan that had been reviewed by GLWA and scheduled for the years 2021 to 2030 were considered by GLWA for inclusion in the FY2021 Capital Improvement Program (CIP). As a result, the major

recommendations for the early years of the planning period became a part of the next CIP to be reviewed and approved by GLWA and its Members in the spring of 2020.

9.10.2 DWSD Annual CIP

The Detroit Water and Sewer Department is engaged in a 5-year \$500 million condition assessment and capital improvement program for its wastewater collection and water distribution systems. Since the program launched in 2018, DWSD has repaired or replaced 22 miles of sewers. As part of a new neighborhood approach launched in summer 2019, DWSD began assessing the water and sewer systems by neighborhood. DWSD has also improved coordination of construction of capital improvements with DTE (natural gas and electric), telecommunication companies, and road agencies on a block-by-block basis.

DWSD and GLWA proactively coordinate projects in their respective operating programs and capital improvement programs. With the identification of proposed sewer separation projects, and the role of MDOT in those projects, planning between DWSD, GLWA and MDOT should be based on five-year and ten-year time horizons.

9.10.3 Wayne County Rouge Valley System Pipelines

As part of the work on the Regional Operating Plan, the inter-relationship of segments of the Wayne County conveyance system and the GLWA regional system was discussed. In two locations, GLWA has Member service connections upstream of conveyance conduits under the operational responsibility and ownership of Wayne County. These include an approximately 500-foot long segment of the Northwest Interceptor near Ford Road and the Fox Creek Enclosure in the Grosse Pointe communities. The Northwest Interceptor segment was recently inspected by GLWA as part of its pipeline condition assessment program. The Fox Creek Enclosure should be inspected by GLWA and a condition assessment performed.

Table 9-3 shows characteristics of the two conduits proposed for transfer to GLWA.

Table 9-3. Wayne County Wastewater Conduits Proposed for Transfer to GLWA

Conduit	From	To	Length	Size	Material	Original Construction Date	Source of Data
Northwest Interceptor	Near Evergreen Road	Near Southfield Road	~5,280 feet	7'-9"	Concrete	1955	GLWA GIS
Fox Creek Enclosure	Kerby Road PS	Ashland Sewer	~8,680 feet (Kirby Rd to Cadieux Rd) ~3,810 feet (Cadieux Rd to Bedford Rd) ~4,600 feet (Bedford Rd to Ashland St)	11'-6" H x 16'-6" W Arch (Kirby Rd to Cadieux Rd) 14'-0" Circular (Cadieux Rd to Bedford Rd) 15'-0" Circular (Bedford Rd to Ashland St)	Arch is Unknown (though likely brick) Design drawing show sewer thickness for the 14'-0" as 4 RB or 16" concrete and for the 15'-0" sewer as 5 RB or 20" concrete. (RB = ring brick)	Likely Constructed in early 1930s? Design drawing from Arch Sewer ~1929 14'-0" and 15'-0" Cylinder ~1927	RWCS Model Pipe location in RWCS model was based on design drawing from late 1920s

9.10.4 Quick Wins

Technical Memorandum 2 describes efforts by GLWA, the Wastewater Master Plan project team, and other project teams to identify smaller construction projects and operational changes that could be accomplished in parallel with the development of the Master Plan. These projects and operational changes were called "Quick Wins", and they included regulator cleaning, backwater gate improvements, elimination of river inflow at several locations, feasibility analysis for a new backwater gate at B-063 and fast-tracking certain analyses during the Master Plan to provide input to other concurrent projects.

The Quick Wins process proved useful as a means to collaborate across GLWA and DWSD operating units, as well as to engage the professional services teams to perform specific projects. It is recommended that GLWA continue to use the Quick Wins process periodically to complete smaller projects that could be holding up larger more critical goals. The essential parts of the Quick Wins process were:

1. Initial brainstorming of ideas with operating groups and consulting teams.
2. Prioritization of projects, and development of implementation steps for each project.
3. Appointment of a coordinator to send reminders and assist with communications.

4. Monthly review meetings to review progress and set the schedule for remaining work.

9.11 External Funding

GLWA will need to continue to expand efforts to secure external funding for its infrastructure improvement requirements. GLWA and its Members regularly rely on the Michigan State Revolving Loan Fund.

The Water Infrastructure Finance and Innovation Act of 2014 (WIFIA) established the WIFIA program to accelerate investment in the nation's water and wastewater infrastructure. The program is administered by the Environmental Protection Agency and works separately from, but in coordination with the State Revolving Fund (SRF) program to provide subsidized financing for large dollar-value projects. Projects that are eligible for Clean Water SRF are eligible for WIFIA funding, including enhanced energy efficiency projects at wastewater facilities, and acquisition of property if it is integral to the project or will mitigate the environmental impact of a project. Planning, preliminary engineering, design, environmental review revenue forecasting and other pre-construction activities are eligible as well as construction and reconstruction activities. Projects must be a minimum of \$20 million in size for large communities. Forty-nine percent of the project can be WIFIA funded, and total Federal assistance may not exceed 80%. Repayment may be deferred up to 5 years after substantial completion of the project and the loans mature 35 years after substantial completion. NEPA, Davis-Bacon, American Iron and Steel and other federal provisions apply.

The benefits of the WIFIA program is a single fixed rate is established at the loan closing and the borrower may receive multiple disbursements over several years at the same rate. The interest rate is based on the U.S. Treasury rate on the date of loan closing, and the rate is not impacted by the borrower's credit rating, although the borrower must be credit worthy and have a dedicated revenue source. The borrower can benefit from customized repayment schedules, providing flexibility to phase in rate increases over time.

The application process consists generally of 3 phases.

- **Phase 1: Project Selection** – Generally in the first quarter of the year EPA announces the amount of funding it will have available for the program and solicits letters of interest (LOI) from prospective borrowers. There is no cost to submit a LOI. The LOI includes information regarding the project's eligibility, the borrower's credit worthiness, and the projects feasibility and alignment with EPA's priorities. Based on this information EPA selects projects which it intends to fund.
- **Phase 2: Project Approval:** An application for WIFIA credit assistance is submitted by the borrower in this phase, and the WIFIA program conducts a detailed financial and engineering review of the project. Terms and conditions of the loan are proposed based on the review and negotiated with the borrower, and a project term sheet is executed.
- **Phase 3: Negotiation and Closing:** Based on the term sheet, the Administrator and the prospective borrower execute a credit agreement which is the legal document ensuring WIFIA funds.

9.12 Framework for Addressing Affordability

This Wastewater Master Plan proposes a diverse array of wastewater infrastructure investments for the WRRF, regional collection system, and CSO control facilities across the GLWA service area for a 40-year planning horizon. GLWA and its Members clearly understand that one of the most challenging elements of long-term planning is the allocation of scarce financial resources amongst competing needs and keeping improvements affordable to all ratepayers. Working with the Regional Collaboration Group, GLWA utilized a cost optimization decision support system to evaluate alternative control strategies for achieving desired outcomes.

The decision support system includes an integrated suite of watershed, collection system, and receiving water quality models which together allow for regionally integrated planning focused on maximizing regional water quality benefits, while containing the financial burden on ratepayers. Cost optimization includes leveraging synergistic regional collaboration opportunities; such as a GLWA and Member coordinated Regional Operating Plan, coordination of sewer separation and green stormwater infrastructure projects with MDOT, coordinated best practices for sewer system inspection and repair, and a Regional Water Quality Monitoring Program. The Adaptive Integrated Plan addresses affordability using a combination of strategies which together manage the financial burden on ratepayers. These include:

- Plan for the necessary costs associated with WRRF and collection system rehabilitation and asset management programs that maintain reliable high-quality service and prioritize accordingly
- Apply regional integrated planning principles using cost optimization decision support systems to identify and prioritize projects that maximize desired outcomes for the lowest regional cost
- Build and leverage synergistic opportunistic partnerships that reduce cost through collaboration, economy of scale, and shared objectives
- Select projects that produce additional community benefits that promote economic prosperity and elevate quality of life
- Phase in full compliance consistent with the NPDES permit through development of the Long Term CSO Control Plan updates due to EGLE in 2022
 - Schedule lower cost CSO control projects and asset management investments for early in the planning period (2023-2027 per NPDES 15.f.2)
 - Schedule the highest cost projects for CSO control later in the planning period
 - Continue utilizing and advancing the decision support system to support design and construction of Phase 1 projects and thereafter to assess progress and refine adaptive phase 2 and 3 project technologies, configurations, sizing, and implementation timing
 - Conduct financial capability evaluations with each permit renewal cycle and work with EGLE to develop adaptive implementation commitments, if necessary

9.13 Communication Plan

Representatives of the Regional Collaboration Group prepared a plan for communicating the Wastewater Master Plan to GLWA Members, local elected officials, environmental groups, the general public, and the media. The Communication Plan provides key messages and tools for each audience relative to the goals and progress of the Wastewater Master Plan. GLWA is implementing the Communication Plan in 2020.

Table 9-4. Key Audiences, Messages and Tools for the Communication Plan

Audience	Key Messages	Tools
GLWA Members	<ul style="list-style-type: none"> ▪ One Water is one system: regional and local. ▪ Recognizing it is one system enables us to optimize costs and rates. ▪ You can be champions in the community for accepting more systematic decision-making. ▪ To reap the benefits of a one system approach requires active member engagement in regional operations and modeling. ▪ Your customers can play a pivotal role in saving money and providing high quality service. 	<ul style="list-style-type: none"> ▪ Outreach Portal ▪ One Water Information Booth ▪ GLWA and Member Websites ▪ Public Service Announcements ▪ Annual Conference
Local Elected Officials	<ul style="list-style-type: none"> ▪ Regional collaboration is the key to cost optimization for your constituents. ▪ Regional collaboration is not lost independence, it is gained value. ▪ You have numerous opportunities to be the champion of success. ▪ Sustaining your revenue base (tax and utility) hinges on quality service. 	<ul style="list-style-type: none"> ▪ Elected Officials Ambassador Program ▪ Annual Briefing ▪ Public Presentation Series ▪ Elected Officials Data Base ▪ 90-Day Contact Calendar ▪ Print and Video Resources
Environmental Groups	<ul style="list-style-type: none"> ▪ You can help by embracing the plan without sacrificing ability to be critical. ▪ Your ongoing participation is welcome. ▪ You can be champions of public vigilance by multiplying personal actions supporting sustainable behaviors. ▪ Target criticisms to the correct audience. 	<ul style="list-style-type: none"> ▪ Green Summit ▪ New Environmental Page on GLWA Website ▪ 10 Ways GLWA Helps List ▪ 10 Ways Environmental Groups Can Help List ▪ Annual Environmental Award
General Public	<ul style="list-style-type: none"> ▪ Our success supports your quality of life in many ways ▪ You are key to that success ▪ Support needed investment ▪ Your personal actions matter 	<ul style="list-style-type: none"> ▪ Billing improvements ▪ Videos ▪ Public Service Announcement ▪ Short Documentary ▪ GLWA Environmental Education Partnership Kit ▪ Story Map Website/Mobile Device Application

Audience	Key Messages	Tools
		<ul style="list-style-type: none"> ▪ Social Media ▪ Retail Billing Mailing Inserts ▪ Branding Extensions
The Media	<ul style="list-style-type: none"> ▪ We respect your vital role. ▪ We have ongoing substance of interest to your audience. ▪ You can help us be better communicators 	<ul style="list-style-type: none"> ▪ Adapt Outreach Materials for Use with the Media ▪ Annual Media Seminar ▪ Create Narrative for Local Interest Stories

9.14 Advanced Planning

Three major advanced planning efforts are anticipated to follow this Wastewater Master Plan. Each of these efforts are anticipated to begin with the conceptual solutions proposed in this Master Plan and provide additional engineering, site selection, modeling and financial analysis to develop basis of design documents that can proceed to design and construction projects.

9.14.1 Long Term CSO Control Plan

An updated Long Term CSO Control Plan (LTCP) is a requirement of the GLWA NPDES Permit issued in July 2019. The LTCP must be prepared by November 15, 2022 and must address designated priority uncontrolled CSO outfalls on the Detroit River and the Rouge River. GLWA anticipates starting the LTCP in 2020. The Long Term CSO Control Plan will advance the components of the Adaptive Integrated Plan designed to meet water quality standards along the Rouge and Detroit Rivers and include a proposed compliance schedule in coordination with EGLE.

9.14.2 2021 SRF Project Plan

The GLWA NPDES Permit requires that a needs assessment for WRRF and regional collection system facilities be updated every five years as part of the SRF Project Plan. The next SRF Project Plan is due on October 1, 2021 including condition assessment and evaluation of service level.

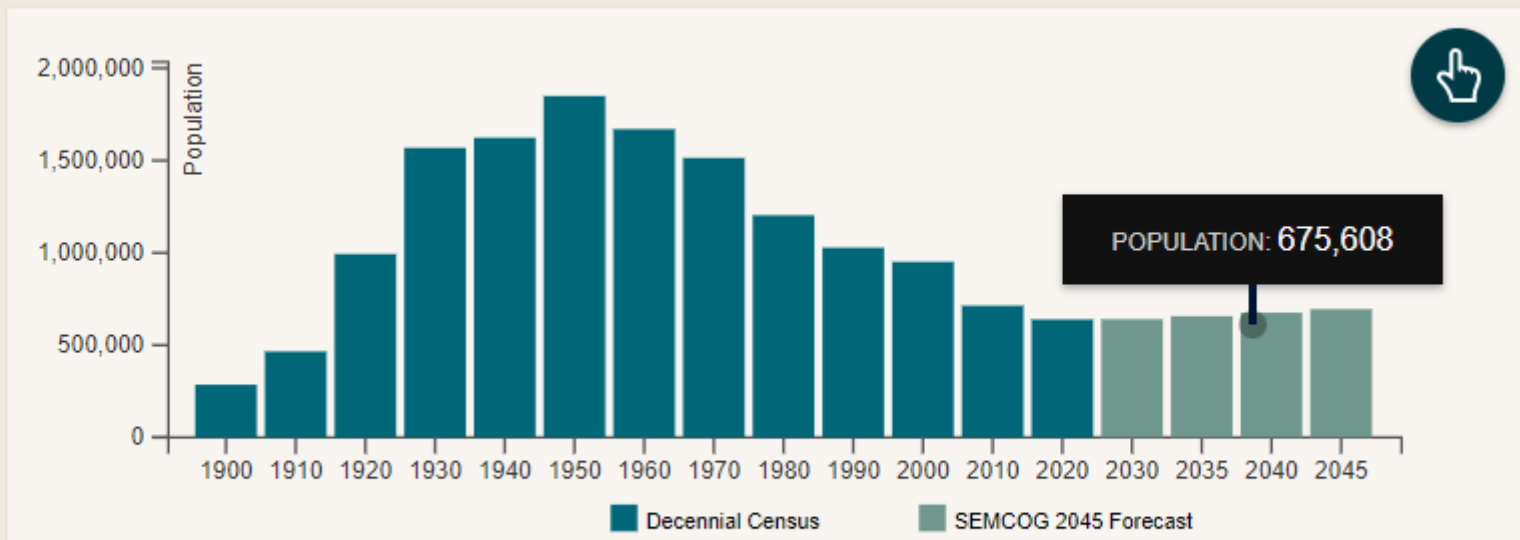
9.14.3 2028 Biosolids Plan

Section 7 and Technical Memorandum 5B discuss near term and long term biosolids alternatives and proposed improvements. Major upgrades are anticipated for the multiple hearth incinerators by 2035, and the current contract operations agreement with NEFCO for the Biosolids Dryer Facility will terminate in 2036. Long term solutions evaluated in Technical Memorandum 5B should be re-evaluated in 2028 based on anticipated costs for energy and new developments in regulations for air quality and land application of biosolids.

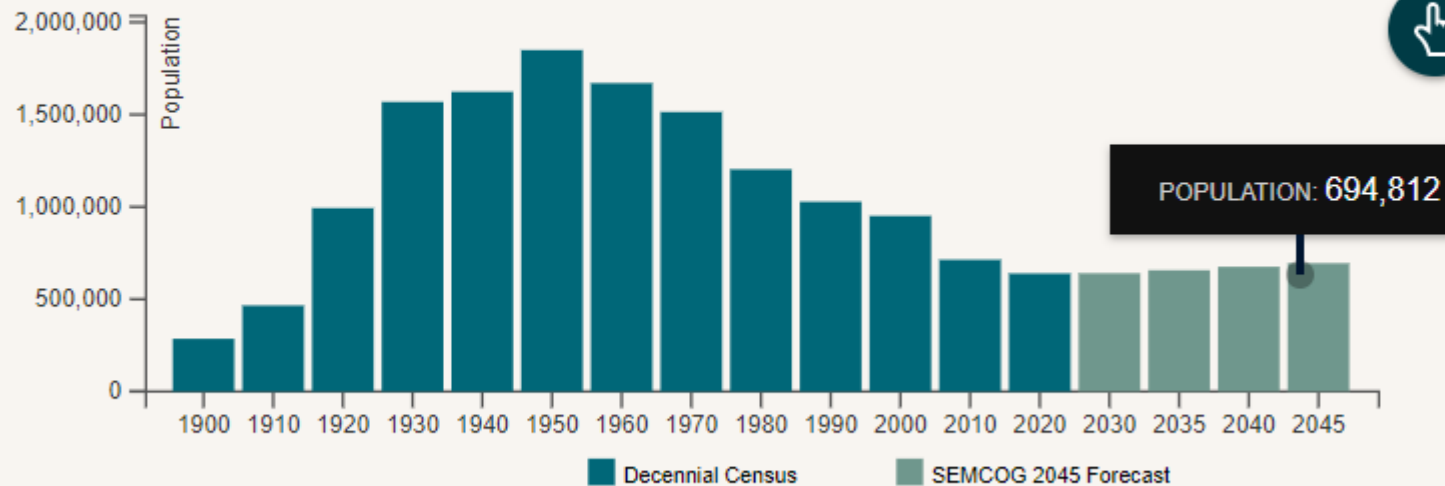
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Appendix F: Population Data

Population Forecast



Population Forecast





QuickFacts Detroit city, Michigan

QuickFacts provides statistics for all states and counties, and for cities and towns with a **population of 5,000 or more**.

Table


All Topics	Detroit city, Michigan
Population Estimates, July 1 2022, (V2022)	NA
Population Estimates, July 1 2021, (V2021)	632,464
PEOPLE	
Population	
Population Estimates, July 1 2022, (V2022)	NA
Population Estimates, July 1 2021, (V2021)	632,464
Population estimates base, April 1, 2020, (V2022)	NA
Population estimates base, April 1, 2020, (V2021)	639,614
Population, percent change - April 1, 2020 (estimates base) to July 1, 2022, (V2022)	NA
Population, percent change - April 1, 2020 (estimates base) to July 1, 2021, (V2021)	-1.1%
Population, Census, April 1, 2020	639,111
Population, Census, April 1, 2010	713,777
Age and Sex	
Persons under 5 years, percent	7.1%
Persons under 18 years, percent	24.9%
Persons 65 years and over, percent	14.1%
Female persons, percent	52.5%
Race and Hispanic Origin	
White alone, percent	12.9%
Black or African American alone, percent (a)	77.9%
American Indian and Alaska Native alone, percent (a)	0.4%
Asian alone, percent (a)	1.6%
Native Hawaiian and Other Pacific Islander alone, percent (a)	0.0%
Two or More Races, percent	3.3%
Hispanic or Latino, percent (b)	7.8%
White alone, not Hispanic or Latino, percent	10.1%
Population Characteristics	
Veterans, 2017-2021	23,823
Foreign born persons, percent, 2017-2021	5.7%
Housing	
Housing units, July 1, 2021, (V2021)	X
Owner-occupied housing unit rate, 2017-2021	48.3%
Median value of owner-occupied housing units, 2017-2021	\$57,700
Median selected monthly owner costs -with a mortgage, 2017-2021	\$1,125
Median selected monthly owner costs -without a mortgage, 2017-2021	\$465
Median gross rent, 2017-2021	\$899
Building permits, 2021	X
Families & Living Arrangements	
Households, 2017-2021	250,096
Persons per household, 2017-2021	2.53
Living in same house 1 year ago, percent of persons age 1 year+, 2017-2021	87.4%
Language other than English spoken at home, percent of persons age 5 years+, 2017-2021	10.8%
Computer and Internet Use	
Households with a computer, percent, 2017-2021	87.6%
Households with a broadband Internet subscription, percent, 2017-2021	76.0%
Education	
High school graduate or higher, percent of persons age 25 years+, 2017-2021	82.6%
Bachelor's degree or higher, percent of persons age 25 years+, 2017-2021	16.2%

Health	
With a disability, under age 65 years, percent, 2017-2021	15.7%
Persons without health insurance, under age 65 years, percent	△ 9.0%
Economy	
In civilian labor force, total, percent of population age 16 years+, 2017-2021	54.3%
In civilian labor force, female, percent of population age 16 years+, 2017-2021	53.2%
Total accommodation and food services sales, 2017 (\$1,000) (c)	2,729,569
Total health care and social assistance receipts/revenue, 2017 (\$1,000) (c)	7,484,820
Total transportation and warehousing receipts/revenue, 2017 (\$1,000) (c)	1,188,024
Total retail sales, 2017 (\$1,000) (c)	3,564,708
Total retail sales per capita, 2017 (c)	\$5,281
Transportation	
Mean travel time to work (minutes), workers age 16 years+, 2017-2021	25.7
Income & Poverty	
Median household income (in 2021 dollars), 2017-2021	\$34,762
Per capita income in past 12 months (in 2021 dollars), 2017-2021	\$20,780
Persons in poverty, percent	△ 31.8%
BUSINESSES	
Businesses	
Total employer establishments, 2020	X
Total employment, 2020	X
Total annual payroll, 2020 (\$1,000)	X
Total employment, percent change, 2019-2020	X
Total nonemployer establishments, 2019	X
All employer firms, Reference year 2017	6,869
Men-owned employer firms, Reference year 2017	4,153
Women-owned employer firms, Reference year 2017	1,094
Minority-owned employer firms, Reference year 2017	1,205
Nonminority-owned employer firms, Reference year 2017	4,516
Veteran-owned employer firms, Reference year 2017	232
Nonveteran-owned employer firms, Reference year 2017	5,419
GEOGRAPHY	
Geography	
Population per square mile, 2020	4,606.8
Population per square mile, 2010	5,144.3
Land area in square miles, 2020	138.73
Land area in square miles, 2010	138.75
FIPS Code	2622000

[About datasets used in this table](#)

Value Notes

 Estimates are not comparable to other geographic levels due to methodology differences that may exist between different data sources.

Some estimates presented here come from sample data, and thus have sampling errors that may render some apparent differences between geographies statistically indistinguishable. Click the Quick Info  icon to the row in TABLE view to learn about sampling error.

The vintage year (e.g., V2022) refers to the final year of the series (2020 thru 2022). Different vintage years of estimates are not comparable.

Users should exercise caution when comparing 2017-2021 ACS 5-year estimates to other ACS estimates. For more information, please visit the [2021 5-year ACS Comparison Guidance](#) page.

Fact Notes

- (a) Includes persons reporting only one race
- (c) Economic Census - Puerto Rico data are not comparable to U.S. Economic Census data
- (b) Hispanics may be of any race, so also are included in applicable race categories

Value Flags

- Either no or too few sample observations were available to compute an estimate, or a ratio of medians cannot be calculated because one or both of the median estimates falls in the lowest or upper in open ended distribution.
- F Fewer than 25 firms
- D Suppressed to avoid disclosure of confidential information
- N Data for this geographic area cannot be displayed because the number of sample cases is too small.
- FN Footnote on this item in place of data
- X Not applicable
- S Suppressed; does not meet publication standards
- NA Not available
- Z Value greater than zero but less than half unit of measure shown

QuickFacts data are derived from: Population Estimates, American Community Survey, Census of Population and Housing, Current Population Survey, Small Area Health Insurance Estimates, Small Area Income and Poverty Estimates, State and County Housing Unit Estimates, County Business Patterns, Nonemployer Statistics, Economic Census, Survey of Business Owners, Building Permits.

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Measuring America's People, Places, and Economy

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Appendix G: Environmental Assessment

This section will be updated as the information becomes available and will be submitted with the final project planning document.



February 16, 2023

Michigan Natural Features Inventory Web Database Review – Schoolcraft South Stormwater Infrastructure Project, Wayne County MI.

OHM has reviewed the MNFI Web Database for Threatened and Endangered Species conducted on February 16, 2023. During this review, the project location was checked against known localities for rare species, and 8 State threatened, endangered, or species of special concern have been documented within the 1.5 mile project area buffer and it is possible that without proper management negative impacts will occur. The species listed include the following: American lotus (*Nelumbo lutea*), Climbing fumitory (*Adlumia fungosa*), Least shrew (*Cryptotis parva*), Rainbow mussel (*Villosa iris*), Round hickorynut (*Obovaria subrotunda*), Round pigtoe (*Pleurobema sintoxia*), Stiff gentian (*Gentianella quinquefolia*) and Twinleaf (*Jeffersonia dipphylla*). Additionally, Section 7 threatened and endangered species were reviewed via the USFWS IPAC website Federally listed threatened, endangered, or candidate species and included the Eastern massasauga rattlesnake (*Sistrurus c. catenatus*), Eastern prairie fringed orchid (*Platanthera leucophaea*), Indiana bat (*Myotis sodalis*), Monarch butterfly (*Danaus plexipuss*), Northern long-eared bat (*Myotis septentrionalis*), Northern riffleshell (*Epioblasma rangiana*), Piping plover (*Charadrius melodus*), Red knot (*Calidris canutus rufa*) and Tricolored Bat (*Perimyotis subflavus*). Determination for Federally listed species have been made utilizing the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) website. Those determination are provided in **Attachment 1**.

This site is under a preliminary study for installation of a detention basin with outfall to the Rouge River.

For the 8 State listed species in the document provided OHM Advisors has determined NO EFFECT to several species and anticipates additional field survey to make final determination to listed species. Field surveys will be conducted under MDNR scientific collectors permits and follow survey methods and reporting measures approved by MDNR. In response to the Rare Species Review provided by MNFI OHM Advisors has prepared the following strategy and documentation to ensure this project does not result in take of species listed in the review.

American lotus (*Nelumbo lutea*) State Threatened species. MNFI describes the habitat for this species as marshes, in quiet backwaters and near-shore areas and in large rivers near the Great Lakes. No suitable habitat is located within the project area. The last observation of this species in within 1.5 miles of the project area occurred in 1897 and is considered historical. OHM has determined no effect to this species. In the event American lotus is observed during project activities said observation will be reported to local county MDNR office within 24 hours.

Climbing fumitory (*Adlumia fungosa*) State Species of Special Concern. MNFI describes the habitat for this species as gravelly or rocky Great Lakes shores, woods, thickets, glades, mesic southern forests and in dune complexes. No suitable habitat is located within the project area. The last observation of this species in within 1.5 miles of the project area occurred in 1929 and is considered historical. OHM has determined no effect to this species. In the event Climbing fumitory is observed during project activities said observation will be reported to local county MDNR office within 24 hours.



Least shrew (*Cryptotis parva*) State Threatened species. MNFI describes the habitat for this species as dry upland meadows with dense coverage of grasses and forbs. It can also be found in marshy areas, fencerows, and woodland edges. Nests are often found tucked under rocks, logs, discarded lumber, metal sheeting, and hay bales left in fields over winter. Potential habitat is located within the project area. Further field surveys will need to be conducted to make a final determination for this species.

Rainbow mussel (*Villosa iris*) State Species of Special Concern. MNFI describes the habitat for this species as coarse sand or gravel in small to medium streams. Potential habitat is located within the project area. Further field surveys will need to be conducted to make a final determination for this species.

Round hickorynut (*Obovaria subrotunda*) State Endangered. MNFI describes the habitat for this species as medium to large rivers and along the shores of Lake Erie and Lake St. Clair, near river mouths. The round hickorynut generally is found in sand and gravel substrates in areas with moderate flow. Potential habitat is located within the project area. Further field surveys will need to be conducted to make a final determination for this species.

Round pigtoe (*Pleurobema sintoxia*) State Species of Special Concern. MNFI describes the habitat for this species as mud, sand, or gravel substrates of medium to large rivers. Potential habitat is located within the project area. Further field surveys will need to be conducted to make a final determination for this species.

Slippershell (*Alasmidonta viridis*) State Threatened. MNFI describes the habitat for this species as creeks and headwaters of rivers in sand or gravel substrates. Occasionally, they occur in larger rivers and lakes and in mud substrates. Potential habitat is located within the project area. Further field surveys will need to be conducted to make a final determination for this species.

Stiff Gentian (*Gentianella quinquefolia*) State Threatened. MNFI describes the habitat for this species as alkaline soils in marshy meadows, in mucky areas along river and stream banks, and wooded edges and hillsides. No suitable habitat is located within the project area. The last observation of this species in within 1.5 miles of the project area occurred in 1916 and is considered historical. OHM has determined no effect to this species. In the event Stiff gentian is observed during project activities said observation will be reported to local county MDNR office within 24 hours.

Twinleaf (*Jeffersonia diphylla*) State Species of Special Concern. MNFI describes the habitat for this species as mesic forests with rich, loamy soils and in floodplain forests. No suitable habitat is located within the project area. The last observation of this species in within 1.5 miles of the project area occurred in 1933 and is considered historical. OHM has determined no effect to this species. In the event Twinleaf is observed during project activities said observation will be reported to local county MDNR office within 24 hours.

Sincerely,

Wade Rose, OHM Advisors Ecologist



Detroit Water and Sewerage Department
South Schoolcraft
Wetland Delineation
Technical Memorandum
2/15/2023

Introduction

OHM performed a wetland delineation in February 2023 within the area north of Outer Drive, west of the Rouge River and east of St. Paul of the Cross Retreat Center. The wetland investigation conducted by OHM Field Ecologists Wade Rose and Melissa Meszaros, and Engineer John Barbatano, included a desktop review and subsequent on-site wetland evaluation. The purpose of this technical memorandum is to describe the methodology and results of the wetland delineation and to provide supporting documentation.

Methodology

Desktop Review

The EGLE Wetlands Map Viewer aerial imagery and wetland inventory maps were reviewed to identify potential and approximate locations of wetlands. The EGLE Wetlands Map Viewer compiles data from the following sources:

- National Wetland Inventory (NWI) maps, generated by the U.S. Fish and Wildlife Service through interpretation of topographic data and aerial photographs.
- Land cover maps generated by the Michigan Department of Natural Resources' Michigan Resource Inventory System (MIRIS), through interpretation of aerial photographs.
- Hydric soils mapped by the U.S. Department of Agriculture, Natural Resource Conservation Service (USDA NRCS).
- The desktop review also included a review of additional soil data produced by the National Cooperative Soil Survey, which were collected from the Web Soil Survey website operated by the USDA NRCS.

On-Site Investigation

An on-site wetland evaluation was performed on February 13, 2023. The investigation consisted of a visual survey of the entire site to identify potential wetland field indicators, followed by formal data collection and analysis of vegetation types, hydrology indicators, and soils data within the wetland and adjacent upland areas. The data collection and analysis were performed based on the methods described in the Northcentral Northeast Regional Supplement to the 1987 USACE Wetlands Delineation Manual. Wetland boundaries were flagged in the field with pink ribbon marked "Wetland Boundary" and the flagged points were surveyed using GPS equipment with sub-foot accuracy.



Results

The results indicated wetlands exist within the proposed project limits. The identified wetlands are Palustrine, Forested, Broad-Leaved Deciduous, Seasonally Flooded (PFO1C). The investigation also concluded that hydrology, soil, and vegetation are significantly disturbed. The area is historic floodplain but has been disconnected from the river by downcutting and is only utilized in large storm events. The soil in the area has garbage in it, indicating this area was a dump at one point and the soil itself is not original to the site. The vegetation contains a majority of invasive species showing that there has been disturbance that's allowed those species to thrive.

Supporting Documentation

The following attachments contain supporting documentation, including the site map that depicts the wetland boundaries/sampling locations and the corresponding field data sheets required as part of an EGLE joint permit application.

- Attachment #1: Wetland Delineation Site Map
- Attachment #2: Wetland Field Data Sheets
- Attachment #3: National Cooperative Soil Survey Map
- Attachment #4: EGLE Wetland Inventory Map

Regulatory Discussion

Our understanding of the current rules is that a wetland is regulated under Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, if it meets one or more of the following criteria:

- Greater than five acres in size.
- Connected to, or located within 1,000 feet of, one of the Great Lakes or Lake St. Clair.
- Connected to, or located within 500 feet of, an inland lake, pond, river, or stream.
- Non-contiguous wetlands less than five acres in size that are on the list of rare and imperiled wetlands.
- Non-contiguous wetlands less than five acres with the documented presence of state or federal endangered or threatened species.

Based on the preliminary field investigation it was determined that wetlands are present within the project area boundary provided and are regulated as the flagged wetlands are located within 500 feet of the Rouge River.



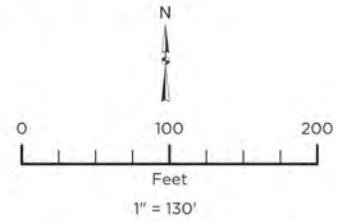
Wetland Delineation Map

Schoolcraft South Area 1

Detroit Water & Sewerage Department

- Upland
- Wetland
- Wetland Flag
- Wetland Boundary
- Wetland Polygon

*Green boundaries have been delineated. Orange boundaries are approximate or regulated by Part 301 regulations.



OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere

Map Published: February 15, 2023



WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	<u>Absolute % Cover</u>	<u>Dominant Species?</u>	<u>Indicator Status</u>	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
	_____ = Total Cover			Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
	_____ = Total Cover			Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
<u>Herb Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
	_____ = Total Cover			Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
<u>Woody Vine Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
	_____ = Total Cover			Hydrophytic Vegetation Present? Yes _____ No _____
Remarks: (Include photo numbers here or on a separate sheet.)				

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

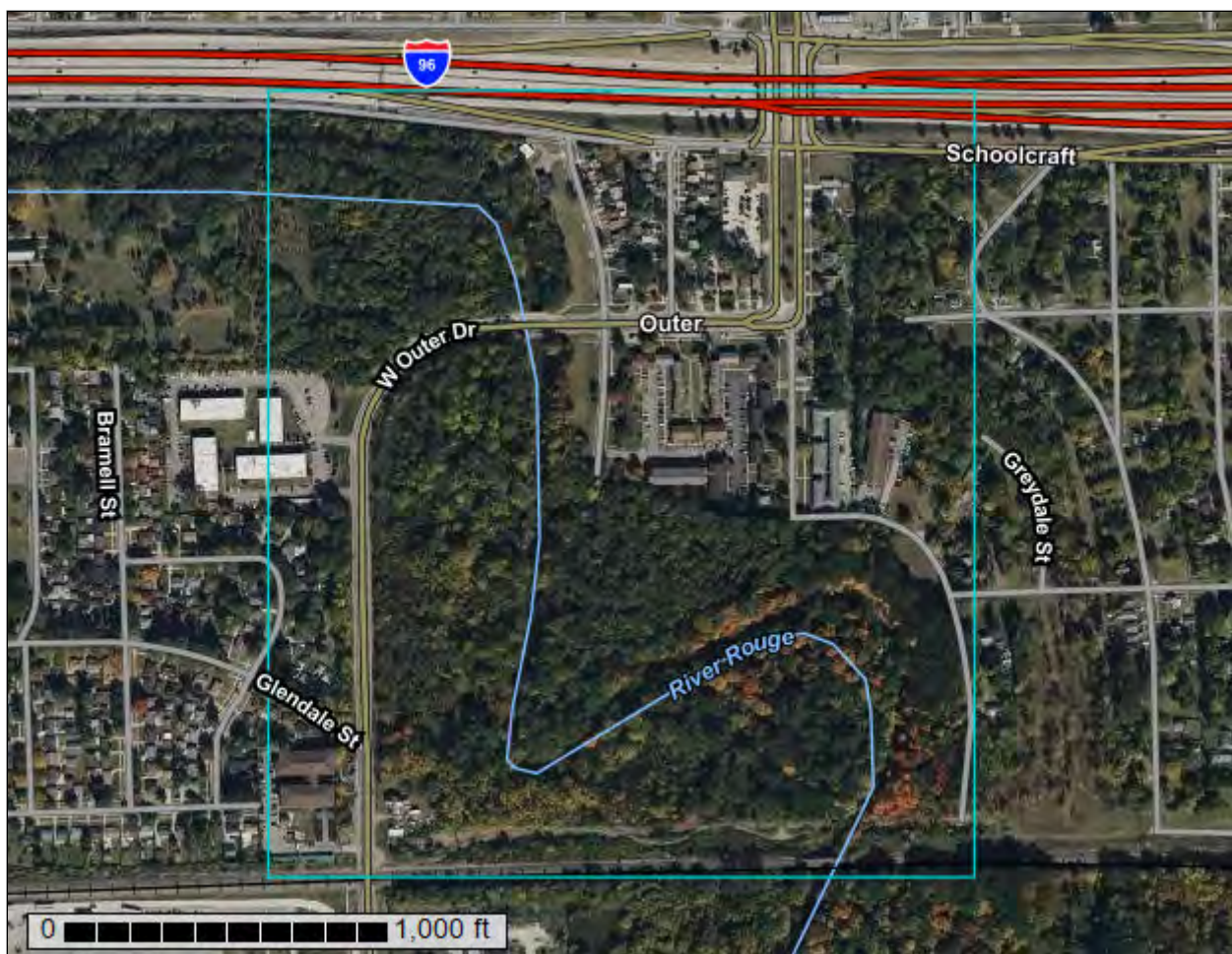
Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				
<u>Herb Stratum</u> (Plot size: _____)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is $\leq 3.0^1$ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				
<u>Woody Vine Stratum</u> (Plot size: _____)				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				
Hydrophytic Vegetation Present? Yes _____ No _____				
Remarks: (Include photo numbers here or on a separate sheet.)				



A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Wayne County, Michigan



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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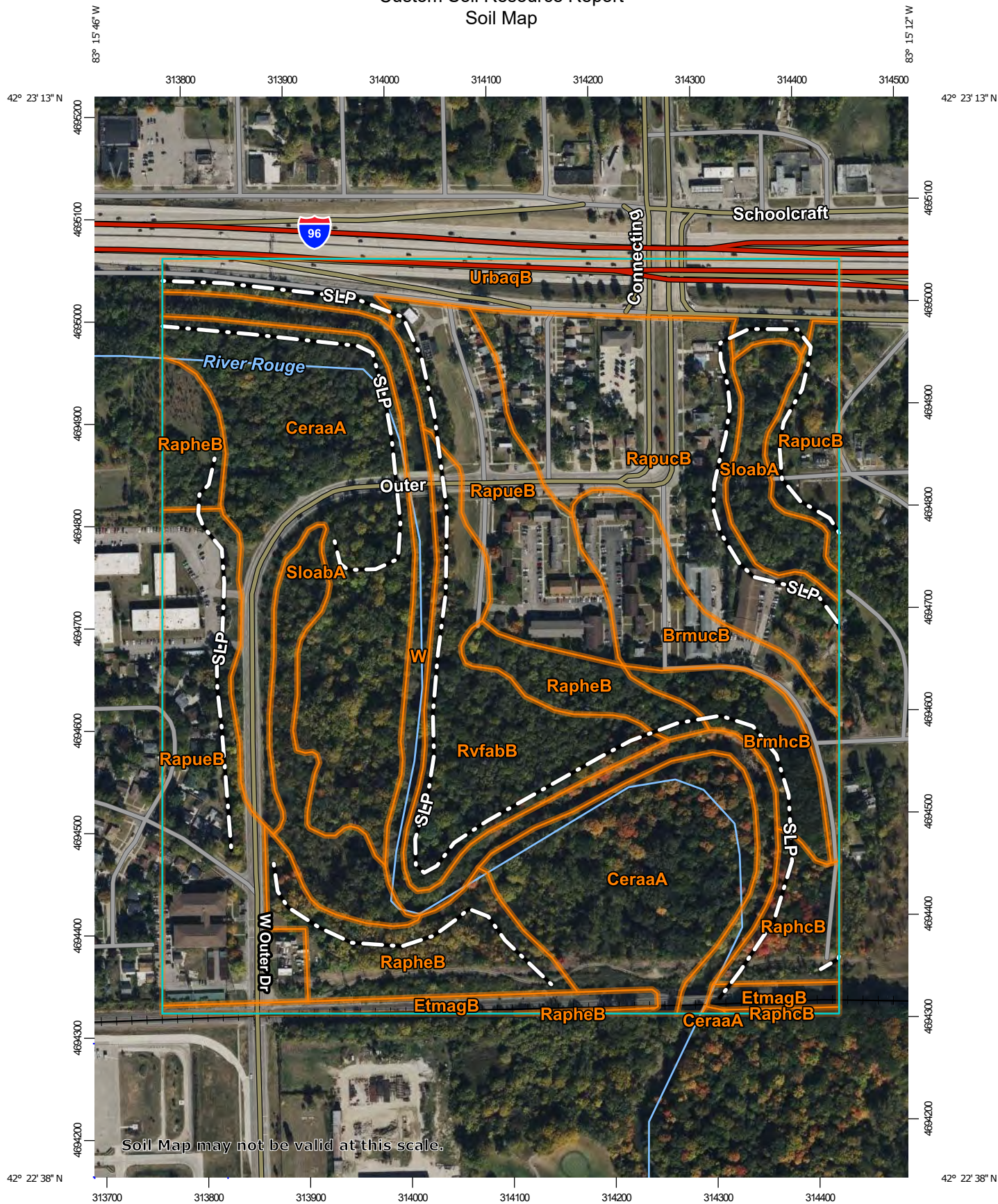
Contents

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Soil Map..... 5
 Soil Map.....6
 Legend.....7
 Map Unit Legend..... 8

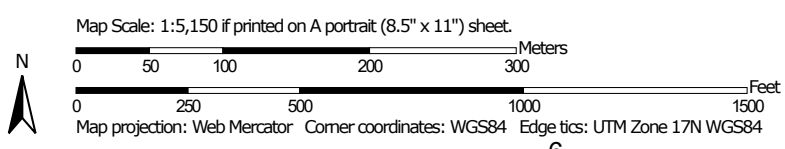
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map




Soil Map may not be valid at this scale.



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)




















Soils




 Soil Map Unit Polygons

 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features


Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wayne County, Michigan
 Survey Area Data: Version 8, Aug 29, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 9, 2022—Oct 21, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Custom Soil Resource Report

Map Unit Legend




Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BrmhcB	Brems loamy sand, loamy substratum, 0 to 4 percent slopes	3.1	2.6%
BrmucB	Brems-Urban land complex, loamy substratum, 0 to 4 percent slopes	5.4	4.4%
CeraaA	Ceresco-Sloan complex, 0 to 3 percent slopes	29.7	24.4%
EtmagB	Udorthents artifacts, 0 to 4 percent slopes	2.6	2.1%
RaphcB	Rapson-Colwood sandy loams, 0 to 4 percent slopes	2.8	2.3%
RapheB	Rapson-Kibbie sandy loams, 0 to 4 percent slopes	10.3	8.5%
RapucB	Rapson-Urban land-Colwood complex, 0 to 4 percent slopes	16.5	13.6%
RapueB	Rapson-Urban land-Kibbie complex, 0 to 4 percent slopes	18.9	15.6%
RvfabB	Riverfront sandy loam, 0 to 4 percent slopes, rarely flooded	8.7	7.2%
SloabA	Sloan silt loam, calcareous, 0 to 1 percent slopes	7.3	6.0%
UrbaqB	Urban land-Riverfront complex, 0 to 4 percent slopes	8.8	7.2%
W	Water	7.5	6.2%
Totals for Area of Interest		121.6	100.0%

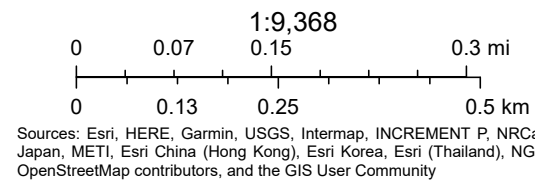
Wetlands Map Viewer



February 15, 2023

Part 303 Final Wetlands Inventory

-  Wetlands as identified on NWI and MIRIS maps
-  Soil areas which include wetland soils
-  Wetlands as identified on NWI and MIRIS maps and soil areas which include wetland soils



Disclaimer: This map is not intended to be used to determine the specific



February 17, 2023

Michigan Natural Features Inventory Web Database Review – Schoolcraft South Stormwater Infrastructure Project, Wayne County MI.

OHM has reviewed the MNFI Web Database for Threatened and Endangered Species conducted on February 17, 2023. During this review, the project location was checked against known localities for rare species, and 8 State threatened, endangered, or species of special concern have been documented within the 1.5 mile project area buffer and it is possible that without proper management negative impacts will occur. The species listed include the following: American lotus (*Nelumbo lutea*), Climbing fumitory (*Adlumia fungosa*), Least shrew (*Cryptotis parva*), Rainbow mussel (*Villosa iris*), Round hickorynut (*Obovaria subrotunda*), Round pigtoe (*Pleurobema sintoxia*), Stiff gentian (*Gentianella quinquefolia*) and Twinleaf (*Jeffersonia dipphylla*). Additionally, Section 7 threatened and endangered species were reviewed via the USFWS IPAC website Federally listed threatened, endangered, or candidate species and included the Eastern massasauga rattlesnake (*Sistrurus c. catenatus*), Eastern prairie fringed orchid (*Platanthera leucophaea*), Indiana bat (*Myotis sodalis*), Monarch butterfly (*Danaus plexipuss*), Northern long-eared bat (*Myotis septentrionalis*), Northern riffleshell (*Epioblasma rangiana*), Piping plover (*Charadrius melodus*), Red knot (*Calidris canutus rufa*) and Tricolored Bat (*Perimyotis subflavus*). Determination for Federally listed species have been made utilizing the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) website. Those determination are provided in **Attachment 1**.

This site is under a preliminary study for installation of a detention basin with outfall to the Rouge River.

For the 8 State listed species in the document provided OHM Advisors has determined NO EFFECT to several species and anticipates additional field survey to make final determination to listed species. Field surveys will be conducted under MDNR scientific collectors permits and follow survey methods and reporting measures approved by MDNR. In response to the Rare Species Review provided by MNFI OHM Advisors has prepared the following strategy and documentation to ensure this project does not result in take of species listed in the review.

American lotus (*Nelumbo lutea*) State Threatened species. MNFI describes the habitat for this species as marshes, in quiet backwaters and near-shore areas and in large rivers near the Great Lakes. No suitable habitat is located within the project area. The last observation of this species in within 1.5 miles of the project area occurred in 1897 and is considered historical. OHM has determined no effect to this species. In the event American lotus is observed during project activities said observation will be reported to local county MDNR office within 24 hours.

Climbing fumitory (*Adlumia fungosa*) State Species of Special Concern. MNFI describes the habitat for this species as gravelly or rocky Great Lakes shores, woods, thickets, glades, mesic southern forests and in dune complexes. No suitable habitat is located within the project area. The last observation of this species in within 1.5 miles of the project area occurred in 1929 and is considered historical. OHM has determined no effect to this species. In the event Climbing fumitory is observed during project activities said observation will be reported to local county MDNR office within 24 hours.



Least shrew (*Cryptotis parva*) State Threatened species. MNFI describes the habitat for this species as dry upland meadows with dense coverage of grasses and forbs. It can also be found in marshy areas, fencerows, and woodland edges. Nests are often found tucked under rocks, logs, discarded lumber, metal sheeting, and hay bales left in fields over winter. Potential habitat is located within the project area. Further field surveys will need to be conducted to make a final determination for this species.

Rainbow mussel (*Villosa iris*) State Species of Special Concern. MNFI describes the habitat for this species as coarse sand or gravel in small to medium streams. Potential habitat is located within the project area. Further field surveys will need to be conducted to make a final determination for this species.

Round hickorynut (*Obovaria subrotunda*) State Endangered. MNFI describes the habitat for this species as medium to large rivers and along the shores of Lake Erie and Lake St. Clair, near river mouths. The round hickorynut generally is found in sand and gravel substrates in areas with moderate flow. Potential habitat is located within the project area. Further field surveys will need to be conducted to make a final determination for this species.

Round pigtoe (*Pleurobema sintoxia*) State Species of Special Concern. MNFI describes the habitat for this species as mud, sand, or gravel substrates of medium to large rivers. Potential habitat is located within the project area. Further field surveys will need to be conducted to make a final determination for this species.

Slippershell (*Alasmidonta viridis*) State Threatened. MNFI describes the habitat for this species as creeks and headwaters of rivers in sand or gravel substrates. Occasionally, they occur in larger rivers and lakes and in mud substrates. Potential habitat is located within the project area. Further field surveys will need to be conducted to make a final determination for this species.

Stiff Gentian (*Gentianella quinquefolia*) State Threatened. MNFI describes the habitat for this species as alkaline soils in marshy meadows, in mucky areas along river and stream banks, and wooded edges and hillsides. Potential habitat is located within the project area. Further field surveys will need to be conducted to make a final determination for this species.

Twinleaf (*Jeffersonia diphylla*) State Species of Special Concern. MNFI describes the habitat for this species as mesic forests with rich, loamy soils and in floodplain forests. Potential habitat is located within the project area. Further field surveys will need to be conducted to make a final determination for this species.

Sincerely,

Wade Rose, OHM Advisors Ecologist



Detroit Water and Sewerage Department
South Schoolcraft
Wetland Delineation
Technical Memorandum
2/15/2023

Introduction

OHM performed a wetland delineation in February 2023 within the area south and east of Outer Drive, west of the Rouge River and north of the rail line. The wetland investigation, conducted by OHM Field Ecologists Seth McRobb and Melissa Meszaros, and Engineer John Barbatano, included a desktop review and subsequent on-site wetland evaluation. The purpose of this technical memorandum is to describe the methodology and results of the wetland delineation and to provide supporting documentation.

Methodology

Desktop Review

The EGLE Wetlands Map Viewer aerial imagery and wetland inventory maps were reviewed to identify potential and approximate locations of wetlands. The EGLE Wetlands Map Viewer compiles data from the following sources:

- National Wetland Inventory (NWI) maps, generated by the U.S. Fish and Wildlife Service through interpretation of topographic data and aerial photographs.
- Land cover maps generated by the Michigan Department of Natural Resources' Michigan Resource Inventory System (MIRIS), through interpretation of aerial photographs.
- Hydric soils mapped by the U.S. Department of Agriculture, Natural Resource Conservation Service (USDA NRCS).
- The desktop review also included a review of additional soil data produced by the National Cooperative Soil Survey, which were collected from the Web Soil Survey website operated by the USDA NRCS.

On-Site Investigation

An on-site wetland evaluation was performed on February 14, 2023. The investigation consisted of a visual survey of the entire site to identify potential wetland field indicators, followed by formal data collection and analysis of vegetation types, hydrology indicators, and soils data within the wetland and adjacent upland areas. The data collection and analysis were performed based on the methods described in the Northcentral Northeast Regional Supplement to the 1987 USACE Wetlands Delineation Manual. Wetland boundaries were flagged in the field with pink ribbon marked "Wetland Boundary" and the flagged points were surveyed using GPS equipment with sub-foot accuracy.



Results

The results indicated wetlands exist within the proposed project limits. The identified wetlands are Palustrine, Forested, Broad-Leaved Deciduous

Supporting Documentation

The following attachments contain supporting documentation, including the site map that depicts the wetland boundaries/sampling locations and the corresponding field data sheets required as part of an EGLE joint permit application.

- Attachment #1: Wetland Delineation Site Map
- Attachment #2: Wetland Field Data Sheets
- Attachment #3: National Cooperative Soil Survey Map
- Attachment #4: EGLE Wetland Inventory Map

Regulatory Discussion

Our understanding of the current rules is that a wetland is regulated under Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, if it meets one or more of the following criteria:

- Greater than five acres in size.
- Connected to, or located within 1,000 feet of, one of the Great Lakes or Lake St. Clair.
- Connected to, or located within 500 feet of, an inland lake, pond, river, or stream.
- Non-contiguous wetlands less than five acres in size that are on the list of rare and imperiled wetlands.
- Non-contiguous wetlands less than five acres with the documented presence of state or federal endangered or threatened species.

Based on the field investigation it was determined that wetlands are present within the project area boundary provided and are regulated as the flagged wetlands are connected to, or located within 500 feet of, the Rouge River.



Wetland Delineation Map

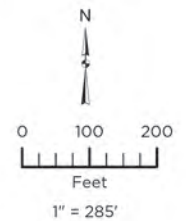
Schoolcraft South Area 2

Detroit Water & Sewerage Department

Overall Map

- Upland
- Wetland
- Wetland Boundary
- Wetland Polygon

*Green boundaries have been delineated. Orange boundaries are approximate or regulated by Part 301 regulations.



OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere

Map Published: February 15, 2023








Wetland Delineation Map

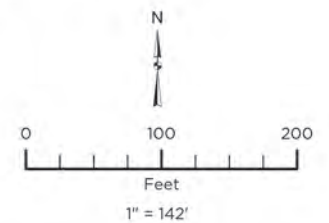
Schoolcraft South Area 2

Detroit Water & Sewerage Department

Map 1

-  Wetland Flag
-  Wetland Boundary
-  Wetland Polygon

*Green boundaries have been delineated. Orange boundaries are approximate or regulated by Part 301 regulations.



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Wetland Delineation Map

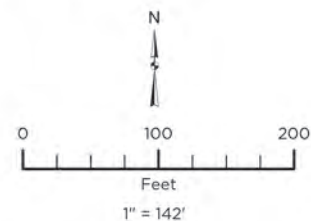
Schoolcraft South Area 2

Detroit Water & Sewerage Department

Map 2

- Upland
- Wetland
- Wetland Flag
- Wetland Boundary
- Wetland Polygon

*Green boundaries have been delineated. Orange boundaries are approximate or regulated by Part 301 regulations.



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Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere

Map Published: February 15, 2023





Wetland Delineation Map

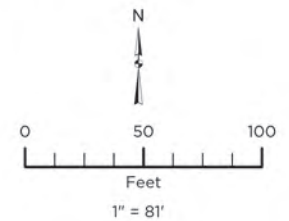
Schoolcraft South Area 2

Detroit Water & Sewerage Department

Map 3

- Upland
- Wetland
- Wetland Flag
- Wetland Boundary
- ▨ Wetland Polygon

*Green boundaries have been delineated. Orange boundaries are approximate or regulated by Part 301 regulations.



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Map Published: February 15, 2023



WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	<u>Absolute % Cover</u>	<u>Dominant Species?</u>	<u>Indicator Status</u>	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
<u>Herb Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
<u>Woody Vine Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Present? Yes _____ No _____
Remarks: (Include photo numbers here or on a separate sheet.)				

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	<u>Absolute % Cover</u>	<u>Dominant Species?</u>	<u>Indicator Status</u>	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
_____ = Total Cover				
_____ = Total Cover				
_____ = Total Cover				
_____ = Total Cover				
_____ = Total Cover				
_____ = Total Cover				
_____ = Total Cover				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
_____ = Total Cover				
_____ = Total Cover				
_____ = Total Cover				
_____ = Total Cover				
_____ = Total Cover				
_____ = Total Cover				
_____ = Total Cover				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
_____ = Total Cover				
_____ = Total Cover				
_____ = Total Cover				
_____ = Total Cover				Hydrophytic Vegetation Present? Yes _____ No _____
_____ = Total Cover				
_____ = Total Cover				
_____ = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.)				

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	<u>Absolute % Cover</u>	<u>Dominant Species?</u>	<u>Indicator Status</u>			
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)		
2. _____	_____	_____	_____			
3. _____	_____	_____	_____			
4. _____	_____	_____	_____			
5. _____	_____	_____	_____			
6. _____	_____	_____	_____			
7. _____	_____	_____	_____			
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____		
<u>Sapling/Shrub Stratum</u> (Plot size: _____)						
1. _____	_____	_____	_____			
2. _____	_____	_____	_____			
3. _____	_____	_____	_____			
4. _____	_____	_____	_____			
5. _____	_____	_____	_____			
6. _____	_____	_____	_____			
7. _____	_____	_____	_____			
_____ = Total Cover						
<u>Herb Stratum</u> (Plot size: _____)				Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.		
1. _____	_____	_____	_____			
2. _____	_____	_____	_____			
3. _____	_____	_____	_____			
4. _____	_____	_____	_____			
5. _____	_____	_____	_____			
6. _____	_____	_____	_____			
7. _____	_____	_____	_____			
8. _____	_____	_____	_____			
9. _____	_____	_____	_____			
10. _____	_____	_____	_____			
11. _____	_____	_____	_____			
12. _____	_____	_____	_____			
_____ = Total Cover						
<u>Woody Vine Stratum</u> (Plot size: _____)				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.		
1. _____	_____	_____	_____			
2. _____	_____	_____	_____			
3. _____	_____	_____	_____			
4. _____	_____	_____	_____			
_____ = Total Cover						
<table style="width:100%; border: none;"> <tr> <td style="width:60%;">Hydrophytic Vegetation Present?</td> <td style="width:20%; text-align: center;">Yes _____</td> <td style="width:20%; text-align: center;">No _____</td> </tr> </table>				Hydrophytic Vegetation Present?	Yes _____	No _____
Hydrophytic Vegetation Present?	Yes _____	No _____				
Remarks: (Include photo numbers here or on a separate sheet.) 						

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
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 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	<u>Absolute % Cover</u>	<u>Dominant Species?</u>	<u>Indicator Status</u>	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				
<u>Herb Stratum</u> (Plot size: _____)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				
<u>Woody Vine Stratum</u> (Plot size: _____)				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				
_____ = Total Cover				Hydrophytic Vegetation Present? Yes _____ No _____
Remarks: (Include photo numbers here or on a separate sheet.)				

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features		Type ¹	Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%				

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7) (**LRR R, MLRA 149B**)
- Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- Loamy Mucky Mineral (F1) (**LRR K, L**)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- Coast Prairie Redox (A16) (**LRR K, L, R**)
- 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- Dark Surface (S7) (**LRR K, L, M**)
- Polyvalue Below Surface (S8) (**LRR K, L**)
- Thin Dark Surface (S9) (**LRR K, L**)
- Iron-Manganese Masses (F12) (**LRR K, L, R**)
- Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- Red Parent Material (F21)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
Depth (inches): _____

Hydric Soil Present? Yes _____ No _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

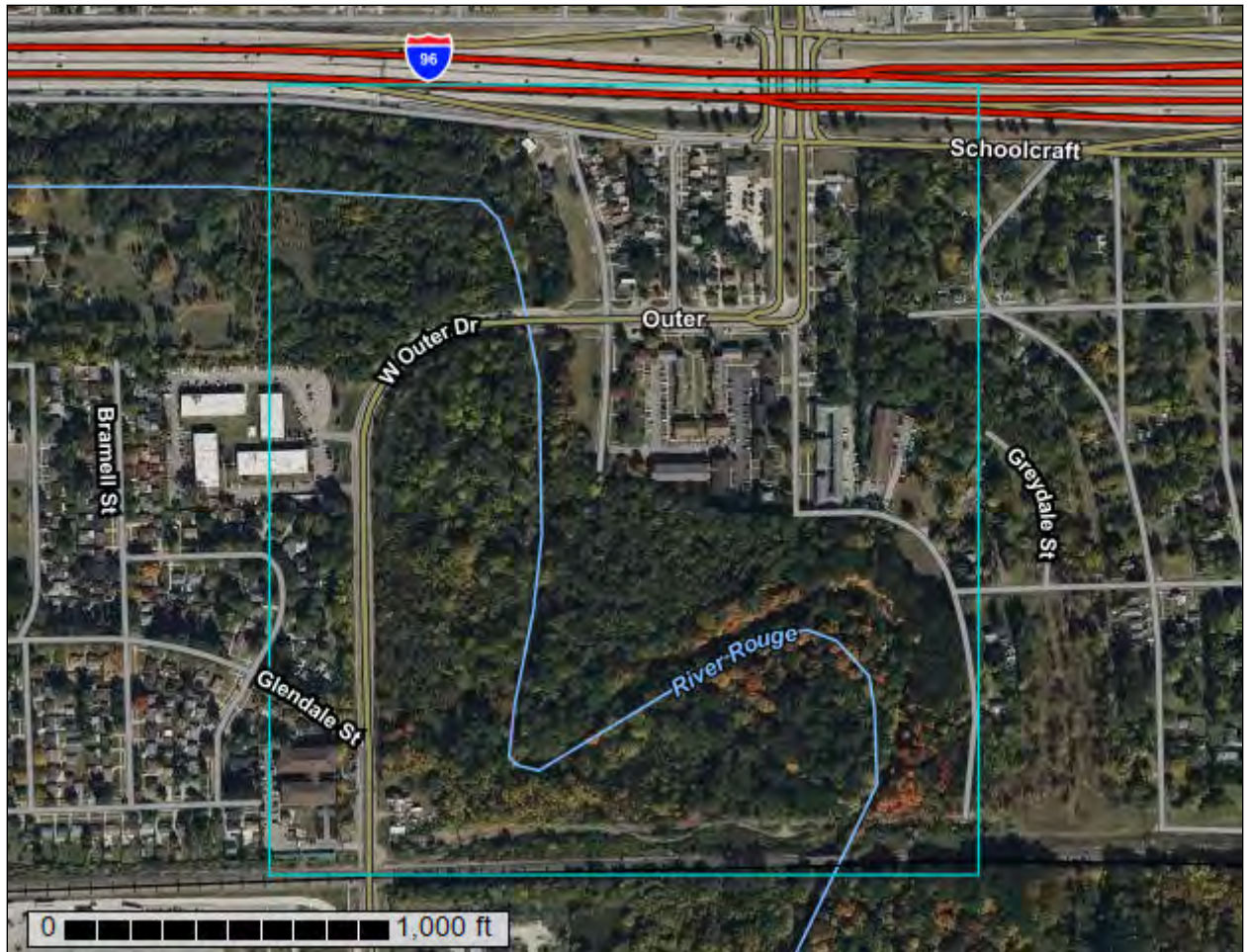
Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	<u>Absolute % Cover</u>	<u>Dominant Species?</u>	<u>Indicator Status</u>	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
<u>Herb Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
<u>Woody Vine Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Present? Yes _____ No _____
Remarks: (Include photo numbers here or on a separate sheet.)				



A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Wayne County, Michigan



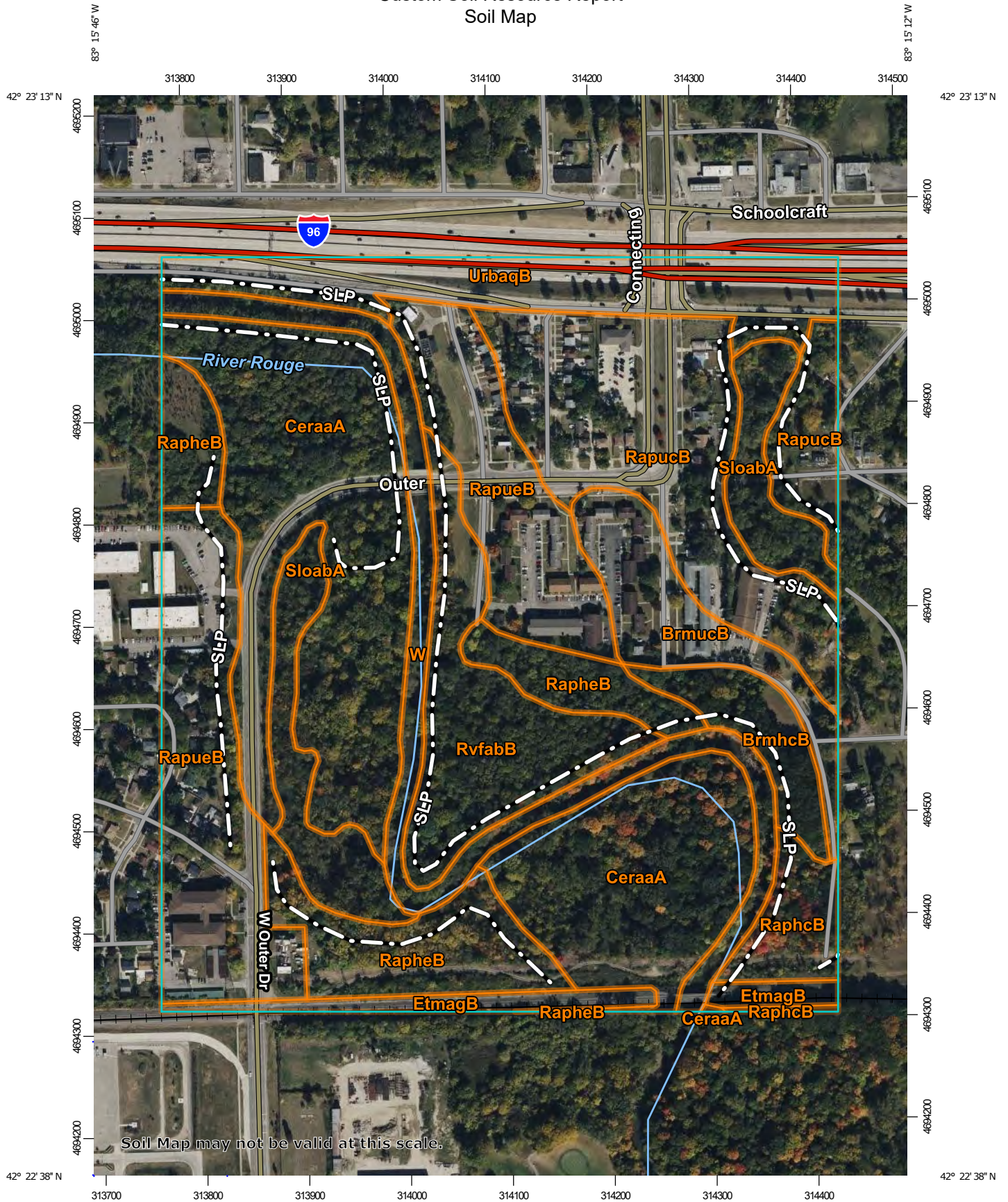
Contents

Preface	2
Soil Map	5
Soil Map.....	6
Legend.....	7
Map Unit Legend.....	8

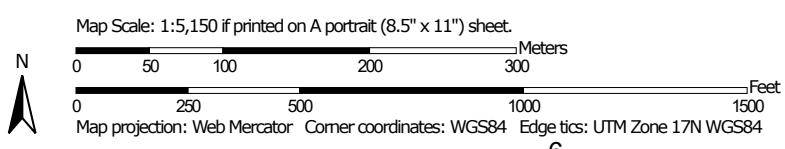
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map




Soil Map may not be valid at this scale.



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)


Soils


 Soil Map Unit Polygons


 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit


 Clay Spot


 Closed Depression

 Gravel Pit

 Gravelly Spot


 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry


 Miscellaneous Water


 Perennial Water

 Rock Outcrop


 Saline Spot

 Sandy Spot

 Severely Eroded Spot


 Sinkhole


 Slide or Slip


 Sodic Spot


 Spoil Area

 Stony Spot


 Very Stony Spot

 Wet Spot


 Other

 Special Line Features

Water Features

 Streams and Canals


Transportation

 Rails


 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wayne County, Michigan
 Survey Area Data: Version 8, Aug 29, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 9, 2022—Oct 21, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Custom Soil Resource Report

Map Unit Legend




Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BrmhcB	Brems loamy sand, loamy substratum, 0 to 4 percent slopes	3.1	2.6%
BrmucB	Brems-Urban land complex, loamy substratum, 0 to 4 percent slopes	5.4	4.4%
CeraaA	Ceresco-Sloan complex, 0 to 3 percent slopes	29.7	24.4%
EtmagB	Udorthearts artifacts, 0 to 4 percent slopes	2.6	2.1%
RaphcB	Rapson-Colwood sandy loams, 0 to 4 percent slopes	2.8	2.3%
RapheB	Rapson-Kibbie sandy loams, 0 to 4 percent slopes	10.3	8.5%
RapucB	Rapson-Urban land-Colwood complex, 0 to 4 percent slopes	16.5	13.6%
RapueB	Rapson-Urban land-Kibbie complex, 0 to 4 percent slopes	18.9	15.6%
RvfabB	Riverfront sandy loam, 0 to 4 percent slopes, rarely flooded	8.7	7.2%
SloabA	Sloan silt loam, calcareous, 0 to 1 percent slopes	7.3	6.0%
UrbaqB	Urban land-Riverfront complex, 0 to 4 percent slopes	8.8	7.2%
W	Water	7.5	6.2%
Totals for Area of Interest		121.6	100.0%

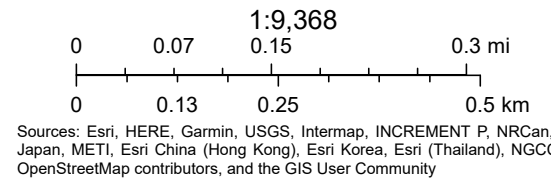
Wetlands Map Viewer



February 15, 2023

Part 303 Final Wetlands Inventory

-  Wetlands as identified on NWI and MIRIS maps
-  Soil areas which include wetland soils
-  Wetlands as identified on NWI and MIRIS maps and soil areas which include wetland soils



Disclaimer: This map is not intended to be used to determine the specific



January 30, 2023

Re: Rare Species Database Review (1-23-23) – Rouge Park Detention Basin Area 1 Preliminary Study

OHM has reviewed the Threatened and Endangered Species data provided by MNFI Web Database Search, conducted on January 23rd, 2023. During this Review, the project location was checked against known localities for rare species, and 9 State threatened, endangered, or species of special concern have been documented within the 1.5 mile project area buffer and it is possible that without proper management negative impacts will occur. The species listed include the following: American lotus (*Nelumbo lutea*), Climbing fumitory (*Adlumia fungosa*), Least shrew (*Cryptotis parva*), Rainbow mussel (*Villosa iris*), Round hickorynut (*Obovaria subrotunda*), Round pigtoe (*Pleurobema sintoxia*), Slippershell (*Alasmidonta viridis*), Stiff gentian (*Gentianella quinquefolia*) and Twinleaf (*Jeffersonia diphylla*). Additionally, Section 7 comments were provided for 9 Federally listed threatened, endangered, or candidate species and included the Indiana Bat (*Myotis sodalis*), Northern Long-Eared Bat (*Myotis septentrionalis*), Tricolored bat (*Perimyotis subflavus*), Piping plover (*Charadrius melodus*), Red knot (*Calidris canutus rufa*), Eastern Massasauga Rattlesnake (*Sistrurus c. catenatus*), Northern riffleshell (*Epioblasma rangiana*), Monarch Butterfly (*Danaus plexippus*) and Eastern prairie fringed orchid (*Platanthera leucophaea*). Determination for Federally listed species have been made utilizing the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) website. Those determination are provided in **Attachment 1**.

The West Chicago detention basin project will involve the construction of a detention basin at the NE corner of the intersection of Plymouth Rd. and Outer Drive Road which would discharge to the Rouge River via an added outfall. The site currently consists of mixed upland hardwood forest and forested wetlands.

For the 9 State listed species in the document provided OHM Advisors has made the following determination for individual species. In response to the Rare Species Database Review provided by MNFI Web Database Search OHM Advisors has prepared the following strategy and documentation to ensure this project does not result in take of species listed in the review.

American lotus (*Nelumbo lutea*) State Threatened species. MNFI describes the habitat for this species as marshes, in quiet backwaters and near-shore areas and in large rivers near the Great Lakes. No suitable habitat is located within the project area. The last observation of this species in within 1.5 miles of the project area occurred in 1897 and is considered historical. OHM has determined no effect to this species. In the event American lotus is observed during project activities said observation will be reported to local county MDNR office within 24 hours.

Climbing fumitory (*Adlumia fungosa*) State Species of Special Concern. MNFI describes the habitat for this species as rocky Great Lakes shores, woods, thickets, glades, mesic southern forests and in dune complexes. The last observation of this species in within 1.5 miles of the project area occurred in 1929 and is considered historical. OHM has determined no effect to this species. In the event Climbing fumitory is observed during project activities said observation will be reported to local county MDNR office within 24 hours.

Least shrew (*Cryptotis parva*) State Threatened. MNFI describes the habitat for this species dry upland meadows with dense coverage of grasses and forbs. It can also be found in marshy areas, fencerows, and woodland edges. Nests are often found tucked under rocks, logs, discarded lumber, metal sheeting, and hay bales left in fields over winter. Some suitable habitat exists within the project area and additional field surveys



may be required when project specifics have been determined to make a final determination for this species. OHM Advisor ecologist will coordinate these as needed field surveys with local agency staff.

Rainbow mussel (*Villosa iris*) State Species of Special Concern. MNFI describes the habitat for this species as coarse sand or gravel in small to medium streams. Some suitable habitat exists within the project area and additional field surveys may be required when project specifics have been determined to make a final determination for this species. OHM Advisor ecologist will coordinate these as needed field surveys with local agency staff.

Round hickorynut (*Obovaria subrotunda*) State Endangered. MNFI describes the habitat for this species as medium to large rivers and along the shores of Lake Erie and Lake St. Clair, near river mouths. The round hickorynut generally is found in sand and gravel substrates in areas with moderate flow. Some suitable habitat exists within the project area and additional field surveys may be required when project specifics have been determined to make a final determination for this species. OHM Advisor ecologist will coordinate these as needed field surveys with local agency staff.

Round pigtoe (*Pleurobema sintoxia*) State Species of Special Concern. MNFI describes the habitat for this species as mud, sand, or gravel substrates of medium to large rivers. Some suitable habitat exists within the project area and additional field surveys may be required when project specifics have been determined to make a final determination for this species. OHM Advisor ecologist will coordinate these as needed field surveys with local agency staff.

Slippershell (*Alasmidonta viridis*) State Threatened. MNFI describes the habitat for this species as creeks and headwaters of rivers in sand or gravel substrates. Occasionally, they occur in larger rivers and lakes and in mud substrates. Some suitable habitat exists within the project area and additional field surveys may be required when project specifics have been determined to make a final determination for this species. OHM Advisor ecologist will coordinate these as needed field surveys with local agency staff.

Stiff gentian (*Gentianella quinquefolia*) State Threatened. MNFI describes the suitable nesting habitat as alkaline soils in marshy meadows, in mucky areas along river and stream banks, and wooded edges and hillsides. Some suitable habitat exists within the project area and additional field surveys may be required when project specifics have been determined to make a final determination for this species. OHM Advisor ecologist will coordinate these as needed field surveys with local agency staff.

Twinleaf (*Jeffersonia diphylla*) State Species of Special Concern. MNFI describes the suitable nesting habitat as mesic forests with rich, loamy soils and in floodplain forests. Some suitable habitat exists within the project area and additional field surveys may be required when project specifics have been determined to make a final determination for this species. OHM Advisor ecologist will coordinate these as needed field surveys with local agency staff.

Sincerely,

Wade Rose, OHM Advisors Ecologist



**DWSD
West Chicago Area 1
Wetland Delineation
Technical Memorandum
1/31/2023**

Introduction

OHM performed a wetland delineation in January 2023 within the area south and west of Rouge Park Drive, east of West Outer Drive and north of Plymouth Road. The wetland investigation conducted by OHM Field Ecologists Wade Rose and Kayla McRobb and Engineer John Barbatano, included a desktop review and subsequent on-site wetland evaluation. The purpose of this technical memorandum is to describe the methodology and results of the wetland delineation and to provide supporting documentation.

Methodology

Desktop Review

The EGLE Wetlands Map Viewer aerial imagery and wetland inventory maps were reviewed to identify potential and approximate locations of wetlands. The EGLE Wetlands Map Viewer compiles data from the following sources:

- National Wetland Inventory (NWI) maps, generated by the U.S. Fish and Wildlife Service through interpretation of topographic data and aerial photographs.
- Land cover maps generated by the Michigan Department of Natural Resources' Michigan Resource Inventory System (MIRIS), through interpretation of aerial photographs.
- Hydric soils mapped by the U.S. Department of Agriculture, Natural Resource Conservation Service (USDA NRCS).
- The desktop review also included a review of additional soil data produced by the National Cooperative Soil Survey, which were collected from the Web Soil Survey website operated by the USDA NRCS.

On-Site Investigation

An on-site wetland evaluation was performed on January 26th and 27th, 2023. The investigation consisted of a visual survey of the entire site to identify potential wetland field indicators, followed by formal data collection and analysis of vegetation types, hydrology indicators, and soils data within the wetland and adjacent upland areas. The data collection and analysis were performed based on the methods described in the Northcentral Northeast Regional Supplement to the 1987 USACE Wetlands Delineation Manual. Wetland boundaries were flagged in the field with pink ribbon marked "Wetland Boundary" and the flagged points were surveyed using GPS equipment with sub-foot accuracy.



Results

The results indicated wetlands exist within the proposed project limits. The identified wetlands are Palustrine Forested Broad-Leaved Deciduous Seasonally Flooded (PFO1C) and Palustrine Emergent *Phragmites australis* Seasonally Flooded (PEM5C).

Wetland	Wetland Type
Wetland 1	PEM5C/PFO1C
Wetland 2	PFO1C
Wetland 3	PFO1C

Supporting Documentation

The following attachments contain supporting documentation, including the site map that depicts the wetland boundaries/sampling locations and the corresponding field data sheets required as part of an EGLE joint permit application.

- Attachment #1: Wetland Delineation Site Map
- Attachment #2: Wetland Field Data Sheets
- Attachment #3: National Cooperative Soil Survey Map
- Attachment #4: EGLE Wetland Inventory Map

Regulatory Discussion

Our understanding of the current rules is that a wetland is regulated under Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, if it meets one or more of the following criteria:

- Greater than five acres in size.
- Connected to, or located within 1,000 feet of, one of the Great Lakes or Lake St. Clair.
- Connected to, or located within 500 feet of, an inland lake, pond, river, or stream.
- Non-contiguous wetlands less than five acres in size that are on the list of rare and imperiled wetlands.
- Non-contiguous wetlands less than five acres with the documented presence of state or federal endangered or threatened species.

Based on the field investigation it was determined that wetlands are present within the project area boundary provided and are regulated as the flagged wetlands are connected to, or located within 500 feet of, the Rouge River and tributaries of the Rouge River.



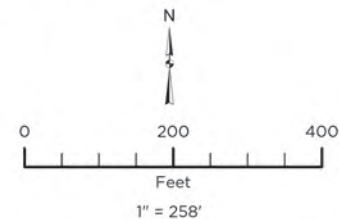
Wetland Delineation Map

Rouge Park Area 1

Detroit Water & Sewer District

- Upland
- Wetland
- Wetland Flag
- Wetland Boundary
- Wetland Polygon

*Green boundaries have been delineated. Orange boundaries are approximate or regulated by Part 301 regulations.



OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere

Map Published: January 31, 2023



WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	<u>Absolute % Cover</u>	<u>Dominant Species?</u>	<u>Indicator Status</u>	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				
<u>Herb Stratum</u> (Plot size: _____)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is $\leq 3.0^1$ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				
<u>Woody Vine Stratum</u> (Plot size: _____)				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				
_____ = Total Cover				Hydrophytic Vegetation Present? Yes _____ No _____
Remarks: (Include photo numbers here or on a separate sheet.)				

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	<u>Absolute % Cover</u>	<u>Dominant Species?</u>	<u>Indicator Status</u>	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				
<u>Herb Stratum</u> (Plot size: _____)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is $\leq 3.0^1$ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				
<u>Woody Vine Stratum</u> (Plot size: _____)				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				
_____ = Total Cover				Hydrophytic Vegetation Present? Yes _____ No _____
Remarks: (Include photo numbers here or on a separate sheet.)				

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features			Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹			

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:	Indicators for Problematic Hydric Soils³:
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> 2 cm Muck (A10) (LRR K, L, MLRA 149B)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Coast Prairie Redox (A16) (LRR K, L, R)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Dark Surface (S7) (LRR K, L, M)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Polyvalue Below Surface (S8) (LRR K, L)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Thin Dark Surface (S9) (LRR K, L)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Iron-Manganese Masses (F12) (LRR K, L, R)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 149B)
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> Red Parent Material (F21)
<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Dark Surface (S7) (LRR R, MLRA 149B)	<input type="checkbox"/> Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes _____ No _____
---	---

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
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 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	<u>Absolute % Cover</u>	<u>Dominant Species?</u>	<u>Indicator Status</u>	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				
<u>Herb Stratum</u> (Plot size: _____)				Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				
<u>Woody Vine Stratum</u> (Plot size: _____)				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				
Hydrophytic Vegetation Present? Yes _____ No _____				
Remarks: (Include photo numbers here or on a separate sheet.)				

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
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 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	<u>Absolute % Cover</u>	<u>Dominant Species?</u>	<u>Indicator Status</u>	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				
<u>Herb Stratum</u> (Plot size: _____)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is $\leq 3.0^1$ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				
<u>Woody Vine Stratum</u> (Plot size: _____)				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Present? Yes _____ No _____
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.)				

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features			Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹			

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7) (LRR R, MLRA 149B)

- Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- Thin Dark Surface (S9) (LRR R, MLRA 149B)
- Loamy Mucky Mineral (F1) (LRR K, L)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- Coast Prairie Redox (A16) (LRR K, L, R)
- 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- Dark Surface (S7) (LRR K, L, M)
- Polyvalue Below Surface (S8) (LRR K, L)
- Thin Dark Surface (S9) (LRR K, L)
- Iron-Manganese Masses (F12) (LRR K, L, R)
- Piedmont Floodplain Soils (F19) (MLRA 149B)
- Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- Red Parent Material (F21)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	<u>Absolute % Cover</u>	<u>Dominant Species?</u>	<u>Indicator Status</u>	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				
<u>Herb Stratum</u> (Plot size: _____)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				
<u>Woody Vine Stratum</u> (Plot size: _____)				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				
Hydrophytic Vegetation Present? Yes _____ No _____				
Remarks: (Include photo numbers here or on a separate sheet.)				

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	<u>Absolute % Cover</u>	<u>Dominant Species?</u>	<u>Indicator Status</u>	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
	_____ = Total Cover			Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
	_____ = Total Cover			Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
<u>Herb Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
	_____ = Total Cover			Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
<u>Woody Vine Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
	_____ = Total Cover			Hydrophytic Vegetation Present? Yes _____ No _____
Remarks: (Include photo numbers here or on a separate sheet.)				



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

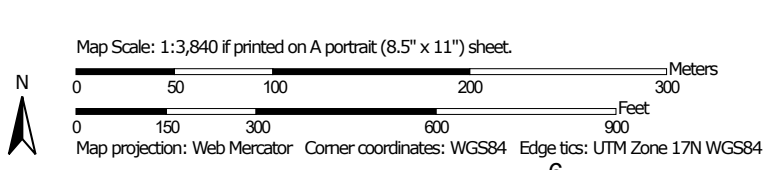
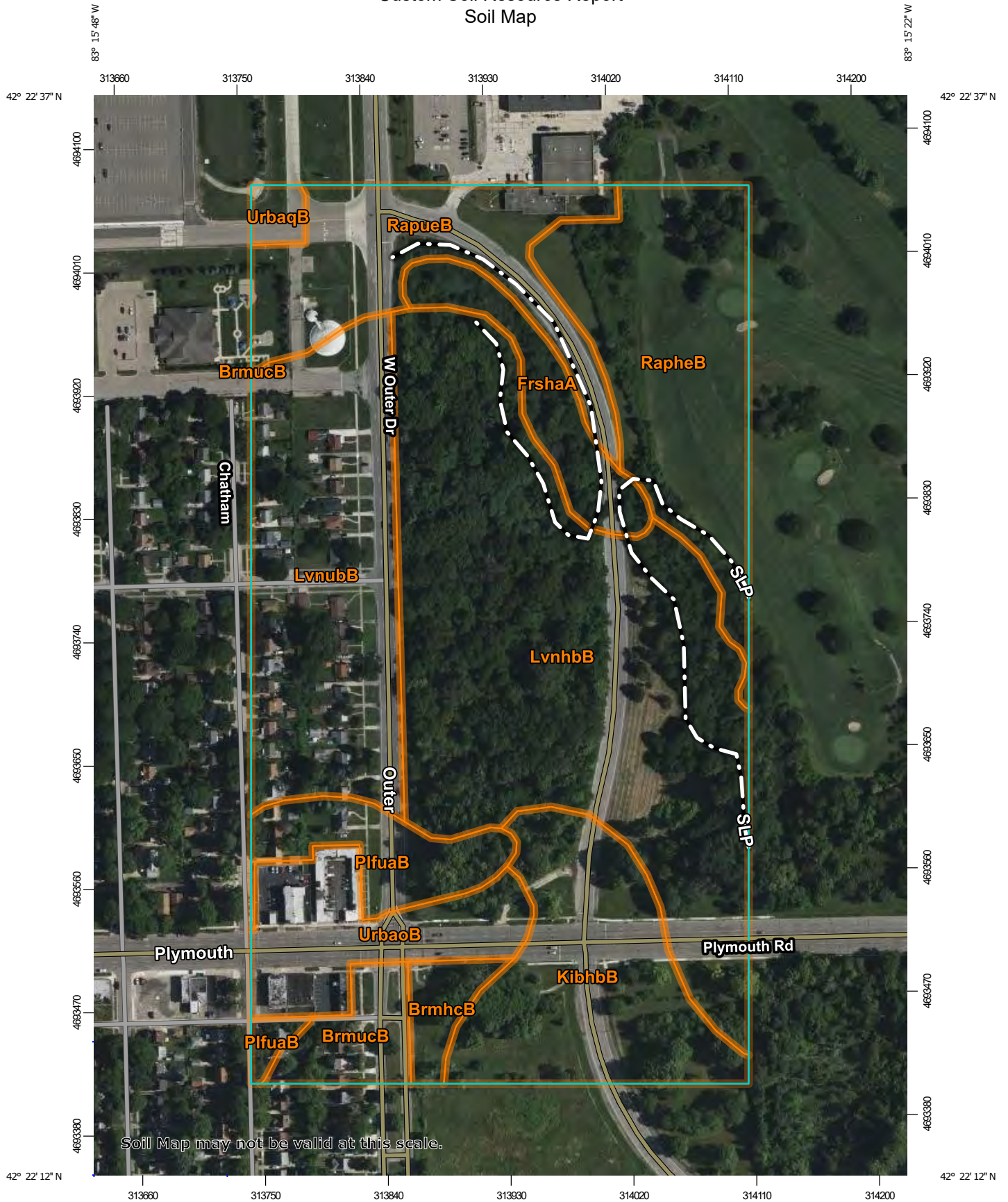
Custom Soil Resource Report for **Wayne County, Michigan**



Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


Custom Soil Resource Report Soil Map



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)


Soils


 Soil Map Unit Polygons


 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit


 Clay Spot


 Closed Depression

 Gravel Pit

 Gravelly Spot


 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry


 Miscellaneous Water


 Perennial Water

 Rock Outcrop


 Saline Spot

 Sandy Spot

 Severely Eroded Spot


 Sinkhole


 Slide or Slip


 Sodic Spot

 Spoil Area

 Stony Spot


 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals


Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wayne County, Michigan
 Survey Area Data: Version 8, Aug 29, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 5, 2020—Aug 12, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Custom Soil Resource Report

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BrmhcB	Brems loamy sand, loamy substratum, 0 to 4 percent slopes	0.9	1.6%
BrmucB	Brems-Urban land complex, loamy substratum, 0 to 4 percent slopes	1.5	2.6%
FrshaA	Freesoil sandy loam, 0 to 2 percent slopes	2.3	3.9%
KibhbB	Kibbie sandy loam, dense substratum, 0 to 4 percent slopes	6.5	11.0%
LvnhbB	Livonia sandy loam, dense substratum, 0 to 4 percent slopes	19.4	32.7%
LvnuB	Livonia-Urban land complex, dense substratum, 0 to 4 percent slopes	9.0	15.2%
PlfuaB	Plainfield-Urban land complex, 0 to 4 percent slopes	2.6	4.3%
RapheB	Rapson-Kibbie sandy loams, 0 to 4 percent slopes	7.6	12.8%
RapueB	Rapson-Urban land-Kibbie complex, 0 to 4 percent slopes	5.4	9.1%
UrbaoB	Urban land-Fortress family complex, 0 to 4 percent slopes	3.7	6.2%
UrbaqB	Urban land-Riverfront complex, 0 to 4 percent slopes	0.4	0.7%
Totals for Area of Interest		59.3	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without

Custom Soil Resource Report

including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

Custom Soil Resource Report

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Custom Soil Resource Report

Wayne County, Michigan**BrmhcB—Brems loamy sand, loamy substratum, 0 to 4 percent slopes****Map Unit Setting**

National map unit symbol: 2whgt
Elevation: 580 to 640 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Brems, human transported surface, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brems, Human Transported Surface**Setting**

Landform: Deltas, nearshore zones (relict), drainageways
Down-slope shape: Linear
Across-slope shape: Convex, linear
Parent material: Sandy human-transported material over sandy glaciolacustrine deposits over loamy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: loamy sand
^Cu - 9 to 12 inches: sand
Ab - 12 to 19 inches: loamy sand
Bwb - 19 to 42 inches: sand
C - 42 to 61 inches: sand
2Cg - 61 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)
Depth to water table: About 36 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: A
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

Custom Soil Resource Report

Minor Components**Livonia, human transported surface**

Percent of map unit: 7 percent
Landform: Deltas, nearshore zones (relict), drainageways
Microfeatures of landform position: Open depressions
Down-slope shape: Linear, concave
Across-slope shape: Convex, linear
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

Plainfield, human transported surface

Percent of map unit: 6 percent
Landform: Deltas, nearshore zones (relict), drainageways
Microfeatures of landform position: Rises
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Ecological site: F099XY004MI - Warm Dry Sandy Ridge
Hydric soil rating: No

Urban land

Percent of map unit: 5 percent
Hydric soil rating: No

Kibbie, human transported surface

Percent of map unit: 2 percent
Landform: Nearshore zones (relict), deltas, drainageways
Microfeatures of landform position: Open depressions
Down-slope shape: Concave, linear
Across-slope shape: Linear, convex
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

BrmucB—Brems-Urban land complex, loamy substratum, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2tx6p
Elevation: 580 to 670 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Brems, human transported surface, and similar soils: 50 percent
Urban land: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Custom Soil Resource Report

Description of Brems, Human Transported Surface**Setting**

Landform: Deltas, nearshore zones (relict), shoals (relict)

Down-slope shape: Linear

Across-slope shape: Convex, linear

Parent material: Sandy human-transported material over sandy glaciolacustrine deposits over loamy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: loamy sand

^Cu - 9 to 12 inches: sand

Ab - 12 to 19 inches: loamy sand

Bwb - 19 to 42 inches: sand

C - 42 to 61 inches: sand

2Cg - 61 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 4 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)

Depth to water table: About 36 to 42 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 35 percent

Gypsum, maximum content: 1 percent

Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)

Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: A

Ecological site: F099XY003MI - Warm Moist Sandy Depression

Hydric soil rating: No

Description of Urban Land**Properties and qualities**

Slope: 0 to 1 percent

Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D

Hydric soil rating: No

Custom Soil Resource Report

Minor Components**Livonia, human transported surface**

Percent of map unit: 7 percent
Landform: Deltas, nearshore zones (relict), shoals (relict)
Microfeatures of landform position: Open depressions
Down-slope shape: Linear, concave
Across-slope shape: Convex, linear
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

Plainfield, human transported surface

Percent of map unit: 6 percent
Landform: Deltas, nearshore zones (relict), shoals (relict)
Microfeatures of landform position: Rises
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Ecological site: F099XY004MI - Warm Dry Sandy Ridge
Hydric soil rating: No

Kibbie, human transported surface

Percent of map unit: 2 percent
Landform: Nearshore zones (relict), deltas, shoals (relict)
Microfeatures of landform position: Open depressions
Down-slope shape: Concave, linear
Across-slope shape: Linear, convex
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

FrshaA—Freesoil sandy loam, 0 to 2 percent slopes**Map Unit Setting**

National map unit symbol: 2whtn
Elevation: 570 to 640 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Freesoil, human transported surface, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Freesoil, Human Transported Surface**Setting**

Landform: Deltas, drainageways
Down-slope shape: Linear

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Across-slope shape: Convex, linear, concave

Parent material: Loamy human-transported material over loamy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: sandy loam

^Cu - 9 to 12 inches: loam

Ab - 12 to 15 inches: loamy very fine sand

Bwb - 15 to 27 inches: loamy very fine sand

C1 - 27 to 50 inches: loamy very fine sand

C2 - 50 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)

Depth to water table: About 30 to 36 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 35 percent

Gypsum, maximum content: 1 percent

Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)

Available water supply, 0 to 60 inches: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: C

Ecological site: F099XY007MI - Lake Plain Flats

Hydric soil rating: No

Minor Components**Anthropotic udorthents**

Percent of map unit: 7 percent

Landform: Deltas, drainageways

Down-slope shape: Linear

Across-slope shape: Convex, linear, concave

Ecological site: F099XY007MI - Lake Plain Flats

Hydric soil rating: No

Urban land

Percent of map unit: 5 percent

Hydric soil rating: No

Colwood, human transported surface

Percent of map unit: 3 percent

Landform: Deltas, drainageways

Microfeatures of landform position: Open depressions

Down-slope shape: Linear, concave

Across-slope shape: Convex, linear, concave

Ecological site: F099XY013MI - Wet Lake Plain Flats

Hydric soil rating: No

Custom Soil Resource Report

KibhbB—Kibbie sandy loam, dense substratum, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2whtr
Elevation: 580 to 630 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Kibbie, human transported surface, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kibbie, Human Transported Surface**Setting**

Landform: Till-floored lake plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy human-transported material over loamy glaciolacustrine deposits over clayey lodgment till

Typical profile

^Au - 0 to 9 inches: sandy loam
^Cu - 9 to 12 inches: loam
Bwb - 12 to 36 inches: silty clay loam
C - 36 to 67 inches: silt loam
2Cd - 67 to 80 inches: clay

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: 55 to 78 inches to densic material
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 30 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 42 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D

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Ecological site: F099XY007MI - Lake Plain Flats

Hydric soil rating: No

Minor Components**Colwood, human transported surface**

Percent of map unit: 6 percent

Landform: Till-floored lake plains

Microfeatures of landform position: Open depressions

Down-slope shape: Concave, linear

Across-slope shape: Linear

Ecological site: F099XY013MI - Wet Lake Plain Flats

Hydric soil rating: No

Urban land

Percent of map unit: 5 percent

Hydric soil rating: No

Anthroportic udorthents, dense substratum

Percent of map unit: 3 percent

Landform: Till-floored lake plains

Down-slope shape: Linear

Across-slope shape: Convex, linear

Ecological site: F099XY007MI - Lake Plain Flats

Hydric soil rating: No

Brems, human transported surface

Percent of map unit: 1 percent

Landform: Till-floored lake plains

Microfeatures of landform position: Rises

Down-slope shape: Convex, linear

Across-slope shape: Linear

Ecological site: F099XY003MI - Warm Moist Sandy Depression

Hydric soil rating: No

LvnhbB—Livonia sandy loam, dense substratum, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2whtz

Elevation: 590 to 640 feet

Mean annual precipitation: 28 to 38 inches

Mean annual air temperature: 45 to 52 degrees F

Frost-free period: 135 to 210 days

Farmland classification: Not prime farmland

Map Unit Composition

Livonia, human transported surface, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Custom Soil Resource Report

Description of Livonia, Human Transported Surface**Setting***Landform:* Deltas*Down-slope shape:* Linear*Across-slope shape:* Concave, linear*Parent material:* Sandy and loamy human-transported material over sandy glaciolacustrine deposits over loamy glaciolacustrine deposits over clayey lodgment till**Typical profile***^Au - 0 to 9 inches:* sandy loam*^Cu - 9 to 12 inches:* sandy loam*Ab - 12 to 19 inches:* loamy sand*Bwb - 19 to 35 inches:* sand*C1 - 35 to 54 inches:* sand*2C2 - 54 to 62 inches:* silt loam*3Cd - 62 to 80 inches:* clay**Properties and qualities***Slope:* 0 to 4 percent*Depth to restrictive feature:* 52 to 77 inches to densic material*Drainage class:* Somewhat poorly drained*Runoff class:* Very low*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)*Depth to water table:* About 30 to 36 inches*Frequency of flooding:* None*Frequency of ponding:* None*Calcium carbonate, maximum content:* 35 percent*Gypsum, maximum content:* 1 percent*Maximum salinity:* Nonsaline (0.1 to 1.5 mmhos/cm)*Available water supply, 0 to 60 inches:* Moderate (about 6.5 inches)**Interpretive groups***Land capability classification (irrigated):* None specified*Land capability classification (nonirrigated):* 8*Hydrologic Soil Group:* C*Ecological site:* F099XY003MI - Warm Moist Sandy Depression*Hydric soil rating:* No**Minor Components****Anthropotic udorthents, dense substratum***Percent of map unit:* 5 percent*Landform:* Deltas*Down-slope shape:* Linear*Across-slope shape:* Concave, linear, convex*Ecological site:* F099XY007MI - Lake Plain Flats*Hydric soil rating:* No**Urban land***Percent of map unit:* 5 percent*Hydric soil rating:* No**Brems, human transported surface***Percent of map unit:* 3 percent

Custom Soil Resource Report

Landform: Deltas
Microfeatures of landform position: Rises
Down-slope shape: Linear, convex
Across-slope shape: Concave, linear
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

Colwood, human transported surface

Percent of map unit: 2 percent
Landform: Deltas
Microfeatures of landform position: Open depressions
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Ecological site: F099XY013MI - Wet Lake Plain Flats
Hydric soil rating: No

LvnubB—Livonia-Urban land complex, dense substratum, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: 2tx74
Elevation: 580 to 650 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Livonia, human transported surface, and similar soils: 55 percent
Urban land: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Livonia, Human Transported Surface**Setting**

Landform: Deltas, till-floored lake plains
Down-slope shape: Linear
Across-slope shape: Concave, linear
Parent material: Sandy and loamy human-transported material over sandy glaciolacustrine deposits over loamy glaciolacustrine deposits over clayey lodgment till

Typical profile

^Au - 0 to 9 inches: sandy loam
^Cu - 9 to 12 inches: sandy loam
Ab - 12 to 19 inches: loamy sand
Bwb - 19 to 35 inches: sand
C1 - 35 to 54 inches: sand
2C2 - 54 to 62 inches: silt loam

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3Cd - 62 to 80 inches: clay

Properties and qualities

Slope: 0 to 4 percent

Depth to restrictive feature: 52 to 77 inches to densic material

Drainage class: Somewhat poorly drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Depth to water table: About 30 to 36 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 35 percent

Gypsum, maximum content: 1 percent

Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)

Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: C

Ecological site: F099XY003MI - Warm Moist Sandy Depression

Hydric soil rating: No

Description of Urban Land**Properties and qualities**

Slope: 0 to 1 percent

Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D

Hydric soil rating: No

Minor Components**Anthropotic udorthents, dense substratum**

Percent of map unit: 5 percent

Landform: Deltas, till-floored lake plains

Down-slope shape: Linear

Across-slope shape: Concave, linear, convex

Ecological site: F099XY007MI - Lake Plain Flats

Hydric soil rating: No

Brems, human transported surface

Percent of map unit: 3 percent

Landform: Till-floored lake plains, deltas

Microfeatures of landform position: Rises

Down-slope shape: Linear, convex

Across-slope shape: Linear, concave

Ecological site: F099XY003MI - Warm Moist Sandy Depression

Hydric soil rating: No

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Colwood, human transported surface

Percent of map unit: 2 percent
Landform: Till-floored lake plains, deltas
Microfeatures of landform position: Open depressions
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Ecological site: F099XY013MI - Wet Lake Plain Flats
Hydric soil rating: No

PlfuaB—Plainfield-Urban land complex, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2tx6q
Elevation: 570 to 680 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Plainfield, human transported surface, and similar soils: 60 percent
Urban land: 35 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Plainfield, Human Transported Surface**Setting**

Landform: Water-lain moraines, deltas, raised beaches, nearshore zones (relict)
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex, concave
Parent material: Sandy human-transported material over sandy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: loamy sand
^Cu - 9 to 12 inches: sand
Bwb - 12 to 45 inches: sand
C - 45 to 80 inches: sand

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
 (1.42 to 14.17 in/hr)

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Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: A
Ecological site: F099XY004MI - Warm Dry Sandy Ridge
Hydric soil rating: No

Description of Urban Land**Properties and qualities**

Slope: 0 to 1 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components**Brems, human transported surface**

Percent of map unit: 5 percent
Landform: Water-lain moraines, deltas, raised beaches, nearshore zones (relict)
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Microfeatures of landform position: Open depressions
Down-slope shape: Convex, linear, concave
Across-slope shape: Linear, convex, concave
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

RapheB—Rapson-Kibbie sandy loams, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2whvb
Elevation: 580 to 660 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F

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Frost-free period: 135 to 210 days

Farmland classification: Not prime farmland

Map Unit Composition

Rapson, human transported surface, and similar soils: 60 percent

Kibbie, human transported surface, and similar soils: 30 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rapson, Human Transported Surface**Setting**

Landform: Lakebeds (relict), drainageways

Down-slope shape: Linear

Across-slope shape: Linear, convex

Parent material: Sandy and loamy human-transported material over sandy glaciolacustrine deposits over loamy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: sandy loam

^Cu - 9 to 12 inches: sandy loam

Bwb - 12 to 28 inches: sand

2C - 28 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 4 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)

Depth to water table: About 30 to 36 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 35 percent

Gypsum, maximum content: 1 percent

Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)

Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: C

Ecological site: F099XY003MI - Warm Moist Sandy Depression

Hydric soil rating: No

Description of Kibbie, Human Transported Surface**Setting**

Landform: Lakebeds (relict), drainageways

Down-slope shape: Linear

Across-slope shape: Linear, convex

Parent material: Loamy human-transported material over loamy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: sandy loam

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^Cu - 9 to 12 inches: loam
Bwb - 12 to 36 inches: silty clay loam
C - 36 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 30 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 42 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

Minor Components**Urban land**

Percent of map unit: 5 percent
Hydric soil rating: No

Anthropogenic udorthents

Percent of map unit: 3 percent
Landform: Deltas, lakebeds (relict)
Down-slope shape: Linear
Across-slope shape: Convex, linear
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

Freesoil, human transported surface

Percent of map unit: 2 percent
Landform: Lakebeds (relict), deltas
Down-slope shape: Linear
Across-slope shape: Linear, convex
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

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RapueB—Rapson-Urban land-Kibbie complex, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2tx7s
Elevation: 570 to 650 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Rapson, human transported surface, and similar soils: 40 percent
Urban land: 35 percent
Kibbie, human transported surface, and similar soils: 20 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rapson, Human Transported Surface**Setting**

Landform: Deltas, lakebeds (relict)
Down-slope shape: Linear
Across-slope shape: Convex, linear
Parent material: Sandy and loamy human-transported material over sandy glaciolacustrine deposits over loamy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: sandy loam
^Cu - 9 to 12 inches: sandy loam
Bwb - 12 to 28 inches: sand
2C - 28 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)
Depth to water table: About 30 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

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Land capability classification (nonirrigated): 8
Hydrologic Soil Group: C
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

Description of Urban Land**Properties and qualities**

Slope: 0 to 1 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Kibbie, Human Transported Surface**Setting**

Landform: Lakebeds (relict), deltas
Down-slope shape: Linear
Across-slope shape: Linear, convex
Parent material: Loamy human-transported material over loamy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: sandy loam
^Cu - 9 to 12 inches: loam
Bwb - 12 to 36 inches: silty clay loam
C - 36 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 30 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 42 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

Custom Soil Resource Report

Minor Components**Anthropotic udorthents**

Percent of map unit: 3 percent
Landform: Deltas, lakebeds (relict)
Down-slope shape: Linear
Across-slope shape: Convex, linear
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

Freesoil, human transported surface

Percent of map unit: 2 percent
Landform: Lakebeds (relict), deltas
Down-slope shape: Linear
Across-slope shape: Linear, convex
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

UrbaoB—Urban land-Fortress family complex, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2whst
Elevation: 570 to 710 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 80 percent
Fortress family and similar soils: 19 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land**Properties and qualities**

Slope: 0 to 1 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D

Custom Soil Resource Report

Hydric soil rating: No

Description of Fortress Family**Setting**

Landform: Nearshore zones (relict), deltas
Down-slope shape: Linear
Across-slope shape: Convex, linear
Parent material: Sandy human-transported material

Typical profile

^Au - 0 to 9 inches: loamy sand
^Cu - 9 to 80 inches: gravelly-artifactual sand

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
 (1.42 to 14.17 in/hr)
Depth to water table: About 36 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: A
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

Minor Components**Riverfront, steep**

Percent of map unit: 1 percent
Landform: Drainageways, deltas, lakebeds (relict)
Down-slope shape: Linear
Across-slope shape: Convex, linear, concave
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

UrbaqB—Urban land-Riverfront complex, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2whsv

Custom Soil Resource Report

Elevation: 560 to 670 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 80 percent
Riverfront and similar soils: 19 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Riverfront

Setting

Landform: Deltas, drainageways, lakebeds (relict)
Down-slope shape: Linear
Across-slope shape: Convex, linear, concave
Parent material: Loamy human-transported material

Typical profile

^Au - 0 to 6 inches: sandy loam
^Cu1 - 6 to 16 inches: very artificial sandy loam
^Cu2 - 16 to 46 inches: gravelly-artificial loam
^Cu3 - 46 to 80 inches: very artificial loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Custom Soil Resource Report

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: B

Ecological site: F099XY007MI - Lake Plain Flats

Hydric soil rating: No

Minor Components

Riverfront, steep

Percent of map unit: 1 percent

Landform: Drainageways, deltas, lakebeds (relict)

Down-slope shape: Linear

Across-slope shape: Convex, linear, concave

Ecological site: F099XY007MI - Lake Plain Flats




Hydric soil rating: No

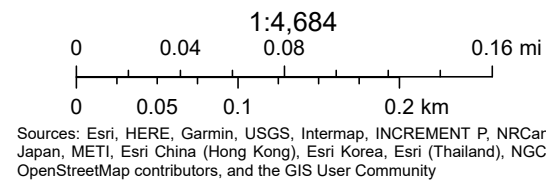
Wetlands Map Viewer



January 31, 2023

Part 303 Final Wetlands Inventory

-  Wetlands as identified on NWI and MIRIS maps
-  Soil areas which include wetland soils
-  Wetlands as identified on NWI and MIRIS maps and soil areas which include wetland soils



Disclaimer: This map is not intended to be used to determine the specific



January 30, 2023

Re: Rare Species Database Review (1-23-23) – Rouge Park Detention Basin Area 2 Preliminary Study

OHM has reviewed the Threatened and Endangered Species data provided by MNFI Web Database Search, conducted on January 23rd, 2023. During this Review, the project location was checked against known localities for rare species, and 5 State threatened, endangered, or species of special concern have been documented within the 1.5 mile project area buffer and it is possible that without proper management negative impacts will occur. The species listed include the following: American lotus (*Nelumbo lutea*), Climbing fumitory (*Adlumia fungosa*), Least shrew (*Cryptotis parva*), Stiff gentian (*Gentianella quinquefolia*) and Twinleaf (*Jeffersonia diphylla*). Additionally, Section 7 comments were provided for 9 Federally listed threatened, endangered, or candidate species and included the Indiana Bat (*Myotis sodalis*), Northern Long-Eared Bat (*Myotis septentrionalis*), Tricolored bat (*Perimyotis subflavus*), Piping plover (*Charadrius melodus*), Red knot (*Calidris canutus rufa*), Eastern Massasauga Rattlesnake (*Sistrurus c. catenatus*), Northern riffleshell (*Epioblasma rangiana*), Monarch Butterfly (*Danaus plexippus*) and Eastern prairie fringed orchid (*Platanthera leucophaea*). Determination for Federally listed species have been made utilizing the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) website. Those determination are provided in **Attachment 1**.

The West Chicago detention basin project will involve the construction of a detention basin at the SE corner of the intersection of Plymouth Rd. and Outer Drive Road which would discharge to the Rouge River via an added outfall. The site currently consists of an old field, emergent wetland and forested wetland areas.

For the 5 State listed species in the document provided OHM Advisors has made the following determination for individual species. In response to the Rare Species Database Review provided by MNFI Web Database Search OHM Advisors has prepared the following strategy and documentation to ensure this project does not result in take of species listed in the review.

American lotus (*Nelumbo lutea*) State Threatened species. MNFI describes the habitat for this species as marshes, in quiet backwaters and near-shore areas and in large rivers near the Great Lakes. No suitable habitat is located within the project area. The last observation of this species in within 1.5 miles of the project area occurred in 1897 and is considered historical. OHM has determined no effect to this species. In the event American lotus is observed during project activities said observation will be reported to local county MDNR office within 24 hours.

Climbing fumitory (*Adlumia fungosa*) State Species of Special Concern. MNFI describes the habitat for this species as rocky Great Lakes shores, woods, thickets, glades, mesic southern forests and in dune complexes. The last observation of this species in within 1.5 miles of the project area occurred in 1929 and is considered historical. OHM has determined no effect to this species. In the event Climbing fumitory is observed during project activities said observation will be reported to local county MDNR office within 24 hours.

Least shrew (*Cryptotis parva*) State Threatened. MNFI describes the habitat for this species dry upland meadows with dense coverage of grasses and forbs. It can also be found in marshy areas, fencerows, and woodland edges. Nests are often found tucked under rocks, logs, discarded lumber, metal sheeting, and hay bales left in fields over winter. Some suitable habitat exists within the project area and additional field surveys may be required when project specifics have been determined to make a final determination for this species. OHM Advisor ecologist will coordinate these as needed field surveys with local agency staff.



Stiff gentian (*Gentianella quinquefolia*) State Threatened. MNFI describes the suitable nesting habitat as alkaline soils in marshy meadows, in mucky areas along river and stream banks, and wooded edges and hillsides. Some suitable habitat exists within the project area and additional field surveys may be required when project specifics have been determined to make a final determination for this species. OHM Advisor ecologist will coordinate these as needed field surveys with local agency staff.

Twinleaf (*Jeffersonia diphylla*) State Species of Special Concern. MNFI describes the suitable nesting habitat as mesic forests with rich, loamy soils and in floodplain forests. Some suitable habitat exists within the project area and additional field surveys may be required when project specifics have been determined to make a final determination for this species. OHM Advisor ecologist will coordinate these as needed field surveys with local agency staff.

Sincerely,

Wade Rose, OHM Advisors Ecologist



**DWSD
West Chicago Area 2
Wetland Delineation
Technical Memorandum
1/31/2023**

Introduction

OHM performed a wetland delineation in January 2023 within the area south of Plymouth Rd, east of West Outer Drive, west of Rouge Park Drive and north of the D-Town Farm property. The wetland investigation conducted by OHM Field Ecologists Wade Rose and Melissa Meszaros, included a desktop review and subsequent on-site wetland evaluation. The purpose of this technical memorandum is to describe the methodology and results of the wetland delineation and to provide supporting documentation.

Methodology

Desktop Review

The EGLE Wetlands Map Viewer aerial imagery and wetland inventory maps were reviewed to identify potential and approximate locations of wetlands. The EGLE Wetlands Map Viewer compiles data from the following sources:

- National Wetland Inventory (NWI) maps, generated by the U.S. Fish and Wildlife Service through interpretation of topographic data and aerial photographs.
- Land cover maps generated by the Michigan Department of Natural Resources' Michigan Resource Inventory System (MIRIS), through interpretation of aerial photographs.
- Hydric soils mapped by the U.S. Department of Agriculture, Natural Resource Conservation Service (USDA NRCS).
- The desktop review also included a review of additional soil data produced by the National Cooperative Soil Survey, which were collected from the Web Soil Survey website operated by the USDA NRCS.

On-Site Investigation

An on-site wetland evaluation was performed on January 27, 2023. The investigation consisted of a visual survey of the entire site to identify potential wetland field indicators, followed by formal data collection and analysis of vegetation types, hydrology indicators, and soils data within the wetland and adjacent upland areas. The data collection and analysis were performed based on the methods described in the Northcentral Northeast Regional Supplement to the 1987 USACE Wetlands Delineation Manual. Wetland boundaries were flagged in the field with pink ribbon marked "Wetland Boundary" and the flagged points were surveyed using GPS equipment with sub-foot accuracy.



Results

The results indicated wetlands exist within the proposed project limits. The identified wetlands are Palustrine Emergent Nonpersistent Seasonally Flooded (PEM2C) and Palustrine Forested Broad-Leaved Deciduous Semipermanently Flooded (PFO1F) based on winter survey, but may be adjusted upon growing season observation.

Supporting Documentation

The following attachments contain supporting documentation, including the site map that depicts the wetland boundaries/sampling locations and the corresponding field data sheets required as part of an EGLE joint permit application.

- Attachment #1: Wetland Delineation Site Map
- Attachment #2: Wetland Field Data Sheets
- Attachment #3: National Cooperative Soil Survey Map
- Attachment #4: EGLE Wetland Inventory Map

Regulatory Discussion

Our understanding of the current rules is that a wetland is regulated under Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, if it meets one or more of the following criteria:

- Greater than five acres in size.
- Connected to, or located within 1,000 feet of, one of the Great Lakes or Lake St. Clair.
- Connected to, or located within 500 feet of, an inland lake, pond, river, or stream.
- Non-contiguous wetlands less than five acres in size that are on the list of rare and imperiled wetlands.
- Non-contiguous wetlands less than five acres with the documented presence of state or federal endangered or threatened species.

Based on the field investigation it was determined that wetlands are present within the project area boundary provided and are regulated as the flagged wetlands are greater than five acres in size.



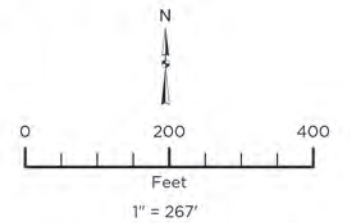
Wetland Delineation Map

Rouge Park Area 2

Detroit Water & Sewer District

- Upland
- Wetland
- Wetland Flag
- Wetland Boundary
- Wetland Polygon

*Green boundaries have been delineated. Orange boundaries are approximate or regulated by Part 301 regulations.



OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere

Map Published: January 31, 2023



WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
<u>Herb Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
<u>Woody Vine Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Present? Yes _____ No _____
Remarks: (Include photo numbers here or on a separate sheet.)				

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features		Type ¹	Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%				

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Dark Surface (S7) (LRR R, MLRA 149B)

- Polyvalue Below Surface (S8) (LRR R, MLRA 149B)
- Thin Dark Surface (S9) (LRR R, MLRA 149B)
- Loamy Mucky Mineral (F1) (LRR K, L)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (LRR K, L, MLRA 149B)
- Coast Prairie Redox (A16) (LRR K, L, R)
- 5 cm Mucky Peat or Peat (S3) (LRR K, L, R)
- Dark Surface (S7) (LRR K, L, M)
- Polyvalue Below Surface (S8) (LRR K, L)
- Thin Dark Surface (S9) (LRR K, L)
- Iron-Manganese Masses (F12) (LRR K, L, R)
- Piedmont Floodplain Soils (F19) (MLRA 149B)
- Mesic Spodic (TA6) (MLRA 144A, 145, 149B)
- Red Parent Material (F21)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes _____ No _____

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	<u>Absolute % Cover</u>	<u>Dominant Species?</u>	<u>Indicator Status</u>	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				
<u>Herb Stratum</u> (Plot size: _____)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				
<u>Woody Vine Stratum</u> (Plot size: _____)				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				
_____ = Total Cover				Hydrophytic Vegetation Present? Yes _____ No _____
Remarks: (Include photo numbers here or on a separate sheet.)				

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features			Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹			

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Stratified Layers (A5) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Dark Surface (S7) (LRR R, MLRA 149B)		<input type="checkbox"/> Polyvalue Below Surface (S8) (LRR R, MLRA 149B) <input type="checkbox"/> Thin Dark Surface (S9) (LRR R, MLRA 149B) <input type="checkbox"/> Loamy Mucky Mineral (F1) (LRR K, L) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8)		Indicators for Problematic Hydric Soils³: <input type="checkbox"/> 2 cm Muck (A10) (LRR K, L, MLRA 149B) <input type="checkbox"/> Coast Prairie Redox (A16) (LRR K, L, R) <input type="checkbox"/> 5 cm Mucky Peat or Peat (S3) (LRR K, L, R) <input type="checkbox"/> Dark Surface (S7) (LRR K, L, M) <input type="checkbox"/> Polyvalue Below Surface (S8) (LRR K, L) <input type="checkbox"/> Thin Dark Surface (S9) (LRR K, L) <input type="checkbox"/> Iron-Manganese Masses (F12) (LRR K, L, R) <input type="checkbox"/> Piedmont Floodplain Soils (F19) (MLRA 149B) <input type="checkbox"/> Mesic Spodic (TA6) (MLRA 144A, 145, 149B) <input type="checkbox"/> Red Parent Material (F21) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)	
---	--	---	--	---	--

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes _____ No _____
---	---

Remarks:



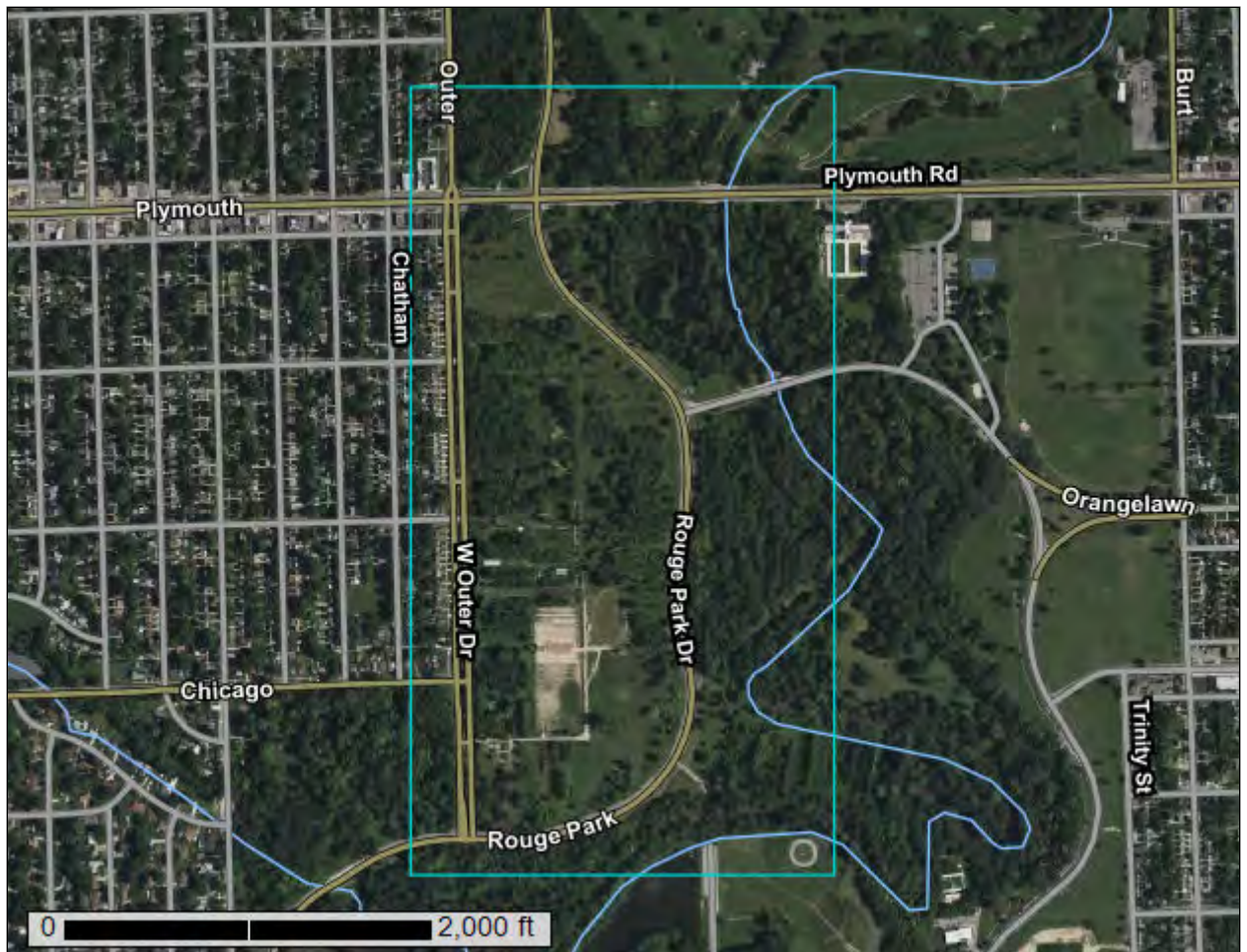
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

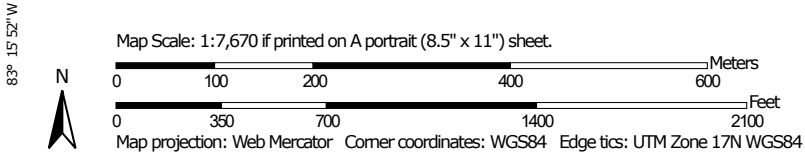
Custom Soil Resource Report for Wayne County, Michigan



Soil Map





































The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

MAP LEGEND

- Area of Interest (AOI)**
 -  Area of Interest (AOI)
- Soils**
 -  Soil Map Unit Polygons
 -  Soil Map Unit Lines
 -  Soil Map Unit Points
- Special Point Features**
 -  Blowout
 -  Borrow Pit
 -  Clay Spot
 -  Closed Depression
 -  Gravel Pit
 -  Gravelly Spot
 -  Landfill
 -  Lava Flow
 -  Marsh or swamp
 -  Mine or Quarry
 -  Miscellaneous Water
 -  Perennial Water
 -  Rock Outcrop
 -  Saline Spot
 -  Sandy Spot
 -  Severely Eroded Spot
 -  Sinkhole
 -  Slide or Slip
 -  Sodic Spot
- Water Features**
 -  Streams and Canals
- Transportation**
 -  Rails
 -  Interstate Highways
 -  US Routes
 -  Major Roads
 -  Local Roads
- Background**
 -  Aerial Photography
- Other Features**
 -  Spoil Area
 -  Stony Spot
 -  Very Stony Spot
 -  Wet Spot
 -  Other
 -  Special Line Features

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wayne County, Michigan
 Survey Area Data: Version 8, Aug 29, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 5, 2020—Aug 12, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Custom Soil Resource Report

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BrmhcB	Brems loamy sand, loamy substratum, 0 to 4 percent slopes	16.5	7.2%
BrmucB	Brems-Urban land complex, loamy substratum, 0 to 4 percent slopes	15.7	6.8%
CeraaA	Ceresco-Sloan complex, 0 to 3 percent slopes	57.3	25.0%
CerabA	Ceresco-Sloan complex, 0 to 3 percent slopes, protected	1.8	0.8%
ColhaA	Colwood sandy loam, 0 to 2 percent slopes	1.9	0.8%
ColhcA	Colwood sandy loam, dense substratum, 0 to 2 percent slopes	15.1	6.6%
ColuaA	Colwood-Urban land complex, 0 to 2 percent slopes	1.2	0.5%
KibhbB	Kibbie sandy loam, dense substratum, 0 to 4 percent slopes	72.9	31.8%
LvnhbB	Livonia sandy loam, dense substratum, 0 to 4 percent slopes	12.6	5.5%
LvnubB	Livonia-Urban land complex, dense substratum, 0 to 4 percent slopes	8.9	3.9%
PlfuaB	Plainfield-Urban land complex, 0 to 4 percent slopes	1.9	0.8%
RapheB	Rapson-Kibbie sandy loams, 0 to 4 percent slopes	6.3	2.7%
SloabA	Sloan silt loam, calcareous, 0 to 1 percent slopes	5.7	2.5%
UrbaoB	Urban land-Fortress family complex, 0 to 4 percent slopes	2.7	1.2%
W	Water	9.0	3.9%
Totals for Area of Interest		229.6	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

Custom Soil Resource Report

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps.

Custom Soil Resource Report

The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Custom Soil Resource Report

Wayne County, Michigan**BrmhcB—Brems loamy sand, loamy substratum, 0 to 4 percent slopes****Map Unit Setting**

National map unit symbol: 2whgt
Elevation: 580 to 640 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Brems, human transported surface, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brems, Human Transported Surface**Setting**

Landform: Deltas, nearshore zones (relict), drainageways
Down-slope shape: Linear
Across-slope shape: Convex, linear
Parent material: Sandy human-transported material over sandy glaciolacustrine deposits over loamy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: loamy sand
^Cu - 9 to 12 inches: sand
Ab - 12 to 19 inches: loamy sand
Bwb - 19 to 42 inches: sand
C - 42 to 61 inches: sand
2Cg - 61 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)
Depth to water table: About 36 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: A
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

Custom Soil Resource Report

Minor Components**Livonia, human transported surface***Percent of map unit: 7 percent**Landform: Deltas, nearshore zones (relict), drainageways**Microfeatures of landform position: Open depressions**Down-slope shape: Linear, concave**Across-slope shape: Convex, linear**Ecological site: F099XY003MI - Warm Moist Sandy Depression**Hydric soil rating: No***Plainfield, human transported surface***Percent of map unit: 6 percent**Landform: Deltas, nearshore zones (relict), drainageways**Microfeatures of landform position: Rises**Down-slope shape: Linear, convex**Across-slope shape: Convex, linear**Ecological site: F099XY004MI - Warm Dry Sandy Ridge**Hydric soil rating: No***Urban land***Percent of map unit: 5 percent**Hydric soil rating: No***Kibbie, human transported surface***Percent of map unit: 2 percent**Landform: Nearshore zones (relict), deltas, drainageways**Microfeatures of landform position: Open depressions**Down-slope shape: Concave, linear**Across-slope shape: Linear, convex**Ecological site: F099XY007MI - Lake Plain Flats**Hydric soil rating: No***BrmucB—Brems-Urban land complex, loamy substratum, 0 to 4 percent slopes****Map Unit Setting***National map unit symbol: 2tx6p**Elevation: 580 to 670 feet**Mean annual precipitation: 28 to 38 inches**Mean annual air temperature: 45 to 52 degrees F**Frost-free period: 135 to 210 days**Farmland classification: Not prime farmland***Map Unit Composition***Brems, human transported surface, and similar soils: 50 percent**Urban land: 35 percent**Minor components: 15 percent**Estimates are based on observations, descriptions, and transects of the mapunit.*

Custom Soil Resource Report

Description of Brems, Human Transported Surface**Setting**

Landform: Deltas, nearshore zones (relict), shoals (relict)

Down-slope shape: Linear

Across-slope shape: Convex, linear

Parent material: Sandy human-transported material over sandy glaciolacustrine deposits over loamy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: loamy sand

^Cu - 9 to 12 inches: sand

Ab - 12 to 19 inches: loamy sand

Bwb - 19 to 42 inches: sand

C - 42 to 61 inches: sand

2Cg - 61 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 4 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)

Depth to water table: About 36 to 42 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 35 percent

Gypsum, maximum content: 1 percent

Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)

Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: A

Ecological site: F099XY003MI - Warm Moist Sandy Depression

Hydric soil rating: No

Description of Urban Land**Properties and qualities**

Slope: 0 to 1 percent

Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D

Hydric soil rating: No

Custom Soil Resource Report

Minor Components**Livonia, human transported surface***Percent of map unit: 7 percent**Landform: Deltas, nearshore zones (relict), shoals (relict)**Microfeatures of landform position: Open depressions**Down-slope shape: Linear, concave**Across-slope shape: Convex, linear**Ecological site: F099XY003MI - Warm Moist Sandy Depression**Hydric soil rating: No***Plainfield, human transported surface***Percent of map unit: 6 percent**Landform: Deltas, nearshore zones (relict), shoals (relict)**Microfeatures of landform position: Rises**Down-slope shape: Linear, convex**Across-slope shape: Convex, linear**Ecological site: F099XY004MI - Warm Dry Sandy Ridge**Hydric soil rating: No***Kibbie, human transported surface***Percent of map unit: 2 percent**Landform: Nearshore zones (relict), deltas, shoals (relict)**Microfeatures of landform position: Open depressions**Down-slope shape: Concave, linear**Across-slope shape: Linear, convex**Ecological site: F099XY007MI - Lake Plain Flats**Hydric soil rating: No***CeraaA—Ceresco-Sloan complex, 0 to 3 percent slopes****Map Unit Setting***National map unit symbol: 2tx70**Elevation: 570 to 690 feet**Mean annual precipitation: 28 to 38 inches**Mean annual air temperature: 45 to 52 degrees F**Frost-free period: 135 to 210 days**Farmland classification: Not prime farmland***Map Unit Composition***Ceresco and similar soils: 75 percent**Sloan and similar soils: 25 percent**Estimates are based on observations, descriptions, and transects of the mapunit.***Description of Ceresco****Setting***Landform: Flood plains, natural levees**Down-slope shape: Linear*

Custom Soil Resource Report

Across-slope shape: Linear, convex

Parent material: Loamy alluvium

Typical profile

A - 0 to 10 inches: loam

Bw1 - 10 to 22 inches: loam

Bw2 - 22 to 34 inches: loam

C1 - 34 to 53 inches: silt loam

C2 - 53 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)

Depth to water table: About 6 to 12 inches

Frequency of flooding: NoneFrequent

Frequency of ponding: None

Calcium carbonate, maximum content: 50 percent

Maximum salinity: Nonsaline (0.2 to 0.8 mmhos/cm)

Available water supply, 0 to 60 inches: Very high (about 15.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: B/D

Ecological site: F099XY008MI - Moist Floodplain

Hydric soil rating: No

Description of Sloan**Setting**

Landform: Meander scars, flood plains

Down-slope shape: Linear

Across-slope shape: Concave, linear

Parent material: Loamy alluvium

Typical profile

A - 0 to 10 inches: silt loam

Bg - 10 to 32 inches: silt loam

Cg - 32 to 80 inches: loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)

Depth to water table: About 0 inches

Frequency of flooding: NoneFrequent

Frequency of ponding: None

Calcium carbonate, maximum content: 32 percent

Maximum salinity: Nonsaline (0.1 to 0.3 mmhos/cm)

Available water supply, 0 to 60 inches: High (about 11.4 inches)

Custom Soil Resource Report

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: B/D

Ecological site: F099XY009MI - Wet Floodplain

Hydric soil rating: Yes

CerabA—Ceresco-Sloan complex, 0 to 3 percent slopes, protected**Map Unit Setting**

National map unit symbol: 2tx7t

Elevation: 570 to 660 feet

Mean annual precipitation: 28 to 38 inches

Mean annual air temperature: 45 to 52 degrees F

Frost-free period: 135 to 210 days

Farmland classification: Not prime farmland

Map Unit Composition

Ceresco and similar soils: 60 percent

Sloan and similar soils: 25 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ceresco**Setting**

Landform: Flood plains, natural levees

Down-slope shape: Linear

Across-slope shape: Linear, convex

Parent material: Loamy alluvium

Typical profile

A - 0 to 10 inches: loam

Bw1 - 10 to 22 inches: loam

Bw2 - 22 to 34 inches: loam

C1 - 34 to 53 inches: silt loam

C2 - 53 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)

Depth to water table: About 6 to 12 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 50 percent

Maximum salinity: Nonsaline (0.2 to 0.8 mmhos/cm)

Custom Soil Resource Report

Available water supply, 0 to 60 inches: Very high (about 15.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: B/D

Ecological site: F099XY008MI - Moist Floodplain

Hydric soil rating: No

Description of Sloan**Setting**

Landform: Meander scars, flood plains

Down-slope shape: Linear

Across-slope shape: Concave, linear

Parent material: Loamy alluvium

Typical profile

A - 0 to 10 inches: silt loam

Bg - 10 to 32 inches: silt loam

Cg - 32 to 80 inches: loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)

Depth to water table: About 0 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 32 percent

Maximum salinity: Nonsaline (0.1 to 0.3 mmhos/cm)

Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: B/D

Ecological site: F099XY009MI - Wet Floodplain

Hydric soil rating: Yes

Minor Components**Urban land**

Percent of map unit: 10 percent

Hydric soil rating: No

Riverfront

Percent of map unit: 5 percent

Landform: Flood plains, natural levees

Down-slope shape: Linear

Across-slope shape: Linear, convex

Ecological site: F099XY008MI - Moist Floodplain

Hydric soil rating: No

Custom Soil Resource Report

ColhaA—Colwood sandy loam, 0 to 2 percent slopes**Map Unit Setting**

National map unit symbol: 2whjtj
Elevation: 580 to 630 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Colwood, human transported surface, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Colwood, Human Transported Surface**Setting**

Landform: Lakebeds (relict), deltas
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Loamy human-transported material over loamy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: sandy loam
^Cu - 9 to 12 inches: loam
Bgb - 12 to 35 inches: silty clay loam
C - 35 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 24 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 42 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D

Custom Soil Resource Report

Ecological site: F099XY013MI - Wet Lake Plain Flats

Hydric soil rating: No

Minor Components**Kibbie, human transported surface**

Percent of map unit: 8 percent

Landform: Lakebeds (relict), deltas

Microfeatures of landform position: Rises

Down-slope shape: Concave, linear, convex

Across-slope shape: Concave, linear

Ecological site: F099XY007MI - Lake Plain Flats

Hydric soil rating: No

Urban land

Percent of map unit: 5 percent

Hydric soil rating: No

Anthropotic udorthents

Percent of map unit: 5 percent

Landform: Lakebeds (relict), deltas

Down-slope shape: Concave, linear

Across-slope shape: Concave, linear, convex

Ecological site: F099XY007MI - Lake Plain Flats

Hydric soil rating: No

Livonia, human transported surface

Percent of map unit: 2 percent

Landform: Lakebeds (relict), deltas

Microfeatures of landform position: Rises

Down-slope shape: Concave, linear, convex

Across-slope shape: Concave, linear

Ecological site: F099XY003MI - Warm Moist Sandy Depression

Hydric soil rating: No

ColhcA—Colwood sandy loam, dense substratum, 0 to 2 percent slopes**Map Unit Setting**

National map unit symbol: 2whtl

Elevation: 590 to 620 feet

Mean annual precipitation: 28 to 38 inches

Mean annual air temperature: 45 to 52 degrees F

Frost-free period: 135 to 210 days

Farmland classification: Not prime farmland

Map Unit Composition

Colwood, human transported surface, and similar soils: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Custom Soil Resource Report

Description of Colwood, Human Transported Surface**Setting**

Landform: Deltas, till-floored lake plains

Down-slope shape: Linear

Across-slope shape: Concave, linear

Parent material: Loamy human-transported material over loamy glaciolacustrine deposits over clayey lodgment till

Typical profile

^Au - 0 to 9 inches: sandy loam

^Cu - 9 to 12 inches: loam

Bgb - 12 to 35 inches: silty clay loam

C - 35 to 65 inches: silt loam

2Cd - 65 to 80 inches: clay

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: 56 to 70 inches to densic material

Drainage class: Poorly drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Depth to water table: About 24 to 30 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 42 percent

Gypsum, maximum content: 1 percent

Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)

Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D

Ecological site: F099XY013MI - Wet Lake Plain Flats

Hydric soil rating: No

Minor Components**Urban land**

Percent of map unit: 5 percent

Hydric soil rating: No

Anthropotic udorthents, dense substratum

Percent of map unit: 3 percent

Landform: Till-floored lake plains, deltas

Down-slope shape: Linear

Across-slope shape: Linear, concave, convex

Ecological site: F099XY007MI - Lake Plain Flats

Hydric soil rating: No

Kibbie, human transported surface

Percent of map unit: 2 percent

Landform: Deltas, till-floored lake plains

Down-slope shape: Linear

Across-slope shape: Concave, linear

Custom Soil Resource Report

Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

ColuaA—Colwood-Urban land complex, 0 to 2 percent slopes**Map Unit Setting**

National map unit symbol: 2tx79
Elevation: 580 to 640 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Colwood, human transported surface, and similar soils: 50 percent
Urban land: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Colwood, Human Transported Surface**Setting**

Landform: Lakebeds (relict), drainageways
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Loamy human-transported material over loamy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: sandy loam
^Cu - 9 to 12 inches: loam
Bgb - 12 to 35 inches: silty clay loam
C - 35 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 24 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 42 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Custom Soil Resource Report

Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Ecological site: F099XY013MI - Wet Lake Plain Flats
Hydric soil rating: No

Description of Urban Land**Properties and qualities**

Slope: 0 to 1 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components**Kibbie, human transported surface**

Percent of map unit: 8 percent
Landform: Lakebeds (relict), drainageways
Microfeatures of landform position: Rises
Down-slope shape: Concave, linear, convex
Across-slope shape: Concave, linear
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

Anthroportic udorthents

Percent of map unit: 5 percent
Landform: Lakebeds (relict), drainageways
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear, convex
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

Livonia, human transported surface

Percent of map unit: 2 percent
Landform: Lakebeds (relict), drainageways
Microfeatures of landform position: Rises
Down-slope shape: Concave, linear, convex
Across-slope shape: Concave, linear
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

Custom Soil Resource Report

KibhbB—Kibbie sandy loam, dense substratum, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2whtr
Elevation: 580 to 630 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Kibbie, human transported surface, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kibbie, Human Transported Surface**Setting**

Landform: Till-floored lake plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy human-transported material over loamy glaciolacustrine deposits over clayey lodgment till

Typical profile

^Au - 0 to 9 inches: sandy loam
^Cu - 9 to 12 inches: loam
Bwb - 12 to 36 inches: silty clay loam
C - 36 to 67 inches: silt loam
2Cd - 67 to 80 inches: clay

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: 55 to 78 inches to densic material
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 30 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 42 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8

Custom Soil Resource Report

Hydrologic Soil Group: D
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

Minor Components**Colwood, human transported surface**

Percent of map unit: 6 percent
Landform: Till-floored lake plains
Microfeatures of landform position: Open depressions
Down-slope shape: Concave, linear
Across-slope shape: Linear
Ecological site: F099XY013MI - Wet Lake Plain Flats
Hydric soil rating: No

Urban land

Percent of map unit: 5 percent
Hydric soil rating: No

Anthropotic udorthents, dense substratum

Percent of map unit: 3 percent
Landform: Till-floored lake plains
Down-slope shape: Linear
Across-slope shape: Convex, linear
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

Brems, human transported surface

Percent of map unit: 1 percent
Landform: Till-floored lake plains
Microfeatures of landform position: Rises
Down-slope shape: Convex, linear
Across-slope shape: Linear
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

LvnhbB—Livonia sandy loam, dense substratum, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2whtz
Elevation: 590 to 640 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Livonia, human transported surface, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Custom Soil Resource Report

Description of Livonia, Human Transported Surface**Setting***Landform:* Deltas*Down-slope shape:* Linear*Across-slope shape:* Concave, linear*Parent material:* Sandy and loamy human-transported material over sandy glaciolacustrine deposits over loamy glaciolacustrine deposits over clayey lodgment till**Typical profile***^Au - 0 to 9 inches:* sandy loam*^Cu - 9 to 12 inches:* sandy loam*Ab - 12 to 19 inches:* loamy sand*Bwb - 19 to 35 inches:* sand*C1 - 35 to 54 inches:* sand*2C2 - 54 to 62 inches:* silt loam*3Cd - 62 to 80 inches:* clay**Properties and qualities***Slope:* 0 to 4 percent*Depth to restrictive feature:* 52 to 77 inches to densic material*Drainage class:* Somewhat poorly drained*Runoff class:* Very low*Capacity of the most limiting layer to transmit water (Ksat):* Very low (0.00 to 0.00 in/hr)*Depth to water table:* About 30 to 36 inches*Frequency of flooding:* None*Frequency of ponding:* None*Calcium carbonate, maximum content:* 35 percent*Gypsum, maximum content:* 1 percent*Maximum salinity:* Nonsaline (0.1 to 1.5 mmhos/cm)*Available water supply, 0 to 60 inches:* Moderate (about 6.5 inches)**Interpretive groups***Land capability classification (irrigated):* None specified*Land capability classification (nonirrigated):* 8*Hydrologic Soil Group:* C*Ecological site:* F099XY003MI - Warm Moist Sandy Depression*Hydric soil rating:* No**Minor Components****Anthropotic udorthents, dense substratum***Percent of map unit:* 5 percent*Landform:* Deltas*Down-slope shape:* Linear*Across-slope shape:* Concave, linear, convex*Ecological site:* F099XY007MI - Lake Plain Flats*Hydric soil rating:* No**Urban land***Percent of map unit:* 5 percent*Hydric soil rating:* No**Brems, human transported surface***Percent of map unit:* 3 percent

Custom Soil Resource Report

Landform: Deltas
Microfeatures of landform position: Rises
Down-slope shape: Linear, convex
Across-slope shape: Concave, linear
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

Colwood, human transported surface

Percent of map unit: 2 percent
Landform: Deltas
Microfeatures of landform position: Open depressions
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Ecological site: F099XY013MI - Wet Lake Plain Flats
Hydric soil rating: No

LvnubB—Livonia-Urban land complex, dense substratum, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: 2tx74
Elevation: 580 to 650 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Livonia, human transported surface, and similar soils: 55 percent
Urban land: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Livonia, Human Transported Surface**Setting**

Landform: Deltas, till-floored lake plains
Down-slope shape: Linear
Across-slope shape: Concave, linear
Parent material: Sandy and loamy human-transported material over sandy glaciolacustrine deposits over loamy glaciolacustrine deposits over clayey lodgment till

Typical profile

^Au - 0 to 9 inches: sandy loam
^Cu - 9 to 12 inches: sandy loam
Ab - 12 to 19 inches: loamy sand
Bwb - 19 to 35 inches: sand
C1 - 35 to 54 inches: sand
2C2 - 54 to 62 inches: silt loam

Custom Soil Resource Report

3Cd - 62 to 80 inches: clay

Properties and qualities

Slope: 0 to 4 percent

Depth to restrictive feature: 52 to 77 inches to densic material

Drainage class: Somewhat poorly drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Depth to water table: About 30 to 36 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 35 percent

Gypsum, maximum content: 1 percent

Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)

Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: C

Ecological site: F099XY003MI - Warm Moist Sandy Depression

Hydric soil rating: No

Description of Urban Land**Properties and qualities**

Slope: 0 to 1 percent

Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D

Hydric soil rating: No

Minor Components**Anthropotic udorthents, dense substratum**

Percent of map unit: 5 percent

Landform: Deltas, till-floored lake plains

Down-slope shape: Linear

Across-slope shape: Concave, linear, convex

Ecological site: F099XY007MI - Lake Plain Flats

Hydric soil rating: No

Brems, human transported surface

Percent of map unit: 3 percent

Landform: Till-floored lake plains, deltas

Microfeatures of landform position: Rises

Down-slope shape: Linear, convex

Across-slope shape: Linear, concave

Ecological site: F099XY003MI - Warm Moist Sandy Depression

Hydric soil rating: No

Custom Soil Resource Report

Colwood, human transported surface

Percent of map unit: 2 percent
Landform: Till-floored lake plains, deltas
Microfeatures of landform position: Open depressions
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Ecological site: F099XY013MI - Wet Lake Plain Flats
Hydric soil rating: No

PlfuaB—Plainfield-Urban land complex, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2tx6q
Elevation: 570 to 680 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Plainfield, human transported surface, and similar soils: 60 percent
Urban land: 35 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Plainfield, Human Transported Surface**Setting**

Landform: Water-lain moraines, deltas, raised beaches, nearshore zones (relict)
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex, concave
Parent material: Sandy human-transported material over sandy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: loamy sand
^Cu - 9 to 12 inches: sand
Bwb - 12 to 45 inches: sand
C - 45 to 80 inches: sand

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
 (1.42 to 14.17 in/hr)

Custom Soil Resource Report

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: A
Ecological site: F099XY004MI - Warm Dry Sandy Ridge
Hydric soil rating: No

Description of Urban Land**Properties and qualities**

Slope: 0 to 1 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components**Brems, human transported surface**

Percent of map unit: 5 percent
Landform: Water-lain moraines, deltas, raised beaches, nearshore zones (relict)
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Microfeatures of landform position: Open depressions
Down-slope shape: Convex, linear, concave
Across-slope shape: Linear, convex, concave
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

RapheB—Rapson-Kibbie sandy loams, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2whvb
Elevation: 580 to 660 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F

Custom Soil Resource Report

Frost-free period: 135 to 210 days

Farmland classification: Not prime farmland

Map Unit Composition

Rapson, human transported surface, and similar soils: 60 percent

Kibbie, human transported surface, and similar soils: 30 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rapson, Human Transported Surface**Setting**

Landform: Lakebeds (relict), drainageways

Down-slope shape: Linear

Across-slope shape: Linear, convex

Parent material: Sandy and loamy human-transported material over sandy glaciolacustrine deposits over loamy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: sandy loam

^Cu - 9 to 12 inches: sandy loam

Bwb - 12 to 28 inches: sand

2C - 28 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 4 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)

Depth to water table: About 30 to 36 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 35 percent

Gypsum, maximum content: 1 percent

Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)

Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: C

Ecological site: F099XY003MI - Warm Moist Sandy Depression

Hydric soil rating: No

Description of Kibbie, Human Transported Surface**Setting**

Landform: Lakebeds (relict), drainageways

Down-slope shape: Linear

Across-slope shape: Linear, convex

Parent material: Loamy human-transported material over loamy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: sandy loam

Custom Soil Resource Report

^Cu - 9 to 12 inches: loam
Bwb - 12 to 36 inches: silty clay loam
C - 36 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 30 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 42 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

Minor Components**Urban land**

Percent of map unit: 5 percent
Hydric soil rating: No

Anthropotic udorthents

Percent of map unit: 3 percent
Landform: Deltas, lakebeds (relict)
Down-slope shape: Linear
Across-slope shape: Convex, linear
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

Freesoil, human transported surface

Percent of map unit: 2 percent
Landform: Lakebeds (relict), deltas
Down-slope shape: Linear
Across-slope shape: Linear, convex
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

Custom Soil Resource Report

SloabA—Sloan silt loam, calcareous, 0 to 1 percent slopes**Map Unit Setting**

National map unit symbol: 2whvk
Elevation: 580 to 640 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Sloan and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sloan**Setting**

Landform: Meander scars, flood plains
Down-slope shape: Linear
Across-slope shape: Concave, linear
Parent material: Loamy alluvium

Typical profile

A - 0 to 10 inches: silt loam
Bg - 10 to 32 inches: silt loam
Cg - 32 to 80 inches: loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Calcium carbonate, maximum content: 32 percent
Maximum salinity: Nonsaline (0.1 to 0.3 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: B/D
Ecological site: F099XY009MI - Wet Floodplain
Hydric soil rating: Yes

Custom Soil Resource Report

Minor Components**Ceresco**

Percent of map unit: 10 percent
Landform: Flood plains, natural levees
Down-slope shape: Linear
Across-slope shape: Linear, convex
Ecological site: F099XY008MI - Moist Floodplain
Hydric soil rating: No

Urba0B—Urban land-Fortress family complex, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2whst
Elevation: 570 to 710 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 80 percent
Fortress family and similar soils: 19 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land**Properties and qualities**

Slope: 0 to 1 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Fortress Family**Setting**

Landform: Nearshore zones (relict), deltas
Down-slope shape: Linear
Across-slope shape: Convex, linear
Parent material: Sandy human-transported material

Custom Soil Resource Report

Typical profile

^Au - 0 to 9 inches: loamy sand

^Cu - 9 to 80 inches: gravelly-artifactual sand

Properties and qualities

Slope: 0 to 4 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Very low

*Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(1.42 to 14.17 in/hr)*

Depth to water table: About 36 to 42 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 10 percent

Gypsum, maximum content: 1 percent

Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: A

Ecological site: F099XY003MI - Warm Moist Sandy Depression

Hydric soil rating: No

Minor Components**Riverfront, steep**

Percent of map unit: 1 percent

Landform: Drainageways, deltas, lakebeds (relict)

Down-slope shape: Linear

Across-slope shape: Convex, linear, concave

Ecological site: F099XY007MI - Lake Plain Flats

Hydric soil rating: No

W—Water**Map Unit Setting**

National map unit symbol: 6b18

Elevation: 570 to 720 feet

Mean annual precipitation: 28 to 34 inches

Mean annual air temperature: 45 to 52 degrees F

Frost-free period: 140 to 160 days

Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

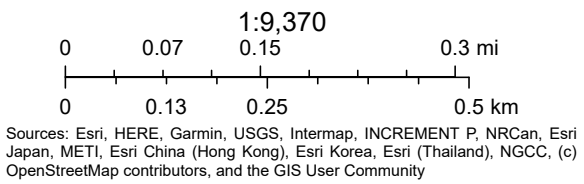
Wetlands Map Viewer



January 31, 2023

Part 303 Final Wetlands Inventory

- Wetlands as identified on NWI and MIRIS maps
- Soil areas which include wetland soils
- Wetlands as identified on NWI and MIRIS maps and soil areas which include wetland soils



Disclaimer: This map is not intended to be used to determine the specific



January 30, 2023

Re: Rare Species Database Review (1-23-23) – Rouge Park Detention Basin Area 3 Preliminary Study

OHM has reviewed the Threatened and Endangered Species data provided by MNFI Web Database Search, conducted on January 23rd, 2023. During this Review, the project location was checked against known localities for rare species, and 5 State threatened, endangered, or species of special concern have been documented within the 1.5 mile project area buffer and it is possible that without proper management negative impacts will occur. The species listed include the following: American lotus (*Nelumbo lutea*), Climbing fumitory (*Adlumia fungosa*), Least shrew (*Cryptotis parva*), Stiff gentian (*Gentianella quinquefolia*) and Twinleaf (*Jeffersonia diphylla*). Additionally, Section 7 comments were provided for 9 Federally listed threatened, endangered, or candidate species and included the Indiana Bat (*Myotis sodalis*), Northern Long-Eared Bat (*Myotis septentrionalis*), Tricolored bat (*Perimyotis subflavus*), Piping plover (*Charadrius melodus*), Red knot (*Calidris canutus rufa*), Eastern Massasauga Rattlesnake (*Sistrurus c. catenatus*), Northern riffleshell (*Epioblasma rangiana*), Monarch Butterfly (*Danaus plexippus*) and Eastern prairie fringed orchid (*Platanthera leucophaea*). Determination for Federally listed species have been made utilizing the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) website. Those determination are provided in **Attachment 1**.

The West Chicago detention basin project will involve the construction of a detention basin at the SE corner of the intersection of West Parkway St. and West Chicago Dr. which would discharge to the Rouge River via an added outfall. The site currently consists of an Upland forest, forested wetland and open channel areas.

For the 5 State listed species in the document provided OHM Advisors has made the following determination for individual species. In response to the Rare Species Database Review provided by MNFI Web Database Search OHM Advisors has prepared the following strategy and documentation to ensure this project does not result in take of species listed in the review.

American lotus (*Nelumbo lutea*) State Threatened species. MNFI describes the habitat for this species as marshes, in quiet backwaters and near-shore areas and in large rivers near the Great Lakes. No suitable habitat is located within the project area. The last observation of this species in within 1.5 miles of the project area occurred in 1897 and is considered historical. OHM has determined no effect to this species. In the event American lotus is observed during project activities said observation will be reported to local county MDNR office within 24 hours.

Climbing fumitory (*Adlumia fungosa*) State Species of Special Concern. MNFI describes the habitat for this species as rocky Great Lakes shores, woods, thickets, glades, mesic southern forests and in dune complexes. The last observation of this species in within 1.5 miles of the project area occurred in 1929 and is considered historical. OHM has determined no effect to this species. In the event Climbing fumitory is observed during project activities said observation will be reported to local county MDNR office within 24 hours.

Least shrew (*Cryptotis parva*) State Threatened. MNFI describes the habitat for this species dry upland meadows with dense coverage of grasses and forbs. It can also be found in marshy areas, fencerows, and woodland edges. Nests are often found tucked under rocks, logs, discarded lumber, metal sheeting, and hay bales left in fields over winter. Some suitable habitat exists within the project area and additional field surveys may be required when project specifics have been determined to make a final determination for this species. OHM Advisor ecologist will coordinate these as needed field surveys with local agency staff.



Stiff gentian (*Gentianella quinquefolia*) State Threatened. MNFI describes the suitable nesting habitat as alkaline soils in marshy meadows, in mucky areas along river and stream banks, and wooded edges and hillsides. Some suitable habitat exists within the project area and additional field surveys may be required when project specifics have been determined to make a final determination for this species. OHM Advisor ecologist will coordinate these as needed field surveys with local agency staff.

Twinleaf (*Jeffersonia diphylla*) State Species of Special Concern. MNFI describes the suitable nesting habitat as mesic forests with rich, loamy soils and in floodplain forests. Some suitable habitat exists within the project area and additional field surveys may be required when project specifics have been determined to make a final determination for this species. OHM Advisor ecologist will coordinate these as needed field surveys with local agency staff.

Sincerely,

Wade Rose, OHM Advisors Ecologist



**DWSD
West Chicago Area 3
Wetland Delineation
Technical Memorandum
1/31/2023**

Introduction

OHM performed a wetland delineation in January 2023 within the area south of West Chicago Street, west of West Outer Driver and North of West Outer Drive. The wetland investigation conducted by OHM Field Ecologists Wade Rose, Kayla McRobb, and Melissa Meszaros and Engineer John Barbatano included a desktop review and subsequent on-site wetland evaluation. The purpose of this technical memorandum is to describe the methodology and results of the wetland delineation and to provide supporting documentation.

Methodology

Desktop Review

The EGLE Wetlands Map Viewer aerial imagery and wetland inventory maps were reviewed to identify potential and approximate locations of wetlands. The EGLE Wetlands Map Viewer compiles data from the following sources:

- National Wetland Inventory (NWI) maps, generated by the U.S. Fish and Wildlife Service through interpretation of topographic data and aerial photographs.
- Land cover maps generated by the Michigan Department of Natural Resources' Michigan Resource Inventory System (MIRIS), through interpretation of aerial photographs.
- Hydric soils mapped by the U.S. Department of Agriculture, Natural Resource Conservation Service (USDA NRCS).
- The desktop review also included a review of additional soil data produced by the National Cooperative Soil Survey, which were collected from the Web Soil Survey website operated by the USDA NRCS.

On-Site Investigation

An on-site wetland evaluation was performed on January 27th, 2023. The investigation consisted of a visual survey of the entire site to identify potential wetland field indicators, followed by formal data collection and analysis of vegetation types, hydrology indicators, and soils data within the wetland and adjacent upland areas. The data collection and analysis were performed based on the methods described in the Northcentral Northeast Regional Supplement to the 1987 USACE Wetlands Delineation Manual. Wetland boundaries were flagged in the field with pink ribbon marked "Wetland Boundary" and the flagged points were surveyed using GPS equipment with sub-foot accuracy.



Results

The results indicated wetlands exist within the proposed project limits. The identified wetlands are Palustrine Forested Broad-Leaved Deciduous (PFO1). The stream that runs through the delineated area is classified as Palustrine Unconsolidated Bottom Sand (PUB2) in the north and then transitioned to Palustrine Unconsolidated Bottom Organic (PUB4) in the south and is protected by Part 301 Inland Lakes and Streams, of the Natural Resources and Environmental Protection Act, 1994, PA 451.

Supporting Documentation

The following attachments contain supporting documentation, including the site map that depicts the wetland boundaries/sampling locations and the corresponding field data sheets required as part of an EGLE joint permit application.

- Attachment #1: Wetland Delineation Site Map
- Attachment #2: Wetland Field Data Sheets
- Attachment #3: National Cooperative Soil Survey Map
- Attachment #4: EGLE Wetland Inventory Map

Regulatory Discussion

Our understanding of the current rules is that a wetland is regulated under Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, if it meets one or more of the following criteria:

- Greater than five acres in size.
- Connected to, or located within 1,000 feet of, one of the Great Lakes or Lake St. Clair.
- Connected to, or located within 500 feet of, an inland lake, pond, river, or stream.
- Non-contiguous wetlands less than five acres in size that are on the list of rare and imperiled wetlands.
- Non-contiguous wetlands less than five acres with the documented presence of state or federal endangered or threatened species.

Based on the field investigation it was determined that wetlands are present within the project area boundary provided and are regulated as the flagged wetlands are connected to, or located within 500 feet of the Ashcroft-Sherwood Drain.



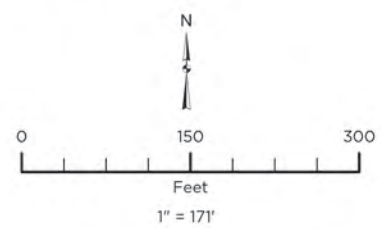
Wetland Delineation Map

Rouge Park Area 3

Detroit Water & Sewer District

- Upland
- Wetland
- Wetland Flag
- Wetland Boundary
- Wetland Polygon

*Green boundaries have been delineated. Orange boundaries are approximate or regulated by Part 301 regulations.



OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere

Map Published: January 31, 2023



WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
<u>Herb Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
_____ = Total Cover				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
<u>Woody Vine Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				Hydrophytic Vegetation Present? Yes _____ No _____
Remarks: (Include photo numbers here or on a separate sheet.)				

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: _____ City/County: _____ Sampling Date: _____
 Applicant/Owner: _____ State: _____ Sampling Point: _____
 Investigator(s): _____ Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No _____ If yes, optional Wetland Site ID: _____
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)	Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No _____ Depth (inches): _____ Water Table Present? Yes _____ No _____ Depth (inches): _____ Saturation Present? Yes _____ No _____ Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes _____ No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:	
Remarks:	

VEGETATION – Use scientific names of plants.

Sampling Point: _____

<u>Tree Stratum</u> (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	
1. _____	_____	_____	_____	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A) Total Number of Dominant Species Across All Strata: _____ (B) Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
	_____ = Total Cover			Prevalence Index worksheet: _____ Total % Cover of: _____ Multiply by: OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<u>Sapling/Shrub Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
	_____ = Total Cover			Hydrophytic Vegetation Indicators: ___ 1 - Rapid Test for Hydrophytic Vegetation ___ 2 - Dominance Test is >50% ___ 3 - Prevalence Index is ≤3.0 ¹ ___ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) ___ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
<u>Herb Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
9. _____	_____	_____	_____	
10. _____	_____	_____	_____	
11. _____	_____	_____	_____	
12. _____	_____	_____	_____	
	_____ = Total Cover			Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
<u>Woody Vine Stratum</u> (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
	_____ = Total Cover			Hydrophytic Vegetation Present? Yes _____ No _____
Remarks: (Include photo numbers here or on a separate sheet.)				



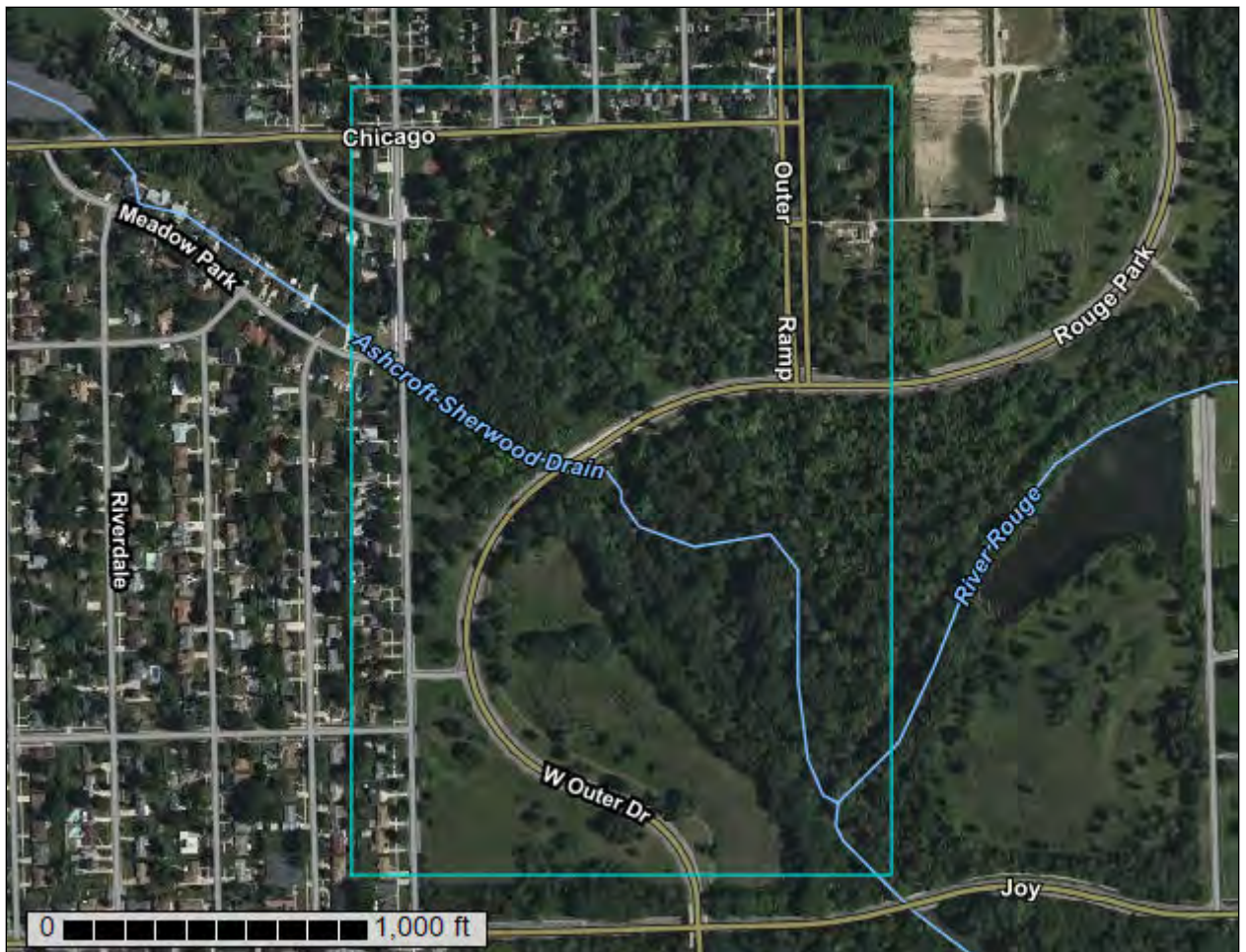
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Wayne County, Michigan



Soil Map

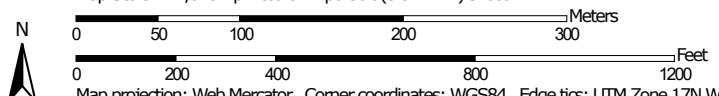
The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Soil Map may not be valid at this scale.

Map Scale: 1:4,620 if printed on A portrait (8.5" x 11") sheet.




Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)


Soils


 Soil Map Unit Polygons


 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit


 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water


 Perennial Water

 Rock Outcrop


 Saline Spot

 Sandy Spot

 Severely Eroded Spot


 Sinkhole

 Slide or Slip


 Sodic Spot

 Spoil Area

 Stony Spot


 Very Stony Spot

 Wet Spot


 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wayne County, Michigan
 Survey Area Data: Version 8, Aug 29, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 5, 2020—Aug 12, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Custom Soil Resource Report

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BrmhcB	Brems loamy sand, loamy substratum, 0 to 4 percent slopes	5.8	5.4%
BrmucB	Brems-Urban land complex, loamy substratum, 0 to 4 percent slopes	0.4	0.4%
CeraaA	Ceresco-Sloan complex, 0 to 3 percent slopes	25.0	23.5%
CerabA	Ceresco-Sloan complex, 0 to 3 percent slopes, protected	2.8	2.6%
FrsuaA	Freesoil-Urban land complex, 0 to 2 percent slopes	3.2	3.0%
LvnhbB	Livonia sandy loam, dense substratum, 0 to 4 percent slopes	37.5	35.4%
LvnuB	Livonia-Urban land complex, dense substratum, 0 to 4 percent slopes	19.1	18.0%
RaphbB	Rapson-Belleville sandy loams, dense substratum, 0 to 4 percent slopes	7.6	7.2%
RapubB	Rapson-Urban land-Belleville complex, dense substratum, 0 to 4 percent slopes	3.5	3.3%
W	Water	1.2	1.2%
Totals for Area of Interest		106.1	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Custom Soil Resource Report

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion

Custom Soil Resource Report

of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Custom Soil Resource Report

Wayne County, Michigan**BrmhcB—Brems loamy sand, loamy substratum, 0 to 4 percent slopes****Map Unit Setting**

National map unit symbol: 2whtg
Elevation: 580 to 640 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Brems, human transported surface, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Brems, Human Transported Surface**Setting**

Landform: Deltas, nearshore zones (relict), drainageways
Down-slope shape: Linear
Across-slope shape: Convex, linear
Parent material: Sandy human-transported material over sandy glaciolacustrine deposits over loamy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: loamy sand
^Cu - 9 to 12 inches: sand
Ab - 12 to 19 inches: loamy sand
Bwb - 19 to 42 inches: sand
C - 42 to 61 inches: sand
2Cg - 61 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)
Depth to water table: About 36 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: A
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

Custom Soil Resource Report

Minor Components**Livonia, human transported surface**

Percent of map unit: 7 percent
Landform: Deltas, nearshore zones (relict), drainageways
Microfeatures of landform position: Open depressions
Down-slope shape: Linear, concave
Across-slope shape: Convex, linear
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

Plainfield, human transported surface

Percent of map unit: 6 percent
Landform: Deltas, nearshore zones (relict), drainageways
Microfeatures of landform position: Rises
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Ecological site: F099XY004MI - Warm Dry Sandy Ridge
Hydric soil rating: No

Urban land

Percent of map unit: 5 percent
Hydric soil rating: No

Kibbie, human transported surface

Percent of map unit: 2 percent
Landform: Nearshore zones (relict), deltas, drainageways
Microfeatures of landform position: Open depressions
Down-slope shape: Concave, linear
Across-slope shape: Linear, convex
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

BrmucB—Brems-Urban land complex, loamy substratum, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2tx6p
Elevation: 580 to 670 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Brems, human transported surface, and similar soils: 50 percent
Urban land: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Custom Soil Resource Report

Description of Brems, Human Transported Surface**Setting**

Landform: Deltas, nearshore zones (relict), shoals (relict)

Down-slope shape: Linear

Across-slope shape: Convex, linear

Parent material: Sandy human-transported material over sandy glaciolacustrine deposits over loamy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: loamy sand

^Cu - 9 to 12 inches: sand

Ab - 12 to 19 inches: loamy sand

Bwb - 19 to 42 inches: sand

C - 42 to 61 inches: sand

2Cg - 61 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 4 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)

Depth to water table: About 36 to 42 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 35 percent

Gypsum, maximum content: 1 percent

Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)

Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: A

Ecological site: F099XY003MI - Warm Moist Sandy Depression

Hydric soil rating: No

Description of Urban Land**Properties and qualities**

Slope: 0 to 1 percent

Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D

Hydric soil rating: No

Custom Soil Resource Report

Minor Components**Livonia, human transported surface***Percent of map unit: 7 percent**Landform: Deltas, nearshore zones (relict), shoals (relict)**Microfeatures of landform position: Open depressions**Down-slope shape: Linear, concave**Across-slope shape: Convex, linear**Ecological site: F099XY003MI - Warm Moist Sandy Depression**Hydric soil rating: No***Plainfield, human transported surface***Percent of map unit: 6 percent**Landform: Deltas, nearshore zones (relict), shoals (relict)**Microfeatures of landform position: Rises**Down-slope shape: Linear, convex**Across-slope shape: Convex, linear**Ecological site: F099XY004MI - Warm Dry Sandy Ridge**Hydric soil rating: No***Kibbie, human transported surface***Percent of map unit: 2 percent**Landform: Nearshore zones (relict), deltas, shoals (relict)**Microfeatures of landform position: Open depressions**Down-slope shape: Concave, linear**Across-slope shape: Linear, convex**Ecological site: F099XY007MI - Lake Plain Flats**Hydric soil rating: No***CeraaA—Ceresco-Sloan complex, 0 to 3 percent slopes****Map Unit Setting***National map unit symbol: 2tx70**Elevation: 570 to 690 feet**Mean annual precipitation: 28 to 38 inches**Mean annual air temperature: 45 to 52 degrees F**Frost-free period: 135 to 210 days**Farmland classification: Not prime farmland***Map Unit Composition***Ceresco and similar soils: 75 percent**Sloan and similar soils: 25 percent**Estimates are based on observations, descriptions, and transects of the mapunit.***Description of Ceresco****Setting***Landform: Flood plains, natural levees**Down-slope shape: Linear*

Custom Soil Resource Report

Across-slope shape: Linear, convex
Parent material: Loamy alluvium

Typical profile

A - 0 to 10 inches: loam
Bw1 - 10 to 22 inches: loam
Bw2 - 22 to 34 inches: loam
C1 - 34 to 53 inches: silt loam
C2 - 53 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 6 to 12 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Calcium carbonate, maximum content: 50 percent
Maximum salinity: Nonsaline (0.2 to 0.8 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 15.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: B/D
Ecological site: F099XY008MI - Moist Floodplain
Hydric soil rating: No

Description of Sloan**Setting**

Landform: Meander scars, flood plains
Down-slope shape: Linear
Across-slope shape: Concave, linear
Parent material: Loamy alluvium

Typical profile

A - 0 to 10 inches: silt loam
Bg - 10 to 32 inches: silt loam
Cg - 32 to 80 inches: loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Calcium carbonate, maximum content: 32 percent
Maximum salinity: Nonsaline (0.1 to 0.3 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.4 inches)

Custom Soil Resource Report

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: B/D
Ecological site: F099XY009MI - Wet Floodplain
Hydric soil rating: Yes

CerabA—Ceresco-Sloan complex, 0 to 3 percent slopes, protected**Map Unit Setting**

National map unit symbol: 2tx7t
Elevation: 570 to 660 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Ceresco and similar soils: 60 percent
Sloan and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ceresco**Setting**

Landform: Flood plains, natural levees
Down-slope shape: Linear
Across-slope shape: Linear, convex
Parent material: Loamy alluvium

Typical profile

A - 0 to 10 inches: loam
Bw1 - 10 to 22 inches: loam
Bw2 - 22 to 34 inches: loam
C1 - 34 to 53 inches: silt loam
C2 - 53 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 6 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 50 percent
Maximum salinity: Nonsaline (0.2 to 0.8 mmhos/cm)

Custom Soil Resource Report

Available water supply, 0 to 60 inches: Very high (about 15.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: B/D

Ecological site: F099XY008MI - Moist Floodplain

Hydric soil rating: No

Description of Sloan**Setting**

Landform: Meander scars, flood plains

Down-slope shape: Linear

Across-slope shape: Concave, linear

Parent material: Loamy alluvium

Typical profile

A - 0 to 10 inches: silt loam

Bg - 10 to 32 inches: silt loam

Cg - 32 to 80 inches: loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)

Depth to water table: About 0 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 32 percent

Maximum salinity: Nonsaline (0.1 to 0.3 mmhos/cm)

Available water supply, 0 to 60 inches: High (about 11.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: B/D

Ecological site: F099XY009MI - Wet Floodplain

Hydric soil rating: Yes

Minor Components**Urban land**

Percent of map unit: 10 percent

Hydric soil rating: No

Riverfront

Percent of map unit: 5 percent

Landform: Flood plains, natural levees

Down-slope shape: Linear

Across-slope shape: Linear, convex

Ecological site: F099XY008MI - Moist Floodplain

Hydric soil rating: No

Custom Soil Resource Report

FrsuaA—Freesoil-Urban land complex, 0 to 2 percent slopes**Map Unit Setting**

National map unit symbol: 2tx6y
Elevation: 570 to 640 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Freesoil, human transported surface, and similar soils: 55 percent
Urban land: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Freesoil, Human Transported Surface**Setting**

Landform: Drainageways, deltas
Down-slope shape: Linear
Across-slope shape: Concave, linear, convex
Parent material: Loamy human-transported material over loamy glaciolacustrine deposits

Typical profile

^Au - 0 to 9 inches: sandy loam
^Cu - 9 to 12 inches: loam
Ab - 12 to 15 inches: loamy very fine sand
Bwb - 15 to 27 inches: loamy very fine sand
C1 - 27 to 50 inches: loamy very fine sand
C2 - 50 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)
Depth to water table: About 30 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.8 inches)

Custom Soil Resource Report

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: C

Ecological site: F099XY007MI - Lake Plain Flats

Hydric soil rating: No

Description of Urban Land**Properties and qualities**

Slope: 0 to 1 percent

Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: D

Hydric soil rating: No

Minor Components**Anthropotic udorthents**

Percent of map unit: 7 percent

Landform: Deltas, drainageways

Down-slope shape: Linear

Across-slope shape: Convex, linear, concave

Ecological site: F099XY007MI - Lake Plain Flats

Hydric soil rating: No

Colwood, human transported surface

Percent of map unit: 3 percent

Landform: Deltas, drainageways

Microfeatures of landform position: Open depressions

Down-slope shape: Linear, concave

Across-slope shape: Convex, linear, concave

Ecological site: F099XY013MI - Wet Lake Plain Flats

Hydric soil rating: No

LvnhbB—Livonia sandy loam, dense substratum, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2whtz

Elevation: 590 to 640 feet

Mean annual precipitation: 28 to 38 inches

Mean annual air temperature: 45 to 52 degrees F

Frost-free period: 135 to 210 days

Custom Soil Resource Report

Farmland classification: Not prime farmland

Map Unit Composition

Livonia, human transported surface, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Livonia, Human Transported Surface**Setting**

Landform: Deltas

Down-slope shape: Linear

Across-slope shape: Concave, linear

Parent material: Sandy and loamy human-transported material over sandy glaciolacustrine deposits over loamy glaciolacustrine deposits over clayey lodgment till

Typical profile

^Au - 0 to 9 inches: sandy loam

^Cu - 9 to 12 inches: sandy loam

Ab - 12 to 19 inches: loamy sand

Bwb - 19 to 35 inches: sand

C1 - 35 to 54 inches: sand

2C2 - 54 to 62 inches: silt loam

3Cd - 62 to 80 inches: clay

Properties and qualities

Slope: 0 to 4 percent

Depth to restrictive feature: 52 to 77 inches to densic material

Drainage class: Somewhat poorly drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Depth to water table: About 30 to 36 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 35 percent

Gypsum, maximum content: 1 percent

Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)

Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: C

Ecological site: F099XY003MI - Warm Moist Sandy Depression

Hydric soil rating: No

Minor Components**Anthroportic udorthents, dense substratum**

Percent of map unit: 5 percent

Landform: Deltas

Down-slope shape: Linear

Across-slope shape: Concave, linear, convex

Ecological site: F099XY007MI - Lake Plain Flats

Hydric soil rating: No

Custom Soil Resource Report

Urban land

Percent of map unit: 5 percent
Hydric soil rating: No

Brems, human transported surface

Percent of map unit: 3 percent
Landform: Deltas
Microfeatures of landform position: Rises
Down-slope shape: Linear, convex
Across-slope shape: Concave, linear
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

Colwood, human transported surface

Percent of map unit: 2 percent
Landform: Deltas
Microfeatures of landform position: Open depressions
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Ecological site: F099XY013MI - Wet Lake Plain Flats
Hydric soil rating: No

LvnubB—Livonia-Urban land complex, dense substratum, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2tx74
Elevation: 580 to 650 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Livonia, human transported surface, and similar soils: 55 percent
Urban land: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Livonia, Human Transported Surface**Setting**

Landform: Deltas, till-floored lake plains
Down-slope shape: Linear
Across-slope shape: Concave, linear
Parent material: Sandy and loamy human-transported material over sandy glaciolacustrine deposits over loamy glaciolacustrine deposits over clayey lodgment till

Custom Soil Resource Report

Typical profile

^Au - 0 to 9 inches: sandy loam
^Cu - 9 to 12 inches: sandy loam
Ab - 12 to 19 inches: loamy sand
Bwb - 19 to 35 inches: sand
C1 - 35 to 54 inches: sand
2C2 - 54 to 62 inches: silt loam
3Cd - 62 to 80 inches: clay

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: 52 to 77 inches to densic material
Drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 30 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: C
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

Description of Urban Land**Properties and qualities**

Slope: 0 to 1 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components**Anthropogenic udorthents, dense substratum**

Percent of map unit: 5 percent
Landform: Deltas, till-floored lake plains
Down-slope shape: Linear
Across-slope shape: Concave, linear, convex
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

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Brems, human transported surface

Percent of map unit: 3 percent
Landform: Till-floored lake plains, deltas
Microfeatures of landform position: Rises
Down-slope shape: Linear, convex
Across-slope shape: Linear, concave
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

Colwood, human transported surface

Percent of map unit: 2 percent
Landform: Till-floored lake plains, deltas
Microfeatures of landform position: Open depressions
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Ecological site: F099XY013MI - Wet Lake Plain Flats
Hydric soil rating: No

RaphbB—Rapson-Belleville sandy loams, dense substratum, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2whv6
Elevation: 600 to 620 feet
Mean annual precipitation: 28 to 38 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Rapson, human transported surface, and similar soils: 60 percent
Belleville, human transported surface, and similar soils: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rapson, Human Transported Surface**Setting**

Landform: Nearshore zones (relict), deltas
Down-slope shape: Linear
Across-slope shape: Convex, linear
Parent material: Sandy and loamy human-transported material over sandy glaciolacustrine deposits over loamy glaciolacustrine deposits over clayey lodgment till

Typical profile

^Au - 0 to 9 inches: sandy loam
^Cu - 9 to 12 inches: sandy loam

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Bwb1 - 12 to 18 inches: sand
Bwb2 - 18 to 24 inches: sand
Cg1 - 24 to 30 inches: sand
2Cg2 - 30 to 65 inches: silt loam
3Cd - 65 to 80 inches: clay

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: 51 to 70 inches to densic material
Drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 30 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: C
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

Description of Belleville, Human Transported Surface**Setting**

Landform: Nearshore zones (relict), deltas
Down-slope shape: Linear
Across-slope shape: Convex, linear
Parent material: Sandy and loamy human-transported material over sandy glaciolacustrine deposits over loamy till over clayey lodgment till

Typical profile

^Au - 0 to 9 inches: sandy loam
^Cu - 9 to 12 inches: sandy loam
Bg - 12 to 28 inches: sand
2C - 28 to 65 inches: clay loam
3Cd - 65 to 80 inches: clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 51 to 69 inches to densic material
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 24 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 28 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)

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Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: C

Ecological site: F099XY011MI - Warm Wet Sandy Depression

Hydric soil rating: No

Minor Components**Urban land**

Percent of map unit: 5 percent

Hydric soil rating: No

Brems, human transported surface

Percent of map unit: 5 percent

Landform: Nearshore zones (relict), deltas

Microfeatures of landform position: Rises

Down-slope shape: Linear, convex

Across-slope shape: Convex, linear

Ecological site: F099XY003MI - Warm Moist Sandy Depression

Hydric soil rating: No

Anthropotic udorthents, dense substratum

Percent of map unit: 3 percent

Landform: Nearshore zones (relict), deltas

Down-slope shape: Linear

Across-slope shape: Convex, linear

Ecological site: F099XY007MI - Lake Plain Flats

Hydric soil rating: No

Freesoil, human transported surface

Percent of map unit: 2 percent

Landform: Nearshore zones (relict), deltas

Down-slope shape: Linear

Across-slope shape: Convex, linear

Ecological site: F099XY007MI - Lake Plain Flats

Hydric soil rating: No

RapubB—Rapson-Urban land-Belleville complex, dense substratum, 0 to 4 percent slopes**Map Unit Setting**

National map unit symbol: 2v13x

Elevation: 610 to 630 feet

Mean annual precipitation: 28 to 38 inches

Mean annual air temperature: 45 to 52 degrees F

Frost-free period: 135 to 210 days

Farmland classification: Not prime farmland

Custom Soil Resource Report

Map Unit Composition

Rapson, human transported surface, and similar soils: 40 percent

Urban land: 35 percent

Belleville, human transported surface, and similar soils: 15 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rapson, Human Transported Surface**Setting**

Landform: Nearshore zones (relict), deltas

Down-slope shape: Linear

Across-slope shape: Convex, linear

Parent material: Sandy and loamy human-transported material over sandy glaciolacustrine deposits over loamy glaciolacustrine deposits over clayey lodgment till

Typical profile

^Au - 0 to 9 inches: sandy loam

^Cu - 9 to 12 inches: sandy loam

Bwb1 - 12 to 18 inches: sand

Bwb2 - 18 to 24 inches: sand

Cg1 - 24 to 30 inches: sand

2Cg2 - 30 to 65 inches: silt loam

3Cd - 65 to 80 inches: clay

Properties and qualities

Slope: 0 to 4 percent

Depth to restrictive feature: 51 to 70 inches to densic material

Drainage class: Somewhat poorly drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Depth to water table: About 30 to 36 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 35 percent

Gypsum, maximum content: 1 percent

Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)

Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: C

Ecological site: F099XY003MI - Warm Moist Sandy Depression

Hydric soil rating: No

Description of Urban Land**Properties and qualities**

Slope: 0 to 1 percent

Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Custom Soil Resource Report

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Belleville, Human Transported Surface**Setting**

Landform: Nearshore zones (relict), deltas
Down-slope shape: Linear
Across-slope shape: Convex, linear
Parent material: Sandy and loamy human-transported material over sandy glaciolacustrine deposits over loamy till over clayey lodgment till

Typical profile

^Au - 0 to 9 inches: sandy loam
^Cu - 9 to 12 inches: sandy loam
Bg - 12 to 28 inches: sand
2C - 28 to 65 inches: clay loam
3Cd - 65 to 80 inches: clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 51 to 69 inches to densic material
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: About 24 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 28 percent
Gypsum, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.5 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: C
Ecological site: F099XY011MI - Warm Wet Sandy Depression
Hydric soil rating: No

Minor Components**Brems, human transported surface**

Percent of map unit: 5 percent
Landform: Nearshore zones (relict), deltas
Microfeatures of landform position: Rises
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Ecological site: F099XY003MI - Warm Moist Sandy Depression
Hydric soil rating: No

Anthropotic udorthents, dense substratum

Percent of map unit: 3 percent

Custom Soil Resource Report

Landform: Nearshore zones (relict), deltas
Down-slope shape: Linear
Across-slope shape: Convex, linear
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

Freesoil, human transported surface

Percent of map unit: 2 percent
Landform: Nearshore zones (relict), deltas
Down-slope shape: Linear
Across-slope shape: Convex, linear
Ecological site: F099XY007MI - Lake Plain Flats
Hydric soil rating: No

W—Water

Map Unit Setting

National map unit symbol: 6bl8
Elevation: 570 to 720 feet
Mean annual precipitation: 28 to 34 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 140 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition




Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

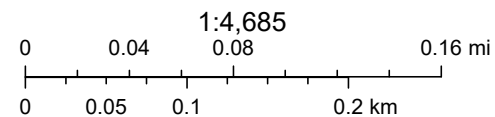
Wetlands Map Viewer



January 31, 2023

Part 303 Final Wetlands Inventory

-  Wetlands as identified on NWI and MIRIS maps
-  Soil areas which include wetland soils
-  Wetlands as identified on NWI and MIRIS maps and soil areas which include wetland soils



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Disclaimer: This map is not intended to be used to determine the specific

DRAFT

Appendix H: SHPO, THPO, U.S. Fish and Wildlife Services, MNFI, and EGLE Resource Division response letters

This section will be updated as the information becomes available and will be submitted with the final project planning document.

[MNFI Home](#) [Contact Us](#) [Plant List](#) [Animal List](#) [Abstracts](#) [Help](#)


Michigan Natural Features Inventory

Web Database Search

MICHIGAN STATE
UNIVERSITY
EXTENSION

Search Results for Town 01S, Range 10E, Section 28 and Wayne County


Query Results Generated on Feb 09, 2023

Displaying Record 1 to 9 of 9 Records Found

Database Updated on Jan 01, 2023

[New Search](#)
[Refine Search](#)
[◀ Previous 25 Records](#)
[Next 25 Records ▶](#)

Abstract	Common Name	Scientific Name	State Status	Federal Status	Last Observed Date	Element Category	Mapping Precision	Site of Observation	Best Documentation of EO	Town	Range	Section	County	MDOT Right of Way
	American lotus	Nelumbo lutea	T		1897-07-09	Plant	U	ROUGE RIVER - DETROIT	Farwell, O.A. 1897. #1564 BLH	01S	10E	4, 5, 9, 16, 21, 27, 28, 33, 34	Wayne	within ROW
	Climbing fumitory	Adlumia fungosa	SC		1929-07-09	Plant	GX	Livonia	Farwell, O.A. 1929. #8467 BLH	01S	10E	6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 31, 32, 33, 34	Wayne	within ROW
	Least shrew	Cryptotis parva	T		1932-11-24	Animal	U	River Rouge Park	Murie, A. 1932. #67093 UMMZ	01S	10E	27, 28, 33, 34	Wayne	
	Rainbow	Villosa iris	SC		1933-07-12	Animal		Middle River Rouge	Goodrich and van der Schalie. 1933-07-12. UMMZ #56961	01S	10E	21, 27, 28	Wayne	within ROW
	Round hickorynut	Obovaria subrotunda	E	PT	1933-07-12	Animal		Middle River Rouge	Goodrich and van der Schalie, 1933-07-12, UMMZ#56962	01S	10E	28	Wayne	within ROW
	Round pigtoe	Pleurobema sintoxia	SC		1933-07-12	Animal		Middle River Rouge	Cooper and van der Schalie, 1933-07-12, UMMZ#56963	01S	10E	28	Wayne	within ROW

	Slippershell	<i>Alasmidonta viridis</i>	T	1933-07-12	Animal		Middle Branch, Ranch Rouge		01S	10E	28	Wayne	within ROW
	Stiff gentian	<i>Gentianella quinquefolia</i>	T	1916-10-08	Plant	GX	DEARBORN	Chandler, B.F. 1916. MICH.	01S	10E	28, 29, 30, 31, 32, 33, 34, 35	Wayne	within ROW
	Twinleaf	<i>Jeffersonia diphylla</i>	SC	1933-SP	Plant	GX	LIVONIA	FARWELL, O.A. 1933. #9362 MICH,BLH	01S	10E	6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 31, 32, 33, 34	Wayne	within ROW

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United States Department of the Interior



FISH AND WILDLIFE SERVICE
Michigan Ecological Services Field Office
2651 Coolidge Road Suite 101
East Lansing, MI 48823-6360
Phone: (517) 351-2555 Fax: (517) 351-1443

In Reply Refer To:

February 16, 2023

Project code: 2023-0046370

Project Name: Schoolcraft Preliminary Outfall Study Area 1

Subject: Verification letter for the project named 'Schoolcraft Preliminary Outfall Study Area 1' for specified threatened and endangered species that may occur in your proposed project location consistent with the Michigan Endangered Species Determination Key (Michigan DKey)

Dear Wade Rose:

The U.S. Fish and Wildlife Service (Service) received on **February 16, 2023** your effect determination(s) for the 'Schoolcraft Preliminary Outfall Study Area 1' (the Action) using the Michigan DKey within the Information for Planning and Consultation (IPaC) system. The Service developed this system in accordance with the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.).

Based on your answers and the assistance of the Service's Michigan DKey, you made the following effect determination(s) for the proposed Action:

Species	Listing Status	Determination
Eastern Massasauga (=rattlesnake) (<i>Sistrurus catenatus</i>)	Threatened	NLAA
Eastern Prairie Fringed Orchid (<i>Platanthera leucophaea</i>)	Threatened	No effect
Indiana Bat (<i>Myotis sodalis</i>)	Endangered	NLAA
Monarch Butterfly (<i>Danaus plexippus</i>)	Candidate	No effect
Northern Long-eared Bat (<i>Myotis septentrionalis</i>)	Threatened	NLAA
Northern Riffleshell (<i>Epioblasma rangiana</i>)	Endangered	No effect
Piping Plover (<i>Charadrius melodus</i>)	Endangered	No effect
Red Knot (<i>Calidris canutus rufa</i>)	Threatened	No effect
Tricolored Bat (<i>Perimyotis subflavus</i>)	Proposed	No effect
	Endangered	

The Service will notify you within 30 calendar days if we determine that this proposed Action does not meet the criteria for a "may affect, not likely to adversely affect" (NLAA) determination

for Federally listed species in Michigan. If we do not notify you within that timeframe, you may proceed with the Action under the terms of the NLAA concurrence provided here. This verification period allows the Michigan Ecological Services Field Office to apply local knowledge to evaluation of the Action, as we may identify a small subset of actions having impacts that were unanticipated. In such instances, the Michigan Ecological Services Field Office may request additional information to verify the effects determination reached through the Michigan DKey.

Your agency has met consultation requirements by informing the Service of your “No Effect” determination(s). No consultation is required for species that you determined will not be affected by the Action.

Please provide sufficient project details on your project homepage in IPaC (Define Project, Project Description) to support your conclusions and the Service’s 30-day review period. Failure to disclose important aspects of your project that would influence the outcome of your effects determinations may negate your determinations and invalidate this letter. If you have site-specific information that leads you to believe a different determination is more appropriate for your project than what the Dkey concludes, you can and should proceed based on the best available information.

The Service recommends that you contact the Service or re-evaluate the project in IPaC if: 1) the scope or location of the proposed Action is changed; 2) new information reveals that the action may affect listed species or designated critical habitat in a manner or to an extent not previously considered; 3) the Action is modified in a manner that causes effects to listed species or designated critical habitat; or 4) a new species is listed or critical habitat designated. If any of the above conditions occurs, additional consultation with the Service should take place before project changes are final or resources committed.

For non-Federal representatives: Please note that when a project requires consultation under section 7 of the Act, the Service must consult directly with the Federal action agency unless that agency formally designates a non-Federal representative (50 CFR 402.08). Non-Federal representatives may prepare analyses or conduct informal consultations; however, the ultimate responsibility for section 7 compliance under the Act remains with the Federal agency. If the Federal agency concurs with your determination, the project as proposed has completed section 7 consultation. All documents and supporting correspondence should be provided to the Federal agency for their records.

Freshwater Mussels:

Based on your answers to the Michigan DKey, the Action will have “No Effect” on Federally listed mussels. **However, state-listed mussels may occur in your Action area. Contact the Michigan Department of Natural Resources to determine effects to state-listed mussels.**

Freshwater mussels are one of the most critically imperiled groups of organisms in the world. In North America, 65% of the remaining 300 species are vulnerable to extinction (Haag and Williams 2014). Implementing measures to conserve and restore freshwater mussel populations directly improves water quality in lakes, rivers, and streams throughout Michigan. An adult freshwater mussel filters anywhere from 1 to 38 gallons of water per day (Baker and Levinton 2003, Barnhart pers. comm. 2019). A 2015 survey found that in some areas mussels can reduce

the bacterial populations by more than 85% (Othman et al. 2015 in Vaughn 2017). Mussels are also considered to be ecosystem engineers, stabilizing substrate and providing habitat for other aquatic organisms (Vaughn 2017). In addition to ecosystem services, mussels play an important role in the food web, contributing critical nutrients to both terrestrial and aquatic habitats, including those that support sport fish (Vaughn 2017). Taking proactive measures to conserve and restore freshwater mussels will improve water quality, which has the potential to positively impact human health and recreation in the State of Michigan.

Bats of Conservation Concern:

Implementing protective measures for bats, including both federally listed and non-listed species, indirectly helps to protect Michigan's agriculture and forests. Bats are significant predators of nocturnal insects, including many crop and forest pests. For example, Whitaker (1995) estimated that a single colony of 150 big brown bats (*Eptesicus fuscus*) would eat nearly 1.3 million pest insects each year. Boyles et al. (2011) noted the "loss of bats in North America could lead to agricultural losses estimated at more than \$3.7 billion/year, and Maine and Boyles (2015) estimated that the suppression of herbivory by insectivorous bats is worth >1 billion USD globally on corn alone. In captive trials, northern long-eared bats were found to significantly reduce the egg-laying activity of mosquitoes, suggesting bats may also play an important role in controlling insect-borne disease (Reiskind and Wund 2009). Mosquitoes have also been found to be a consistent component of the diet of Indiana bats and are eaten most heavily during pregnancy (6.6%; Kurta and Whitaker 1998). Taking proactive steps to help protect bats may be very valuable to agricultural and forest product yields and pest management costs in and around a project area. Such conservation measures include limiting tree clearing during the bat active season (April through October varies by location) and/or the non-volant period (June through July), when young bats are unable to fly, and minimizing the extent of impacts to forests, wetlands, and riparian habitats.

Bald and Golden Eagles:

Bald eagles, golden eagles, and their nests are protected under the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended, 16 U.S.C. 668a-d) (Eagle Act). The Eagle Act prohibits, except when authorized by an Eagle Act permit, the "taking" of bald and golden eagles and defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." The Eagle Act's implementing regulations define disturb as "...to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

If the Action may impact bald or golden eagles, additional coordination with the Service under the Eagle Act may be required. For more information on eagles and conducting activities in the vicinity of an eagle nest, please visit <https://www.fws.gov/library/collections/all-about-eagles>. In addition, the Service developed the National Bald Eagle Management Guidelines (May 2007) in order to assist landowners in avoiding the disturbance of bald eagles. The full Guidelines are available at <https://www.fws.gov/media/national-bald-eagle-management-guidelines-0>.

If you have further questions regarding potential impacts to eagles, please contact Chris Mensing, Chris_Mensing@fws.gov or 517-351-2555.

Monarch butterfly and other pollinators

In December 2020, after an extensive status assessment of the monarch butterfly, we determined that listing the monarch under the Endangered Species Act is warranted but precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants. Therefore, the Service added the monarch butterfly to the candidate list. The Service will review its status each year until we are able to begin developing a proposal to list the monarch.

The Endangered Species Act does not establish protections or consultation requirements for candidate species. Some Federal and State agencies may have policy requirements to consider candidate species in planning. We encourage implementing measures that will remove or reduce threats to these species and possibly make listing unnecessary.

For all projects, we recommend the following best management practices (BMPs) to benefit monarch and other pollinators.

Monarch and Pollinator BMP Recommendations

Consider monarch and other pollinators in your project planning when possible. Many pollinators are declining, including species that pollinate key agricultural crops and help maintain natural plant communities. Planting a diverse group of native plant species will help support the nutritional needs of Michigan's pollinators. We recommend a mix of flowering trees, shrubs, and herbaceous plants so that something is always blooming and pollen is available during the active periods of the pollinators, roughly early spring through fall (mid-March to mid-October). To benefit a wide variety of pollinators, choose a wide range of flowers with diverse colors, heights, structure, and flower shape. It is important to provide host plants for any known butterfly species at your site, including native milkweed for Monarch butterfly. Incorporating a water source (e.g., ephemeral pool or low area) and basking areas (rocks or bare ground) will provide additional resources for pollinators.

Many pollinators need a safe place to build their nests and overwinter. During spring and summer, leave some areas unmowed or minimize the impacts from mowing (e.g., decrease frequency, increase vegetation height). In fall, leave areas unraked and leave plant stems standing. Leave patches of bare soil for ground nesting pollinators.

Avoid or limit pesticide use. Pesticides can kill more than the target pest. Some pesticide residues can kill pollinators for several days after the pesticide is applied. Pesticides can also kill natural predators, which can lead to even worse pest problems.

Planting native wildflowers can also reduce the need to mow and water, improve bank stabilization by reducing erosion, and improve groundwater recharge and water quality.

Resources:

<https://www.fws.gov/initiative/monarchs>

<https://www.fws.gov/library/collections/pollinators>

Wetland impacts:

Section 404 of the Clean Water Act of 1977 (CWA) regulates the discharge of dredged or fill material into waters (including wetlands) of the United States. Regulations require that activities

permitted under the CWA (including wetland permits issued by the Michigan Department of Environment, Great Lakes, and Energy (EGLE)) not jeopardize the continued existence of species listed as endangered or threatened. Permits issued by the U.S. Army Corps of Engineers must also consider effects to listed species pursuant to section 7 of the Endangered Species Act. The Service provides comments to the agencies that may include permit conditions to help avoid or minimize impacts to wildlife resources including listed species. For this project, we consider the conservation measures you agreed to in the determination key and/or as part of your proposed action to be non-discretionary. If you apply for a wetland permit, these conservation measures should be explicitly incorporated as permit conditions. Include a copy of this letter in your wetland permit application to streamline the threatened and endangered species review process.

Bat References

- Boyles, J.G., P.M. Cryan, G.F. McCracken, T.H. Kunz. 2011. Economic Importance of Bats in Agriculture. *Science* 332(1):41-42.
- Kurta, A. and J.O. Whitaker. 1998. Diet of the Endangered Indiana Bat (*Myotis sodalis*) on the Northern Edge of Its Range. *The American Midland Naturalist* 140(2):280-286.
- Reiskind, M.H. and M.A. Wund. 2009. Experimental assessment of the impacts of northern long-eared bats on ovipositing *Culex* (Diptera: Culicidae) mosquitoes. *Journal of Medical Entomology* 46(5):1037-1044.
- Whitaker, Jr., J.O. 1995. Food of the big brown bat *Eptesicus fuscus* from maternity colonies in Indiana and Illinois. *American Midland Naturalist* 134(2):346-360.

Mussel References

- Baker, S.M. and J. Levinton. 2003. Selective feeding by three native North American freshwater mussels implies food competition with zebra mussels. *Hydrobiologia* 505(1):97-105.
- Haag, W. R. and J.D. Williams, 2014. Biodiversity on the brink: an assessment of conservation strategies for North American freshwater mussels. *Hydrobiologia* 735:45-60.
- Morowski, D., L. James and D. Hunter. 2009. Freshwater mussels in the Clinton River, southeastern Michigan: an assessment of community status. *Michigan Academician* XXXIX: 131-148.
- Othman, F., M.S. Islam, E.N. Sharifah, F. Shahrom-Harrison and A. Hassan. 2015. Biological control of streptococcal infection in Nile tilapia *Oreochromis niloticus* (Linnaeus, 1758) using filter-feeding bivalve mussel *Pilsbryconcha exilis* (Lea, 1838). *Journal of Applied Ichthyology* 31: 724-728.
- Vaughn, C.C. 2017. Ecosystem services provided by freshwater mussels. *Hydrobiologia* DOI: 10.1007/s10750-017-3139-x.

1. The Group 3 is a specific list of stream segments within known counties that contain habitat likely to be occupied by listed mussels (see Michigan Freshwater Mussel Survey Protocol and Relocation Procedures for additional information).

Summary of conservation measures for your project You agreed to the following conservation measures to avoid adverse effects to listed species and our concurrence is only valid if the measures are fully implemented. These must be included as permit conditions if a permit is required and/or included in any contract language.

Eastern massasauga

Materials used for erosion control and site restoration must be wildlife-friendly. Do not use erosion control products containing plastic mesh netting or other similar material that could entangle eastern massasauga rattlesnake (EMR). Several products for soil erosion and control exist that do not contain plastic netting including net-less erosion control blankets (for example, made of excelsior), loose mulch, hydraulic mulch, soil binders, unreinforced silt fences, and straw bales. Others are made from natural fibers (such as jute) and loosely woven together in a manner that allows wildlife to wiggle free.

To increase human safety and awareness of EMR, those implementing the project must first review the EMR factsheet (available at <https://www.fws.gov/media/eastern-massasauga-rattlesnake-fact-sheet>), and watch MDNR's "60-Second Snakes: The Eastern Massasauga Rattlesnake" video (available at https://youtu.be/~PFnXe_e02w).

During project implementation, report sightings of any federally listed species, including EMR, to the Service within 24 hours.

The project will not result in permanent loss of more than one acre of wetland or conversion of more than 10 acres of EMR upland habitat (uplands associated with high quality wetland habitat) to other land uses.

Indiana bat

Any cutting/trimming of potential roost trees for Indiana bat (trees ≥ 5 inches in diameter [at breast height] with cracks, crevices and/or exfoliating bark) must occur OUTSIDE the non-volant ("pup") season for Indiana bat (June 1 through July 31). Prescribed fire and/or pesticide/herbicide application must also occur outside June-July where potential roost trees are present.

Tree cutting/trimming and/or prescribed burning will not clear ≥ 20 contiguous acres of forest or fragment a connective corridor between 2 or more forest patches of at least 5 acres.

Northern long-eared bat

Based on the project area you entered into IPaC, the project does not occur within 0.25 miles of a known northern long-eared bat hibernaculum. Tree removal, as defined in the 4(d) rule, will not occur within 150 feet of a known occupied northern long-eared bat maternity roost tree.

Any cutting/trimming of potential roost trees for northern long-eared bat (trees ≥ 3 inches in diameter [at breast height] with cracks, crevices, cavities, and/or exfoliating bark) will be limited to the inactive season (October 1 through April 14). Prescribed fire and/or pesticide/herbicide application will also occur during the inactive season where potential roost trees are present.

Tree cutting/trimming and/or prescribed burning will not clear ≥ 20 contiguous acres of forest or fragment a connective corridor between 2 or more forest patches of at least 5 acres.

Action Description

You provided to IPaC the following name and description for the subject Action.

1. Name

Schoolcraft Preliminary Outfall Study Area 1

2. Description

The following description was provided for the project 'Schoolcraft Preliminary Outfall Study Area 1':

This project is under a feasibility study for the installation of a detention basin with outlet to the Rouge River.

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@42.38413425,-83.2605908387956,14z>



Qualification Interview

1. Are there any possible effects to any listed species or to designated critical habitat from your project or effects from any other actions or projects subsequently made possible by your project?

Select "Yes" even if the expected effects to the species or critical habitat are expected to be 1) extremely unlikely (discountable), 2) can't meaningfully be measured, detected, or evaluated (insignificant), or 3) wholly beneficial.

Select "No" to confirm that the project details and supporting information allow you to conclude that listed species and their habitats will not be exposed to any effects (including discountable, insignificant, or beneficial effects) and therefore, you have made a "no effect" determination for all species. If you are unsure, select YES to answer additional questions about your project.

Yes

2. This determination key is intended to assist the user in the evaluating the effects of their actions on Federally listed species in Michigan. It does not cover other prohibited activities under the Endangered Species Act (e.g., for wildlife: import/export, Interstate or foreign commerce, possession of illegally taken wildlife, purposeful take for scientific purposes or to enhance the survival of a species, etc.; for plants: import/export, reduce to possession, malicious destruction on Federal lands, commercial sale, etc.) or other statutes. Click yes to acknowledge that you must consider other prohibitions of the ESA or other statutes outside of this determination key.

Yes

3. Is the action the approval of a long-term (i.e., in effect greater than 10 years) permit, plan, or other action? (e.g., a new or re-issued hydropower license, a land management plan, or other kinds of documents that provide direction for projects or actions that may be conducted over a long term (>10 years) without the need for additional section 7 consultation).

No

4. Is the action being funded, authorized, or carried out by a Federal agency?

Yes

5. Does the action involve the installation or operation of wind turbines?

No

6. Are there at least 30 days prior to your action occurring? Endangered species consultation must be completed before taking any action that may have effects to listed species. The Service also needs 30 days to review projects before we can verify conclusions in some dkey output letters. For example, if you have already started some components of the project on the ground (e.g., removed vegetation) before completing this key, answer “no” to this question. The only exception is if you have a Michigan Field Office pre-approved emergence survey (i.e., if you have conducted pre-approved emergence surveys for listed bats before tree removal, you can still answer yes to this question).

Yes

7. Does the action involve constructing a new communication tower or modifying an existing communications tower?

No

8. Does the activity involve aerial or other large-scale application of any chemical (including insecticide, herbicide, etc.)?

No

9. Does your project include water withdrawal (ground or surface water) greater than 10,000 gallons/day?

No

10. Will your action permanently affect hydrology?

No

11. Will your action temporarily affect hydrology?

No

12. Will your project have any direct impacts to a stream or river (e.g., Horizontal Directional Drilling (HDD), hydrostatic testing, stream/road crossings, new storm-water outfall discharge, dams, other in-stream work, etc.)?

Yes

13. Does your project have the potential to indirectly impact the stream/river or the riparian zone (e.g., cut and fill, horizontal directional drilling, hydrostatic testing, construction, vegetation removal, discharge, etc.)?

Yes

14. Are you applying for one of the following Michigan EGLE/Army Corps of Engineers joint permit application Minor Permit (MP) Categories:
MP 3 - Boat Hoist; MP 5 - Boal Wells; MP 7 - Completed Enforcement Actions; MP 12 - Dock;
MP 21 - Fish and Wildlife Habitat Structures;
MP 22 - Ford Stream Crossings for Commercial Forestry Operations;
MP 28 - Maintenance and Repair of Serviceable Structures;
MP 45 - Temporary Recreational Structures;
MP 48 - Wetland Habitat Restoration and Enhancement?

Verify the MP category number and associated description matches your project/application (https://www.michigan.gov/documents/egle/WRD-Minor-Project-Categories_733320_7.pdf). If you don't know what category applies for your project, answer no to this question.

No

15. Are you applying for one of the following Michigan EGLE/Army Corps of Engineers joint permit application General Permit (GP) Categories:
GP A - Aids to Navigation;
GP C - Clear Span Bridge;
GP E - Culverts - Small;
GP J - Dry Fire Hydrant;
GP O - Minor Permit Revisions and Transfers;
GP Q - Mooring Buoy;
GP W - Scientific Measuring Devices;
GP X - Snow Road Stream Crossings for Forestry Operations;
GP Z - Spring Piles and Piling Clusters;
GP DD - Wetland Habitat Restoration and Enhancement?

Verify the GP category number and associated description matches your project/application (https://www.michigan.gov/documents/deq/wrd-general-permit-categories_555828_7.pdf). If you don't know what category applies for your project, answer no to this question.

No

16. Will your action disturb the ground or existing vegetation? This includes any off road vehicle access, soil compaction, digging, seismic survey, directional drilling, heavy equipment, grading, trenching, placement of fill, pesticide application, vegetation management (including removal or maintenance using equipment or chemicals), cultivation, development, etc.

Yes

17. Is the action a utility-scale solar development project?

No

18. [Hidden semantic] Does the action intersect the MOBU AOI?

Automatically answered

Yes

19. Under the ESA, monarchs remain warranted but precluded by listing actions of higher priority. The monarch is a candidate for listing at this time. The Endangered Species Act does not establish protections or consultation requirements for candidate species. Some Federal and State agencies may have policy requirements to consider candidate species in planning. We encourage implementing measures that will remove or reduce threats to these species and possibly make listing unnecessary. If your project will have no effect on monarch butterflies (for example, if your project won't affect their habitat or individuals), then you can make a "no effect" determination for this project. Are you making a "no effect" determination for monarch?

Yes

20. [Hidden Semantic] Does the action intersect the Eastern massasauga rattlesnake area of influence?

Automatically answered

Yes

21. Does your action involve prescribed fire?

No

22. Will this action occur entirely in the Eastern massasauga rattlesnake inactive season (October 16 through April 14)?

No

23. Will this action occur entirely in the Eastern massasauga rattlesnake active season (April 15 through October 15)?

No

24. Will the action result in permanent loss of more than one acre of wetland or conversion of more than 10 acres of uplands of potential Eastern massasauga rattlesnake habitat (uplands associated with high quality wetland habitat) to other land uses?

No

25. Will you use [wildlife safe materials](#) for erosion control and site restoration and eliminate the use of erosion control products containing plastic mesh netting or other similar material that could ensnare Eastern massasauga rattlesnake?

Yes

26. Will you watch MDNR's ["60-Second Snakes: The Eastern Massasauga Rattlesnake \(EMR\)"](#) video, review the [EMR factsheet](#) or call 517-351-2555 to increase human safety and awareness of EMR?

Yes

27. Will all action personnel report any Eastern massasauga rattlesnake observations, or observation of any other listed threatened or endangered species, during action implementation to the Service within 24 hours?
Yes
28. [Semantic] Does the action area intersect the northern riffelshell area of influence?
Automatically answered
Yes
29. [Hidden Semantic] Does the action area intersect the piping plover area of influence?
Automatically answered
Yes
30. [Hidden Semantic] Does the action area intersect the rufa red knot area of influence?
Automatically answered
Yes
31. [Hidden Semantic] Does the action area intersect the area of influence for Eastern prairie fringed orchid?
Automatically answered
Yes
32. [Hidden Semantic] Does the action area intersect the Indiana bat area of influence?
Automatically answered
Yes
33. The project has the potential to affect federally listed bats. Does the action area contain any known or potential bat hibernacula (natural caves, abandoned mines, or underground quarries)?
No
34. Has a presence/absence bat survey or field-based habitat assessment following the Service's Range-wide [Indiana Bat and Northern Long-eared Bat Summer Survey Guidelines](#) been conducted within the action area?
No
35. Does the action involve removal/modification of a human structure (barn, house or other building) known to contain roosting bats?
No
36. Does the action include removal/modification of an existing bridge or culvert?
No
37. Does the action include herbicide application?
No
38. Does the action include tree cutting/trimming, prescribed fire, and/or pesticide (e.g., insecticide, rodenticide) application?
Yes
-

39. Will the action clear >10 acres of contiguous forest (i.e., connected by 1,000 feet or less) or fragment a riparian or other connective forested corridor (e.g., tree line) between 2 or more forest patches of at least 5 acres? For more information, see [Appendix II](#).

No

40. Does the action area contain potential NLEB bat roost trees (trees ≥ 3 inches in diameter [at breast height] with cracks, crevices, cavities and/or exfoliating bark)? For more information, see [Appendix IV](#).

Yes

41. Does the action area contain potential Indiana bat roost trees (trees ≥ 5 inches in diameter [at breast height] with cracks, crevices and/or exfoliating bark)? For more information, see [Appendix III](#).

Yes

42. Does the action include emergency cutting/trimming of hazard trees in order to prevent imminent loss of human life and/or property?

No

43. [Semantic] Is any portion of the action area within 5 miles of a known Indiana or northern long-eared bat hibernaculum?

Automatically answered

No

44. [Semantic] Does the action area intersect the Michigan Modeled Indiana Bat Habitat?

Automatically answered

Yes

45. Your project intersected modeled Indiana bat habitat.

Will all tree cutting/trimming, prescribed fire, and/or pesticide application be restricted to the inactive (hibernation) season for listed bats (that is, conducted during October 1 through April 14)?

Yes

46. Will the action clear >10 acres of modeled Indiana bat habitat?

To determine whether it is >10 acres, you can download the shapefile or kmz here: [Indiana bat model](#). For more information on the development of the Indiana bat habitat suitability model, see [Appendix I](#).

No

47. [Hidden Semantic] Does the action area intersect the Indiana bat AOI?

Automatically answered

Yes

48. [Hidden Semantic] Does this project intersect the northern long-eared bat area of influence?

Automatically answered

Yes

49. Is the project action area located within 0.25 miles of a known northern long-eared bat hibernaculum?

Automatically answered

No

50. Will the action involve Tree Removal as defined in the 4(d) rule for northern long-eared bat?

No

51. [Hidden Semantic] Does the action area intersect the Indiana bat AOI?

Automatically answered

Yes

52. Will all tree cutting/trimming, prescribed fire, and/or pesticide/herbicide application be restricted to the inactive (hibernation) season for northern long-eared bat (that is, conducted during October 1 through April 14)?

Yes

53. [Hidden semantic] Does the action intersect the Tricolored bat AOI/SLA/range?

Automatically answered

Yes

54. The tricolored bat was proposed for listing as endangered on September 13, 2022. In Michigan, the tricolored bat was rare pre-white nose syndrome (WNS) and is exceedingly rare post-WNS. The species has been observed in 12 Michigan counties to date, largely during the fall or winter. With very few exceptions, the species has not been observed in Michigan in the summer months, and no maternity colonies have been found. During winter, tricolored bats hibernate in caves, abandoned mines, and abandoned tunnels ranging from small to large in size. During spring, summer and fall months, they roost primarily among leaf clusters of live or recently dead deciduous/hardwood trees.

Are you making a no effect determination on this project for the tricolored bat?

Yes

IPaC User Contact Information

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United States Department of the Interior



FISH AND WILDLIFE SERVICE
Michigan Ecological Services Field Office
2651 Coolidge Road Suite 101
East Lansing, MI 48823-6360
Phone: (517) 351-2555 Fax: (517) 351-1443

In Reply Refer To:
Project Code: 2023-0046370
Project Name: Schoolcraft Preliminary Outfall Study Area 1

February 16, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

Official Species List

The attached species list identifies any Federally threatened, endangered, proposed and candidate species that may occur within the boundary of your proposed project or may be affected by your proposed project. The list also includes designated critical habitat if present within your proposed project area or affected by your project. This list is provided to you as the initial step of the consultation process required under section 7(c) of the Endangered Species Act, also referred to as Section 7 Consultation.

Under 50 CFR 402.12(e) (the regulations that implement section 7 of the Endangered Species Act), the accuracy of this species list should be verified after 90 days. You may verify the list by visiting the IPaC website (<https://ipac.ecosphere.fws.gov/>) at regular intervals during project planning and implementation. To update an Official Species List in IPaC: from the My Projects page, find the project, expand the row, and click Project Home. In the What's Next box on the Project Home page, there is a Request Updated List button to update your species list. Be sure to select an "official" species list for all projects.

Consultation requirements and next steps

Section 7 of the Endangered Species Act of 1973 requires that actions authorized, funded, or carried out by Federal agencies not jeopardize Federally threatened or endangered species or adversely modify designated critical habitat. To fulfill this mandate, Federal agencies (or their designated non-Federal representative) must consult with the Fish and Wildlife Service if they determine their project may affect listed species or critical habitat.

There are two approaches to evaluating the effects of a project on listed species.

Approach 1. Use the All-species Michigan determination key in IPaC. This tool can assist you in making determinations for listed species for some projects. In many cases, the determination key

will provide an automated concurrence that completes all or significant parts of the consultation process. Therefore, we strongly recommend screening your project with the **All-Species Michigan Determination Key (Dkey)**. For additional information on using IPaC and available Determination Keys, visit <https://www.fws.gov/media/mifo-ipac-instructions> (and click on the attachment). Please carefully review your Dkey output letter to determine whether additional steps are needed to complete the consultation process.

Approach 2. Evaluate the effects to listed species on your own without utilizing a determination key. Once you obtain your official species list, you are not required to continue in IPaC, although in most cases using a determination key should expedite your review. If the project is a Federal action, you should review our section 7 step-by-step instructions before making your determinations: <https://www.fws.gov/office/midwest-region-headquarters/midwest-section-7-technical-assistance>. If you evaluate the details of your project and conclude “no effect,” document your findings, and your listed species review is complete; you do not need our concurrence on “no effect” determinations. If you cannot conclude “no effect,” you should coordinate/consult with the Michigan Ecological Services Field Office. The preferred method for submitting your project description and effects determination (if concurrence is needed) is electronically to EastLansing@fws.gov. Please include a copy of this official species list with your request.

For all **wind energy projects** and **projects that include installing communications towers that use guy wires**, please contact this field office directly for assistance, even if no Federally listed plants, animals or critical habitat are present within your proposed project area or may be affected by your proposed project.

Migratory Birds

Please see the “Migratory Birds” section below for important information regarding incorporating migratory birds into your project planning. Our Migratory Bird Program has developed recommendations, best practices, and other tools to help project proponents voluntarily reduce impacts to birds and their habitats. The Bald and Golden Eagle Protection Act prohibits the take and disturbance of eagles without a permit. If your project is near an eagle nest or winter roost area, see our Eagle Permits website at <https://www.fws.gov/program/eagle-management/eagle-permits> to help you avoid impacting eagles or determine if a permit may be necessary.

Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your consideration of threatened and endangered species during your project

planning. Please include a copy of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
 - USFWS National Wildlife Refuges and Fish Hatcheries
 - Migratory Birds
 - Wetlands
-

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Michigan Ecological Services Field Office

2651 Coolidge Road Suite 101

East Lansing, MI 48823-6360

(517) 351-2555

Project Summary

Project Code: 2023-0046370

Project Name: Schoolcraft Preliminary Outfall Study Area 1

Project Type: New Constr - Above Ground

Project Description: This project is under a feasibility study for the installation of a detention basin with outlet to the Rouge River.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@42.38413425,-83.2605908387956,14z>



Counties: Wayne County, Michigan

Endangered Species Act Species

There is a total of 9 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 2 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Indiana Bat <i>Myotis sodalis</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949 General project design guidelines: https://ipac.ecosphere.fws.gov/project/C7INKGE5RVFQXBWDX2IONDCUWU/documents/generated/6982.pdf	Endangered
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045 General project design guidelines: https://ipac.ecosphere.fws.gov/project/C7INKGE5RVFQXBWDX2IONDCUWU/documents/generated/6983.pdf	Threatened
Tricolored Bat <i>Perimyotis subflavus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Birds

NAME	STATUS
Piping Plover <i>Charadrius melodus</i> Population: [Great Lakes watershed DPS] - Great Lakes, watershed in States of IL, IN, MI, MN, NY, OH, PA, and WI and Canada (Ont.) There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Endangered
Red Knot <i>Calidris canutus rufa</i> There is proposed critical habitat for this species. This species only needs to be considered under the following conditions: <ul style="list-style-type: none"> Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened

Reptiles

NAME	STATUS
Eastern Massasauga (=rattlesnake) <i>Sistrurus catenatus</i> No critical habitat has been designated for this species. This species only needs to be considered under the following conditions: <ul style="list-style-type: none"> For all Projects: Project is within EMR Range Species profile: https://ecos.fws.gov/ecp/species/2202 General project design guidelines: https://ipac.ecosphere.fws.gov/project/C7INKGE5RVFQXBWDX2IONDCUWU/documents/generated/5280.pdf	Threatened

Clams

NAME	STATUS
Northern Riffleshell <i>Epioblasma rangiana</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/527	Endangered

Insects

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Eastern Prairie Fringed Orchid <i>Platanthera leucophaea</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/601	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

-
1. The [Migratory Birds Treaty Act](#) of 1918.
 2. The [Bald and Golden Eagle Protection Act](#) of 1940.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern \(BCC\)](#) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Dec 1 to Aug 31
Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10

NAME	BREEDING SEASON
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Golden-winged Warbler <i>Vermivora chrysoptera</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability Of Presence Summary

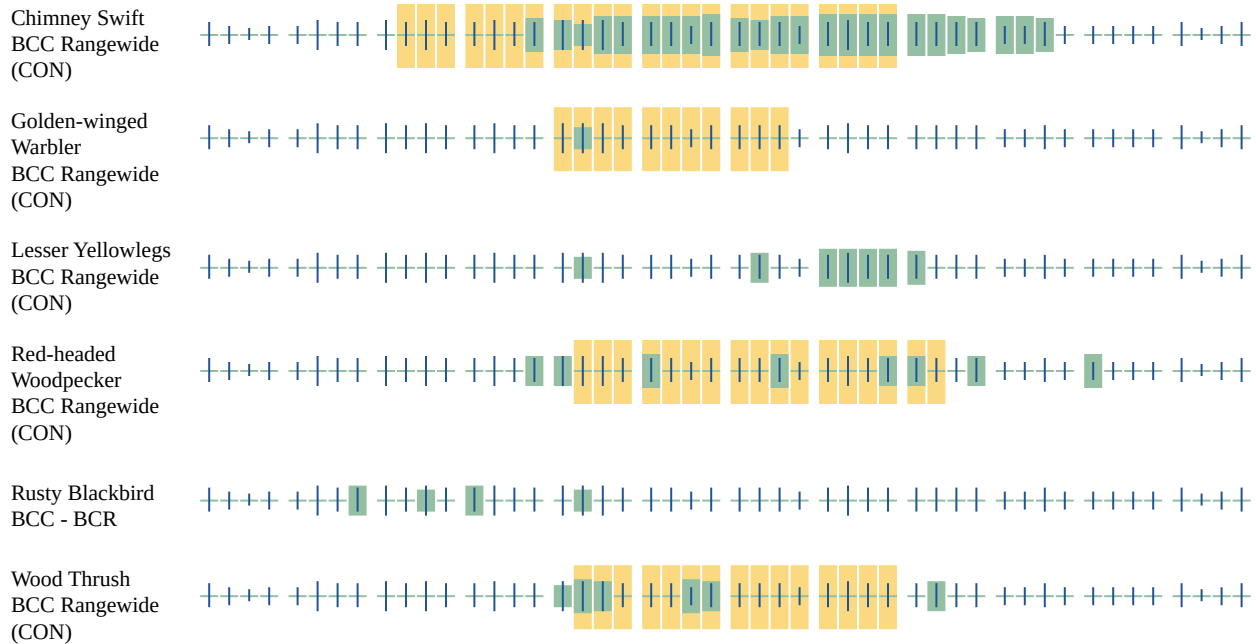
The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for



Additional information can be found using the following links:

- Birds of Conservation Concern <https://www.fws.gov/program/migratory-birds/species>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [Rapid Avian Information Locator \(RAIL\) Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the [RAIL Tool](#) and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
 2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
 3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).
-

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

RIVERINE

- [R2UBH](#)
-

IPaC User Contact Information

Agency: Detroit city

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State: MI

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Email: wade.rose@ohm-advisors.com

Phone: 2482914573

[MNFI Home](#) [Contact Us](#) [Plant List](#) [Animal List](#) [Abstracts](#) [Help](#)


Michigan Natural Features Inventory

Web Database Search

MICHIGAN STATE
UNIVERSITY
EXTENSION

Search Results for Town 01S, Range 10E, Section 28 and Wayne County


Query Results Generated on Feb 09, 2023

Displaying Record 1 to 9 of 9 Records Found

Database Updated on Jan 01, 2023

[New Search](#)
[Refine Search](#)
[◀ Previous 25 Records](#)
[Next 25 Records ▶](#)

Abstract	Common Name	Scientific Name	State Status	Federal Status	Last Observed Date	Element Category	Mapping Precision	Site of Observation	Best Documentation of EO	Town	Range	Section	County	MDOT Right of Way
	American lotus	Nelumbo lutea	T		1897-07-09	Plant	U	ROUGE RIVER - DETROIT	Farwell, O.A. 1897. #1564 BLH	01S	10E	4, 5, 9, 16, 21, 27, 28, 33, 34	Wayne	within ROW
	Climbing fumitory	Adlumia fungosa	SC		1929-07-09	Plant	GX	Livonia	Farwell, O.A. 1929. #8467 BLH	01S	10E	6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 31, 32, 33, 34	Wayne	within ROW
	Least shrew	Cryptotis parva	T		1932-11-24	Animal	U	River Rouge Park	Murie, A. 1932. #67093 UMMZ	01S	10E	27, 28, 33, 34	Wayne	
	Rainbow	Villosa iris	SC		1933-07-12	Animal		Middle River Rouge	Goodrich and van der Schalie. 1933-07-12. UMMZ #56961	01S	10E	21, 27, 28	Wayne	within ROW
	Round hickorynut	Obovaria subrotunda	E	PT	1933-07-12	Animal		Middle River Rouge	Goodrich and van der Schalie, 1933-07-12, UMMZ#56962	01S	10E	28	Wayne	within ROW
	Round pigtoe	Pleurobema sintoxia	SC		1933-07-12	Animal		Middle River Rouge	Cooper and van der Schalie, 1933-07-12, UMMZ#56963	01S	10E	28	Wayne	within ROW

	Slippershell	<i>Alasmidonta viridis</i>	T	1933-07-12	Animal		Middle Branch, Ranch Rouge		01S	10E	28	Wayne	within ROW
	Stiff gentian	<i>Gentianella quinquefolia</i>	T	1916-10-08	Plant	GX	DEARBORN	Chandler, B.F. 1916. MICH.	01S	10E	28, 29, 30, 31, 32, 33, 34, 35	Wayne	within ROW
	Twinleaf	<i>Jeffersonia diphylla</i>	SC	1933-SP	Plant	GX	LIVONIA	FARWELL, O.A. 1933. #9362 MICH,BLH	01S	10E	6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 31, 32, 33, 34	Wayne	within ROW

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United States Department of the Interior



FISH AND WILDLIFE SERVICE
Michigan Ecological Services Field Office
2651 Coolidge Road Suite 101
East Lansing, MI 48823-6360
Phone: (517) 351-2555 Fax: (517) 351-1443

In Reply Refer To:

February 17, 2023

Project code: 2023-0046694

Project Name: Schoolcraft Preliminary Outfall Study Area 2

Subject: Verification letter for the project named 'Schoolcraft Preliminary Outfall Study Area 2' for specified threatened and endangered species that may occur in your proposed project location consistent with the Michigan Endangered Species Determination Key (Michigan DKey)

Dear Wade Rose:

The U.S. Fish and Wildlife Service (Service) received on **February 17, 2023** your effect determination(s) for the 'Schoolcraft Preliminary Outfall Study Area 2' (the Action) using the Michigan DKey within the Information for Planning and Consultation (IPaC) system. The Service developed this system in accordance with the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.).

Based on your answers and the assistance of the Service's Michigan DKey, you made the following effect determination(s) for the proposed Action:

Species	Listing Status	Determination
Eastern Massasauga (=rattlesnake) (<i>Sistrurus catenatus</i>)	Threatened	NLAA
Eastern Prairie Fringed Orchid (<i>Platanthera leucophaea</i>)	Threatened	No effect
Indiana Bat (<i>Myotis sodalis</i>)	Endangered	NLAA
Monarch Butterfly (<i>Danaus plexippus</i>)	Candidate	No effect
Northern Long-eared Bat (<i>Myotis septentrionalis</i>)	Threatened	NLAA
Northern Riffleshell (<i>Epioblasma rangiana</i>)	Endangered	No effect
Piping Plover (<i>Charadrius melodus</i>)	Endangered	No effect
Red Knot (<i>Calidris canutus rufa</i>)	Threatened	No effect
Tricolored Bat (<i>Perimyotis subflavus</i>)	Proposed	No effect
	Endangered	

The Service will notify you within 30 calendar days if we determine that this proposed Action does not meet the criteria for a "may affect, not likely to adversely affect" (NLAA) determination

for Federally listed species in Michigan. If we do not notify you within that timeframe, you may proceed with the Action under the terms of the NLAA concurrence provided here. This verification period allows the Michigan Ecological Services Field Office to apply local knowledge to evaluation of the Action, as we may identify a small subset of actions having impacts that were unanticipated. In such instances, the Michigan Ecological Services Field Office may request additional information to verify the effects determination reached through the Michigan DKey.

Your agency has met consultation requirements by informing the Service of your “No Effect” determination(s). No consultation is required for species that you determined will not be affected by the Action.

Please provide sufficient project details on your project homepage in IPaC (Define Project, Project Description) to support your conclusions and the Service’s 30-day review period. Failure to disclose important aspects of your project that would influence the outcome of your effects determinations may negate your determinations and invalidate this letter. If you have site-specific information that leads you to believe a different determination is more appropriate for your project than what the Dkey concludes, you can and should proceed based on the best available information.

The Service recommends that you contact the Service or re-evaluate the project in IPaC if: 1) the scope or location of the proposed Action is changed; 2) new information reveals that the action may affect listed species or designated critical habitat in a manner or to an extent not previously considered; 3) the Action is modified in a manner that causes effects to listed species or designated critical habitat; or 4) a new species is listed or critical habitat designated. If any of the above conditions occurs, additional consultation with the Service should take place before project changes are final or resources committed.

For non-Federal representatives: Please note that when a project requires consultation under section 7 of the Act, the Service must consult directly with the Federal action agency unless that agency formally designates a non-Federal representative (50 CFR 402.08). Non-Federal representatives may prepare analyses or conduct informal consultations; however, the ultimate responsibility for section 7 compliance under the Act remains with the Federal agency. If the Federal agency concurs with your determination, the project as proposed has completed section 7 consultation. All documents and supporting correspondence should be provided to the Federal agency for their records.

Freshwater Mussels:

Based on your answers to the Michigan DKey, the Action will have “No Effect” on Federally listed mussels. **However, state-listed mussels may occur in your Action area. Contact the Michigan Department of Natural Resources to determine effects to state-listed mussels.**

Freshwater mussels are one of the most critically imperiled groups of organisms in the world. In North America, 65% of the remaining 300 species are vulnerable to extinction (Haag and Williams 2014). Implementing measures to conserve and restore freshwater mussel populations directly improves water quality in lakes, rivers, and streams throughout Michigan. An adult freshwater mussel filters anywhere from 1 to 38 gallons of water per day (Baker and Levinton 2003, Barnhart pers. comm. 2019). A 2015 survey found that in some areas mussels can reduce

the bacterial populations by more than 85% (Othman et al. 2015 in Vaughn 2017). Mussels are also considered to be ecosystem engineers, stabilizing substrate and providing habitat for other aquatic organisms (Vaughn 2017). In addition to ecosystem services, mussels play an important role in the food web, contributing critical nutrients to both terrestrial and aquatic habitats, including those that support sport fish (Vaughn 2017). Taking proactive measures to conserve and restore freshwater mussels will improve water quality, which has the potential to positively impact human health and recreation in the State of Michigan.

Bats of Conservation Concern:

Implementing protective measures for bats, including both federally listed and non-listed species, indirectly helps to protect Michigan's agriculture and forests. Bats are significant predators of nocturnal insects, including many crop and forest pests. For example, Whitaker (1995) estimated that a single colony of 150 big brown bats (*Eptesicus fuscus*) would eat nearly 1.3 million pest insects each year. Boyles et al. (2011) noted the "loss of bats in North America could lead to agricultural losses estimated at more than \$3.7 billion/year, and Maine and Boyles (2015) estimated that the suppression of herbivory by insectivorous bats is worth >1 billion USD globally on corn alone. In captive trials, northern long-eared bats were found to significantly reduce the egg-laying activity of mosquitoes, suggesting bats may also play an important role in controlling insect-borne disease (Reiskind and Wund 2009). Mosquitoes have also been found to be a consistent component of the diet of Indiana bats and are eaten most heavily during pregnancy (6.6%; Kurta and Whitaker 1998). Taking proactive steps to help protect bats may be very valuable to agricultural and forest product yields and pest management costs in and around a project area. Such conservation measures include limiting tree clearing during the bat active season (April through October varies by location) and/or the non-volant period (June through July), when young bats are unable to fly, and minimizing the extent of impacts to forests, wetlands, and riparian habitats.

Bald and Golden Eagles:

Bald eagles, golden eagles, and their nests are protected under the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended, 16 U.S.C. 668a-d) (Eagle Act). The Eagle Act prohibits, except when authorized by an Eagle Act permit, the "taking" of bald and golden eagles and defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." The Eagle Act's implementing regulations define disturb as "...to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

If the Action may impact bald or golden eagles, additional coordination with the Service under the Eagle Act may be required. For more information on eagles and conducting activities in the vicinity of an eagle nest, please visit <https://www.fws.gov/library/collections/all-about-eagles>. In addition, the Service developed the National Bald Eagle Management Guidelines (May 2007) in order to assist landowners in avoiding the disturbance of bald eagles. The full Guidelines are available at <https://www.fws.gov/media/national-bald-eagle-management-guidelines-0>.

If you have further questions regarding potential impacts to eagles, please contact Chris Mensing, Chris_Mensing@fws.gov or 517-351-2555.

Monarch butterfly and other pollinators

In December 2020, after an extensive status assessment of the monarch butterfly, we determined that listing the monarch under the Endangered Species Act is warranted but precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants. Therefore, the Service added the monarch butterfly to the candidate list. The Service will review its status each year until we are able to begin developing a proposal to list the monarch.

The Endangered Species Act does not establish protections or consultation requirements for candidate species. Some Federal and State agencies may have policy requirements to consider candidate species in planning. We encourage implementing measures that will remove or reduce threats to these species and possibly make listing unnecessary.

For all projects, we recommend the following best management practices (BMPs) to benefit monarch and other pollinators.

Monarch and Pollinator BMP Recommendations

Consider monarch and other pollinators in your project planning when possible. Many pollinators are declining, including species that pollinate key agricultural crops and help maintain natural plant communities. Planting a diverse group of native plant species will help support the nutritional needs of Michigan's pollinators. We recommend a mix of flowering trees, shrubs, and herbaceous plants so that something is always blooming and pollen is available during the active periods of the pollinators, roughly early spring through fall (mid-March to mid-October). To benefit a wide variety of pollinators, choose a wide range of flowers with diverse colors, heights, structure, and flower shape. It is important to provide host plants for any known butterfly species at your site, including native milkweed for Monarch butterfly. Incorporating a water source (e.g., ephemeral pool or low area) and basking areas (rocks or bare ground) will provide additional resources for pollinators.

Many pollinators need a safe place to build their nests and overwinter. During spring and summer, leave some areas unmowed or minimize the impacts from mowing (e.g., decrease frequency, increase vegetation height). In fall, leave areas unraked and leave plant stems standing. Leave patches of bare soil for ground nesting pollinators.

Avoid or limit pesticide use. Pesticides can kill more than the target pest. Some pesticide residues can kill pollinators for several days after the pesticide is applied. Pesticides can also kill natural predators, which can lead to even worse pest problems.

Planting native wildflowers can also reduce the need to mow and water, improve bank stabilization by reducing erosion, and improve groundwater recharge and water quality.

Resources:

<https://www.fws.gov/initiative/monarchs>

<https://www.fws.gov/library/collections/pollinators>

Wetland impacts:

Section 404 of the Clean Water Act of 1977 (CWA) regulates the discharge of dredged or fill material into waters (including wetlands) of the United States. Regulations require that activities

permitted under the CWA (including wetland permits issued by the Michigan Department of Environment, Great Lakes, and Energy (EGLE)) not jeopardize the continued existence of species listed as endangered or threatened. Permits issued by the U.S. Army Corps of Engineers must also consider effects to listed species pursuant to section 7 of the Endangered Species Act. The Service provides comments to the agencies that may include permit conditions to help avoid or minimize impacts to wildlife resources including listed species. For this project, we consider the conservation measures you agreed to in the determination key and/or as part of your proposed action to be non-discretionary. If you apply for a wetland permit, these conservation measures should be explicitly incorporated as permit conditions. Include a copy of this letter in your wetland permit application to streamline the threatened and endangered species review process.

Bat References

- Boyles, J.G., P.M. Cryan, G.F. McCracken, T.H. Kunz. 2011. Economic Importance of Bats in Agriculture. *Science* 332(1):41-42.
- Kurta, A. and J.O. Whitaker. 1998. Diet of the Endangered Indiana Bat (*Myotis sodalis*) on the Northern Edge of Its Range. *The American Midland Naturalist* 140(2):280-286.
- Reiskind, M.H. and M.A. Wund. 2009. Experimental assessment of the impacts of northern long-eared bats on ovipositing *Culex* (Diptera: Culicidae) mosquitoes. *Journal of Medical Entomology* 46(5):1037-1044.
- Whitaker, Jr., J.O. 1995. Food of the big brown bat *Eptesicus fuscus* from maternity colonies in Indiana and Illinois. *American Midland Naturalist* 134(2):346-360.

Mussel References

- Baker, S.M. and J. Levinton. 2003. Selective feeding by three native North American freshwater mussels implies food competition with zebra mussels. *Hydrobiologia* 505(1):97-105.
- Haag, W. R. and J.D. Williams, 2014. Biodiversity on the brink: an assessment of conservation strategies for North American freshwater mussels. *Hydrobiologia* 735:45-60.
- Morowski, D., L. James and D. Hunter. 2009. Freshwater mussels in the Clinton River, southeastern Michigan: an assessment of community status. *Michigan Academician XXXIX*: 131-148.
- Othman, F., M.S. Islam, E.N. Sharifah, F. Shahrom-Harrison and A. Hassan. 2015. Biological control of streptococcal infection in Nile tilapia *Oreochromis niloticus* (Linnaeus, 1758) using filter-feeding bivalve mussel *Pilsbryconcha exilis* (Lea, 1838). *Journal of Applied Ichthyology* 31: 724-728.
- Vaughn, C.C. 2017. Ecosystem services provided by freshwater mussels. *Hydrobiologia* DOI: 10.1007/s10750-017-3139-x.

1. The Group 3 is a specific list of stream segments within known counties that contain habitat likely to be occupied by listed mussels (see Michigan Freshwater Mussel Survey Protocol and Relocation Procedures for additional information).

Summary of conservation measures for your project You agreed to the following conservation measures to avoid adverse effects to listed species and our concurrence is only valid if the measures are fully implemented. These must be included as permit conditions if a permit is required and/or included in any contract language.

Eastern massasauga

Materials used for erosion control and site restoration must be wildlife-friendly. Do not use erosion control products containing plastic mesh netting or other similar material that could entangle eastern massasauga rattlesnake (EMR). Several products for soil erosion and control exist that do not contain plastic netting including net-less erosion control blankets (for example, made of excelsior), loose mulch, hydraulic mulch, soil binders, unreinforced silt fences, and straw bales. Others are made from natural fibers (such as jute) and loosely woven together in a manner that allows wildlife to wiggle free.

To increase human safety and awareness of EMR, those implementing the project must first review the EMR factsheet (available at <https://www.fws.gov/media/eastern-massasauga-rattlesnake-fact-sheet>), and watch MDNR's "60-Second Snakes: The Eastern Massasauga Rattlesnake" video (available at https://youtu.be/~PFnXe_e02w).

During project implementation, report sightings of any federally listed species, including EMR, to the Service within 24 hours.

The project will not result in permanent loss of more than one acre of wetland or conversion of more than 10 acres of EMR upland habitat (uplands associated with high quality wetland habitat) to other land uses.

Indiana bat

Any cutting/trimming of potential roost trees for Indiana bat (trees ≥ 5 inches in diameter [at breast height] with cracks, crevices and/or exfoliating bark) must occur OUTSIDE the non-volant ("pup") season for Indiana bat (June 1 through July 31). Prescribed fire and/or pesticide/herbicide application must also occur outside June-July where potential roost trees are present.

Tree cutting/trimming and/or prescribed burning will not clear ≥ 20 contiguous acres of forest or fragment a connective corridor between 2 or more forest patches of at least 5 acres.

Northern long-eared bat

Based on the project area you entered into IPaC, the project does not occur within 0.25 miles of a known northern long-eared bat hibernaculum. Tree removal, as defined in the 4(d) rule, will not occur within 150 feet of a known occupied northern long-eared bat maternity roost tree.

Any cutting/trimming of potential roost trees for northern long-eared bat (trees ≥ 3 inches in diameter [at breast height] with cracks, crevices, cavities, and/or exfoliating bark) will be limited to the inactive season (October 1 through April 14). Prescribed fire and/or pesticide/herbicide application will also occur during the inactive season where potential roost trees are present.

Tree cutting/trimming and/or prescribed burning will not clear ≥ 20 contiguous acres of forest or fragment a connective corridor between 2 or more forest patches of at least 5 acres.

Action Description

You provided to IPaC the following name and description for the subject Action.

1. Name

Schoolcraft Preliminary Outfall Study Area 2

2. Description

The following description was provided for the project 'Schoolcraft Preliminary Outfall Study Area 2':

The site is under a feasibility study for installation of inline detention system with an outfall into the Rouge River.

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@42.379624899999996,-83.25941297595425,14z>



QUALIFICATION INTERVIEW

1. Are there any possible effects to any listed species or to designated critical habitat from your project or effects from any other actions or projects subsequently made possible by your project?

Select "Yes" even if the expected effects to the species or critical habitat are expected to be 1) extremely unlikely (discountable), 2) can't meaningfully be measured, detected, or evaluated (insignificant), or 3) wholly beneficial.

Select "No" to confirm that the project details and supporting information allow you to conclude that listed species and their habitats will not be exposed to any effects (including discountable, insignificant, or beneficial effects) and therefore, you have made a "no effect" determination for all species. If you are unsure, select YES to answer additional questions about your project.

Yes

2. This determination key is intended to assist the user in the evaluating the effects of their actions on Federally listed species in Michigan. It does not cover other prohibited activities under the Endangered Species Act (e.g., for wildlife: import/export, Interstate or foreign commerce, possession of illegally taken wildlife, purposeful take for scientific purposes or to enhance the survival of a species, etc.; for plants: import/export, reduce to possession, malicious destruction on Federal lands, commercial sale, etc.) or other statutes. Click yes to acknowledge that you must consider other prohibitions of the ESA or other statutes outside of this determination key.

Yes

3. Is the action the approval of a long-term (i.e., in effect greater than 10 years) permit, plan, or other action? (e.g., a new or re-issued hydropower license, a land management plan, or other kinds of documents that provide direction for projects or actions that may be conducted over a long term (>10 years) without the need for additional section 7 consultation).

No

4. Is the action being funded, authorized, or carried out by a Federal agency?

Yes

5. Does the action involve the installation or operation of wind turbines?

No

6. Are there at least 30 days prior to your action occurring? Endangered species consultation must be completed before taking any action that may have effects to listed species. The Service also needs 30 days to review projects before we can verify conclusions in some dkey output letters. For example, if you have already started some components of the project on the ground (e.g., removed vegetation) before completing this key, answer “no” to this question. The only exception is if you have a Michigan Field Office pre-approved emergence survey (i.e., if you have conducted pre-approved emergence surveys for listed bats before tree removal, you can still answer yes to this question).

Yes

7. Does the action involve constructing a new communication tower or modifying an existing communications tower?

No

8. Does the activity involve aerial or other large-scale application of any chemical (including insecticide, herbicide, etc.)?

No

9. Does your project include water withdrawal (ground or surface water) greater than 10,000 gallons/day?

No

10. Will your action permanently affect hydrology?

No

11. Will your action temporarily affect hydrology?

No

12. Will your project have any direct impacts to a stream or river (e.g., Horizontal Directional Drilling (HDD), hydrostatic testing, stream/road crossings, new storm-water outfall discharge, dams, other in-stream work, etc.)?

Yes

13. Does your project have the potential to indirectly impact the stream/river or the riparian zone (e.g., cut and fill, horizontal directional drilling, hydrostatic testing, construction, vegetation removal, discharge, etc.)?

Yes

14. Are you applying for one of the following Michigan EGLE/Army Corps of Engineers joint permit application Minor Permit (MP) Categories:
MP 3 - Boat Hoist; MP 5 - Boal Wells; MP 7 - Completed Enforcement Actions; MP 12 - Dock;
MP 21 - Fish and Wildlife Habitat Structures;
MP 22 - Ford Stream Crossings for Commercial Forestry Operations;
MP 28 - Maintenance and Repair of Serviceable Structures;
MP 45 - Temporary Recreational Structures;
MP 48 - Wetland Habitat Restoration and Enhancement?

Verify the MP category number and associated description matches your project/application (https://www.michigan.gov/documents/egle/WRD-Minor-Project-Categories_733320_7.pdf). If you don't know what category applies for your project, answer no to this question.

No

15. Are you applying for one of the following Michigan EGLE/Army Corps of Engineers joint permit application General Permit (GP) Categories:
GP A - Aids to Navigation;
GP C - Clear Span Bridge;
GP E - Culverts - Small;
GP J - Dry Fire Hydrant;
GP O - Minor Permit Revisions and Transfers;
GP Q - Mooring Buoy;
GP W - Scientific Measuring Devices;
GP X - Snow Road Stream Crossings for Forestry Operations;
GP Z - Spring Piles and Piling Clusters;
GP DD - Wetland Habitat Restoration and Enhancement?

Verify the GP category number and associated description matches your project/application (https://www.michigan.gov/documents/deq/wrd-general-permit-categories_555828_7.pdf). If you don't know what category applies for your project, answer no to this question.

No

16. Will your action disturb the ground or existing vegetation? This includes any off road vehicle access, soil compaction, digging, seismic survey, directional drilling, heavy equipment, grading, trenching, placement of fill, pesticide application, vegetation management (including removal or maintenance using equipment or chemicals), cultivation, development, etc.

Yes

17. Is the action a utility-scale solar development project?

No

18. [Hidden semantic] Does the action intersect the MOBU AOI?

Automatically answered

Yes

19. Under the ESA, monarchs remain warranted but precluded by listing actions of higher priority. The monarch is a candidate for listing at this time. The Endangered Species Act does not establish protections or consultation requirements for candidate species. Some Federal and State agencies may have policy requirements to consider candidate species in planning. We encourage implementing measures that will remove or reduce threats to these species and possibly make listing unnecessary. If your project will have no effect on monarch butterflies (for example, if your project won't affect their habitat or individuals), then you can make a "no effect" determination for this project. Are you making a "no effect" determination for monarch?

Yes

20. [Hidden Semantic] Does the action intersect the Eastern massasauga rattlesnake area of influence?

Automatically answered

Yes

21. Does your action involve prescribed fire?

No

22. Will this action occur entirely in the Eastern massasauga rattlesnake inactive season (October 16 through April 14)?

No

23. Will this action occur entirely in the Eastern massasauga rattlesnake active season (April 15 through October 15)?

No

24. Will the action result in permanent loss of more than one acre of wetland or conversion of more than 10 acres of uplands of potential Eastern massasauga rattlesnake habitat (uplands associated with high quality wetland habitat) to other land uses?

No

25. Will you use [wildlife safe materials](#) for erosion control and site restoration and eliminate the use of erosion control products containing plastic mesh netting or other similar material that could ensnare Eastern massasauga rattlesnake?

Yes

26. Will you watch MDNR's ["60-Second Snakes: The Eastern Massasauga Rattlesnake \(EMR\)"](#) video, review the [EMR factsheet](#) or call 517-351-2555 to increase human safety and awareness of EMR?

Yes

27. Will all action personnel report any Eastern massasauga rattlesnake observations, or observation of any other listed threatened or endangered species, during action implementation to the Service within 24 hours?
Yes
28. [Semantic] Does the action area intersect the northern riffelshell area of influence?
Automatically answered
Yes
29. [Hidden Semantic] Does the action area intersect the piping plover area of influence?
Automatically answered
Yes
30. [Hidden Semantic] Does the action area intersect the rufa red knot area of influence?
Automatically answered
Yes
31. [Hidden Semantic] Does the action area intersect the area of influence for Eastern prairie fringed orchid?
Automatically answered
Yes
32. [Hidden Semantic] Does the action area intersect the Indiana bat area of influence?
Automatically answered
Yes
33. The project has the potential to affect federally listed bats. Does the action area contain any known or potential bat hibernacula (natural caves, abandoned mines, or underground quarries)?
No
34. Has a presence/absence bat survey or field-based habitat assessment following the Service's Range-wide [Indiana Bat and Northern Long-eared Bat Summer Survey Guidelines](#) been conducted within the action area?
No
35. Does the action involve removal/modification of a human structure (barn, house or other building) known to contain roosting bats?
No
36. Does the action include removal/modification of an existing bridge or culvert?
No
37. Does the action include herbicide application?
No
38. Does the action include tree cutting/trimming, prescribed fire, and/or pesticide (e.g., insecticide, rodenticide) application?
Yes
-

39. Will the action clear >10 acres of contiguous forest (i.e., connected by 1,000 feet or less) or fragment a riparian or other connective forested corridor (e.g., tree line) between 2 or more forest patches of at least 5 acres? For more information, see [Appendix II](#).

No

40. Does the action area contain potential NLEB bat roost trees (trees ≥ 3 inches in diameter [at breast height] with cracks, crevices, cavities and/or exfoliating bark)? For more information, see [Appendix IV](#).

Yes

41. Does the action area contain potential Indiana bat roost trees (trees ≥ 5 inches in diameter [at breast height] with cracks, crevices and/or exfoliating bark)? For more information, see [Appendix III](#).

Yes

42. Does the action include emergency cutting/trimming of hazard trees in order to prevent imminent loss of human life and/or property?

No

43. [Semantic] Is any portion of the action area within 5 miles of a known Indiana or northern long-eared bat hibernaculum?

Automatically answered

No

44. [Semantic] Does the action area intersect the Michigan Modeled Indiana Bat Habitat?

Automatically answered

Yes

45. Your project intersected modeled Indiana bat habitat.

Will all tree cutting/trimming, prescribed fire, and/or pesticide application be restricted to the inactive (hibernation) season for listed bats (that is, conducted during October 1 through April 14)?

Yes

46. Will the action clear >10 acres of modeled Indiana bat habitat?

To determine whether it is >10 acres, you can download the shapefile or kmz here: [Indiana bat model](#). For more information on the development of the Indiana bat habitat suitability model, see [Appendix I](#).

No

47. [Hidden Semantic] Does the action area intersect the Indiana bat AOI?

Automatically answered

Yes

48. [Hidden Semantic] Does this project intersect the northern long-eared bat area of influence?

Automatically answered

Yes

49. Is the project action area located within 0.25 miles of a known northern long-eared bat hibernaculum?

Automatically answered

No

50. Will the action involve Tree Removal as defined in the 4(d) rule for northern long-eared bat?

No

51. [Hidden Semantic] Does the action area intersect the Indiana bat AOI?

Automatically answered

Yes

52. Will all tree cutting/trimming, prescribed fire, and/or pesticide/herbicide application be restricted to the inactive (hibernation) season for northern long-eared bat (that is, conducted during October 1 through April 14)?

Yes

53. [Hidden semantic] Does the action intersect the Tricolored bat AOI/SLA/range?

Automatically answered

Yes

54. The tricolored bat was proposed for listing as endangered on September 13, 2022. In Michigan, the tricolored bat was rare pre-white nose syndrome (WNS) and is exceedingly rare post-WNS. The species has been observed in 12 Michigan counties to date, largely during the fall or winter. With very few exceptions, the species has not been observed in Michigan in the summer months, and no maternity colonies have been found. During winter, tricolored bats hibernate in caves, abandoned mines, and abandoned tunnels ranging from small to large in size. During spring, summer and fall months, they roost primarily among leaf clusters of live or recently dead deciduous/hardwood trees.

Are you making a no effect determination on this project for the tricolored bat?

Yes

IPAC USER CONTACT INFORMATION

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Name: Wade Rose

Address: 34000 Plymouth Rd

City: Livonia

State: MI

Zip: 48150

Email: wade.rose@ohm-advisors.com

Phone: 2482914573



United States Department of the Interior



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In Reply Refer To:
Project Code: 2023-0046694
Project Name: Schoolcraft Preliminary Outfall Study Area 2

February 17, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

Official Species List

The attached species list identifies any Federally threatened, endangered, proposed and candidate species that may occur within the boundary of your proposed project or may be affected by your proposed project. The list also includes designated critical habitat if present within your proposed project area or affected by your project. This list is provided to you as the initial step of the consultation process required under section 7(c) of the Endangered Species Act, also referred to as Section 7 Consultation.

Under 50 CFR 402.12(e) (the regulations that implement section 7 of the Endangered Species Act), the accuracy of this species list should be verified after 90 days. You may verify the list by visiting the IPaC website (<https://ipac.ecosphere.fws.gov/>) at regular intervals during project planning and implementation. To update an Official Species List in IPaC: from the My Projects page, find the project, expand the row, and click Project Home. In the What's Next box on the Project Home page, there is a Request Updated List button to update your species list. Be sure to select an "official" species list for all projects.

Consultation requirements and next steps

Section 7 of the Endangered Species Act of 1973 requires that actions authorized, funded, or carried out by Federal agencies not jeopardize Federally threatened or endangered species or adversely modify designated critical habitat. To fulfill this mandate, Federal agencies (or their designated non-Federal representative) must consult with the Fish and Wildlife Service if they determine their project may affect listed species or critical habitat.

There are two approaches to evaluating the effects of a project on listed species.

Approach 1. Use the All-species Michigan determination key in IPaC. This tool can assist you in making determinations for listed species for some projects. In many cases, the determination key

will provide an automated concurrence that completes all or significant parts of the consultation process. Therefore, we strongly recommend screening your project with the **All-Species Michigan Determination Key (Dkey)**. For additional information on using IPaC and available Determination Keys, visit <https://www.fws.gov/media/mifo-ipac-instructions> (and click on the attachment). Please carefully review your Dkey output letter to determine whether additional steps are needed to complete the consultation process.

Approach 2. Evaluate the effects to listed species on your own without utilizing a determination key. Once you obtain your official species list, you are not required to continue in IPaC, although in most cases using a determination key should expedite your review. If the project is a Federal action, you should review our section 7 step-by-step instructions before making your determinations: <https://www.fws.gov/office/midwest-region-headquarters/midwest-section-7-technical-assistance>. If you evaluate the details of your project and conclude “no effect,” document your findings, and your listed species review is complete; you do not need our concurrence on “no effect” determinations. If you cannot conclude “no effect,” you should coordinate/consult with the Michigan Ecological Services Field Office. The preferred method for submitting your project description and effects determination (if concurrence is needed) is electronically to EastLansing@fws.gov. Please include a copy of this official species list with your request.

For all **wind energy projects** and **projects that include installing communications towers that use guy wires**, please contact this field office directly for assistance, even if no Federally listed plants, animals or critical habitat are present within your proposed project area or may be affected by your proposed project.

Migratory Birds

Please see the “Migratory Birds” section below for important information regarding incorporating migratory birds into your project planning. Our Migratory Bird Program has developed recommendations, best practices, and other tools to help project proponents voluntarily reduce impacts to birds and their habitats. The Bald and Golden Eagle Protection Act prohibits the take and disturbance of eagles without a permit. If your project is near an eagle nest or winter roost area, see our Eagle Permits website at <https://www.fws.gov/program/eagle-management/eagle-permits> to help you avoid impacting eagles or determine if a permit may be necessary.

Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your consideration of threatened and endangered species during your project

planning. Please include a copy of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
 - USFWS National Wildlife Refuges and Fish Hatcheries
 - Migratory Birds
 - Wetlands
-

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Michigan Ecological Services Field Office

2651 Coolidge Road Suite 101

East Lansing, MI 48823-6360

(517) 351-2555

PROJECT SUMMARY

Project Code: 2023-0046694
Project Name: Schoolcraft Preliminary Outfall Study Area 2
Project Type: New Constr - Below Ground
Project Description: The site is under a feasibility study for installation of inline detention system with an outfall into the Rouge River.

Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@42.379624899999996,-83.25941297595425,14z>



Counties: Wayne County, Michigan

ENDANGERED SPECIES ACT SPECIES

There is a total of 9 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 2 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Indiana Bat <i>Myotis sodalis</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949 General project design guidelines: https://ipac.ecosphere.fws.gov/project/I3PZDQNSRFIVKOMGPN2Y35WQE/documents/generated/6982.pdf	Endangered
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045 General project design guidelines: https://ipac.ecosphere.fws.gov/project/I3PZDQNSRFIVKOMGPN2Y35WQE/documents/generated/6983.pdf	Threatened
Tricolored Bat <i>Perimyotis subflavus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

BIRDS

NAME	STATUS
Piping Plover <i>Charadrius melodus</i> Population: [Great Lakes watershed DPS] - Great Lakes, watershed in States of IL, IN, MI, MN, NY, OH, PA, and WI and Canada (Ont.) There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Endangered
Red Knot <i>Calidris canutus rufa</i> There is proposed critical habitat for this species. This species only needs to be considered under the following conditions: <ul style="list-style-type: none"> Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened

REPTILES

NAME	STATUS
Eastern Massasauga (=rattlesnake) <i>Sistrurus catenatus</i> No critical habitat has been designated for this species. This species only needs to be considered under the following conditions: <ul style="list-style-type: none"> For all Projects: Project is within EMR Range Species profile: https://ecos.fws.gov/ecp/species/2202 General project design guidelines: https://ipac.ecosphere.fws.gov/project/I3PZDQNSRFIVKOMGPN2Y35WQE/documents/generated/5280.pdf	Threatened

CLAMS

NAME	STATUS
Northern Riffleshell <i>Epioblasma rangiana</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/527	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

FLOWERING PLANTS

NAME	STATUS
Eastern Prairie Fringed Orchid <i>Platanthera leucophaea</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/601	Threatened

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

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1. The [Migratory Birds Treaty Act](#) of 1918.
 2. The [Bald and Golden Eagle Protection Act](#) of 1940.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern \(BCC\) list](#) or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Dec 1 to Aug 31
Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10

NAME	BREEDING SEASON
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Golden-winged Warbler <i>Vermivora chrysoptera</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

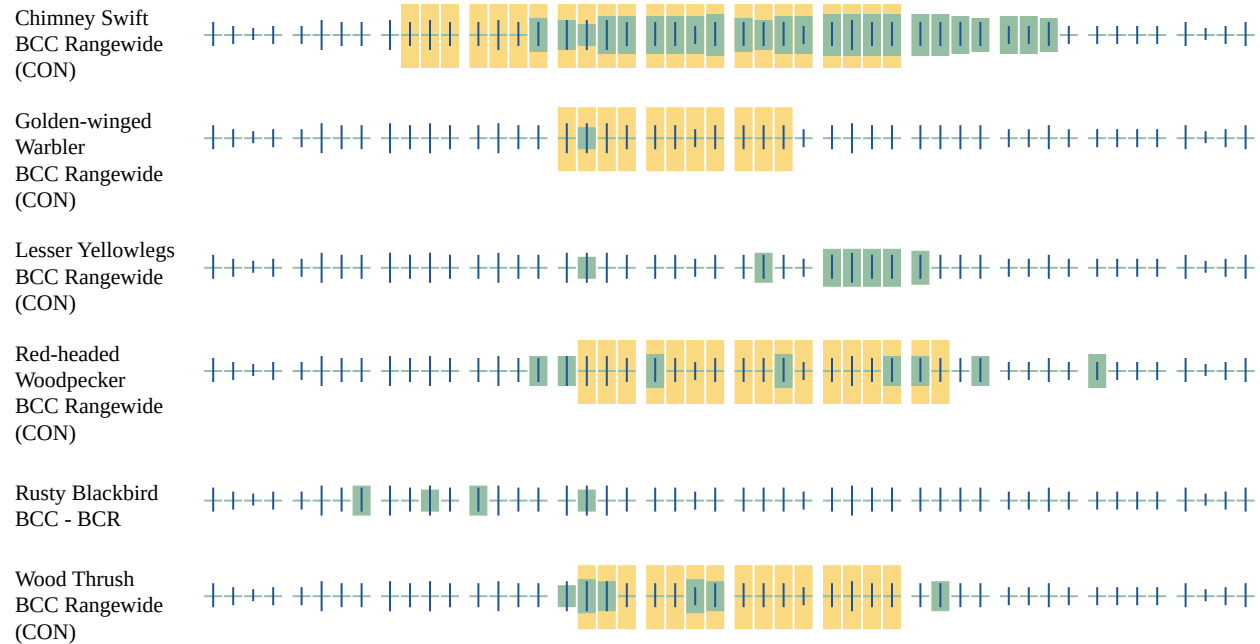
The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for



Additional information can be found using the following links:

- Birds of Conservation Concern <https://www.fws.gov/program/migratory-birds/species>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>

MIGRATORY BIRDS FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [Rapid Avian Information Locator \(RAIL\) Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the [RAIL Tool](#) and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
 2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
 3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).
-

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

WETLANDS

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

RIVERINE

- [R2UBH](#)

FRESHWATER FORESTED/SHRUB WETLAND

- [PFO1C](#)
-

IPAC USER CONTACT INFORMATION

Agency: Detroit city

Name: Wade Rose

Address: 34000 Plymouth Rd

City: Livonia

State: MI

Zip: 48150

Email: wade.rose@ohm-advisors.com

Phone: 2482914573



Michigan Natural Features Inventory

Web Database Search



Search Results for Town 01S, Range 10E, Section 28 and Wayne County

Query Results Generated on Jan 23, 2023

Displaying Record 1 to 9 of 9 Records Found






Database Updated on Jan 01, 2023

[New Search](#)

[Refine Search](#)

[◀ Previous 25 Records](#)

[Next 25 Records ▶](#)

	Common Name	Scientific Name	State Status	Federal Status	Last Observed Date	Element Category	Mapping Precision	Site of Observation	Best Documentation of EO	Town	Range	Section	County
	American lotus	Nelumbo lutea	T		1897-07-09	Plant	U	ROUGE RIVER - DETROIT	Farwell, O.A. 1897. #1564 BLH	01S	10E	4, 5, 9, 16, 21, 27, 28, 33, 34	Wayne
	Climbing fumitory	Adlumia fungosa	SC		1929-07-09	Plant	GX	Livonia	Farwell, O.A. 1929. #8467 BLH	01S	10E	6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 31, 32, 33, 34	Wayne
	Least shrew	Cryptotis parva	T		1932-11-24	Animal	U	River Rouge Park	Murie, A. 1932. #67093 UMMZ	01S	10E	27, 28, 33, 34	Wayne
	Rainbow	Villosa iris	SC		1933-07-12	Animal		Middle River Rouge	Goodrich and van der Schalie. 1933-07-12. UMMZ #56961	01S	10E	21, 27, 28	Wayne
	Round hickorynut	Obovaria subrotunda	E	PT	1933-07-12	Animal		Middle River Rouge	Goodrich and van der Schalie, 1933-07-12, UMMZ#56962	01S	10E	28	Wayne
	Round pigtoe	Pleurobema sintoxia	SC		1933-07-12	Animal		Middle River Rouge	Cooper and van der Schalie, 1933-07-12, UMMZ#56963	01S	10E	28	Wayne
	Slippershell	Alasmidonta viridis	T		1933-07-12	Animal		Middle Branch, Ranch Rouge		01S	10E	28	Wayne

Stiff gentian	<i>Gentianella quinquefolia</i>	T	1916-10-08	Plant	GX	DEARBORN	Chandler, B.F. 1916. MICH.	01S	10E	28, 29, 30, 31, 32, 33, 34, 35	Wayne
Twinleaf	<i>Jeffersonia diphylla</i>	SC	1933-SP	Plant	GX	LIVONIA	FARWELL, O.A. 1933. #9362 MICH,BLH	01S	10E	6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 31, 32, 33, 34	Wayne

[New Search](#)
[Refine Search](#)
[◀ Previous 25 Records](#)
[Next 25 Records ▶](#)



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Michigan Ecological Services Field Office
2651 Coolidge Road Suite 101
East Lansing, MI 48823-6360
Phone: (517) 351-2555 Fax: (517) 351-1443

In Reply Refer To:
Project Code: 2023-0036649
Project Name: West Chicago Detention Basin Area 1

January 23, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

Official Species List

The attached species list identifies any Federally threatened, endangered, proposed and candidate species that may occur within the boundary of your proposed project or may be affected by your proposed project. The list also includes designated critical habitat if present within your proposed project area or affected by your project. This list is provided to you as the initial step of the consultation process required under section 7(c) of the Endangered Species Act, also referred to as Section 7 Consultation.

Under 50 CFR 402.12(e) (the regulations that implement section 7 of the Endangered Species Act), the accuracy of this species list should be verified after 90 days. You may verify the list by visiting the IPaC website (<https://ipac.ecosphere.fws.gov/>) at regular intervals during project planning and implementation. To update an Official Species List in IPaC: from the My Projects page, find the project, expand the row, and click Project Home. In the What's Next box on the Project Home page, there is a Request Updated List button to update your species list. Be sure to select an "official" species list for all projects.

Consultation requirements and next steps

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There are two approaches to evaluating the effects of a project on listed species.

Approach 1. Use the All-species Michigan determination key in IPaC. This tool can assist you in making determinations for listed species for some projects. In many cases, the determination key

will provide an automated concurrence that completes all or significant parts of the consultation process. Therefore, we strongly recommend screening your project with the **All-Species Michigan Determination Key (Dkey)**. For additional information on using IPaC and available Determination Keys, visit <https://www.fws.gov/media/mifo-ipac-instructions> (and click on the attachment). Please carefully review your Dkey output letter to determine whether additional steps are needed to complete the consultation process.

Approach 2. Evaluate the effects to listed species on your own without utilizing a determination key. Once you obtain your official species list, you are not required to continue in IPaC, although in most cases using a determination key should expedite your review. If the project is a Federal action, you should review our section 7 step-by-step instructions before making your determinations: <https://www.fws.gov/office/midwest-region-headquarters/midwest-section-7-technical-assistance>. If you evaluate the details of your project and conclude “no effect,” document your findings, and your listed species review is complete; you do not need our concurrence on “no effect” determinations. If you cannot conclude “no effect,” you should coordinate/consult with the Michigan Ecological Services Field Office. The preferred method for submitting your project description and effects determination (if concurrence is needed) is electronically to EastLansing@fws.gov. Please include a copy of this official species list with your request.

For all **wind energy projects** and **projects that include installing communications towers that use guy wires**, please contact this field office directly for assistance, even if no Federally listed plants, animals or critical habitat are present within your proposed project area or may be affected by your proposed project.

Migratory Birds

Please see the “Migratory Birds” section below for important information regarding incorporating migratory birds into your project planning. Our Migratory Bird Program has developed recommendations, best practices, and other tools to help project proponents voluntarily reduce impacts to birds and their habitats. The Bald and Golden Eagle Protection Act prohibits the take and disturbance of eagles without a permit. If your project is near an eagle nest or winter roost area, see our Eagle Permits website at <https://www.fws.gov/program/eagle-management/eagle-permits> to help you avoid impacting eagles or determine if a permit may be necessary.

Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your consideration of threatened and endangered species during your project

planning. Please include a copy of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
 - USFWS National Wildlife Refuges and Fish Hatcheries
 - Migratory Birds
 - Wetlands
-

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Michigan Ecological Services Field Office

2651 Coolidge Road Suite 101

East Lansing, MI 48823-6360

(517) 351-2555

Project Summary

Project Code: 2023-0036649

Project Name: West Chicago Detention Basin Area 1

Project Type: New Constr - Above Ground

Project Description: The project is in the feasibility stage for the design and construction of a regional detention basin for the West Chicago neighborhood in NW Detroit. The location is heavily forested and lies between an active golf course, a densely populated neighborhood and industrial area and share connectivity to Rouge Park.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@42.3740333,-83.25991611659543,14z>



Counties: Wayne County, Michigan

Endangered Species Act Species

There is a total of 9 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 2 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Indiana Bat <i>Myotis sodalis</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949 General project design guidelines: https://ipac.ecosphere.fws.gov/project/BPGADQENZNFNJJINIKD7W2BSTZU/documents/generated/6982.pdf	Endangered
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045 General project design guidelines: https://ipac.ecosphere.fws.gov/project/BPGADQENZNFNJJINIKD7W2BSTZU/documents/generated/6983.pdf	Endangered
Tricolored Bat <i>Perimyotis subflavus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Birds

NAME	STATUS
Piping Plover <i>Charadrius melodus</i> Population: [Great Lakes watershed DPS] - Great Lakes, watershed in States of IL, IN, MI, MN, NY, OH, PA, and WI and Canada (Ont.) There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Endangered
Red Knot <i>Calidris canutus rufa</i> There is proposed critical habitat for this species. This species only needs to be considered under the following conditions: <ul style="list-style-type: none"> Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened

Reptiles

NAME	STATUS
Eastern Massasauga (=rattlesnake) <i>Sistrurus catenatus</i> No critical habitat has been designated for this species. This species only needs to be considered under the following conditions: <ul style="list-style-type: none"> For all Projects: Project is within EMR Range Species profile: https://ecos.fws.gov/ecp/species/2202 General project design guidelines: https://ipac.ecosphere.fws.gov/project/BPGADQENZNFNJJINIKD7W2BSTZU/documents/generated/5280.pdf	Threatened

Clams

NAME	STATUS
Northern Riffleshell <i>Epioblasma rangiana</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/527	Endangered

Insects

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Eastern Prairie Fringed Orchid <i>Platanthera leucophaea</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/601	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

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1. The [Migratory Birds Treaty Act](#) of 1918.
 2. The [Bald and Golden Eagle Protection Act](#) of 1940.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern \(BCC\) list](#) or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Dec 1 to Aug 31
Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10

NAME	BREEDING SEASON
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Golden-winged Warbler <i>Vermivora chrysoptera</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability Of Presence Summary

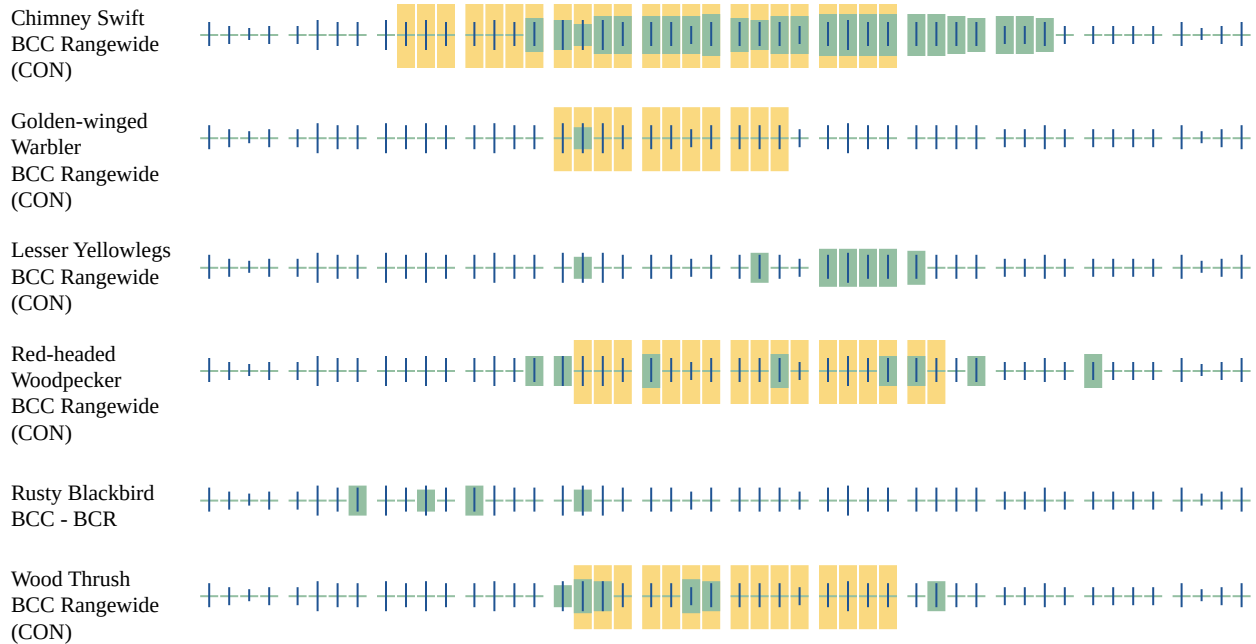
The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for



Additional information can be found using the following links:

- Birds of Conservation Concern <https://www.fws.gov/program/migratory-birds/species>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [Rapid Avian Information Locator \(RAIL\) Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the [RAIL Tool](#) and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
 2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
 3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).
-

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

THERE ARE NO WETLANDS WITHIN YOUR PROJECT AREA.

IPaC User Contact Information

Agency: Detroit city
Name: Wade Rose
Address: 34000 Plymouth Rd
City: Livonia
State: MI
Zip: 48150
Email: wade.rose@ohm-advisors.com
Phone: 2482914573

Lead Agency Contact Information

Lead Agency: Environmental Protection Agency



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Michigan Ecological Services Field Office
2651 Coolidge Road Suite 101
East Lansing, MI 48823-6360
Phone: (517) 351-2555 Fax: (517) 351-1443

In Reply Refer To:
Project code: 2023-0036661
Project Name: West Chicago Detention Basin Area 2
IPaC Record Locator: 667-121839928

February 01, 2023

Subject: Consistency letter for 'West Chicago Detention Basin Area 2' for specified federally threatened and endangered species and designated critical habitat that may occur in your proposed project area consistent with the Michigan Determination Key for project review and guidance for federally listed species (Michigan Dkey).

Dear Wade Rose:

The U.S. Fish and Wildlife Service (Service) received on **February 01, 2023** your effect determination(s) for the 'West Chicago Detention Basin Area 2' (the Action) using the Michigan DKey within the Information for Planning and Consultation (IPaC) system. The Service developed this system in accordance with the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

Based on your answers and the assistance of the Service's Michigan DKey, you made the following effect determination(s) for the proposed Action:

Species	Listing Status	Determination
Eastern Massasauga (=rattlesnake) (<i>Sistrurus catenatus</i>)	Threatened	May affect
Eastern Prairie Fringed Orchid (<i>Platanthera leucophaea</i>)	Threatened	No effect
Indiana Bat (<i>Myotis sodalis</i>)	Endangered	NLAA
Monarch Butterfly (<i>Danaus plexippus</i>)	Candidate	No effect
Northern Long-eared Bat (<i>Myotis septentrionalis</i>)	Threatened	NLAA
Northern Riffleshell (<i>Epioblasma rangiana</i>)	Endangered	No effect
Piping Plover (<i>Charadrius melodus</i>)	Endangered	No effect
Red Knot (<i>Calidris canutus rufa</i>)	Threatened	No effect
Tricolored Bat (<i>Perimyotis subflavus</i>)	Proposed Endangered	No effect

Please carefully review this letter. Your Endangered Species Act requirements are not complete.

For non-Federal representatives: Please note that when a project requires consultation under section 7 of the Act, the Service must consult directly with the Federal action agency unless that agency formally designates a non-Federal representative (50 CFR 402.08). Non-Federal representatives may prepare analyses or conduct informal consultations; however, the ultimate responsibility for section 7 compliance under the Act remains with the Federal agency. Please include the Federal action agency in additional correspondence regarding this project.

Eastern Massasauga (EMR):

EMR may be present in the Action area. The following projects are not within the scope of the Michigan DKey: prescribed fire; new roads or trails that create a permanent barrier to EMR movement; projects that alter hydrology permanently, or temporarily if during the inactive season; projects that are large in scale; and projects that do not apply recommended conservation measures. Project-specific review is needed for these types of projects. **Please coordinate with the Michigan Ecological Services Field Office to further evaluate effects of the Action on EMR.**

Bats of Conservation Concern:

Implementing protective measures for bats, including both federally listed and non-listed species, indirectly helps to protect Michigan's agriculture and forests. Bats are significant predators of nocturnal insects, including many crop and forest pests. For example, Whitaker (1995) estimated that a single colony of 150 big brown bats (*Eptesicus fuscus*) would eat nearly 1.3 million pest insects each year. Boyles et al. (2011) noted the "loss of bats in North America could lead to agricultural losses estimated at more than \$3.7 billion/year, and Maine and Boyles (2015) estimated that the suppression of herbivory by insectivorous bats is worth >1 billion USD globally on corn alone. In captive trials, northern long-eared bats were found to significantly reduce the egg-laying activity of mosquitoes, suggesting bats may also play an important role in controlling insect-borne disease (Reiskind and Wund 2009). Mosquitoes have also been found to be a consistent component of the diet of Indiana bats and are eaten most heavily during pregnancy (6.6%; Kurta and Whitaker 1998). Taking proactive steps to help protect bats may be very valuable to agricultural and forest product yields and pest management costs in and around a project area. Such conservation measures include limiting tree clearing during the bat active season (April through October varies by location) and/or the non-volant period (June through July), when young bats are unable to fly, and minimizing the extent of impacts to forests, wetlands, and riparian habitats.

Bald and Golden Eagles:

Bald eagles, golden eagles, and their nests are protected under the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended, 16 U.S.C. 668a-d) (Eagle Act). The Eagle Act prohibits, except when authorized by an Eagle Act permit, the "taking" of bald and golden eagles and defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." The Eagle Act's implementing regulations define disturb as "...to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially

interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”

If the Action may impact bald or golden eagles, additional coordination with the Service under the Eagle Act may be required. For more information on eagles and conducting activities in the vicinity of an eagle nest, please visit <https://www.fws.gov/library/collections/all-about-eagles>. In addition, the Service developed the National Bald Eagle Management Guidelines (May 2007) in order to assist landowners in avoiding the disturbance of bald eagles. The full Guidelines are available at <https://www.fws.gov/media/national-bald-eagle-management-guidelines-0>.

If you have further questions regarding potential impacts to eagles, please contact Chris Mensing, Chris_Mensing@fws.gov or 517-351-2555.

Monarch butterfly and other pollinators

In December 2020, after an extensive status assessment of the monarch butterfly, we determined that listing the monarch under the Endangered Species Act is warranted but precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants. Therefore, the Service added the monarch butterfly to the candidate list. The Service will review its status each year until we are able to begin developing a proposal to list the monarch.

The Endangered Species Act does not establish protections or consultation requirements for candidate species. Some Federal and State agencies may have policy requirements to consider candidate species in planning. We encourage implementing measures that will remove or reduce threats to these species and possibly make listing unnecessary.

For all projects, we recommend the following best management practices (BMPs) to benefit monarch and other pollinators.

Monarch and Pollinator BMP Recommendations

Consider monarch and other pollinators in your project planning when possible. Many pollinators are declining, including species that pollinate key agricultural crops and help maintain natural plant communities. Planting a diverse group of native plant species will help support the nutritional needs of Michigan’s pollinators. We recommend a mix of flowering trees, shrubs, and herbaceous plants so that something is always blooming and pollen is available during the active periods of the pollinators, roughly early spring through fall (mid-March to mid-October). To benefit a wide variety of pollinators, choose a wide range of flowers with diverse colors, heights, structure, and flower shape. It is important to provide host plants for any known butterfly species at your site, including native milkweed for Monarch butterfly. Incorporating a water source (e.g., ephemeral pool or low area) and basking areas (rocks or bare ground) will provide additional resources for pollinators.

Many pollinators need a safe place to build their nests and overwinter. During spring and summer, leave some areas unmowed or minimize the impacts from mowing (e.g., decrease frequency, increase vegetation height). In fall, leave areas unraked and leave plant stems standing. Leave patches of bare soil for ground nesting pollinators.

Avoid or limit pesticide use. Pesticides can kill more than the target pest. Some pesticide residues can kill pollinators for several days after the pesticide is applied. Pesticides can also kill natural predators, which can lead to even worse pest problems.

Planting native wildflowers can also reduce the need to mow and water, improve bank stabilization by reducing erosion, and improve groundwater recharge and water quality.

Resources:

<https://www.fws.gov/initiative/monarchs>

<https://www.fws.gov/library/collections/pollinators>

Coordination with the Service is not complete if additional coordination is advised above for any species. Please email our office at MIFO_DKey@fws.gov and attach a copy of this letter, so we can discuss methods to avoid or minimize potential adverse effects to those species.

Bat References

Boyles, J.G., P.M. Cryan, G.F. McCracken, T.H. Kunz. 2011. Economic Importance of Bats in Agriculture. *Science* 332(1):41-42.

Kurta, A. and J.O. Whitaker. 1998. Diet of the Endangered Indiana Bat (*Myotis sodalis*) on the Northern Edge of Its Range. *The American Midland Naturalist* 140(2):280-286.

Reiskind, M.H. and M.A. Wund. 2009. Experimental assessment of the impacts of northern long-eared bats on ovipositing *Culex* (Diptera: Culicidae) mosquitoes. *Journal of Medical Entomology* 46(5):1037-1044.

Whitaker, Jr., J.O. 1995. Food of the big brown bat *Eptesicus fuscus* from maternity colonies in Indiana and Illinois. *American Midland Naturalist* 134(2):346-360.

Summary of conservation measures for your project You agreed to the following conservation measures to avoid adverse effects to listed species and our concurrence is only valid if the measures are fully implemented. These must be included as permit conditions if a permit is required and/or included in any contract language.

Indiana bat

Any cutting/trimming of potential roost trees for Indiana bat (trees ≥ 5 inches in diameter [at breast height] with cracks, crevices and/or exfoliating bark) must occur OUTSIDE the non-volant ("pup") season for Indiana bat (June 1 through July 31). Prescribed fire and/or pesticide/herbicide application must also occur outside June-July where potential roost trees are present.

Tree cutting/trimming and/or prescribed burning will not clear ≥ 20 contiguous acres of forest or fragment a connective corridor between 2 or more forest patches of at least 5 acres.

Northern long-eared bat

Based on the project area you entered into IPaC, the project does not occur within 0.25 miles of a known northern long-eared bat hibernaculum. Tree removal, as defined in the 4(d) rule, will not occur within 150 feet of a known occupied northern long-eared bat maternity roost tree.

Any cutting/trimming of potential roost trees for northern long-eared bat (trees ≥ 3 inches in diameter [at breast height] with cracks, crevices, cavities, and/or exfoliating bark) will be limited to the inactive season (October 1 through April 14). Prescribed fire and/or pesticide/herbicide application will also occur during the inactive season where potential roost trees are present.

Tree cutting/trimming and/or prescribed burning will not clear ≥ 20 contiguous acres of forest or fragment a connective corridor between 2 or more forest patches of at least 5 acres.

Action Description

You provided to IPaC the following name and description for the subject Action.

1. Name

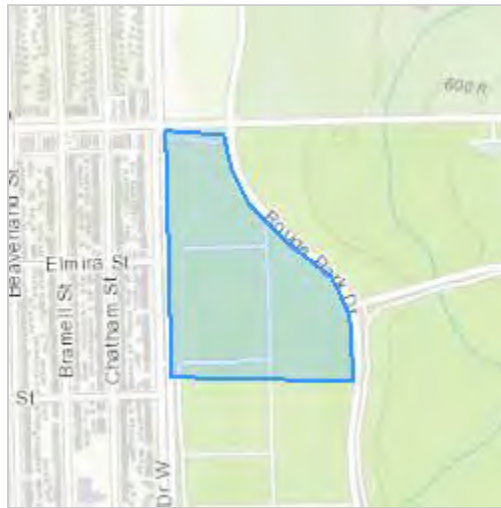
West Chicago Detention Basin Area 2

2. Description

The following description was provided for the project 'West Chicago Detention Basin Area 2':

The project is in the feasibility stage for the design and construction of a regional detention basin for the West Chicago neighborhood in NW Detroit. The location is forested and contains a mix of upland and wetland areas. The site lies between a densely populated neighborhood and industrial area and shares connectivity to Rouge Park.

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@42.36927745,-83.25899971485048,14z>



Qualification Interview

1. Are there any possible effects to any listed species or to designated critical habitat from your project or effects from any other actions or projects subsequently made possible by your project?

Select "Yes" even if the expected effects to the species or critical habitat are expected to be 1) extremely unlikely (discountable), 2) can't meaningfully be measured, detected, or evaluated (insignificant), or 3) wholly beneficial.

Select "No" to confirm that the project details and supporting information allow you to conclude that listed species and their habitats will not be exposed to any effects (including discountable, insignificant, or beneficial effects) and therefore, you have made a "no effect" determination for all species. If you are unsure, select YES to answer additional questions about your project.

Yes

2. This determination key is intended to assist the user in the evaluating the effects of their actions on Federally listed species in Michigan. It does not cover other prohibited activities under the Endangered Species Act (e.g., for wildlife: import/export, Interstate or foreign commerce, possession of illegally taken wildlife, purposeful take for scientific purposes or to enhance the survival of a species, etc.; for plants: import/export, reduce to possession, malicious destruction on Federal lands, commercial sale, etc.) or other statutes. Click yes to acknowledge that you must consider other prohibitions of the ESA or other statutes outside of this determination key.

Yes

3. Is the action the approval of a long-term (i.e., in effect greater than 10 years) permit, plan, or other action? (e.g., a new or re-issued hydropower license, a land management plan, or other kinds of documents that provide direction for projects or actions that may be conducted over a long term (>10 years) without the need for additional section 7 consultation).

No

4. Is the action being funded, authorized, or carried out by a Federal agency?

Yes

5. Does the action involve the installation or operation of wind turbines?

No

6. Are there at least 30 days prior to your action occurring? Endangered species consultation must be completed before taking any action that may have effects to listed species. The Service also needs 30 days to review projects before we can verify conclusions in some dkey output letters. For example, if you have already started some components of the project on the ground (e.g., removed vegetation) before completing this key, answer “no” to this question. The only exception is if you have a Michigan Field Office pre-approved emergence survey (i.e., if you have conducted pre-approved emergence surveys for listed bats before tree removal, you can still answer yes to this question).

Yes

7. Does the action involve constructing a new communication tower or modifying an existing communications tower?

No

8. Does the activity involve aerial or other large-scale application of any chemical (including insecticide, herbicide, etc.)?

No

9. Does your project include water withdrawal (ground or surface water) greater than 10,000 gallons/day?

No

10. Will your action permanently affect hydrology?

Yes

11. Will your project have any direct impacts to a stream or river (e.g., Horizontal Directional Drilling (HDD), hydrostatic testing, stream/road crossings, new storm-water outfall discharge, dams, other in-stream work, etc.)?

Yes

12. Does your project have the potential to indirectly impact the stream/river or the riparian zone (e.g., cut and fill, horizontal directional drilling, hydrostatic testing, construction, vegetation removal, discharge, etc.)?

Yes

13. Are you applying for one of the following Michigan EGLE/Army Corps of Engineers joint permit application Minor Permit (MP) Categories:
MP 3 - Boat Hoist; MP 5 - Boal Wells; MP 7 - Completed Enforcement Actions; MP 12 - Dock;
MP 21 - Fish and Wildlife Habitat Structures;
MP 22 - Ford Stream Crossings for Commercial Forestry Operations;
MP 28 - Maintenance and Repair of Serviceable Structures;
MP 45 - Temporary Recreational Structures;
MP 48 - Wetland Habitat Restoration and Enhancement?

Verify the MP category number and associated description matches your project/application (https://www.michigan.gov/documents/egle/WRD-Minor-Project-Categories_733320_7.pdf). If you don't know what category applies for your project, answer no to this question.

No

14. Are you applying for one of the following Michigan EGLE/Army Corps of Engineers joint permit application General Permit (GP) Categories:
GP A - Aids to Navigation;
GP C - Clear Span Bridge;
GP E - Culverts - Small;
GP J - Dry Fire Hydrant;
GP O - Minor Permit Revisions and Transfers;
GP Q - Mooring Buoy;
GP W - Scientific Measuring Devices;
GP X - Snow Road Stream Crossings for Forestry Operations;
GP Z - Spring Piles and Piling Clusters;
GP DD - Wetland Habitat Restoration and Enhancement?

Verify the GP category number and associated description matches your project/application (https://www.michigan.gov/documents/deq/wrd-general-permit-categories_555828_7.pdf). If you don't know what category applies for your project, answer no to this question.

No

15. Will your action disturb the ground or existing vegetation? This includes any off road vehicle access, soil compaction, digging, seismic survey, directional drilling, heavy equipment, grading, trenching, placement of fill, pesticide application, vegetation management (including removal or maintenance using equipment or chemicals), cultivation, development, etc.

Yes

16. Is the action a utility-scale solar development project?

No

17. [Hidden semantic] Does the action intersect the MOBU AOI?

Automatically answered

Yes

18. Under the ESA, monarchs remain warranted but precluded by listing actions of higher priority. The monarch is a candidate for listing at this time. The Endangered Species Act does not establish protections or consultation requirements for candidate species. Some Federal and State agencies may have policy requirements to consider candidate species in planning. We encourage implementing measures that will remove or reduce threats to these species and possibly make listing unnecessary. If your project will have no effect on monarch butterflies (for example, if your project won't affect their habitat or individuals), then you can make a "no effect" determination for this project. Are you making a "no effect" determination for monarch?

Yes

19. [Hidden Semantic] Does the action intersect the Eastern massasauga rattlesnake area of influence?

Automatically answered

Yes

20. In a previous answer in this key, you indicated your project will have permanent effects to hydrology. Will the hydrological impacts result in a significant change in the elevation of surface water upstream or downstream, or in the local groundwater elevations?

A significant change is one where the elevations are expected to change more than 6 inches or result in inundation.

No

21. Does your action involve prescribed fire?

No

22. Will this action occur entirely in the Eastern massasauga rattlesnake inactive season (October 16 through April 14)?

No

23. Will this action occur entirely in the Eastern massasauga rattlesnake active season (April 15 through October 15)?

No

24. Will the action result in permanent loss of more than one acre of wetland or conversion of more than 10 acres of uplands of potential Eastern massasauga rattlesnake habitat (uplands associated with high quality wetland habitat) to other land uses?

Yes

25. [Semantic] Does the action area intersect the northern riffelshell area of influence?

Automatically answered

Yes

26. [Hidden Semantic] Does the action area intersect the piping plover area of influence?
Automatically answered
Yes
27. [Hidden Semantic] Does the action area intersect the rufa red knot area of influence?
Automatically answered
Yes
28. [Hidden Semantic] Does the action area intersect the area of influence for Eastern prairie fringed orchid?
Automatically answered
Yes
29. [Hidden Semantic] Does the action area intersect the Indiana bat area of influence?
Automatically answered
Yes
30. The project has the potential to affect federally listed bats. Does the action area contain any known or potential bat hibernacula (natural caves, abandoned mines, or underground quarries)?
No
31. Has a presence/absence bat survey or field-based habitat assessment following the Service's Range-wide [Indiana Bat and Northern Long-eared Bat Summer Survey Guidelines](#) been conducted within the action area?
No
32. Does the action involve removal/modification of a human structure (barn, house or other building) known to contain roosting bats?
No
33. Does the action include removal/modification of an existing bridge or culvert?
No
34. Does the action include herbicide application?
No
35. Does the action include tree cutting/trimming, prescribed fire, and/or pesticide (e.g., insecticide, rodenticide) application?
Yes
36. Will the action clear >10 acres of contiguous forest (i.e., connected by 1,000 feet or less) or fragment a riparian or other connective forested corridor (e.g., tree line) between 2 or more forest patches of at least 5 acres? For more information, see [Appendix II](#).
No
37. Does the action area contain potential NLEB bat roost trees (trees ≥ 3 inches in diameter [at breast height] with cracks, crevices, cavities and/or exfoliating bark)? For more information, see [Appendix IV](#).
Yes
-

38. Does the action area contain potential Indiana bat roost trees (trees ≥ 5 inches in diameter [at breast height] with cracks, crevices and/or exfoliating bark)? For more information, see [Appendix III](#).

Yes

39. Does the action include emergency cutting/trimming of hazard trees in order to prevent imminent loss of human life and/or property?

No

40. [Semantic] Is any portion of the action area within 5 miles of a known Indiana or northern long-eared bat hibernaculum?

Automatically answered

No

41. [Semantic] Does the action area intersect the Michigan Modeled Indiana Bat Habitat?

Automatically answered

Yes

42. Your project intersected modeled Indiana bat habitat.

Will all tree cutting/trimming, prescribed fire, and/or pesticide application be restricted to the inactive (hibernation) season for listed bats (that is, conducted during October 1 through April 14)?

Yes

43. Will the action clear >10 acres of modeled Indiana bat habitat?

To determine whether it is >10 acres, you can download the shapefile or kmz here: [Indiana bat model](#). For more information on the development of the Indiana bat habitat suitability model, see [Appendix I](#).

No

44. [Hidden Semantic] Does the action area intersect the Indiana bat AOI?

Automatically answered

Yes

45. [Hidden Semantic] Does this project intersect the northern long-eared bat area of influence?

Automatically answered

Yes

46. Is the project action area located within 0.25 miles of a known northern long-eared bat hibernaculum?

Automatically answered

No

47. Will the action involve Tree Removal as defined in the 4(d) rule for northern long-eared bat?

No

48. [Hidden Semantic] Does the action area intersect the Indiana bat AOI?

Automatically answered

Yes

49. Will all tree cutting/trimming, prescribed fire, and/or pesticide/herbicide application be restricted to the inactive (hibernation) season for northern long-eared bat (that is, conducted during October 1 through April 14)?

Yes

50. [Hidden semantic] Does the action intersect the Tricolored bat AOI/SLA/range?

Automatically answered

Yes

51. The tricolored bat was proposed for listing as endangered on September 13, 2022. In Michigan, the tricolored bat was rare pre-white nose syndrome (WNS) and is exceedingly rare post-WNS. The species has been observed in 12 Michigan counties to date, largely during the fall or winter. With very few exceptions, the species has not been observed in Michigan in the summer months, and no maternity colonies have been found. During winter, tricolored bats hibernate in caves, abandoned mines, and abandoned tunnels ranging from small to large in size. During spring, summer and fall months, they roost primarily among leaf clusters of live or recently dead deciduous/hardwood trees.

Are you making a no effect determination on this project for the tricolored bat?

Yes

IPaC User Contact Information

Agency: Detroit city
Name: Wade Rose
Address: 34000 Plymouth Rd
City: Livonia
State: MI
Zip: 48150
Email: wade.rose@ohm-advisors.com
Phone: 2482914573

Lead Agency Contact Information

Lead Agency: Environmental Protection Agency



Michigan Natural Features Inventory

Web Database Search



Search Results for Town 01S, Range 10E, Section 33 and Wayne County

Query Results Generated on Jan 23, 2023

Displaying Record 1 to 5 of 5 Records Found

Database Updated on Jan 01, 2023

[New Search](#)

[Refine Search](#)

[◀ Previous 25 Records](#)

[Next 25 Records ▶](#)

Abstract	Common Name	Scientific Name	State Status	Federal Status	Last Observed Date	Element Category	Mapping Precision	Site of Observation	Best Documentation of EO	Town	Range	Section	County
	American lotus	Nelumbo lutea	T		1897-07-09	Plant	U	ROUGE RIVER - DETROIT	Farwell, O.A. 1897. #1564 BLH	01S	10E	4, 5, 9, 16, 21, 27, 28, 33, 34	Wayne
	Climbing fumitory	Adlumia fungosa	SC		1929-07-09	Plant	GX	Livonia	Farwell, O.A. 1929. #8467 BLH	01S	10E	6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 31, 32, 33, 34	Wayne
	Least shrew	Cryptotis parva	T		1932-11-24	Animal	U	River Rouge Park	Murie, A. 1932. #67093 UMMZ	01S	10E	27, 28, 33, 34	Wayne
	Stiff gentian	Gentianella quinquefolia	T		1916-10-08	Plant	GX	DEARBORN	Chandler, B.F. 1916. MICH.	01S	10E	28, 29, 30, 31, 32, 33, 34, 35	Wayne
	Twinleaf	Jeffersonia diphylla	SC		1933-SP	Plant	GX	LIVONIA	FARWELL, O.A. 1933. #9362 MICH,BLH	01S	10E	6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 31, 32, 33, 34	Wayne

[New Search](#)

[Refine Search](#)

[◀ Previous 25 Records](#)

[Next 25 Records ▶](#)



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Michigan Ecological Services Field Office
2651 Coolidge Road Suite 101
East Lansing, MI 48823-6360
Phone: (517) 351-2555 Fax: (517) 351-1443

In Reply Refer To:
Project Code: 2023-0036661
Project Name: West Chicago Detention Basin Area 2

January 23, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

Official Species List

The attached species list identifies any Federally threatened, endangered, proposed and candidate species that may occur within the boundary of your proposed project or may be affected by your proposed project. The list also includes designated critical habitat if present within your proposed project area or affected by your project. This list is provided to you as the initial step of the consultation process required under section 7(c) of the Endangered Species Act, also referred to as Section 7 Consultation.

Under 50 CFR 402.12(e) (the regulations that implement section 7 of the Endangered Species Act), the accuracy of this species list should be verified after 90 days. You may verify the list by visiting the IPaC website (<https://ipac.ecosphere.fws.gov/>) at regular intervals during project planning and implementation. To update an Official Species List in IPaC: from the My Projects page, find the project, expand the row, and click Project Home. In the What's Next box on the Project Home page, there is a Request Updated List button to update your species list. Be sure to select an "official" species list for all projects.

Consultation requirements and next steps

Section 7 of the Endangered Species Act of 1973 requires that actions authorized, funded, or carried out by Federal agencies not jeopardize Federally threatened or endangered species or adversely modify designated critical habitat. To fulfill this mandate, Federal agencies (or their designated non-Federal representative) must consult with the Fish and Wildlife Service if they determine their project may affect listed species or critical habitat.

There are two approaches to evaluating the effects of a project on listed species.

Approach 1. Use the All-species Michigan determination key in IPaC. This tool can assist you in making determinations for listed species for some projects. In many cases, the determination key

will provide an automated concurrence that completes all or significant parts of the consultation process. Therefore, we strongly recommend screening your project with the **All-Species Michigan Determination Key (Dkey)**. For additional information on using IPaC and available Determination Keys, visit <https://www.fws.gov/media/mifo-ipac-instructions> (and click on the attachment). Please carefully review your Dkey output letter to determine whether additional steps are needed to complete the consultation process.

Approach 2. Evaluate the effects to listed species on your own without utilizing a determination key. Once you obtain your official species list, you are not required to continue in IPaC, although in most cases using a determination key should expedite your review. If the project is a Federal action, you should review our section 7 step-by-step instructions before making your determinations: <https://www.fws.gov/office/midwest-region-headquarters/midwest-section-7-technical-assistance>. If you evaluate the details of your project and conclude “no effect,” document your findings, and your listed species review is complete; you do not need our concurrence on “no effect” determinations. If you cannot conclude “no effect,” you should coordinate/consult with the Michigan Ecological Services Field Office. The preferred method for submitting your project description and effects determination (if concurrence is needed) is electronically to EastLansing@fws.gov. Please include a copy of this official species list with your request.

For all **wind energy projects** and **projects that include installing communications towers that use guy wires**, please contact this field office directly for assistance, even if no Federally listed plants, animals or critical habitat are present within your proposed project area or may be affected by your proposed project.

Migratory Birds

Please see the “Migratory Birds” section below for important information regarding incorporating migratory birds into your project planning. Our Migratory Bird Program has developed recommendations, best practices, and other tools to help project proponents voluntarily reduce impacts to birds and their habitats. The Bald and Golden Eagle Protection Act prohibits the take and disturbance of eagles without a permit. If your project is near an eagle nest or winter roost area, see our Eagle Permits website at <https://www.fws.gov/program/eagle-management/eagle-permits> to help you avoid impacting eagles or determine if a permit may be necessary.

Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your consideration of threatened and endangered species during your project

planning. Please include a copy of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
 - USFWS National Wildlife Refuges and Fish Hatcheries
 - Migratory Birds
 - Wetlands
-

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Michigan Ecological Services Field Office

2651 Coolidge Road Suite 101

East Lansing, MI 48823-6360

(517) 351-2555

Project Summary

Project Code: 2023-0036661

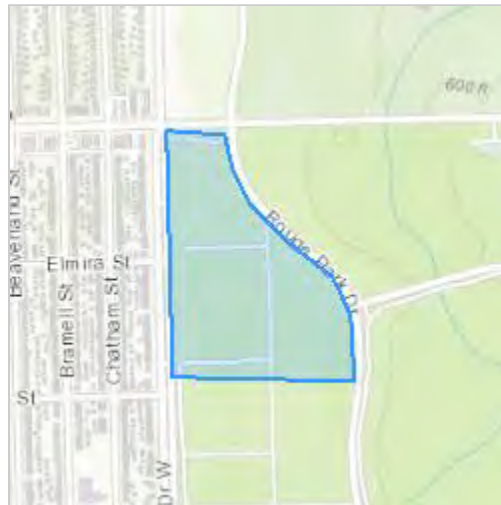
Project Name: West Chicago Detention Basin Area 2

Project Type: New Constr - Above Ground

Project Description: The project is in the feasibility stage for the design and construction of a regional detention basin for the West Chicago neighborhood in NW Detroit. The location is forested and contains a mix of upland and wetland areas. The site lie between a densely populated neighborhood and industrial area and shares connectivity to Rouge Park.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@42.36927745,-83.25899971485048,14z>



Counties: Wayne County, Michigan

Endangered Species Act Species

There is a total of 9 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 2 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Indiana Bat <i>Myotis sodalis</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949 General project design guidelines: https://ipac.ecosphere.fws.gov/project/KFUCWMMOUJAWJOU3KPZTQB2BTI/documents/generated/6982.pdf	Endangered
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045 General project design guidelines: https://ipac.ecosphere.fws.gov/project/KFUCWMMOUJAWJOU3KPZTQB2BTI/documents/generated/6983.pdf	Endangered
Tricolored Bat <i>Perimyotis subflavus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Birds

NAME	STATUS
Piping Plover <i>Charadrius melodus</i> Population: [Great Lakes watershed DPS] - Great Lakes, watershed in States of IL, IN, MI, MN, NY, OH, PA, and WI and Canada (Ont.) There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Endangered
Red Knot <i>Calidris canutus rufa</i> There is proposed critical habitat for this species. This species only needs to be considered under the following conditions: <ul style="list-style-type: none"> Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened

Reptiles

NAME	STATUS
Eastern Massasauga (=rattlesnake) <i>Sistrurus catenatus</i> No critical habitat has been designated for this species. This species only needs to be considered under the following conditions: <ul style="list-style-type: none"> For all Projects: Project is within EMR Range Species profile: https://ecos.fws.gov/ecp/species/2202 General project design guidelines: https://ipac.ecosphere.fws.gov/project/KFUCWMMOUJAWJOU3KPZTQB2BTI/documents/generated/5280.pdf	Threatened

Clams

NAME	STATUS
Northern Riffleshell <i>Epioblasma rangiana</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/527	Endangered

Insects

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Eastern Prairie Fringed Orchid <i>Platanthera leucophaea</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/601	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

-
1. The [Migratory Birds Treaty Act](#) of 1918.
 2. The [Bald and Golden Eagle Protection Act](#) of 1940.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern \(BCC\) list](#) or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Dec 1 to Aug 31
Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10

NAME	BREEDING SEASON
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Golden-winged Warbler <i>Vermivora chrysoptera</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability Of Presence Summary

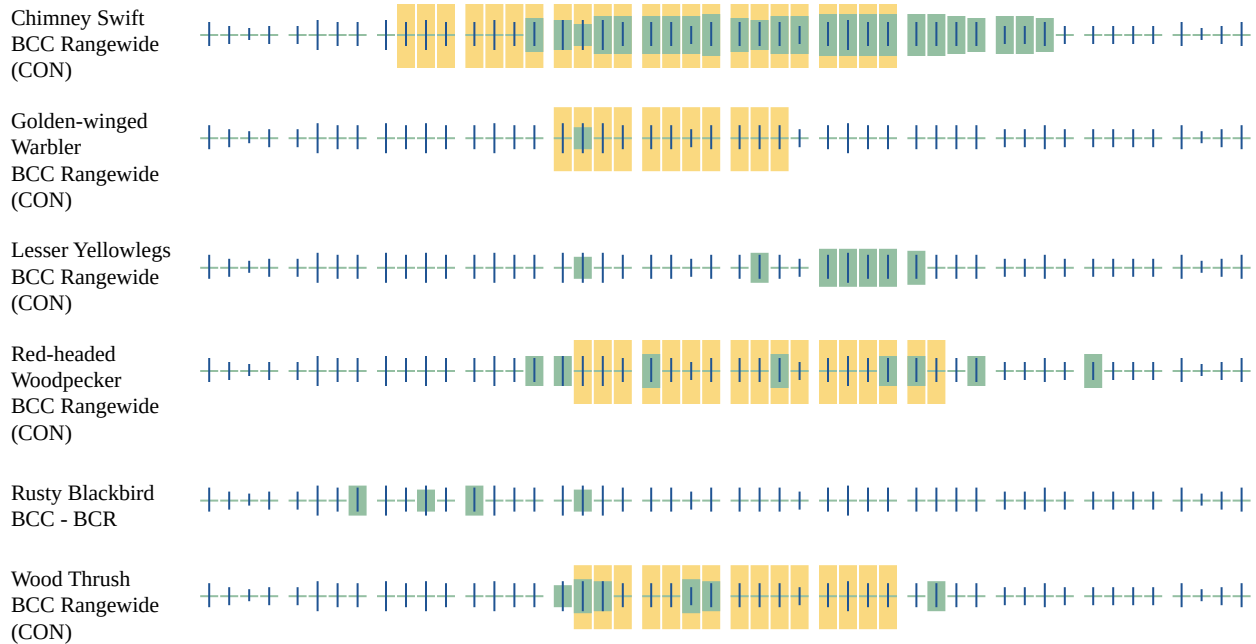
The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for



Additional information can be found using the following links:

- Birds of Conservation Concern <https://www.fws.gov/program/migratory-birds/species>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [Rapid Avian Information Locator \(RAIL\) Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the [RAIL Tool](#) and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
 2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
 3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).
-

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

WETLAND INFORMATION WAS NOT AVAILABLE WHEN THIS SPECIES LIST WAS GENERATED.
PLEASE VISIT [HTTPS://WWW.FWS.GOV/WETLANDS/DATA/MAPPER.HTML](https://www.fws.gov/wetlands/data/mapper.html) OR CONTACT THE FIELD OFFICE FOR FURTHER INFORMATION.

IPaC User Contact Information

Agency: Detroit city
Name: Wade Rose
Address: 34000 Plymouth Rd
City: Livonia
State: MI
Zip: 48150
Email: wade.rose@ohm-advisors.com
Phone: 2482914573

Lead Agency Contact Information

Lead Agency: Environmental Protection Agency



Michigan Natural Features Inventory

Web Database Search



Search Results for Town 01S, Range 10E, Section 33 and Wayne County

Query Results Generated on Jan 23, 2023

Displaying Record 1 to 5 of 5 Records Found

Database Updated on Jan 01, 2023

[New Search](#)

[Refine Search](#)

[◀ Previous 25 Records](#)

[Next 25 Records ▶](#)

Abstract	Common Name	Scientific Name	State Status	Federal Status	Last Observed Date	Element Category	Mapping Precision	Site of Observation	Best Documentation of EO	Town	Range	Section	County
	American lotus	Nelumbo lutea	T		1897-07-09	Plant	U	ROUGE RIVER - DETROIT	Farwell, O.A. 1897. #1564 BLH	01S	10E	4, 5, 9, 16, 21, 27, 28, 33, 34	Wayne
	Climbing fumitory	Adlumia fungosa	SC		1929-07-09	Plant	GX	Livonia	Farwell, O.A. 1929. #8467 BLH	01S	10E	6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 31, 32, 33, 34	Wayne
	Least shrew	Cryptotis parva	T		1932-11-24	Animal	U	River Rouge Park	Murie, A. 1932. #67093 UMMZ	01S	10E	27, 28, 33, 34	Wayne
	Stiff gentian	Gentianella quinquefolia	T		1916-10-08	Plant	GX	DEARBORN	Chandler, B.F. 1916. MICH.	01S	10E	28, 29, 30, 31, 32, 33, 34, 35	Wayne
	Twinleaf	Jeffersonia diphylla	SC		1933-SP	Plant	GX	LIVONIA	FARWELL, O.A. 1933. #9362 MICH,BLH	01S	10E	6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 31, 32, 33, 34	Wayne

[New Search](#)

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United States Department of the Interior



FISH AND WILDLIFE SERVICE
Michigan Ecological Services Field Office
2651 Coolidge Road Suite 101
East Lansing, MI 48823-6360
Phone: (517) 351-2555 Fax: (517) 351-1443

In Reply Refer To:
Project code: 2023-0036668
Project Name: West Chicago Detention Basin Area 3

February 02, 2023

Subject: Verification letter for the project named 'West Chicago Detention Basin Area 3' for specified threatened and endangered species that may occur in your proposed project location consistent with the Michigan Endangered Species Determination Key (Michigan DKey)

Dear Wade Rose:

The U.S. Fish and Wildlife Service (Service) received on **February 02, 2023** your effect determination(s) for the 'West Chicago Detention Basin Area 3' (the Action) using the Michigan DKey within the Information for Planning and Consultation (IPaC) system. The Service developed this system in accordance with the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

Based on your answers and the assistance of the Service's Michigan DKey, you made the following effect determination(s) for the proposed Action:

Species	Listing Status	Determination
Eastern Massasauga (=rattlesnake) (<i>Sistrurus catenatus</i>)	Threatened	NLAA
Eastern Prairie Fringed Orchid (<i>Platanthera leucophaea</i>)	Threatened	No effect
Indiana Bat (<i>Myotis sodalis</i>)	Endangered	NLAA
Monarch Butterfly (<i>Danaus plexippus</i>)	Candidate	No effect
Northern Long-eared Bat (<i>Myotis septentrionalis</i>)	Threatened	NLAA
Northern Riffleshell (<i>Epioblasma rangiana</i>)	Endangered	No effect
Piping Plover (<i>Charadrius melodus</i>)	Endangered	No effect
Red Knot (<i>Calidris canutus rufa</i>)	Threatened	No effect
Tricolored Bat (<i>Perimyotis subflavus</i>)	Proposed Endangered	No effect

The Service will notify you within 30 calendar days if we determine that this proposed Action does not meet the criteria for a "may affect, not likely to adversely affect" (NLAA) determination

for Federally listed species in Michigan. If we do not notify you within that timeframe, you may proceed with the Action under the terms of the NLAA concurrence provided here. This verification period allows the Michigan Ecological Services Field Office to apply local knowledge to evaluation of the Action, as we may identify a small subset of actions having impacts that were unanticipated. In such instances, the Michigan Ecological Services Field Office may request additional information to verify the effects determination reached through the Michigan DKey.

Your agency has met consultation requirements by informing the Service of your “No Effect” determination(s). No consultation is required for species that you determined will not be affected by the Action.

Please provide sufficient project details on your project homepage in IPaC (Define Project, Project Description) to support your conclusions and the Service’s 30-day review period. Failure to disclose important aspects of your project that would influence the outcome of your effects determinations may negate your determinations and invalidate this letter. If you have site-specific information that leads you to believe a different determination is more appropriate for your project than what the Dkey concludes, you can and should proceed based on the best available information.

The Service recommends that you contact the Service or re-evaluate the project in IPaC if: 1) the scope or location of the proposed Action is changed; 2) new information reveals that the action may affect listed species or designated critical habitat in a manner or to an extent not previously considered; 3) the Action is modified in a manner that causes effects to listed species or designated critical habitat; or 4) a new species is listed or critical habitat designated. If any of the above conditions occurs, additional consultation with the Service should take place before project changes are final or resources committed.

For non-Federal representatives: Please note that when a project requires consultation under section 7 of the Act, the Service must consult directly with the Federal action agency unless that agency formally designates a non-Federal representative (50 CFR 402.08). Non-Federal representatives may prepare analyses or conduct informal consultations; however, the ultimate responsibility for section 7 compliance under the Act remains with the Federal agency. If the Federal agency concurs with your determination, the project as proposed has completed section 7 consultation. All documents and supporting correspondence should be provided to the Federal agency for their records.

Bats of Conservation Concern:

Implementing protective measures for bats, including both federally listed and non-listed species, indirectly helps to protect Michigan’s agriculture and forests. Bats are significant predators of nocturnal insects, including many crop and forest pests. For example, Whitaker (1995) estimated that a single colony of 150 big brown bats (*Eptesicus fuscus*) would eat nearly 1.3 million pest insects each year. Boyles et al. (2011) noted the “loss of bats in North America could lead to agricultural losses estimated at more than \$3.7 billion/year, and Maine and Boyles (2015) estimated that the suppression of herbivory by insectivorous bats is worth >1 billion USD globally on corn alone. In captive trials, northern long-eared bats were found to significantly reduce the egg-laying activity of mosquitoes, suggesting bats may also play an important role in

controlling insect-borne disease (Reiskind and Wund 2009). Mosquitoes have also been found to be a consistent component of the diet of Indiana bats and are eaten most heavily during pregnancy (6.6%; Kurta and Whitaker 1998). Taking proactive steps to help protect bats may be very valuable to agricultural and forest product yields and pest management costs in and around a project area. Such conservation measures include limiting tree clearing during the bat active season (April through October varies by location) and/or the non-volant period (June through July), when young bats are unable to fly, and minimizing the extent of impacts to forests, wetlands, and riparian habitats.

Bald and Golden Eagles:

Bald eagles, golden eagles, and their nests are protected under the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended, 16 U.S.C. 668a-d) (Eagle Act). The Eagle Act prohibits, except when authorized by an Eagle Act permit, the “taking” of bald and golden eagles and defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” The Eagle Act’s implementing regulations define disturb as “...to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”

If the Action may impact bald or golden eagles, additional coordination with the Service under the Eagle Act may be required. For more information on eagles and conducting activities in the vicinity of an eagle nest, please visit <https://www.fws.gov/library/collections/all-about-eagles>. In addition, the Service developed the National Bald Eagle Management Guidelines (May 2007) in order to assist landowners in avoiding the disturbance of bald eagles. The full Guidelines are available at <https://www.fws.gov/media/national-bald-eagle-management-guidelines-0>.

If you have further questions regarding potential impacts to eagles, please contact Chris Mensing, Chris_Mensing@fws.gov or 517-351-2555.

Monarch butterfly and other pollinators

In December 2020, after an extensive status assessment of the monarch butterfly, we determined that listing the monarch under the Endangered Species Act is warranted but precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants. Therefore, the Service added the monarch butterfly to the candidate list. The Service will review its status each year until we are able to begin developing a proposal to list the monarch.

The Endangered Species Act does not establish protections or consultation requirements for candidate species. Some Federal and State agencies may have policy requirements to consider candidate species in planning. We encourage implementing measures that will remove or reduce threats to these species and possibly make listing unnecessary.

For all projects, we recommend the following best management practices (BMPs) to benefit monarch and other pollinators.

Monarch and Pollinator BMP Recommendations

Consider monarch and other pollinators in your project planning when possible. Many pollinators are declining, including species that pollinate key agricultural crops and help maintain natural plant communities. Planting a diverse group of native plant species will help support the nutritional needs of Michigan's pollinators. We recommend a mix of flowering trees, shrubs, and herbaceous plants so that something is always blooming and pollen is available during the active periods of the pollinators, roughly early spring through fall (mid-March to mid-October). To benefit a wide variety of pollinators, choose a wide range of flowers with diverse colors, heights, structure, and flower shape. It is important to provide host plants for any known butterfly species at your site, including native milkweed for Monarch butterfly. Incorporating a water source (e.g., ephemeral pool or low area) and basking areas (rocks or bare ground) will provide additional resources for pollinators.

Many pollinators need a safe place to build their nests and overwinter. During spring and summer, leave some areas unmowed or minimize the impacts from mowing (e.g., decrease frequency, increase vegetation height). In fall, leave areas unraked and leave plant stems standing. Leave patches of bare soil for ground nesting pollinators.

Avoid or limit pesticide use. Pesticides can kill more than the target pest. Some pesticide residues can kill pollinators for several days after the pesticide is applied. Pesticides can also kill natural predators, which can lead to even worse pest problems.

Planting native wildflowers can also reduce the need to mow and water, improve bank stabilization by reducing erosion, and improve groundwater recharge and water quality.

Resources:

<https://www.fws.gov/initiative/monarchs>

<https://www.fws.gov/library/collections/pollinators>

Wetland impacts:

Section 404 of the Clean Water Act of 1977 (CWA) regulates the discharge of dredged or fill material into waters (including wetlands) of the United States. Regulations require that activities permitted under the CWA (including wetland permits issued by the Michigan Department of Environment, Great Lakes, and Energy (EGLE)) not jeopardize the continued existence of species listed as endangered or threatened. Permits issued by the U.S. Army Corps of Engineers must also consider effects to listed species pursuant to section 7 of the Endangered Species Act. The Service provides comments to the agencies that may include permit conditions to help avoid or minimize impacts to wildlife resources including listed species. For this project, we consider the conservation measures you agreed to in the determination key and/or as part of your proposed action to be non-discretionary. If you apply for a wetland permit, these conservation measures should be explicitly incorporated as permit conditions. Include a copy of this letter in your wetland permit application to streamline the threatened and endangered species review process.

Bat References

Boyles, J.G., P.M. Cryan, G.F. McCracken, T.H. Kunz. 2011. Economic Importance of Bats in Agriculture. *Science* 332(1):41-42.

Kurta, A. and J.O. Whitaker. 1998. Diet of the Endangered Indiana Bat (*Myotis sodalis*) on the Northern Edge of Its Range. *The American Midland Naturalist* 140(2):280-286.

Reiskind, M.H. and M.A. Wund. 2009. Experimental assessment of the impacts of northern long-eared bats on ovipositing *Culex* (Diptera: Culicidae) mosquitoes. *Journal of Medical Entomology* 46(5):1037-1044.

Whitaker, Jr., J.O. 1995. Food of the big brown bat *Eptesicus fuscus* from maternity colonies in Indiana and Illinois. *American Midland Naturalist* 134(2):346-360.

Summary of conservation measures for your project You agreed to the following conservation measures to avoid adverse effects to listed species and our concurrence is only valid if the measures are fully implemented. These must be included as permit conditions if a permit is required and/or included in any contract language.

Eastern massasauga

Materials used for erosion control and site restoration must be wildlife-friendly. Do not use erosion control products containing plastic mesh netting or other similar material that could entangle eastern massasauga rattlesnake (EMR). Several products for soil erosion and control exist that do not contain plastic netting including net-less erosion control blankets (for example, made of excelsior), loose mulch, hydraulic mulch, soil binders, unreinforced silt fences, and straw bales. Others are made from natural fibers (such as jute) and loosely woven together in a manner that allows wildlife to wiggle free.

To increase human safety and awareness of EMR, those implementing the project must first review the EMR factsheet (available at <https://www.fws.gov/media/eastern-massasauga-rattlesnake-fact-sheet>), and watch MDNR's "60-Second Snakes: The Eastern Massasauga Rattlesnake" video (available at https://youtu.be/~PFnXe_e02w).

During project implementation, report sightings of any federally listed species, including EMR, to the Service within 24 hours.

The project will not result in permanent loss of more than one acre of wetland or conversion of more than 10 acres of EMR upland habitat (uplands associated with high quality wetland habitat) to other land uses.

Indiana bat

Any cutting/trimming of potential roost trees for Indiana bat (trees ≥ 5 inches in diameter [at breast height] with cracks, crevices and/or exfoliating bark) must occur OUTSIDE the non-volant ("pup") season for Indiana bat (June 1 through July 31). Prescribed fire and/or pesticide/herbicide application must also occur outside June-July where potential roost trees are present.

Tree cutting/trimming and/or prescribed burning will not clear ≥ 20 contiguous acres of forest or fragment a connective corridor between 2 or more forest patches of at least 5 acres.

Northern long-eared bat

Based on the project area you entered into IPaC, the project does not occur within 0.25 miles of a known northern long-eared bat hibernaculum. Tree removal, as defined in the 4(d) rule, will not occur within 150 feet of a known occupied northern long-eared bat maternity roost tree.

Any cutting/trimming of potential roost trees for northern long-eared bat (trees ≥ 3 inches in diameter [at breast height] with cracks, crevices, cavities, and/or exfoliating bark) will be limited to the inactive season (October 1 through April 14). Prescribed fire and/or pesticide/herbicide application will also occur during the inactive season where potential roost trees are present.

Tree cutting/trimming and/or prescribed burning will not clear ≥ 20 contiguous acres of forest or fragment a connective corridor between 2 or more forest patches of at least 5 acres.

Action Description

You provided to IPaC the following name and description for the subject Action.

1. Name

West Chicago Detention Basin Area 3

2. Description

The following description was provided for the project 'West Chicago Detention Basin Area 3':

The project is in the feasibility stage for the design and construction of a regional detention basin for the West Chicago neighborhood in NW Detroit. The location is forested and contains a mix of upland and wetland areas. The site lies between a densely populated neighborhood and shares connectivity to Rouge Park.

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@42.3630072,-83.26234989622206,14z>



Qualification Interview

1. Are there any possible effects to any listed species or to designated critical habitat from your project or effects from any other actions or projects subsequently made possible by your project?

Select "Yes" even if the expected effects to the species or critical habitat are expected to be 1) extremely unlikely (discountable), 2) can't meaningfully be measured, detected, or evaluated (insignificant), or 3) wholly beneficial.

Select "No" to confirm that the project details and supporting information allow you to conclude that listed species and their habitats will not be exposed to any effects (including discountable, insignificant, or beneficial effects) and therefore, you have made a "no effect" determination for all species. If you are unsure, select YES to answer additional questions about your project.

Yes

2. This determination key is intended to assist the user in the evaluating the effects of their actions on Federally listed species in Michigan. It does not cover other prohibited activities under the Endangered Species Act (e.g., for wildlife: import/export, Interstate or foreign commerce, possession of illegally taken wildlife, purposeful take for scientific purposes or to enhance the survival of a species, etc.; for plants: import/export, reduce to possession, malicious destruction on Federal lands, commercial sale, etc.) or other statutes. Click yes to acknowledge that you must consider other prohibitions of the ESA or other statutes outside of this determination key.

Yes

3. Is the action the approval of a long-term (i.e., in effect greater than 10 years) permit, plan, or other action? (e.g., a new or re-issued hydropower license, a land management plan, or other kinds of documents that provide direction for projects or actions that may be conducted over a long term (>10 years) without the need for additional section 7 consultation).

No

4. Is the action being funded, authorized, or carried out by a Federal agency?

Yes

5. Does the action involve the installation or operation of wind turbines?

No

6. Are there at least 30 days prior to your action occurring? Endangered species consultation must be completed before taking any action that may have effects to listed species. The Service also needs 30 days to review projects before we can verify conclusions in some dkey output letters. For example, if you have already started some components of the project on the ground (e.g., removed vegetation) before completing this key, answer “no” to this question. The only exception is if you have a Michigan Field Office pre-approved emergence survey (i.e., if you have conducted pre-approved emergence surveys for listed bats before tree removal, you can still answer yes to this question).

Yes

7. Does the action involve constructing a new communication tower or modifying an existing communications tower?

No

8. Does the activity involve aerial or other large-scale application of any chemical (including insecticide, herbicide, etc.)?

No

9. Does your project include water withdrawal (ground or surface water) greater than 10,000 gallons/day?

No

10. Will your action permanently affect hydrology?

Yes

11. Will your project have any direct impacts to a stream or river (e.g., Horizontal Directional Drilling (HDD), hydrostatic testing, stream/road crossings, new storm-water outfall discharge, dams, other in-stream work, etc.)?

Yes

12. Does your project have the potential to indirectly impact the stream/river or the riparian zone (e.g., cut and fill, horizontal directional drilling, hydrostatic testing, construction, vegetation removal, discharge, etc.)?

Yes

13. Are you applying for one of the following Michigan EGLE/Army Corps of Engineers joint permit application Minor Permit (MP) Categories:
MP 3 - Boat Hoist; MP 5 - Boal Wells; MP 7 - Completed Enforcement Actions; MP 12 - Dock;
MP 21 - Fish and Wildlife Habitat Structures;
MP 22 - Ford Stream Crossings for Commercial Forestry Operations;
MP 28 - Maintenance and Repair of Serviceable Structures;
MP 45 - Temporary Recreational Structures;
MP 48 - Wetland Habitat Restoration and Enhancement?

Verify the MP category number and associated description matches your project/application (https://www.michigan.gov/documents/egle/WRD-Minor-Project-Categories_733320_7.pdf). If you don't know what category applies for your project, answer no to this question.

No

14. Are you applying for one of the following Michigan EGLE/Army Corps of Engineers joint permit application General Permit (GP) Categories:
GP A - Aids to Navigation;
GP C - Clear Span Bridge;
GP E - Culverts - Small;
GP J - Dry Fire Hydrant;
GP O - Minor Permit Revisions and Transfers;
GP Q - Mooring Buoy;
GP W - Scientific Measuring Devices;
GP X - Snow Road Stream Crossings for Forestry Operations;
GP Z - Spring Piles and Piling Clusters;
GP DD - Wetland Habitat Restoration and Enhancement?

Verify the GP category number and associated description matches your project/application (https://www.michigan.gov/documents/deq/wrd-general-permit-categories_555828_7.pdf). If you don't know what category applies for your project, answer no to this question.

No

15. Will your action disturb the ground or existing vegetation? This includes any off road vehicle access, soil compaction, digging, seismic survey, directional drilling, heavy equipment, grading, trenching, placement of fill, pesticide application, vegetation management (including removal or maintenance using equipment or chemicals), cultivation, development, etc.

Yes

16. Is the action a utility-scale solar development project?

No

17. [Hidden semantic] Does the action intersect the MOBU AOI?

Automatically answered

Yes

18. Under the ESA, monarchs remain warranted but precluded by listing actions of higher priority. The monarch is a candidate for listing at this time. The Endangered Species Act does not establish protections or consultation requirements for candidate species. Some Federal and State agencies may have policy requirements to consider candidate species in planning. We encourage implementing measures that will remove or reduce threats to these species and possibly make listing unnecessary. If your project will have no effect on monarch butterflies (for example, if your project won't affect their habitat or individuals), then you can make a "no effect" determination for this project. Are you making a "no effect" determination for monarch?

Yes

19. [Hidden Semantic] Does the action intersect the Eastern massasauga rattlesnake area of influence?

Automatically answered

Yes

20. In a previous answer in this key, you indicated your project will have permanent effects to hydrology. Will the hydrological impacts result in a significant change in the elevation of surface water upstream or downstream, or in the local groundwater elevations?

A significant change is one where the elevations are expected to change more than 6 inches or result in inundation.

No

21. Does your action involve prescribed fire?

No

22. Will this action occur entirely in the Eastern massasauga rattlesnake inactive season (October 16 through April 14)?

No

23. Will this action occur entirely in the Eastern massasauga rattlesnake active season (April 15 through October 15)?

No

24. Will the action result in permanent loss of more than one acre of wetland or conversion of more than 10 acres of uplands of potential Eastern massasauga rattlesnake habitat (uplands associated with high quality wetland habitat) to other land uses?

No

25. Will you use [wildlife safe materials](#) for erosion control and site restoration and eliminate the use of erosion control products containing plastic mesh netting or other similar material that could ensnare Eastern massasauga rattlesnake?

Yes

26. Will you watch MDNR's "[60-Second Snakes: The Eastern Massasauga Rattlesnake \(EMR\)](#)" video, review the [EMR factsheet](#) or call 517-351-2555 to increase human safety and awareness of EMR?
Yes
27. Will all action personnel report any Eastern massasauga rattlesnake observations, or observation of any other listed threatened or endangered species, during action implementation to the Service within 24 hours?
Yes
28. [Semantic] Does the action area intersect the northern riffelshell area of influence?
Automatically answered
Yes
29. [Hidden Semantic] Does the action area intersect the piping plover area of influence?
Automatically answered
Yes
30. [Hidden Semantic] Does the action area intersect the rufa red knot area of influence?
Automatically answered
Yes
31. [Hidden Semantic] Does the action area intersect the area of influence for Eastern prairie fringed orchid?
Automatically answered
Yes
32. [Hidden Semantic] Does the action area intersect the Indiana bat area of influence?
Automatically answered
Yes
33. The project has the potential to affect federally listed bats. Does the action area contain any known or potential bat hibernacula (natural caves, abandoned mines, or underground quarries)?
No
34. Has a presence/absence bat survey or field-based habitat assessment following the Service's Range-wide [Indiana Bat and Northern Long-eared Bat Summer Survey Guidelines](#) been conducted within the action area?
No
35. Does the action involve removal/modification of a human structure (barn, house or other building) known to contain roosting bats?
No
36. Does the action include removal/modification of an existing bridge or culvert?
No
37. Does the action include herbicide application?
No
-

38. Does the action include tree cutting/trimming, prescribed fire, and/or pesticide (e.g., insecticide, rodenticide) application?

Yes

39. Will the action clear >10 acres of contiguous forest (i.e., connected by 1,000 feet or less) or fragment a riparian or other connective forested corridor (e.g., tree line) between 2 or more forest patches of at least 5 acres? For more information, see [Appendix II](#).

No

40. Does the action area contain potential NLEB bat roost trees (trees ≥ 3 inches in diameter [at breast height] with cracks, crevices, cavities and/or exfoliating bark)? For more information, see [Appendix IV](#).

Yes

41. Does the action area contain potential Indiana bat roost trees (trees ≥ 5 inches in diameter [at breast height] with cracks, crevices and/or exfoliating bark)? For more information, see [Appendix III](#).

Yes

42. Does the action include emergency cutting/trimming of hazard trees in order to prevent imminent loss of human life and/or property?

No

43. [Semantic] Is any portion of the action area within 5 miles of a known Indiana or northern long-eared bat hibernaculum?

Automatically answered

No

44. [Semantic] Does the action area intersect the Michigan Modeled Indiana Bat Habitat?

Automatically answered

Yes

45. Your project intersected modeled Indiana bat habitat.

Will all tree cutting/trimming, prescribed fire, and/or pesticide application be restricted to the inactive (hibernation) season for listed bats (that is, conducted during October 1 through April 14)?

Yes

46. Will the action clear >10 acres of modeled Indiana bat habitat?

To determine whether it is >10 acres, you can download the shapefile or kmz here: [Indiana bat model](#). For more information on the development of the Indiana bat habitat suitability model, see [Appendix I](#).

No

47. [Hidden Semantic] Does the action area intersect the Indiana bat AOI?

Automatically answered

Yes

48. [Hidden Semantic] Does this project intersect the northern long-eared bat area of influence?

Automatically answered

Yes

49. Is the project action area located within 0.25 miles of a known northern long-eared bat hibernaculum?

Automatically answered

No

50. Will the action involve Tree Removal as defined in the 4(d) rule for northern long-eared bat?

No

51. [Hidden Semantic] Does the action area intersect the Indiana bat AOI?

Automatically answered

Yes

52. Will all tree cutting/trimming, prescribed fire, and/or pesticide/herbicide application be restricted to the inactive (hibernation) season for northern long-eared bat (that is, conducted during October 1 through April 14)?

Yes

53. [Hidden semantic] Does the action intersect the Tricolored bat AOI/SLA/range?

Automatically answered

Yes

54. The tricolored bat was proposed for listing as endangered on September 13, 2022. In Michigan, the tricolored bat was rare pre-white nose syndrome (WNS) and is exceedingly rare post-WNS. The species has been observed in 12 Michigan counties to date, largely during the fall or winter. With very few exceptions, the species has not been observed in Michigan in the summer months, and no maternity colonies have been found. During winter, tricolored bats hibernate in caves, abandoned mines, and abandoned tunnels ranging from small to large in size. During spring, summer and fall months, they roost primarily among leaf clusters of live or recently dead deciduous/hardwood trees.

Are you making a no effect determination on this project for the tricolored bat?

Yes

IPaC User Contact Information

Agency: Detroit city
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Address: 34000 Plymouth Rd
City: Livonia
State: MI
Zip: 48150
Email: wade.rose@ohm-advisors.com
Phone: 2482914573

Lead Agency Contact Information

Lead Agency: Environmental Protection Agency



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Michigan Ecological Services Field Office
2651 Coolidge Road Suite 101
East Lansing, MI 48823-6360
Phone: (517) 351-2555 Fax: (517) 351-1443

In Reply Refer To:
Project Code: 2023-0036668
Project Name: West Chicago Detention Basin Area 3

January 23, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

Official Species List

The attached species list identifies any Federally threatened, endangered, proposed and candidate species that may occur within the boundary of your proposed project or may be affected by your proposed project. The list also includes designated critical habitat if present within your proposed project area or affected by your project. This list is provided to you as the initial step of the consultation process required under section 7(c) of the Endangered Species Act, also referred to as Section 7 Consultation.

Under 50 CFR 402.12(e) (the regulations that implement section 7 of the Endangered Species Act), the accuracy of this species list should be verified after 90 days. You may verify the list by visiting the IPaC website (<https://ipac.ecosphere.fws.gov/>) at regular intervals during project planning and implementation. To update an Official Species List in IPaC: from the My Projects page, find the project, expand the row, and click Project Home. In the What's Next box on the Project Home page, there is a Request Updated List button to update your species list. Be sure to select an "official" species list for all projects.

Consultation requirements and next steps

Section 7 of the Endangered Species Act of 1973 requires that actions authorized, funded, or carried out by Federal agencies not jeopardize Federally threatened or endangered species or adversely modify designated critical habitat. To fulfill this mandate, Federal agencies (or their designated non-Federal representative) must consult with the Fish and Wildlife Service if they determine their project may affect listed species or critical habitat.

There are two approaches to evaluating the effects of a project on listed species.

Approach 1. Use the All-species Michigan determination key in IPaC. This tool can assist you in making determinations for listed species for some projects. In many cases, the determination key

will provide an automated concurrence that completes all or significant parts of the consultation process. Therefore, we strongly recommend screening your project with the **All-Species Michigan Determination Key (Dkey)**. For additional information on using IPaC and available Determination Keys, visit <https://www.fws.gov/media/mifo-ipac-instructions> (and click on the attachment). Please carefully review your Dkey output letter to determine whether additional steps are needed to complete the consultation process.

Approach 2. Evaluate the effects to listed species on your own without utilizing a determination key. Once you obtain your official species list, you are not required to continue in IPaC, although in most cases using a determination key should expedite your review. If the project is a Federal action, you should review our section 7 step-by-step instructions before making your determinations: <https://www.fws.gov/office/midwest-region-headquarters/midwest-section-7-technical-assistance>. If you evaluate the details of your project and conclude “no effect,” document your findings, and your listed species review is complete; you do not need our concurrence on “no effect” determinations. If you cannot conclude “no effect,” you should coordinate/consult with the Michigan Ecological Services Field Office. The preferred method for submitting your project description and effects determination (if concurrence is needed) is electronically to EastLansing@fws.gov. Please include a copy of this official species list with your request.

For all **wind energy projects** and **projects that include installing communications towers that use guy wires**, please contact this field office directly for assistance, even if no Federally listed plants, animals or critical habitat are present within your proposed project area or may be affected by your proposed project.

Migratory Birds

Please see the “Migratory Birds” section below for important information regarding incorporating migratory birds into your project planning. Our Migratory Bird Program has developed recommendations, best practices, and other tools to help project proponents voluntarily reduce impacts to birds and their habitats. The Bald and Golden Eagle Protection Act prohibits the take and disturbance of eagles without a permit. If your project is near an eagle nest or winter roost area, see our Eagle Permits website at <https://www.fws.gov/program/eagle-management/eagle-permits> to help you avoid impacting eagles or determine if a permit may be necessary.

Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your consideration of threatened and endangered species during your project

planning. Please include a copy of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
 - USFWS National Wildlife Refuges and Fish Hatcheries
 - Migratory Birds
 - Wetlands
-

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Michigan Ecological Services Field Office

2651 Coolidge Road Suite 101

East Lansing, MI 48823-6360

(517) 351-2555

Project Summary

Project Code: 2023-0036668

Project Name: West Chicago Detention Basin Area 3

Project Type: New Constr - Above Ground

Project Description: The project is in the feasibility stage for the design and construction of a regional detention basin for the West Chicago neighborhood in NW Detroit. The location is forested and contains a mix of upland and wetland areas. The site lies between a densely populated neighborhood and shares connectivity to Rouge Park.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@42.3630072,-83.26234989622206,14z>



Counties: Wayne County, Michigan

Endangered Species Act Species

There is a total of 9 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 2 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Indiana Bat <i>Myotis sodalis</i> There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949 General project design guidelines: https://ipac.ecosphere.fws.gov/project/BOJDSZAUS5GMZJXFEMUUXDDYV4/documents/generated/6982.pdf	Endangered
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045 General project design guidelines: https://ipac.ecosphere.fws.gov/project/BOJDSZAUS5GMZJXFEMUUXDDYV4/documents/generated/6983.pdf	Endangered
Tricolored Bat <i>Perimyotis subflavus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Birds

NAME	STATUS
Piping Plover <i>Charadrius melodus</i> Population: [Great Lakes watershed DPS] - Great Lakes, watershed in States of IL, IN, MI, MN, NY, OH, PA, and WI and Canada (Ont.) There is final critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Endangered
Red Knot <i>Calidris canutus rufa</i> There is proposed critical habitat for this species. This species only needs to be considered under the following conditions: <ul style="list-style-type: none"> Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened

Reptiles

NAME	STATUS
Eastern Massasauga (=rattlesnake) <i>Sistrurus catenatus</i> No critical habitat has been designated for this species. This species only needs to be considered under the following conditions: <ul style="list-style-type: none"> For all Projects: Project is within EMR Range Species profile: https://ecos.fws.gov/ecp/species/2202 General project design guidelines: https://ipac.ecosphere.fws.gov/project/BOJDSZAUS5GMZJXFEMUUXDDYV4/documents/generated/5280.pdf	Threatened

Clams

NAME	STATUS
Northern Riffleshell <i>Epioblasma rangiana</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/527	Endangered

Insects

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Eastern Prairie Fringed Orchid <i>Platanthera leucophaea</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/601	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

-
1. The [Migratory Birds Treaty Act](#) of 1918.
 2. The [Bald and Golden Eagle Protection Act](#) of 1940.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern \(BCC\) list](#) or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Dec 1 to Aug 31
Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10

NAME	BREEDING SEASON
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Golden-winged Warbler <i>Vermivora chrysoptera</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability Of Presence Summary

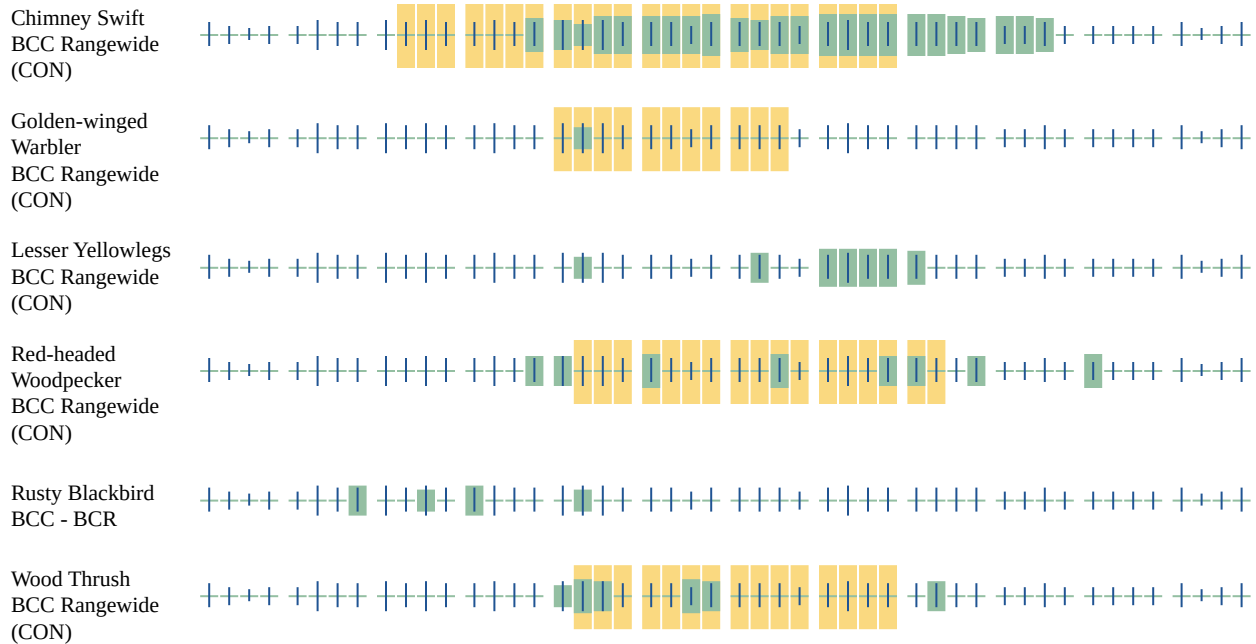
The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for



Additional information can be found using the following links:

- Birds of Conservation Concern <https://www.fws.gov/program/migratory-birds/species>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [Rapid Avian Information Locator \(RAIL\) Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the [RAIL Tool](#) and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
 2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
 3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).
-

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

THERE ARE NO WETLANDS WITHIN YOUR PROJECT AREA.

IPaC User Contact Information

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Name: Wade Rose
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City: Livonia
State: MI
Zip: 48150
Email: wade.rose@ohm-advisors.com
Phone: 2482914573

Lead Agency Contact Information

Lead Agency: Environmental Protection Agency



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Michigan Ecological Services Field Office
2651 Coolidge Road Suite 101
East Lansing, MI 48823-6360
Phone: (517) 351-2555 Fax: (517) 351-1443

In Reply Refer To:
Project code: 2023-0036649
Project Name: West Chicago Detention Basin Area 1
IPaC Record Locator: 714-121781350

February 01, 2023

Subject: Consistency letter for 'West Chicago Detention Basin Area 1' for specified federally threatened and endangered species and designated critical habitat that may occur in your proposed project area consistent with the Michigan Determination Key for project review and guidance for federally listed species (Michigan Dkey).

Dear Wade Rose:

The U.S. Fish and Wildlife Service (Service) received on **February 01, 2023** your effect determination(s) for the 'West Chicago Detention Basin Area 1' (the Action) using the Michigan DKey within the Information for Planning and Consultation (IPaC) system. The Service developed this system in accordance with the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

Based on your answers and the assistance of the Service's Michigan DKey, you made the following effect determination(s) for the proposed Action:

Species	Listing Status	Determination
Eastern Massasauga (=rattlesnake) (<i>Sistrurus catenatus</i>)	Threatened	May affect
Eastern Prairie Fringed Orchid (<i>Platanthera leucophaea</i>)	Threatened	No effect
Indiana Bat (<i>Myotis sodalis</i>)	Endangered	NLAA
Monarch Butterfly (<i>Danaus plexippus</i>)	Candidate	No effect
Northern Long-eared Bat (<i>Myotis septentrionalis</i>)	Threatened	May affect
Northern Riffleshell (<i>Epioblasma rangiana</i>)	Endangered	No effect
Piping Plover (<i>Charadrius melodus</i>)	Endangered	No effect
Red Knot (<i>Calidris canutus rufa</i>)	Threatened	No effect
Tricolored Bat (<i>Perimyotis subflavus</i>)	Proposed Endangered	No effect

Please carefully review this letter. Your Endangered Species Act requirements are not complete.

For non-Federal representatives: Please note that when a project requires consultation under section 7 of the Act, the Service must consult directly with the Federal action agency unless that agency formally designates a non-Federal representative (50 CFR 402.08). Non-Federal representatives may prepare analyses or conduct informal consultations; however, the ultimate responsibility for section 7 compliance under the Act remains with the Federal agency. Please include the Federal action agency in additional correspondence regarding this project.

Northern Long-eared Bat: The Action “May Affect” the Northern Long-eared Bat (NLEB). However, the Action complies with the final 4(d) rule with incidental take covered by the U.S. Fish and Wildlife Service’s January 5, 2016, Intra-Service Programmatic Biological Opinion on the final 4(d) rule for the NLEB addressing “Activities Exceeded from Take Prohibitions.” As such, no further consultation is required for NLEB.

Please report to our office any changes to the information about the Action that you submitted in IPaC, the results of any bat surveys conducted in the Action area, and any northern long-eared bats that are found during Action implementation. Additionally, please note that on March 23, 2022, the Service published a proposal to reclassify the NLEB as endangered under the Endangered Species Act. The U.S. District Court for the District of Columbia has ordered the Service to complete a new final listing determination for the NLEB by November 2022 (Case 1:15-cv-00477, March 1, 2021). The bat, currently listed as threatened, faces extinction due to the range-wide impacts of white-nose syndrome (WNS), a deadly fungal disease affecting cave-dwelling bats across the continent. The proposed reclassification, if finalized, would remove the current 4(d) rule for the NLEB, as these rules may be applied only to threatened species. Depending on the type of effects a project has on NLEB, the change in the species’ status may trigger the need to re-initiate consultation for any actions that are not completed and for which the Federal action agency retains discretion once the new listing determination becomes effective (anticipated to occur by December 30, 2022). If your project may result in incidental take of NLEB after the new listing goes into effect, this will first need to be addressed in an updated consultation that includes an Incidental Take Statement. If your project may require re-initiation of consultation, please contact the Michigan Ecological Services Field Office for additional guidance.

Eastern Massasauga (EMR):

EMR may be present in the Action area. The following projects are not within the scope of the Michigan DKey: prescribed fire; new roads or trails that create a permanent barrier to EMR movement; projects that alter hydrology permanently, or temporarily if during the inactive season; projects that are large in scale; and projects that do not apply recommended conservation measures. Project-specific review is needed for these types of projects. **Please coordinate with the Michigan Ecological Services Field Office to further evaluate effects of the Action on EMR.**

Bats of Conservation Concern:

Implementing protective measures for bats, including both federally listed and non-listed species, indirectly helps to protect Michigan’s agriculture and forests. Bats are significant predators of

nocturnal insects, including many crop and forest pests. For example, Whitaker (1995) estimated that a single colony of 150 big brown bats (*Eptesicus fuscus*) would eat nearly 1.3 million pest insects each year. Boyles et al. (2011) noted the “loss of bats in North America could lead to agricultural losses estimated at more than \$3.7 billion/year, and Maine and Boyles (2015) estimated that the suppression of herbivory by insectivorous bats is worth >1 billion USD globally on corn alone. In captive trials, northern long-eared bats were found to significantly reduce the egg-laying activity of mosquitoes, suggesting bats may also play an important role in controlling insect-borne disease (Reiskind and Wund 2009). Mosquitoes have also been found to be a consistent component of the diet of Indiana bats and are eaten most heavily during pregnancy (6.6%; Kurta and Whitaker 1998). Taking proactive steps to help protect bats may be very valuable to agricultural and forest product yields and pest management costs in and around a project area. Such conservation measures include limiting tree clearing during the bat active season (April through October varies by location) and/or the non-volant period (June through July), when young bats are unable to fly, and minimizing the extent of impacts to forests, wetlands, and riparian habitats.

Bald and Golden Eagles:

Bald eagles, golden eagles, and their nests are protected under the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended, 16 U.S.C. 668a-d) (Eagle Act). The Eagle Act prohibits, except when authorized by an Eagle Act permit, the “taking” of bald and golden eagles and defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” The Eagle Act’s implementing regulations define disturb as “...to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”

If the Action may impact bald or golden eagles, additional coordination with the Service under the Eagle Act may be required. For more information on eagles and conducting activities in the vicinity of an eagle nest, please visit <https://www.fws.gov/library/collections/all-about-eagles>. In addition, the Service developed the National Bald Eagle Management Guidelines (May 2007) in order to assist landowners in avoiding the disturbance of bald eagles. The full Guidelines are available at <https://www.fws.gov/media/national-bald-eagle-management-guidelines-0>.

If you have further questions regarding potential impacts to eagles, please contact Chris Mensing, Chris_Mensing@fws.gov or 517-351-2555.

Monarch butterfly and other pollinators

In December 2020, after an extensive status assessment of the monarch butterfly, we determined that listing the monarch under the Endangered Species Act is warranted but precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants. Therefore, the Service added the monarch butterfly to the candidate list. The Service will review its status each year until we are able to begin developing a proposal to list the monarch.

The Endangered Species Act does not establish protections or consultation requirements for candidate species. Some Federal and State agencies may have policy requirements to consider

candidate species in planning. We encourage implementing measures that will remove or reduce threats to these species and possibly make listing unnecessary.

For all projects, we recommend the following best management practices (BMPs) to benefit monarch and other pollinators.

Monarch and Pollinator BMP Recommendations

Consider monarch and other pollinators in your project planning when possible. Many pollinators are declining, including species that pollinate key agricultural crops and help maintain natural plant communities. Planting a diverse group of native plant species will help support the nutritional needs of Michigan's pollinators. We recommend a mix of flowering trees, shrubs, and herbaceous plants so that something is always blooming and pollen is available during the active periods of the pollinators, roughly early spring through fall (mid-March to mid-October). To benefit a wide variety of pollinators, choose a wide range of flowers with diverse colors, heights, structure, and flower shape. It is important to provide host plants for any known butterfly species at your site, including native milkweed for Monarch butterfly. Incorporating a water source (e.g., ephemeral pool or low area) and basking areas (rocks or bare ground) will provide additional resources for pollinators.

Many pollinators need a safe place to build their nests and overwinter. During spring and summer, leave some areas unmowed or minimize the impacts from mowing (e.g., decrease frequency, increase vegetation height). In fall, leave areas unraked and leave plant stems standing. Leave patches of bare soil for ground nesting pollinators.

Avoid or limit pesticide use. Pesticides can kill more than the target pest. Some pesticide residues can kill pollinators for several days after the pesticide is applied. Pesticides can also kill natural predators, which can lead to even worse pest problems.

Planting native wildflowers can also reduce the need to mow and water, improve bank stabilization by reducing erosion, and improve groundwater recharge and water quality.

Resources:

<https://www.fws.gov/initiative/monarchs>

<https://www.fws.gov/library/collections/pollinators>

Coordination with the Service is not complete if additional coordination is advised above for any species. Please email our office at MIFO_DKey@fws.gov and attach a copy of this letter, so we can discuss methods to avoid or minimize potential adverse effects to those species.

Bat References

Boyles, J.G., P.M. Cryan, G.F. McCracken, T.H. Kunz. 2011. Economic Importance of Bats in Agriculture. *Science* 332(1):41-42.

Kurta, A. and J.O. Whitaker. 1998. Diet of the Endangered Indiana Bat (*Myotis sodalis*) on the Northern Edge of Its Range. *The American Midland Naturalist* 140(2):280-286.

Reiskind, M.H. and M.A. Wund. 2009. Experimental assessment of the impacts of northern long-eared bats on ovipositing *Culex* (Diptera: Culicidae) mosquitoes. *Journal of Medical Entomology* 46(5):1037-1044.

Whitaker, Jr., J.O. 1995. Food of the big brown bat *Eptesicus fuscus* from maternity colonies in Indiana and Illinois. *American Midland Naturalist* 134(2):346-360.

Summary of conservation measures for your project You agreed to the following conservation measures to avoid adverse effects to listed species and our concurrence is only valid if the measures are fully implemented. These must be included as permit conditions if a permit is required and/or included in any contract language.

Indiana bat

Any cutting/trimming of potential roost trees for Indiana bat (trees ≥ 5 inches in diameter [at breast height] with cracks, crevices and/or exfoliating bark) must occur OUTSIDE the non-volant ("pup") season for Indiana bat (June 1 through July 31). Prescribed fire and/or pesticide/herbicide application must also occur outside June-July where potential roost trees are present.

Tree cutting/trimming and/or prescribed burning will not clear ≥ 20 contiguous acres of forest or fragment a connective corridor between 2 or more forest patches of at least 5 acres.

Northern long-eared bat

Based on the project area you entered into IPaC, the project does not occur within 0.25 miles of a known northern long-eared bat hibernaculum. Tree removal, as defined in the 4(d) rule, will not occur within 150 feet of a known occupied northern long-eared bat maternity roost tree.

Action Description

You provided to IPaC the following name and description for the subject Action.

1. Name

West Chicago Detention Basin Area 1

2. Description

The following description was provided for the project 'West Chicago Detention Basin Area 1':

The project is in the feasibility stage for the design and construction of a regional detention basin for the West Chicago neighborhood in NW Detroit. The location is heavily forested and lies between an active golf course, a densely populated neighborhood and industrial area and share connectivity to Rouge Park.

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@42.3740333,-83.25991611659543,14z>



Qualification Interview

1. Are there any possible effects to any listed species or to designated critical habitat from your project or effects from any other actions or projects subsequently made possible by your project?

Select "Yes" even if the expected effects to the species or critical habitat are expected to be 1) extremely unlikely (discountable), 2) can't meaningfully be measured, detected, or evaluated (insignificant), or 3) wholly beneficial.

Select "No" to confirm that the project details and supporting information allow you to conclude that listed species and their habitats will not be exposed to any effects (including discountable, insignificant, or beneficial effects) and therefore, you have made a "no effect" determination for all species. If you are unsure, select YES to answer additional questions about your project.

Yes

2. This determination key is intended to assist the user in the evaluating the effects of their actions on Federally listed species in Michigan. It does not cover other prohibited activities under the Endangered Species Act (e.g., for wildlife: import/export, Interstate or foreign commerce, possession of illegally taken wildlife, purposeful take for scientific purposes or to enhance the survival of a species, etc.; for plants: import/export, reduce to possession, malicious destruction on Federal lands, commercial sale, etc.) or other statutes. Click yes to acknowledge that you must consider other prohibitions of the ESA or other statutes outside of this determination key.

Yes

3. Is the action the approval of a long-term (i.e., in effect greater than 10 years) permit, plan, or other action? (e.g., a new or re-issued hydropower license, a land management plan, or other kinds of documents that provide direction for projects or actions that may be conducted over a long term (>10 years) without the need for additional section 7 consultation).

No

4. Is the action being funded, authorized, or carried out by a Federal agency?

Yes

5. Does the action involve the installation or operation of wind turbines?

No

6. Are there at least 30 days prior to your action occurring? Endangered species consultation must be completed before taking any action that may have effects to listed species. The Service also needs 30 days to review projects before we can verify conclusions in some dkey output letters. For example, if you have already started some components of the project on the ground (e.g., removed vegetation) before completing this key, answer “no” to this question. The only exception is if you have a Michigan Field Office pre-approved emergence survey (i.e., if you have conducted pre-approved emergence surveys for listed bats before tree removal, you can still answer yes to this question).

Yes

7. Does the action involve constructing a new communication tower or modifying an existing communications tower?

No

8. Does the activity involve aerial or other large-scale application of any chemical (including insecticide, herbicide, etc.)?

No

9. Does your project include water withdrawal (ground or surface water) greater than 10,000 gallons/day?

No

10. Will your action permanently affect hydrology?

Yes

11. Will your project have any direct impacts to a stream or river (e.g., Horizontal Directional Drilling (HDD), hydrostatic testing, stream/road crossings, new storm-water outfall discharge, dams, other in-stream work, etc.)?

Yes

12. Does your project have the potential to indirectly impact the stream/river or the riparian zone (e.g., cut and fill, horizontal directional drilling, hydrostatic testing, construction, vegetation removal, discharge, etc.)?

Yes

13. Are you applying for one of the following Michigan EGLE/Army Corps of Engineers joint permit application Minor Permit (MP) Categories:
MP 3 - Boat Hoist; MP 5 - Boal Wells; MP 7 - Completed Enforcement Actions; MP 12 - Dock;
MP 21 - Fish and Wildlife Habitat Structures;
MP 22 - Ford Stream Crossings for Commercial Forestry Operations;
MP 28 - Maintenance and Repair of Serviceable Structures;
MP 45 - Temporary Recreational Structures;
MP 48 - Wetland Habitat Restoration and Enhancement?

Verify the MP category number and associated description matches your project/application (https://www.michigan.gov/documents/egle/WRD-Minor-Project-Categories_733320_7.pdf). If you don't know what category applies for your project, answer no to this question.

No

14. Are you applying for one of the following Michigan EGLE/Army Corps of Engineers joint permit application General Permit (GP) Categories:
GP A - Aids to Navigation;
GP C - Clear Span Bridge;
GP E - Culverts - Small;
GP J - Dry Fire Hydrant;
GP O - Minor Permit Revisions and Transfers;
GP Q - Mooring Buoy;
GP W - Scientific Measuring Devices;
GP X - Snow Road Stream Crossings for Forestry Operations;
GP Z - Spring Piles and Piling Clusters;
GP DD - Wetland Habitat Restoration and Enhancement?

Verify the GP category number and associated description matches your project/application (https://www.michigan.gov/documents/deq/wrd-general-permit-categories_555828_7.pdf). If you don't know what category applies for your project, answer no to this question.

No

15. Will your action disturb the ground or existing vegetation? This includes any off road vehicle access, soil compaction, digging, seismic survey, directional drilling, heavy equipment, grading, trenching, placement of fill, pesticide application, vegetation management (including removal or maintenance using equipment or chemicals), cultivation, development, etc.

Yes

16. Is the action a utility-scale solar development project?

No

17. [Hidden semantic] Does the action intersect the MOBU AOI?

Automatically answered

Yes

18. Under the ESA, monarchs remain warranted but precluded by listing actions of higher priority. The monarch is a candidate for listing at this time. The Endangered Species Act does not establish protections or consultation requirements for candidate species. Some Federal and State agencies may have policy requirements to consider candidate species in planning. We encourage implementing measures that will remove or reduce threats to these species and possibly make listing unnecessary. If your project will have no effect on monarch butterflies (for example, if your project won't affect their habitat or individuals), then you can make a "no effect" determination for this project. Are you making a "no effect" determination for monarch?

Yes

19. [Hidden Semantic] Does the action intersect the Eastern massasauga rattlesnake area of influence?

Automatically answered

Yes

20. In a previous answer in this key, you indicated your project will have permanent effects to hydrology. Will the hydrological impacts result in a significant change in the elevation of surface water upstream or downstream, or in the local groundwater elevations?

A significant change is one where the elevations are expected to change more than 6 inches or result in inundation.

No

21. Does your action involve prescribed fire?

No

22. Will this action occur entirely in the Eastern massasauga rattlesnake inactive season (October 16 through April 14)?

No

23. Will this action occur entirely in the Eastern massasauga rattlesnake active season (April 15 through October 15)?

No

24. Will the action result in permanent loss of more than one acre of wetland or conversion of more than 10 acres of uplands of potential Eastern massasauga rattlesnake habitat (uplands associated with high quality wetland habitat) to other land uses?

Yes

25. [Semantic] Does the action area intersect the northern riffelshell area of influence?

Automatically answered

Yes

26. [Hidden Semantic] Does the action area intersect the piping plover area of influence?
Automatically answered
Yes
27. [Hidden Semantic] Does the action area intersect the rufa red knot area of influence?
Automatically answered
Yes
28. [Hidden Semantic] Does the action area intersect the area of influence for Eastern prairie fringed orchid?
Automatically answered
Yes
29. [Hidden Semantic] Does the action area intersect the Indiana bat area of influence?
Automatically answered
Yes
30. The project has the potential to affect federally listed bats. Does the action area contain any known or potential bat hibernacula (natural caves, abandoned mines, or underground quarries)?
No
31. Has a presence/absence bat survey or field-based habitat assessment following the Service's Range-wide [Indiana Bat and Northern Long-eared Bat Summer Survey Guidelines](#) been conducted within the action area?
No
32. Does the action involve removal/modification of a human structure (barn, house or other building) known to contain roosting bats?
No
33. Does the action include removal/modification of an existing bridge or culvert?
No
34. Does the action include herbicide application?
No
35. Does the action include tree cutting/trimming, prescribed fire, and/or pesticide (e.g., insecticide, rodenticide) application?
Yes
36. Will the action clear >10 acres of contiguous forest (i.e., connected by 1,000 feet or less) or fragment a riparian or other connective forested corridor (e.g., tree line) between 2 or more forest patches of at least 5 acres? For more information, see [Appendix II](#).
Yes
37. Will the action clear > 20 acres of forest or fragment a connective corridor between 2 or more forest patches of at least 5 acres? For more information, see [Appendix II](#).
No
-

38. Does the action area contain potential NLEB bat roost trees (trees ≥ 3 inches in diameter [at breast height] with cracks, crevices, cavities and/or exfoliating bark)? For more information, see [Appendix IV](#).

Yes

39. Does the action area contain potential Indiana bat roost trees (trees ≥ 5 inches in diameter [at breast height] with cracks, crevices and/or exfoliating bark)? For more information, see [Appendix III](#).

Yes

40. Does the action include emergency cutting/trimming of hazard trees in order to prevent imminent loss of human life and/or property?

No

41. [Semantic] Is any portion of the action area within 5 miles of a known Indiana or northern long-eared bat hibernaculum?

Automatically answered

No

42. Will all tree cutting/trimming, prescribed fire, and/or pesticide application occur OUTSIDE the non-volant ("pup") season for Indiana bat (that is, no cutting/trimming, prescribed fire, or pesticide application during June 1 through July 31)?

Note: Based on the project's location, conducting these activities outside the months of June and July may be sufficient to avoid adverse effects to/take of Indiana bat.

Yes

43. [Hidden Semantic] Does this project intersect the northern long-eared bat area of influence?

Automatically answered

Yes

44. Is the project action area located within 0.25 miles of a known northern long-eared bat hibernaculum?

Automatically answered

No

45. Will the action involve Tree Removal as defined in the 4(d) rule for northern long-eared bat?

No

46. [Hidden semantic] Does the action intersect the Tricolored bat AOI/SLA/range?

Automatically answered

Yes

47. The tricolored bat was proposed for listing as endangered on September 13, 2022. In Michigan, the tricolored bat was rare pre-white nose syndrome (WNS) and is exceedingly rare post-WNS. The species has been observed in 12 Michigan counties to date, largely during the fall or winter. With very few exceptions, the species has not been observed in Michigan in the summer months, and no maternity colonies have been found. During winter, tricolored bats hibernate in caves, abandoned mines, and abandoned tunnels ranging from small to large in size. During spring, summer and fall months, they roost primarily among leaf clusters of live or recently dead deciduous/hardwood trees.

Are you making a no effect determination on this project for the tricolored bat?

Yes

Project Questionnaire

If the project includes forest conversion, report the appropriate acreages below. Otherwise, type '0' in questions 1-3.

1. Estimated total acres of forest conversion:

16

2. If known, estimated acres of forest conversion from April 1 to October 31

0

3. If known, estimated acres of forest conversion from June 1 to July 31

0

If the project includes timber harvest, report the appropriate acreages below. Otherwise, type '0' in questions 4-6.

4. Estimated total acres of timber harvest

0

5. If known, estimated acres of timber harvest from April 1 to October 31

0

6. If known, estimated acres of timber harvest from June 1 to July 31

0

If the project includes prescribed fire, report the appropriate acreages below. Otherwise, type '0' in questions 7-9.

7. Estimated total acres of prescribed fire

0

8. If known, estimated acres of prescribed fire from April 1 to October 31

0

9. If known, estimated acres of prescribed fire from June 1 to July 31

0

IPaC User Contact Information

Agency: Detroit city
Name: Wade Rose
Address: 34000 Plymouth Rd
City: Livonia
State: MI
Zip: 48150
Email: wade.rose@ohm-advisors.com
Phone: 2482914573

Lead Agency Contact Information

Lead Agency: Environmental Protection Agency

DRAFT

Appendix I: Public Meeting and Public Comment

**DETROIT WATER AND SEWERAGE DEPARTMENT NOTICE
PUBLIC HEARING FOR STORMWATER IMPROVEMENTS
FY24 CLEAN WATER STATE REVOLVING FUND (CWSRF) PROJECT**

The Detroit Water and Sewerage Department (DWSD) announces a Public Hearing regarding its Project Plan for proposed stormwater improvements in the City of Detroit. DWSD will be seeking low interest Clean Water State Revolving Fund (CWSRF) loan assistance for FY2024.

These projects are comprised of upgrading stormwater infrastructure at select locations in the West Outer Drive neighborhood (West Chicago) and the Castle Rouge and Eliza Howell neighborhood (Schoolcraft) in the City of Detroit.

The projects are titled West Chicago and Schoolcraft Stormwater Improvements. This project is broken into four subgroups, B064 (Project A), B063 (Project B), B070 (Project C) and B069 (Project D). Construction will include excavation and removal of existing materials, construction of the proposed storm sewer backfill of the excavation required for piping work, and restoration of each work site. All work to be performed within the existing road right-of-way. The impact of the project will be improved ability of DWSD to provide reliable sanitary services and improved water quality of the Rouge River. The Michigan Department of Environment, Great Lakes & Energy's (EGLE) acceptance of the City of Detroit as significantly overburdened may allow these projects to be funded through a grant; which would result in minimal to no impact on user rates.

The temporary impact of construction activities will be minimized through mitigation measures specified in the contract documents. Adverse impacts on historical, archaeological, geographic, or cultural areas are not expected. This project is necessary to ensure that the DWSD will be able to reduce combined sewer overflows to the Rouge River while maintaining sanitary service to residents and improving the water quality of the Rouge River. The Project Plan describes stormwater projects that will convey drainage to the Rouge River and reduce combined sewer overflows. The total cost of the project is currently estimated at approximately \$17 million for Project A, \$19.2 million for Project B, \$20 million for Project C and \$22 Million for Project D; a total of \$78.2 million which is being sought through the CWSRF program.

The Public Hearing will present a description of the recommended projects, estimated costs, noting no potential impact for customers. The use of grant funding will cover the cost. The purpose of the hearing is not only to inform, but to seek and gather input from people that will be affected. Comments and viewpoints from the public are encouraged.

THE PUBLIC HEARING WILL BE DURING THE BOARD OF WATER COMMISSIONERS MEETING ON:

DATE: Wednesday, March 15, 2023

PLACE: Detroit Water and Sewerage Department
Water Board Building
735 Randolph, 5th Floor, Board Room
Detroit, Michigan 48226

TIME: 2:00 p.m.

Call in using your phone: 301-715-8592
312-626-6799
267-831-0333

Zoom Meeting ID: 815 7263 5118
Zoom Passcode: 482262021

To attend online:

Zoom link: <https://cityofdetroit.zoom.us/j/81572635118>
Use Passcode: 482262021

Information on the Project Plan will be available for review after February 28, 2023 at the following locations:

1. City Website: detroitmi.gov/dwsd
2. By email request to Jose Abraham: jose.abraham@detroitmi.gov
3. In person at the Water Board Building

If you have questions or want to submit written statements for the Public Meeting, call or write:

Call: Jose Abraham at (313) 267-8000
Email: Jose Abraham at jose.abraham@detroitmi.gov

Mail: Jose Abraham
Detroit Water and Sewerage Department
735 Randolph, 7th Floor
Detroit, MI 48226

Written comments will be accepted at the above address if received prior to 2:00 p.m. EST, Wednesday, April 19, 2023

You may provide your public comment in-person or via Zoom (see below).

In-person attendees

- Upon entering the Water Board Building, DWSD Security will do temperature checks and require everyone to wear a mask during the entire time inside the facility, whether vaccinated or unvaccinated.
- Social distancing inside the Board Room will be required.
- If you want to make public comment, complete the form available in the Board Room and it will be provided to the Chair. The Chair will call on you during the appropriate time.
- We respectfully request that you maximize your three minutes by sharing all your comments/questions at one time.
- You will only be called upon once for public comment during each section.
- Once the chair closes public comment, there will be no other comments from the public accepted and all public attendees will not be acknowledged during the remainder of the meeting.

Attending via Zoom

- During the public comment section, raise your hand using the Zoom hand icon on your desktop or mobile device, or if calling into the meeting by phone, press *9 to raise your hand (press *6 to unmute when called upon).
- We respectfully request that you maximize your three minutes by sharing all your comments/questions at one time.
- You will only be called upon once for public comment.
- Once the chair closes public comment, there will be no other comments from the public accepted and all attendees will remain muted for the duration of the meeting.

City of Detroit, Water and Sewerage Department
Gary Brown, Director