GLWA
Great Lakes Water Authority

DRAFT

Hubbell-Southfield CSO Facility Improvements

ITA: 918-0716
2026 CLEAN WATER STATE REVOLVING FUND PROJECT PLAN

FEBRUARY 2025

WADE TRIM

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Acronyms	
Acronym	Name
AACE	Association for the Advancement of Cost Engineering
AOR	Allowable Operating Region
AWT	Advanced Water Treatment
BAF	Biologically Active Filtration
BDF	Biosolids Dryer Facility
Bio P	Biological Phosphorus
CFS	Cubic Feet Per Second
COF	Central Off-Load Facility
CSO	Combined Sewer Overflow
DRO	Detroit River Outfall
DWF	Dry Weather Facility
DWSD	Detroit Water and Sewer Department
EB	Electrical Building
EOPCC	Engineer's Opinion of Probable Construction Costs
FEMA	Federal Emergency Management Agency
GLWA	Great Lakes Water Authority
GPF	Grit Processing Facility
HGL	Hydraulic Grade Line
HI	Hydraulic Institute
HP	Horsepower
HPO	High Purity Oxygen
HVAC	Heating, Ventilation, and Air Conditioning
HVOF	High Velocity Oxygen Fuel
HWL	High Water Level
ILP	Intermediate Lift Pump
LWL	Low Water Level
MAU	Makeup Air Unit
MBR	Membrane Bioreactor
MCFS	Minimum Continuous Stable Flow
MDEQ	Michigan Department of Environmental Quality
MF	Microfiltration

Acronym	Name
MG	Million Gallons
mg/L	Milligrams per Liter
MG	Million Gallons
MGD	Million Gallons Per Day
MI-EGLE	Michigan Department of Environment, Great Lakes, and Energy
MLP	Main Lift Pump
Mm	Millimeter (s)
MNFI	Michigan Natural Features Inventory
N/A, NA	Not Applicable
NPDES	National Pollution Discharge Elimination System
NPV	Net Present Value (same as Present Worth)
NTP	Notice to Proceed
O&M	Operation and Maintenance
OM&R	Operations, Maintenance and Repair
OC	Organochloride
OPCC	Opinion of Probable Construction Costs
POA	Pull-Out-Assemblies
POR	Preferred Operating Region
PW	Present Worth (Same as Net Present Value)
RAS	Return Activate Sludge
RO	Reverse Osmosis
RPM	Revolutions Per Minute
RRO	Rouge River Outfall
SCR	Screenings Capture Ratio
SEMCOG	Southeast Council of Governments
SFE	Screened Final Effluent
SHPO	State Historic Preservation Office
SOTR	Standard Oxygen Transfer Rate
SRF	State Revolving Fund
SWD	Side Water Depth
TDH	Total Dynamic Head
THPO	Tribal Historic Preservation Office

Acronym	Name
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TRC	Total Residual Chlorine
USFWS	United States Fish and Wildlife Services
VFD	Variable Frequency Drive
VSD	Variable Speed Drive
VTSH	Vertical Turbine Solids Handling
WAS	Waste Activated Sludge
WRRF	Water Resource Recovery Facility
WTT	Wade Trim Team

Wade Trim has used text and data from the following sources in the development of this Project Plan:

Summary of Additional Sources of Data for the Project Plan	
Source	Description
Wade Trim	Hubbell-Southfield CSO Facility Improvements Basis of Design Report, June 2024
Jacobs	CS-299 CSO Facilities Assessment Report, April 2021
Jacobs	Hubbell-Southfield CSO Facility Improvements Project SRF Project Plan, July 2021
AECOM	Hubbell-Southfield CSO Facility Improvements (CIP273001) Preliminary Basis of Design Report, June 2022
CDM	GLWA Wastewater Master Plan
MNFI	Endangered, Threatened, or Candidate Species Survey
SEMCOG	Population Data

EXECUTIVE SUMMARY

This document has been prepared in accordance with the planning guidelines adopted by the Michigan Department of Environment, Great Lakes, and Energy (EGLE) for the State Revolving Fund (SRF) low interest loan program. It is the intent of the Great Lakes Water Authority (GLWA) to seek low interest loan assistance under the SRF program for the Hubbell-Southfield (HS) Combined Sewer Overflow (CSO) Facility Improvements project, described in this Project Plan.

The Great Lakes Water Authority (GLWA) provides regional wastewater collection, transport, and treatment services for approximately three million people in the City of Detroit and 76 other communities (see **Figure ES-1**). Wastewater from the service area is conveyed through a series of collection sewers, interceptors, and pump stations to the Water Resource Recovery Facility (WRRF). During storm events, flows that exceed the capacity of the sewer system are allowed to overflow the system in accordance with the existing NPDES permit. GLWA has operational responsibility for the regional sewer system including combined sewer overflow (CSO) control facilities that treat flows.

The Great Lakes Water Authority (GLWA) initiated a project to conduct numerous improvements to the Hubbell-Southfield Combined Sewer Overflow (CSO) Facility located in Dearborn, Michigan. Hubbell-Southfield is one of nine GLWA CSO facilities and has a 22-million-gallon (MG) storage capacity and a design flow capacity of 2,200 cfs. The facility began operation in 1999 and requires rehabilitation and upgrades to ensure continued reliable treatment of wet weather flows. The tributary area to Hubbell-Southfield comprises approximately 14,400 acres in the City of Dearborn and the west side of the City of Detroit. The facility discharges to the Northwest Interceptor with overflows discharging to the Rouge River. An aerial view of the existing Hubbell-Southfield CSO Facility can be found in **Figure ES-2**, and a map that shows a boundary for the project wok is presented in **Figure ES-3**. **Figure ES-4** shows locations of the tributary sewer level sensors to be replaced.

The overall goals of the project are to bring the Hubbell-Southfield CSO Facility up to current codes/standards, standardize equipment, improve operations, strengthen operational reliability, and improve safety and ease of maintenance for operators. This project encompasses improvements to basin flushing, dewatering, disinfection, screening, instrumentation and controls, architectural/HVAC, and electrical, as well as site work and other items. A CSO Facilities Assessment evaluated alternatives and provided recommended capital improvement needs at the HS CSO Facility. A major upgrade is to replace the existing flushing system used to clean the basin with a more effective system. An alternative evaluation determined that a new spray nozzle system was the recommended alternative to provide this cleaning. **Table ES-** summarizes the recommended improvement at the HS CSO Facility along with the estimated construction costs.

Table ES-1. HS CSO Basin Improvements Summary	
Item (Construction Cost)	Description
Civil/Site ($3,160,074)	Resurface basin entrance road and clean/rehabilitate/replace culvert crossing from TPC golf course to Rouge River. Replace fencing and vehicle gate at far eastern entrance. Add drains to low lying areas on top of basin. Modify site to support new chemical storage building.
Demolition ($2,818,431)	Demolition of old equipment and temporary systems.
Architectural ($326,212)	Miscellaneous repairs to Process Building for interior finishes, cabinets, and rework of working spaces. Add new Chemical Storage Building.
Structural ($6,491,882)	Rehab/repairs to the floors of Basins 1 and 2 and flushing pond; install new flushing lanes and new access hatch atop the flushing pond; foundations for chemical storage building and misc. structural repairs. Complete replacement of the screen walkway. Modify drive cross slope above shunt channel to improve drainage.
Process ($18,179,073)	Installation of new modified flushing piping and nozzle system and installation of new chemical storage building and feed systems to provide total of 50,000 gallons of on-site storage. Replacement of dewatering pumps, flushing pump and gravity dewatering ball valves.
HVAC/Plumbing ($634,670)	Upgrades to HVAC in the Headworks and Process Building. Addition of new Building Management System controls. Upgrade hose bibs and NPW pressure in basins. Add new HVAC and plumbing at New Chemical Storage Building.
Electrical ($7,440,485)	Complete replacement of all electrical systems including MCCs, wiring and conduit. Upgrade to support new systems and lighting and electrical in New Chemical Storage Building. Add selected exterior receptacles, exterior lighting, and interior lighting in the basin.
I&C ($7,378,594)	Complete replacement of all control system elements (VR8, Dams, and Basins) – PLC, SCADA, OIT, wiring and conduit. Inclusion of new control of chemical feed and flushing systems. Provide for 2 additional remote level sensors in the influent combined sewer system.
$46,429,420	Subtotal
$21,053,261	*Contingency, Engineering, and Construction Administration*
$67,482,681	**Total**

Figure ES-1. Hubbell-Southfield Sewer Service Area

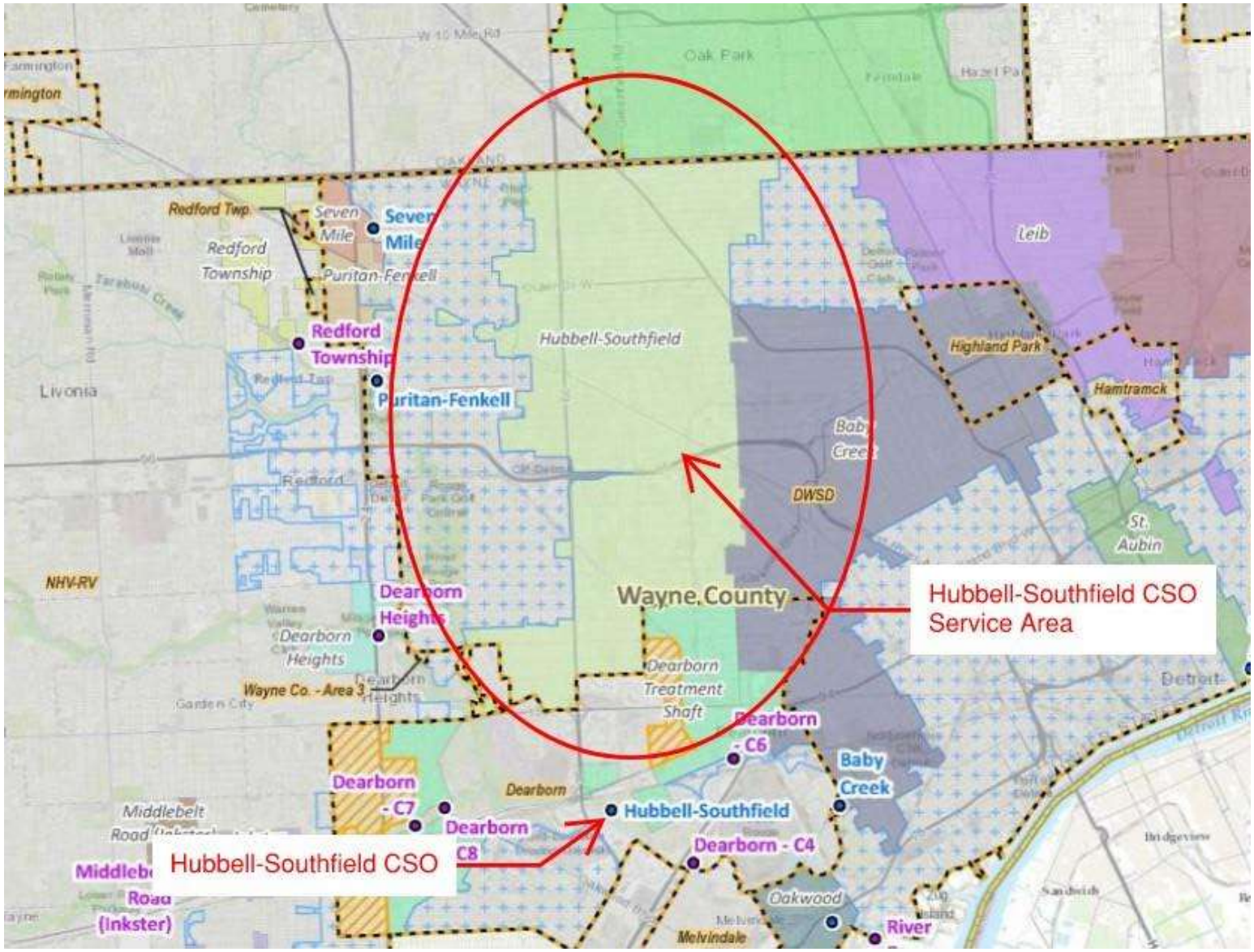


Figure ES-2. Hubbell-Southfield CSO Aerial View

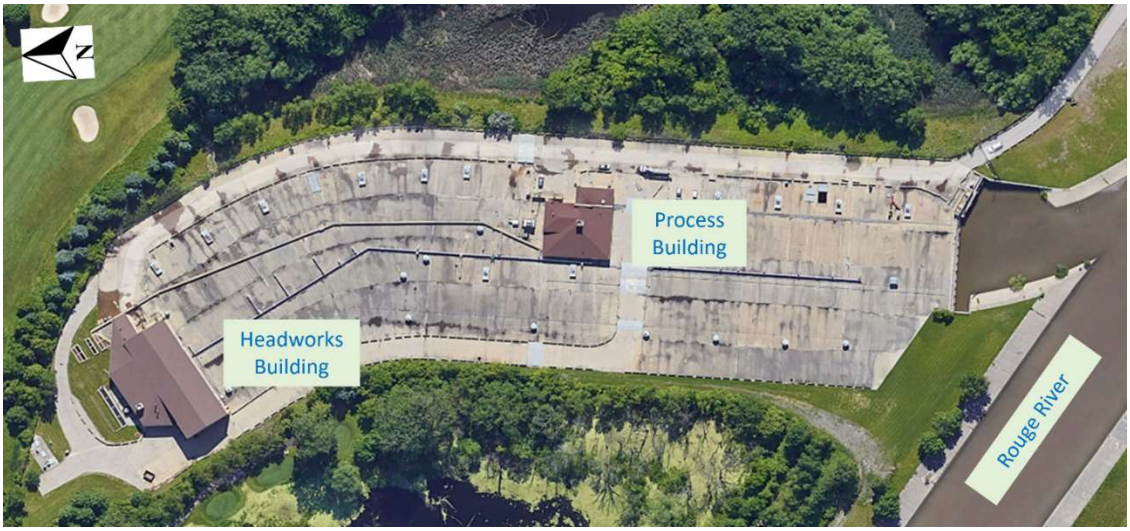


Figure ES-3. Location Map for the Hubbell-Southfield CSO Facility

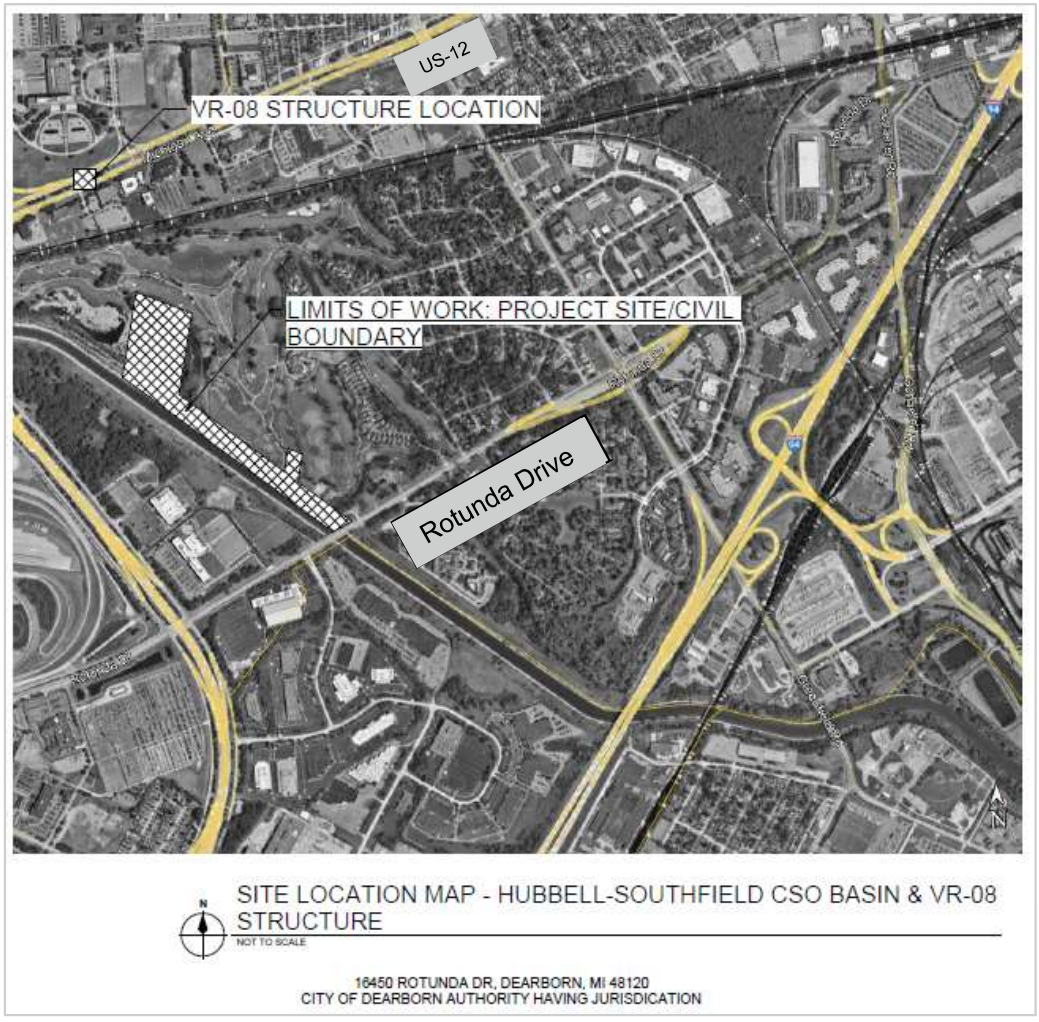
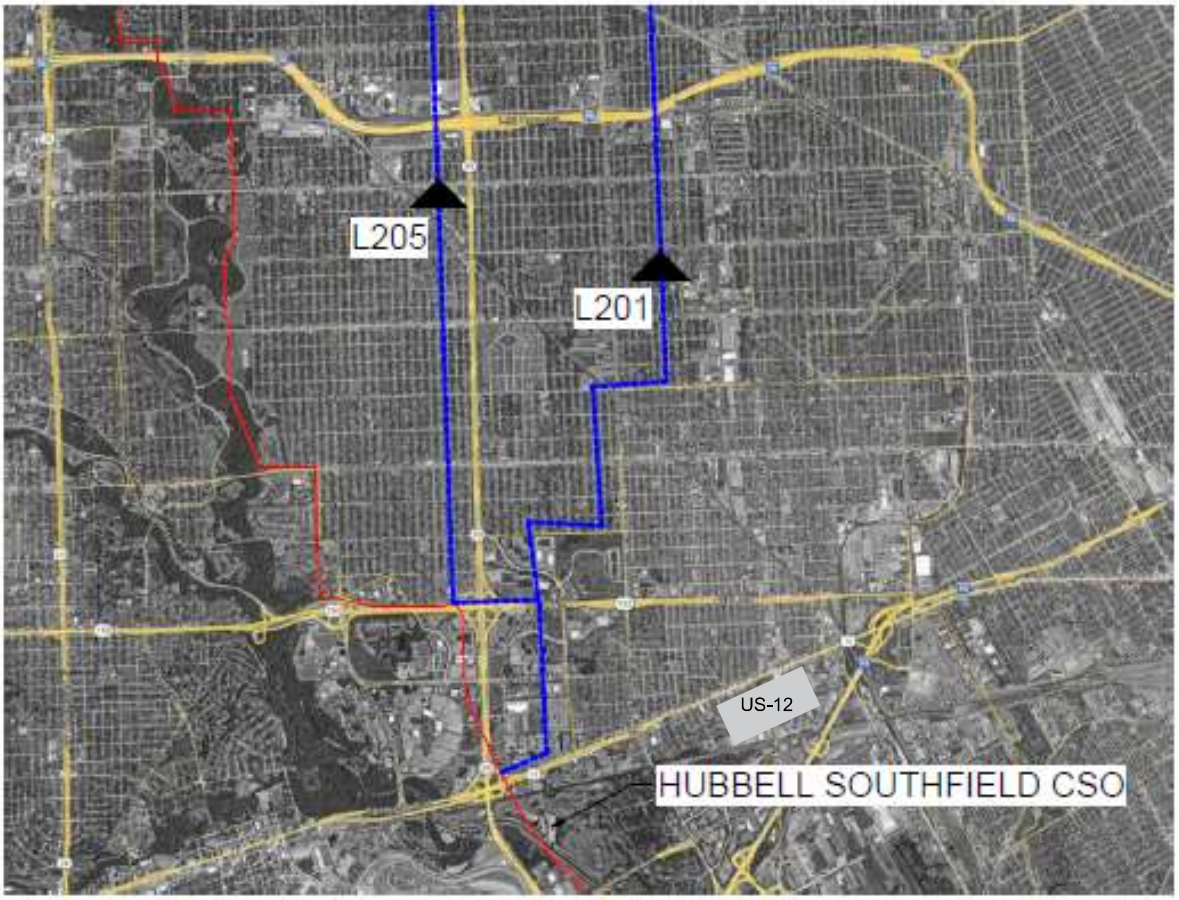


Figure ES-4. Location Map for the Hubbell-Southfield CSO Tributary Sewers Level Sensors



1.0 PROJECT BACKGROUND

1.1 Introduction and Purpose

This document has been prepared in accordance with the planning guidelines adopted by the Michigan Department of Environment, Great Lakes, and Energy (EGLE) for the State Revolving Fund (SRF) low interest loan program. It is the intent of the Great Lakes Water Authority (GLWA) to seek low interest loan assistance under the SRF program for the recommended work.

The purpose of this document is to describe the various improvements at the GLWA's Hubbell-Southfield (HS) Combined Sewer Overflow (CSO) Facility, which GLWA is proposing to undertake with SRF funding to provide safe, efficient, and reliable operation of the facility. This Project Plan provides information on the current status of the facility, a description of why the improvements are needed, an evaluation of the alternatives, a description of the recommended alternative, and an assessment of the environmental impacts. The Project Plan also serves as the basis for public review and comment on the proposed work in accordance with the public participation requirements of the SRF program.

1.2 Delineation of Study Area

GLWA's service area within the corporate limits of the City of Detroit includes Highland Park and Hamtramck which are separate communities located completely within the City's corporate boundary. **Figure 1-1** depicts the GLWA service area and the location of the existing HS CSO facility along with other GLWA facilities. The GLWA service area encompasses approximately 88,876 acres in the City of Detroit with a population of approximately 670,031 people according to the 2019 population estimates from the Census Bureau, plus considerable commercial and industrial activity. Of this area, slightly less than half (39,300 acres) is located in the Rouge River drainage area. The remainder (49,576 acres) is tributary to the Detroit River. The entire GLWA wastewater service area includes 76 surrounding communities with 188,024 acres in Wayne County, 308,913 acres in Oakland County, and 162,242 acres in Macomb County.

The HS tributary area within the City of Detroit consists of approximately 14,400 acres on the west side of Detroit. The facility is located south of Michigan Avenue (US-12) and east of the Southfield Freeway adjacent to the Rouge River. **Figure 1-2** shows the tributary area and location of the HS CSO Facility.

Figure 1-1. Map of CSO Facility Locations

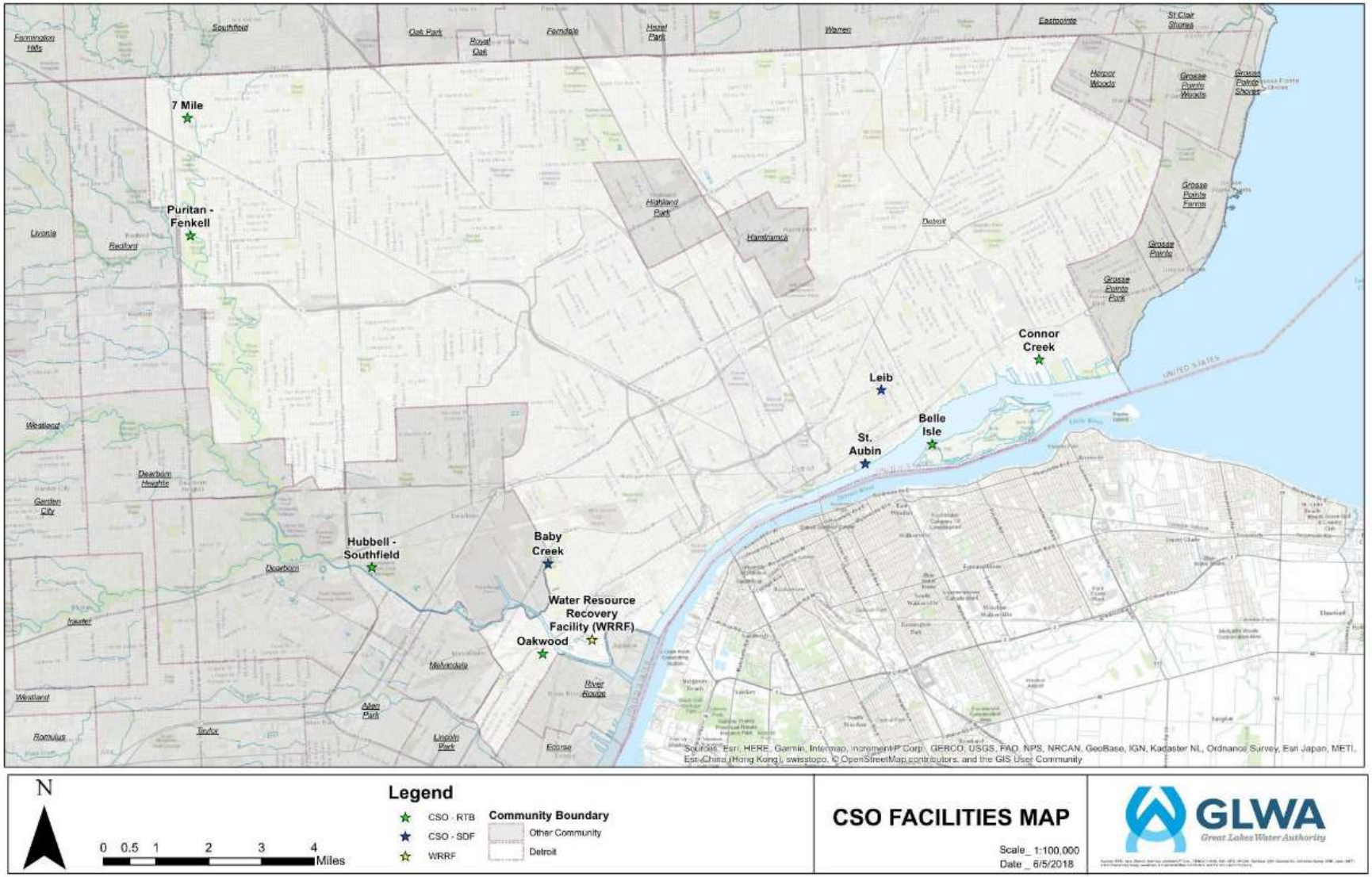
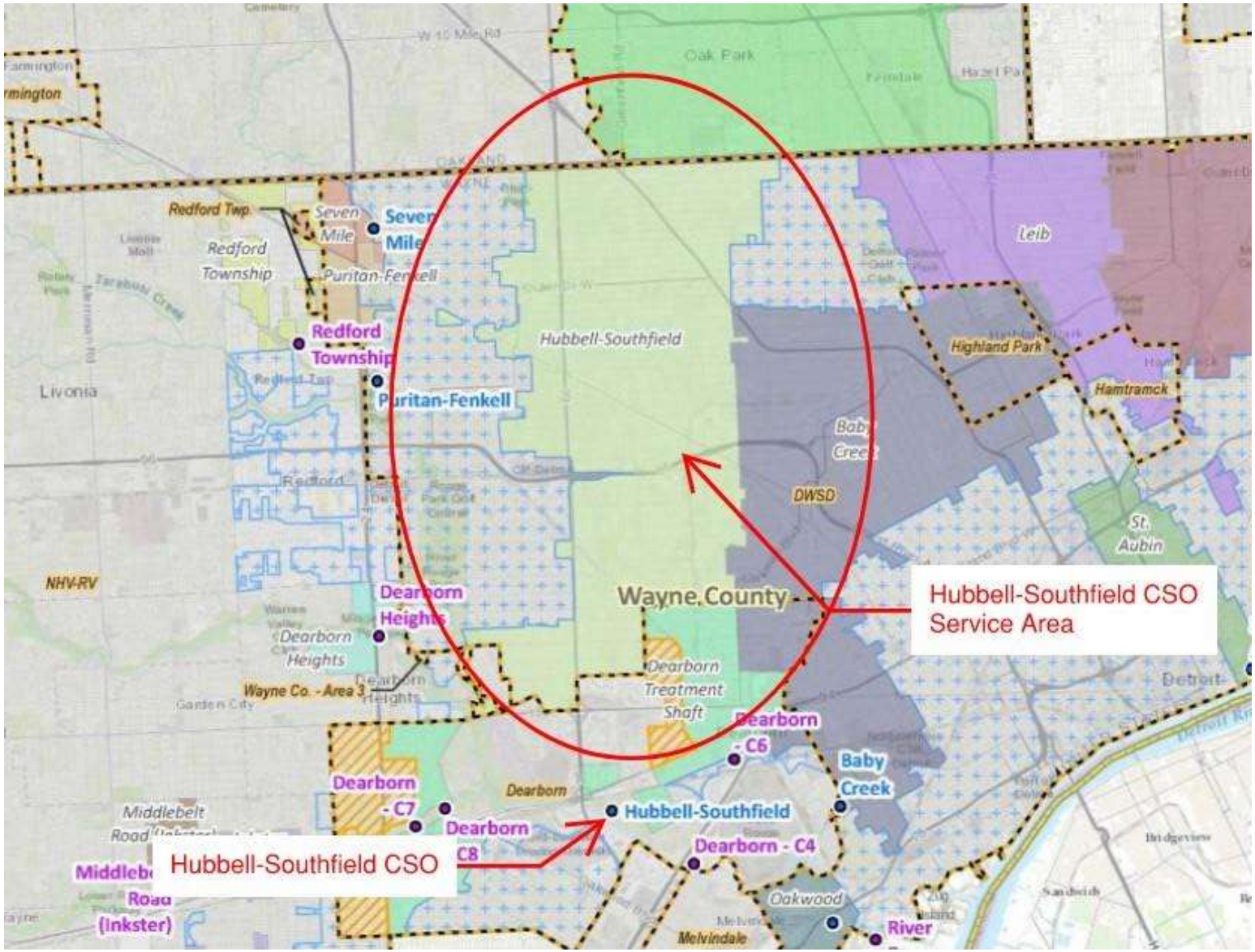


Figure 1-2. Hubbell-Southfield CSO Tributary Area



1.3 Cultural Resources

The Detroit area was inhabited by Indians prior to European settlements. Most Indian villages were located near waterways because of food supplies and ease of transportation via canoe. Although Indian relics have been discovered in Springwells and the Fort Wayne areas of the City of Detroit, no archeological sites are known to exist within the HS CSO Facility project area.

Numerous historical structures are located in and around Detroit that are reflective of early settlements in the area. The early architecture was influenced mainly by French occupation of the territory and by the economic background of the early settlers in the territory. More than a hundred historical sites and landmarks within Detroit are listed in national registers. The existing facility was constructed in the 1990s and is not considered a historical structural.

1.4 The Natural Environment

1.4.1 Air Quality

There are currently no air quality issues caused by or experienced at the CSO facility. During construction of the project, it is possible that heavy machinery could perpetuate air-born dust. Procedures to minimize dust and other air-born particles caused by construction will be put into place as part of the contract documents.

1.4.2 Wetlands

Wetlands are poorly drained areas generally or intermittently covered with water up to ten feet deep, with emergent vegetation. Included in this habitat type are (1) bogs having acidic water and generally blanketed with a floating mat of specialized mosses, shrubs, and trees; (2) marshes covered with one to three feet of water in which cattails and bulrushes are common; (3) shrub swamps where vegetation grows in soil water logged or covered with up to six inches of water; and (4) wooded swamps where trees dominate in waterlogged soil.

Within the City of Detroit, the marshes are generally confined to the edges of waterways. **Appendix B.1** includes the National Wetlands Inventory Map for the H-S CSO Facility. The only wetland feature in the boundary of the project's study area is the Rouge River. The impact to the River is discussed in **Sections 1.4.3 Coastal Zones** and **Section 1.4.5 Natural or Wild and Scenic Rivers.**

1.4.3 Coastal Zones

The H-S CSO Facility is not within a Managed Coastal Zone. **Appendix B.2** contains a map indicating the location of the H-S CSO relative to the Managed Coastal Zone.

1.4.4 Floodplains

Flood plains are relatively flat areas or lowlands adjacent to channels of water courses or water bodies which may be temporarily covered by flood water during periods of high precipitation. In southeast Michigan, flood plains are found along virtually all rivers and lakes, including the Rouge

River. The Great Lakes Basin Commission has estimated that there will be a continued reduction in floodplain acreage through the year 2020. Industrial, commercial, and residential expansion account for most of the loss of this type of habitat.

The National Flood Hazard Layer FIRMette map, **Appendix B.3**, indicates that only the effluent gates of the H-S CSO Facility are in the "Without Base Flood Elevation (BFE)".

1.4.5 Natural or Wild and Scenic Rivers

The HS CSO Facility is adjacent to and discharges to the Rouge River, see **Appendix B.4.** The project work at the discharge gates, river intake gate, and new manual bar screens requires an EGLE/USACE Joint Permit Application (JPA), see **Appendix D.5.** Water quality issues related to the Rouge River is addressed in **Section 2.2** of this Project Plan.

The Rouge River is intensively developed, with little vacant land within the drainage area in the City of Detroit other than designated recreational areas and parks. North of the confluence of the Middle Branch, the development is primarily residential with small commercial outcroppings and a substantial area designated as park land along the riverbanks. After traversing the City of Dearborn, the River emerges into a predominantly industrialized portion within the City of Detroit until it outlets to the Detroit River near Zug Island.

1.4.6 Major Surface Waters

Other than the Rouge River, there are no major surface waters adjacent to the project.

1.4.7 Topography

Local topography is described quantitatively in measures of relative relief and slope. Relative relief is the difference in elevation between the highest and lowest points in a particular area. Relative relief on the lake plains varies from 10 to 50 feet per square mile. Slopes that limit urban development and agricultural land use (steeper than 7 degrees) are rare in the area.

1.4.8 Soils and Geology

The Detroit area is part of the vast central lowland of North America. The topography consists of plains and low hills, with few extremes of slope or relief. In this region, landforms are the result of the deposition and erosion of loose materials (sand, gravel, silt, and clay particles) in recent geologic time, by either moving water or melting geologic ice.

The surface geology of Detroit is characterized as a lowland zone. This zone is a belt of low, flat lands, varying in width from 20 to 30 miles, located between the Great Lakes shoreline and the edge of the zone of hills and valleys. This lowland is composed mainly of clay and sand deposits laid in the bottom of a large lake which existed during the last glacial period. Interspersed with these lake deposits are small areas of water-laid glacial moraines, raised beach ridges marking former lake

shores, and raised deltas formed by rivers fed by the melting glaciers. In certain areas, the geological conditions have constrained subsurface construction operations (particularly tunnel boring projects) due to porous rock strata with high groundwater tables and hydrogen sulfide contamination.

The soils in the area are classified as gray-brown podzolic soils and are part of a large area of such soils extending roughly from southern Missouri and Central Wisconsin to Maryland and the Upper St. Lawrence Valley in Quebec. Podzols are acid soils formed under needle-leaf forests in cold climates and are very poor in plant nutrients.

Detroit's soil is a typical lowland zone soil which consists of level, poorly drained loam and clay soils developed on former lake bottom sediments. Isolated areas of level, sandy soils are also found as remnants of glacial river- deltas.

Bedrock aquifers in area are generally considered poor for public use and consumption because of the presence of hydrogen sulfide (H2S) gas, which leaves the water with a disagreeable quality. For this reason, groundwater utilization is not widely practiced, and the Detroit public water is supplied by the GLWA regional system that uses surface water for its raw water source.

1.4.9 Agricultural Resources

The upstream area to the HS CSO facility is fully developed. There are no prime agricultural lands within the project boundary or the surrounding area. Therefore, there will be no effect on agricultural resources from any of the improvements within this project plan. **Appendix B.5** includes USGS Global Croplands Data maps of the area.

1.4.10 Endangered Species

A request was sent to the Michigan Natural Features Inventory (MNFI) for a Rare Species Review of the project boundary and the surrounding area. This correspondence can be found in **Appendix G.1.** Response from the MNFI will be available in **Appendix B.6** when it becomes available.

The results of an Information for Planning and Consultation (IPaC) investigation for the project-level H-S CSO Facility Improvements project are included in **Appendix B.7.** However, the resource list is for informational purposes only and does not constitute an analysis of project level impacts. The Michigan Natural Features Inventory (MNFI)

From the IPaC investigation, it was determined that 6 species that may be potentially affected by activities in the project area. The Indiana Bat and the Tricolored Bat are among the mammals that could potentially be living on or near the site of work. The Rufa Redknot is the only bird species, and the Eastern Massasauga Rattlesnake is the only reptile species that may be affected by the project. Lastly, the Monarch Butterfly (insect) and the Eastern Prairie Fringed Orchid (plant) may be affected by the project work. There are no critical habitats in the project area.

1.5 Land Use

The location of the proposed project will be at the existing HS CSO Facility. The existing land use within the upstream area is comprised predominantly of residential, commercial, and industrial uses. Most of the land in the area has previously been developed. The City's demolition and redevelopment program will continue for the foreseeable future.

The H-S CSO facility is located within an unzoned area of the City of Dearborn. **Table 1-1** summarizes the zoning/land use for the facility. The zoning maps is available in **Appendix C.** There are currently no plans to change the land use of the site location in the 20-year study period. The zoning is expected to remain the same for the 20-year planning period of the project.

Table 1-1. Summary of Zoning/Land Use

CSO Facility Name	Zoning Code	Zoning Description
Hubbell-Southfield CSO	Not Zoned	Not Applicable

1.6 Population Projections

The GLWA CSO service area includes the City of Detroit and several other suburban communities. The population and area served by the H-S CSO is shown in **Table 1-2.**

Table 1-2. Population and Drainage Area for the Hubbell-Southfield CSO Facility

Facility	Total Drainage Area (ac)	2020 Population	2045 Population [a]
Hubbell-Southfield	14,400	120,000	126,900

Notes: [a] The 2045 population was estimated based on 5.7% increase according to SEMCOG 2045 Regional Forecast

1.7 Economic Characteristics

Detroit has had an unemployment rate above regional averages. High unemployment rates have been a chronic problem in a ring surrounding the central business district. Compared to regional averages, the City has a relatively low percentage of its population employed in professional occupations and has a higher-than-average incidence of unskilled workers. Prime employment categories include civil service, banking, real estate, and insurance. The 2023 adjusted median household income for the City of Detroit is listed as $39,575 by the U.S. Census Bureau. However, including downtown revitalization and development, including more living space, population is likely to increase over the next five years. Income levels in Detroit tend to be significantly below those levels reported in neighboring areas in Wayne, Oakland, and Macomb Counties.

1.8 Existing Facilities

The H-S CSO Facility is an RTB with 22 MG of storage, and a treatment capacity of 3,200 cfs. It was constructed in 1996. **Table 1-3** summarizes the design criteria for the H-S CSO facility. There are two buildings on site - a Headworks Building and a Process Building. The headworks building contains a headworks area, chemical room, mechanical room, and an odor control area. The process building contains the control room, odor control room, work area, electrical room, basement area, restroom, locker room, and mechanical room. Flow enters the facility Headworks through a double box culvert influent sewer where six mechanically cleaned bar screens remove screenings from the influent flow. Flow continues through the distribution channel to Basin 1. Flow from Basin 1 can overflow a weir or travel into Basin 2. Flow not entering Basin 1 enters the Bypass Channel. Flow routed through the Bypass Channel can enter Basin 2 or enter the Shunt Channel and exit the facility. Basin 2 overflow leaves the effluent channel and is discharged to the Rouge River.

Table 1-3 Key Design Criteria and General Information for H-S CSO Facility

Design Criteria	Hubbell-Southfield
Facility Abbreviation	H-S
Facility Type	RTB
Year of Startup	1996
Hydraulic Capacity (cfs)	3,200
Treatment Capacity (cfs)[a,b]	3,200/ 2,200[c]
Storage Volume (MG)	22
Screen Type (size of slot or opening)	Bar Screen (1.5- inch)
Disinfection Type	Liquid Sodium Hypochlorite (NaOCl)
Receiving Water Body	Rouge River
Contact Time (min)	22
Storm Size	1yr – 24 hr
Dewatering	Gravity & Pumped

[a] Treatment capacity refers to the design capacity of the screening and disinfection systems.

[c] Based on Hubbell-Southfield O&M Manual, the disinfection capacity is 2,200 cfs. The screening capacity is not specifically listed and is assumed to be equal to the hydraulic capacity.

1.8.1 Disinfection

The sodium hypochlorite disinfection system consists of two FRP storage tanks, five gear pumps, and three induction mixers. The sodium hypochlorite pumps discharge to a common header with a flow meter that splits to the three induction mixers, the Shunt Channel, Basin 1, and Basin 2. During an event sodium hypochlorite is normally only fed to the three induction mixers.

1.8.2 Flushing and Dewatering

Dewatering System

Basin dewatering can be accomplished by gravity or pumping. The basin is typically dewatered by pumping. There are two 8,000 gpm pumps for each basin, for a total of four dewatering pumps. The system was designed for one pump as duty, with the other pump as backup. The dewatering pumps were designed to remove water down to about 74.5 ft, which is about 25 ft below the basin high water level.

The dewatering system originally included one 200 gpm sump pump for each compartment. These pumps have been removed. As noted below, Operators would like to see this pump replaced.

Flushing System

The spray flushing system is intended to remove the remaining solids left on the floor of the basin and shunt channel after the basin has been dewatered. There are 22 flushing spray zones throughout the basin. Two submersible flushing water pumps are located in the effluent channel (referred to as the Pond) and a strainer is located in the Process Building dewatering pump room. If there is not enough effluent after a wet weather event in the effluent channel for the basin flushing, additional (City) water can be used to fill the effluent channel. The Pond fills at line pressure and there is no booster pump to help it fill faster.

The flushing system has not performed its intended function since it was originally installed. Solids accumulate across both basins and in the shunt channel. As such, the operators must lower a bobcat into the basin and use fire hoses to clean solids from the bottom of the basin. Due to the extraordinary difficulty of cleaning the basin, GLWA does not clean the basin after every event.

1.8.3 Instrumentation and Control

The original control system at H-S was installed in 1996 under PC-694. Since then, several modifications to the original control system have taken place. In 2002 under PC-713, the facility's PLC control system was upgraded to interface with the Ovation system to enable remote monitoring and control the facility from SCC. In 2009, PC-761 replaced the control system and workstations with new Allen Bradley ControlLogix redundant PLCs and new operator workstations with Factory Talk View SE software. The existing hardwired back- up control panel and other miscellaneous PLCs and subsystems are incorporated into the overall control system. The current system is equipped with a back-up radio system to communicate critical monitoring points back to the SCC on wide area network failure. In addition, the H-S CSO facility utilizes a number of level sensors and flow meters for monitoring flows through the treatment system, chemical dosing, and chemical storage tank levels.

1.8.4 Site

The H-S facility has two buildings situated on top of the basin, namely the Headworks Building over the north influent end of the basin and the Process Building over the dewatering pumps at the center of the basin. The access entrance to the site is through a 24-ft wide sliding vehicular gate. Security around the perimeter of the site is provide by an 8-ft high chain link fence. Site pavement consists of 9-in. reinforced concrete on undisturbed earth. The access road from Rotunda Dr. to the basin consists of 10-in. asphalt on 12 in. of gravel base.

1.8.5 System Bypasses

The CSO facilities operated by GLWA have an overflow outfall to divert water to in a bypass event. According to the GLWA 2024 Annual Consolidated Report, the 2023 annual untreated discharge volume to the Rouge River was 525 MG, and four outfalls account for 83% of the discharge.

Table 1-4 presents the reported discharge flows from the H-S CSO facility based on historical data collected over a nearly three-year period (August 1, 2016, to April 30, 2019). Discharge flow is presented as a daily average, which includes dry days with no discharge, and a daily average of all wet weather days. The number of wet weather days is presented in the final column.

Table 1-4 Discharge Flows at the Hubbell-Southfield CSO Facility

Facility	Facility Design Treatment Capacity, cfs	Discharge Flow		No. of Wet Weather Days (Out of 973 Total Days)
		Daily Average of Entire Year, cfs	Daily Average of Wet Weather Days Only, cfs	
Hubbell-Southfield	2,200	11	116	91

1.8.6 Operation and Maintenance Issues

The project included herein is intended to address O&M “issues” that hinder the operation of the H-S CSO facility. The project will address operational and maintenance improvement opportunities associated with new technology, and aging components. The project will improve reliability, ease of maintenance, and operational efficiency. The specific O&M improvement opportunities are discussed with in **Section 2.0 Summary of Project Need.**

1.8.7 Climate Resiliency

The GLWA collection and treatment system has been designed to provide climate resiliency for its operating processes. Operating equipment and processes including electrical aspects that are susceptible to temperature fluctuation are maintained in properly temperature-controlled and ventilated areas. This provides for the ability to maintain proper operation and treatment through changes internally and from the environment.

Critical processes at the CSO Facilities can run off backup power if necessary. The backup generators are regularly maintained as part of a preventative maintenance schedule. The generators give the plant operating security in the event of climate-related outages or outages to the primary electrical supply.

1.9 Fiscal Sustainability Plan

This project plan involves repair and replacement and therefore, requires a Fiscal Sustainability Plan. It should be noted that, as part of the CS-299 CSO Facilities Assessment project, the following tasks were completed:

- Asset audit of all major assets at the CSO facilities
- Condition assessments (detailed or visual) for all assets
- Development of a Scheduled Replacement Plan based on asset condition and year of installation
- A capital improvement plan to address capital needs at each facility.

These tasks represent the required items of a Fiscal Sustainability Plan. The CS-299 CSO Facilities Assessment report is included in **Appendix K.3** for reference.

GLWA has implemented an asset management program which captures the inventory of the assets included in this Project Plan. A complete inventory can be made available upon request. **Table 1-5** summarizes the critical assets at the existing facility. The Fiscal Sustainability Certification form is included in **Appendix D.**

Table 1-5: Summary of Critical Assets

Existing CSO Facility	Critical Asset(s)
Hubbell-Southfield RTB	Dewatering pumps (4), Sump pumps (2), Sample pumps (3), Mixers (4), Effluent flap gates (7), Influent bar screens (6), Chemical storage tanks (2), Odor control system

2.0 SUMMARY OF PROJECT NEED

The GLWA operates and maintains nine CSO facilities. The primary function of the CSOs, including the H-S CSO, is to adequately treat any wet weather overflows prior to discharge to the receiving water body or return captured water to the Wastewater Resource Recovery Facility (WRRF) for further treatment. The facility must meet discharge requirements contained in GLWA's National Pollutant Discharge Elimination System (NPDES) permit.

A CSO Facilities Assessment, conducted under contract CS-299, assessed capital improvement needs at nine facilities, including the H-S CSO Facility. A number of disinfection, flushing, electrical, I&C, and site related needs were identified. Under this project, further condition assessment and study was conducted to evaluate the alternatives and confirm the project improvements.

2.1 Regulatory Compliance Status

The current NPDES Permit GLWA Wastewater System can be found in **Appendix E.** GLWA is currently in compliance with all requirements set forth by the NPDES Permit. There are currently no active Administrative Consent Orders or Amended Active Consent Orders placed on GLWA for the CSO Facilities.

2.2 Water Quality Issues

The Rouge River is also intensively developed, with little vacant land within the drainage area in the City of Detroit other than designated recreational areas and parks. North of the confluence of the Middle Branch, the development is primarily residential with small commercial outcroppings and a substantial area designated as parkland along the riverbanks. After traversing the City of Dearborn, the River emerges into a predominantly industrialized portion within the City of Detroit until emptying into the Detroit River near Zug Island.

Relatively poor water quality has been documented in the Rouge River by numerous studies and publications including the Rouge River National Wet Weather Demonstration Project, the Remedial Action Plan, and various water quality assessments performed by MDEQ and others. However, recent monitoring shows that there has been measurable improvement in many areas for some pollutant parameters. These changes are likely the result of CSO control facilities and stormwater management efforts throughout the watershed.

The Rouge River receives municipal and industrial discharges as well as intermittent combined sewer overflows and stormwater discharges during and after wet weather periods. Biological investigations document that pollutant-tolerant species predominate in the Rouge River and that sludge beds are a problem.

High fecal coliform levels have been measured during wet and dry weather periods, and the Rouge River has little assimilative capacity due to its shallow depth, slow velocity, and relatively low re-

aeration rates. High concentrations of dissolved solids and Biochemical Oxygen Demand have been recorded. P levels were identified to exceed recommended state levels for tributary streams.

Toxic pollutants have been observed in samples from the Rouge River, particularly in sediments. The Rouge River supports a limited aquatic fishery of pollutant tolerant species and is considered to be a significant tributary load to the Detroit River and the Great Lakes.

The MDEQ completed two TMDL studies in 2007 for the Rouge River for Biota and E Coli. The E Coli TMDL was revised in 2011 to incorporate the allowable bacteria loadings from GLWA recommended CSO control facilities as identified in the modified NPDES Permit issued to GLWA. The purpose of these TMDL studies is to establish controls on pollutant sources to achieve in-stream water quality goals.

In addition to the Detroit and Rouge Rivers, several small tributary water courses are also located in the service area. These include Fox Creek, Conner Creek, and Baby Creek. Historically, these small tributaries provided drainage from areas within the City of Detroit to the Rouge and Detroit Rivers. As Detroit became increasingly urbanized and developed, these tributaries have been enclosed over much of their length. Today, the water bodies consist of short channels at the outlet of the historic watershed. During dry weather periods, the enclosed drains from these areas are connected to the wastewater collection system. For this reason, the open water channels tend to be relatively stagnant bodies of water except during wet weather periods. These channels typically exhibit poor water quality as a result of sediment deposition and oxygen depletion, and relatively little interaction with the downstream receiving body.

2.3 Summary of Project Need

As part of the CS-299 Needs Assessment project, needs and improvements were identified to meet the current or anticipated changes to the CSO system hydraulics, health and safety, equipment standardization, and ease of operation and maintenance. The needs were identified through several activities, including the following:

- Discipline-specific meetings with GLWA CSO O&M staff
- Observations during site visits by Jacobs team staff members
- Review of Wastewater Master Plan (CDM Smith Inc., 2020)
- Review of supervisory control and data acquisition (SCADA) data

A discipline-specific approach was conducted for the evaluation of needs at each facility. The disciplines include screening, disinfection, flushing & dewatering, HVAC, electrical, instrumentation, site, architectural, and safety. As such, the list of needs identified is summarized by discipline in the sections below. Refer to the CS-299 Facilities Assessment report (**Appendix K**) for additional information.

The general intent of the evaluation of the facilities needs was to:

- Bring the facility up to current codes and standards, where possible
- Standardizing equipment, where possible
- Improve the operational reliability of the facility
- Reduce the number of process shutdowns due to maintenance and equipment failures
- Improve worker safety

2.3.1 Disinfection Needs

Disinfection-related needs at the H-S CSO facility are as follows:

- Chemical feed system: In addition to the desire to standardize on one or two types of chemical feed pumps between facilities and the desire to simplify chemical feed where possible, the H-S chemical feed system has the following issues:
  - The feed pumps are in a confined basement and on short pump pads. As such, they are at risk of being damaged if there is a spill or water leak.
  - The sump pumps in the feed pump area were not designed for corrosive or chemical service and have been damaged by exposure to sodium hypochlorite. Replacement with sump pumps suitable for corrosive chemical service is desired.
- Lack of flow-paced and TRC-paced automated chemical feed: Chemical feed system controls are O&M intensive and have performance issues with feeding appropriate levels of chemical. To stay compliant, overfeeding chemical is common.
- Hypochlorite storage capacity is reportedly not enough for large storm events. GLWA requested that Jacobs investigate this issue Jacobs found that the concrete containment area used for existing spill containment was the original sodium hypochlorite storage. The two existing 15,000 gallons FRP tanks provide less chemical storage (30,000 gallons total) than the original concrete storage tanks. Historical chemical usage from the four largest wet weather events from 2016 through 2018 was evaluated for the CSO facilities, including H-S. The data indicate that the volume of sodium hypochlorite fed exceeded the storage volume at H-S in one event. In that event, 38,775 gallons was reportedly fed compared to the currently available 30,000 gallons storage volume. Chemical deliveries occurred during the event to address this. Based on the event above, additional hypochlorite storage is needed.

2.3.2 Flushing and Dewatering Needs

Flushing and dewatering-related needs at the H-S CSO facility are as follows:

- The spray flushing system is ineffective for removing solids and debris from the floor of the basin and shunt channel after a storm event. To properly clean the solids and debris from the facility, operators must manually use fire hoses, and a bobcat lowered into the basin after storm events. This effort is safety concern due to the confined space, sloped and slippery floors and poorly lit conditions. The flushing system has been unsuccessfully upgraded in the past.

- The dewatering pumps need to be upgraded, and missing sump pumps need to be replaced. A fluidization system should be considered under the sump pumps to avoid large accumulations of solids in the sump
- There is no way to access to the effluent channel (Pond) area.

2.3.3 Electrical and Instrumentation/Control Needs

Electrical and I&C-related needs at the H-S CSO facility is as follows:

- The lighting is poor or non-existent in some locations, making for unsafe working conditions.
- Need for remote control capability of the Chemical Feed area from the Control Building
- Need for local remote control for dewatering pumps
- Need for tank level indication at Chemical Fill Station
- Need for process cameras at select locations
- Update Ovation control system to the latest version and increased monitoring capabilities

2.3.4 Site Needs

Site-related needs at the H-S CSO facility are as follows:

- The existing two inch non-potable water header line for flushing the Headworks Area provides insufficient pressure for washdown after storm events
- Poor condition of the service drive around the basin
- Localized ponding of water on the basin roof surface. In the winter, this water freezes and causes safety concerns
- Poor condition of security fencing
- The detention ponds drainage from the golf course discharged over the access road creates an issue for GLWA vehicles

2.4 Project Needs for the Next 20 Years

GLWA identified additional project needs at the WRRF that will address operation and capacity needs based on the 20-year population projection. A list of these identified projects is shown as a table in Appendix F. This table was taken from the GLWA 2020 Wastewater Master Plan. GLWA will continue to identify and implement projects that maintain and improve the treatment of wastewater at the WRRF, CSO Facilities, and the rest of the wastewater system. At the H-S CSO facility, barring unforeseeable circumstances, this project addresses disinfection, flushing, dewatering, electrical, instrumentation & control, and site needs for the next 20 years.

3.0 ALTERNATIVE EVALUATION APPROACH

Project teams explored "Potential Alternatives" including the Regional Alternative and No Action Alternative to identify those that would provide a viable solution to the Projects' Needs for the next 20 years. Those that were deemed viable were further analyzed as "Optimum Performance Alternatives". The costs and impacts of Optimum Performance Alternatives were evaluated as described in **Section 3.3.** The Regional and "No Action" alternatives are discussed below because they are not viable, and, therefore, not included in the evaluation with the Optimum Performance Alternatives.

3.1 Regional Alternative

A Regional Alternative in the context of this Project Plan is not applicable. GLWA operates the regional CSO and SDF facilities that receive combined sewer flows from several counties in the region. The proposed improvements presented in this Project Plan are all within the facilities' properties. The City of Detroit and numerous surrounding communities are serviced by GLWA. The function and capacity added to the system by the CSO and SDF facilities cannot be achieved by connecting with another system.

3.2 Identification of Alternatives for Evaluation

A discipline-specific needs assessment approach was conducted as part of CS-299 CSO Facilities Assessment. **Section 2.3** of this Project Plan summarizes the identified needs. Discipline-specific alternatives were developed to address the needs. Refer to the CS-299 Facilities Assessment report (**Appendix K**) and **Section 3.4** for additional information.

3.3 Optimum Performance Alternatives Approach

GLWA's approach to evaluating the Optimum Performance Alternatives and obtaining the Selected Alternative, was iterative and spanned multiple projects from 2021 to the present. The foundation for the scope of work is found in CS-299 CSO Facilities Assessment, Volume 2 – Multi-Disciplinary Facilities Assessment, April 2021, by Jacobs (**Appendix K.3**), which divided the scope into Projects. The CS-299 Report performed alternative evaluations for each of the projects. The CS-299 alternative evaluations were performed in three steps:

1. Net Present Value (NPV) monetary evaluation
2. Non-monetary evaluation that considered the following five benefits:
    - Benefit #1 – Health and Safety,
    - Benefit #2 – Water Quality and Compliance,
    - Benefit #3 – Capacity Enhancement,
    - Benefit #4 – Component Performance
    - Benefit #5 – O&M Ease;
3. Best Value calculation based on the lowest NPV / Total Benefit ratio.

Table 3-1 summarizes the relevant selected projects from CS-299.

Table 3-1 CS-299 Summary of Recommended Projects at Hubbell-Southfield CSO Facility

Project No.	Description
HS-SCR-1	Screening Improvements
HS-DIS-1	Chemical Feed Utilizing Manifold Pump Distribution and Centrifugal Pumps
HS-DIS-2	Provide Flow-paced and TRC-paced Chemical Feed Control System
HS-DIS-3	Add a New Chemical Storage Tank
HS-FD-1	New Basin Flushing System "Do Nothing - replace in kind"
HS-FD-2	Upgrade Basin Dewatering Pumps and Reinstall Sump Pumps and Fluidization System
HS-FD-3	Provide Equipment Access to Effluent Channel
HS-ELEC-1	Electrical Improvements
HS-I&C-1	I&C Improvements
HS-I&C-2	Control System Upgrade
HS-HVAC	Process Building Air Balance Study
HS-SITE-1	Increase Flushing Water Pressure and Add Hose Bibs in Headworks Area
HS-SITE-2	Site Improvements
HS-ARCH-1	Architectural Rehabilitation

GLWA revisited HS-FD-1 for New Basin Flushing System alternative due to safety and environmental concerns. While the CS-299 report stated the "Do Nothing" alternative was the "Best Value", it also stated, "the poor health and safety conditions for GLWA operations personnel, however, are not properly conveyed in this analysis and the current four cleanings per year is not believed to be adequate to meet EGLE requirements to have the basin ready for subsequent storm events." In subsequent studies, GLWA pursued options that would minimize the need for personnel to enter the basin and would minimize carry-over of contaminants from one storm to the next.

A subsequent study suggested tipping buckets. **Section 3.3.2** summarizes the approach to evaluating tipping bucket alternative. Tipping buckets are included in the alternatives analysis, but did not result in the Selected alternative because of cost. **Section 3.1.1** explains why the Do Nothing alternative was not considered as a viable alternative. The present worth comparison is included in **Appendix H.**

3.3.1 No Action / "Do Nothing" Flushing Alternative

The Do Nothing alternative typically involves replacing the existing assets in- kind. However, Hubbell-Southfield flushing improvements are unique because GLWA completed a "replace in-kind" project just eight years ago. Unfortunately, the replacement did not deliver acceptable results. Basin cleaning still required personnel to enter the basin and manually clean the residue left behind by the flushing nozzles. The manual cleaning activity is performed in a confined space, under uncomfortable conditions and is labor intensive. While it can be performed safely, it is considered an unnecessary safety risk.

Furthermore, the manual basin cleaning may not be completed before the next wet weather event begins. The Do Nothing alternative is not considered because it does not successfully clean the basin, resulting in an increased safety risk to GLWA staff when they entered the basin to manually clean the residue.

3.3.2 Tipping Buckets Above the Basin Flushing Alternative

A follow up study recommended tipping buckets located above the basin. Locating the tipping buckets' bearings above the basin improved flushing reliability, worker safety, and overall basin performance when compared with the following alternatives:

- "Do Nothing" - Maintaining the existing ineffective spray system
- Flushing Gates – moderate flushing reliability and difficult to maintain inside the basin
- Tipping Buckets within the Basin – moderate flushing reliability and difficult to maintain inside the basin
- Vacuum Flushing System – Moderate flushing reliability and more expensive than tipping buckets located above the basin

Tipping buckets above the basin was determined to be cost-prohibitive.

3.3.3 Flushing with New Nozzle System Alternative

The Hubbell-Southfield CSO Facility Improvements Basis of Design Report (BODR) identified a more cost-effective flushing solution than the tipping buckets located above the basin. By leveraging some of the recent flushing piping replacements, replacing pipes as necessary to achieve the desired hydraulic performance, replacing pumps, updating nozzle configurations, creating additional flushing zones, modifying the basin floor (structure), the design team was able to meet the design objectives (Health and Safety, Water Quality & Compliance, Capacity Enhancement, Performance, O&M Ease), at a lower cost. These changes from the BODR are summarized in **Table 3-2.**

Table 3-2 June 2024 Basis of Design Report Summary of Improvements	
Project No.	Description
HS-FD-1	New Basin Flushing System • Lower flushing pumps' elevations to facilitate use of river water for flushing. • Install flow meter on strainer discharge. • Install river water manual bar screen and repurpose decant gate for a river water inlet gate.
HS-FD-2	Upgrade Basin Dewatering Pumps and Reinstall Sump Pumps and Fluidization System • Install flushing valves on dewatering pump discharge.
HS-FD-4	Structural Repairs to Base Slab
HS-FD-5	New River Gate and Screen • Structure • Coffer Dam • Electric Actuator • Screen • Hoist
HS-DIS-2	Provide Flow-paced and TRC-paced Chemical Feed Control System (TRC: Total Residual Chlorine) • Replace sample pumps.
HS-DIS-4	Relocate Chemical Loading Station
HS-DIS-5	New Sampling Pump and Access Hatch
HS-DIS-6	Chlorine Gas Detection
HS-DIS-7	Hoist Work in Existing Chemical Room
HS-I&C-1	I&C Improvements • Two level sensors will be installed in upstream sewers
HS-ELEC-1	Electrical Improvements • Support electrical systems for new sample pumps and dewatering pumps
HS-SITE-2	Site Improvements • Concrete rehabilitation associated with hatch replacement. • Sign removal and replacement

Table 3-3 compares the capital costs of the tipping bucket and new nozzle system systems. **Table 3-3** assumes cost for the projects other than HS-FD-1, (see **Table 3-1** and **Table 3-2**) are the same. The present worth cost comparison is included in **Appendix H.**

Table 3-3 Flushing System Alternative Cost Comparison			
Assumed Project No.	Description	Tipping Buckets above the Basin Alternative	New Nozzle System Alternative
HS-FD-1	New Basin Flushing System	$59,506,293	$13,910,239
OTHER	Sum of Other Improvements Common Across Both Alternatives	$32,519,181	$32,519,181
	Totals	**$92,025,474**	**$46,429,420**
	New Nozzle System Savings	**$45,598,554**	

** Costs do not include contingency, engineering,* or OM&R

4.0 SELECTED ALTERNATIVE FOR THE CSO FACILITIES II IMPROVEMENTS PROJECT

The overall goal for the proposed project is to standardize equipment (where applicable), improve operational reliability, restore existing facilities, and improve worker safety. This section presents the recommended alternatives that make up the recommended project at the H-S CSO Facility.

4.1 Project Description

The selected alternatives include the improvements listed in **Table 4-1.**

Table 4-1 HS CSO Basin Improvements Summary

Item	Description
Civil/Site ($3,160,074)	Resurface basin entrance road and clean/rehabilitate/replace culvert crossing from TPC golf course to Rouge River. Replace fencing and vehicle gate at far eastern entrance. Add drains to low lying areas on top of basin. Modify site to support new chemical storage building.
Demolition ($2,818,431)	Demolition of old equipment and temporary systems.
Architectural ($326,212)	Misc repairs to Process Building for interior finishes, cabinets, and rework of working spaces. Add new Chemical Storage Building.
Structural ($6,491,882)	Rehab/repairs to the floors of Basins 1 and 2 and flushing pond; install new flushing lanes and new access hatch atop the flushing pond; foundations for chemical storage building and misc. structural repairs. Complete replacement of the screen walkway. Modify drive cross slope above shunt channel to improve drainage.
Process ($18,179,073)	Installation of new modified flushing piping and nozzle system and installation of new chemical storage building and feed systems to provide total of 50,000 gallons of on-site storage. Replacement of dewatering pumps, flushing pump and gravity dewatering ball valves.
HVAC/Plumbing ($634,670)	Upgrades to HVAC in the Headworks and Process Building. Addition of new Building Management System controls. Upgrade hose bibs and NPW pressure in basins. Add new HVAC and plumbing at New Chemical Storage Building.
Electrical ($7,440,485)	Complete replacement of all electrical systems including MCCs, wiring and conduit. Upgrade to support new systems and lighting and electrical in New Chemical Storage Building. Add selected exterior receptacles, exterior lighting, and interior lighting in the basin.
I&C ($7,378,594)	Complete replacement of all control system elements (VR8, Dams, and Basins) – PLC, SCADA, OIT, wiring and conduit. Inclusion of new control of chemical feed and flushing systems. Provide for 2 additional remote level sensors in the influent combined sewer system.
$46,429,421	**Total** ***(not including contingency, engineering, or construction admin.)***

4.2 Project Schedule

The proposed project is scheduled to be completed in accordance with the schedule presented in **Table 4-2.**

Table 4-2 Implementation Schedule

Project Activity	Project Milestone
Project Plan Public Hearing	April 23, 2025
Submittal of Project Plan to EGLE	May 01, 2025
Start Design	September 25, 2023
Complete Design	August 25, 2025
Start Construction	June 25, 2026
Complete Construction	December 24, 2029
Project Closeout	June 22, 2030

4.3 Mitigation Cost

There are no major environmental impacts expected from the implementation of the Selected Alternative. A detailed evaluation of the anticipated environmental impacts is addressed in **Section 6** of this document.

4.4 Cost Estimate and User Cost

The total project costs for the Selected Alternative represent construction costs, contingency, and engineering costs for design/administration during construction. The total project cost for the H-S CSO Facility Improvements projects is based on the current project cost estimates. The costs are consistent with the level of details available at the study stage and was developed in accordance with the Association for the Advancement of Cost Engineering International (AACE) criteria. It is a Class 2 estimated with an expected accuracy range of -15% to +20%. An inflation and market adjustment factor of 20% has been added to the projected capital cost to account for inflation to the time of construction and to account for recent construction price increases, which may remain after the pandemic.

This project is targeted for a low interest loan assistance through the SRF program. The availability of loan funds is dependent on annual appropriations and the placement of the projects on the Priority List prepared annually by EGLE. Repayment of the SRF loan through annual debt retirement payments will impact the customer rates resulting in increased user costs. This impact to customer rates is determined by dividing the project's cost across the GLWA customers as calculated in Appendix H.

Table 4-3 User Cost Impact for the SRF Hubbell-Southfield CSO Facility Improvements Project	
Item	Improvements
Estimated Capital Cost	$46,429,420
Contingency	$9,635,000
Engineering and Const. Admin.	$11,418,261
Total Cost of Project	$67,482,681
Total Present Worth	$85,654,793
Annualized Cost of Project (assuming SRF discount rate of 2.0% over 20 years)	$5,238,366
Service Area Households (City of Detroit and surrounding communities)	1,275,737
Estimated Household User Cost	~ $ 4.11 / household / year

4.5 Delivery Method

GLWA intends to deliver this project a traditional Design-Bid-Build.

4.6 Implementability of Selected Alternative

All the alternatives summarized in **Section 4.1** can be implemented. Implementation would require GLWA to procure a contractor to implement the work through a contract agreement.

GLWA is a regional utility with broad statutory authority. GLWA has entered into contracts with its suburban customers, which establish the terms and conditions for receiving and treating wastewater and overseeing the operation and maintenance of the system. GLWA (formerly DWSD) 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. GLWA will be the loan applicant for the proposed Project.

4.7 Disadvantaged Community Status

The population assessed for the costs for construction in this project have a median household income of $36,453, which, according to the SEMCOG data, is significantly less than the statewide median household income from the US Census Bureau of $69,183. However, based on the criteria for overburdened communities, the service area does not qualify as overburdened based on the user costs of the project of $4.11 per year per household.

4.8 Useful Life Evaluation

The evaluation of the selected alternative took into consideration the expected useful life of the proposed project components. Typical useful life spans for each project aspect were given based on either known lifespan, such as process equipment where a lifespan can be provided by a

manufacturer, or standard item lifespans that have been accepted, such as the useful life of a structure. The architectural, structural components constructed in this project are expected to have a useful life of 50 years. The site civil work and the proposed process equipment both have an estimated useful life of 20 years. The electrical, instrumentation, and controls have a useful life of 15 years. Estimated useful life is used in the Present Worth (Lifecyle Cost) Calculations presented in **Appendix H.**

- Structures: 50 years
- Architectural: 20 years
- Process Equipment and Site Civil: 20 years
- Electrical and Mechanical Equipment: 15 years
- I & C Equipment: 10 years

4.9 Analysis of Impacts

4.9.1 Short and Long Term

The short-term adverse impacts associated with construction activities will be minimal, and will be mitigated, in comparison to the resulting long-term beneficial impacts. Short-term impacts include dust, noise, and site aesthetics, most of which are highly unlikely to impact any neighboring properties. No adverse long-term impacts are anticipated.

4.9.2 Irreversible or Irretrievable

The impact of the proposed project on irreversible and irretrievable commitment of resources includes materials utilized during construction and fossil fuels utilized to implement project construction.

4.9.3 Direct Impacts

Construction of the proposed project is not expected to have an adverse effect on historical, archaeological, geographic, or cultural areas, because the construction activities will occur in the areas within the existing CSO facility boundary or at remote sites, which have previously been disturbed by prior construction. The proposed project will not detrimentally affect the water quality of the area, air quality, wetlands, endangered species, wild and scenic rivers, or unique agricultural lands. The proposed improvements will significantly improve GLWA's capability to reliably treat wet weather flows at H-S CSO Facility. Portions of the disinfection feed system may need to be taken out of service to accommodate the construction components, but plans should be made to maintain proper operation of a portion of the system during construction to allow the facilities to meet effluent permit requirements. Short duration full shutdowns should be limited in nature and coordinated with all anticipated weather.

Implementation of the improvements will also generate construction-related jobs, and local contractors will have an opportunity to bid contract work. The aesthetics of the area will be

temporarily affected until restoration is complete. Resources will be lost in the production of materials used in construction, and fossil fuels will also be utilized during construction activities.

4.9.4 Indirect Impacts

It is not anticipated that GLWA's proposed improvements will alter the ongoing pattern of growth and development in the study area. Growth patterns in the service area are subject to local use and zoning plans, thus providing further opportunity to minimize indirect impacts.

4.9.5 Cumulative Impacts

Improved reliability and efficiency to disinfect wet weather discharges to the Rouge River is the primary cumulative beneficial impacts anticipated from the implementation of the proposed project.

4.10 Mitigation of the Selected Alternative

Where adverse impacts cannot be avoided, mitigation methods will be implemented. Mitigating measures for the projects such as soil erosion control, if required, will be utilized as necessary and in accordance with applicable laws. Details will be further specified in the construction contract documents used for the project.

4.10.1 Short-Term Mitigation

Short-term impacts due to construction activities such as noise and dust cannot be avoided. However, efforts will be made to minimize the adverse impacts by use of thorough design and well planned construction sequencing. Site restoration will minimize the adverse impacts of construction, and adherence to the Soil Erosion and Sedimentation Act will minimize the impacts due to disturbance of the soil structure, if such disturbance is found to be necessary. Specific techniques will be specified in the construction contract documents.

4.10.2 Long-Term Mitigation

Adverse long-term impacts due to the proposed project are not anticipated. The aesthetic impacts of construction within the boundaries of the CSO Facility or remote sites will be mitigated by site restoration.

4.10.3 Indirect Impact Mitigation

In general, it is not anticipated that mitigative measures to address indirect impacts will be necessary for the recommended improvements addressed in this Project Plan. The proposed improvements are located within the boundaries of the CSO Facility and two remote level sensor sites, so they do not promote growth in areas not currently served by GLWA. Therefore, indirect impacts are not likely to be a significant concern for these improvements.

5.0 PUBLIC PARTICIPATION

5.1 Public Hearing Advertisement

A Public Hearing Notice was published to alert parties interested in this Project Plan and request input prior to its adoption (see **Appendix I**). In addition, a direct mail notification was sent to the potentially interested parties included on a mailing list provided by GLWA (see **Appendix C**). This direct mail notice included an invitation to comment.

5.2 Public Hearing Contents

A formal public hearing on the draft Project Plan was held before the Board of Water Commissioners at 2:00 p.m. on April 23, 2025. The hearing included a presentation on the project, as well as an opportunity for public comment and questions. The hearing transcript and a copy of the visual aids (handout) used during the presentation are included in **Appendix I**, along with the attendance list. There were no comments from the Board members requiring revisions to the Project Plan.

5.3 Public Comments Received and Answered

PENDING – Public meeting tentatively scheduled for 4/23/25

5.4 Resolution and Adoption of the Plan

The Project Plan was approved by the Board of Water Commissioners, which adopted a Resolution at its regular monthly meeting on April 23, 2025, authorizing GLWA to proceed with official filing of the Project Plan for purposes of securing low interest loan assistance under the SRF Program. An executed copy of the Board of Water Commissioners' Resolution approval for the Project Plan is included in **Appendix J** of this document.

Miscellaneous correspondence applicable to the Project Plan is also included in **Appendix J.**

Appendix A.
Supporting Resources for Cultural Evaluation

Application for State Historic Preservation Office (SHPO) Section 106 Consultation

APPLICATION FOR SHPO SECTION 106 CONSULTATION

Submit one application for each project for which comment is requested. Consult the *Instructions for the Application for SHPO Section 106 Consultation Form* when completing this application.

Submit application materials online at www.michigan.gov/shposection106 or mail to: Michigan State Historic Preservation Office, 300 North Washington Square, Lansing, MI 48913

I. GENERAL INFORMATION

☒ New submittal
☐ More information relating to SHPO ER# SHPO Project #
☐ Submitted under a Programmatic Agreement (PA)
PA Name/Date: PA name/date, if applicable

a. **Project Name:** **Hubbell-Southfield CSO Facility Improvements**

b. **Project Location(s):**

If there is more than one location for your project, additional rows may be added to the table below. Township, Range, Section/Private Claim refer to the public land survey sections. Each Township/Range group must have its own row in the table below and must include the corresponding county and municipal unit.

County	Municipality	Street Address	Township (N/S)	Range (E/W)	Section(s) or Private Claim
Wayne County	Dearborn, MI	16540 Rotunda Dr.	02S	10E	12-I

II. FEDERAL AGENCY INVOLVEMENT AND RESPONSE CONTACT INFORMATION

a. **Federal Agency:** U.S. Environmental Protection Agency Region 5
Contact Name: Mr. Andrew Lausted
Contact Address: 77 West Jackson Blvd. **City:** Chicago **State:** Illinois **Zip:** 60604
Email: lausted.andrew@epa.gov
Specify the federal agency involvement in the project: Funding

b. **If HUD is the Federal Agency: 24 CFR Part 50 ☐ or Part 58 ☐**
Responsible Entity (RE): Not Applicable
Contact Name: Not Applicable
Contact Address: **City:** **State:** **Zip:**
RE Email: **Phone:**

c. **State Agency Contact (*if applicable*):** Michigan EGLE
Contact Name: Jonathan Berman
Contact Address: Constitution Hall, P.O. Box 30457 **City:** Lansing **Zip:** 48909-7957
Email: bermanj@michigan.gov **Phone:** 517-897-3634

d. **Applicant (if different than federal agency):** Great Lakes Water Authority
Contact Name: Kashmira Patel, PE, Engineer
Contact Address: 9300 W Jefferson Ave **City:** Detroit **State:** MI **Zip:** 48209
Email: Kashmira.Patel@glwater.org **Phone:** 313.297.5938

e. **Consulting Firm (if applicable):** Wade Trim and Associates
Contact Name: Dave Delia, PE
Contact Address: 500 Griswold St. **City:** Detroit **State:** MI **Zip**: 48226

Email: ddelia@wadetrim.com Phone: 313-961-3650

III. PROJECT INFORMATION

a. Project Work Description

Describe all work to be undertaken as part of the project:

The proposed project involves improvements to the Hubbell-Southfield CSO Facility that is owned and operated by Great Lakes Water Authority (GLWA). The proposed project aims to bring the HSCSO facility up to current codes and standards (where applicable), standardize equipment (where applicable), improve operational reliability, and improve worker safety. The improvements include upgrades to the disinfection system, screening system, flushing system, HVAC system, instrumentation and control, architectural improvements, electrical improvements, and site/civil improvements. The following describes the scope of the project work:

- Improvements to the Basin Flushing system include the replacement of a flushing pump; the replacement of flushing piping; a new flushing valve; a new magnetic flow meter; and structural modifications to the basin floor that include the installation of flushing lane curbs and fillets.
- The dewatering system improvements include four new dewatering pumps; two new ball valves; and select improvements to the dewatering dry well piping.
- Chemical storage is being expanded with a new 20,000 gallon tank enclosed in a new chemical storage building. The chemical feed and transfer system is being upgraded with new transfer pumps new TRC analyzers (with associated piping, strainers, and instrumentation and control systems).
- The electrical system upgrades include new MCCs, a new standby generator, and some new electrical appurtenances. A new Emerson Ovation control system with two new remote level sensors are also included.
- Site improvements include fencing, road, stormwater culvert, and access upgrades. Ponding/Puddling on the roof deck is also being addressed.
- Architectural improvements include upgrades in the existing Headworks and Process Buildings, improvements to the screen walkway in the Headworks Building, and new access hatches int the Basins.

b. Project Location and Area of Potential Effect (APE)

i. **Maps.** Please indicate all maps that will be submitted as attachments to this form.
☒Street map, clearly displaying the direct and indirect APE boundaries
☒Site map
☐USGS topographic map Name(s) of topo map(s): Name(s) of topo map(s)
☒Aerial map
☐Map of photographs
☐Other: Identify type(s) of map(s)

ii. **Site Photographs**

iii. **Describe the APE:**

The Project Area is Assumed to be the area of potential effects (APE) for archaeological resources (Archaeological APE). This area includes the work areas in which ground disturbing activities are planned to occur.

The project scope of work is entirely on the Hubbell-Southfield CSO property and consists of 4 instances of groundwork. The groundwork scope is listed below:

1. The property fence will be replaced along the perimeter of the site. The drawing for the proposed fence is included in the attachment to this application.

2. A new chemical building next to driveway behind the headworks building will be constructed. The building will require ground work for its foundation. The location of the new building can be found in the attachment to this application.
3. A culvert will be replaced and a manhole installed on the North side of the driveway near Rotunda Dr. The location of this replacement is shown in the attachment.

The groundwork that will be performed in this project will not be on any "virgin" ground. In other words, all ground that will be dug up has previously been disturbed in other project sat this site.

iv. **Describe the steps taken to define the boundaries of the APE:**
The APE of this project was determined by the project work (listed above) that will be involving groundwork. The boundaries were determined by the project drawings that show the affected area.

IV. IDENTIFICATION OF HISTORIC PROPERTIES

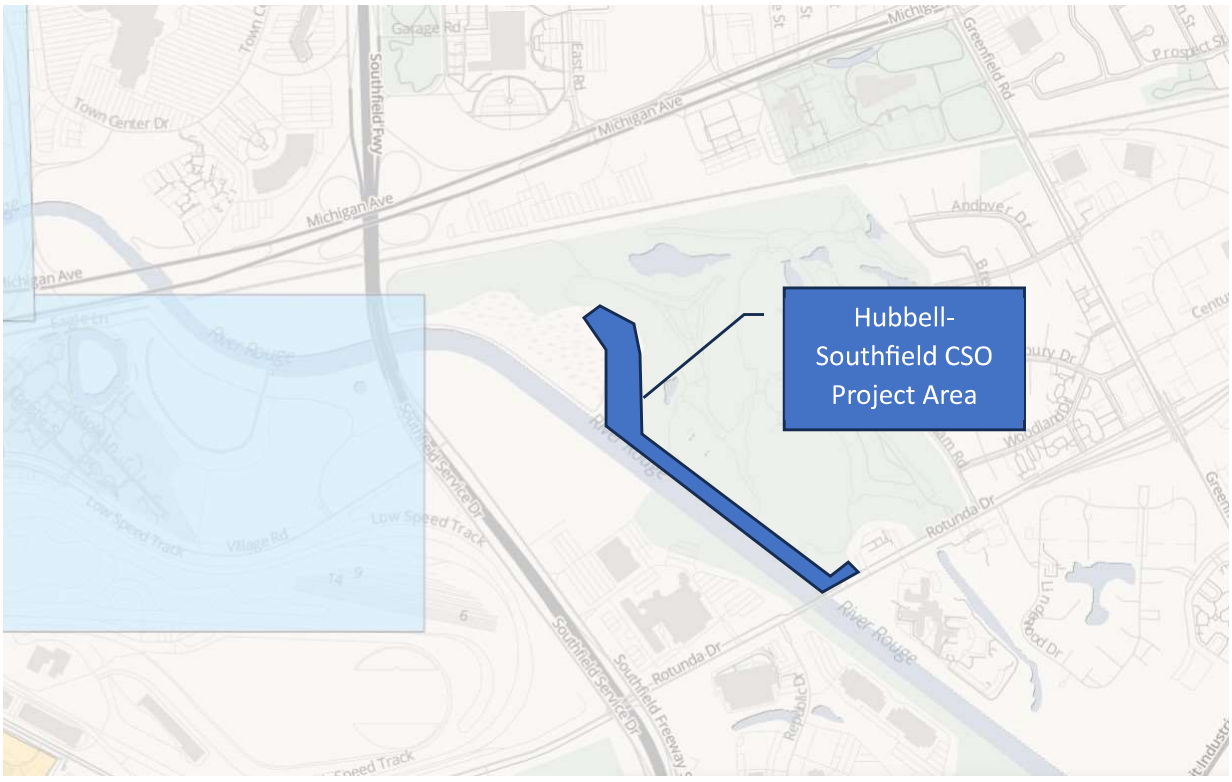
a. **Scope of Effort Applied**

i. **List sources consulted for information on historic properties in the project area** (including but not limited to SHPO office and/or other locations of inventory data).

National Register of Historic Places

ii. Provide documentation of previously identified sites as attachments.
iii. **Provide a map** showing the relationship between the previously identified properties and sites, your project footprint and project APE.

Figure 1 Historic Areas Compared to HSCSO Project



iv. Have you reviewed existing site information at the SHPO: ☐Yes ☒ No
v. Have you reviewed information from non-SHPO sources: ☒Yes ☐ No

b. **Identification Results**

i. **Above-ground Properties**

A. **Are you submitting above-ground identification information?** ☐ Yes ☒ No

B. **If yes, please indicate level:**

☐ Literature Review ☐ Reconnaissance Survey Report ☐ Intensive Survey Report

C. **Total number of properties surveyed** 1

D. **Total number of previously identified Historic Properties in your APE** 0

E. **Total number of newly identified properties recommended eligible for listing in the National Register of Historic Places** 0

F. **Summarize, briefly, your findings for above-ground resources.**

There are no historic properties in the APE

G. **Attach the appropriate Michigan SHPO Architectural Identification Form for each resource or site 50 years of age or older in the APE.** Refer to the *Instructions for the Application for SHPO Section 106 Consultation Form* for guidance on this.

H. **Provide the name and qualifications of the person who made recommendations of eligibility for the above-ground identification forms.**

Name Dave Delia, PE **Agency/Consulting Firm:** Wade Trim

Is the individual a 36CFR Part 61 Qualified Historian or Architectural Historian ☐ Yes ☒ No

Are their credentials currently on file with the SHPO? ☐ Yes ☒ No

If NO attach this individual's qualifications form and resume.

ii. **Archaeology**

Submit the following information using attachments, as necessary.

A. **Are you submitting archaeological information?** ☐ Yes ☒ No

B. **If yes, please indicate:** ☐ Assessment (Desktop Review) ☐ Archeological Report

a. **Width(s), length(s), and depth(s) of proposed ground disturbance(s):**

The four instances of ground disturbance will have the following approximate dimensions:

i. The fence will be about 4,700 ft. long and will be installed at 4 ft. deep (below the frost line).
ii. The driveway replacement will be over the surface area that is shown in the attachment to this application. The asphalt will be laid with a 6" engineered fill on top of the existing compacted subgrade, a 12" aggregate base, and 12 inch – 4 lifts of mix #4C on top.
iii. The new chemical building footprint will be approximately 45 ft. by 28 ft. and the bottom slab of concrete will be laid at approximately 7 ft. below grade.

iv. For the culvert replacement work, a 72" manhole will be installed nearly 16 ft. below grade. Approximately 60 ft. of 24" pipe will be installed at varying depths up to 12 ft. for this culvert replacement as well.

C. **Is a portion of the APE underwater?** ☐ Yes ☒ No
If the assessment did not include the underwater portions of the APE, please briefly justify:
Justification for not assessing the potential for submerged historic resources:

D. **Potential to adversely affect significant archaeological resources**:
☒ Low ☐ Moderate ☐ High

Is fieldwork recommended? ☐ Yes ☒ No
Briefly justify the recommendation:
All groundwork will be conducted on previously disturbed ground.

E. **Have you attached an Archaeological Sensitivity Map?** ☐ Yes ☒ No

F. **Summary of previously reported archaeological sites and surveys:**
Previously reported archaeological sites and surveys

G. **Summarize past and present land use:**
The land is currently on the site of the Hubbell-Southfield CSO Facility and was previously disturbed for the facility's construction in the late 1990s.

H. **If archaeological fieldwork has been conducted, please attach a copy of the report copy and provide full report reference here**:
Full report reference

I. **Provide the name and qualifications of the person who provided the information for the Archaeology section:**
Name: Name of archaeologist **Agency/Firm:** Archaeologist's agency or firm
Is the person a 36CFR Part 61 Qualified Archaeologist? ☐ Yes ☐ No
Are their credentials currently on file with the SHPO? ☐ Yes ☐ No
If NO, attach this individual's qualifications form and resume.

Archaeological site locations are legally protected.
This application may not be made public without first redacting sensitive archaeological information.

V. IDENTIFICATION OF CONSULTING PARTIES

a. **Provide a list of *all* consulting parties,** including Native American tribes, local governments, applicants for federal assistance/permits/licenses, parties with a demonstrated interest in the undertaking, and public comment:
Great Lakes Water Authority
Wade Trim
Detroit Historic District Commission
Detroit Historic Designation Advisory Board
Michigan's 12 Federally designated Indian tribes

b. **Provide a summary of consultation with consultation parties:**
A correspondence letter and with a summary and attached site plans and project work will be sent out to consultation parties. The contents of this letter can be found in the attachments to this application.

c. **Provide summaries of public comment and the method by which that comment was sought:**
A public hearing is scheduled for April 23, 2025. Comments will be sent shortly thereafter.

VI. DETERMINATION OF EFFECT

Guidance for applying the Criteria of Adverse Effect can be found in *the Instructions for the Application for SHPO Section 106 Consultation Form*.

a. **Basis for determination of effect**:

It has been determined that no historic properties can be found within the APE, and all groundwork in project scope will be operated on previously disturbed ground, and therefore no historic properties will be affected by the project work.

b. **Determination of effect**

☒ **No historic properties will be affected**

☐ **Historic properties will be affected,** and the project will (check one):

☐ have **No Adverse Effect** on historic properties within the APE.

☐ have an **Adverse Effect** on one or more historic properties in the APE and the federal agency, or federally authorized representative, will consult with the SHPO and other parties to resolve the adverse effect under 800.6.

☐ **More Information Needed:** We are initiating early consultation. A determination of effect will be submitted to the SHPO at a later date, pending results of survey.

Federally Authorized Signature:_____ Date:_____

Type or Print Name: _____

Title: _____

ATTACHMENT CHECKLIST

Identify any materials submitted as attachments to the form:

☐ Additional federal, state, local government, applicant, consultant contacts

☒ Maps of project location

Number of maps attached: 6

☒ Site Photographs

☐Map of photographs

☐ Plans and specifications

☐ Other information pertinent to the work description: Identify the type of materials attached

☐ Updated documentation of previously identified historic properties

☐ New Architectural Properties Identification Forms

☐ Map showing the relationship between identified historic properties, your project footprint, and project APE

☐ Above-ground qualified person's qualification form and resume

☐ Above-ground survey report

☐ Archaeological sensitivity map

☐ Archaeology survey report

☐ Archaeologist and Historian qualifications and resume- if not on file already.

☒ Other: Consultation Parties Correspondence Letter; Site layouts are included in attachment

Correspondence Letter and Site Layouts Attachment

Wade Trim Associates, Inc.
500 Griswold Street, Suite 2500 • Detroit, MI 48226
313.961.3650 • www.wadetrim.com

February 28, 2025

«Contact»
«Address»
«City_State_Zip»

Attention: «Contact»
«Affiliation»

Re: Hubbell-Southfield CSO Facility Improvements

Dear «Contact»:

Wade Trim Associates, working on behalf of Great Lakes Water Authority (GLWA), is preparing a Clean Water Revolving Fund (CWRF) Project Plan with the intent to apply for State Revolving Fund (SRF) funding for the Hubbell-Southfield Combined Sewer Overflow (CSO) Facility Improvements (CIP273001).

The project is located at the Hubbell-Southfield CSO basin, 16540 Rotunda Dr, Dearborn, MI 48120. CSO facilities are installed to decrease pollution during wet weather events that exceed the capacity of the sanitary sewer systems. The Hubbell-Southfield CSO is one of nine GLWA CSO treatment facilities. It has a 22-million-gallon (MG) storage capacity and a design flow capacity of 2,200 cfs. The facility began operation in 1999, and various improvements have been completed since then. The tributary area to Hubbell-Southfield CSO comprises approximately 14,400 acres in the City of Dearborn and the west side of the City of Detroit. The facility discharges to the Northwest Interceptor with overflows discharging to the Rouge River. The goals of this project are to bring the facility up to current codes/standards, standardize equipment, improve operations, strengthen operational reliability, improve safety, and ease maintenance.

This application is intended to secure low-interest loan funding through the Michigan Department of Environment, Great Lakes, and Energy (MI-EGLE) CWSRF, with distribution starting in fiscal year 2027.

This notice of opportunity to comment is being sent to you to fulfill the consultation requirement of Section 106 of the National Historic Preservation Act review process. Should you have any comments on potential impacts to known areas of religious, historic, and/or cultural significance in the area of the proposed project, please provide them before April 23rd, 2025. Any comments or concerns received will be included in the Final Project Plan.

The Hubbell-Southfield CSO Facility Improvements Project includes the following:

- Improvements to the facility's flushing system including the replacement of a flushing pump, piping, and a new flushing valve; a new magnetic flow meter; and structural modifications to the basin floor that include the installation of flushing lane curbs.
- The dewatering system improvements include four new dewatering pumps; two new ball valves; and piping upgrades.

- Chemical storage that holds disinfectant is being expanded with a new 20,000-gallon tank enclosed in a new chemical storage building. The chemical feed and transfer system used to treat the water is being upgraded with new transfer pumps and TRC analyzers along with associated piping, strainers, and instrumentation and control systems.
- The electrical system upgrades include new Motor Control Centers and new electrical wiring. A new computer control system with two new remote level sensors is also included.
- Site improvements include fencing replacement, stormwater culvert repair, and driveway paving upgrades.
- Architectural improvements include minor upgrades in the existing Headworks and Process Buildings, improvements to a walkway in the Headworks Building, and new access hatches into the basin.

These improvements will maintain the long-term reliability of this critical CSO facility.

Please see the attached maps for the location of the project.

The complete draft project plan will be available to the public on April 8th, 2025, on the **GLWA Website:** https://www.glwater.org/. If you require a bound printed copy, please contact me and we can arrange for a physical copy to be mailed.

If you have any questions on this request or need further information to complete a review of the proposed projects, please contact me at 313.961.3650 or at ddelia@wadetrim.com. Please direct any written communications to my office at 500 Griswold Street, Suite 2500, Detroit, MI 48226, with the subject heading *2026 GLWA Hubbell-Southfield CSO Facility Improvements Project*.

Very truly yours,

Wade Trim, Inc.

David J. Delia

David J. Delia, PE
Senior Project Manager

MS
GLW2033

2026 GLWA Hubbell-Southfield CSO Facility Improvements Clean Water State Revolving Fund (CWSRF)

The State Revolving Fund (SRF) funding application is for the Hubbell-Southfield CSO Facility Improvements (CIP273001) project.

Figures 1 and 2 show the location of the Hubbell-Southfield CSO Facility. Figures 3 through 7 show the locations of the proposed work.

This attachment contains the following figures:

Figure 1 Hubbell-Southfield Aerial View 16540 Rotunda Dr, Dearborn, MI 48120

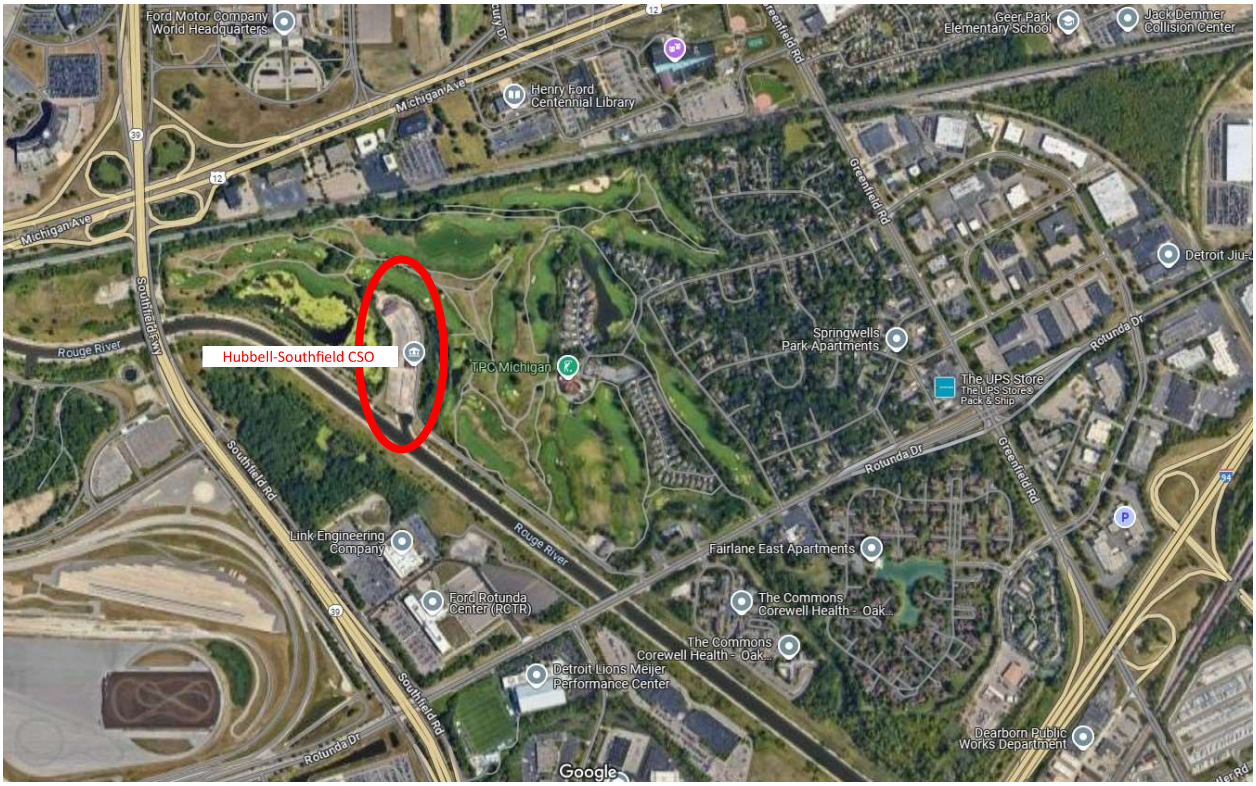


Figure 2 Hubbell-Southfield Site Aerial View

Figure 3 Limits of Site Work

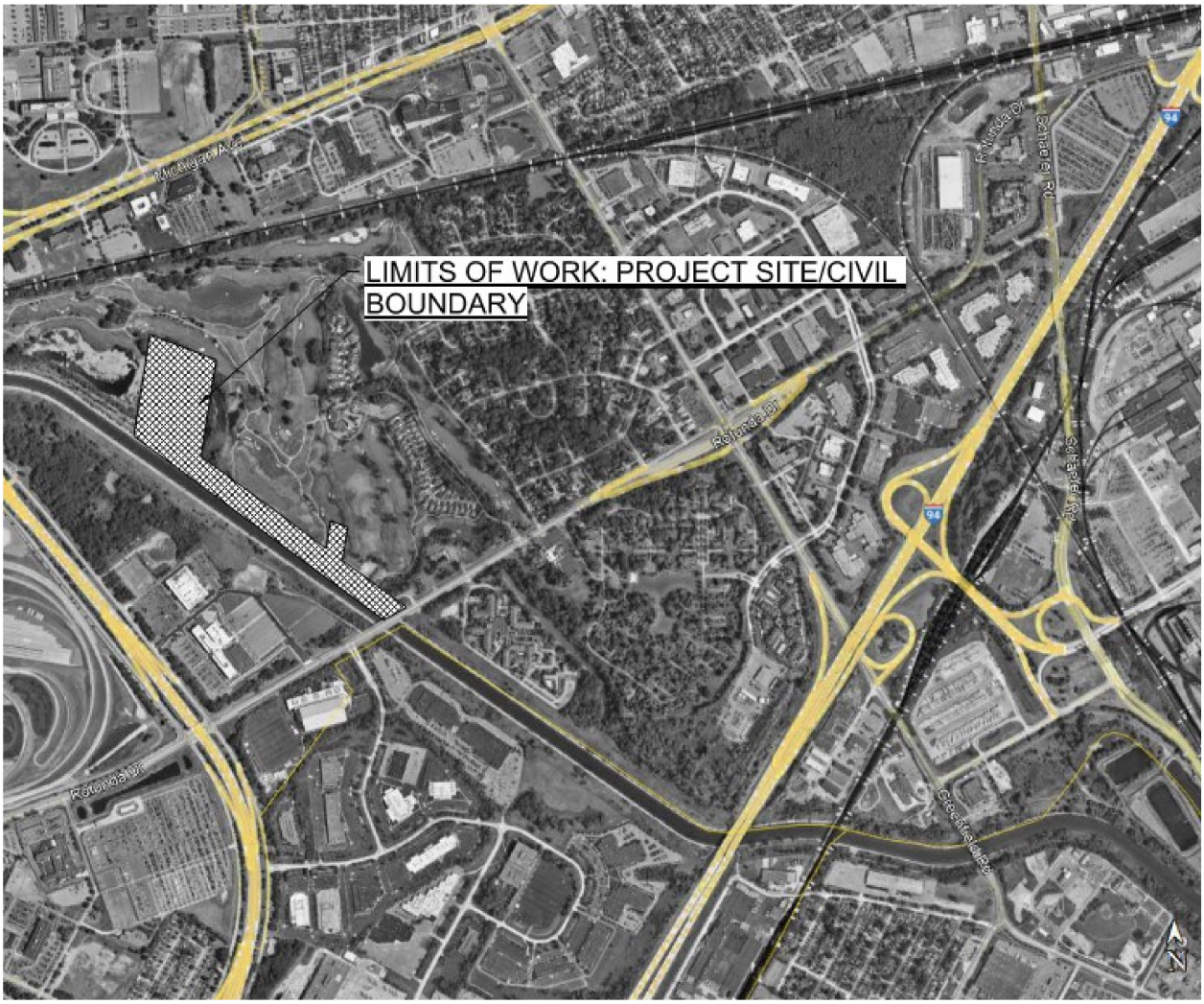


Figure 4 New level Sensor Locations

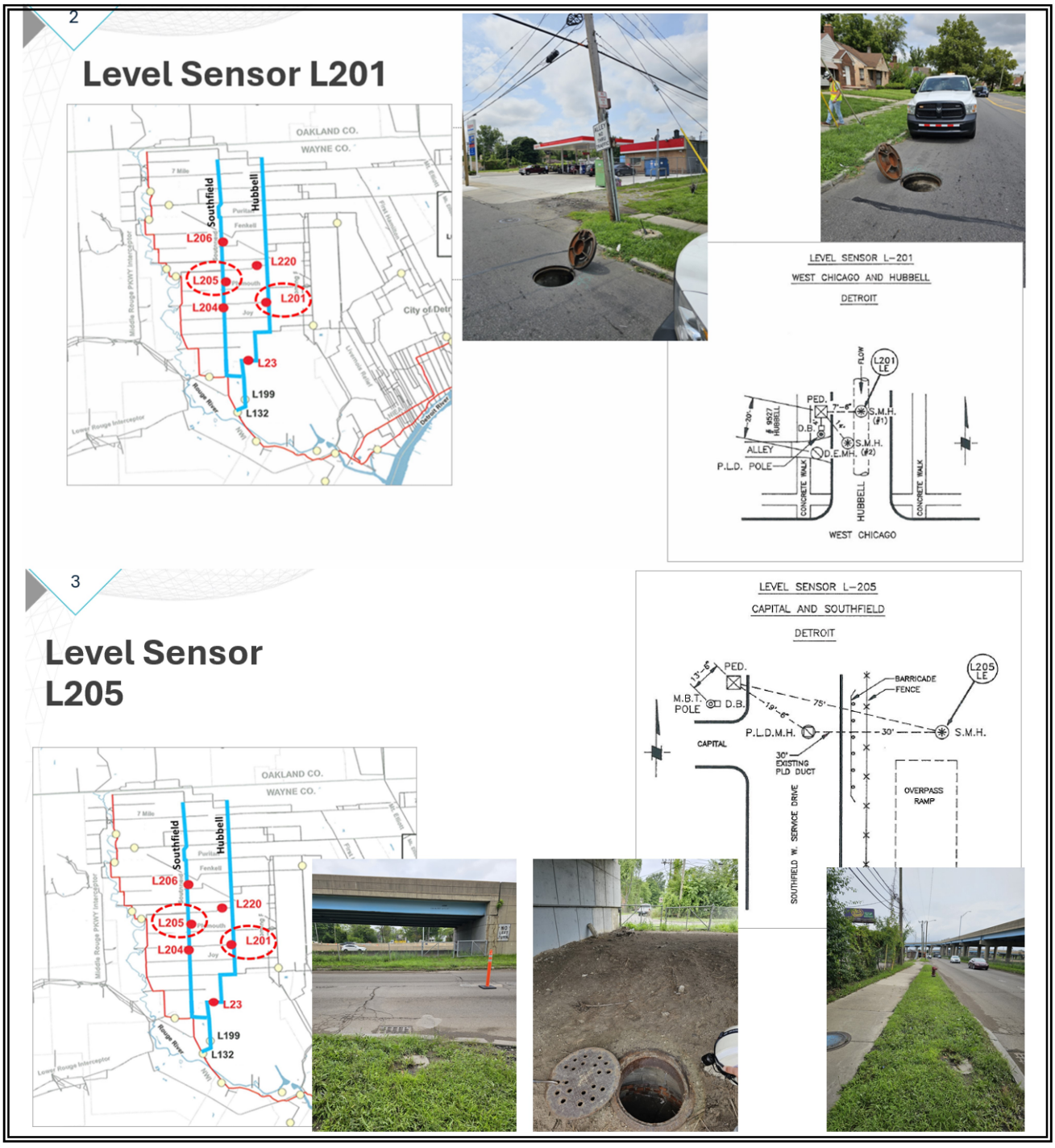


Figure 5 New Chemical Building and Utilities

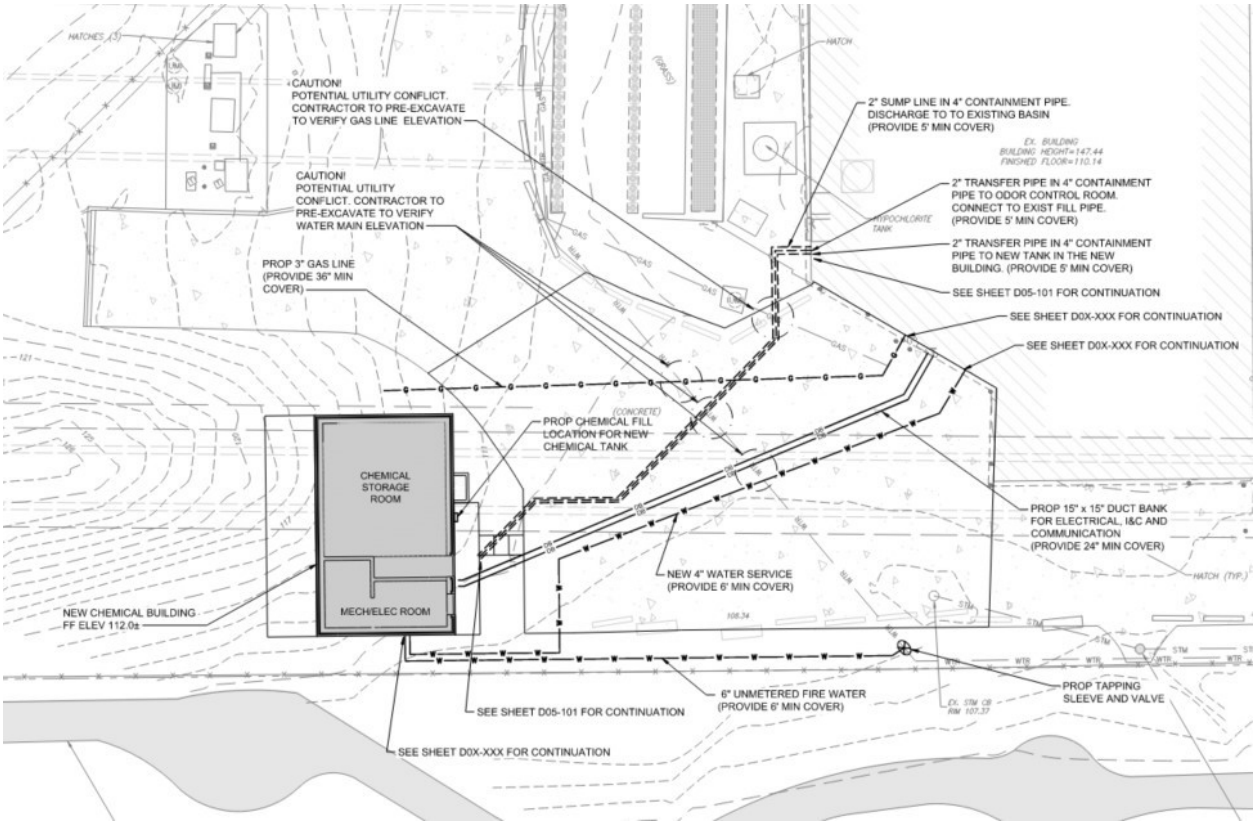


Figure 6 Fence Installation Drawing

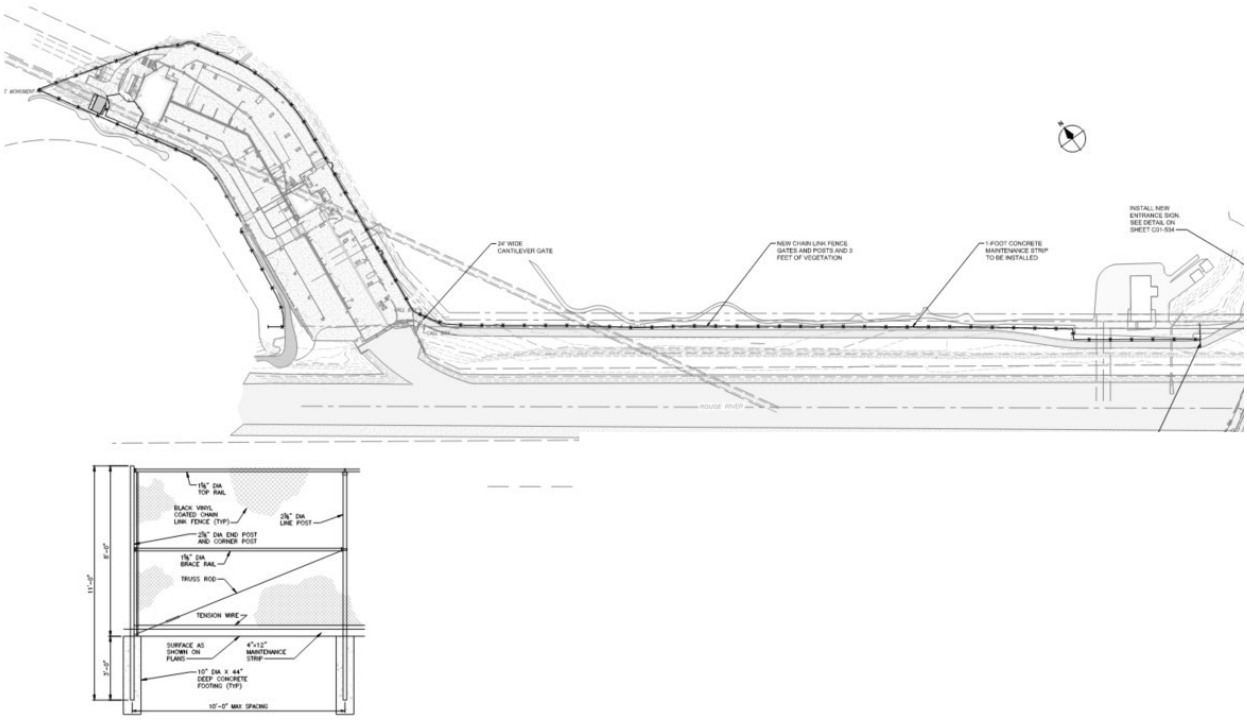
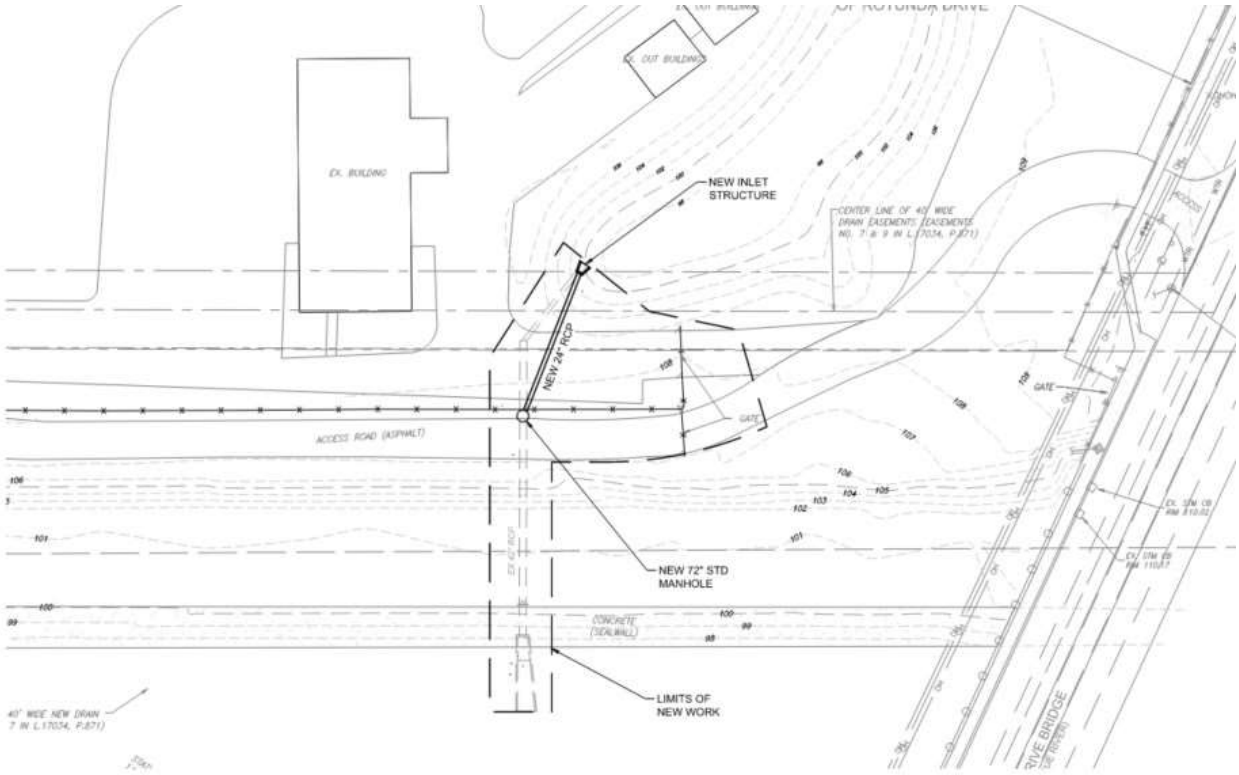


Figure 7 Driveway Replacement Area

Figure 8 Culvert Replacement Location



Appendix B.
Supporting Resources for the Natural Environment

Appendix B.1
Wetlands

U.S. Fish and Wildlife Service
National Wetlands Inventory

Hubbell-Southfield

June 21, 2024

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

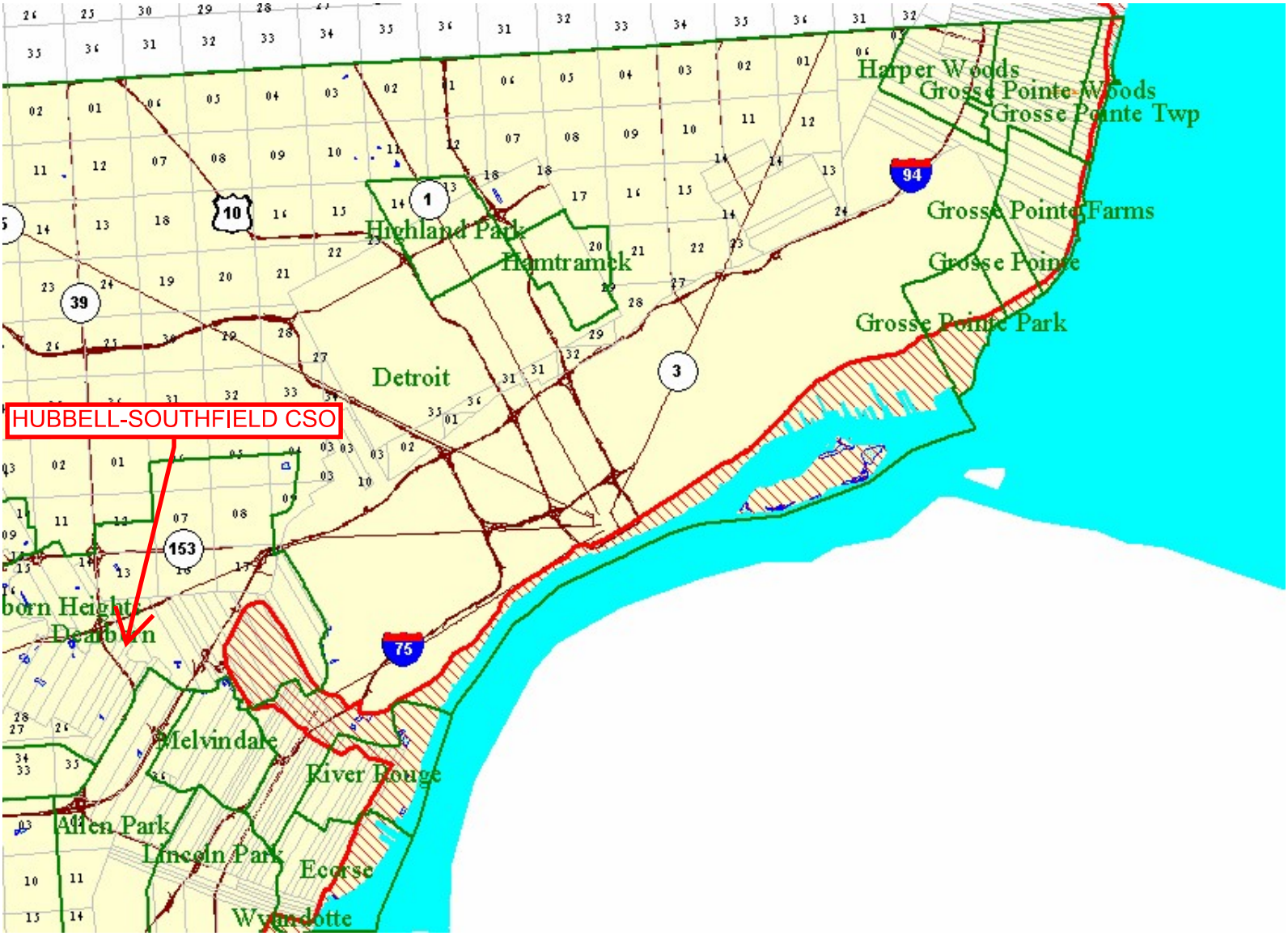
This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

Appendix B.2
Coastal Zones

Wayne County
Grosse Point Township, Grosse Point Woods, Grosse Point Farms
Grosse Point, Grosse Point Park, and Detroit, T1S R14E
Detroit, T1S R14E, T2S R13E, andT2S R12E
River Rouge, T2S R11E

The heavy red line is the ***Coastal Zone Management Boundary***
The red hatched area is the ***Coastal Zone Management Area***.

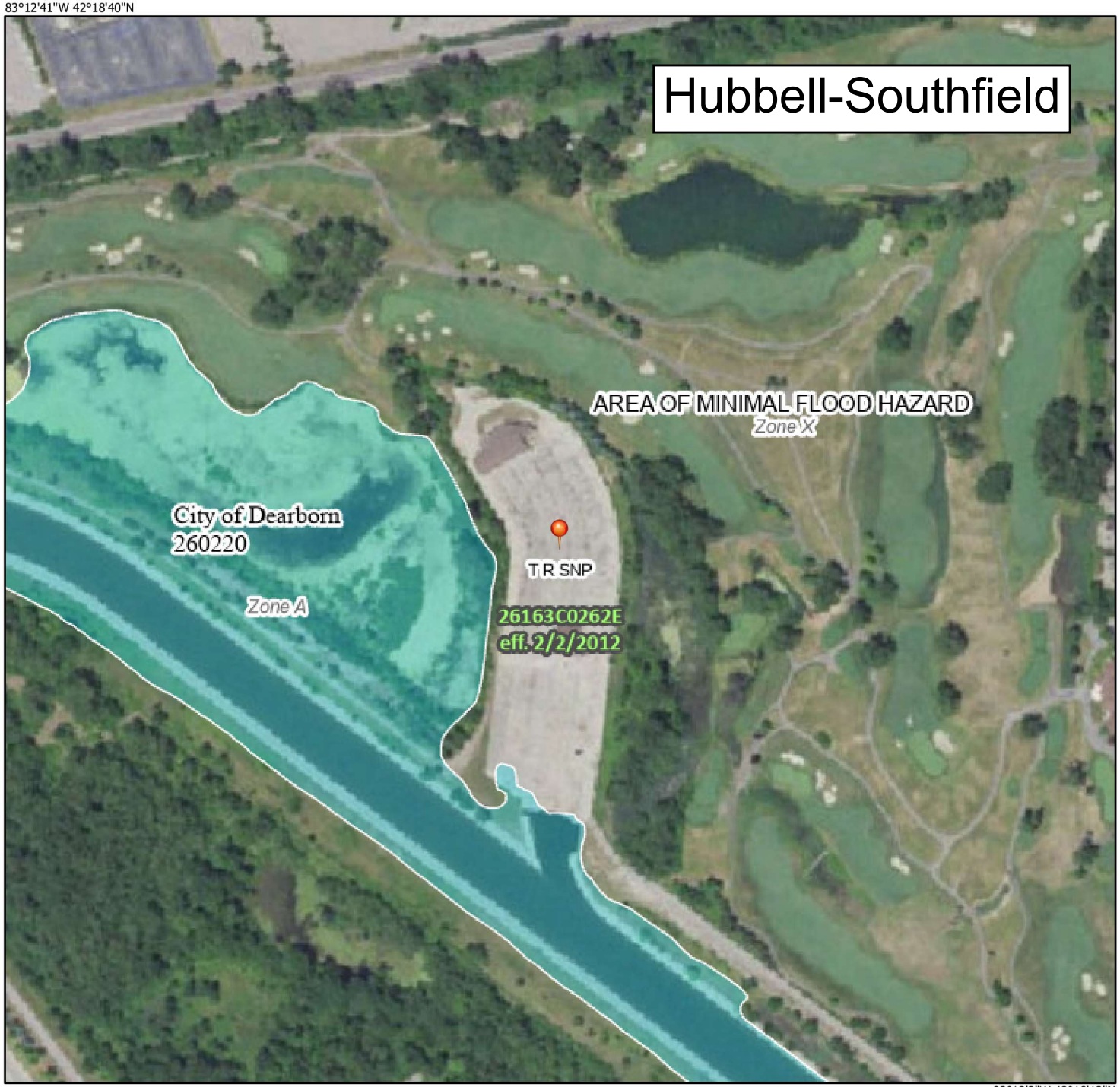


Appendix B.3
Floodplains

National Flood Hazard Layer FIRMette

FEMA

83°12'41"W 42°18'40"N



83°12'3"W 42°18'13"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

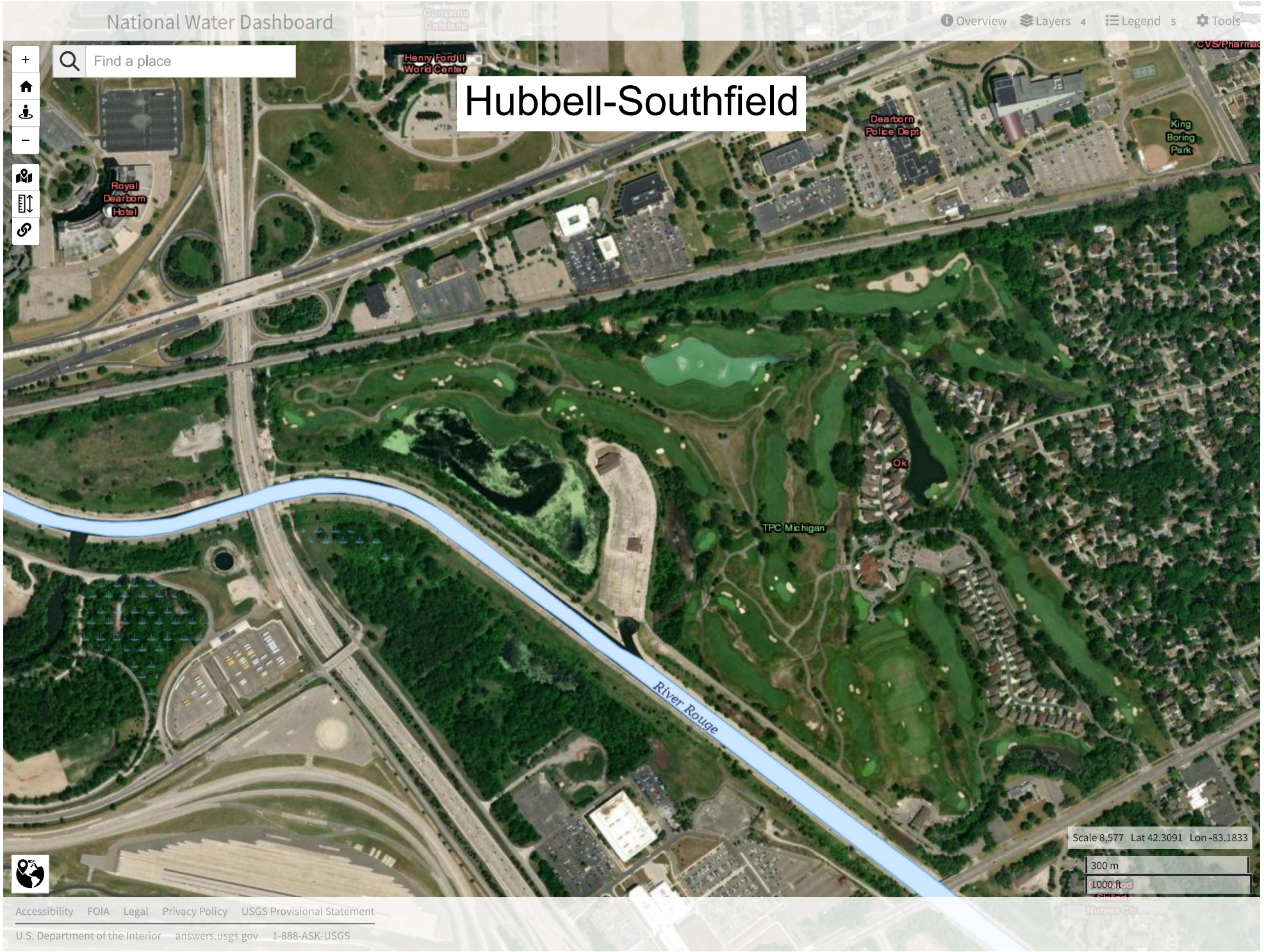
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 6/20/2024 at 10:18 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix B.4
Natural or Wild Scenic Rivers and Major Surface Waters


National Water Dashboard
Overview
Layers 4
Legend 5
Tools
Find a place
Hubbell-Southfield
Henry Ford II World Center
Dearborn Police Dept
King Boring Park
Royal Dearborn Hotel
TPC Michigan
River Rouge
Scale 8,577 Lat 42.3091 Lon -83.1833
300 m
1000 ft
Accessibility FOIA Legal Privacy Policy USGS Provisional Statement
U.S. Department of the Interior answers.usgs.gov 1-888-ASK-USGS

Appendix B.5
Agricultural Resources

Hubbell-Southfield

Appendix B.6
Michigan Natural Features Inventory Rare Species Review

Appendix B.7
IPaC Known Endangered Species for MNFI

IPaC resource list

Please note that the Federal Highways Programmatic Consultation for Transportation Projects affecting NLEB or Indiana Bat Determination Key is temporarily offline for updates and will be available soon. We apologize for any inconvenience this may cause. ×

Thi ... al
hab ... 's
(US ... nced
bel ... t
that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Wayne County, Michigan

Local office

Michigan Ecological Services Field Office

(517) 351-2555
(517) 351-1443

2651 Coolidge Road Suite 101
East Lansing, MI 48823-6360

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

2. 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.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Indiana Bat Myotis sodalis Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/5949	Endangered
Tricolored Bat Perimyotis subflavus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

Birds

NAME	STATUS
Rufa Red Knot Calidris canutus rufa Wherever found This species only needs to be considered if the following condition applies: • Only actions that occur along coastal areas during the Red Knot migratory window of MAY 1 - SEPTEMBER 30. There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1864	Threatened

Reptiles

NAME	STATUS
Eastern Massasauga (=rattlesnake) Sistrurus catenatus Wherever found This species only needs to be considered if the following condition applies: • For all Projects: Project is within EMR Range No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2202	Threatened

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/9743	Proposed Threatened

Flowering Plants

NAME	STATUS
Eastern Prairie Fringed Orchid Platanthera leucophaea Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/601	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act [2] and the Migratory Bird Treaty Act (MBTA) [1]. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate avoidance and minimization measures, as described in the various links on this page.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management

- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are Bald Eagles and/or Golden Eagles in your project area.

Measures for Proactively Minimizing Eagle Impacts
For information on how to best avoid and minimize disturbance to nesting bald eagles, please review the National Bald Eagle Management Guidelines. You may employ the timing and activity-specific distance recommendations in this document when designing your project/activity to avoid and minimize eagle impacts. For bald eagle information specific to Alaska, please refer to Bald Eagle Nesting and Sensitivity to Human Activity.

The FWS does not currently have guidelines for avoiding and minimizing disturbance to nesting Golden Eagles. For site-specific recommendations regarding nesting Golden Eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

If disturbance or take of eagles cannot be avoided, an incidental take permit may be available to authorize any take that results from, but is not the purpose of, an otherwise lawful activity. For assistance making this determination for Bald Eagles, visit the Do I Need A Permit Tool. For assistance making this determination for golden eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

Ensure Your Eagle List is Accurate and Complete
If your project area is in a poorly surveyed area in IPaC, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the Supplemental Information on Migratory Birds and Eagles, to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to bald or golden eagles on your list, see the "Probability of Presence Summary" below to see when these bald or golden eagles are most likely to be present and breeding in your project area.

Review the FAQs
The FAQs below provide important additional information and resources.

NAME	BREEDING SEASON

Bald Eagle *Haliaeetus leucocephalus* — Breeds Dec 1 to Aug 31

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.
https://ecos.fws.gov/ecp/species/1626

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 "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "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 that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

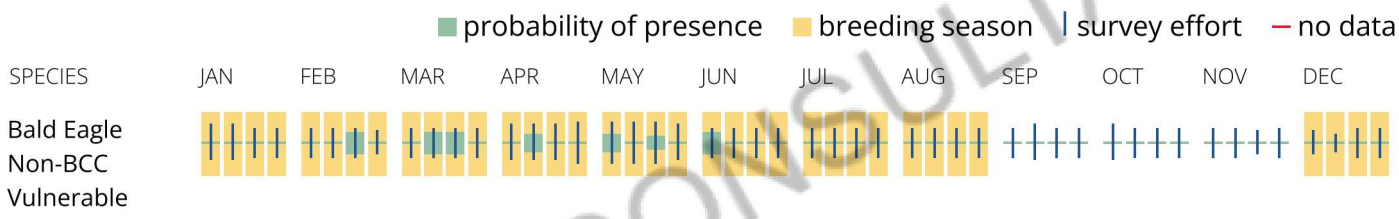
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Bald & Golden Eagles FAQs

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence 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 an eagle (Bald and Golden Eagle Protection Act requirements may apply).

Proper interpretation and use of your eagle report
On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). 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 line or no data line (red horizontal) 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 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 and associated information help you know what to look for to confirm presence and helps guide you in knowing when to implement avoidance and minimization measures to eliminate or reduce potential impacts from your project activities or get the appropriate permits should presence be confirmed.

How do I know if eagles are 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 resident), you may query your location using the RAIL Tool and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If an eagle on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your "IPaC PROBABILITY OF PRESENCE SUMMARY" at the top of your results list), 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.

Interpreting the Probability of Presence Graphs

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 taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:
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 that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Migratory birds

The Migratory Bird Treaty Act (MBTA) [1] prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service). The incidental take of migratory birds is the injury or death of birds that results from, but is not the purpose, of an activity. The Service interprets the MBTA to prohibit incidental take.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

Measures for Proactively Minimizing Migratory Bird Impacts

Your IPaC Migratory Bird list showcases birds of concern, including Birds of Conservation Concern (BCC), in your project location. This is not a comprehensive list of all birds found in your project area. However, you can help proactively minimize significant impacts to all birds at your project location by implementing the measures in the Nationwide avoidance and minimization measures for birds document, and any other project-specific avoidance and minimization measures suggested at the link Measures for avoiding and minimizing impacts to birds for the birds of concern on your list below.

Ensure Your Migratory Bird List is Accurate and Complete

If your project area is in a poorly surveyed area, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the Supplemental Information on Migratory Birds and Eagles document, to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

Review the FAQs
The FAQs below provide important additional information and resources.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* 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. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Black-billed Cuckoo *Coccyzus erythropthalmus* 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
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Canada Warbler *Cardellina canadensis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10
Cerulean Warbler *Setophaga cerulea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/2974	Breeds Apr 22 to Jul 20
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Eastern Whip-poor-will *Antrostomus vociferus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Golden-winged Warbler *Vermivora chrysoptera* 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

Grasshopper Sparrow Ammodramus savannarum perpallidus This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8329	Breeds Jun 1 to Aug 20
Lesser Yellowlegs Tringa flavipes 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
Long-eared Owl asio otus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3631	Breeds Mar 1 to Jul 15
Red-headed Woodpecker Melanerpes erythrocephalus 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 Euphagus carolinus This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Semipalmated Sandpiper Calidris pusilla This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Wood Thrush Hylocichla mustelina 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 "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "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 that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

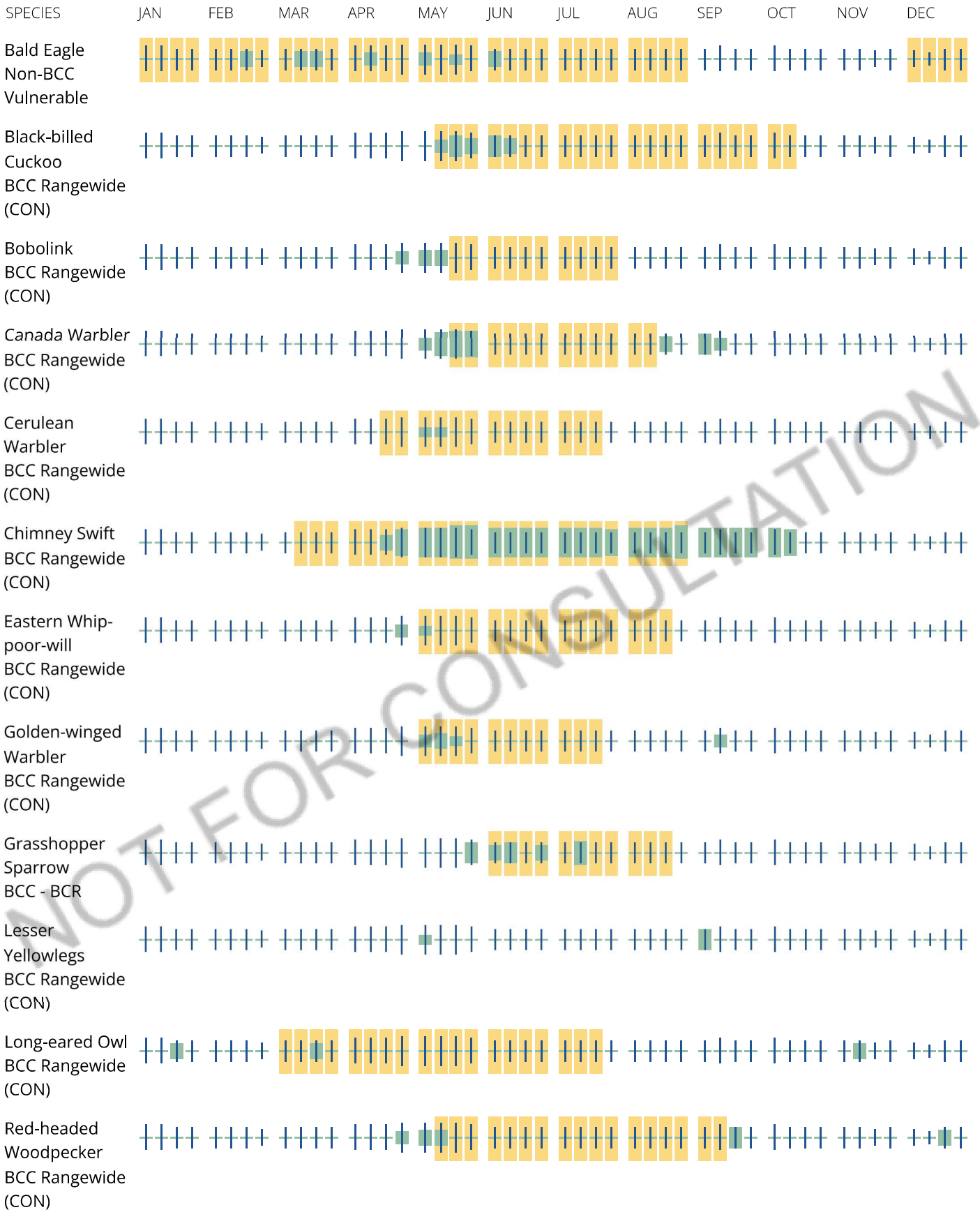
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

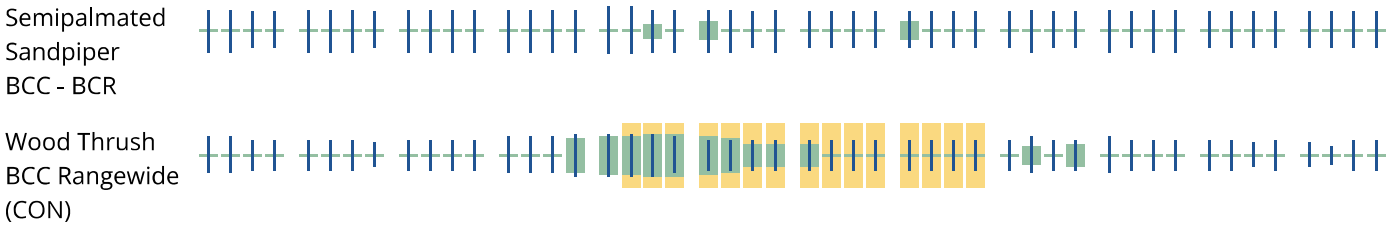
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.





Migratory Bird FAQs

Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Avoidance & Minimization Measures for Birds describes measures that can help avoid and minimize impacts to all birds at any location year-round. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is one of the most effective ways to minimize impacts. To see when birds are most likely to occur and breed 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 Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location, such as those listed under the Endangered Species Act or the Bald and Golden Eagle Protection Act and those species marked as "Vulnerable". See the FAQ "What are the levels of concern for migratory birds?" for more information on the levels of concern covered in the IPaC migratory bird species list.

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) with which your project intersects. These species have been identified as warranting special attention because they are BCC species in that area, an eagle (Bald and Golden Eagle Protection 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, and to verify survey effort when no results present, please visit the Rapid Avian Information Locator (RAIL) Tool.

Why are subspecies showing up on my list?

Subspecies profiles are included on the list of species present in your project area because observations in the AKN for **the species** are being detected. If the species are present, that means that the subspecies may also be present. If a subspecies shows up on your list, you may need to rely on other resources to determine if that subspecies may be present (e.g. your local FWS field office, state surveys, your own surveys).

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 to 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 resident), you may query your location using the RAIL Tool and view 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 IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your "IPaC PROBABILITY OF PRESENCE SUMMARY" at the top of your results list), 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 Bald and Golden Eagle Protection 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 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 BCC species. For more information on avoidance and minimization measures you can implement to help avoid and minimize migratory bird impacts, please see the FAQ "Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

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.

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 look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). 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 does not represent all birds present in your project area. 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 and associated information help you know what to look for to confirm presence and helps guide implementation of avoidance and minimization measures to eliminate or reduce potential impacts from your project activities, should presence be confirmed. To learn more about avoidance and minimization measures, visit the FAQ "Tell me about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

Interpreting the Probability of Presence Graphs
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 taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:
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 that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Facilities

National Wildlife Refuge lands

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 at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

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.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

PEM1F

FRESHWATER POND

PABHx

RIVERINE

R2UBH

A full description for each wetland code can be found at the National Wetlands Inventory website

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix C.
Zoning Maps

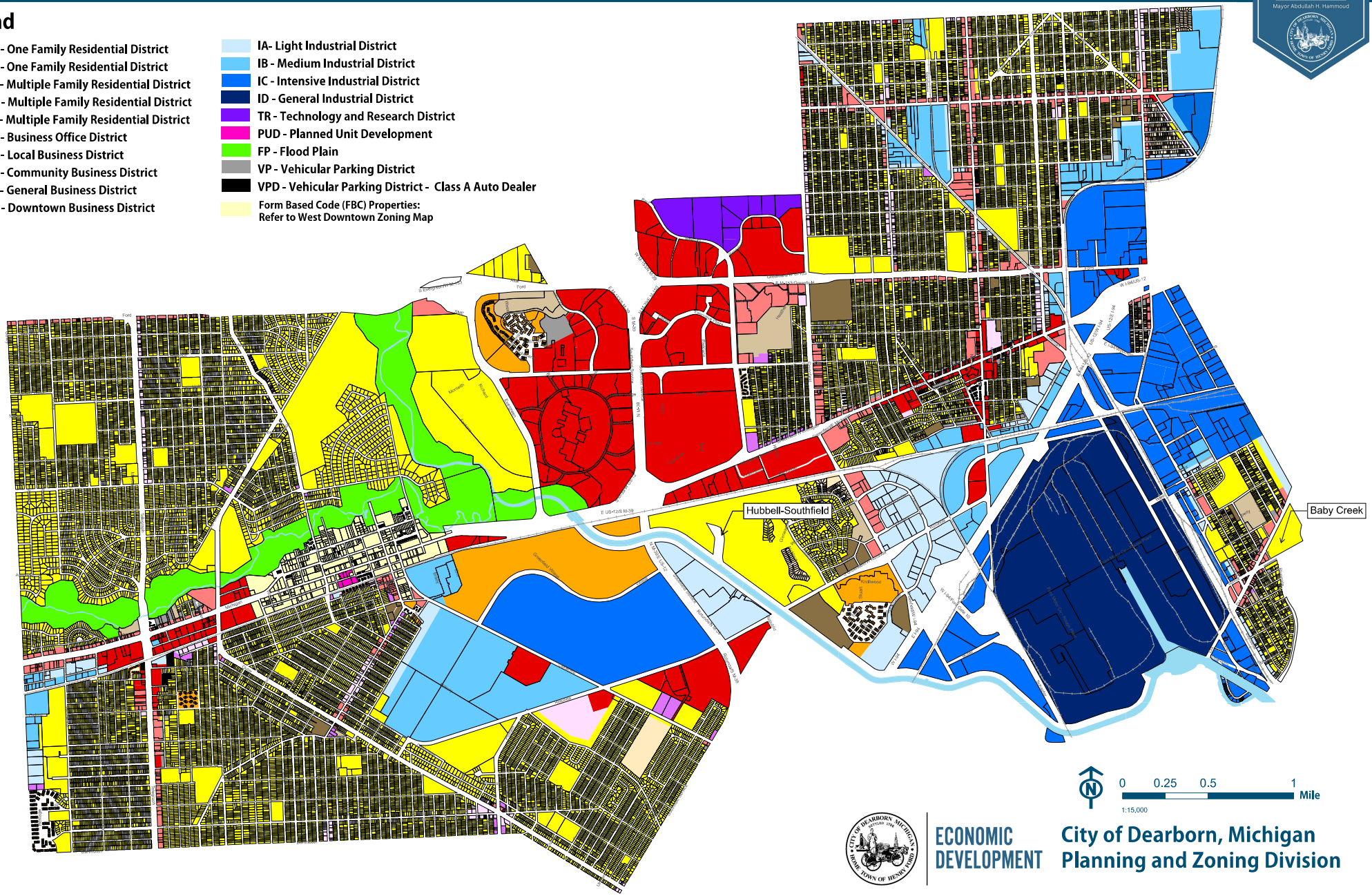
City of Dearborn Zoning Map

As Amended to December 1st, 2023

ECONOMIC DEVELOPMENT
Mayor Abdullah H. Hammoud

Legend

- RA - One Family Residential District
- RB - One Family Residential District
- RC - Multiple Family Residential District
- RD - Multiple Family Residential District
- RE - Multiple Family Residential District
- OS - Business Office District
- BA - Local Business District
- BB - Community Business District
- BC - General Business District
- BD - Downtown Business District
- IA- Light Industrial District
- IB - Medium Industrial District
- IC - Intensive Industrial District
- ID - General Industrial District
- TR - Technology and Research District
- PUD - Planned Unit Development
- FP - Flood Plain
- VP - Vehicular Parking District
- VPD - Vehicular Parking District - Class A Auto Dealer
- Form Based Code (FBC) Properties: Refer to West Downtown Zoning Map



0 0.25 0.5 1 Mile

1:15,000

ECONOMIC DEVELOPMENT

City of Dearborn, Michigan
Planning and Zoning Division

Appendix D.
EGLE Forms

Appendix D.1
Project Useful Life and Cost Analysis Certification Form

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

Finance Division

PROJECT USEFUL LIFE AND COST ANALYSIS CERTIFICATION FORM

Per Section 602(b)(13) of the Federal Water Pollution Control Act (FWPCA), all Clean Water State Revolving Fund (CWSRF) assistance recipients must certify that they have conducted the studies and evaluations described in 602(b)(13)(A) and (B), collectively known as a cost and effectiveness analysis.

Applicant Name:_____ CWSRF Project Number:_____

Project Description:_____

1) The applicant has studied and evaluated the cost and effectiveness of the processes, materials, techniques, and technologies for carrying out the proposed project or activity for which assistance is sought under the CWSRF; and

2) The applicant has selected, to the maximum extent practicable, a project or activity that maximizes the potential for efficient water use, reuse, recapture, and conservation, and energy conservation, taking into account the cost of:

- constructing the project or activity;
- operating and maintaining the project or activity over the life of the project; and
- replacing the project or activity.

3) The applicant has completed a Project Useful Life analysis for the project or activity and is included in the Project Planning Document or appropriate documentation is attached to this certification.

☐ I certify that requirements (1), (2), and (3) above have been met.

_____

Name of Professional Engineer (Please Print or Type)

_____

Signature of Professional Engineer Date

_____

Name and Title of Authorized Representative (Please Print or Type)

_____

Signature of Authorized Representative Date

Appendix D.2
Fiscal Sustainability Plan Certification Form and Guidance

Fiscal Sustainability Plan Certification Form

Describe SRF Project to be Funded: OR SRF Project Number _____

_____

_____

Check one box below:

☐ FSP does not apply because:

- ☐ The project is for a new treatment works system.
- ☐ The project involves an upgrade that does not involve repair/replacement or expansion of a treatment works system.
- ☐ The project is for nonpoint source work.
- ☐ Other (explain)

☐ FSP is complete for the SRF-funded project and is available for review by contacting:

_____
(Name) (Phone)

_____

_____

I certify that _____ has developed and implemented a plan that meets
(Applicant's Name)
the requirements of Section 603(d)(1)(E)(i) of the Water Resources Reform and Development Act of 2014. The FSP includes an inventory of critical assets, an evaluation of the condition and performance of inventoried assets, a plan for maintaining, repairing, and as necessary, replacing the treatment works, and a plan for funding such activities. The applicant also certifies that the water and energy conservation efforts have been evaluated and will be implemented.

_____
Name and Title of Authorized Representative *(Please Print or Type)*

_____
Signature of Authorized Representative Date

Fiscal Sustainability Plan
Guidance and Frequently Asked Questions (FAQ)

Guidance

On June 10, 2014, President Obama signed into law the Water Resources Reform and Development Act of 2014 (WRRDA). Among its provisions are amendments to the Federal Water Pollution Control Act (FWPCA), which includes the administration of the Clean Water State Revolving Fund (SRF) program. The WRRDA requirement to complete and implement a fiscal sustainability plan (FSP) will be a new condition of the SRF loan agreement. Section 603(d)(1)(E) states that treatment works proposed for repair, replacement, or expansion must develop and implement an FSP that includes at a minimum the following four items:

1. Inventory of critical assets that are part of the treatment works;
2. Evaluation of the condition and performance of inventoried assets or asset groupings;
3. Certification that the recipient has evaluated and will be implementing water and energy conservation efforts as part of the plan; and
4. A plan for maintaining, repairing, funding, and as necessary, replacing the treatment works.

All applicants who submit a Project Plan after October 1, 2014, will need to self-certify they are complying with the FSP requirement or that they are exempt. This FSP Certification form will need to be completed and submitted with the Part III Application.

Prior to final loan disbursement, a review of the FSP will be performed by DEQ staff. The DEQ visit will include a review and discussion of the asset inventory, evaluation of efforts to implement water and energy conservation efforts, and a brief overview of the plan to repair/replace/maintain and funding for those activities. See attachment for some examples of conservation activities.

FAQs

Q: Does the FSP need to be system wide?

A: No, the FSP can pertain to only those assets that are a part of the SRF-financed project. For example, if the SRF project is on the collection system only, the FSP would only cover the collection system. The FSP does not need to contain treatment plant infrastructure.

Q: What is an FSP and when is it completed?

A: An FSP is very similar to an Asset Management Plan (AMP) and should be viewed as a 'living document' that is regularly reviewed, revised, and expanded. For this reason, there is no final deadline for FSP completion. However, in order to ensure compliance with this new statutory requirement, applicants must certify that they have created and implemented a FSP (containing the minimum components listed above). Applicants must include Items 1 and 2 above in their final SRF Project Plan submitted by July 1. Item 4 above should be included in the user charge/rate methodology submittal.

Q: Is the development of an FSP an eligible loan cost?

A: Yes, an applicant can request up to $2 million in loan funds to complete an FSP/AMP or to use towards the development/further development of its AMP. If an applicant is receiving

SAW funds for AMP development, SRF loan funds cannot be used for the same activities already included in its SAW grant. For example, if condition assessment activities for Districts A and B were included in a SAW grant, those same activities cannot be included in an SRF loan. However, condition assessment activities for District C can be included in the SRF loan. This request of AMP funds should be stated in the applicant's Project Plan.

Q: Do FSP's need to be submitted for review/approval?

A: No, FSPs do not need to be submitted for SRF purposes. DEQ staff may ask to review an applicant's FSP during a site visit or inspection. If loan funds are being used for the development of an FSP/AMP, Revolving Loan Section staff will ask to review the applicant's FSP/AMP during their final site visit.

Q: Who must complete an FSP?

A: An FSP is required for any applicant that is seeking SRF funding for treatment works proposed for repair, replacement, or expansion. FSP's are not required for new treatment works (there is no existing system) or for nonpoint source projects.

Q: I have a SAW grant for AMP development; what do I need to do?

A: You must still complete the certification form and submit it with your SRF Part III Application as well as including the FSP minimum Items 1 and 2 (on the previous page) with your final Project Plan, and Item 4 with your rate methodology submittal.

Q: Are energy and water conservation tasks considered eligible loan activities?

A: Yes, loan eligible activities include energy and water assessments and audits.

Q: What type of energy and water conservation activities can be reviewed and implemented by an applicant?

A: Applicants can find several conservation resources noted in Appendix I.

Q: Can an applicant apply for just a $2 million loan for asset management development?

A: No, the applicant must still have an eligible SRF construction project (i.e., address a water quality problem) to receive the $2 million for asset management program development.

Water and Energy Conservation Examples for a Wastewater Treatment Facility

Applicant's that accept SRF assistance must certify that they evaluated and will be implementing water and energy conservation efforts as part of their fiscal sustainability plan. Below are some examples of water and energy conservation efforts that can be evaluated and used to fulfill this requirement:

Energy Conservation:

1. Improve efficiency of aeration equipment: Aeration systems in wastewater plants account for about half of a wastewater treatment plant's energy use. Improved system controls, energy-efficient blowers, and energy-efficient diffuser technologies can reduce costs.
2. Biogas utilization: Biogas recovered from sludge digesters can be burned to produce electricity and heat buildings at the facility. Biogas can also be used to fuel microturbines – an innovative way to generate power using rotational energy.
3. Improve pumping efficiency: Ensure that pumps are sized appropriately and install variable frequency drives that allow speed variations to match flow conditions.
4. Improve efficiency of HVAC and lighting: Replace light fixtures and light bulbs with high efficiency models. Retrofitting HVAC with a more efficient system will have a high initial cost but can reduce energy use by 10-40 percent, generally making it cost-effective over the life of the investment.
5. Improve efficiency of operations: Installing Supervisory Control and Data Acquisition (SCADA) software can increase the efficiency of process monitoring and operational control.

Water Conservation:

1. Plant effluent water system: A plant effluent water system can be utilized to recycle effluent water to wastewater treatment plant systems that normally use treated potable water.
2. Reclaimed water for irrigation: During the summer months, reclaimed water can be used to irrigate lawns and landscaping rather than potable water.
3. Reclaimed water for industrial use: Traditionally, pulp and paper facilities, textile facilities, and other facilities using reclaimed water for cooling tower purposes.

Additional information can be found by searching for water and energy conservation methods on the Environmental Protection Agency's website (www.epa.gov/).

Compiled by: Revolving Loan Section, Michigan Department of Environmental Quality
March 2015

APPENDIX I

Supplemental Information for Implementing Section 603(d)(1)(E)(i)(III)

Under Section 603(d)(1)(E)(i)(III) of the Federal Water Pollution Control Act, as amended, a recipient of a Clean Water State Revolving Fund (CWSRF) loan for "repair, replacement, or expansion" of a treatment works must certify that it has evaluated and will be implementing water and energy conservation efforts as part of its fiscal sustainability plan. As stated in *Interpretive Guidance for Certain Amendments in the Water Resources Reform and Development Act to Titles I, II, V and VI of the Federal Water Pollution Control Act*, the Environmental Protection Agency recommends that the CWSRFs evaluate whether a recipient has selected, to the maximum extent practicable, water and energy efficient approaches in the selected project.

Energy Conservation

One example of how CWSRFs can evaluate the energy portion of the certification is to use information developed by the recipient through energy assessments and audits. Energy assessments help utilities identify the amount of energy being used in various aspects of its operations. Energy audits, in turn, allow utilities to identify and prioritize projects that will result in operational and capital improvements to their infrastructure and operations, cost savings, and other climate-related benefits like reductions in greenhouse gas emissions and the use of renewable energy. EPA encourages CWSRFs to promote the use of these proven and objective methods by CWSRF borrowers.

Energy Use Assessments

A number of tools are available to help utilities conduct energy assessments, including:

- **EPA's Energy Use Assessment Tool—**this is a free Excel-based tool that can be downloaded and is specifically designed for small and medium sized wastewater and water utilities. It enables utilities to analyze their current energy bills and analyze energy consumption for major pieces of equipment. It also allows the utility to develop a printable summary report outlining current energy consumption and costs, generate graphs depicting energy use over time, and highlight areas of potential improvement in energy efficiency. It is available at http://water.epa.gov/infrastructure/sustain/energy_use.cfm.
- **NYSERDA Energy Benchmarking Tool—**The New York State Energy Research and Development Agency (NYSERDA) has developed a tool to help wastewater utilities assess and benchmark their current energy usage, along with a number of other useful self-audit checklists, available at http://www.nyserda.ny.gov/Energy-Efficiency-and-Renewable-Programs/Commercial-and-Industrial/Sectors/Municipal-Water-and-Wastewater.aspx.

Energy Audits

Energy audits can be broadly characterized according to the following three levels:

- Level 1 (Walk Through Audits)
  - Generally last several hours at the facility
  - Usually result in suggestions for low cost improvements in areas like HVAC or lighting
- Level 2 (Energy Survey and Analysis Audits)
  - One or two days in duration, plus additional time to review energy bills, etc.
  - In addition to HVAC/lighting recommendations, usually result in recommendations for equipment upgrades in existing processes (e.g., variable frequency drives, more efficient motors, etc.)
- Level 3 (Process Energy Audit)
  - One or more days at the facility, time to analyze energy bills and pump curves, and time for additional data gathering
  - Audit covers energy use in both existing and alternative processes, potential design modifications, and optimization of processes and equipment
  - Audit suggestions covered detailed operational and process suggestions for both short-term and long-term payback periods as well as capital intensive projects that may require outside funding
  - Most likely to result in significant savings

EPA hosted a webinar in August 2014 describing a number of energy assessment and audit tools available to states and potential recipients of CWSRF funding. The webinar slides are available at http://water.epa.gov/infrastructure/sustain/upload/NRWA-Energy-Audits-for-Small-Utilities-8-4-14.pdf.

Tool available to help wastewater utilities obtain or conduct energy audits include:

- **EPA's Energy Use Assessment Tool—**described in more detail above. Available at http://water.epa.gov/infrastructure/sustain/energy_use.cfm.

Both energy assessments and audits are eligible for funding under the CWSRF, and a number of organizations can help utilities with these activities, including:

- State Energy Offices (http://www.naseo.org/members-states)
- Electric utilities serving wastewater utilities (http://www.dsireusa.org/)

- Technical assistance providers like the National Rural Water Association, RCAP, and others
- Department of Energy Industrial Assessment Centers (http://energy.gov/eere/amo/industrial-assessment-centers-iacs).

Water Conservation

Water conservation includes efficiency and reuse efforts to not only conserve our raw water supply, but to also reduce flow to wastewater treatment plants. Therefore, one way CWSRF borrowers can fulfill the water conservation requirement is to consider alternative or complementary projects that result in reduced wastewater flows and therefore reduce a treatment works' capacity needs. There are a number of water conservation projects borrowers can consider, including:

- **Water Reuse—**recycling and water reuse projects that replace potable sources with non-potable sources
  - Gray water, condensate, and wastewater effluent reuse systems
  - Extra treatment costs and distribution pipes associated with water reuse

- **Water Efficient Devices—**installing or retrofitting water efficient devices, such as plumbing fixtures and appliances
  - Shower heads, faucets, toilets, urinals, etc.
  - Education and incentive programs to conserve water such as rebates

- **Water Meters—**installing any type of water meter in a previously unmetered area, or replacing existing broken/malfunctioning water meters or upgrading them if rate structure is based on metered use

- **Water Audits and Conservation Plans—**performing audits of entire utilities or individual users (e.g., large corporations) to assess the amount of water being consumed, the need for retrofits, etc.

Utilities can also fulfill this requirement by considering water conservation projects that are not CWSRF eligible.

Water Efficiency Tools

Tools are readily available to help utilities determine how much water is being conserved, including:

- **EPA's WaterSense Program—**Tools and resources to promote water efficiency are available at http://www.epa.gov/watersense/. States, local governments, and utilities can partner with WaterSense to get access to additional tools and resources to help them design and implement water efficiency and conservation programs. Partnership is free.

- **EPA's Water Conservation Plan Guidelines—**Helpful recommendations to utilities for creating and implementing a Water Conservation Plan, depending on the size of the population served by the utility, available at http://epa.gov/watersense/water-conservation-plan-guidelines.

- **AWWA Water Audit Software—**Free software specifically designed to help utilities perform water audits, to help quantify and track water losses, and determine areas for improved efficiency. Available at http://www.awwa.org/resources-tools/water-knowledge/water-loss-control.aspx.

- **AWE Water Conservation Tracking Tool—**A tool to evaluate water savings, costs, and benefits of conservation programs for a specific water utility, available to AWE members at http://www.allianceforwaterefficiency.org/tracking-tool.aspx.

- Many states have guidelines and example plans to help utilities develop water conservation plans. For example:

    - **TWDB Water Conservation Plan—**Texas Water Development Board has developed a set of guidelines, tutorials, and example plans to help utilities create a water conservation plan that can be adopted and utilized by different entities. Available at http://www.twdb.texas.gov/conservation/municipal/plans/.

Appendix D.3
Project Priority List (PPL) Scoring Data Form

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

Finance Division

PROJECT PRIORITY LIST SCORING DATA FORM

Part 53, Clean Water Assistance, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.

Instructions

The following information must be completed and submitted alongside a Project Planning Document for the Clean Water State Revolving Fund (CWSRF) or Strategic Water Quality Initiatives Fund (SWQIF). This form should only be completed for items to be included in the upcoming fiscal year project. Include page numbers and appendices of where supporting documentation can be found in the planning document. For traditional wastewater projects, including combined sewer separation, please complete sections 1-4. For projects with only storm water work please complete sections 5-8.

For questions related to wastewater scoring, please contact Charlie Hill at 906-236-3916 or HillC@Michigan.gov. For questions related to storm water scoring, please contact Christe Alwin at 517-420-1501 or AlwinC@Michigan.gov.

Project Information

Applicant:_____

Project Location: _____

CWSRF/SWQIF Project Number: _____

Applicant Population:_____ Population Served by the Project:_____

Project Type: ☐ Wastewater (including emerging contaminant projects) ☐ Storm Water

1. Compliance – Wastewater Projects

Does the project have an enforceable construction schedule established by an order, permit, enforcement action, or other document issued by EGLE?

☐ Yes ☐ No

If yes, copy of enforcement action, order, permit, notice, or another document. Pages:_____

2. Public Health – Wastewater Projects

Sanitary Sewer Overflow (SSO)/Bypass. Pages:_____

☐ Wet weather related SSOs demonstrated not meeting SSO policy.

☐ Operational-related SSOs demonstrated dry weather SSOs due to structural concerns (incorrect pumps, difficult to maintain siphons, etc.).

Combined Sewer Overflow (CSO). Pages:_____

Based on maximum annual volume reported in the last five years, does the project involve the reduction of annual CSO volumes? Check which volume reduction applies.

☐ Greater than 10MG ☐ 5-10MG ☐ Less than 5MG ☐ N/A

Biosolids scoring for PFOS. Pages:_____

☐ Meets 20 ppb PFOS as expressed in interim biosolids strategy. Must meet EPA public risk level if issued before 3 years. Must meet interim biosolids strategy if revised in next 3 years.

3. Water Quality – Wastewater Projects

Pre-project conditions, including wastewater collection/treatment deficiencies and water quality problems occurring. Pages:_____

☐ Project includes centralized treatment to address failing septic systems in unsewered areas.

Pages:_____

If you selected this option, please identify the following documentation included below.

☐ Documentation of fecal coliform in surface water resulting from failing septic tanks.

☐ Documented illicit discharges of sanitary sewage to surface water resulting from failing septic tanks.

☐ Documentation of impact to surface water resulting from failing septic tanks (visual indicators or other metrics).

☐ No documentation of impacts to surface water is included.

Post-project conditions, including proposed facilities and water quality improvements.

Pages:_____

A. Information on Existing Discharge Pages: _____

i. Discharge Method:
☐Surface Water ☐Groundwater ☐No existing discharge

ii. Discharge Type:
☐Continuous ☐Seasonal ☐Intermittent ☐ No existing discharge

iii. Flow (identify MGD or MGY):_____
For facilities that discharge to regional treatment plants and do not file surface water discharge monitoring reports, provide the average daily metered flow.

iv. Receiving Water and Type:_____

v. Location (township, range, and section): _____

vi. Existing Treatment:
☐Untreated ☐Secondary ☐Tertiary ☐Combined Sewer Overflow
☐Primary (includes septic systems with tile fields or direct surface water discharge)

vii. Existing Disinfection Process:
☐None ☐Chlorination ☐Alternative, other: _____

viii. Nitrate contamination of public or private wells caused by the discharge of effluent/waste from the treatment system or systems. Pages: _____

☐ Public well(s) in vicinity contains nitrates > 10 mg/L
☐ Private well(s) in vicinity contains nitrates > 10 mg/L
☐ Monitoring well(s) in vicinity contains nitrates > 10 mg/L
☐ No evidence of nitrate contamination in local wells

Note: If only the total inorganic nitrogen ("TIN" ammonia + nitrite + nitrate) concentration is available, a separate sampling and nitrate analysis should be performed to document the nitrate concentration.

B. Information on Proposed Discharge Pages: _____

i. Discharge Type:
☐Continuous ☐Seasonal ☐Intermittent

ii. Discharge Points and Receiving Waters:

_____

_____

_____

iii. Average Design Flow (identify MGD or MGY):_____

iv. Identify Receiving Water:_____

v. Location (township, range, and section): _____

vi. Effluent Limits:

Minimum Dissolved Oxygen:_____ $CBOD_5$:_____

Ammonia:_____ Phosphorus:_____

Total Inorganic Nitrogen (TIN) from groundwater permit:_____

vii. Will the proposed facility address documented total residual chlorine (TRC) violations?
☐Yes, proceed to question viii. ☐No

viii. Will the proposed improvements involve either dechlorination or an alternative disinfection technology (e.g., ultraviolet disinfection, ozonation) that eliminates the use of chlorine? ☐Yes ☐No

C. Existing Pre-Project CSO and SSO Discharges

Information must be provided for each outfall directly associated with the proposed project. Note that both tables must be completed for each discharge.

Outfall Number	Receiving Stream	Location (township, range, section)	Estimated Overflow Volume (MG) for 1-year, 1-hour storm event
001			
002			
003			
004			
005			

Outfall Number	Estimated Overflow Duration, in hours	Estimated Annual Overflow Volume (MG)	Tributary Residential Population
001			
002			
003			
004			
005			

D. Future Post-Project CSO and SSO Discharges

List each outfall from Section C. For outfalls which will cease to function as combined sewer outfalls upon the completion of this project, simply enter “Eliminated” under Receiving Stream. List any new outfalls (e.g., for a retention/treatment basin) created by this project and include its associated discharge data. Note that both tables must be completed for each discharge.

Outfall Number	Receiving Stream	Location (township, range, section)	Estimated Overflow Volume (MG) for 1-year, 1-hour storm event
001			
002			
003			
004			
005			

Outfall Number	Estimated Overflow Duration, in hours	Estimated Annual Overflow Volume (MG)	Detention Time Before Discharge for 1-year, 1-hour storm event
001			
002			
003			
004			
005			

4. Improving Infrastructure – Wastewater Projects

Check the following which apply to the proposed project. Pages:_____

☐ Proposed project is part of an approved Asset Management Program.

☐ The purpose of the proposed project is for regionalization of systems.

☐ The proposed project involves resiliency components (e.g., pumping or type of pumps, electrical systems, basement backup protection, etc.)

The following items only apply to storm water projects.

5. Compliance – Storm Water Projects

Is the applicant a Municipal Separate Storm Sewer System (MS4) permittee?

☐ Yes, permit number:_____ ☐ No

Has the applicant received a violation notice identifying violations related to at least one of the following MS4 permit requirements? ☐ Yes, select all that apply below ☐ No

☐ Illicit Discharge Elimination Program

☐ Post-Construction Stormwater Runoff Program

☐ Pollution Prevention and Good Housekeeping Program

☐ Total Maximum Daily Load (TMDL) Implementation Plan

Copy of violation notice. Page:_____

6. Public Health – Storm Water Projects

Does the project result in **all** the following? Pages:_____

☐ Reduced storm water runoff volume for small and large events.

☐ Treatment of the water quality volume.

☐ At least one of the following

- Addresses known flooding issue causing water quality problems or basement backups.
- The design considers projected precipitation for the service life of the project or an increase in precipitation above the current National Oceanic Atmospheric Administration (NOAA) Atlas 14 estimates.

7. Water Quality – Storm Water Projects

Is the project located in an applicable TMDL watershed (i.e., E. coli, biota/sediment, phosphorus, dissolved oxygen, or chloride)?

☐ Yes, TMDL(s) title:_____ ☐ No

Does the project result in a direct reduction of the pollutant(s) causing the TMDL impairment?

☐ Yes ☐ No Pages:_____

Does the project result in reduced storm water runoff volume as a primary focus of the project?

☐ Yes ☐ No Pages:_____

Identify all best management practices (BMPs) and estimate size/quantity of each in the project. Definitions of the BMPs below are included at the end of this document.

Bioretention Basins Pages:_____

Enter the quantity for each size bioretention basin included in the project.

Less than 0.5 acre:_____ 0.5-1.5 acres:_____ Greater than 1.5 acres:_____

Rain Gardens Pages:_____

Enter the quantity for each size rain garden included in the project.

Less than 300ft^2:_____ 300-1000ft^2:_____ Greater than 1000ft^2:_____

Bioswales Pages:_____

Enter the quantity for each size bioswale included in the project.

Less than 1 acre:_____ 1 – 3 acres:_____ Greater than 3 acres:_____

Infiltration Trenches Pages:_____

Enter the quantity for each size infiltration trench included in the project.

Less than 1 acre:_____ 1 – 5 acres:_____ Greater than 5 acres:_____

Pervious Pavement Pages:_____

Select the size of pervious pavement included in the project.

☐ Less than 1 acre ☐ 1 – 5 acres ☐ Greater than 5 acres

Green Roofs Pages:_____

Enter the quantity of green roofs included in the project:_____

Native Revegetation Pages:_____

Select the size area of native revegetation included in the project.

☐ Less than 1 acre ☐ 1 – 5 acres ☐ Greater than 5 acres

Water Storage and Reuse Pages:_____

Select the quantity of water storage and reuse included in the project.

☐ Less than 1,000 gallons ☐ 1,000 – 5,000 gallons ☐ Greater than 5,000 gallons

Tree Cover Pages:_____

Enter the quantity of trees planted as part of the project:_____

Does the project result in increased water quality treatment from an existing discharge?

☐ Yes ☐ No Pages:_____

Does the project result in disconnection of existing impervious surfaces with a quantifiable runoff volume reduction or water quality benefit?

☐ Yes, disconnection area:_____ ☐ No Pages:_____

Does the project result in a new or retrofitted regional BMP(s) to address known local site issues preventing full implementation of the NPDES MS4 post-construction requirements?

☐ Yes ☐ No Pages:_____

Does the regional BMP(s) serve more than one site/parcel?

☐ Yes, number of sites/parcels:_____ ☐ No

8. Improving Infrastructure – Storm Water Projects

Does the project result in implementation of a Stormwater Asset Management Program.

☐ Yes ☐ No Pages:_____

Does the project result in a water quality benefit from the coordination between two or more municipal agencies on stormwater management?

☐ Yes, list municipal entities benefiting from the project ☐ No Pages:_____

_____

_____

_____

BMP Definitions:

Bioretention Basins: Shallow, vegetated basins designed to infiltrate, treat, and temporarily store stormwater. Bioretention basins should be pretreated to optimize water quality performance.

Rain Gardens: Shallow surface depressions planted with native vegetation to capture and treat stormwater runoff. Rain gardens should be pretreated to optimize water quality performance.

Bioswales: Shallow, vegetated stormwater channels designed to slow down runoff and provide infiltration. Check dams may be included to improve performance and maximize infiltration.

Infiltration Trenches: Linear subsurface infiltration structures, typically composed of stone trenches wrapped with geotextile fabric, designed to provide infiltration and conveyance of stormwater.

Green Roof: Rooftops or constructed surfaces that include a thin covering of vegetation or growth media that enables infiltration and evapotranspiration of stormwater.

Native Revegetation: transitioning impervious or previously non-native turfgrass spaces to native plants. Native revegetated spaces may include forest, prairie, meadow, or constructed wetland.

Water Storage and Reuse: structures designed to intercept and store runoff from rooftops and other impervious spaces and allow for its reuse.

Tree Cover: Trees planted specifically for stormwater benefit purposes including stormwater uptake, storage, and evapotranspiration.

Appendix D.4
Qualifications-Based Selections (QBS) Form

QBS Certification Form

Procurement of Architectural and Engineering Services

Project Name: _____

SRF Project Number: _____

Per Section 602(b)(14) of the Federal Water Pollution Control Act (FWPCA), all architectural/ engineering contracts executed after October 1, 2014, must publicly announce all requirements for architectural and engineering services for State Revolving Fund projects and negotiate contracts for those services using the Qualifications-Based Selection process. **Attach the Request for Qualifications advertisement.**

Please list the firms that responded to the Request for Qualifications.

_____

_____

_____

_____

_____

_____

Select one of the following:

☐ I certify to the best of my knowledge that the above referenced project complies with the requirements of Section 602(b)(14) of FWPCA.

If fewer than three firms responded to the Request for Qualifications, describe the efforts taken to publicly advertise and directly solicit participation:

_____

_____

_____

_____

☐ Compliance with Section 602(b)(14) of FWPCA is not required as all architectural and engineering work was performed in-house, or for the reasons listed below:

_____

_____

_____

_____

_____

Name and Title of Authorized Representative *(Please Print or Type)*

_____

Signature of Authorized Representative Date

Appendix E.
Regulatory Compliance Documents

NPDES Discharge Permit

GLWA NPDES Discharge 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 18, 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. This permit was modified (minor) on July 18, 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.

	Maximum Limits for Quantity or Loading				Maximum Limits for Quality or Concentration				Monitoring	Sample
Parameter	Monthly	7-Day	Daily	Units	Monthly	7-Day	Daily	Units	Frequency	Type
Flow	(report)	---	(report)	MGD	---	---	---	---	Daily	Report Total Daily Flow
Fecal Coliform Bacteria	---	---	---	---	200	400	(report)	cts/100 ml	Daily	Grab
Total Residual Chlorine	---	---	---	---	---	---	0.11	mg/l	Daily	Grab
Oil & Grease	---	---	---	---	---	15	(report)	mg/l	Daily	Grab
Polychlorinated Biphenyls (PCBs)										
PCB Aroclor 1016	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1221	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1232	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1242	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1248	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1254	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1260	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
					Maximum PCB Aroclor					
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)	µg/l	Quarterly	Grab
Total Copper	---	---	(report)	lbs/day	---	---	(report)	µg/l	Quarterly	24-Hr Composite
					Minimum Daily		**Maximum Daily**			
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 $2.6x10^{-5}$ µg/l ($2.0x10^{-4}$ 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 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.

Parameter	Maximum Limits for Quantity or Loading Monthly	Daily	Units	Maximum Limits for Quality or Concentration Monthly	Daily	Units	Monitoring Frequency	Sample Type
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	Calculation
– Uncorrected	---	---	---	---	(report)	ng/l	2x Monthly	Grab
– Field Duplicate	---	---	---	---	(report)	ng/l	2x Monthly	Grab
– Field Blank	---	---	---	---	(report)	ng/l	2x Monthly	Preparation
– Laboratory Method Blank	---	---	---	---	(report)	ng/l	2x Monthly	Preparation

	12-Month Rolling Average				12-Month Rolling Average					
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.

	Maximum Limits for Quantity or Loading				Maximum Limits for Quality or Concentration				Monitoring	Sample
Parameter	**Monthly**	**7-Day**	**Daily**	**Units**	**Monthly**	**7-Day**	**Daily**	**Units**	**Frequency**	**Type**
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	(report)	lbs/day	25	40	(report)	mg/l	Daily	24-Hr Composite
Total Suspended Solids	233,000	349,000	(report)	lbs/day	30	45	(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	Quarterly	Calculation
– Uncorrected	---	---	---	---	---	---	(report)	ng/l	Quarterly	Grab
– Field Duplicate	---	---	---	---	---	---	(report)	ng/l	Quarterly	Grab
– Field Blank	---	---	---	---	---	---	(report)	ng/l	Quarterly	Preparation
– Laboratory Method Blank	---	---	---	---	---	---	(report)	ng/l	Quarterly	Preparation
	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	---	(report)	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	---	(report)	%	Monthly	Calculation
Total Suspended Solids Minimum % Removal			---	85	---	(report)	%	Monthly	Calculation

a. Sampling Locations
Samples for $CBOD_5$, 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. 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 permittee 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 permittee shall enter "*G" on the Discharge Monitoring Report (DMR). (For purposes of reporting on the Daily tab of the DMR, the permittee shall enter “*G” on the first day of the month only).

e. 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.

f. 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.

	Maximum Limits for Quantity or Loading				Maximum Limits for Quality or Concentration				Monitoring	Sample
Parameter	**Monthly**	**7-Day**	**Daily**	**Units**	**Monthly**	**7-Day**	**Daily**	**Units**	**Frequency**	**Type**

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)

Parameter	Maximum Limits for Quantity or Loading Monthly	7-Day	Daily	Units	Maximum Limits for Quality or Concentration Monthly	7-Day	Daily	Units	Monitoring Frequency	Sample Type
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:										
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
Polychlorinated Biphenyls (PCBs)										
PCB Aroclor 1016	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1221	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1232	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1242	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1248	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1254	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1260	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
					Maximum PCB Aroclor					
PCB Aroclor (see I.A.4.e.)		---	---	---	(report)	---	---	µg/l	Monthly	See I.A.4.e.
					Minimum Daily		**Maximum Daily**			
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." For the purpose of reporting on the Summary tab of the DMR, the value reported under PCB Aroclor shall be the highest individual 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.

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.

	Maximum Limits for Quantity or Loading				Maximum Limits for Quality or Concentration				Monitoring	Sample
Parameter	Monthly	7-Day	Daily	Units	Monthly	7-Day	Daily	Units	Frequency	Type
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	(report)	cts/100 ml	Daily	Grab
Total Residual Chlorine	---	---	---	---	---	---	38	µg/l	Daily	Grab
Oil & Grease	---	---	---	---	---	15	(report)	mg/l	Daily	Grab
Total Polychlorinated Biphenyls (PCBs)										
PCB Aroclor 1016	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1221	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1232	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1242	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1248	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1254	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
PCB Aroclor 1260	---	---	---	---	---	---	(report)	µg/l	Weekly	24-Hr Composite
					Maximum PCB Aroclor					
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 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:

Influent Characteristics	Maximum Limits for Quantity or Loading Monthly	7-Day	Daily	Units	Maximum Limits for Quality or Concentration Monthly	7-Day	Event	Units	Monitoring Frequency	Sample Type
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
					Event Average		**Event Maximum**			
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 Monthly	7-Day	Daily	Units	Maximum Limits for Quality or Concentration Monthly	7-Day	Event	Units	Monitoring Frequency	Sample Type
Oil & Grease (Monitoring Point 109A only)	---	---	---	---	(report)	---	(report)	mg/l	Daily During Discharge	Grab
					Event Minimum		**Event Maximum**			
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 $CBOD_5$, 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:

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	Daily	Units		
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
							Event Maximum			
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
					Event Average		**Event Maximum**			
Total Residual Chlorine Any Event (see additional controls specified in Part 1.A.8.)	---	---	---	---	(report)	---	(report)	mg/l	See I.A.7.a.	Grab
					Event Minimum		**Event Maximum**			
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.

f. 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 permittee 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 permittee shall enter "*G" on the Discharge Monitoring Report (DMR). (For purposes of reporting on the Daily tab of the DMR, the permittee shall enter "*G" on the first day of the month only).

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	
Benzidine	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 budged/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.

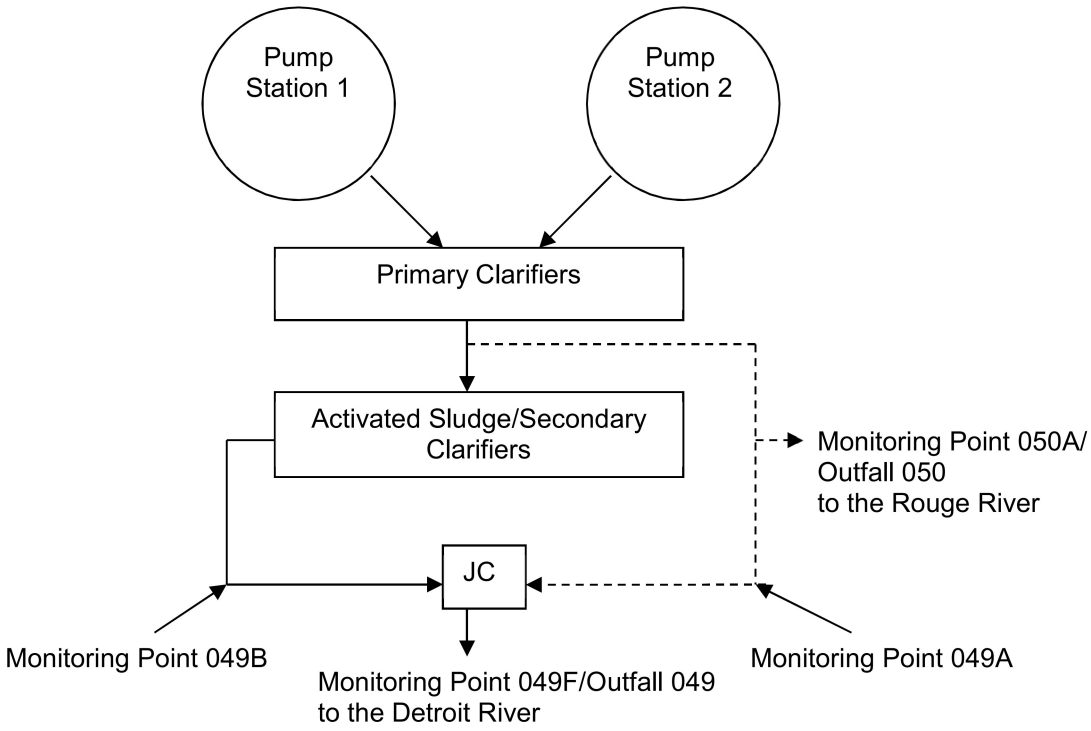
13. Reopener for Primary and Secondary Treatment Capacity

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.

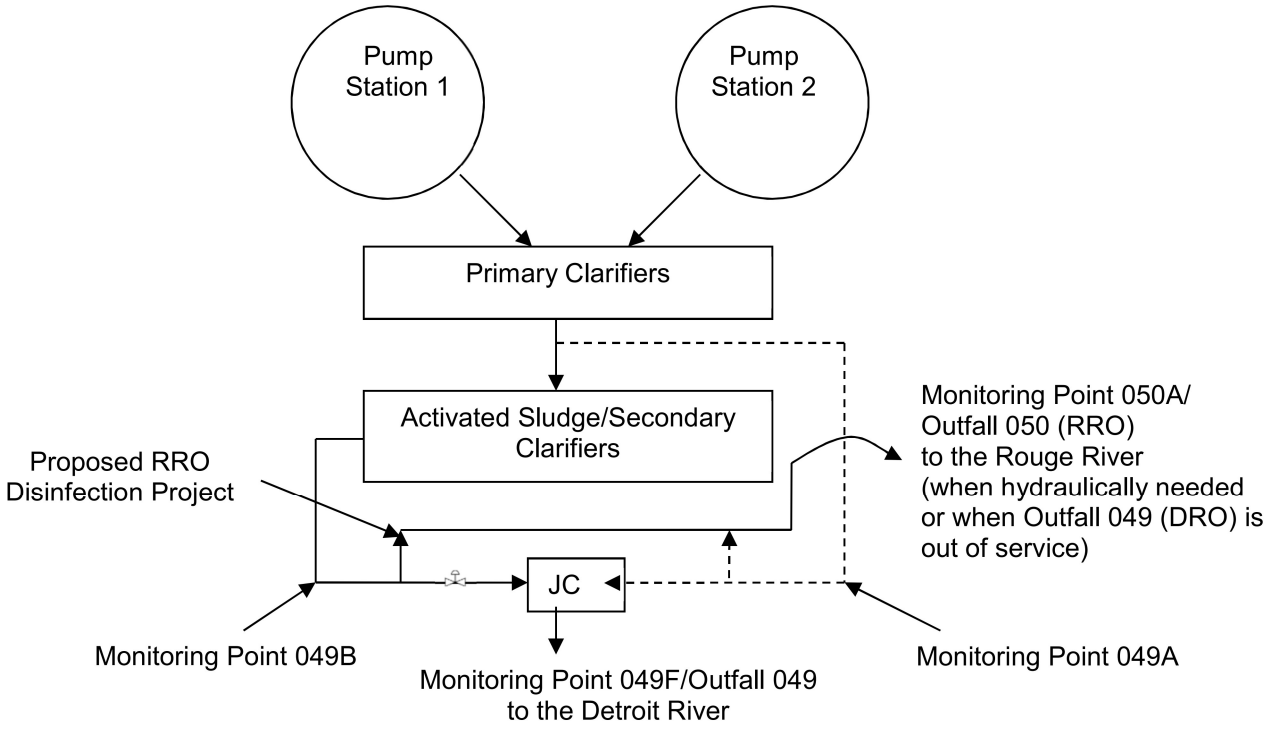
These required wet weather treatment capacities may be revised if new/altered wet weather conditions (such as initiation of operation of upstream CSO facilities, etc.) indicate that either less or more flow can be effectively processed. The criteria used to determine whether the required wet weather 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.:

OUTFALL	LOCATION	LAT/LONG	RECEIVING STREAM
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.

OUTFALL	LOCATION	LAT/LONG	RECEIVING STREAM
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.

OUTFALL	LOCATION	LAT/LONG	RECEIVING STREAM
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.

OUTFALL	LOCATION	LAT/LONG	RECEIVING STREAM
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

OUTFALL	LOCATION	LAT/LONG	RECEIVING STREAM
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

OUTFALL	LOCATION	LAT/LONG	RECEIVING STREAM
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.

EC_{50} 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.

IC_{25} 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.

LC_{50} 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.

Appendix F.
GLWA Schedule of Project Needs 2020 through 2060

Financial Figures are in thousands of dollars ($1,000's)

CIPNumber	Title	Project_ Status	Year_ Added	Lifetime Actual Thru FY 23	FY 25	FY 26	FY 27	FY 28	FY 29	FY 30 & Beyond	FY 25-29 CIP Total	Project Total	Percent of W/S CIP	RC SCORE
273001	Hubbell Southfield CSO Facility Improvements	Project Execution- Design	2021	$438	$3,032	$449	$7,915	$9,042	$9,017	$22,605	$29,455	$54,520	1%	75.7
270006	CSO Facilities Improvements II	Project Execution- Design	2021	$737	$1,056	$3,487	$8,908	$4,881	$0	$0	$18,331	$20,572	1%	61
270004	Oakwood and Leib CSO Facilities Improvement Project	Project Execution- Design	2020	$2,071	$1,394	$64	$4,551	$5,236	$5,222	$21,900	$16,468	$42,596	1%	79.4
270007	Disinfection System Improvements at Baby Creek, Belle Isle, Conner Creek, and Puritan Fenkell CSO Facilities	Active - Pre- Procurement - Design	2021	$1	$206	$1,085	$1,085	$1,088	$534	$4,323	$3,998	$8,346	0%	57
260600	CSO Facilities Improvement Program	Project Execution- Construction	2017	$0	$657	$657	$657	$659	$1,265	$1,014,416	$3,897	$1,018,750	26%	N/A
270003	Long Term CSO Control Plan	Project Execution- Design	2019	$6,590	$1,587	$0	$0	$0	$0	$0	$1,587	$9,576	0%	88
270010	HVAC Improvements at Puritan Fenkell and Seven Mile CSO Facilities	Active - Pre- Procurement - Design	2021	$9	$88	$34	$325	$518	$517	$24	$1,482	$1,583	0%	57.8
260623*	CSO Baby Creek Screen Rehabilitation	Project Execution- Construction	2021	$1,448	$31	$0	$0	$0	$0	$0	$31	$2,389	0%	N/A
260622*	CSO Emergency Generator Improvements	Project Execution- Construction	2021	$1,084	$0	$0	$0	$0	$0	$0	$0	$1,370	0%	N/A
270001	Pilot CSO Netting Facility	Active - Pre- Procurement - Design	2019	$2	$0	$0	$0	$0	$0	$37,874	$0	$37,884	1%	89.6
276002	Replacement of Make-up Air Unit No. 2 at Conner Creek CSO Facility	Project Execution- Construction	2022	$349	$0	$0	$0	$0	$0	$0	$0	$357	0%	92.5

Appendix G.
Correspondences

Appendix G.1
Michigan Natural Features Inventory (MNFI) Correspondences

Szyperski, Matt

From: Szyperski, Matt
Sent: Friday, February 14, 2025 1:45 PM
To: Szyperski, Matt
Subject: RE: GLWA HSCSO Rare Species Review Request

From: Sanders, Michael <sander75@msu.edu>
Sent: Thursday, February 13, 2025 11:38 AM
To: Szyperski, Matt <mszyperski@wadetrim.com>
Cc: Delia, David <ddelia@wadetrim.com>; Sexton, Nicolette <sextonn4@msu.edu>
Subject: RE: GLWA HSCSO Rare

Hello Matt:

NOTE: We have added additional staff members to our RSR team so please send all RSR and IR email requests to mnfi@msu.edu or send a letter to our mailing address with the following information. Do not send to individual staff emails.

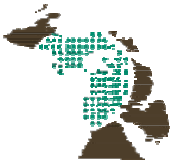
Thank you for the opportunity to review and comment on this activity for possible impacts to Michigan's rare natural features. We have received your request and have placed it in our work que. Please note that due to **a continued high volume of Reviews** we are no longer offering rush orders and the optional project map, and it may be **Several WEEKS** before this request is responded to, and our invoice/info agreement is sent out. Also note that projects with **multiple locations** may require extra time and resources to complete.

See https://mnfi.anr.msu.edu/services/rare-species-reviews for more details on some of the changes and the steps for submitting a rare species review.

We will begin processing the review as soon as possible.

Thank you,

Mike Sanders



Michael A. Sanders, M.S., M.A.
Environmental Review Specialist/Zoologist
Michigan Natural Features Inventory
Michigan State University Extension
Office 517-284-6215
mnfi.anr.msu.edu
Report Rare Species Observations

MSU Extension programs and material are open to all without regard to race, color, national origin, gender, gender identity, religion, age, height, weight, disability, political beliefs, sexual orientation, marital status, family status, or veteran status.

Michigan State University occupies the ancestral, traditional and contemporary lands of the Anishianaabeg – Three Fires Confederacy of Ojibwe, Odawa and Potawatomi peoples. The university resides on land ceded in the 1819 Treaty of Saginaw.

Have you found a rare species? Follow the link below!
Learn How to Report Rare Species Observations

From: Szyperski, Matt <mszyperski@wadetrim.com>
Sent: Tuesday, February 11, 2025 5:39 PM
To: Sanders, Michael <sander75@msu.edu>
Cc: Delia, David <ddelia@wadetrim.com>
Subject: GLWA HSCSO Rare

Good Afternoon,

My name is Matt Szyperski with Wade Trim. We are currently working with Great Lakes Water Authority (GLWA) to attain CWSRF funding for the Hubbell-Southfield CSO facility project they have planned. As part of the Project Planning Document we are putting together, we need a Rare Species Review completed by the MNFI for this site location. The attached PDF shows the project boundaries for The Hubbell-Southfield CSO Facility site.

The project work consists of:

- Improvements to the Basin Flushing system include the replacement of a flushing pump; the replacement of flushing piping; a new flushing valve; a new magnetic flow meter; and structural modifications to the basin floor that include the installation of flushing lane curbs and fillets.
- The dewatering system improvements include four new dewatering pumps; two new ball valves; and select improvements to the dewatering dry well piping.
- Chemical storage is being expanded with a new 20,000 gallon tank enclosed in a new chemical storage building. The chemical feed and transfer system is being upgraded with new transfer pumps new TRC analyzers (with associated piping, strainers, and instrumentation and control systems).
- The electrical system upgrades include new MCCs, a new standby generator, and some new electrical appurtenances. A new Emerson Ovation control system with two new remote level sensors are also included.
- Site improvements include fencing, road, stormwater culvert, and access upgrades. Ponding/Puddling on the roof deck is also being addressed.
- Architectural improvements include upgrades in the existing Headworks and Process Buildings, improvements to the screen walkway in the Headworks Building, and new access hatches int the Basins.

The current conditions of each of the site included in this request is as follows:

- The Hubbell-Southfield CSO Facility is along the Rouge River just West of TPC Michigan Golf Course. The project work will mainly be contained within the facility/basin with a boundary fence replacement being part of the project scope as well.

Thanks, and let me know if there is anything else I can provide.

Best,

Matt

Matthew Szyperski, Engineer
25251 Northline Road, Taylor, MI 48180
734.403.6051 office
616.443.6279 cell

Appendix G.2
Tribal Historic Preservation Office (THPO) Correspondences

Wade Trim Associates, Inc.
500 Griswold Street, Suite 2500 • Detroit, MI 48226
313.961.3650 • www.wadetrim.com

February 28, 2025

«Contact»
«Address»
«City_State_Zip»

Attention: «Contact»
«Affiliation»

Re: Hubbell-Southfield CSO Facility Improvements

Dear «Contact»:

Wade Trim Associates, working on behalf of Great Lakes Water Authority (GLWA), is preparing a Clean Water Revolving Fund (CWRF) Project Plan with the intent to apply for State Revolving Fund (SRF) funding for the Hubbell-Southfield Combined Sewer Overflow (CSO) Facility Improvements (CIP273001).

The project is located at the Hubbell-Southfield CSO basin, 16540 Rotunda Dr, Dearborn, MI 48120. CSO facilities are installed to decrease pollution during wet weather events that exceed the capacity of the sanitary sewer systems. The Hubbell-Southfield CSO is one of nine GLWA CSO treatment facilities. It has a 22-million-gallon (MG) storage capacity and a design flow capacity of 2,200 cfs. The facility began operation in 1999, and various improvements have been completed since then. The tributary area to Hubbell-Southfield CSO comprises approximately 14,400 acres in the City of Dearborn and the west side of the City of Detroit. The facility discharges to the Northwest Interceptor with overflows discharging to the Rouge River. The goals of this project are to bring the facility up to current codes/standards, standardize equipment, improve operations, strengthen operational reliability, improve safety, and ease maintenance.

This application is intended to secure low-interest loan funding through the Michigan Department of Environment, Great Lakes, and Energy (MI-EGLE) CWSRF, with distribution starting in fiscal year 2027.

This notice of opportunity to comment is being sent to you to fulfill the consultation requirement of Section 106 of the National Historic Preservation Act review process. Should you have any comments on potential impacts to known areas of religious, historic, and/or cultural significance in the area of the proposed project, please provide them before April 23rd, 2025. Any comments or concerns received will be included in the Final Project Plan.

The Hubbell-Southfield CSO Facility Improvements Project includes the following:

- Improvements to the facility's flushing system including the replacement of a flushing pump, piping, and a new flushing valve; a new magnetic flow meter; and structural modifications to the basin floor that include the installation of flushing lane curbs.
- The dewatering system improvements include four new dewatering pumps; two new ball valves; and piping upgrades.

- Chemical storage that holds disinfectant is being expanded with a new 20,000-gallon tank enclosed in a new chemical storage building. The chemical feed and transfer system used to treat the water is being upgraded with new transfer pumps and TRC analyzers along with associated piping, strainers, and instrumentation and control systems.
- The electrical system upgrades include new Motor Control Centers and new electrical wiring. A new computer control system with two new remote level sensors is also included.
- Site improvements include fencing replacement, stormwater culvert repair, and driveway paving upgrades.
- Architectural improvements include minor upgrades in the existing Headworks and Process Buildings, improvements to a walkway in the Headworks Building, and new access hatches into the basin.

These improvements will maintain the long-term reliability of this critical CSO facility.

Please see the attached maps for the location of the project.

The complete draft project plan will be available to the public on April 8th, 2025, on the **GLWA Website:** https://www.glwater.org/. If you require a bound printed copy, please contact me and we can arrange for a physical copy to be mailed.

If you have any questions on this request or need further information to complete a review of the proposed projects, please contact me at 313.961.3650 or at ddelia@wadetrim.com. Please direct any written communications to my office at 500 Griswold Street, Suite 2500, Detroit, MI 48226, with the subject heading *2026 GLWA Hubbell-Southfield CSO Facility Improvements Project*.

Very truly yours,

Wade Trim, Inc.

David J. Delia

David J. Delia, PE
Senior Project Manager

MS
GLW2033

2026 GLWA Hubbell-Southfield CSO Facility Improvements Clean Water State Revolving Fund (CWSRF)

The State Revolving Fund (SRF) funding application is for the Hubbell-Southfield CSO Facility Improvements (CIP273001) project.

Figures 1 and 2 show the location of the Hubbell-Southfield CSO Facility. Figures 3 through 7 show the locations of the proposed work.

This attachment contains the following figures:

Figure 1 Hubbell-Southfield Aerial View 16540 Rotunda Dr, Dearborn, MI 48120

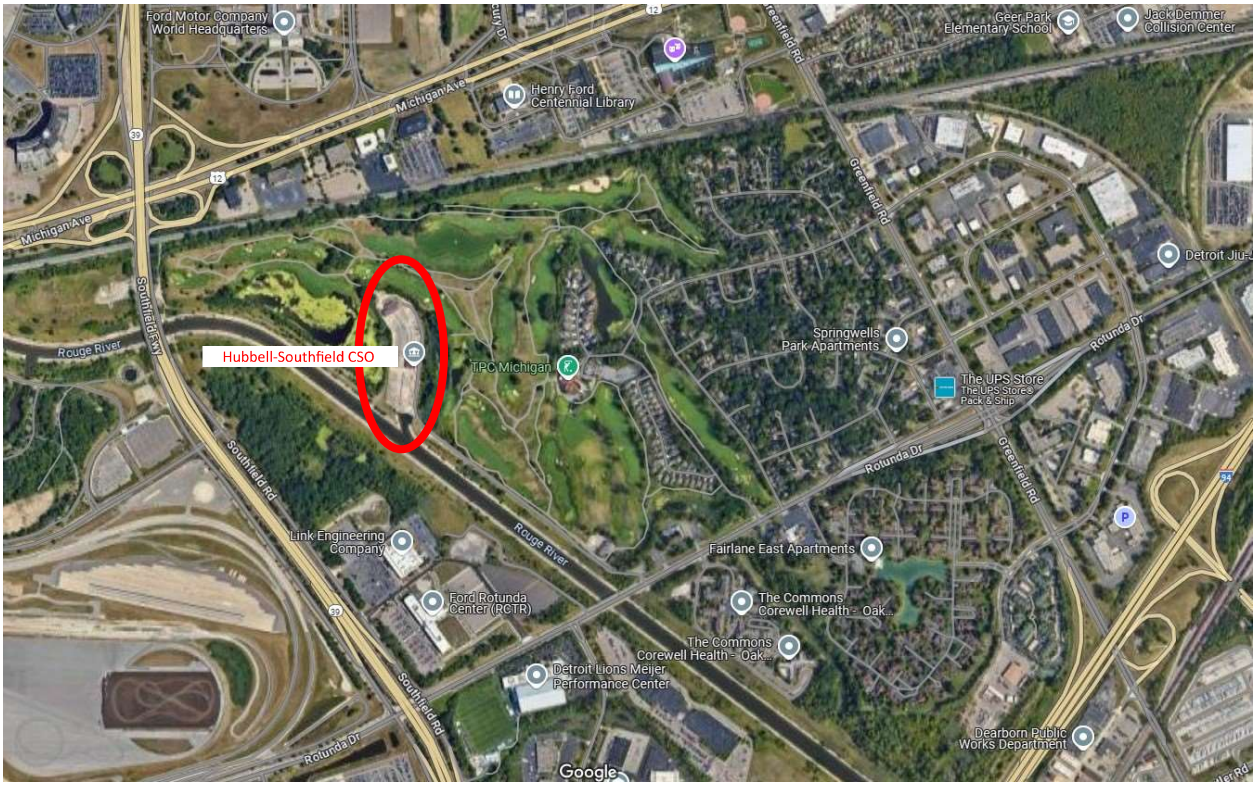


Figure 2 Hubbell-Southfield Site Aerial View

Figure 3 Limits of Site Work

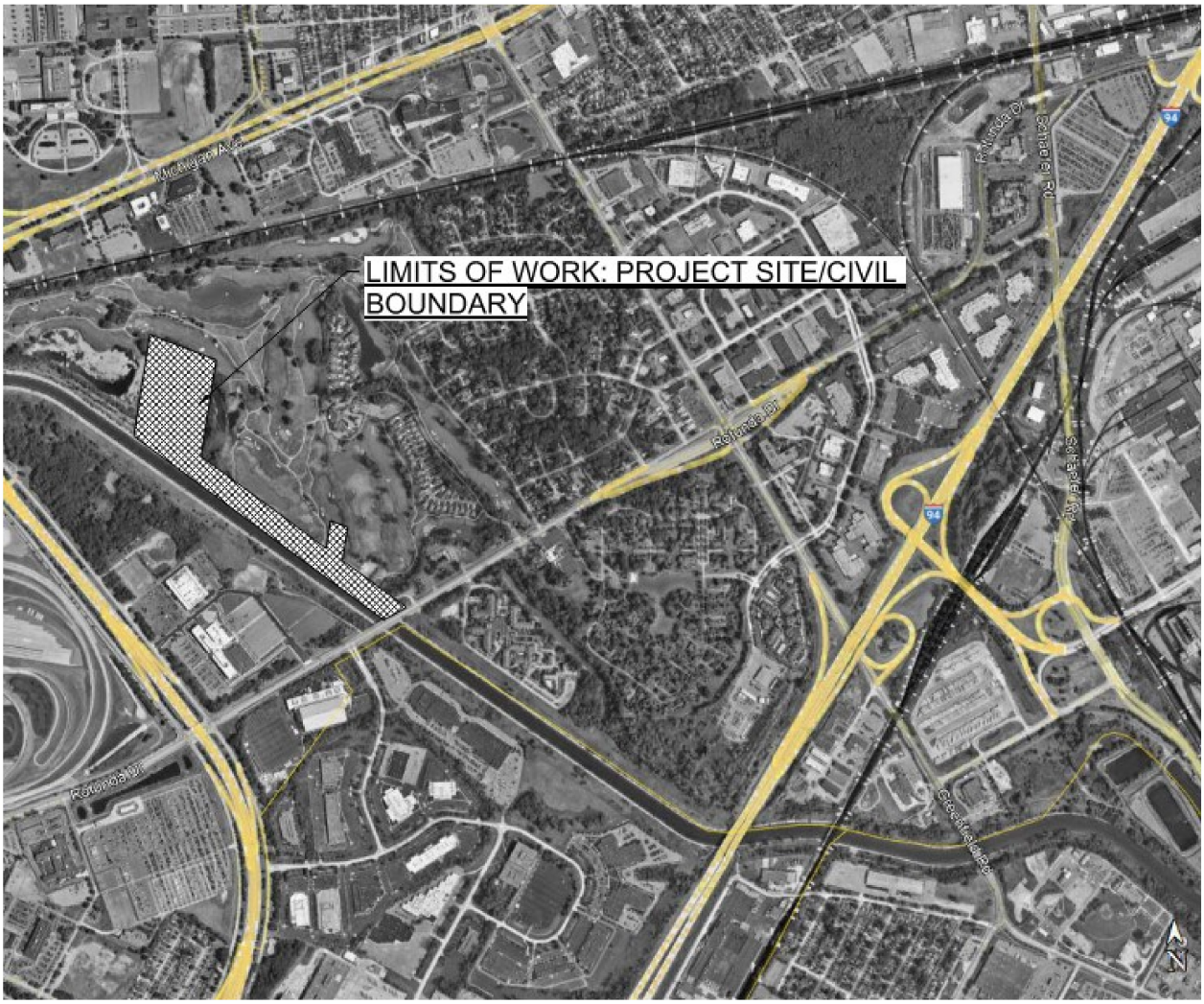


Figure 4 New level Sensor Locations

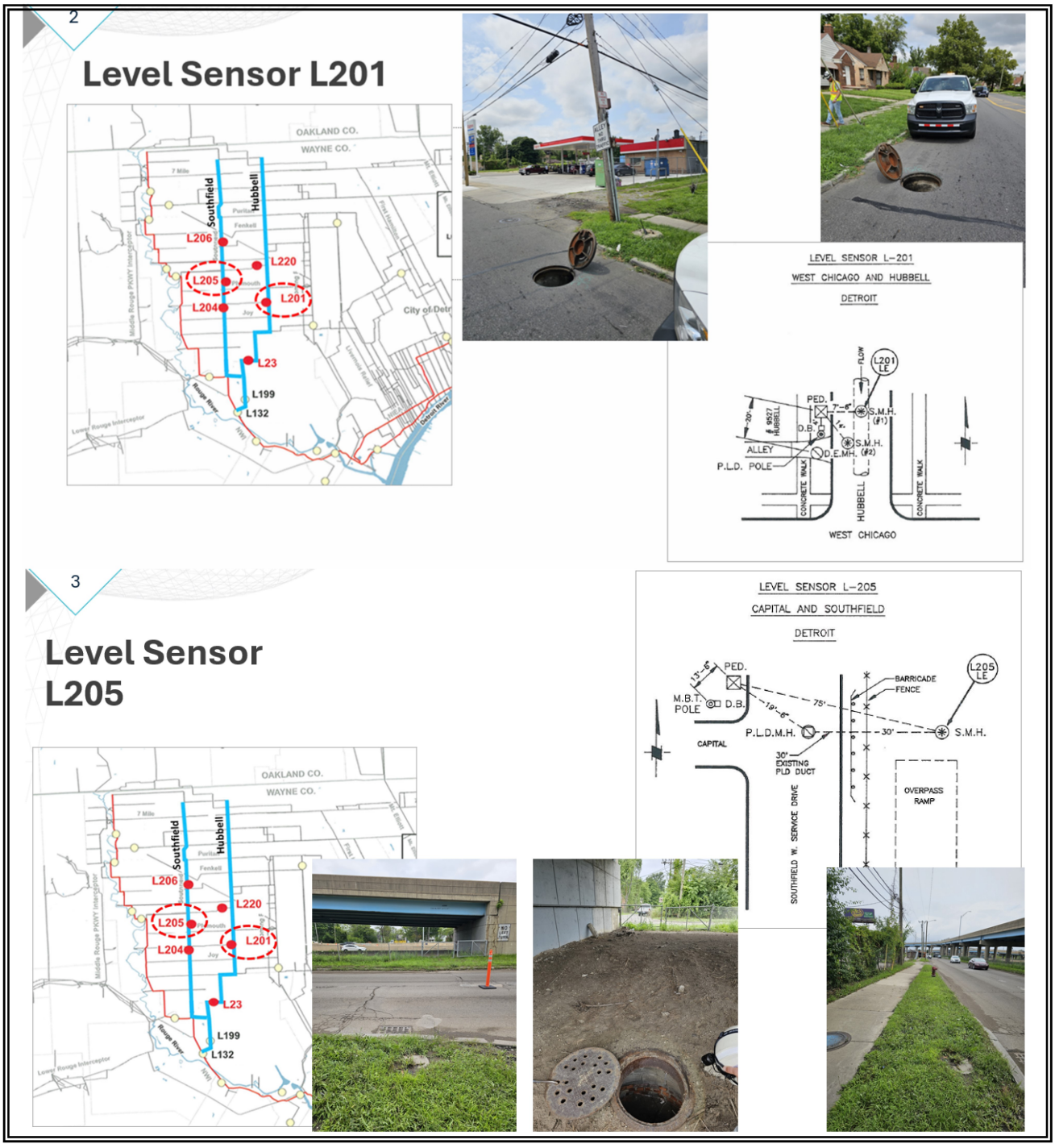


Figure 5 New Chemical Building and Utilities

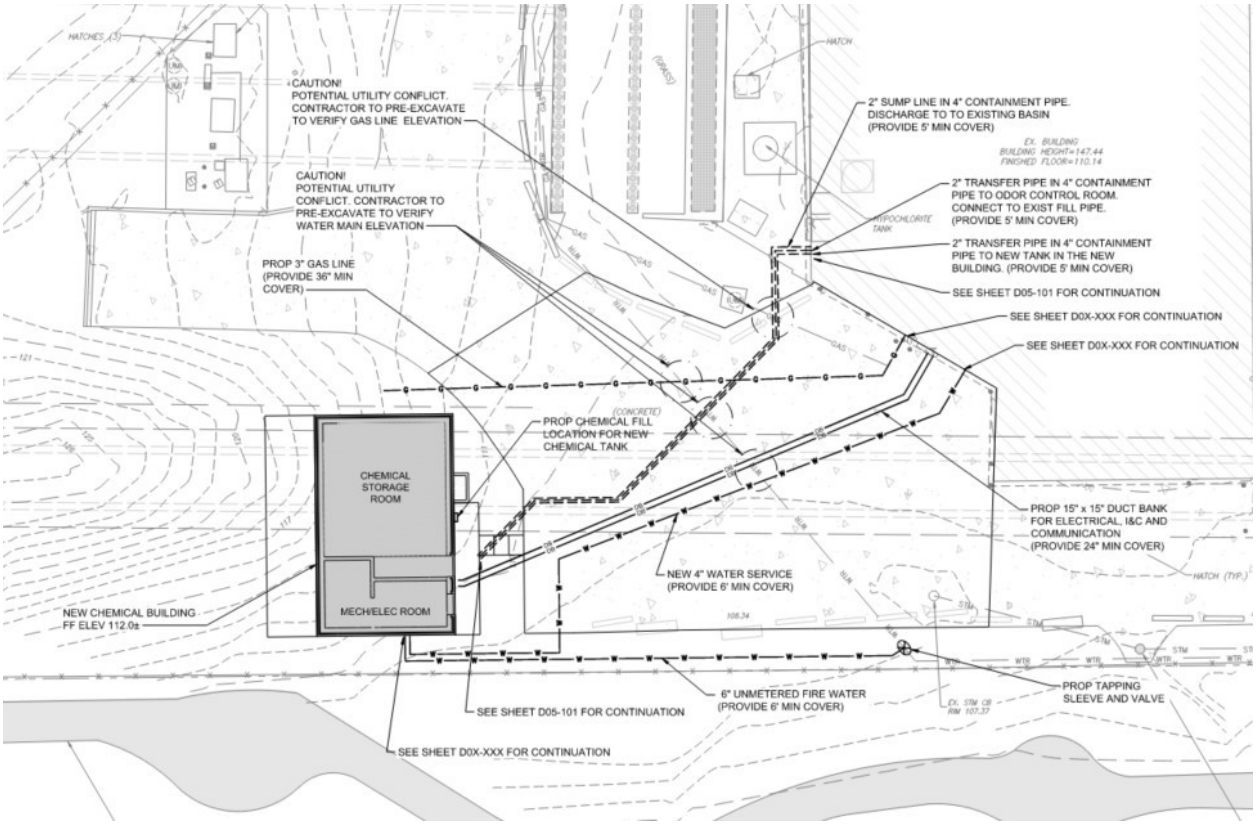


Figure 6 Fence Installation Drawing

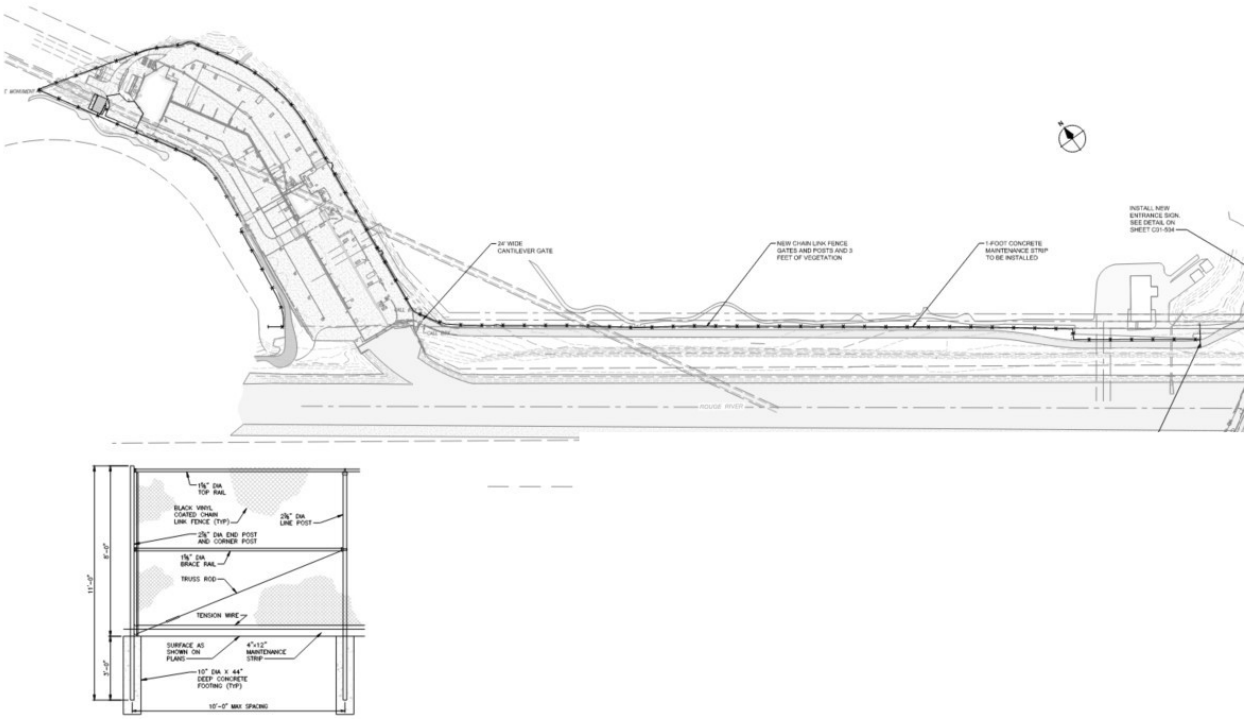
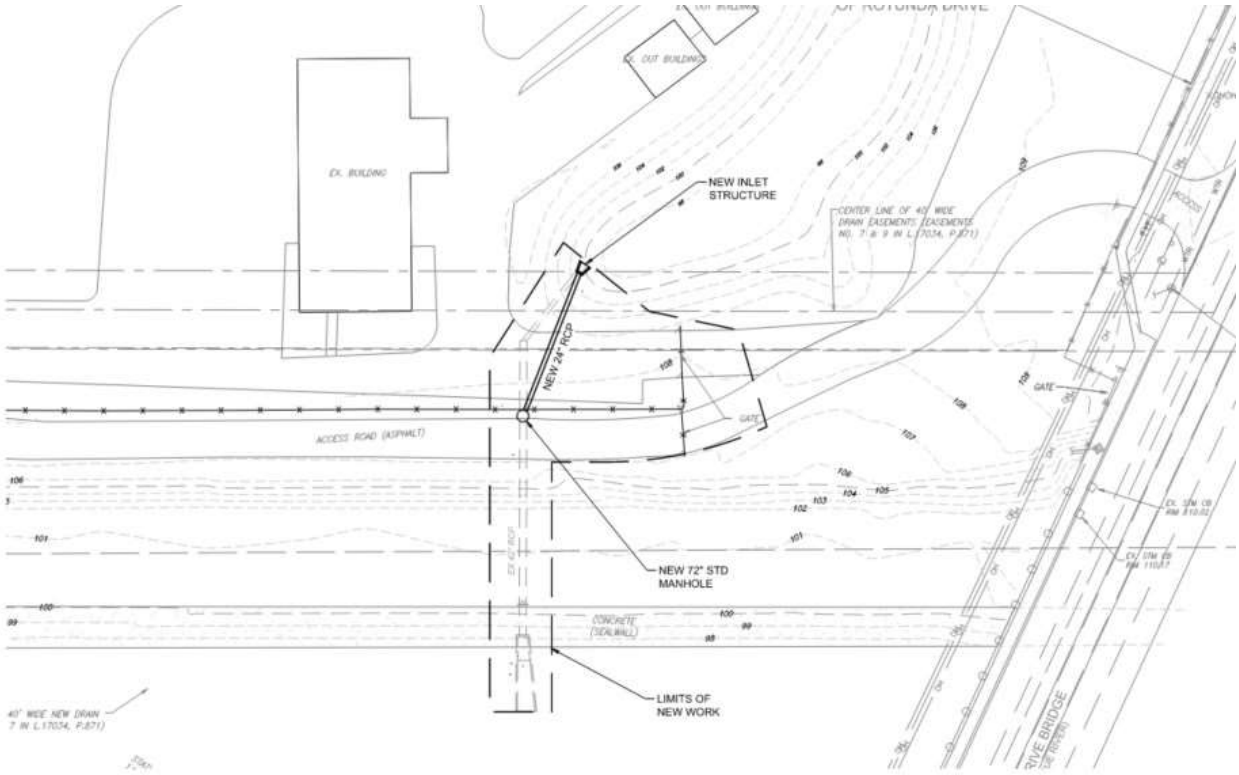


Figure 7 Driveway Replacement Area

Figure 8 Culvert Replacement Location



Appendix G.3
State Historic Preservation Office (SHPO) Correspondence

Appendix H.
Cost Estimates

Appendix H.1
Cost Estimates and Present Worth (Lifecycle Cost) Calculations

WADE TRIM

Present Worth (Lifecycle Cost) Calculations
PW Alternatives

Conceptual Cost Estimate:

Planning Period (n): 20 years
Number of households: 1,275,737
Discount Rate (DR): 2.000% from MDEQ Website (https://www.michigan.gov/egle/regulatory-assistance/funding/fd/state-revolving-fund)
Inflation Rate (i): 2.9% https://www.usinflationcalculator.com/inflation/current-inflation-rates/

		Do Nothing - NOT EVALUATED		Tipping Buckets Above Basin		Selected Alternative (60% OPCC)	
Description		Replace flushing system in-kind; This alternative was implemented and was not successful		60 Stainless Steel Tipping buckets located on top of the basin for easy maintenance		Selected disinfection, walkway, flushing, HVAC, I&C, Architectural, electrical, and site improvements	
Construction Duration		2.5 years		2.5 years		2.5 years	
Capital Costs Expected Useful Life (years)		**Capital Costs**	**Escalated**	**Capital Costs**	**Escalated**	**Capital Costs**	**Escalated**
Land (can be escalated at 3%)		$ -	$ -	$ -	$ -	$ -	$ -
	Years		**Salvage Value**		**Salvage Value**		**Salvage Value**
Desktop and Laptop Computers	5	$ -	$ -	$ -	$ -	$ -	$ -
Structures	50	$ -	$ -	$ 45,154,902	$ 27,092,941.18	$ 6,492,453	$ 3,895,471.97
Architectural	20	$ -	$ -	$ 1,225,027	$ -	$ 1,924,673	$ -
Process Equipment and Site Civil	20	$ -	$ -	$ 21,962,826	$ -	$ 20,907,591	$ -
Electrical and Mechanical Equipment	15	$ -	$ -	$ 9,908,987	$ -	$ 8,797,083	$ -
I & C Equipment	10	$ -	$ -	$ 5,287,679	$ -	$ 8,307,619	$ -
	Subtotal	**$ -**	**$ -**	**$ 83,539,420**	**$ 27,092,941**	**$ 46,429,420**	**$ 3,895,472**
Contingency	21%	$ -		$ 17,336,041		$ 9,635,000	
Total Probable Construction Cost	**Subtotal**	$ -		$ 100,875,461		$ 56,064,420	
Engineering	20%	$ -		$ 20,544,622		$ 11,418,261	
Legal, and Admin	0%	$ -		$ -		$ -	
SRF Loan Request	**Total**	$ -		**$ 121,420,083**		**$ 67,482,681**	
Annual OM&R Costs	**Year:**	**2025**	**Annual Change**	**2022**	**Annual Change**	**2022**	**Annual Change**
Salaries and Administrative		$ -		$ -		$ -	
Energy (can be escalated)		$ -	$ -	$ -	$ -	$ -	$ -
Chemicals		$ -		$ -		$ -	
Repair and Maintenance		$ -		$ -		$ -	
	Total O&M	$ -		$ -		$ -	
	Years		**Escalated**		**Escalated**		**Escalated**
Replacement	5	$ -	$ -	$ -	$ -	$ -	$ -
Replacement	10	$ -	$ -	$ 5,287,679	$ 7,037,507	$ 8,307,619	$ 11,056,822
Replacement	15	$ -	$ -	$ 9,908,987	$ 15,214,576	$ 8,797,083	$ 13,507,324
PRESENT WORTH CALCULATIONS							
Initial Cost		$ -		$ 121,420,083		$ 67,482,681	
OM&R		$ -		$ 17,077,861		$ 19,106,586	
Salvage Value (minus)		$ -		$ (18,232,773)		$ (2,621,541)	
Interest During Construction		$ -		$ 3,035,502		$ 1,687,067	
Total Present Worth		$ -		$ 123,300,673		$ 85,654,793	
Equivalent Annual Cost		**$ -**		**$ 7,540,665**		**$ 5,238,366**	
User Impact Cost		**$ -**		**$ 5.91**		**$ 4.11**	

Present Worth Factors

Case	*Years*	*Factor*
Single Payment	*5*	*0.9057*
Single Payment	*10*	*0.8203*
Single Payment	*15*	*0.7430*
Salvage Value	*20*	*0.6730*
OM&R	*20*	*16.3514*
Energy	*20*	*144.6003*
Capital Recovery Factor	*20*	*0.0612*

Assumptions:

The project is anticipated to reduce annual operations, maintenance and repair (OM&R) costs; $0 is assumed for Salaries and Administrative, Energy, and Repair and Maintenance because the project is anticipated to reduce costs from current expenditures; $0 is conservatively assumed for Chemicals because reduced chemical usage should result from this project; this project's OM&R costs should not negatively affect User Impact Cost.

Appendix H.2
Opinion of Probable Construction Costs (OPCC)

Appendix A - ENGINEER'S OPINION OF CONSTRUCTION COST

PROJECT 2103225 Hubbell Southfield CSO Facility Improvements **DATE:** 11/4/2024

LOCATIO Dearborn, MI **PROJECT NO.:** GLW203301D

BASIS FOR ESTIMATE: [ ] CONCEPTUAL [X] PRELIMINARY [ ] FINAL

WORK: CSO Basin improvements including flushing, I&C, Electrical, dewatering/sump pumps, effluent channel access, screening improvements, chemical feed and disinfection improvements, chemical storage, HVAC, flushing water, architectural and site improvements

ITEM NO.	DESCRIPTION	AMOUNT TOTAL
	Division 01 - General Requirements	**$4,437,000**
	Division 02 - Existing Conditions	**$1,897,000**
	Division 03 - Concrete	**$3,426,000**
	Division 04 - Masonry	**$188,000**
	Division 05 - Metals	**$89,000**
	Division 06 - Wood, Plastics, & Composites	**$302,000**
	Division 07 - Thermal & Moisture Protection	**$83,000**
	Division 08 - Openings	**$239,000**
	Division 09 - Finishes	**$162,000**
	Division 10 - Specialties	**$10,000**
	Division 12 - Furnishings	**$20,000**
	Division 21 - Fire Suppression	**$20,000**
	Division 22 - Plumbing	**$1,033,000**
	Division 23 - HVAC	**$433,000**
	Division 26 - Electrical	**$4,964,000**
	Division 27 - Communications	**$20,000**
	Division 28 - Electrical Safety and Security	**$20,000**
	Division 31 - Earthwork	**$267,000**
	Division 32 - Exterior Improvements	**$934,000**
	Division 33 - Utilities	**$341,000**
	Division 40 - Process Interconnections	**$11,940,000**
	Division 41 - Material Processing and Handling Equipment	**$35,000**
	Division 43 - Process Gas and Liquid Handling, Purification and Storage	**$1,538,000**
	Division 46 - Water and Wastewater Equipment	**$20,000**
	Subtotal	**$32,418,000**
	Escalation to Midpoint of Construction (4.5 years @ 3% per year)	**$4,539,000**
	Subtotal	$36,957,000
	Overhead (10%)	**$3,242,000**
	Subtotal	$40,199,000
	Profit (10%)	**$4,020,000**
	Subtotal	$44,219,000
	Mob/Bonds/Insurance (5%)	**$2,211,000**
	Subtotal	$46,430,000
	Design Estimating Contingency (15%)	**$6,965,000**
	Subtotal	**$53,395,000**
	GLWA Unforeseen Conditions Allowance (5%)	**$2,670,000**
	Total Construction	**$56,065,000**

This Engineer's Opinion of Construction Costs is provided based on available information and the engineer's experience and qualifications and represents their best judgment as a design professional familiar with the construction industry. The engineer has no control over the costs of labor, materials, equipment, or over the contractor's methods of determining prices or over competitive bidding or market conditions. The engineer cannot and does not guarantee that proposals, bids or construction cost will not vary from this estimate.

Appendix I.
Public Participation

Appendix I.1
Public Hearing Notice

Appendix I.2
Project Plan Direct Mailing List

City of Eastpointe, City Clerk
23200 Gratiot Ave.
Eastpointe, MI 48021-1683

Ray Township, City Clerk
64255 Wolcott Rd.
Ray, MI 48096-2433

Charter Twp. of Chesterfield
City Clerk
47275 Sugarbush Rd.
Chesterfield, MI 48047-5136

City of Sterling Heights, City Clerk
40555 Utica Rd.
Sterling Heights, MI 48311-8009

City of Mt. Clemens, City Clerk
1 Crocker Blvd.
Mt. Clemens, MI 48043-2525

Charter Twp. of Washington
City Clerk
57900 Van Dyke Rd
Washington, MI 48094-2883

Bruce Township, City Clerk
223 E. Gates St.
Romeo, MI 48065-4405

Shelby Charter Township, City Clerk
52700 Van Dyke Ave.
Shelby Township, MI 48316-3556

Charter Township of Clinton
City Clerk
40700 Romeo Plank Rd.
Clinton Township, MI 48038-2900

City of Memphis, City Clerk
35095 Potter St.
Memphis, MI 48041-4654

City of Fraser, City Clerk
34935 Hidden Pine Dr.
Fraser, MI 48026-2091

Lenox Township, City Clerk
63775 Gratiot Ave.
Lenox, MI 48050-2517

Macomb Township, City Clerk
54111 Broughton Rd.
Macomb, MI 48042-1831

City of St. Clair Shores, City Clerk
27600 Jefferson Circle Dr.
Saint Clair Shores, MI 48094-2883

Richmond Township, City Clerk
34900 School Section Rd.
Richmond, MI 48062-3624

Village of Romeo, City Clerk
121 W. Saint Clair St.
Romeo, MI 48065-4691

Village of New Haven, City Clerk
57775 Main St.
New Haven, MI 48048-2627

SEMCOG
1001 Woodward, Ste. 1400
Detroit, MI 48226

Village of Armada, City Clerk
74274 Burk St.
Armada, MI 48005-7704

City of Utica, City Clerk
7550 Auburn Rd. Ste. 1
Utica, MI 48317-5279

City of New Baltimore, City Clerk
36535 Green St.
New Baltimore, MI 48047-2598

City of Richmond, City Clerk
68225 S. Main St.
Richmond, MI 48062-1383

City of Roseville, City Clerk
29777 Civic Center Blvd.
Roseville, MI 48066-2179

Armada Township, City Clerk
23121 E. Main St.
Armada, MI 48005-4706

Charter Township of Harrison
City Clerk
38151 Lanse Creuse St.
Harrison, Township, MI 48045-3479

City of Warren, City Clerk
1 City Sq., Ste. 205
Warren, MI 48093-5290

Charter Township of Brandon
City Clerk
P.O. Box 929
Ortonville, MI 48462-0929

City of Southfield, City Clerk
26000 Evergreen Rd.
Southfield, MI 48076-4453

Village of Holly, City Clerk
Karl Richter Center
Holly, MI 48442-1694

Addison Township, City Clerk
1440 Rochester Rd., Ste. 2
Leonard, MI 48367-3560

City of Troy, City Clerk
500 W. Big Beaver Rd.
Troy, MI 48084-5285

City of Berkley, City Clerk
3338 Coolidge Hwy.
Berkley, MI 48072-1690

Charter Township of Milford
City Clerk
1100 Atlantic St., Ste. 1
Milford, MI 48381-2000

Charter Township of Royal Oak
City Clerk
21131 Garden Ln.
Ferndale, MI 48220-4200

City of Wixom, City Clerk
49045 Pontiac Trail
Wixom, MI 48393-2567

City of Bloomfield Hills
City Clerk
45 E. Long Lake Rd.
Bloomfield Hills, MI 48304-2369

Charter Township of Waterford
City Clerk
5200 Civic Center Dr.
Waterford, MI 48329-3715

Charter Township of Lyon
City Clerk
58000 Grand River Ave.
New Hudson, MI 48165-9816

City of Novi, City Clerk
45175 W. 10 Mile Rd.
Novi, MI 48375-3024

City of South Lyon, City Clerk
335 S. Warren St.
South Lyon, MI 48178-1317

City of Pleasant Ridge City Clerk
23925 Woodward Ave.
Pleasant Ridge, MI 48069-1199

City of Sylvan lake
City Clerk
1820 Inverness St.
Sylvan Lake, MI 48320-1679

City of Huntington Woods
City Clerk
26815 Scotia Rd.
Huntington Woods, MI 48070-1101

Village of Milford, City Clerk
1100 Atlantic St., Ste. 2
Milford, MI 48381-2001

Village of Lake Orion
City Clerk
21 E. Church St.
Lake Orion, MI 48362-3212

City of Hazel Park, City Clerk
111 E. 9 Mile Rd., Fl. 2
Hazel Park, MI 48030-1892

Village of Bingham Farms
City Clerk
24255 W. 13 Mile Rd., Ste. 190
Bingham Farms, MI 48025-4345

Novi Township, City Clerk
44020 Cottisford St.
Northville, MI 48167-8911

City of Royal Oak, City Clerk
211 S. Williams St.
Royal Oak, MI 48067-2634

City of Farmington, City Clerk
23600 Liberty St.
Farmington, MI 48335-3572

City of Pontiac, City Clerk
47450 Woodward Ave.
Pontiac, MI 48342-5021

City of Auburn Hills, City Clerk
1827 N. Squirrel Rd.
Auburn Hills, MI 48326-2753

City of Clawson, City Clerk
425 N. Main St., Ste. 1
Clawson, MI 48017-1596

City of Lake Angelus
City Clerk
45 Gallogly Rd.
Lake Angelus, MI 48326-1262

City of Rochester Hills, City Clerk
1000 Rochester Hills Dr.
Rochester Hills, MI 48309-3033

Charter Township of White Lake
City Clerk
7525 Highland Rd.
White Lake, MI 48383-2938

Groveland Township
City Clerk
4695 Grange Hall Rd.
Holly, MI 48442-8707

City of Orchard Lake Village
City Clerk
3955 Orchard Lake Rd.
Orchard Lake, MI 48323-1605

Charter Township of Highland
City Clerk
205 N. John St.
Highland, MI 48357-4531

City of Ferndale, City Clerk
300 E. 9 Mile Rd.
Ferndale, MI 48220-1731

Rose Township, City Clerk
9080 Mason St.
Holly, MI 48442-8650

City of the Village of Clarkston
375 Depot Rd.
Clarkston, MI 48346-1418

Village of Wolverine Lake
City Clerk
425 Glengary Rd.
Wolverine Lake, MI 48390-1404

Springfield Charter Township
City Clerk
12000 Davisburg Rd.
Davisburg, MI 48350-2643

Village of Oxford, City Clerk
22 W. Burdick St.
Oxford, MI 48371-4683

City of Oak Park, City Clerk
14000 Oak Park Blvd.
Oak Park, MI 48237-2090

City of Rochester, City Clerk
400 6th St.
Rochester, MI 48307-1483

Village of Leonard, City Clerk
23 E. Elmwood
Leonard, MI 48367-1803

Charter Township of Independence
City Clerk
6483 Waldon Center Dr.
Clarkston, MI 48347-0069

City of Birmingham, City Clerk
151 Martin St.
Birmingham, MI 48009-3368

City of Madison Heights, City Clerk
300 W. 13 Mile Rd.
Madison Heights, MI 48071-1899

Village of Franklin, City Clerk
32325 Franklin Rd.
Franklin, MI 48025-1199

Charter Township of Oakland
City Clerk
4393 Collins Rd.
Rochester, MI 48306-1619

Charter Township of Bloomfield
City Clerk
4200 Telegraph Rd.
Bloomfield, MI 48302-2038

Charter Twp. of W. Bloomfield
City Clerk
4550 Walnut Lake Rd.
West Bloomfield, MI 48323-2556

Charter Township of Orion
City Clerk
2525 Joslyn Rd.
Lake Orion, MI 48360-1951

City of Farmington Hills, City Clerk
31555 W. 11 Mile Rd.
Farmington Hills, MI 48336-1165

City of Lathrup Village, City Clerk
27400 Southfield Rd.
Lathrup Village, MI 48076-3489

Charter Township of Royal Oak
City Clerk
21131 Garden Ln.
Ferndale, MI 48220-4200

Southfield Township, City Clerk
18550 W. 13 Mile Rd.
Southfield Township, MI 48025

City of Keego Harbor, City Clerk
2025 Beechmont St.
Keego Harbor, MI 48320-1168

Holly Township, City Clerk
102 Civic Dr.
Holly, MI 48442-1500

Charter Township of Oxford
City Clerk
300 Dunlap Rd.
Oxford, MI 48371-6900

City of Grosse Pointe, City Clerk
17147 Maumee Ave.
Grosse Pointe, MI 48230-1589

City of Flat Rock, City Clerk
25500 Gibraltar Rd.
Flat Rock, MI 48134-1335

Charter Township of Canton
City Clerk
1150 S. Canton Center Rd.
Canton, MI 48188-1608

Brownstown Charter Township
City Clerk
21313 Telegraph Rd.
Brownstown, MI 48183-1314

City of Garden City, City Clerk
6000 Middlebelt Rd.
Garden City, MI 48135-2480

City of Grosse Pointe Park
City Clerk
15115 E. Jefferson Ave., Ste.1
Grosse Pointe Park, MI 48230-1312

City of Taylor, City Clerk
23555 Goddard Rd.
Taylor, MI 48180-4116

City of Lincoln Park, City Clerk
1355 Southfield Rd.
Lincoln Park, MI 48146-2380

City of Dearborn, City Clerk
16901 Michigan Ave.
Dearborn, MI 48126

Charter Township of Redford
City Clerk
15145 Beech Daly Rd.
Redford, MI 48239-3201

Charter Township of Plymouth
City Clerk
9955 N. Haggerty Rd.
Plymouth, MI 48170-4673

City of Romulus, City Clerk
11111 Wayne Rd.
Romulus, MI 48174-1485

City of Westland, City Clerk
36300 Warren Rd.
Westland, MI 48185

City of Southgate, City Clerk
14440 Dix Toledo Rd.
Southgate, MI 48195-2598

City of Harper Woods, City Clerk
19617 Harper Ave.
Harper Woods, MI 48225-2095

City of Trenton, City Clerk
2800 3rd St.
Trenton, MI 48183-2918

City of Hamtramck, City Clerk
3401 Evaline St.
Hamtramck, MI 48212-3315

City of Highland Park, City Clerk
12050 Woodward Ave.
Highland Park, MI 48203-3578

City of Wyandotte, City Clerk
3200 Biddle Ave.
Wyandotte, MI 48192-5915

City of Grosse Pointe Woods
City Clerk
20225 Mack Plaza Dr.
Grosse Pointe Woods, MI 48236-2343

Northville Charter Township
City Clerk
44405 6 Mile Rd.
Northville, MI 48168-9547

City of Livonia, City Clerk
33000 Civic Center Dr.
Livonia, MI 48154-3087

Sumpter Township, City Clerk
23480 Sumpter Rd.
Belleville, MI 48111-9679

City of Ecorse, City Clerk
3869 W. Jefferson Ave.
Ecorse, MI 48229-1701

City of Riverview, City Clerk
14100 Civic Park Dr.
Riverview, MI 48193-7600

City of River Rouge, City Clerk
10600 W. Jefferson Ave., Ste. 1
River Rouge, MI 48218-1298

City of Woodhaven, City Clerk
21869 West Rd.
Woodhaven, MI 48183-3297

City of Plymouth, City Clerk
201 S. Main St.
Plymouth, MI 48170-1637

City of Belleville, City Clerk
6 Main St.
Belleville, MI 48111-2736

City of Northville, City Clerk
215 W. Main St.
Northville, MI 48167-1599

City of Wayne, City Clerk
3355 S. Wayne Rd.
Wayne, MI 48184-1232

City of Allen Park, City Clerk
16850 Southfield Rd.
Allen Park, MI 48101-2557

City of the Village of Grosse Pte. Shores
City Clerk
795 Lake Shore Rd.
Grosse Pointe Shores, MI 48236-1455

City of Rockwood, City Clerk
32409 Fort Rd.
Rockwood, MI 48173-1111

City of Dearborn Heights
City Clerk
6045 Fenton, St.
Dearborn Heights, MI 48127-3287

Grosse Ile Township, City Clerk
9601 Groh Rd.
Grosse Ile, MI 48138-2171

City of Grosse Pointe Farms
City Clerk
90 Kerby Rd.
Grosse Pointe Farms, MI 48236-3161

City of Inkster, City Clerk
26215 Trowbridge St.
Inkster, MI 48141-1800

Huron Charter Township, City Clerk
22950 Huron River Dr.
New Boston, MI 48164-9791

City of Detroit, City Clerk
2 Woodward Ave., Rm. 200
Detroit, MI 48226-3441

Charter Township of Van Buren
City Clerk
46425 Tyler Rd.
Belleville, MI 4811-5217

City of Melvindale, City Clerk
3100 Oakwood Blvd.
Melvindale, MI 48122-1298

Dept. of Public Safety
16850 Southfield Rd.
Allen Park, MI 48101-2599

Dept. of Public Works
7070 E. Ten Mile Rd.
Center Line, MI 48015-0000

Water and Sewer Manager
2951 Greenfield Rd.
Dearborn, MI 48120

Dept. of Public Works
23600 Liberty St., P.O. Box 9002
Farmington, MI 48335-3572

Sewer Supervisor
17147 Maumee
Grosse Pointe, MI 48230-1589

Sewer Superintendent
90 Kerby Rd.
Grosse Pointe, MI 48236-3100

Dept. of Public Safety
15115 E. Jefferson
Grosse Pointe Park, MI 48230-1399

Water/Sewer Superintendent
3401 Evaline
Hamtramck, MI 48212-3399

Dept. of Public Works
19600 E. Eight Mile Rd.
Harper Woods, MI 48225-1139

Water/Sewer Director
12050 Woodward Ave.
Highland Park, MI 48203-3596

DPW Water Superintendent
3100 Oakwood Blvd.
Melvindale, MI 48122-1220

Deputy Director of Public Works
15145 Beech Daly
Redford, MI 48239-3299

Appendix I.3
Project Plan Summary

Appendix I.4
Public Hearing Meeting Presentation

Appendix I.5
Public Hearing Transcript

Appendix J.
Board Resolution

Appendix K.
Basis of Design Documents

Appendix K.1
Basis of Design Report (June 2024)

Great Lakes Water Authority
9300 W. Jefferson Ave
Detroit, MI 48209
www.glwater.org
844.455.GLWA(4592)

Transmittal Form

To: Department of Environment, Great Lakes, and Energy (EGLE) Attn: Laura Verona, District Supervisor WARREN DISTRICT OFFICE – PUBLIC WASTEWATER UNIT 27700 Donald Court, Macomb County Warren, Michigan 48092-2793
Date: 6/20/2024
Subject: GLWA Contract No. 2103225 CIP 273001, "Hubbell Southfield CSO Facility Improvements"

We are submitting: ☒Attached ☐Under separate cover:

COPIES	DATE	DESCRIPTION
1	6/20/2024	Basis of Design Report (BODR)

Transmitted By:
☐ Mail ☐Hand Delivered ☐Next Day Delivery ☐UPS Ground ☒Other: Email

These are transmitted as checked below:

☐For approval	☐Approved as submitted	☒For review and comment
☐For your use	☐Approved as noted	☐Submit copies for distribution
☐As requested	☐Returned for corrections	☐For your record

Remarks: Attached please find BODR of subject contract, let us know if any comments.

Sender: Kashmira Patel
Life Cycle Project Manager
Phone: (313) 999-5345
Email: Kashmira.Patel@glwater.org

Signature: _____

Recipient Signature:_____

GLWA
Great Lakes Water Authority

Hubbell-Southfield CSO Facility Improvements

BASIS OF DESIGN REPORT

GLWA Contract No. 2103225
CIP 273001

June 2024

WADE TRIM

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TABLE OF CONTENTS

FIGURES

TABLES

Acronyms	
BMS	Building Management System
CFD	Computational Fluid Dynamics
DDC	Direct Digital Controller
FRP	Fiber-reinforced Plastic
IESNA	Illuminating Engineering Society of North America
MCC	Motor Control Center
OCS	Emerson Ovation Control System
PCC	Plant Control Center
PLC	Programmable Logic Controller
TRC	Total Residual Chlorine
TSS	Total Suspended Solids
UPS	Uninterruptible Power Supply
WRRF	Water Resource Recovery Facility

EXECUTIVE SUMMARY

The Great Lakes Water Authority (GLWA) initiated a project to conduct numerous improvements to the Hubbell-Southfield Combined Sewer Overflow (CSO) Facility located in Dearborn, Michigan. Hubbell-Southfield is one of nine GLWA CSO facilities and has a 22-million-gallon (MG) storage capacity and a design flow capacity of 2,200 cfs. The facility began operation in 1999 and various improvements have been completed since then. The tributary area to Hubbell-Southfield comprises approximately 14,400 acres in the City of Dearborn and the west side of the City of Detroit. The facility discharges to the Northwest Interceptor with overflows discharging to the Rouge River. The overall goals of the project are to bring the Hubbell-Southfield CSO Facility up to current codes/standards, standardize equipment, improve operations, strengthen operational reliability, and improve safety and ease of maintenance for operators.

This project encompasses improvements to basin flushing, dewatering, disinfection, screening, instrumentation and controls, architectural/HVAC, and electrical, as well as site work and other items. **Table ES-1** summarizes the proposed improvements by project numbering included in the executed contract. The remaining report sections provide additional detail for each. A separate Condition Assessment Report dated 6/7/24 summarizes an updated assessment of the facility.

Figure ES-1. Hubbell Southfield CSO Facility and Rouge River

CSO flows are disinfected by feeding a sodium hypochlorite solution. A portion of the excavated envelope of the basin is walled off for 2 sodium hypochlorite storage tanks. These tanks are piped through 5 chemical feed pumps and fed either through 3 chemical feed mixers in the basin influent or to the Shunt Channel, Basin 1, or Basin 2. Sodium hypochlorite can also be fed to the odor control system and the flushing water system.

Following the original construction, 2 FRP tanks (15,000 gallons each) were added in 2011 for sodium hypochlorite storage within the original concrete hypochlorite tank area (**Figure 1-2**). This addition replaced the original storage, decreasing the overall volume of chemical storage from 72,000 gallons to 30,000 gallons but provides adequate secondary containment for the chemical. Due to this change, the concentration of sodium hypochlorite fed for disinfection was increased from approximately 5% to 8%. Together, the two basins offer a treatment capacity of 2,200 cfs. When the combined capacity of the basins is exceeded, the Shunt Channel can be used to bypass the retention basins entirely. This channel provides an additional hydraulic capacity of 1,000 cfs, but provides limited chlorine contact time under high flow conditions.

The bulk-purchased sodium hypochlorite (12.5%) is transferred from tanker trucks into the two FRP chemical storage tanks inside the Headworks Building. These tanks are replenished between CSO events to ensure readiness for subsequent events. To extend the chemical's shelf life, the stored sodium hypochlorite solution is diluted from 12.5% to 8% upon delivery.

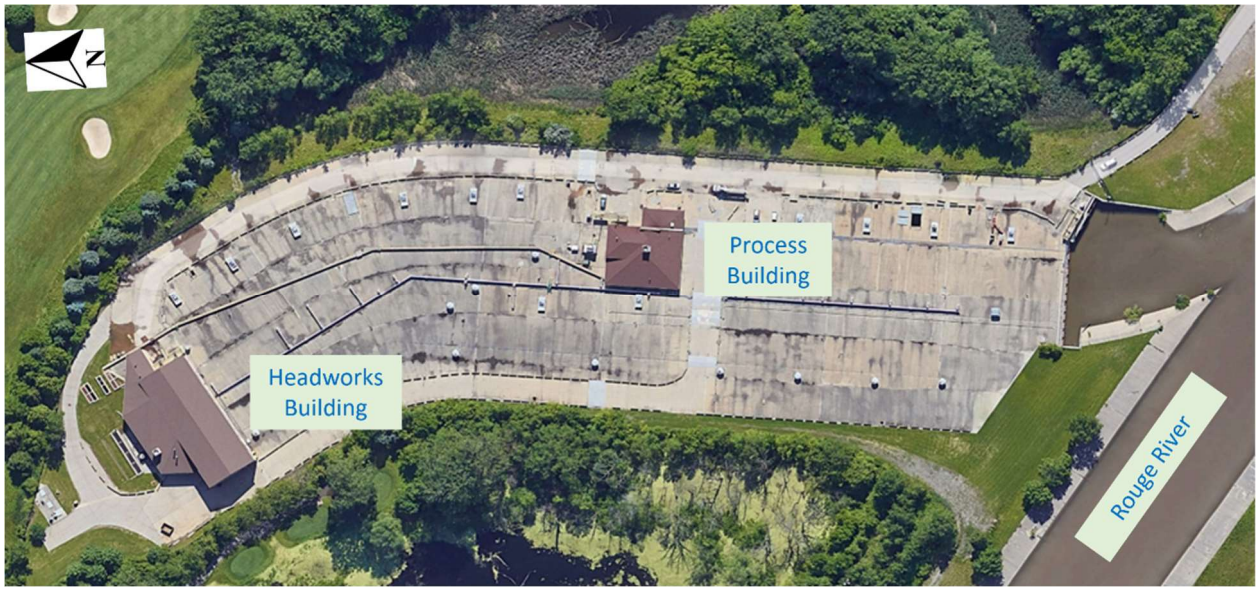

N
Process Building
Headworks Building
Rouge River

Table ES-1. Summary of Improvements

Project No.	Description
HS-FD-1	New Basin Flushing System • Replace existing spray nozzle system in basins 1 and 2 with new fully automated system that delivers higher flows and flushing velocities using river water for flushing after CSO water is expended. • Repair basin floor cracks and construct flushing lanes to channelize and concentrate flushing water. • Replace one flushing water pump and repair flushing water strainer. • Adds VFDs to flushing water pumps to allow use in both high and low-pressure flushing zones. • Replace existing hose bib piping with larger piping to improve flow/pressure and allow simultaneous use of two hoses. • Rehabilitate/automate existing effluent channel river gate. Add automated lower gate or valve to use river water during low river conditions. • Rehabilitate existing effluent channel drain gate. • Retain NPW supply for filling effluent channel if needed. • Abandon fan mixers in both basins. Consider retaining smaller mixers near screens.
HS-FD-2	Upgrade Basin Dewatering Pumps and Reinstall Sump Pumps and Fluidization System • Replace dewatering pumps, piping, fittings, and pump rails. Pumps to be updated to improve grit suspension/removal in combination with sump pumps recently replaced by GLWA. • Replace two 24-inch dewatering control ball valves.
HS-FD-3	Provide Equipment Access to Effluent Channel - A new entry hatch with GLWA standard safety features will be included at the effluent channel near the access drive to provide access for equipment.
HS-SCR-1	Screening Improvements • Replace fiber reinforced plastic (FRP) walkway grating, framing, and handrails. • Review and recommend other improvements to be completed by GLWA to address screen swaying, dragging, and shaking.
HS-DIS-1	Chemical Feed System Improvements • Replace/provide chemical feed pumps and add pressure gauges and manifold system to follow systems at other facilities. • Provide spill protection in pump areas. • Replace existing sump pumps. • Replace/adjust feed piping system. • Rehabilitate coating in chemical storage and feed areas. • Upgrade chlorine gas detection system in existing and new chemical storage areas. • Provide for automated clean water flushing system for chemical feed lines and strainers for existing and new storage. • Provide for automated dilution and recirculation of chemicals in tanks. • Review existing induction mixers and modify to support maintenance if needed. • Include rehab of existing chemical storage tanks as needed.
HS-DIS-2	Provide Flow-paced and TRC-paced Chemical Feed Control System (TRC: Total Residual Chlorine) • Implement flow paced, TRC, and turbidity adjusted chemical feed control system. • Install new TRC analyzers to match other facilities. • Include capability for manual operation.
HS-DIS-3	Add New Chemical Storage Tank • Add an additional 20,000-gallon chemical storage tank in a new building with dedicated chemical feed system. • Provide dilution water system. • Provide recirculation system. • Add level monitoring, alarms and gauges at the tanks and unloading area. • Provide piping, valves, venting and hose bibbs as needed. • Add secondary containment. • Add spill containment in unloading areas. • Provide coating in chemical storage and feed areas. • Provide containment sump and sump pump. • Add ventilation and freeze protection. • Add emergency shower/eye wash (rehab of existing in other GLWA contract). • Provide platforms, rails and stairways for tank access.

HS-ELEC-1	Electrical Improvements
	• Complete/update electrical studies – Short Circuit, Arc Flash, Hazard Classifications with new improvements.
	• Add new internal basin and exterior lighting and exterior maintenance receptacles.
	• Replace existing facility conduit and wiring.
	• Correct power sags/spikes on chemical pump VFDs – (new constant speed centrifugal pumps are provided)
	• Update grounding system per recent testing recommendations to accommodate facility improvements.
	• Coordinate with DTE on service replacement
	• Coordinate new ATS support systems.
	• Rework MCC equipment
	• Replace/upgrade generator, main distribution, and circuit breaker panels
	• Add weather protection
	• Grounding testing was completed during the 30% design phase and suggestions for minor improvements will be addressed.
	• Support new electrical systems for other upgrades
	  ○ Chemical feed pumps
	  ○ Flushing water pumps
	  ○ Sump pumps

HS-I&C-1	I&C Improvements
	• Replace existing conduit and wiring.
	• Replace field instruments as needed.
	• Design new control system for:
	  ○ Flushing control system
	  ○ Chemical sampling and feed control system
	  ○ Dewatering pumping system
	  ○ VR-8 gate

Project No.	Description
	• Provide for local control during construction • New P&IDs • Include I&C updates for new process cameras being installed by others. • Add 3 level sensor installations in upstream sewers • Include updated gas monitoring for both chemical storage areas
HS-I&C-2	Control System Upgrade - The facility's control system, networks, workstations, and local control system panels will be replaced or upgraded the latest GLWA standards. • Design new control system compatible with other CSO facilities. • Use Ovation system and panels. • Include new UPS systems. • Integrate remote panels into new network. • Add I/O as needed. • Add new Ovation communications modules. • Add Ethernet Link Controller. • Add non-Ovation devices. • Add fan out switches. • Add Ovation devices and media converters. • Add new back-up control panel with OIT. • Follow GLWA cybersecurity protocols. • Add new Ovation workstations. • Graphics shall follow GLWA ISA standards. • Add new Ovation panels. • Design programming, switchover procedures, and testing needed for a contractor to implement. • Develop a sole source procurement plan for Emerson equipment (TM).
HS-HVAC	HVAC Improvements • Process Building, Replace PACU-1, DHU-1, • ACCU-1 and ducts with a new system • Odor Control Building, replace existing HVAC system • Dewatering Room, replace existing HVAC system • Headworks Building, modify HVAC (minor) • Add DDC control for all HVAC systems • Add HVAC to new chemical storage building
HS-SITE-1	Increase Flushing Water Pressure at Basin and Increase Flow to Refill Weir Effluent Channel • In-basin hose bib water supply piping will be replaced and upsized to improve hose bib water pressure and flow rate. • NPW supply to effluent channel will be retained.
HS-SITE-2	Site Improvements • Security fencing/gate removal and replacement • Restore the access driveway and eliminate ponding – consider potential for green infrastructure. • Inspect, clean, and rehabilitate/replace existing golf course drainage culvert. • Repair basin roof and modify to eliminate ponding water. • Conduct additional structural repairs not performed to date (basin floor). • Replace missing grating over the shunt channel trench.

HS-ARCH-1	Architectural Improvements
	• Process Building
	  ○ Replace acoustical ceiling tiles in kind.
	  ○ Replace damaged ceramic floor tiles and paint floors
	  ○ Repair floor and cabinets in lab
	  ○ Renovate and convert locker room to a toilet and lunchroom
	• Headworks Building - paint floors

1.0 BACKGROUND

1.1 Original Basin

Based on a 1989 requirement from the Michigan Department of Natural Resources (MDNR) and subsequent modifications, the Detroit Water and Sewerage Department (DWSD) was tasked with addressing discharges from the combined sewer system into the Rouge River. One of the resulting projects at Outfall No. 58 was construction of the Hubbell-Southfield CSO Facility, located south of Michigan Avenue and east of the Southfield Expressway in the City of Dearborn.

The basin includes 6 bar screens (5 duty and 1 standby) that discharge screenings to a single conveyor and roll-off dumpster. The influent flow (2,200 cfs design) typically fills Basins 1 and 2 in one of two modes. Under the first flush mode (normal operation), flow fills Basin 1 first and is then routed via the shunt channel to Basin 2. In flow-through mode, Basin 1 fills first and then overflows to Basin 2 or flows through up to 5 basin slide gates to fill Basin 2 (see **Figure 1-1**). The two basins provide a total storage volume of 22 million gallons (MG). An additional 1,000 cfs can be discharged through the Shunt Channel during peak flow conditions and other operational schemes are possible based on isolating the basins through use of slide gates.

CSO flows are disinfected by feeding a sodium hypochlorite solution. A portion of the excavated envelope of the basin is walled off for 2 sodium hypochlorite storage tanks. These tanks are piped through 5 chemical feed pumps and fed either through 3 chemical feed mixers in the basin influent or to the Shunt Channel, Basin 1, or Basin 2. Sodium hypochlorite can also be fed to the odor control system and the flushing water system.

Following the original construction, 2 FRP tanks (15,000 gallons each) were added in 2011 for sodium hypochlorite storage within the original concrete hypochlorite tank areas (**Figure 1-2**). This addition replaced the original storage and decreased the overall volume of chemical storage by 41,800 gallons but provides adequate secondary containment for the chemical. Due to this change, the concentration of sodium hypochlorite fed for disinfection was increased from approximately 5% to 8%.

The system installed for flushing the basins and channels includes two 5,000-gpm flushing water pumps (1 duty and 1 standby). From these pumps, flushing water proceeds through a strainer to a network of flushing piping with flushing nozzles spread throughout 22 zones within the basins and shunt channel. Motorized butterfly valves control flow to the nozzles within each zone.

The Facility has two above-grade structures located above the basins. A Headworks Building includes spaces for mechanical, odor control, chemical feed, and screening. A Process Building contains odor control, electrical, mechanical, and locker/office spaces.

Figure 1-1. Hubbell-Southfield CSO Facility Overview

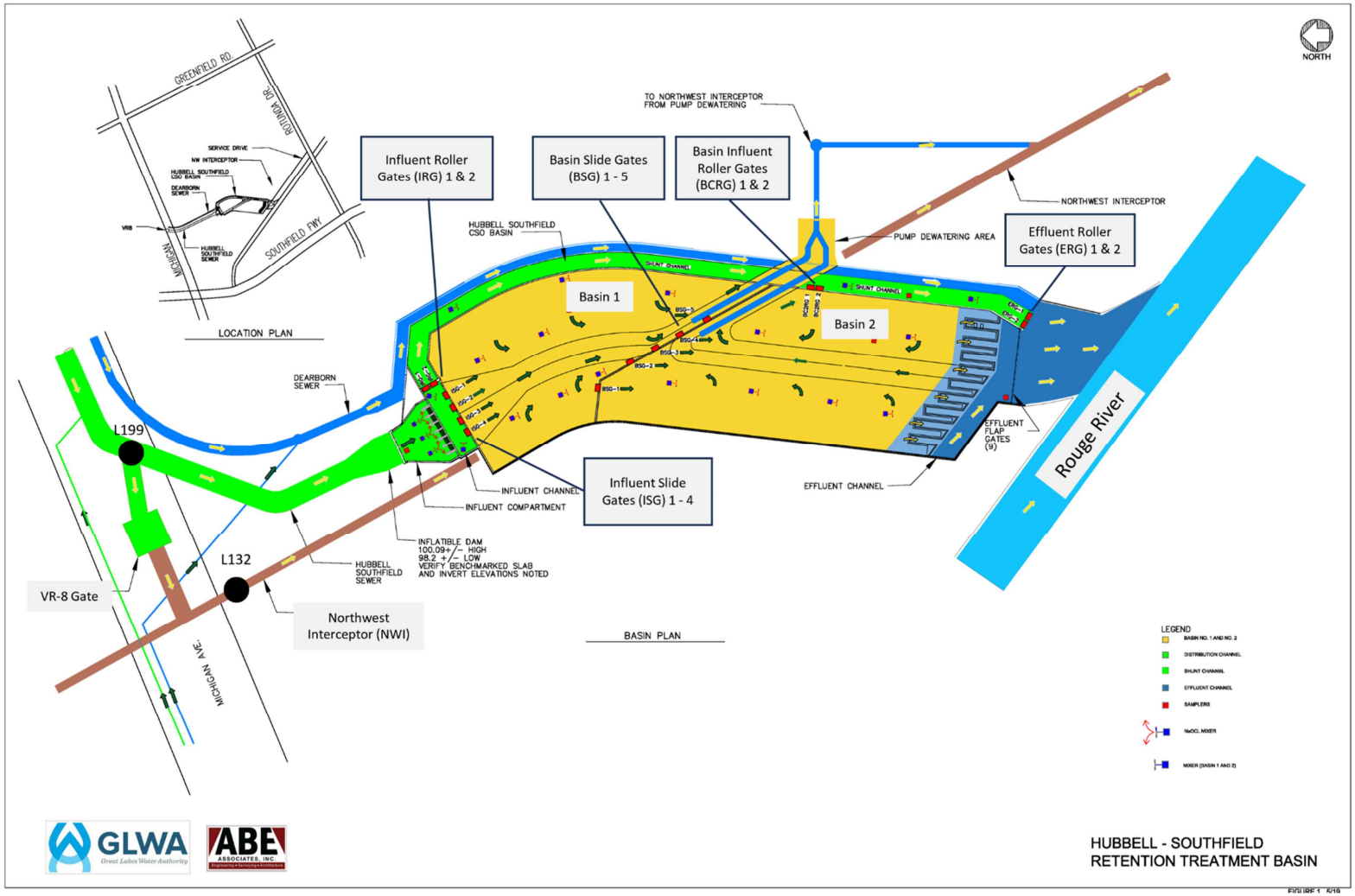
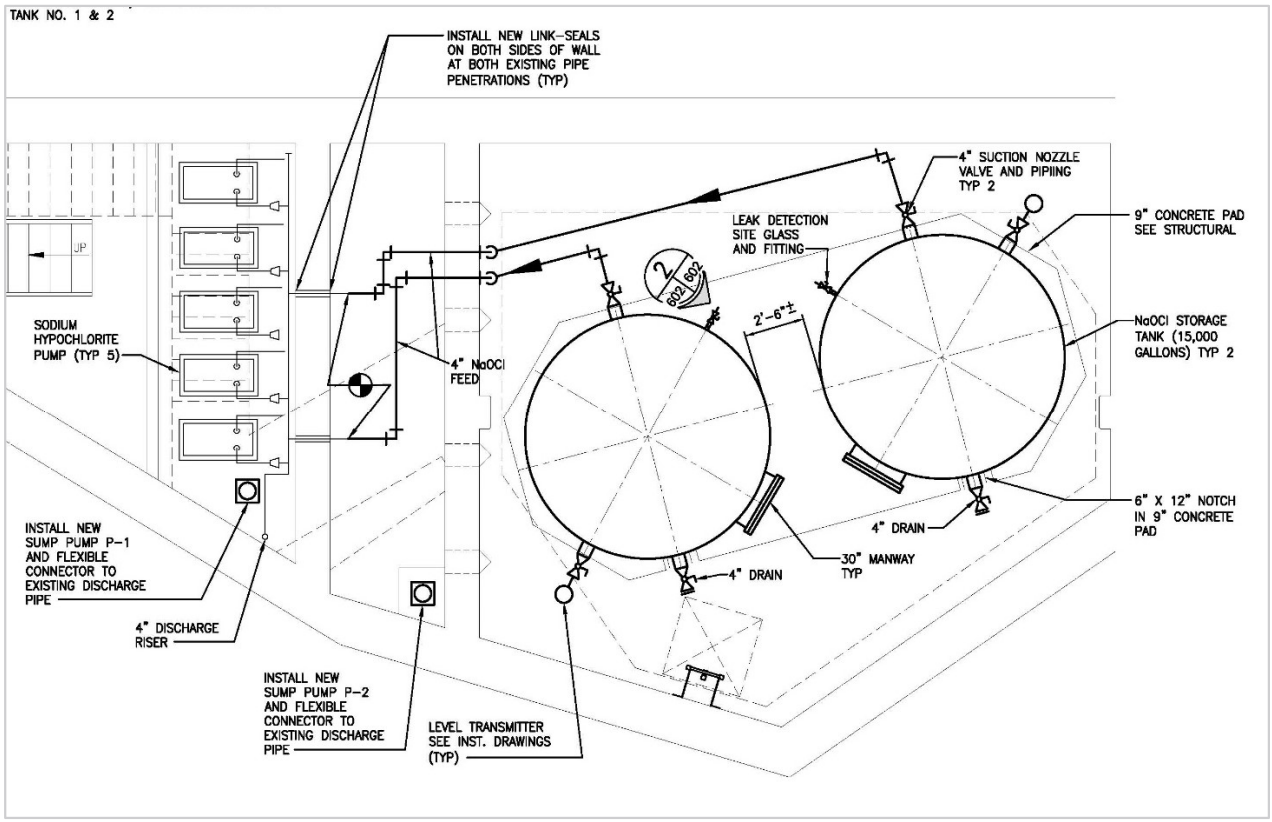


Figure 1-2. Sodium Hypochlorite Tank Revisions (2011)



1.2 Flushing System Improvements

In 2015, a project (PC-788) to rehabilitate the facility flushing system was completed. This project replaced components of the flushing system including control valves and flushing nozzles. In addition, chemical feed mixers, basin mixers, influent inflatable dams, and sampling pumps were replaced. The strainer was replaced in 2021 and is currently being repaired.

1.3 CS-299 Needs Assessment

As part of the CS-299 CSO Facilities Assessment Report, various needs were identified for the Facility. Work in this project is based on the CS-299 initial assessment of needs and recommended alternatives. Among the proposed alternatives for each issue, it was recommended to account for factors such as health and safety, compliance, and water quality, enhancing facility capacity, performance of the components, and ease of operations/maintenance.

1.4 Preliminary Basis of Design

A Preliminary Basis of Design Report (CS-272) was prepared in June 2022 to document potential proposed improvements to the facility. These improvements have been evaluated further under the current project and the subsequent recommendations are included in this 30% Basis of Design Report.

2.0 OBJECTIVES

This BODR summarizes the proposed improvements for submittal to EGLE as a part of the Part 41 construction permit approval application and will be updated throughout preliminary and final design.

3.0 BASIS OF DESIGN DEVELOPMENT PROCESS

This section summarizes development of the basis of design detailed in subsequent report sections.

3.1 Data Review

Information listed in **Table 3-1** was provided by GLWA to the project team for data review and incorporation into the project. Data from these references were reviewed and used to evaluate the items developed in this report.

3.2 Condition Assessments

A condition assessment was conducted to review the existing condition of the site, buildings, and facility equipment. Site visits with visual assessments were used to assess rehabilitation vs. replacement vs. repair. These findings are documented in a separate Condition Assessment Study Report. Information from the condition assessment was used to confirm the recommended improvements to be included in the proposed project improvements described in this report.

3.3 Alternatives Evaluation

Alternatives were developed and evaluated for the chemical storage and dosing strategies, flushing technologies, and non-potable water supply upgrades. These evaluations exist in separate Study Reports and Technical Memoranda. Recommended improvements are summarized in this report.

Table 3-1. Previous Contracts and Supporting Information

Document	Description
PC-694 (Basis of Design Report/Drawings/Specifications/ CAD/Shop Drawings/Geotech Report	Original Hubbell-Southfield CSO Facility construction
PC-739 (Flushing Gate Shop Drawing)	Shop drawing for flushing gate system
PC-761 (Drawings)	Hubbell-Southfield control system replacement
PC-776 (Drawings/CAD/Shop Drawings)	Sodium hypochlorite tank revision
PC-788 (Drawings/CAD/Shop Drawings)	Flushing system improvements
Site Process Flow Diagram (CAD)	Process flow diagram CAD files
CS-299 Facilities Assessment Report (Needs Assessment, Common Needs Among Multiple Facilities, Conceptual Design Drawings, Facilities Detailed Cost, Asset Audit/Condition Assessment/FMEAs/Schedule Replacement Plan) prepared by Jacobs	Portions relevant to the Hubbell-Southfield site are included
CS-272 Hubbell-Southfield CSO Facility Improvements (7-2-030-A) Preliminary Basis of Design Report prepared by AECOM, June 2022	This report is based on and updates the 2022 BODR
CS-1499	VR-08 Gate Rehabilitation
Contract 1902224 CSO Facilities Structural Improvements	PULLMAN/Wade Trim project
Contract 2102655	Chemical feed controls
2100575 (CIP 260622)	Emergency generator improvements drawings
ALTA Survey	Hubbell-Southfield site topographic survey
AST Inspection (Contract 1901904)	Sodium hypochlorite aboveground storage tank inspection report
SRF Project Plan	State Revolving Fund Project Plan for proposed improvements
Chemical Feed Control Task Agreement	Scope of work to evaluate and perform upgrades to chemical feed system at Hubbell-Southfield

4.0 PROPOSED HUBBELL-SOUTHFIELD CSO IMPROVEMENTS

4.1 Screening

Wade Trim retained E&I Corporation to inspect the existing screens and provide recommendations for rehabilitation as needed. The inspection site visit was completed on May 23, 2024 and a preliminary report has been provided to Wade Trim for review. The report is being updated by the inspection team and will be provided to GLWA when finalized for review and consideration of proposed improvements.

4.1.1 Screen Swaying

Improvements to address screen equipment swaying are being implemented by GLWA under a separate maintenance activity.

4.1.2 Walkway

The existing screening area fiberglass grating will be improved with deeper/stiffer grating to limit the grating deflection to ¼ inch under a 100-psf uniform loading to minimize lateral walkway sway between supports. Handrail posts will be replaced to limit deflection at the top under OSHA loading to 1 inch or less.

4.2 Disinfection

The objectives of the proposed improvements to the disinfection system include:

- Provide reliable chemical storage and feed.
- Provide automated chemical feed control for regulatory compliance.
- Improve safety and security features of the disinfection facility.

Improvements to the disinfection system include the following:

Chemical Feed System Improvements

- Metering pumps replacement with additional pressure gauges
- Modification to chemical induction mixers mounting equipment
- Additional of chemical feed piping manifold and automated clean water flushing system.
- Automated chemical dilution system
- Chlorine gas detection upgrade

Chemical Dosing Improvements

- Upgrades to the TRC Analyzers
- Additional of self-backwashing filters (on sampling line)
- Additional sampling pump(s) and access
- Upgrades to the associated piping and valving

Chemical Storage Improvements

- Additional 20,0000 gallons of storage volume in a new building with storage containment area improvement (sump and coating)
- Chemical transfer/mixing pump installation (new building)
- Addition of new piping and valves
- Offloading station improvements to the existing and new storage areas following GLWA standard layout
- Addition of a new emergency shower/eye wash station (new building)

4.2.1 Basis of Disinfection Improvements Design

GLWA's Long Term CSO Control Plan incorporated Hubbell-Southfield into the National Pollutant Discharge Elimination System (NPDES) permit. The current NPDES permit requirements pertaining to disinfection include:

Report event average and maximum total residual chlorine (TRC) (mg/L)

- Goal: event average of 1.5 mg/L
- Goal: event instantaneous maximum of 2.0 mg/L November to April
- Goal: event instantaneous maximum of 3.0 mg/L May to October

For daily Discharge Monitoring Reports (DMRs), report the geometric mean of all fecal coliform samples taken during an event, provided three or more samples are collected. Sample every two hours for the first six hours and every four hours thereafter for the duration of the discharge.

- Limit: Fecal Coliform must be <400 cts/mL for each event May 1 to October 31
- Limit: Fecal Coliform must be <1,000 cts/mL for each event November 1 to April 30

The equipment sizing criteria is based on design flow to Hubbell-Southfield in 10-year 24-hour storm event with peak flow rate at 2,200 cubic feet per second (cfs). The chemical storage tank will be sized based on 8 percent sodium hypochlorite solution which is diluted from 12.5 percent solution provided at delivery. The existing basin volume will provide a minimum contact time of 20 minutes during peak storm events at a design dose of 10 mg/L as chlorine.

4.2.2 HS-DIS-1 Chemical Feed System Improvements

The major components of the chemical feed system include metering pumps, chemical induction/mixing units, and associated chemical piping.

Metering Pumps

Based on design dose of 10 mg/L, 8 percent sodium hypochlorite dosing rate is estimated at 124 gpm for the peak hydraulic flow during the 10-year 24-hour event. The same as the current setting, the metering pumps will be used to deliver sodium hypochlorite solution to the Headworks, Basins 1 and 2, the Shunt Channel, flushing system, and odor control. The facility will maintain the use of five

metering pumps, each with 5 to 50 gpm capacity. All five pumps will be equipped with speed control and remote on/off functionality.

An analysis of metering pump types was completed for other GLWA facilities. Centrifugal pumps are preferred chemical metering pumps due to wider availability in compatible materials and sufficient capacity to reduce the feed system capacity. In addition, GLWA staff are more experienced with the operation and maintenance of centrifugal pumps. To maintain consistency between facilities, the existing gear pumps at Hubbell-Southfield will be replaced with centrifugal sealless magnetic drive pumps and dedicated control valves for each sodium hypochlorite application point.

Chemical Induction/Mixing Units

The facility currently has three 25-hp Gas Mastrrr chemical feed unit induction mixers. Evaluations completed for other GLWA facilities concluded that alternative induction mixer manufacturers have limited capabilities to meet GLWA's preference for explosion proof drive motors. For this reason, Gas Mastrrr units are used for the basis of design. Currently, GLWA indicates that the induction units are replaced as needed under the standard maintenance budget and likely the same type and capacity Gas Mastrrr units will be used for future replacement. The existing mounting and protection approach for this equipment will be evaluated and may be modified to support RCM objectives.

Chemical Piping

The metering pumps currently deliver chemical to a common header that is connected to each application point. For consistency with other GLWA facilities, it is proposed that the configuration be updated with a manifold loop with dedicated flow control valves for each application. GLWA has requested Schedule 80 PVC with flanged or glued joins only, along with vented ball valves and true union joints.

The existing and new chemical piping will be flushed with potable water or air after each event to increase the life of the piping and appurtenances and before an expected event. It is recommended that the piping be kept dry or filled with potable water between events.

Chlorine Gas Detection

As requested by GLWA, chlorine gas detector will be installed in the sodium hypochlorite storage and feed facility. New chlorine gas detection monitors will be provided in the new Chemical Storage Building. The existing chlorine gas detection unit in the Chemical Storage Room will be replaced with a new unit.

4.2.3 HS-DIS-2 Chemical Dosing Improvements

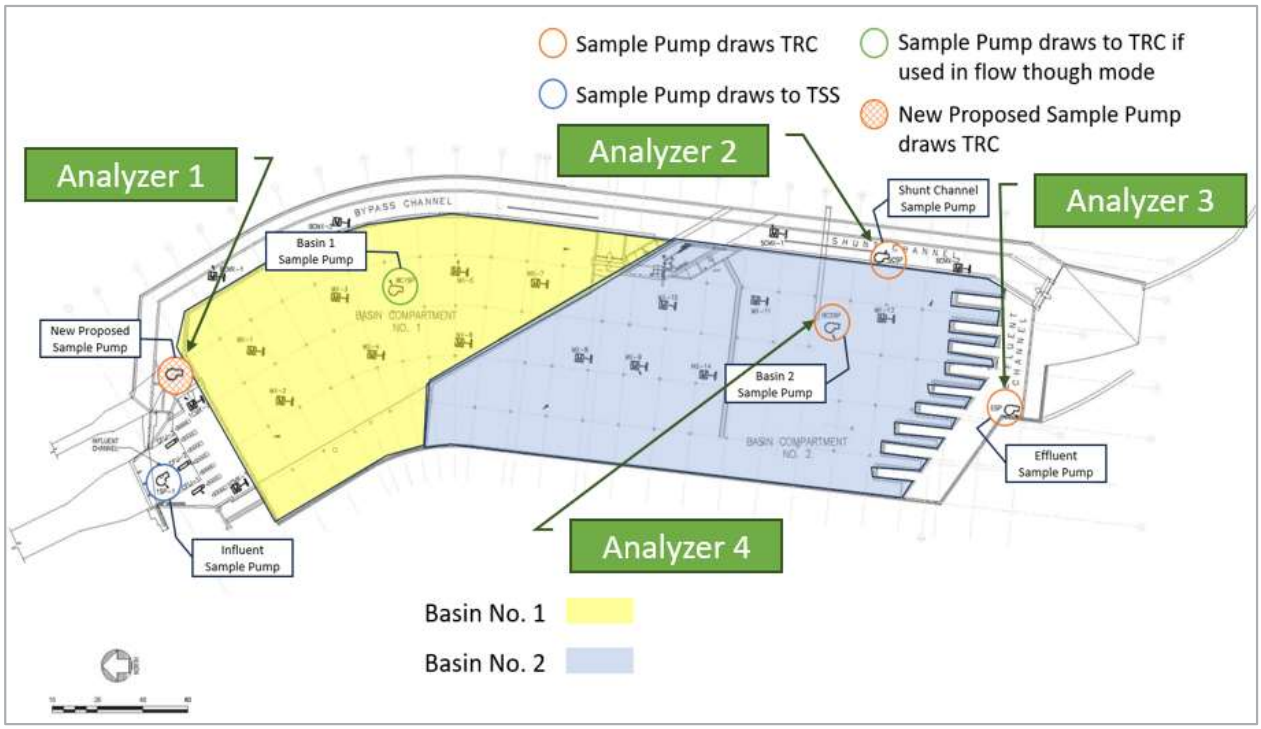
The current chemical dosing strategy relies on manual monitoring and manual control. Real-time monitoring and automatic control could allow operators to fine-tune chemical dosing and potentially

reduce the overall volume of chemical required during a CSO event. Alternative dosing control methods and related considerations are evaluated in the Disinfection Study Report (April 2024).

Fully automatic chemical dosing control involves the use of real-time Total Residual Chlorine (TRC) analyzers equipped with self-backwashing filters or strainers, flow meter(s), and sample pumps. Automatic dosing can be implemented in different modes, including flow-pacing, residual-pacing, or CT control algorithms.

A proposed system will include four TRC analyzers and associated four self-backwashing filters or strainers, five sampling pumps and associated piping and valving. The potential location for TRC analyzer and self-backwashing filters/strainers is the room where the auto-sampler is located in the Operation Building. Sampling of CSO during event would be required in the locations shown in **Figure 4-1.**

Figure 4-1. Proposed Sampling Locations



Automatic dosing control relies on the proper functioning of every part of the control system and chemical feed system, like metering pumps and induction units. There are three automatic control modes: flow-pacing, residual-pacing, and CT control algorithm. Operators can pick which mode to use based on their experience with the control program. This lets operators adjust their dosing strategy to match different situations, making the dosing process more efficient and effective overall.

During storm events, sampling pumps will extract CSO samples at the retention basin location depicted in the figure. These sampling pumps will then transfer the samples to a TRC analyzer, which continuously monitors the chlorine residual concentration in real-time at the sampling location. By combining this data with the flow signal obtained from the flow meter, an automatic calculation will be performed to determine the necessary chlorine dosage. This calculation aims to either maintain a specified target dose or achieve a target residual concentration at the basin's end before discharge into the outfall.

Note that manual grab sampling is required by the NPDES permit and this procedure will be maintained regardless of the chemical dosing strategy.

Total Residual Chlorine Analyzers

The facility is equipped with a Swan colorimetric TRC analyzer, but it is not being used and is not set up for controlling chemical dosing. Other GLWA facilities have the same type of Swan colorimetric TRC analyzer and further pilot testing is ongoing. It is recommended that GLWA retains the unit, as any future TRC analyzers acquired will likely be of the same type. This continuity in equipment type across facilities can streamline maintenance, training, and operational processes, as operators and staff will already be familiar with the equipment and its functionalities.

Self-backwashing Filters/Strainers

GLWA is currently piloting self-backwashing filters at other facilities. The results of the pilot studies will inform the preferred manufacturer and model for Hubbell-Southfield to support real-time monitoring and automatic control.

Sampling Pumps

To effectively accommodate the various water levels at sampling spots, sample pumps will be used to draw flow from the basin. Four existing sampling pumps (Basin 1, Basin 2, Shunt Channel Downstream, Effluent from Basin 2) will be maintained and their existing location. A new fourth pump will be added to draw flow from the entrance of the shunt channel just downstream of the location of chemical injection. The existing and new sampling pumps will be submersible chopper pumps with a flow rate rating of 50 gpm and a TDH capability of 50 feet. This setup will enable the pumps to draw samples from different water depths, ensuring sampling coverage across the entire range of depths at the sampling spots.

4.2.4 HS-DIS-3 Chemical Storage Improvements

Over the past several years, large storm events have required more chemical than the 30,000 gallons of onsite storage can provide. As described in the Preliminary Basis of Design Report (PBODR) (AECOM 2022), the largest storm events from 2016 to 2018 required 38,755 gallons of sodium hypochlorite. GLWA contacts the chemical supplier during storm events to replenish spent chemical; however, because other facilities are putting in similar requests at the same time and

there is a limited supply of regional chemical tankers, Hubbell-Southfield operators need to use chlorine tablets mixed with potable water as a substitute to delivered chemical. Chlorine tablets are used approximately 6-8 times per year depending on storm frequency and tanker availability. These difficulties in securing enough chemical for large storms has prompted an evaluation of different storage tank configurations to provide sufficient storage for a range of storm events.

The project team performed a model-based design flow analysis for the 10-year 24-hour CSO event. Detailed flow analysis, chemical usage and storage calculated is included in the Hubbell-Southfield CSO Facility Improvements Disinfection Study Report (April 2024). The expected rainfall for a 10-year, 24-hour storm event is 3.31 inches. This results in a disinfection system storm flow of 2,200 cfs. The total CSO volume requiring disinfection under this scenario is 452 million gallons.

The disinfection design flow was used to calculate the sodium hypochlorite volume needed for 12.5 percent and 8 percent solutions. At 8 percent, 50,000 gallons of sodium hypochlorite are required to treat a 10-year, 24-hour storm. These volumes are the basis of storage alternatives discussed in the Disinfection Study Report.

Disinfection for Hubbell-Southfield is addressed in the Disinfection Study (April 2024) with a recommendation of constructing a new building to house a new 20,000-gallon sodium hypochlorite storage tank. Sizing of this tank is based on providing a total of 50,000-gallons between the two existing and one new tank in order to meet the 8 percent chemical demand during the designated design flow during 10-year 24-hour storm event.

Chemical Storage Tanks

A new 20,000-gallon FRP tank will be housed in a new building adjacent to the existing headworks building. The tank will be equipped with titanium basket strainers on the tank discharge lines to prevent settled particles from clogging the metering pumps. This new storage tank will be interconnected with the existing chemical piping system so that the chemical pumps located in the existing pump area will feed from the new chemical tank in the new building. The existing storage tanks are in good condition and will not be replaced but will be modified to include a safety access platform at the top of the tanks.

Sump Pumps

The containment area will be equipped with sump pumps and a hose bib to address any accidental chemical spills. The sump pump design will align with the existing pump specifications, featuring a submersible self-priming Corcoran type pump. This pump will have a capacity of 56 gpm at a TDH of 25 feet and will be powered by a 1.5 HP motor. This setup ensures efficient and effective cleanup capabilities, enhancing the overall safety and environmental protection measures within the containment area.

Transfer/Mixing Pump

A transfer pump will be installed in the new building to support the chemical recirculation process between the new tank and the existing tanks. Chemical recirculation provides mixing and resuspending the contents of the storage tanks, therefore reducing crystallization, and ensuring any settled particles are resuspended. Currently, the storage tanks are recirculated individually on a monthly basis.

Chemical Dilution

Potable water will be used to dilute sodium hypochlorite from 12.5 percent to 8 percent. Valves and piping will be set up for dilution at both the new and existing buildings. This practice helps extend the chemical's shelf life. GLWA checks the chemical strength monthly, discarding any below 5 percent. It's recommended to continue diluting after delivery. It is recommended that GLWA continue the practice of diluting the solution after delivery. Using potable water to dilute the sodium hypochlorite is acceptable for this Facility due to the relatively low hardness of Detroit water, which averages approximately 100 ppm according to recent publicly available Detroit drinking water reports.

Chemical Offloading Stations

The existing chemical offloading station is currently situated inside the north Odor Control Room and features a drip containment tub. However, accessing the containment tub from the roll-up door requires a long piping connection for offloading. Additionally, there are control cabinets with metal doors nearby, some of which show visible signs of corrosion. It is suspected that the proximity to sodium hypochlorite has caused this corrosion, as other cabinets within the facility do not exhibit corrosion. To address this issue, it is recommended to relocate the existing offloading station outdoors. This new setup would include a connector lockbox and hose bibs, allowing staff to rinse the containment tub easily. By moving the offloading station outside, the risk of corrosion near sensitive equipment will be minimized, enhancing safety, and prolonging the lifespan of equipment within the Odor Control Room. The new offloading station for the new chemical storage building will be set up similarly. An eye wash/shower station will also be provided.

4.3 Flushing System

Flushing system improvements include process improvements to the flushing piping and pumping systems and structural improvements to rehabilitate and reconfigure the basin floors to create curbed flushing lanes for the new system. The improved system will include RCD/RCM considerations to support reliability and efficient O&M.

4.3.1 Flushing Process Improvements

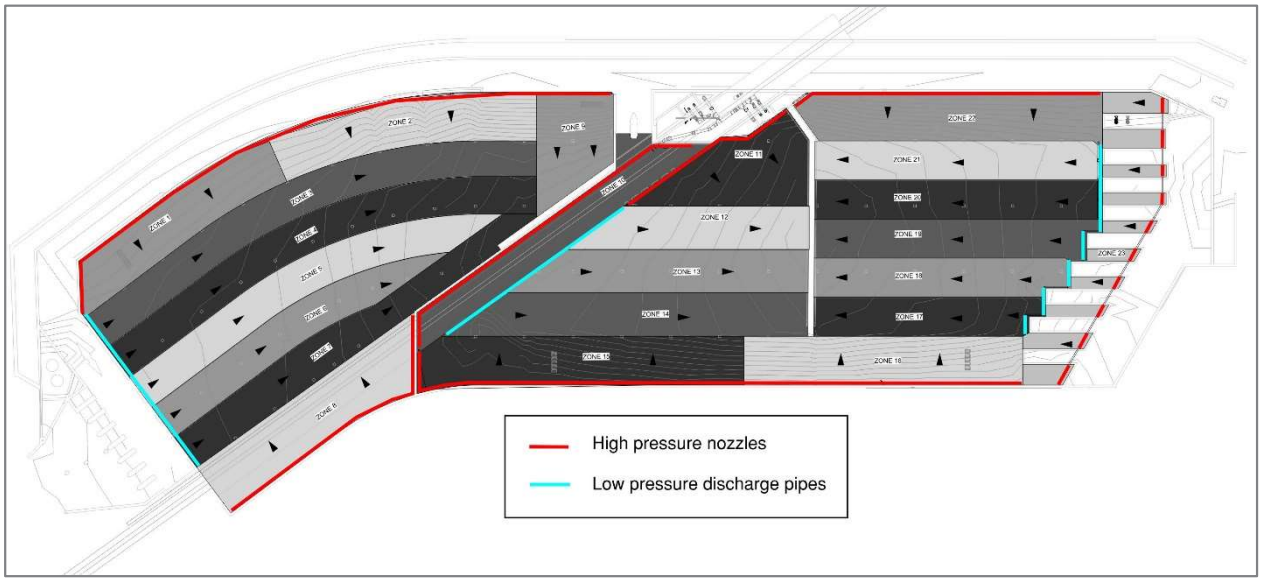
A new pipe and nozzle system is proposed to be installed in the basin to replace the existing system. The existing 20 flushing zones in Basins 1 and 2 plus the 2 flushing zones in the Shunt Channel will be converted to 22 new flushing zones in Basins 1 and 2 with an additional flushing zone for the Finger Weir Channels in Basin 2. The Shunt Channel is currently cleaned naturally when flow is

directed from the influent to Basin 2, so the flushing pipes will be removed from this area as part of the project and the two zones will be repurposed for use in the basins.

The new system to be installed in Basins 1 and 2 will maintain the existing flushing piping/strainer from the flushing pumps up to the 23 flushing valves on top of the basin. New piping will be installed in the basin downstream of the valves as the pipes enter the basin at the top to create new flushing lanes. Concrete curbs will be added to create the lanes between the zones to contain the flush water and channel the solids. These lanes on the flatter portions of the floor, shown in **Figure 4-2**, will generally be between 30and 35 feet wide, depending on the slope of the floor (the greater the slope, the wider the lane).

The new lanes will be oriented approximately 90 degrees from the existing flushing zones to allow for a continuous flush flow from the upstream end of the floor to the downstream end at the dewatering sumps. This will move the solids that have settled on the floor so that the entire surface of the floor is effectively flushed. This new orientation and the proposed zones (flushing lanes highlighted in various shades of gray) are shown in **Figure 4-2.** Flushing lane curbing will be configured with operator input to allow equipment/bobcat access and movement within the basins.

Figure 4-2. Modified Flushing System with Low- and High-Pressure Zones

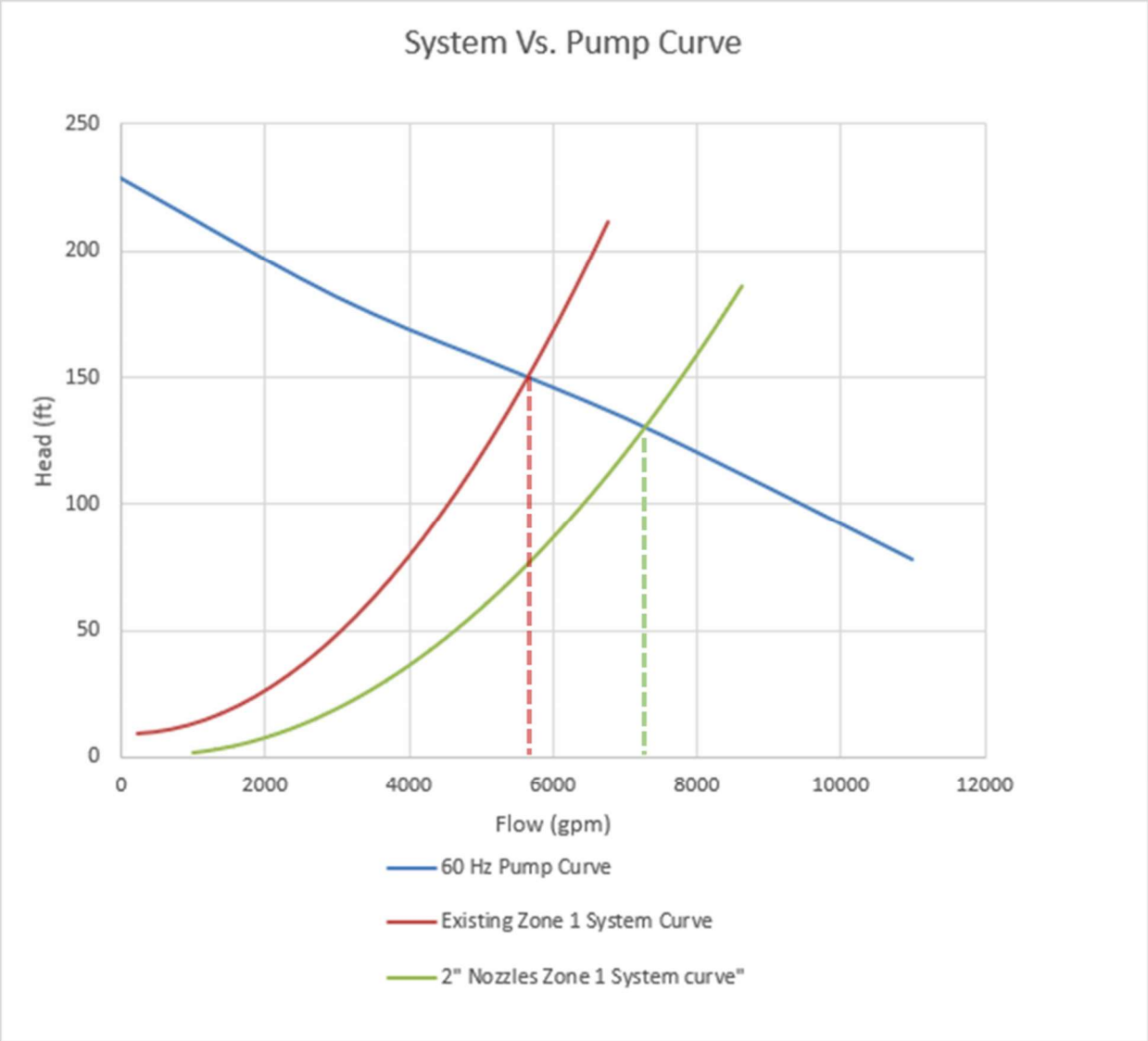


The new system will generally use larger diameter pipe nozzles (4 to 8 inches) located near the floor to provide a continuous flow of low-pressure water that follows the slope of the floor to the sump channel at the downstream end for each basin. The exception to this will be along the perimeter of the basin where the floor slope is steeper; new piping with high-pressure, small-diameter nozzles located near the flow will be used. Flushing zones along the perimeter will be much longer than the zones along the flatter portions of the floor, up to approximately 200 feet. This will result in a lower

volume of water per unit length of the flushing lane, but given the higher slope of the floor, the flow rate is not required to be as high. The layout shown uses the existing flushing piping valve infrastructure as much as possible to make this a cost-effective option given the project budget. Thus, no new flushing zones are proposed to be added. The two existing Shunt Channel zones will be repurposed within the basins.

The estimated flow in the zones will be increased from the current 5,000 gpm per flushing zone with 1" nozzles to approximately 6,300 gpm with 2" nozzles for high pressure zones and 4-8" diameter pipe discharges for low pressure zones. This will lower the system head requirements on the existing flushing pumps (including the one recently replaced in 2021) and allow the pumps to operate further out on their performance curve, increasing the discharge flow rates. We have modeled this system based on the existing pump curve. The additional flushing velocity will improve the solids removal from the floor. **Figure 4-3** shows an example of a pump curve with two system curves. The pump discharge is lower for the system with the higher hydraulic losses and higher for the system with lower hydraulic losses. **Figure 4-4** shows a preliminary configuration of the flushing piping and curbed lanes in Basin 1. This will be reviewed and likely raised in preliminary design to address potential debris accumulation on the flushing piping and allow free movement of equipment in and out of the basins.

Figure 4-3. Varying Pump Flow Rates Based On Varying Discharge System Hydraulic Losses



Reduced system head losses increase pump discharge.

Figure 4-4. Modified Flushing Header Piping and Lanes - Lower Sloped Areas

Figure 4-5 shows the preliminary configuration of a perimeter flushing zone.

Figure 4-5. Modified Flushing Header Piping along Steeper Sloped Perimeter Areas

The critical areas of the proposed system have been evaluated using computational fluid dynamics (CFD) modeling to show that the solids, which are typically found in the basin at depths of up to 6 inches, can be cleaned from the floor in under 30 minutes per flushing zone. If very large storm events deposit more than 6 inches of solids on the floor, the flushing system will either have to run for additional time or manual cleaning of the floor may still be required.

The flushing pumps will operate at either a low speed for the larger diameter nozzle system in the curbed zones, or at a higher speed for the high-pressure perimeter zones with the use of new variable frequency drives on the pumps.

River water is proposed as the flushing water source for normal operation. The existing strainer will be used to strain out debris that could plug the high-pressure nozzles. The existing flushing pumps are proposed to be reused for the new flushing system. One of the two existing pumps was recently replaced. It is recommended that the older flushing pump be replaced in this project with the same or similar pump (**Table 4-1**). The existing capability to fill the effluent channel with water from the City of Dearborn will be retained for use if needed.

Table 4-1. Flushing Pump Replacement

Description	Value
Current Pump	Flygt 3312
Proposed Pump	Flygt 3312
Number of Pumps Replaced	1
Design Point	High pressure Zone 6100 gpm @ 87' TDH – 50 Hz Low pressure zone 6400 gpm @ 43.5' TDH – 40 Hz
Horsepower	385 HP

4.3.2 Flushing Structural Improvements

Proposed modifications to the basin floors include:
Install concrete to correct the transverse slope of the floor in the new flushing lanes where needed. This will help maintain a distributed flow of flushing water across the lanes. Depth of the concrete will vary from approximately 1 inch minimum to 6 inches maximum.
Install training walls to help direct the flushing flow.

Complete additional repairs to the floor, walls, columns, beams, precast double tee roof members, and cast-in-place concrete roof slabs and beams. These improvements include base slab repairs that have not been performed to date. Due to the age of the basin, the concrete and joints have deteriorated. The basin was recently inspected, and repair drawings were generated to repair deterioration. However, anticipating that this project would affect items that needed repairs (for instance, repairing base mat deterioration that will be covered by topping as part of this project), only some of the repairs were bid and are being performed.

4.4 Basin Dewatering

4.4.1 Dewatering Process Improvements

Basin dewatering can be accomplished by gravity and/or pumping. Gravity dewatering to the Northwest Interceptor (NWI) occurs by opening one of the two flow control valves. A control system regulates the valve position and corresponding flow from the basin to the NWI. The gravity discharge rate is controlled so as not to exceed the remaining capacity in the NWI as measured by a level sensor (ID L132) in the NWI. Basins 1 and 2 can be dewatered by gravity flow from a basin water level of 99.5 feet down to about 94.75 feet. Dewatering by gravity can continue down to 90.5 feet if siphoning occurs; however, when the water surface level is below 94.75 feet, the flow rate in the discharge line causes the velocity to drop below the recommended 3.5 fps.

Dewatering Pumps

The dewatering pumps will operate as they do now and will dewater the remainder of the basin volume down to elevation 74.5 feet. Below this elevation, two sump pumps can be used to dewater the final volume of water in the pump sump pit.

The two dewatering pumps in each basin are sized so that one pump can operate normally during a dewatering cycle with the second pump as backup. During the flushing operation, two pumps should run concurrently to remove the flushing water as it flows into the sump.

The four existing dewatering pumps will be replaced with pumps having a comparable design point as the existing pumps, but with improved grit handling capability. A Flygt NP-3202 pump is proposed for this application (**Table 4-2**). The proposed pump includes internal abrasion protection and a self-cleaning impeller. A pump mix flush valve should also be considered for installation on the pumps to assist with grit resuspension.

Table 4-2. Dewatering Pump Replacement

Description	Value
Current Pump	Vaughn Chopper Pump Model SE6U, 30 HP
Proposed Pump	Flygt NP 3202 LT 3
Number of Pumps Replaced	4
Design Point	3800 gpm at 23’ TDH
Horsepower	45 HP

Dewatering Sump Pumps

The two existing sump pumps were recently replaced by GLWA with new Landia submersible pumps. These pumps are equipped with two motor actuator valves (per pump), which can direct the discharge flow from the pumps to a separate grit suspension nozzle mounted on the floor next to the

pump. This system is designed to automatically direct the discharge of the pump to the sump area via the new nozzle on a periodic basis to suspend grit in the pump sump pit and reduce grit buildup. The sump pit and guide rails will be enhanced as needed to support reliable operation and maintenance.

Gravity Dewatering Control Valves

The two existing 24-inch ball valves, which were installed to control gravity dewatering of the two basins, are nonfunctional and will be replaced as part of this project with new rubber seated ball valves.

4.4.2 Dewatering Structural Improvements

Structural work related to dewatering consists of foundations for new pumps and new pipe supports and penetrations. Design of modifications to the floor and walls in the dewatering area is included. An evaluation will be performed to determine if any additions or modifications to existing access hatches are required above the dewatering pumps. Similar to the screening area, grating in the Shunt Channel floor needs to be replaced.

4.5 Electrical

4.5.1 Power

The existing main power service electrical equipment and generators (including loads) were evaluated for any deficiencies within the existing electrical system including grounding requirements. New motor control centers (MCCs) with feeder breakers for the new chemical building, chemical feed pump existing variable frequency drives (VFDs) will be replaced by constant speed starters, and new power and lighting panels will be provided. Additional circuit breakers in existing power and lighting panels will be provided to accomplish new work described as follows. The cabling between the VFDs and flushing pump motors will be VFD cables as per the VFD manufacturer's recommendations. New maintenance receptacles on the basin decks will be provided, along with an updated one-line diagram showing all major electrical power distribution equipment. Existing conduits and wiring will be replaced.

4.5.2 Lighting

New site lights will be added on the access roadway, basin decks, and outfall decks. The new site lights will be photocell control and will be controlled by a contactor with an On-Off-Auto selector switch. The Illuminating Engineering Society of North America (IESNA) recommends 2-foot candles (average) for site lighting. However, this recommended value requires tall poles and cobra-head type lighting fixtures that are not feasible for this facility. To minimize the structural modifications on the basin decks and to maintain the access road aesthetics, uniform site lighting with 1-foot candle (average) will be provided. For the asphalt access road, decorative type light poles are recommended because they will be located between a golf course and a river. The project will also add new lights at the basin and shunt channel entrance locations and at other select locations within the basin areas.

4.5.3 Arc Flash Study

The existing "Short Circuit Study, Overcurrent Device Coordination & Arc Flash Hazard Analysis" will be updated as the electrical distribution system changes.

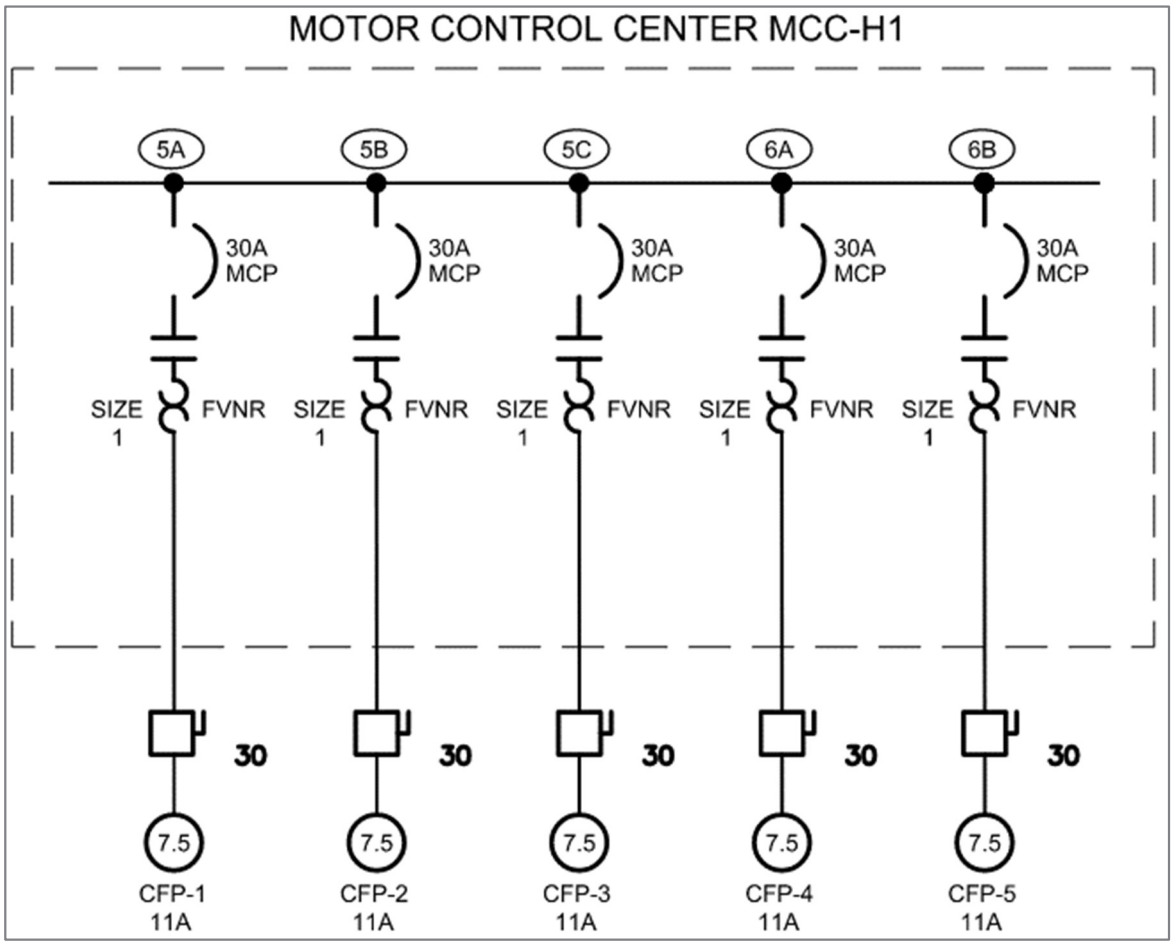
4.5.4 Hazardous Area Classification

All areas of the facility were classified per the requirements identified in NFPA 820. Drawings have been developed identifying these areas and will be included as the design progresses.

4.5.5 New Chemical Feed Pumps

The existing VFDs will be removed and replaced with constant speed starters mounted in MCC-H1 (**Figure 4-6**). Electrical upgrades will be made to support the new chemical feed pump power systems. Features will be included to address current electrical issues with tripping out of the pumps.

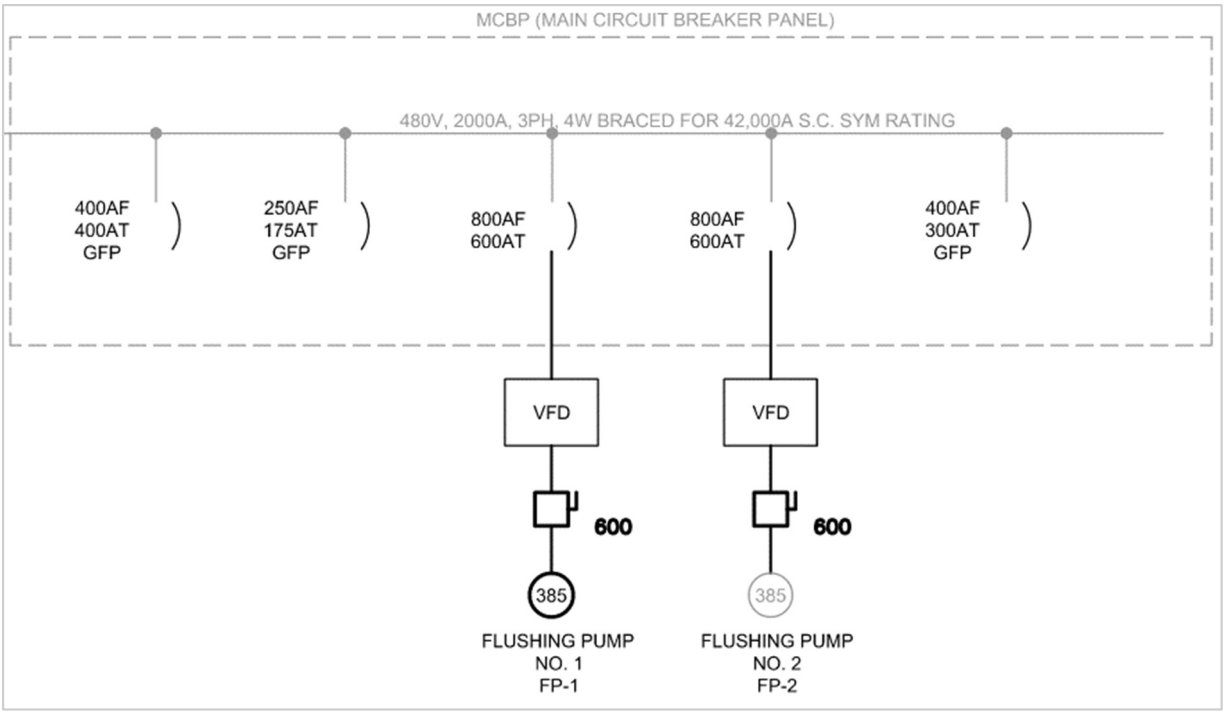
Figure 4-6. Chemical Feed Pumps Power One-Line



4.5.6 New Basin Flushing System

The flushing water pumps will be changed from constant to variable speed and be controlled by VFDs instead of the existing reduced voltage soft starters (**Figure 4-7**). All electrical equipment associated with the pumps will be replaced including VFD power cables and pump seal leak and protection relays. The new VFDs will be in the Process Building electrical room. The existing pump not expected to be replaced will need to be compatible with VFD operation which will be determined during design.

Figure 4-7. Variable Speed Flushing Pump One-Line



4.5.7 New Basin Dewatering System

Basin dewatering pumps will be controlled by the new MCC-P1. All electrical equipment including pump seal leak and protection relays will be replaced.

4.6 Instrumentation & Control

4.6.1 Overall Basin Control System

The overall facility control system will be replaced with the Emerson Ovation Control System (OCS) platform as summarized in **Table 4-3.** The system will consist of two redundant Ovation controllers, one in the Process Building and one in the Headworks Building, to control the basin's overall control system. The new control system will be integrated into the existing Ovation infrastructure at the WRRF Plant Control Center (PCC) which will interface to the existing root switches, database server, domain controller, and historian.

The proposed OCS panels will consist of redundant Ovation OCR3000 controllers (Drop numbers to be assigned by GLWA), which will replace the Allen-Bradley ControlLogix, and CompactLogix PLCs used in the existing system. Ovation OMC100 microcontrollers will replace the Allen-Bradley MicroLogix controllers used in the roller gate control panels.

Table 4-3. Hubbell-Southfield CSO Facility Control System

Panel Area	Existing Device	Proposed
Process Building Main Control Panel	Allen-Bradley Controllogix Plc	Ovation Ocr3000 (Redundant)
Headworks Building PLC Control Panel	Allen-Bradley Compactlogix Plc	Ovation Ocr3000 (Redundant)
Air Dam Control Panel	Allen-Bradley Controllogix Plc	Hardwire To Headworks Ovation System
Influent Roller Gates Control Panel	Allen-Bradley Micrologix	Ovation Omc100
Bypass Roller Gates Control Panel	Allen-Bradley Micrologix	Ovation Omc100
Effluent Roller Gates Control Panel	Allen-Bradley Micrologix	Ovation Omc100
VR-8	SCADAPACK	Ovation OCC100
Radio/Rotork Panel	Allen-Bradley Slc 5/05	Demo

The existing uninterruptible power supply (UPS), located in the main Process Building electrical room, will be used to feed the new Ovation system components. The existing UPS bypass switches will be demolished as needed for existing components being removed from the UPS. A new UPS system will be added under this project to provide power to the Headworks Building Ovation system controllers. Ovation input/output (IO) power at each building will be accomplished through the Ovation redundant power supplies powered from two separate 120VAC power feeds.

Ovation standard universal IO base/backplanes will replace the existing Allen-Bradley IO modules and support the following IO module types based on GLWA's standardized models:

- Analog Input (4-20mA)
- Analog Output (4-20mA)
- Digital Input 0-120VAC
- Digital Output 0-120VAC. Either G2R or KUEP interposing relays may be used located directly on the Ovation backplane or via DIN rail mounted accessory connected via cable to a digital output IO module.

In addition to existing IO points within the field, additional IOs will be added to support the following new and upgraded systems:

- The Rotork PakScan P3 network and remaining field devices will be replaced by hardwired IO points for commands and feedback. This includes flushing valves (FV-06 thru FV-27), the basin slide gates (BSG-1 thru BSG-5), and influent slide gates (ISG-1 thru ISG-4).
- Additional IO points for the upgraded basin flushing system.
- Upgrade the chemical system with an additional storage tank. Include new level indications and high alarms at the chemical fill stations. The control system logic will be modified to provide remote control capability of the chemical system. A new TRC concentration analyzer will be installed downstream from the chemical feed point to enable the system to perform flow-paced and TRC-paced within the control system.
- New local and remote controls for the dewatering pumps.
- All existing controls for mixer fans that may be retained near the influent screens and other systems.
- Monitoring of the HVAC system alarm points.
- New local and remote controls for automated use of the river gate for filling the flushing reservoir
- New local and remote sump pump controls as needed
- New remote level sensor sites for monitoring only

The following non-Ovation (e.g., third party) devices will interface to the Ovation system via Ethernet IP:

- Power quality monitoring systems
- Generator monitoring
- Variable Frequency Drives
- Gas monitoring system in the chemical storage areas

The new network will consist of a redundant pair of fanout switches that will be used for Ovation traffic and switch model numbers to match GLWA's latest networking standards. Each fanout switch will have a fiber uplink to communicate with their respective Ovation root switches at the WRRF PCC.

The following Ovation devices will have redundant connections to the fanout switches:

- Two pairs of redundant Ovation Controllers
- Ovation Database Server Workstation in CSO control room
- Ovation Operator Workstation 1 in CSO control room
- Ovation Operator Workstation 2 in CSO control room
- Ovation Operator Workstation in Headworks Building - Due to the distance to the Headworks Building from the Process Building, redundant fiber-optic communication between the two Ovation controller pairs will be used.

Account policies and Ovation roles will be configured in accordance with GLWA's cybersecurity standards.

The Ovation workstations include dual homed network connections for redundancy and connect directly to the Ovation fanout switches. The Ovation workstations will be loaded with the same Ovation software revision level as the main WRRF PCC Ovation system:

- Ovation database server (Process Building Control Room) will support 2 monitors; 2 desktop mounts.
- Operator workstation 1 (Process Building Control Room) will support 3 monitors; 2 desktop mounts and a 50-inch wall-mounted display.
- Operator workstation 2 (Process Building Control Room) will support 3 monitors; 2 desktop mounts and a 50-inch wall mounted display.
- Backup operator workstation (Headworks Building) will support 1 monitor; 1 desktop mount.

All Ovation graphics will be developed using the GLWA standard ISA high-performance graphics platform.

4.6.2 Chemical System

The Chemical Feed system will be enhanced to include new tank level indications and high alarms for the existing and new storage tank and new truck fill station. The Chemical system and the new VFDs for the chemical feed pumps will have both local and remote control through the Ovation Control system. The system will include that capability for local and remote manual control; automatic control will be in the Flow-paced, TRC-paced, or CT-control modes.

The system will have automatic adjustment capabilities for chemical flow, which will be based on the influent flow rate and real-time TRC readings. Metering pumps will be controlled using different modes: flow-pacing mode with a set dose point based on flow signal, TRC-pacing mode with a residual setpoint using flow signal and TRC readings, or CT-control mode with a CT setpoint utilizing a combination of flow and residual signals. Existing sampling pumps (to remain) will be used to pull CSO samples to the TRC analyzer from specified locations in the basin.

TRC signals can be utilized to fine-tune the chemical feed flows to the process, with an adjustment range of up to 30% in either direction. The existing Total Suspended Solids (TSS) probe will be replaced to monitor the water quality of CSO, and the location will be determined to ensure reliable and efficient operation. This data collection will help establish a correlation between TSS levels and the required chemical dosage, providing valuable insights for process optimization and control.

4.6.3 Basin Flushing System

The control system will be upgraded to include control and monitoring of the additional VFD for each flushing pump. The control system will automatically control the speed of the VFD, adjusting to the correct speed for the various flushing zones in the basins. Control system modifications will address the existing flushing zone valves, and other additional control and monitoring point requirements to incorporate the changes within the control system for local and remote control. The new system will incorporate automatic control of the river water gate outside of the flushing water reservoir, opening it to maintain water level in the effluent channel when the flushing pumps are operating. The pumps will not be allowed to start if the level in the effluent channel is below a low limit. An existing process water valve will be used to fill the effluent channel if required with secondary water fed from the existing potable water main connection.

4.6.4 Basin Dewatering System

The dewatering system consists of 2 automatic gravity drain valves, 4 dewatering pumps, and 2 sump pumps that operate in an alternating sequence, and a discharge flowmeter. This project will replace all 4 dewatering pumps. The new control system will provide local and remote control of the pumps. The new sump pumps can be started after the dewatering pumps are at their cutoff level. The sump pumps have their own control panel that also controls 2 electric actuated discharge valves on each pump. These valves are actuated to alternate the discharge flow between a grit suspension nozzle in the pump and the discharge pipe to the interceptor. These controls will be modified as needed to provide for reliable sump operation.

4.6.5 Fire Alarm System

The Simplex Fire Alarm system will be updated to include the proposed Chemical Storage Building and additional areas as required.

4.6.6 Replacement of Instrumentation and Control Systems Wiring/Cable

All instrumentation field wiring and cables associated with the basin control systems are 25 years old and will be replaced.

4.6.7 Overall Basin Instrumentation Upgrades

Replace instruments as detailed in the Condition Assessment Report section 6.0 ‘Instrumentation and Controls’. New instruments will adhere to current GLWA standards.

4.6.8 Gate Structure VR-08 Upgrades

Pressure and level sensing instrumentation at the existing VR-08 gate structure located on Michigan Avenue will be replaced. The existing Schneider SCADAPACK controller will be replaced with an Ovation OCC100 controller.

4.6.9 Upstream Level Sensor Upgrades

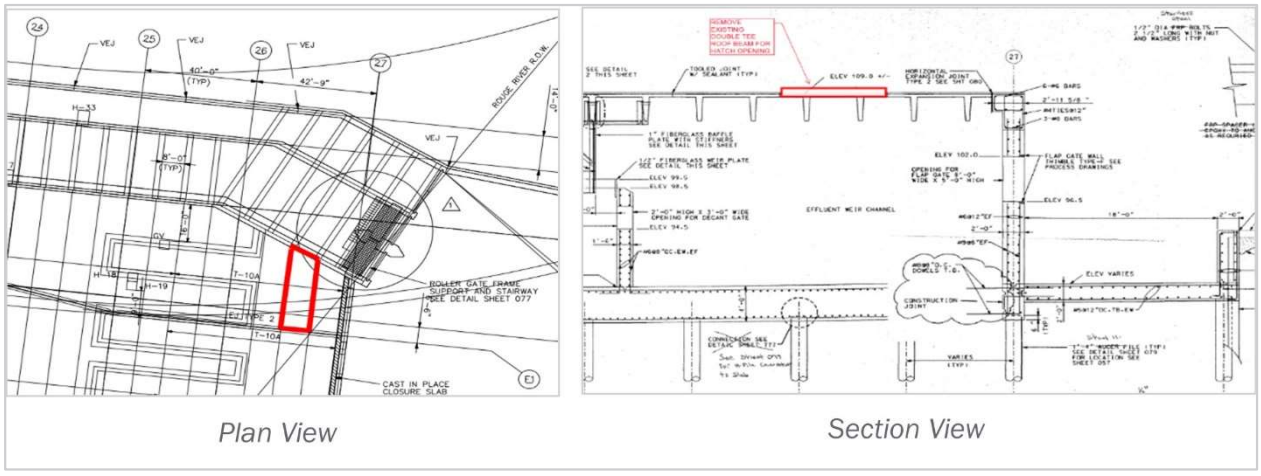
Reactivate up to 3 level sensors within upstream locations and connect data to the Hydraulic Viewer Tool and Ovation. The existing sites will be rehabilitated to include new sensing equipment, power, and communications systems. The sensors are recommended to be replaced early in the project to support construction activities.

4.7 Architectural

4.7.1 New Hatch Opening

The basin lacks the access required to lower large equipment into the Effluent Channel for cleaning and maintenance. A new removable covered opening in the existing basin roof over the Effluent Channel will be constructed to expand access. The hatch will be close to the access roadway in the southeast corner and will be designed for ease of access from the driveway. Complete removal of a 10-foot-wide double tee will provide an opening large enough to lower a bobcat or similar-sized equipment into the basin. See Error! Reference source not found.8 for plan and section views.

Figure 4-8. New Hatch Concept for Effluent Channel



Plan View *Section View*

4.7.2 Existing Process Building

The sampling area, including sampling sink, will be moved back to the odor control room based on compliance with NFPA 820, and NEC Electrical Room Classification based on the potential hazard of the samples. New metal lab casework will be configured in the odor control room and will include a sampling sink and drying rack to accommodate the new sampling requirements. The existing laminate casework in the open area will be replaced with new, prefinished, metal lab casework and lab countertop with integral sink and upper wall cabinets. Work in the Process Building will also include new interior finish upgrades and renovation of a portion of the existing locker room/storage room area to convert it into a second single-use toilet room, break room, and enlarged locker space.

Additional improvements include:

Doors and Hardware – Replace the walk door/ frame and replace with a new custom door with a 1-½" high sloped curb at both the OHD and the walk door locations.

Room Finishes – Floors and ceiling coating/covering systems. Replace various damaged acoustical ceiling tiles. Replace ceramic tile floors with new trolled-on epoxy coating, and paint floors where applicable.

4.7.3 Chemical Storage Building

An additional sodium hypochlorite storage tank will be located in the new Chemical Storage Building. The exterior finishes and design will match the existing buildings on site. A personnel access door will be included along with glass block for improved lighting. The ability to remove a section of the exterior wall to allow for future replacement of the storage tank will be included. Rooms for chemical storage, mechanical and electrical equipment will be provided.

A new safety platform will be added to the top of the existing chemical storage tanks to provide for access.

4.8 Site/Civil Improvements

4.8.1 Basin Roof and Ponding Repairs and Modifications

Ponding over the Dearborn and Shunt Channels will be eliminated by filling in low spots with bonded concrete topping or other improvement. To create positive drainage, additional bonded topping will need to be installed over the entire surface of both channels to shed the water completely to the east, or to the east and west. The structural capacity of the channel roof slabs will be reviewed during design to determine how much, if any, topping can be added due to the increased weight.

4.8.2 Security Fencing/Gate Removal and Replacement

The Hubbell-Southfield CSO Facility site includes 4,788 feet of cyclone fencing ranging in height from 5 to 8 feet, a 24-foot double leaf gate to enter the access drive, an automated cantilever gate to enter the basin facility, and 5 miscellaneous gates along the perimeter. The security fencing around the site is in fair to poor condition. The fencing along the asphalt access drive is generally in worse condition than the fencing around the facility. An alternative to replacing the entire fence would be replacing the fence along the access drive.

The proposed fencing would replace the existing fencing in kind with some improvement. The existing fencing uses tension wire at the top and bottom; the proposed fencing should replace the tension wire at the top with a top bar to prevent sagging of the fencing and fabric. See **Figure 4-9** for a standard detail of the fencing described. Posts should be installed in concrete foundations. Privacy fabric should be installed where the golf course is adjacent to the basin for aesthetic purposes (**Figure 4-10**).

Figure 4-9. Security Fence Typical Section

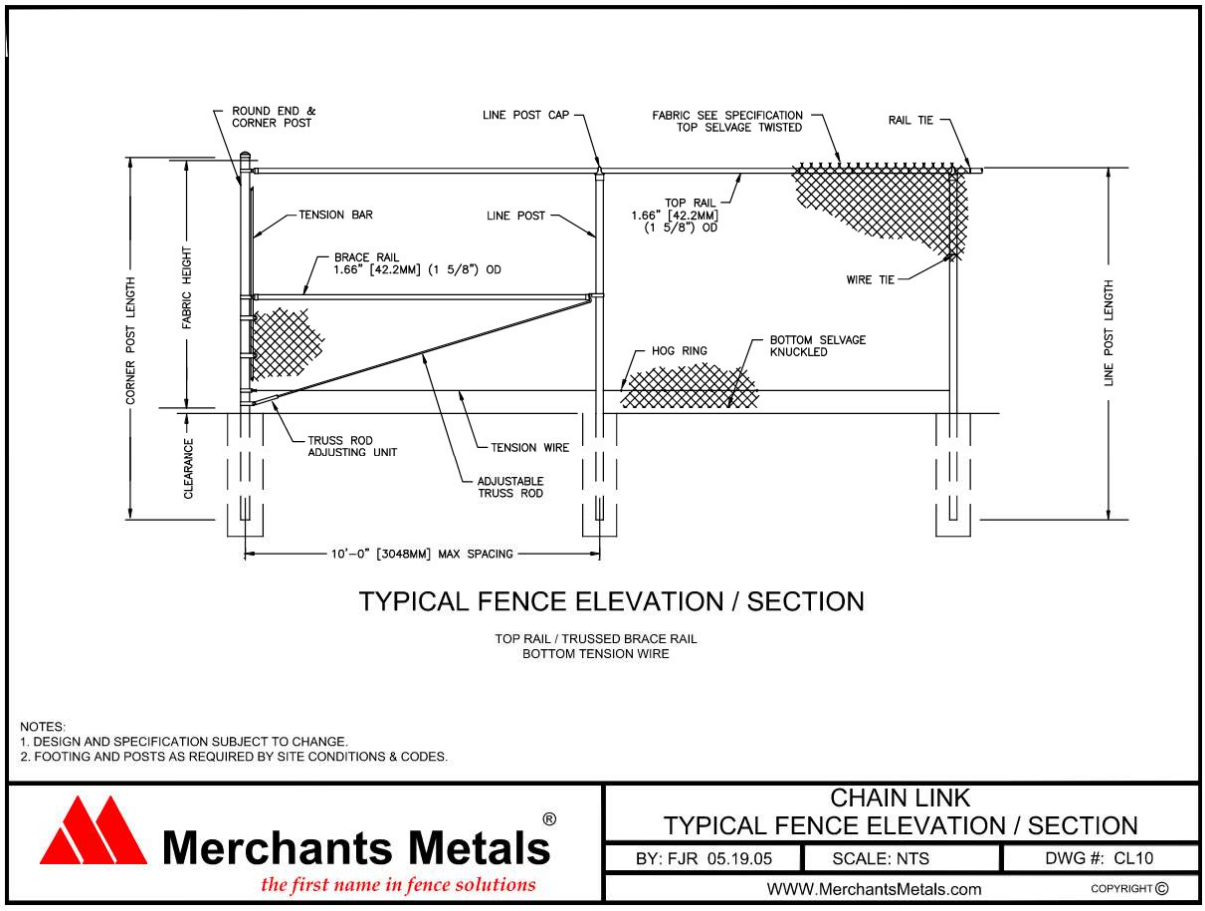
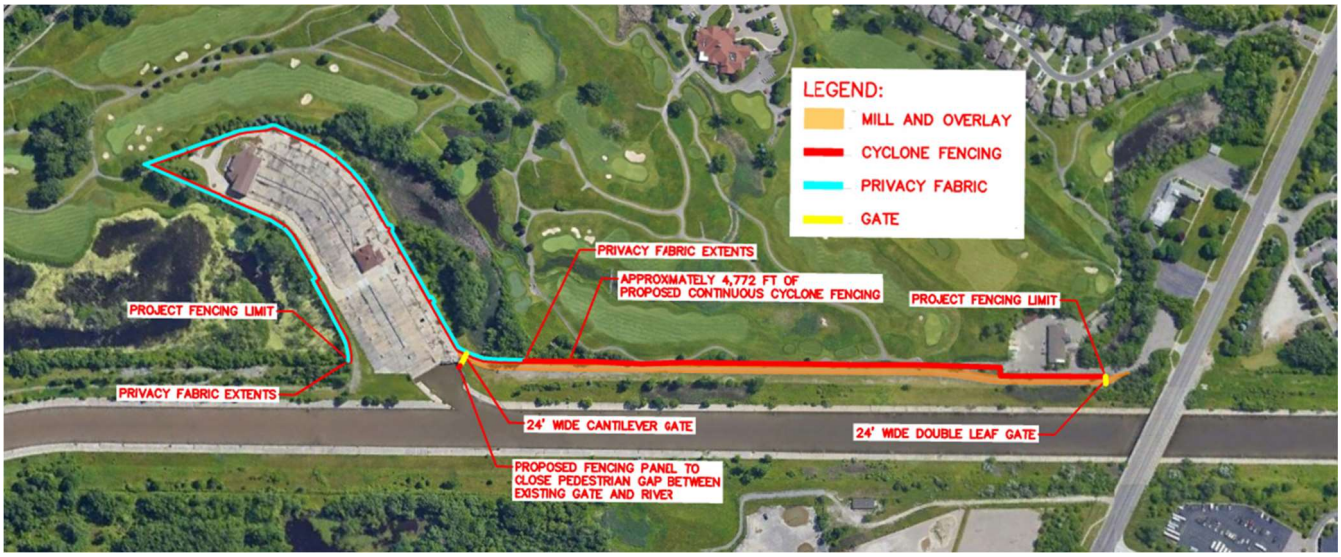


Figure 4-10. Proposed Fencing Replacement



The existing gates require varying degrees of repair/removal. The existing cantilever gate was not discussed as part of the needs assessment and replacement has not been recommended. However, GLWA has noted they would like to close a gap on the southwest side between the gate and the channel with additional fencing so that pedestrians cannot walk into the facility.

The 24-foot-wide, double leaf gate used to gain access to the access drive will be replaced in kind. The 3 to 4 additional gates around the perimeter fencing that provide access to the golf course or vice versa will be removed. Typical fence sections will be installed at these locations to match the proposed adjacent fencing. GLWA requests a concrete maintenance strip be installed along the base of the proposed fencing. GLWA has also indicated that the fence construction improvements may be completed in a separate GLWA construction contract due to budget constraints. Design and coordination with the golf course will be included under the current project. Services during construction may be included if the construction is completed concurrently.

Access/Service Driveway Resurfacing

The access drive is defined as the asphalt drive starting at the Rotunda Road approach and ending at the concrete basin. The service drive is defined as the concrete drive adjacent to, around, and through the basin.

It is recommended to mill and resurface the existing access drive. There appears to be no structural issues with the drive's ability to handle GLWA vehicles. The types of deterioration occurring on the drive can be corrected with a mill and resurface. After milling, any visible remaining cracks should be sealed before resurfacing. There is also ponding occurring on the access drive. The drive should be resurfaced with a crown to shed water off the roadway. GLWA has also communicated that the access drive resurfacing construction may be completed in a separate GLWA construction contract. Design will be included under the current project. Services during construction may be included if the construction is completed concurrently.

4.8.3 Golf Course Drainage Culvert

Blockage of the existing culvert was not known during the CS-299 Needs Assessment and was later discovered during discussion with the golf course superintendent. The City of Dearborn provided the as-built figure of the existing culvert shown in **Figure 4-31**. The majority of the culvert needs to be removed and replaced, as shown in **Figure 4-42**, since the damage is located somewhere under the access drives.

Figure 4-31. Existing Golf Course Drainage Culvert

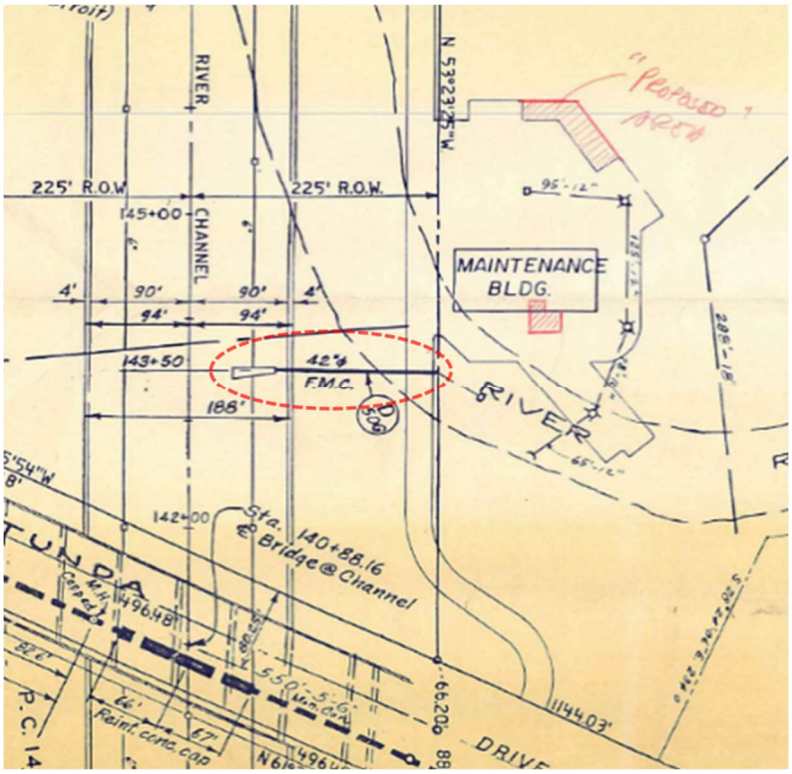
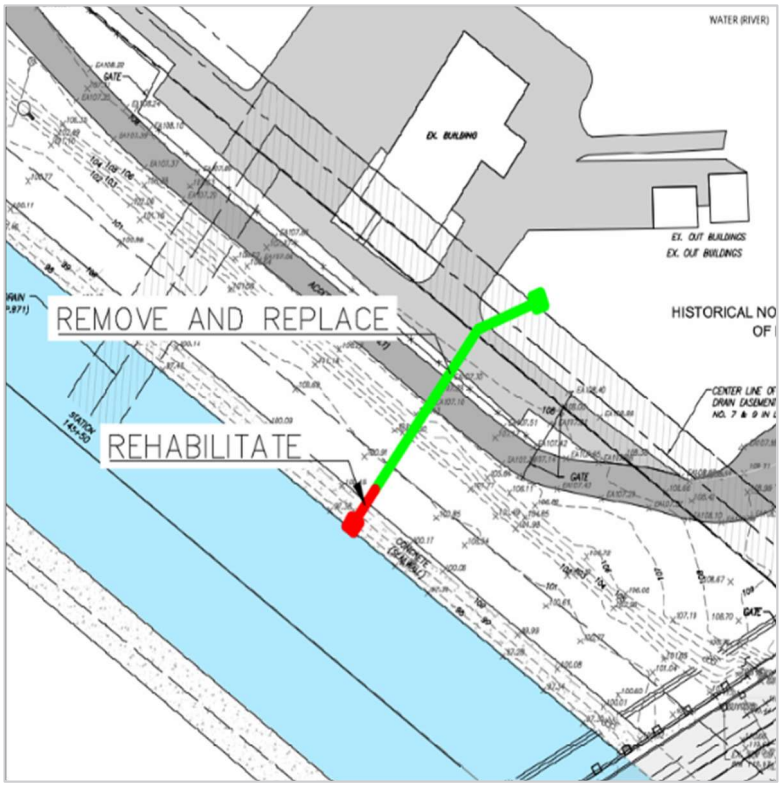


Figure 4-42. Proposed Culvert Replacement



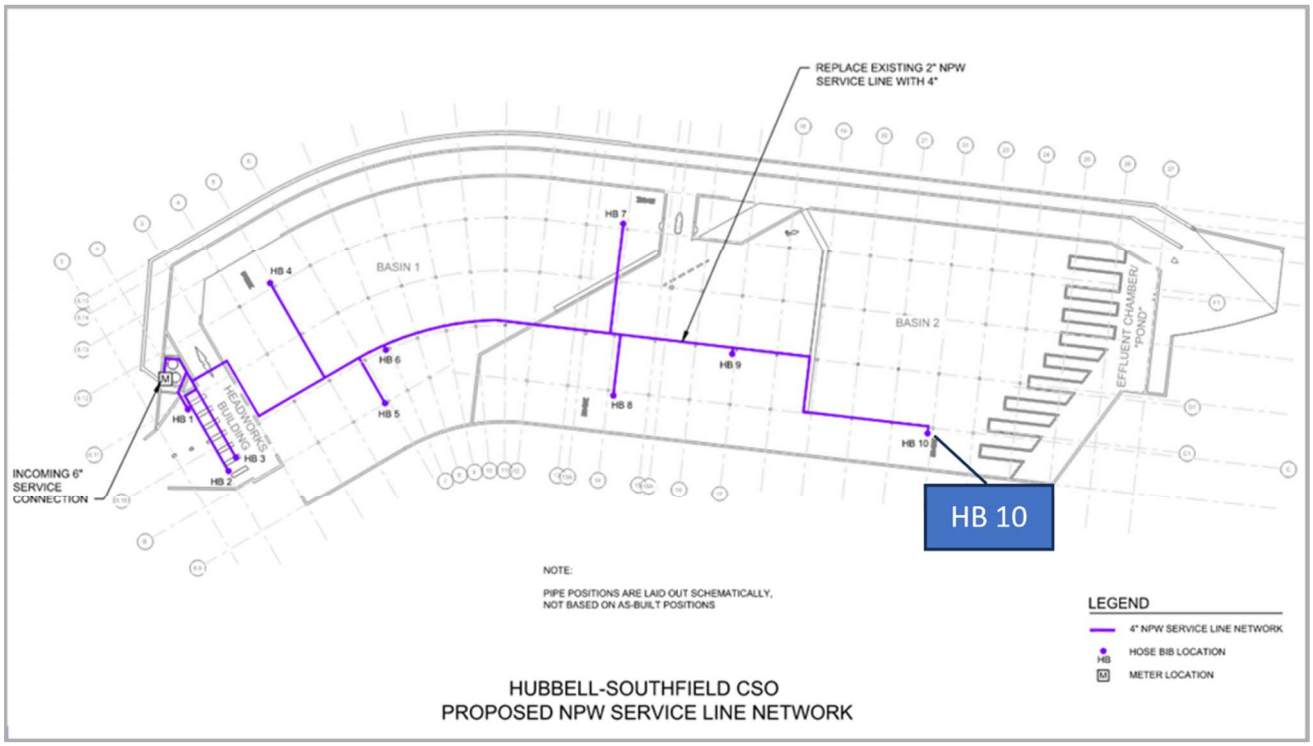
Open cutting and replacing the culvert from the inlet structure to an acceptable distance away from the outlet on the Rouge River side is recommended. The distance from the Rouge River concrete sidewalls should be approximately 20 feet from the culvert outlet. The objective is to remain out of the area of influence from the topmost portion of the concrete seawall. The remaining portion of culvert to the outlet should be cleaned and rehabbed with an interior liner filling the annular space between the existing culvert and liner. The remaining culvert extent should be replaced with reinforced concrete pipe to handle the vehicle loads on the access drive. A manhole should be added in the replaced section of the culvert to improve access for routine maintenance and cleaning.

The culvert will be inspected and cleaned during construction to allow for the evaluation of culvert damage before determining the extent of the damage/repairs. A unit price item will be included in the bid tab for this work. Construction considerations for damming the Rouge River side of the culvert are important. Construction next to a body of water requires additional PPE and safety considerations. An inflatable rubber culvert balloon may be used to dam the water during construction to eliminate the need for cofferdams and concrete seawall repair in the Rouge River.

Non-Potable Water System

Existing non-potable water piping consists of a connection to a 6-inch-diameter water main within the Headworks Building. After backflow prevention, a 2-inch-diameter branch is taken across essentially the full length of the basin from north to south supplying water to hose bibbs along the length. A 4-inch-diameter line is proposed to replace the existing 2-inch- diameter line (**Figure 4-53**) to significantly improve flow and pressure at the hose bibs. At existing hose bibb locations, a proposed 1.5-inch-diameter line, ball valve, and quick connect fitting will be installed for connection of a 1.5-inch-diameter hose. This upgrade will raise the capacity of the piping system header at the far end of the basin (header above HB 10 in **Figure 4-53**) from approximately 50 gpm to 320 gpm. However, to facilitate handling by personnel, the 1.5-inch-diameter hose will generally convey about 160 gpm of flow. Based on this, up to two hoses may be used simultaneously without significant reduction in flow. The length of the hoses was assumed to be 25-feet. As part of the design, two alternatives will be considered to prevent the new piping from freezing and rupturing: insulation and draining the lines prior to cold weather.

Figure 4-53. Proposed Hose Bib Supply Line improvements



4.9 HVAC/Plumbing

4.9.1 Existing Process Building

The constant volume packaged air-conditioning unit, PACU-1, and associated gas-fired duct heater, DHU-1, and air-cooled condensing unit, ACCU-1, will be replaced with a variable air volume air-handling system with 5 zoned VAV boxes with reheat coils, indirect gas-fired furnace section, and DX cooling coil with air-cooled condensing unit. The HVAC zones shown in **Table 4-4** will use individual space thermostats for zone temperature control.

Table 4-4. Proposed Existing Process Building HVAC Zones

Variable Air Volume (VAV) BOX	Reheat Provided	Area Served
VAV-1	No	Electrical Room (unoccupied space)
VAV-2	Yes	Work Room/Corridor/Mechanical
VAV-3	Yes	Office
VAV-4	Yes	Storage/Men's Locker/ Women's Locker/Toilet
VAV-5	Yes	Storage/Corridor

The new air handling unit capacity and individual zoned VAV boxes will be sized to match the heating, ventilating, and air-conditioning loads that will be recalculated during the design phase. The following design parameters will be adapted to site conditions and local building codes:

- Winter Ambient (min.) Design Temperature 3.2°F
- Summer Ambient (max.) Design Temperatures 90.5°F Dry Bulb
  73.2°F Wet Bulb
- Winter Interior (min.) Design Temperatures 72°F (occupied spaces)
  60°F (unoccupied spaces)
- Summer Interior (max.) Design Temperatures 74°F (occupied spaces)
  80°F (unoccupied spaces)

The minimum ventilation rates will be provided as required by the Michigan Mechanical Code, Table 403.3.1.

- A minimum ventilation rate of 5 CFM per person plus 0.06 CFM per square foot floor space will be provided for occupied spaces including work room, office, and storage room (potential future office).
- A minimum ventilation rate of 0.06 CFM per square foot of floor space will be provided for corridors.
- A minimum exhaust air-flow rate of 0.25 CFM per square foot of floor space is required for locker rooms. 100 CFM will be exhausted from each of the men's locker and women's locker rooms to maintain the existing exhaust ventilation rate.
- A minimum exhaust air-flow rate of 70 CFM per toilet plus 50 CFM per shower head are required for toilet/shower areas. 200 CFM will be exhausted from the toilet room to maintain the existing exhaust ventilation rate.
- 100 CFM will be exhausted from the janitor closet to maintain the existing exhaust ventilation rate.

The VAV boxes will include reheat coils in accordance with the Michigan Mechanical and Energy Codes. The reheat coils will be electric resistance type. Electric resistance reheat coils are recommended in lieu of hot water reheat coils due to the scale of the system. A hot water heating system would require the investment and space allocation for boilers, pumps, piping, air separator, expansion tank, and chemical pot feeder.

The existing supply and return ductwork will be further evaluated during the design phase and modified and/or provided with new supply and/or return ductwork to each zoned space to provide adequate air distribution and air recirculation. The ductwork will be galvanized steel to match existing ductwork material.

Individual supply air grilles will be provided in the locker and toilet rooms in accordance with the Michigan Mechanical Code to prohibit transfer air from one occupied space to another.

Standard, stand-alone automatic temperature controls with DDC processor controls (that are non-proprietary, accessible and compatible with the GLWA BMS system) will be provided for the packaged air-handling unit and associated air-cooled condensing unit, control air dampers, VAV boxes, and exhaust air fan.

The odor control room ventilation equipment, including the make-up air unit, HVU-1, exhaust fan, EF-3, and the associated control air dampers, will be replaced with similar equipment and upgraded with DDC processor controls. The ventilation rate will be 6 ACH during the summer months and 3 ACH during the winter months. The ventilation system needs to operate continuously in compliance with NFPA-820 and the ventilation controls will be upgraded to include automatic control including summer/winter ventilation modes to reduce ventilation energy costs in compliance with NFPA-820. The existing ductwork will be evaluated during the design phase and replaced as necessary.

The dewatering room ventilation equipment, including the make-up air unit, HVU-4, exhaust fan, EF-7, and associated control air dampers, will be replaced with similar equipment and upgraded with DDC processor controls. The ventilation rate will be increased from 3 ACH to 6 ACH to comply with NFPA-820, improve indoor air quality, and reduce surface corrosion. The ventilation system needs to operate continuously in compliance with NFPA-820 and the ventilation controls will be upgraded to include automatic temperature control and local room temperature monitoring with the capability to tie into the plant's SCADA system as required by GLWA. New supply and exhaust ductwork will be provided and sized for the increased system airflow and constructed from aluminum for corrosion resistance.

New HVAC system DDC controls will integrate with the plant's existing building management system (BMS) located at the WRRF for HVAC system monitoring and control. GLWA will provide details of the existing BMS to be incorporated into the design. Additional desktop PC and DDC graphics that match the existing BMS at the plant will be provided as required.

4.9.2 Headworks Building

The odor control room ventilation equipment will be partially replaced. The make-up air unit HVU-2 is in good and reliable condition and will remain. Unit EF-3 will be replaced. To accommodate additional exhaust ductwork in the odor control and hypochlorite rooms, EF-1 and EF-2 will be replaced. Additional monitoring DDC controls will be added to allow for remote monitoring of the system operation to the extent allowed. Remote access to the DDC system will be incorporated in the existing monitoring system in the WRRF. The new controls will replace the existing control panel and operate HVU-2 and exhaust fans continuously in compliance with NFPA 820.

Similar to the odor control room, the headworks room ventilation equipment, including make-up air unit HVU-3, are in good and reliable condition and will remain. Additional air monitoring DDC controls

will be added to allow for remote monitoring of system operations to the extent allowed as well as remote access at the WRRF.

4.10 Geotechnical

Geotechnical information from the original construction is available and has been used as a reference for the current project. Additional soil borings and geotechnical analysis as required for design of the proposed improvements will be conducted to support the work.

Based on the subsurface conditions at the site, the unknown limits of fill placement associated with the prior construction, and the presence of several below grade structures to be protected, it is anticipated that the proposed chemical storage tank structure will be pile supported.

To support the geotechnical design and development of foundation recommendations, a minimum of one soil boring should be advanced to the bedrock surface. Samples obtained from the boring should be tested in a laboratory to develop the soil strengths and properties necessary to complete the foundation design for the proposed chemical storage tank structure.

5.0 DESIGN BASIS (CODES AND STANDARDS)

5.1 GLWA Specific Requirements

The following GLWA standards and templates may be applicable to this project and will be applied as appropriate:

- Instrumentation, Loop Drawings Legend (Template)
- Instrumentation, Loop Drawings Discrete (Template)
- Instrumentation, Loop Drawings Analog (Template)
- Instrumentation, Termination Sheet (Template)
- Instrumentation, Alarm Rationalization Table (Template)
- Instrumentation, Database Table (Template)
- Process Detail, Seal Water (Template)
- Instrumentation, Point ID Breakdown
- Conduit Layout Example
- Conduit Schedule Example
- Control Panel Checkout Example
- Riser Diagram Example
- Network Diagram Example
- Power One-line Example
- High Performance Graphic Example
- Emergency Response and Evacuation Map Example
- Control Panel Factory Acceptance Test (FAT) Checklist Example
- Controls Workshop Agenda Example
- Job Aids Example
- Process Description Example
- Software Description Example
- Site Specific Equipment Data Sheets Example
- Design Level VFD Schematic Example
- Design Level Isometrics Example
- Concrete Investigation Mapping Example
- Electrical One-line Requirements
- Electrical Plan View Requirements
- Electrical Schematic Requirements
- Electrical and Instrumentation Detail Requirements
- Process Flow Diagram Requirements
- Process and Instrumentation Diagram Requirements
- RCD/RCM design recommendations will also be developed to provide for a more reliable design that reduces potential for failure of an asset, maintenance, or operations and increases reliability.

5.2 Civil

5.2.1 Codes/References

The most recent versions of codes, standards, and/or guidelines from the following organizations will be used where applicable during the design phase:

- American Association of State & Transportation Officials (AASHTO)
- American Concrete Institute (ACI)
- American Concrete Pipe Association, Design Manual-Concrete Pipe (ACPA)
- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)
- American Water Works Association (AWWA)
- Americans With Disabilities Act Accessibility Guidelines (ADAAG)
- Charter County of Wayne, Michigan, Department of Environmental Services and Public Services
- City of Dearborn Department of Public Works
- Great Lakes Water Authority (GLWA)
- Michigan Department of Environment, Great Lakes, and Energy (EGLE)
- Michigan Department of Transportation (MDOT)
- National Pollutant Discharge Elimination System (NPDES)
- Occupational Safety and Health Administration (OSHA)
- United States Environmental Protection Agency (USEPA)

5.3 Structural

5.3.1 Codes

Design codes for structural work will include:

- Michigan Building Code (Use edition that is current at time of design. Michigan Building Code specifies the appliable editions of the codes listed below with the exception of ACI 350)
- ACI 318 for concrete design (all concrete not containing or conveying water)
- ACI 350-20 for concrete design (all concrete containing or conveying water)
- ACI 530 and 530.1/ASCE 5 & 6/ TMS402 & 602 – for masonry construction
- AISC 360 – for steel design
- AISI Codes – for cold-formed steel design (codes specified in the Michigan Building Code)
- APA Codes – for engineered wood design (codes specified in the Michigan Building Code)
- ASCE 7 for structural design loadings
- AWC NDS – for wood design
- PCI – for precast concrete design
- SDI – steel deck design
- SJI – steel joist and joist girder construction

5.3.2 General Structural Considerations

Other structural considerations include:

- The design will incorporate all OSHA requirements for fall, opening, and edge protection.

- Stairs, rails, and guard rails will be designed for loadings specified in the Michigan Building Code (publicly accessible areas and office, lab, and control areas) or OSHA (all other areas not accessible by the general public).
- Exposed metal hatches, embedded steel, handrail, and guardrail will be galvanized steel or aluminum.

5.4 Architectural

5.4.1 Codes/References

Design codes for architectural work will include:

- 2015 Michigan Building Code
- 2015 Michigan Rehabilitation Code
- 2015 Michigan Plumbing Code
- 2015 Michigan Mechanical Code
- 2017 MEC, Michigan Electrical Part 8 Rules, January 4, 2019
- A117.1-2009 Accessible and Usable Buildings and Facilities
- International Energy Conservation Code 2015 (IECC 2015)

5.4.2 General Architectural Considerations

The design will incorporate all OSHA requirements for fall, opening, and edge protection.

5.5 Process

5.5.1 Codes/References

The most recent versions of codes, standards and/or guidelines from the following organizations will be used where applicable during the design phase. They include, but are not limited to:

- Ten State Standards – Recommended Standards for Wastewater Treatment Facilities; Policies for the Design, Review, and Approval of Plans and Specification for Wastewater Collection and Treatment Facilities, A Report of the Wastewater Committee of the Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers.
- American National Standards Institute (ANSI)
- American Society of Mechanical Engineers (ASME)
- American Society for Testing and Materials (ASTM)
- American Water Works Association (AWWA)
- American Welding Society (AWS)

5.5.2 General Process Considerations

Process design for the Hubbell-Southfield CSO Facility improvements is generally based on the following criteria that are used to guide development of the design:

- Replace equipment or system that does not adequately perform its intended function.
- Emphasize Reliability Centered Design concepts prioritizing the overall reliable operation and maintenance of the facility.

- Standardize equipment, where practical, across GLWA CSO facilities to simplify operations and maintenance needs.

5.6 Mechanical

5.6.1 Codes/References

Design codes and standards for mechanical work will include:

- Ten State Standards – Recommended Standards for Wastewater Treatment Facilities (2014)
- National Fire Protection Association (NFPA)
  - NFPA-820 – Standard for Fire Protection in Wastewater Treatment and Collection Facilities (2020)
  - Michigan Mechanical Code (2015)
  - International Mechanical Code (2015) with amendments
- Michigan Plumbing Code (2015)
  - International Plumbing Code (2015) with amendments
- Michigan Energy Code (2015)
  - International Energy Conservation Code with amendments
- American National Standards Institute (ANSI)
- American Society of Testing and Materials (ASTM)

5.7 Electrical

This section presents the general electrical design criteria for the electrical power system to support the planned improvements under this project. The design will provide a safe and reliable means of delivering and distributing power while maintaining ease of maintenance.

5.7.1 Codes and Standards

Electrical design will conform to the latest editions of the following applicable standards and codes:

- City of Dearborn Building Code (with state amendments)
- City of Dearborn Fire Code (with state amendments)
- National Electrical Code (NEC - NFPA 70, 2017)
- National Electrical Safety Code (NESC)
- Life Safety Code (NFPA 101)

Standards and codes of the following organizations will also govern, as applicable:

- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)
- Federal Specification - Fed Spec
- Illuminating Engineers Society (IES)
- Institute of Electrical and Electronic Engineers (IEEE)
- Insulated Cable Engineers Association (ICEA)
- National Electrical Manufacturers Association (NEMA)

- National Fire Protection Association (NFPA)
- Occupational Safety and Health Act (OSHA)
- Underwriters Laboratory (UL)

5.7.2 Electrical Power Distribution System

Design of the power distribution system for the project will follow the current design guidelines as recognized by IEEE, NEC, and current industry standards.

5.7.3 Load Profile

The Hubbell-Southfield CSO Facility improvements project includes the addition of a new building to house a new chemical storage tank, new basin flushing system, and new chemical feed system, along with other improvements.

The new electrical loads will include exhaust fan(s), lights, and receptacles for the new Chemical Building, and new outdoor receptacles and lighting around the Process Building, new lights at the outfall, new lights along the access road, new process cameras installed by others, and new TRC analyzers. These new loads are in addition to what is already at the facility.

The replacement electrical loads will include a new flushing water pump, new dewatering pumps, new chemical feed pumps, and sump pumps.

5.7.4 Electrical System Layout

The Hubbell-Southfield CSO Facility is currently powered by two different power sources, a normal power supply and a standby power supply. The normal power supply is a 480/277V, 3-phase, 2,500 ampere DTE service from a DTE-owned, 1,500 KVA pad-mounted transformer located just outside of the Process Building. The standby power supply is a 600 KW, 750 KVA, 480/277V, 3-phase, standby generator located just outside of the Process Building. The automatic transfer controller (ATC) within the main distribution panel (MDP) automatically starts the generator upon normal power failure and powers the critical loads within the facility.

5.7.5 Distribution and Utilization Voltages

The following distribution and equipment utilization voltages and ratings will generally be used. Depending on the specific equipment requirements determined in design, there could be some exceptions.

- General Power Distribution, 480 V, 3-phase
- Motors, 1/2 hp and larger, 480 V, 3-phase
- Motors, smaller than 1/2 hp, 120 V, single phase
- Controls, 120 V, single phase
- Site lighting, 480 V, single phase
- Convenience outlets, 120 V, single phase

- Field Instruments (AC) 120 V, single phase

5.7.6 General Design Requirements

The following general requirements and guidelines will be used in the design of electrical equipment and support systems.

Existing Motor Control Center (MCC-H1) Replacement

MCC-H1 is expected to be replaced in kind at the same location. The MCC's main circuit breaker will have an arc flash energy reducing maintenance switch (as required by the GLWA Design Deliverable Criteria (DOR)) which, when activated, will force the circuit breaker to open as quickly as possible thus reducing the risk of arc flash while maintenance is performed on the equipment. When the work is done, the switch can be de-activated, and the circuit breaker will operate as set by the Overcurrent Device Coordination study. Local control (START/STOP, LOR, etc.) for the MCC, (MCC-H2, MCC-P1, MCC-P2), will not be at the MCC, but in a control panel outside of the electrical room. All relays required for motor control and protection will be located within the MCC. The MCC will also be equipped with a Surge Protective Device (SPD) and power monitoring (both required by the DOR) and will have tin-plated bus. The MCC is expected to be replaced at the same location as existing. Temporary power will be needed during the transition. MCC manufacturers will be Square D or Eaton.

Existing Motor Control Center (MCC-H2) Replacement

MCC-H2 will have the same upgrades as MCC-H1 but will be smaller due to the removal of basin mixers from the facility. The main circuit breaker will be changed from 600A to 250A. The MCC is expected to be replaced at the same location as existing. Temporary power will be needed during the transition.

Existing Motor Control Center (MCC-P1) Replacement

MCC-P1 will have surge protection and power monitoring but will remain without a main circuit breaker. The circuit breaker in the switchgear MDP will be upgraded to have an arc flash maintenance switch. The MCC is expected to be replaced at the same location as existing. Temporary power will be needed during the transition.

Existing Motor Control Center (MCC-P2) Replacement

MCC-P2 will be smaller due to the removal of basin mixers from the facility and will have surge protection and power monitoring but will remain without a main circuit breaker. The circuit breaker in the switchboard MCBP will be upgraded to have an arc flash maintenance switch. The MCC is expected to be replaced at the same location as existing. Temporary power will be needed during the transition.

Existing Switchgear MDP Modifications

Since the switchgear was recently upgraded with new power monitoring in 2021 and a new automatic transfer controlling PLC in 2022, the switchgear is expected to be upgraded with replacement power circuit breakers and the addition of surge protection. The circuit breaker replacement will need to be done by Square D services division. Select circuit breakers will be equipped with arc flash maintenance switches. Temporary shutdowns will be required as breakers are replaced, and temporary power may be needed.

Existing Switchboard MCBP Modifications

The switchboard is also expected to be upgraded with replacement circuit breakers and the addition of surge protection. The circuit breaker replacement will need to be done by Square D services division. Select circuit breakers will be equipped with arc flash maintenance switches. Temporary shutdowns will be required as breakers are replaced, and temporary power may be needed.

Power Panels

New 277/480 V power panels will be wall mounted and NEMA rated with a rating suitable for the area classification. Tin-plated copper bussing, a main circuit breaker, and a surge protection device will be provided as minimum requirements. The power panels will be provided with a main circuit breaker with 65 kAIC interrupting capacity, all necessary 1-pole and 3-pole feeder breakers, appropriate grounding provisions, and spare circuit breakers, along with spare finished space for additional circuit breakers. Panels to be replaced in the Headworks building to be in the same location as existing. Temporary power will be needed during the transition.

Lighting Panels

New 120/208 V lighting panels will be wall-mounted and NEMA-rated with rating suitable for the area classification. Tin-plated copper bussing, a main circuit breaker and a surge protection device will be provided as minimum requirements. The lighting panels will be provided with a main circuit breaker with 22 kAIC interrupting capacity, all necessary 1-pole and 3-pole feeder breakers, appropriate grounding provisions and spare circuit breakers along with spare finished space for additional circuit breakers. Panels to be replaced in the Headworks building to be in the same location as existing. Temporary power will be needed during the transition.

Motors

Motors for all equipment will have NEMA premium high efficiency ratings, unless otherwise noted. Motor enclosures will be suitable for the environment in which they are installed. All single-phase fractional HP motors, less than ½ HP will be powered from a 120 V, single phase source. All ½ HP and larger motors will be powered from a 480 V, 3-phase source. The use of 208 V and 277 V, single phase power for any for motors will be prohibited.

Wires and Cables

The following general guidelines will be used for wire and cable sizing, selection, and installation:

- Wire for General Interior and Exterior Use: Single conductor, annealed copper, NEC Type XHHW-2 rated 90 degrees C in dry locations or wet locations, 600 volts.
- Single-pair shielded cable conductors for installation in conduit will be #16 AWG minimum, stranded, tinned copper, polyethylene or extruded PVC/Nylon insulated twisted shielded pair. The shield will be aluminum polyester with 100% coverage. The cable will include a drain wire and PVC jacket. Insulation will be 600 volts and temperature rating 90 degrees C.
- All power wiring will be minimum No. 12 AWG and control wiring will be minimum No. 14 AWG.
- Separate ground wires will be provided in all conduits.
- Each individual wire in power, control, indication, and instrumentation circuits will be provided with identification markers at the point of termination. The wire markers will be of the heat shrinkable tube type, with custom typed identification numbers and will be positioned to be readily visible for inspection. Labeling of power and control circuits will be in accordance with GLWA's requirements.
- No splicing will be provided unless otherwise approved by GLWA for elements such as equipment manufacturer's cables such as light pigtails, float switch leads, pump cables, etc.

Raceways

Specific types of raceways will be chosen for locations vulnerable to damage by moisture, extreme temperature, or corrosion, and considering voltage and cost. The following general guidelines will be used for raceway sizing, selection, and installation:

- Indoor exposed conduits in all areas except corrosive areas will be rigid galvanized steel.
- Indoor exposed conduits in all corrosive areas will be PVC-coated rigid galvanized steel.
- Outdoor underground conduits will be PVC-Schedule 40 and encased in concrete. Aluminum conduits will be provided for all outdoor exposed conduits.
- All underground conduits will be encased with minimum 3-inch-thick concrete of 4,000 psi strength.
- All exposed conduits will be minimum ¾-inch-diameter trade size. All buried conduits will be minimum 1-inch-diameter trade size.
- All conduits will be new.
- Raceways in walls, floors, and ceilings of new buildings will be concealed to the extent possible.
- Number of conduit bends will be limited to an equivalent of 270 degrees on long runs.
- For all conduits entering building from below grade, building walls will be core drilled and conduit sealed to prevent moisture intrusion.
- All wall and floor penetrations will be sealed using approved sealing methods.
- All indoor raceway and equipment support systems in non-corrosive areas will be hot dipped galvanized steel. Cold galvanizing will not be specified.

- All raceway and equipment support systems in indoor corrosive areas and all outdoor areas will be stainless steel unless stainless steel corrosion is a concern. When stainless steel corrosion is a concern, PVC-coated or FRP Strut Supports and fittings will be specified.
- Conduits will not be painted.
- Labeling of power and control conduits will be in accordance with GLWA's requirements.
- Conduits installed on the basin roof (grade) will be arranged to not be directly in front of control panels. Ramps, for wheeled carts, will be installed on top of conduits as directed by GLWA. Ramps will not be intended to support motor vehicles.

Grounding Criteria

The new electrical system and equipment will be grounded in compliance with the National Electrical Code (NEC). The non-current-carrying parts of equipment, raceways, and other enclosures will be grounded using equipment grounding conductor. The grounded circuit conductor will not be used for grounding non-current-carrying parts of equipment, raceways, and other enclosures except where specifically listed and permitted by the NEC. Transformer neutrals of wye-connected transformers will be solidly grounded through a grounding conductor connected to the grounding system. A separate grounding conductor will be provided in each raceway independent of raceway material. A separate grounding conductor for each motor will be provided and connected at the motor box. A grounding-type bushing for feeder conduits will be provided at each power panel. Underground and grounding connections embedded in concrete will be UL-listed ground grid connectors. A ground ring complete with ground rods will be provided at each outdoor structure, as permitted by field conditions. Each duct bank will have a grounding conductor. Shielded instrumentation cable will have its shield grounded at one end only, unless otherwise required by the instrument manufacturer.

The existing grounding system was evaluated, and any needed improvements will be made as required by the NEC. Any new grounding system elements will be connected to the existing grounding system. Final grounding system testing using fall potential or other non-destructive method shall be provided by the contractor after construction.

Short Circuit Criteria

For purposes of design, the following short-circuit ratings for various electrical distribution equipment will be used:

- 480 V Power Panels: 65 KA
- 480 V Control Panels: 65 KA
- 208/120V Lighting Panels: 22 KA
- Non-fused Disconnect Switches: 10 KA

Voltage Drop Criteria

For purposes of design, the following voltage drop for various electrical distribution equipment will be used. Steady state voltage drops will be calculated as required. Design will be provided such that

voltage drops will not exceed 3 percent for branch circuits, 2 percent for the feeders and 5 percent overall under steady-state conditions.

5.8 Instrumentation & Controls

This section presents the general Instrumentation and Controls design criteria for the new control system and other planned instrumentation improvements under this project. The design will ease operation and provide for reliable maintenance of the CSO facility.

I&C project components are based on conformance to current Great Lakes Water Authority Instrumentation/Controls Standards, with an emphasis on standardizing control systems across multiple facilities.

5.8.1 Codes/References

Instrumentation and Control design will conform to the latest editions of the following applicable standards and codes:

- GLWA Latest Standards on the Emerson Ovation Control systems
- GLWA Latest Standards on field Instruments and miscellaneous field devices
- City of Dearborn Building Code (with state amendments)
- State of Michigan Building Code (with state amendments).
- City of Dearborn Fire Code (with state amendments).
- National Electrical Code (NEC - NFPA 70, 2017).
- National Electrical Safety Code (NESC).
- Life Safety Code (NFPA 101).

Standards and codes of the following organizations will also govern, where applicable:

- American National Standards Institute (ANSI).
- American Society for Testing and Materials (ASTM).
- Federal Specification - Fed Spec.
- Illuminating Engineers Society (IES).
- Institute of Electrical and Electronic Engineers (IEEE).
- Insulated Cable Engineers Association (ICEA).
- National Electrical Manufacturers Association (NEMA).
- National Fire Protection Association (NFPA)
- Occupational Safety and Health Act (OSHA).
- Underwriters Laboratory (UL).

Applicable Federal and local codes and UL listing requirements will be followed.

The CSO Facility main control system consists of an Allen Bradley PLC Control system with local Allen Bradley PLCs throughout the field. The main operator workstations in the main control room use

Rockwell Factory Talk View SE software. The control system, networks, workstations, and local control system panels will be replaced or upgraded to remove obsolete equipment and to meet the latest GLWA standards. A new Emerson Ovation control system and workstations with new high-performance graphics will be provided under this project. Existing local Allen Bradley PLCs will be upgraded to meet GLWA latest standards and communications.

Additional field devices will be added to monitor and control the modifications to the following systems:

- Incorporate local, remote manual and automatic control mode capability of the chemical feed system from the main control system, including flow-paced and TRC -paced automatic chemical feed modes to the upgraded system
- Provide local, remote manual and automatic control modes for dewatering pumps and flushing system from the main control room
- Provide tank level indication and alarms at both chemical fill stations
- Provide chlorine gas monitoring system in both chemical storage areas
- Process cameras (installed by others) at select locations
- Replace instrumentation and control systems wiring/cable
- VR-8 gate and influent dams
- Remote level sensor site locations (up to three)
- All new and existing outdoor panels require a protective overhead cover from the weather.
- The design shall allow for local control of critical devices while the equipment is being phased over to the new control system.

5.8.2 Main Control System

The main Control System will be an Emerson Ovation hardware and software system with operator workstations. Existing field Rockwell Allen Bradley PLCs will be integrated into the new Ovation system or replaced with Ovation controllers.

5.8.3 Instrumentation and Controls Instrumentation and Devices

Instrumentation and Controls project instrumentation and devices are based on conformance to current Great Lakes Water Authority Instrumentation/Controls Standards, with an emphasis on standardizing the control system across multiple facilities.

5.8.4 Phase-Over

The project consists of a multiple step phase-over construction plan, where the facility must remain in operation during the entire project. Details of facility operation during construction are being reviewed with EGLE. The existing overall control system and local controls must remain in operation except for the processes and equipment that are being demolished within that phase. The new controls for each phase must be incorporated and functioning in the new control system before proceeding to the next phase of construction. Existing controls shall be available during construction

until the new system is installed, tested, and deemed operational, at which point operations will transition to the new system.

The specifications will define a maximum period of time for equipment outages that must be planned in advance and be subject to postponement due to unforeseen basin maintenance and rain events. Provisions to temporarily operate equipment in local manual at the devices will be used wherever possible. The specifications will also describe a suggested method for the contractor to sequence work to minimize the phase-over. The sequence will consider such steps as putting all new equipment power and signals cable/wires and conduits in place within the existing control system to be ready for immediate connection of the new equipment being installed. The sequence will also consider when the local instruments and devices are being replaced or added, new cables/wires and conduits can be connected to terminations in the new Ovation control system.

6.0 CONSTRUCTION SCHEDULE AND SEQUENCING

This section describes key considerations related to scheduling and sequencing of the work.

6.1 Construction Schedule

The allowable duration of construction is dependent on the final scope of the facility improvements and will be revised as the BODR progresses. The GLWA CIP 2025-2029 anticipated project construction duration is currently 4 years. Factors that could impact the construction schedule include:

Wet weather impacts – The Detroit area experiences on average 140 days of precipitation per year. During construction, portions of the facility will be unavailable to the contractor due to safety requirements or operational needs: (1) the potential for wet weather basin inflow; (2) water stored in the basin; or (3) due to conditions where basin cleaning is needed to allow work to proceed. The expected available working time in basin areas needs to be considered especially with regards to Part 41 considerations for allowable shutdowns of portions of the facility.

Equipment delivery times - In recent years, major projects have seen delays or increased durations for procurement of major process and electrical components. Information on anticipated delivery times will need to be considered in development of duration. Electrical equipment procurement times on recent projects have been 18 to 24 months.

A detailed construction schedule will be developed to support the contract duration as the design progresses.

6.2 Maintenance of Plant Operations

The facility must remain in operation to provide for continued service and treatment of CSO throughout the construction period. Due to the expected impacts of wet weather, work in the basin areas will likely require shut down of portions of the CSO facility for at least a portion of the construction. It is anticipated that a single basin can be taken out of service during non-recreation periods with lower likelihood of wet weather events. It is assumed at least two seasons will be allowed for flushing system replacement. Basin 1 and the shunt channel can remain in service while work is occurring within Basin 2 requiring temporary structures to divert flow to the facility outlet channel. Basin 1 can be isolated, and flow treated in Basin 2. Coordination with EGLE will be needed to gain approval for these shutdowns during construction.

Development of the project bidding documents will require that Work Restrictions and detailed guidance be provided to contractors on Maintenance of Plant Operations (MOPO). Temporary measures such as backup power, HVAC, standby chemical storage capacity, and operation control stations will be needed while existing equipment is demolished, and new equipment installed and

tested. Constraints on allowable equipment outages and procedures for equipment shutdown requests will be outlined. Details on these measures will be developed as the design progresses.

Some initial constraints include:

- Wetlands areas existing adjacent to the facility; no entry for laydown or parking
- Designated laydown areas, trailer, and parking to be provided
- Limitations on loads with basin roof areas; cannot support heavy equipment
- TPC Golf Course: no access; concern about odors, noise, and dust; work outside of important golf events
- Operations: contractor must maintain access for GLWA (and its contractors) and provide ability to operate and maintain the facility at all times.
- Cutting into existing concrete will require special shoring and construction procedures and will require a plan developed by a Professional Engineer.
- Contractor shall coordinate with other contractors conducting work at the facility.

6.3 Preliminary Suggested Construction Sequence

Due to the short duration of the bidding process and to guide a contractor on a way that the facility could be constructed, a Suggested Construction Sequence will be developed. The contractor will be required to review and submit a Work Plan that identifies their planned approach with any proposed revisions to the sequence to complete the work with their means and methods. Electrical and I&C work needs to be scheduled to maintain facility operation and additional requirements will be developed as the design progresses.

Prior to the start of each phase, all equipment and material should be on site and ready for installation. Sequence assumes normal working hours, but that work should proceed continuously once systems are taken out of service until completion.

Preliminary elements of a Suggested Construction Sequence are presented below along with approximate durations for each phase:

Phase 1 - Mobilize and Procure Equipment (12 to 18 months)

Establish wet weather safety/alert protocols; install load limits signs and barriers; order long-lead items. The upstream level sensor sites should also be installed and activated to provide further information on sewer levels during the construction period.

- Monitor weather and sewer levels.
- GLWA to communicate operations system status to construction team.
- Remove workers from all below grade areas and temporary facilities/equipment/tools from unprotected below grade areas if wet weather event conditions are forecast.

Phase 2 - Above-Grade Work (Milestone 1, 6 months)

Address screening improvements. Complete site improvements and architectural upgrades to the buildings. Upgrade HVAC and complete upgrades that can be done without working in the basin filling areas.

Completion of this work is intended to improve the function of the facility early in the construction and reduce the above grade activities during the below grade construction periods.

Phase 3 – Effluent Channel Work (6 months)

Complete any work needed to improve the operation of the river water effluent channel filling gate and adding an additional filling gate or valve, including small cofferdam construction at the outfall. Construct new equipment hatch at effluent channel. Work needed to provide a new sampling point at the entrance to the shunt channel and to modify the existing induction mixers can also be performed. Demolition of flushing systems in shunt channel can also be completed.

Considerations during this phase include:

- Sequence and perform work during dry weather.
- Be prepared to provide temporary pumping if work is not completed.
- Test equipment

Completion of this work is intended to improve the ability to clean the basin during construction.

Phase 4 – Chemical Storage and Disinfection Upgrades (Milestone 2, 12 months)

Install any temporary systems as needed. Complete work and testing prior to conducting flushing system work to increase reliability of facility during basin outages. Considerations during this phase include:

- GLWA to continue to operate using old system during construction if storm occurs.
- Relocate the existing chemical unloading station outside of building.
- Construct new Chemical Storage Building complete.
- Install new chemical tank, piping, and pumping systems in new building.
- Install new pumps, piping, and valves to service both old and new systems – complete work sequentially to ensure full ability to treat if storm occurs or provide temporary pumping systems to allow for full switchover at once.
- Complete hose bib upgrades.
- Test system with clean water first, then with chemicals.
- GLWA to be responsible for any disinfection chemical delivery, handling, and water quality lab testing.

Completion of this work allows for flows to be treated with the benefit of the new disinfection systems.

Phase 5 – Basin 2 Work (8 months)

This phase includes all the work in Basin 2 needed to install the new flushing systems and would be planned for the first fall/winter season.

- Open all Basin 1 influent gates and bulkhead high overflow weir to Basin 2.
- Close gates to Basin 2/bulkhead as needed to isolate Basin 2.
- Conduct any work needed to isolate Basin 2 from the Effluent Channel/River.
- For normal operations, route first flush into Basin 1 and then route excess flow via shunt channel/open shunt channel gates
- Clean all concrete areas and remove solids
- Demolish existing nozzles and piping.
- Install new nozzles and piping including new hose bibs
- Complete upgrades in the dewatering pit.
- Perform slab repairs
- Install concrete for new flushing lanes
- Complete any lighting improvements
- Remove temporary bulkheads
- Test flushing systems – option to divert sanitary flow into basin from upstream system at existing diversion dams to cover with solids and run tests or test continuously once put into operation

Phase 6 - Basin 1 Work (8 months)

This phase includes all the work in Basin 1 needed to install the new flushing systems and would be planned for the second fall/winter season.

- Bulkhead/close all Basin 1 influent gates and maintain bulkhead on high overflow weir to Basin 2.
- For normal operations, route flow via shunt channel to Basin 2 and run flow-through mode through Basin 2; divert flow in excess of Basin 2 treatment capacity via the shunt channel.
- Clean all concrete areas and remove solids.
- Demolish existing nozzles and piping.
- Install new nozzles and piping including new hose bibs.
- Complete upgrades in the dewatering pit.
- Perform slab repairs.
- Install concrete for new flushing lanes.
- Complete any lighting improvements.
- Test flushing systems – option to divert sanitary flow into basin from upstream system at existing diversion dams to cover with solids and run tests or test continuously once put into operation

Phase 7 – Complete Any Remaining Work (6 months)

This phase includes completing any remaining work needed to reach substantial completion.

7.0 PERMITTING AND REGULATIONS

The facility improvements will require a series of approvals and permits from various utilities and regulatory stakeholders. **Table** summarizes the anticipated permits and approvals needed for the project. Once the improvements are identified, coordination with the various agencies will be conducted to confirm the need and requirements for permitting and approvals.

Table 77-1. Permitting and Approval Summary

Permit Required	Agency
Part 41 - Wastewater Construction Permit	EGLE
Soil and Erosion Permit	City of Dearborn
Permission to work on TPC Property to Fix Stormwater Culvert	TPC
Building Permit	City of Dearborn
Setback and Sprinkler Variance (for New Chemical Building)	City of Dearborn
State Floodplain Permit (Work in the Rouge River at river gate)	EGLE
Nationwide Permit (Work in the Rouge River at river gate and stormwater culvert)	US Army Corps of Engineers
SRF Project Plan Approval	EGLE

It is assumed that easements or formal right of way documents are not needed but that will need to be confirmed with representatives of the TPC. If ROW is required, these improvements may need to be implemented via a separate approach or special requirements be included in the construction contract.

Appendix K.2
Hubbell-Southfield CSO Facility Improvements, 2026 Clean Water SRF Project Plan, Summary of Selected Alternative Improvements, February 2025

Project No. Cost	Description
HS-DIS-4 $386,276	Relocate Chemical Loading Station
HS-DIS-5 $171,070	New Sampling Pump and Access Hatch
HS-DIS-6 $525,322	Chlorine Gas Detection
HS-DIS-7 $33,185	Hoist Work in Existing Room

HS-ELEC-1
$8,071,801
	Electrical Improvements
	• Complete/update electrical studies – Short Circuit, Arc Flash, Hazard Classifications with new improvements.
	• Add new internal basin and exterior lighting and exterior maintenance receptacles.
	• Replace existing facility conduit and wiring.
	• Correct power sags/spikes on chemical pump VFDs – (new constant speed centrifugal pumps are provided)
	• Update grounding system per recent testing recommendations to accommodate facility improvements.
	• Coordinate with DTE on service replacement
	• Coordinate new ATS support systems.
	• Rework MCC equipment
	• Replace/upgrade generator, main distribution, and circuit breaker panels
	• Add weather protection
	• Grounding testing was completed during the 30% design phase and suggestions for minor improvements will be addressed.
	• Support new electrical systems for other upgrades
	  ○ Chemical feed pumps
	  ○ Flushing water pumps
	  ○ Sump pumps
	  ○ Sample pumps
	  ○ Dewatering pumps

Project No. Cost	Description

HS-I&C-1
$1,600,190
	I&C Improvements
	• Replace existing conduit and wiring.
	• Replace field instruments as needed.
	• Design new control system for:
	  ○ Flushing control system
	  ○ Chemical sampling and feed control system
	  ○ Dewatering pumping system
	  ○ VR-8 gate
	• Provide for local control during construction
	• New P&IDs
	• Include I&C updates for new process cameras being installed by others.
	• Add 2 level sensor installations in upstream sewers
	• Include updated gas monitoring for both chemical storage areas

HS-I&C-2 $5,778,372	Control System Upgrade - The facility's control system, networks, workstations, and local control system panels will be replaced or upgraded the latest GLWA standards. • Design new control system compatible with other CSO facilities. • Use Ovation system and panels. • Include new UPS systems. • Integrate remote panels into new network. • Add I/O as needed. • Add new Ovation communications modules. • Add Ethernet Link Controller. • Add non-Ovation devices. • Add fan out switches. • Add Ovation devices and media converters. • Add new back-up control panel with OIT. • Follow GLWA cybersecurity protocols. • Add new Ovation workstations. • Graphics shall follow GLWA ISA standards. • Add new Ovation panels. • Design programming, switchover procedures, and testing needed for a contractor to implement. • Develop a sole source procurement plan for Emerson equipment (TM).

Project No. Cost	Description
HS-HVAC $717,630	HVAC Improvements • Process Building, Replace PACU-1, DHU-1, • ACCU-1 and ducts with a new system • Odor Control Building, replace existing HVAC system • Dewatering Room, replace existing HVAC system • Headworks Building, modify HVAC (minor) • Add DDC control for all HVAC systems • Add HVAC to new chemical storage building
HS-SITE-1 $716,966	Increase Flushing Water Pressure at Basin and Increase Flow to Refill Weir Effluent Channel • In-basin hose bib water supply piping will be replaced and upsized to improve hose bib water pressure and flow rate. • NPW supply to effluent channel will be retained.
HS-SITE-2 $2,516,931	Site Improvements • Security fencing/gate removal and replacement • Restore the access driveway and eliminate ponding – consider potential for green infrastructure. • Inspect, clean, and rehabilitate/replace existing golf course drainage culvert. • Repair basin roof and modify to eliminate ponding water. • Conduct additional structural repairs not performed to date (basin floor). • Replace missing grating over the shunt channel trench. • Concrete rehabilitation associated with hatch replacement. Sign Removal and Replacement

HS-ARCH-1
$413,156
	Architectural Improvements
	• Process Building
	  ○ Replace acoustical ceiling tiles in kind.
	  ○ Replace damaged ceramic floor tiles and paint floors
	  ○ Repair floor and cabinets in lab
	  ○ Renovate and convert locker room to a toilet and lunchroom
	• Headworks Building - paint floors

$46,429,420	Subtotal
$9,635,000	Contingency
$11,418,261	Engineering
$67,482,681	**Total**

Appendix K.3
CS-299 CSO Facilities Assessment, Volume 2 – Multi-Disciplinary Facilities Assessment, April 2021, by Jacobs (Chapter 9, Hubbell-Southfield)

9. Hubbell-Southfield CSO Control Facility

9.1 General Facility Description and Future Capacity Considerations

9.1.1 General Facility Description

The Hubbell Southfield CSO Facility is an RTB with 22 MG of storage, and a treatment capacity of 3,200 cfs. It was constructed in 1996. There are two buildings on site - a Headworks Building and a Control Building. The headworks building contains a headworks area, chemical room, mechanical room, and an odor control area. The control room building contains the control room, odor control room, work area, electrical room, basement area, restroom, locker room, and mechanical room.

Schematics of the facility, including a process flow diagram, are included in Volume 6 – Appendices, Appendix G.

9.1.2 Future Capacity Considerations

There were no future capacity considerations identified at the time of this report.

9.2 Facility Assessment

9.2.1 Screening

9.2.1.1 Description of Existing System

The Hubbell-Southfield CSO Facility has six catenary bar screens that were installed in 1996. Screenings from the screens are discharged to a single conveyor belt, which conveys the screenings to a dumpster. The screenings are disposed in a landfill.

Table 9-1 provides an overview of the existing screening system at Hubbell-Southfield CSO facility.

Table 9-1. Overview of Existing Screening System Hubbell-Southfield CSO Facility

Parameter	Value
Treatment Capacity (cfs)	3,200
No. of Screens	6
Manufacturer	Jones and Atwood
Screen Type	Catenary Bar Screen
Opening Size	1.5-in. slot
Depth or Length / Width	22 ft 0 in / 9 ft 6 in
Screen Cleaning	Mechanical Rake
Screening Removal	Conveyor belt to dumpster and landfilled

9.2.1.2 Identified Needs and Issues

The needs and issues were identified from meetings with O&M staff and Jacobs team site visit and investigations. The following issues were identified related to the screens:

- Provide a screening retention plate along entire conveyer to prevent screenings from falling off the conveyors at the back of the screens.

- O&M staff noted that the grating over the bar screen channel deflects when walking on it
- Prevent the edges of the bar screen rakes from dragging on concrete. This issue has been added to the scope of the OEM evaluation. This issue has been added to the scope of E&I's assessment, which has not occurred as of the time of this report. If there are capital costs associated with the retrofit to address this issue, it will be added based on OEM input.
- Prevent screens from swaying during operation. During higher flow events, the screens reportedly sway to some degree. The operators believe this is caused by the returning rake getting tossed by the rapid flow of water and affecting the rest of the screen. They noted that the Conner Creek screens (which is a similar screen but does not sway) has chain guide returns that extend closer to the floor of the channel. This issue was added to the scope of the OEM evaluation; however, the OEM was unable to see the swaying because flow did not occur during the site visit. If this issue causes problems in the future, it should be video-taped to document the issue.
- O&M staff noted that the overhead crane pendant is old and bulky.

9.2.1.3 Description and Evaluation of Alternatives

A project to address the needs and issues identified above is presented in this section. The evaluation of alternatives is also included in this section, along with the recommended alternative.

Screening Improvements (Project HS-SCR-1). Due to the relatively small nature of some of the screening-related projects identified as improvements, all of the identified screening improvements are proposed to be in one project – Screening Improvements. This project could be split into multiple delivery projects, if needed. As such, there are two alternatives for this project:

1) **Alternative 1: Do Nothing.**
2) **Alternative 2: Screening Improvements** including,
    - Screening Retention Plate Along Entire Conveyer
    - Walkway Grating Over Bar Screen Channels
    - Replace Overhead Crane Pendant

    Each of the screening related improvements listed above are described further below:

    Screening Retention Plate Along Entire Conveyer. Screenings from the screens occasionally fall off the conveyor at the back of the screens. A screenings retention plate would guide the discharged screenings to the middle of the conveyor belt. A cost for a screening retention plate (similar to screening retention plate at Conner Creek) is included in the capital cost estimate.

    Walkway Grating Over Bar Screen Channels. O&M staff reported that grating does not feel sufficient (i.e., it deflects when walking on it). A cost for grating replacement is included in the capital costs.

    Replace Overhead Crane Pendant. O&M staff indicated the current push-button, explosion-proof crane pendant is old and very bulky (Figure 9-1). Jacobs contacted Crane Technologies to obtain a replacement cost for a new pendant.

Figure 9-1. Existing Pendant for Overhead Crane at Hubbell-Southfield CSO Facility

The alternative evaluation is presented in Table 9-2. Capital costs for Alternative 2 are presented in Volume 6 – Appendices, Appendix C under this project title.

The total benefit score for Alternative 2, however, is about 1.0 higher than Alternative 1 due to improved health and safety, component performance, and ease of O&M. The NPV/Benefit cost for Alternative 2 is $54,000, which is a relatively low cost compared to other projects recommended in this assessment. **Because of the advantages with this alternative, Alternative 2 – Screening Improvements is the recommended alternative.**

Table 9-2. Alternative Evaluation for Screen Improvements (Project HS-SCR-1)

Alt.	Description		Benefit Category	Benefit Score	Total Benefit	Capital Costs	Annual O&M	NPV	NPV/Benefit (prefer low value)	Best Value Alternative
1	*Alt. Name:*	Do Nothing	Health and Safety	2	2.62	$ -	$ -	$ -	$ -	Not Applicable
	Definition:	Do nothing.	Water Quality & Compliance	3						
	Adv.:	None.	Capacity Enhancement	3						
	Disadv.:	Some screenings fall off conveyor; walkway grating does not seem sufficient; pendant outdated.	Component Performance	2						
	Comments:	None	O&M Ease	3						
2	*Alt. Name:*	Screening Improvements	Health and Safety	4	3.60	$ 195,000	$ -	$ 195,000	$ 54,167	Not Applicable
	Definition:	Addition of screening retention plate along entire conveyer; replace walkway grating over bar screen channels; replace overhead crane pendant.	Water Quality & Compliance	3						
	Adv.:	Grating would be stronger; Cleaner screening operation	Capacity Enhancement	3						
	Disadv.:	None.	Component Performance	4						
	Comments:	None	O&M Ease	4						

9.2.2 Disinfection

9.2.2.1 Description of Existing System

The sodium hypochlorite disinfection system consists of two FRP storage tanks, five gear pumps, and three induction mixers. There are six screens discharging into a common influent channel from which flow is directed to Basin Compartment 1 or to the Shunt Channel which can feed Basin Compartment 2. There are three induction mixers located upstream of the bar screens. The sodium hypochlorite pumps discharge to a common header with a flow meter that splits to the three induction mixers, the Shunt Channel, Basin 1, Basin 2, flushing, and odor control. During an event sodium hypochlorite is normally only fed to the three induction mixers. Flow splitting is not metered and there does not appear to be any basis for throttling the valves to individual induction mixers to achieve equal flow splitting. Table 9-3 provides an overview of the existing disinfection system at Hubbell-Southfield CSO facility.

Table 9-3. Overview of Existing Disinfection System at Hubbell-Southfield CSO Facility

Parameter	Value
Treatment Capacity (cfs)	2,200
Design Feed Strength (% hypochlorite)	5
Max. Dosage at Design Flow (mg/L Cl_2)	10
Disinfection Contact Time (min)	20
Storage Tanks Number Volume of Each Tank (gal) Type	 2 15,000 FRP
Pumps Number Capacity (gpm) Type	 5 10-55 Gear
Mixers Number / Type Model Number/ hp / Manufacturer	 3 / Chemical induction mixers Series 32 / 25 hp / Gas Mastrrr

9.2.2.2 Identified Needs and Issues

The needs and issues identified for Hubbell-Southfield were identified from meetings with O&M staff and Jacobs team site visit and investigations. The identified needs and issues are listed in the following bullets:

- Chemical feed system. In addition to the desire to standardize on one or two types of chemical feed pumps between facilities and the desire to simplify chemical feed where possible, the Hubbell Southfield chemical feed system has the following issue:
  - The feed pumps are in a confined basement are on short pump pads and as such at risk of being damaged if there was a spill or water leak.
  - The sump pumps in the feed pump area were not designed for corrosive or chemical service and have been damaged by exposure to sodium hypochlorite. Replacement with sump pumps suitable for corrosive chemical service is desired.

These issues are addressed in Replace Chemical Feed System (Project HS-DIS-1) below.

- Lack of flow-paced and TRC-paced automated chemical feed. Chemical feed system controls are O&M intensive and have performance issues with feeding appropriate levels of chemical. To stay compliant,

overfeeding chemical is common. This issue is addressed in Provide Flow-paced and TRC-paced Automated Chemical Feed (Project HS-DIS-2) below.

- Hypochlorite storage capacity is reportedly not enough for large storm events. GLWA requested that Jacobs investigate this issue. Jacobs found that the concrete containment area used for existing spill containment was the original sodium hypochlorite storage. The two existing 15,000 gallons FRP tanks installed in the original concrete storage tanks provide less chemical storage than the concrete tanks. Historical chemical usage from the four largest wet weather events from 2016 through 2018 was evaluated for all of the CSO facilities, including Hubbell Southfield. The data indicate that the volume of sodium hypochlorite fed exceeded the storage volume at Hubbell Southfield in one event. In that event 38,775 gallons was reportedly fed compared to 30,000 gallons storage volume. Chemical deliveries occurred during the event to address this. Based on the event above, additional hypochlorite storage is needed. This issue is addressed in Add New Chemical Storage Tank (Project HS-DIS-3).

9.2.2.3 Description and Evaluation of Alternatives

Projects to address the needs and issues identified above are presented in this section. The evaluation of project alternatives is also included in this section, by potential project, along with the recommended alternative.

Replace Chemical Feed System (Project HS-DIS-1). The alternatives to address the common chemical feed system issues among most of the CSO facilities were presented in Replace Chemical Feed System (Section 5.2.2). Alternatives include:

1) **Alternative 1: Replace Existing Chemical Feed System In-Kind.** This alternative would generally replace the existing feed system in-kind. If this alternative were to be selected, minor improvements to address some identified issues could be considered; however, Jacobs did not specifically evaluate any individual improvements to the existing system; rather, the focus was on the identified alternatives.
2) **Alternative 2: Chemical Feed Utilizing Standardized Pump Distribution and Hose Pumps.** The major advantage of this alternative is that it is easier to control as one pump is dedicated to a channel. Hose pumps will be larger than the existing gear pumps at Hubbell-Southfield and the need to enlarge the pump area was considered for this alternative. Although not all pumps may fit in the current row of pumps, there appears to be sufficient room to locate a couple of the pumps along the north wall under the stairway if necessary. The costs for demolishing the existing pads and adding new taller and larger pads was included in all alternatives and the cost will not substantially change with pump location. Details regarding pump layout are deferred to design.
3) **Alternative 3: Chemical Feed Utilizing Standardized Manifold Pump Distribution and Centrifugal Pumps.**

Each of the alternatives above would include provisions to address the additional concerns specific to the Hubbell Southfield feed system:

- Sump Pump: For cost estimating purposes, a chemically resistant sump pump is assumed for the sump in the chemical feed basement areas as well as hard-piped dilution water to the sump requested by plant personnel.
- Spill Protection: Jacobs evaluated two options to address the concern of sodium hypochlorite spill in the pump area, including:
  - **Option 1: Level sensors and raising pump pads.** This option would install a level sensor or contact switch in the pump area. The sensor would be programmed to close actuated valves from the tanks if a spill is detected. Also, this alternative includes raising the pump pads to 2 ft (from their current 4 in.) to further protect the pumps if a spill occurred.
  - **Option 2: Transfer Pump and Day Tank.** This option would include the sensor in Option 1 that would close the tank valves if a spill should occur. This option would also provide a transfer pump and day tank. However, the transfer pumps would remain a weak link in a flood. In order to address this, a vertical shaft

chemically resistant sump pump with the motor located above maximum flood level, as offered by Vanton Pumps, would serve as an emergency backup to a transfer pump. In a flood situation, the sump pump would serve as the transfer pump to the day tank or to return the sodium hypochlorite to one of the storage tanks after that tank's outlet valve is closed.

The cost for a level sensor in the pump area and programming to close actuated valves from the tanks if a spill is detected is a relatively low-cost alternative. As such it is included in Alternatives 2 and 3 above.

The alternative evaluation for these alternatives is presented in Table 9-4. The sources of costs used in this evaluation are listed below:

- The capital cost for Alternative 1 were obtained from the replacement costs of the SRP.
- The capital cost for Alternative 2 and 3 is included in Volume 6 – Appendices, Appendix C under this project title.
- The O&M cost for Alternative 1 was developed based on GLWA experience of pump rebuilds per year at a cost of $30,000.
- O&M costs for Alternative 2 were developed based on input from hose pump manufacturer for annual lubrication and hose replacement, and rebuild of the pumps at Year 10.
- O&M costs for Alternative 3 were estimated based on pump rebuild cost of $20,000 per pump at Year 10. This frequency is based on GLWA experience at Conner Creek.

Table 9-4 shows that the Total Benefit score of Alternatives 2 and 3 are 1.5 higher than Alternative 1 (Do Nothing) due to improved ease of O&M and improved component performance, which should lead to more consistent and reliable water quality compliance. Based on having the lowest NPV/Benefit cost, **Alternative 3 - Chemical Feed Utilizing Standardized Manifold Pump Distribution and Centrifugal Pumps is the Best Value Alternative. As such, this is the recommended alternative.**

Table 9-4. Alternative Evaluation for Replace Chemical Feed System (Project HS-DIS-1)

Alt.	Description		Benefit Category	Benefit Score	Total Benefit	Capital Costs	Annual O&M	NPV	NPV/Benefit (prefer low value)	Best Value Alternative
1	*Alt. Name:*	Replace Existing Chemical Feed System in-kind	Health and Safety	3	2.08	$ 969,900	$ 30,000	$ 1,602,589	$ 769,243	
	Definition:	Replace existing chemical feed system.	Water Quality & Compliance	2						
	Adv.:	Less maintenance. Known existing system.	Capacity Enhancement	3						
	Disadv.:	Existing system is difficult to operate and maintain and has performance issues with	Component Performance	1						
	Comments:	None	O&M Ease	1						
2	*Alt. Name:*	Chemical Feed Utilizing Standardized Pump Distribution and Hose Pumps	Health and Safety	3	3.60	$ 1,130,000	$ 17,125	$ 1,491,160	$ 414,211	
	Definition:	Upgrade chemical feed system to individual pump distribution system with one pump per	Water Quality & Compliance	4						
	Adv.:	Easier control as one pump is dedicated to a channel.	Capacity Enhancement	3						
	Disadv.:	Lots of pumps and valves, allows for an installed redundant pump but manual	Component Performance	4						
	Comments:	None	O&M Ease	4						
3	*Alt. Name:*	Chemical Feed Utilizing Standardized Manifold Pump Distribution and Centrifugal Pumps	Health and Safety	3	3.60	$ 534,000	$ 3,000	$ 597,269	$ 165,908	Best Value Alternative
	Definition:	Upgrade chemical feed system to manifold pump distribution system with multiple pumps	Water Quality & Compliance	4						
	Adv.:	Less pumps and valves for easier maintenance. Redundant pump is installed and easily	Capacity Enhancement	3						
	Disadv.:	Not quite as energy efficient. Maintenance of flow control devices to equalize flows to each	Component Performance	4						
	Comments:	None	O&M Ease	4						

Provide Flow-paced and TRC-paced Automated Chemical Feed (Project HS-DIS-2). As with the other CSO facilities, the chemical feed system does not work in automatic. Consistent dosing in response to rapid changes in flow requires flow pacing. Refinement of the hypochlorite dose in response to changes in chlorine demand requires automated adjustment of the target dose through the use of an online TRC analyzer.

The alternatives to address this issue were presented in Provide Flow-Paced and TRC-Paced Automated Chemical Feed (Section 5.2.3). The alternatives include:

1) **Alternative 1: Continue Manual Adjustment of Chemical Feed**. This alternative would continue to use the existing level of controls and automation for the chemical feed system in which the operators manually adjust chlorine feed. The influent flow meter readings would continue to be used by the operator to adjust the chlorine feed rates.
2) **Alternative 2: Provide Flow-paced and TRC-paced Chemical Feed Control System.** This alternative would automatically adjust chemical flow based on influent flow rate and also utilize the sampling and analysis of wastewater from a point a relatively short distance downstream of the facility to analyze TRC concentrations to further adjust chemical feed flows.

   The sample point should be located approximately 15 minutes travel time downstream of the dosing point at average flow but peak flow travel time must also be considered. The exact location would be determined during design.

   The automatic chemical feed system will require less operator input during an event. However, there will be increased maintenance of the TRC system by GLWA staff (either lab technicians or operators) during the storm and during dry weather. The annual O&M cost includes costs for maintaining the TRC monitors.

The alternative evaluation is presented in Table 9-5. The sources of costs used in this evaluation are listed in the following bullet:

- The capital costs for Alternative 2 are included in Volume 6 – Appendices, Appendix C under this project title.
- The annual O&M cost for Alternative 2 assumes that a lab technician or operator would need to perform inspection/maintenance of the TRC analyzers on a routine basis to make sure it remains functional between storm events.

Although Alternative 1 does not require any additional capital or O&M, it does not address the fact that the TRC goal may not be met every event. Alternative 2 provides the best opportunity to meet the effluent TRC goals in the NPDES permit. Based on the improved ability to meet the NPDES permit TRC goal, **Alternative 2 – Provide Flow-paced and TRC-paced Chemical Feed Control System is the recommended alternative.**

Table 9-5. Alternative Evaluation for Provide Flow-paced and TRC-paced Chemical Feed Control System (Project HS-DIS-2)

Alt.	Description		Benefit Category	Benefit Score	Total Benefit	Capital Costs	Annual O&M	NPV	NPV/Benefit (prefer low value)	Best Value Alternative
1	*Alt. Name:*	Continue Manual Adjustment of Chemical Feed	Health and Safety	3	2.40	$ -	$ -	$ -	$ -	Not Applicable
	Definition:	Continue to use the existing level of controls and automation for the chemical feed system in which the operators manually adjust chlorine feed.	Water Quality & Compliance	2						
	Adv.:	Less maintenance. Known existing system.	Capacity Enhancement	3						
	Disadv.:	Requires more operator input to monitor disinfection performance. May result in less efficient chemical feed and possible overdosing of chemical.	Component Performance	2						
	Comments:	None	O&M Ease	2						
2	*Alt. Name:*	Provide Flow-paced and TRC-paced Chemical Feed Control System	Health and Safety	3	3.45	$ 220,000	$ 4,860	$ 322,496	$ 93,477	Not Applicable
	Definition:	Upgrade chemical feed control system utilizing flow-pacing and TRC-pacing.	Water Quality & Compliance	5						
	Adv.:	Less operator input during a rain event. Better control of chemical feed resulting in more efficient use of chemical.	Capacity Enhancement	3						
	Disadv.:	Maintenance intensive. Flow pacing is common at CSO facilities, but TRC-pacing is difficult with infrequent CSO facility use.	Component Performance	4						
	Comments:	None	O&M Ease	2						

Add New Chemical Storage Tank (Project HS-DIS-3). Based on the evaluation performed in the previous section, there is a need for additional chemical storage tank to ensure adequate chemical during larger events. There are two alternatives:

1) **Alternative 1: Do Nothing - Rely on Chemical Deliveries during Storm Event.** This approach was used during the large event that exceeded the existing chemical storage capacity. This alternative relies upon an outside contractor to deliver enough hypochlorite to make it through the storm event.

2) **Alternative 2: Add New Chemical Storage Tank.** The O&M staff requested a tank at grade to serve as a backup. They also requested the capability for gravity feed to the influent from the new tank in case the pump room floods. The lack of reliable influent flow measurement prevents sizing additional sodium hypochlorite storage based on influent flow, design doses, and assumed hypochlorite strength considering degradation potential. However, the installation of new flow meters in 2019 may help to inform tank sizing for design. For budgeting purposes, a third tank sized the same as the existing two 15,000 gallon tanks is assumed, inside a building with chemical containment, mechanical, electrical and I&C.

   As requested by GLWA, the possibility of gravity feed from the chemical tanks with a meter and valve was evaluated. The effluent weir from the CSO basins into the effluent channel controls the hydraulic grade line at the influent induction mixers to above elevation 100 once the basin is filled. The bottom of a new at-grade sodium hypochlorite tank would be approximately elevation 111 and the maximum liquid depth is approximately 13 ft. Thus, there is approximately 11 ft of static head available with the tank empty and 24 ft with the tanks full. This corresponds to 4.8 pounds psig empty to 10.3 psig full available head. The induction mixers require back pressure valves to prevent siphoning chemical. Evoqua recommends a setting of 15 psig. Therefore, the available static head is inadequate for gravity feed before even accounting for friction loss and flow control valve loss. Thus, continued pumping as the means of chemical delivery is recommended.

The alternative evaluation is presented in Table 9-6. Capital costs for Alternative 2 are presented in Volume 6 – Appendices, Appendix C under this project title.

As shown in Table 9-6, Alternative 2 has a Total Benefit score about 1.5 higher than Alternative 1 because of the improved water quality and compliance (i.e., facility could run out of chemical during a storm and violate permit), and ease of O&M. Because of the risk of violating permit, **Alternative 2 is the recommended alternative.**

Table 9-6. Alternative Evaluation for Add New Chemical Storage Tank (Project HS-DIS-3)

Alt.	Description		Benefit Category	Benefit Score	Total Benefit	Capital Costs	Annual O&M	NPV	NPV/Benefit (prefer low value)	Best Value Alternative
1	*Alt. Name:*	Do Nothing/Rely on Chemical Deliveries during Storm Event	Health and Safety	3	2.00	$ -	$ -	$ -	$ -	Not Applicable
	Definition:	Do nothing.	Water Quality & Compliance	1						
	Adv.:	Lower Cost	Capacity Enhancement	3						
	Disadv.:	May run out of chemical during a large storm event, thereby violating permit.	Component Performance	3						
	Comments:	None	O&M Ease	1						
2	*Alt. Name:*	Add a New Chemical Storage Tank	Health and Safety	3	3.50	$ 753,000	$ -	$ 753,000	$ 215,143	Not Applicable
	Definition:	Install new tank at grade to serve as a backup with capability for gravity feed	Water Quality & Compliance	4						
	Adv.:	Sufficient chemical for larger storm events.	Capacity Enhancement	3						
	Disadv.:	Higher cost	Component Performance	3						
	Comments:	None	O&M Ease	4						

9.2.3 Odor Control

9.2.3.1 Description of Existing System

The Hubbell Southfield odor control system consists of two separate horizontal cross flow scrubber systems. Odorous air flows horizontally across the empty scrubber chamber and scrubbing solution is sprayed into the oncoming air from numerous spray nozzles. One system, located in the Headworks Building, treats air from the Headworks area and Basin No. 1. A second system, located in the Process Building, treats air from Basin No. 2. The systems were originally designed with the capability to spray a solution of sodium hypochlorite and sodium hydroxide to remove odorous gasses. However, the sodium hydroxide has not been used for some time. The chemical solution is recycled through the scrubber and recirculation tank, and fresh sodium hypochlorite is added as needed. Excess chemical solution overflows out of the recirculation tank into a drain.

The system was installed in 1996. Overall, the system is in good condition. The odor control system does not have an air permit.

Per GLWA, no formal odor complaints have been received for at least the past three years; however, the golf course has indicated that they can smell the facility.

9.2.3.2 Identified Needs and Issues

During meetings with O&M staff related to the odor control system, no needs were identified. The recommendation in this section is based on Jacobs evaluation of the existing system.

Potential Reduction of Odor Treatment during Operation. The facility does not have an air permit and is not required to operate the odor control system. The facility may not generate significant odors during wet weather events due to dilution of sewage with storm water. Storm water significantly reduces the concentration of sulfide and other odorous compounds in sewage. Odors may be more prevalent during the dewatering phase caused by odors from settled solids but may still be low. Due to the expected low odors from the facility, GLWA may want to consider operating the scrubber systems with water only and no sodium hypochlorite. Removal of H_2S is dependent on the H_2S concentration. Removal will be significantly less with only water, but there may be relatively low levels of H_2S to remove. Another option, which provides even less treatment, would be to operate the system without water and blow air through an empty scrubber system and out the stack. (This could be considered during the winter months when the golf course is not active, but is not recommended when the golf course is being used.)

Odor Study. Under both of these options, the discharged air may be non-odorous or sufficiently diluted with ambient air to render it non-odorous or non-detectable to receptors. Prior to implementing either one of these options, GLWA should conduct an odor study to sample influent air to the existing scrubber system for H_2S to determine if the H_2S concentration is sufficiently low. A non-detectable concentration of H_2S in the influent air means the systems can likely operate without sodium hypochlorite or water. The study would also sample the discharge when using water spray, to determine the measured effectiveness of such an operation.

9.2.3.3 Description and Evaluation of Alternatives

Based on discussion in the previous section, there were no odor control-related issues that that would be classified as capital improvement “needs.”

9.2.4 Flushing and Dewatering

9.2.4.1 Description of Existing System

Dewatering System: Basin dewatering can be accomplished by gravity or pumping. Gravity dewatering to the Northwest Interceptor (NWI) occurs by opening one of two flow control valves (BD-1 or BD-3). A control system regulates the valve position and corresponding flow from the basin to the NWI. The gravity discharge rate is controlled so as not to exceed the remaining capacity in the NWI as measured by a level sensor in the NWI. The Basin Compartments 1 and 2 can be dewatered from a basin water level of 99.5 ft down to about 94.75 ft. The basin could be dewatered by gravity down to 90.5 ft (if siphoning); however, at a water surface level below 94.75, the flow rate in the discharge line causes the velocity to drop below a recommended value of 3.5 ft/sec.

The remainder of volume in the basin must be removed by pumping. There are two 8,000 gpm pumps for each basin, for a total of four dewatering pumps. The system was designed for one pump as duty, with the other pump as backup. The dewatering pumps were designed to remove water down to about 74.5 ft, which is about 25 ft below the basin high water level.

The dewatering system originally included one 200 gpm sump pump for each compartment. These pumps have been removed. As noted below, Operators would like to see this pump replaced.

The basin was also designed to be decanted if there was no capacity in the NWI before a subsequent storm. The top 5 ft of water from the basin compartments could be decanted to the Rouge River. There are two decant gates located at the end of Basin 2: Basin Decant Slide Gate and Effluent Decant Gate. The Operators have not decanted flow and do not foresee the need to decant in the future. As such, these gates should remain closed and do not need to be replaced in the future. These gates could be removed in the future and the openings permanently filled with concrete.

Flushing System: The spray flushing system is intended to remove the remaining solids left on the floor of the basin and shunt channel after the basin has been dewatered. There are 22 flushing spray zones. Two submersible flushing water pumps are located in the effluent channel (referred to as the Pond) and a strainer is located in the Process Building dewatering pump room. If there is not enough effluent after a wet weather event in the effluent channel for the basin flushing, additional (City) water can be used to fill the effluent channel. The Pond fills at line pressure and there is no booster pump to help it fill faster.

The flushing system has not performed its intended function since it was originally installed. Solids accumulate across both basins and in the shunt channel. As such, the operators must lower a bobcat into the basin and use fire hoses to clean solids from the bottom of the basin. Due to the extraordinary difficulty of cleaning the basin, GLWA does not clean the basin after every event.

Table 9-7 provides an overview of the existing flushing and dewatering system at Hubbell-Southfield CSO facility.

Table 9-7. Overview of Existing Flushing and Dewatering System at Hubbell-Southfield CSO Facility

Parameter	Value
Total Basin Volume (MG)	22
Headworks and basin Dewatering and Flushing System	▪ Gravity dewatering can occur for the top portion of captured volume, but this is not typical operation ▪ There are two 8,000 gpm dewatering pumps for Basin 1 and two 8,000 gpm dewatering pumps for Basin 2 ▪ Two 5,000 gpm flushing pumps are located in the effluent channel. A strainer is provided in the Process Building Basement. ▪ Flushing system consists of spray flushing system with 22 zones. System is largely ineffective at removing solids from the basins

9.2.4.2 Identified Needs and Issues

The needs and issues were identified from meetings with O&M staff and Jacobs team site visit and investigations. These issues are listed in the following bullets and further described in the next section.

- There are significant issues with flushing solids from the floor of the basin and shunt channel.
- The dewatering pumps need to be upgraded and missing sump pumps need to be replaced. A fluidization system should be considered under the sump pumps to avoid large accumulations of solids in the sump
- There is no way to access to the effluent channel (Pond) area.

9.2.4.3 Description and Evaluation of Alternatives

Projects to address the needs and issues identified above are presented in this section. The evaluation of project alternatives is also included in this section, by potential project, along with the recommended alternative.

Basin Flushing System (Project HS-FD-1). Flushing solids from the floor of the basin and shunt channel has been a problem since the facility was constructed. The existing flushing system using spray nozzles has been largely ineffective due to the large volume of solids that are generated during each storm and the fact that a subsequent storm may enter the facility before the entire contents have been cleaned. The configuration of the spray system (15 ft above the floor) also makes the spray system ineffective.

There are three alternatives for addressing this issue:

1) **Alternative 1: Do Nothing/ Continue Current Operation.** GLWA Operations staff to continue to manually clean the basin.
2) **Alternative 2: Contractor Clean Out.** Contractor to manually clean the basin. This alternative is similar to Alternative 1; however, it would include increased number of cleanings per year to meet the intent of the permit to have the basin ready for a subsequent storm event.
3) **Alternative 3: New Basin Flushing System.** Based on the poor performance of the existing spray flushing system at Hubbell Southfield and experience at another CSO basin in the Southeast Michigan region (Milk River CSO Basin), GLWA requested a completely new system. Jacobs initially considered both flushing gates and tipping buckets to replace the existing system. After consultations with several manufacturers and evaluating initial conceptual layouts, tipping buckets were removed from consideration due to the low head space inside of the basin areas and maximum flushing length limitation of only 200 ft. As such, the recommended flushing system involves flushing gates/reservoirs in the contact basins and an improved spray system in the shunt channel. This concept is shown in Figure HS-FD-1-ALT-3 in Volume 6 – Appendices, Appendix B.

   Demolition. The demolition activities consist primarily of removing of the existing basin mixers and spray system components (pumps, pipes, fittings), concrete removal for construction and permanent access through the roof slab, and other equipment mounted inside of the tank to allow the extensive structural concrete placement. Temporary relocation of some equipment and piping/conduits on top of the tank to facilitate construction is assumed.

   Flushing Gate Reservoir Configuration. The existing basin's semi-circular configuration, slope, alignment of the NWI dividing basin into two sections, and drainage channels create a challenging retrofit condition. Flushing gate reservoirs will be located along three lines in the upstream and downstream sections of the two basin compartments. The reservoir volume is determined by the length and slope of the surface that must be flushed by the flushing wave. The longest flushing length is along the northeastern wall of the facility is approximately 430 ft long. The average flushing reservoir volume for the conceptual configuration is approximately 15,000 gallons. The final design should validate and further refine the minimum volume requirement using a sediment fate-transport model (e.g., HEC-RAS) for each flushing lane based on length

and longitudinal channel slope. For 37 flushing reservoirs, the total flushing volume required is approximately 550,000 gallons.

Immediately downstream from the screens, an initial reservoir array will be constructed in Basin 1 with the flushing gate reservoirs suspended above the basin floor and with the gate openings directed towards the existing drainage channel in the upstream section. The suspended reservoirs, as shown in Figure HS-FD-1-ALT-3, allow low flows to continue underneath into the basin in a 2- to 3-foot high channel. As the water level continues to rise in the basin, the hydraulic gradient will build upstream of the suspended reservoirs and increase the velocity in the low-flow channel, effectively moving sediment into the basin sump and the dewatering pump station. Flows will eventually overtop the flushing gate reservoir walls (approximately 8 ft above the floor) and fill the reservoir volume.

A second array of flushing reservoirs is proposed in Basin 2 on the downstream side of the NWI alignment. The reservoirs of this array would be constructed on the existing basin floor with the gate openings directed towards the drainage channel that runs through the middle of Basin 2. The third and final array would be constructed along the finger weirs near the basin outlet. These reservoirs would also be constructed on the floor with the gate openings directed back towards the drainage channel in the middle of Basin 2.

Structural Retrofits. Flushing gates release a flushing wave that needs to be contained in a confined channel to maintain velocity and effectively carry resuspended sediment to a collection point. The basin floors will require concrete training walls along each flushing channel. Additionally, the existing floor will require concrete leveling across most of the entire basin to create level cross-sectional flushing channels. The conceptual design developed indicates that approximately 8,000 cy of concrete fill will be required to create adequate flushing wave channels and reservoirs. Additional concrete fill (structural and low-density concrete fill, approximately 1,000 cy) will be required throughout the basin as fillets and bulk fill to eliminate voids and areas where the flushing waves cannot remove sediment. The total displacement of the new concrete in the contact basin is approximately 1.82 million gallons.

A review of the existing facilities structural details indicate that the base slab could be susceptible to damage if any drainage channel realignments are made. The conceptual design avoids additional base slab structural improvements and subsurface improvements. Additionally, the facility's proximity to surface water and high groundwater would require extensive dewatering should any penetrations through the base slab be required. Additional modifications to the existing base slab, addition of concrete, and other improvements may negatively impact the structure and the foundation. A detailed analysis of the future condition live/dead loads should be completed during final design and structural/foundation improvements incorporated into the project by the final designer. These improvement could include additional piles, retrofitted structural supports, and use of higher strength concrete mixes.

Secondary Flushing Water Source. A secondary source of flushing water is recommended to provide additional flushing cycles for post-event cleaning. The base option for the concept development is to repurpose the existing flushing system water source and install a pipe network to fill the reservoirs in each array. A second option is to use a surface water source, similar to St. Aubin CSO Facility. The close proximity of the Rouge River at the outfall end of the facility allows for the installation of a pump intake, pump system and force main to provide water for a fill pipe network in the contact basin above the reservoirs. GLWA should consider large screens (4-in. bar-type or similar) to prevent floating debris from entering the effluent chamber. GLWA's experience with zebra mussel removal from other facilities in this area indicates that smaller screen openings should be avoided. Similarly, a small opening with a flap-gate opening inward to the effluent channel may help prevent floating debris from entering while ensuring adequate water is available for secondary flushing and shunt channel spray system operation.

The recommended alternative assumes each array of flushing gate reservoirs will be filled using surface water as the flushing water source, similar to the St. Aubin flushing system. Two 2,000-gpm submersible pumps will be mounted in the existing effluent channel. Each pump will discharge to separate 6-in. HDPE force mains that are mounted to the interior roof of the contact basin space (either at the centerline of the overall basin, or

along one wall). One pump will provide flushing water to the northernmost flushing reservoir array, and the other will provide flushing water to the other two arrays. At each array, a second run of 6-in. HDPE will extend over the top of the flushing reservoirs with a tee fitting. A concrete notch (3 ft long by 6 in. deep) cut into the walls between each reservoir would serve as a weir and will enable flows between the reservoirs to fill evenly as the pumps operate.

GLWA has noted that Basin 2 tends to accumulate more solids from wet weather events than Basin 1 and is expected to require more than one post-event flushing with the proposed flushing gate system. By dedicating one pump to the Basin 2 flushing gate arrays (closest to the finger weir), GLWA will be able to more quickly fill these reservoirs to provide a secondary cleaning of this area (estimated fill time at 2,000 gpm of 100 minutes). The other flushing reservoirs in the northern half of the basin will fill more slowly (approximately 180 minutes).

Alternative Gravity Filling System for Basin 2. A sub-alternative for filling the flushing gate reservoirs includes adding a new gated opening or repurposing an existing gated opening in the finger weirs between Basin 2 flushing chamber and the Pond. Each flushing reservoir will have a lower weir notched into the concrete walls between adjacent flushing reservoirs. Opening the gate will allow river water from the reservoir to quickly fill this array of flushing gate reservoirs from one source via overtopping the notched weirs and provide water for additional flushes. A screened and gated opening between the reservoir and the river channel is required to control flows into this space and limit floatable materials and larger aquatic organism from entering the facility. Pumping river water to the other flushing reservoirs using pumps would still be required with the conceptual configuration proposed. Extending a gravity pipe to the other arrays may be possible by adjusting or reconfiguring the elevations and layout of the proposed concept.

New Shunt Channel Flushing System. A new spray flushing system is proposed for the shunt channel. Two new flushing headers will be extended into the shunt channel on both sides of the conduit, and two new submersible pumps will draw river water from the effluent chamber near the secondary flushing gate water source pumps described above.

Each pump will provide water to one half of the shunt channel. Record drawings indicate a transverse slope in the channel's shelf of approximately 0.7 to 1.0 percent, draining from the exterior wall towards the low-flow channel next to the interior wall. The low-flow channel has a slope of approximately 0.5 percent and drains the northern and southern effluent channel sections towards the dewatering pumps. The northern (Basin 1) half of the channel will include two 590-foot, 8-in. HDPE (SDR 13.5) headers, mounted with stainless steel hardware approximately 6 ft from the floor, one above the top edge of the shelf and the other over the low-flow channel. Half-in. holes will be directionally drilled on 4-foot spacings to push solids towards the low flow channel, and along the low-flow channel towards the dewatering pumps. The pumping requirement for the northern half system is approximately 3,300 gpm. The southern (Basin 2) half of the channel includes two 280-foot, 8-in. HDPE headers mounted in a similar fashion and drilled accordingly. The pumping requirement for the southern half system is approximately 1,600 gpm. Similarly-sized pipe runs (approximately 560 ft) connect pumps to both headers.

The control strategy may require only running one half of the effluent channel cleaning system at a time in order to prevent overwhelming the dewatering pumps. Control valves to support pulsing may be required and are recommended to be installed on top of the facility or in new vaults installed in the roof. Flow rate, volume/pressure at application points and control strategy should be confirmed during final design using CFD or scale models.

Additional Mechanical Systems. The flushing gate hydraulic systems will require a new control room as the existing surface facilities at Hubbell Southfield do not have adequate space. Therefore, a new control room/building (occupied, declassified space) is assumed and will be constructed on top of the roof slab. The cost estimate assumes a stand-alone building rather than remodeling or adding to either of the existing buildings. An allowance for structural retrofits of the existing tank's roof slab and beams to support a new

surface structure is included in the costs. Hydraulic tubing would be routed inside of the basin along the ceiling to each gate actuator.

Advantages and Disadvantages of Alternative: This flushing gate option described above appears to be the most viable solution for improving the flushing of the basin using automated systems. The advantages of a flushing gate system at this facility include:

- Effective removal of sediment from the bottom of the basin: Currently, the sediment is only removed periodically due to the significant amount of time and effort. The new system should be able to flush the basins every time the basin is dewatered after a storm event.
- Improved NPDES permit compliance by being able to clean the basin after every event. Note that permit prohibits the discharge of sludge or residual accumulations from the basin to surface waters and requires the settled sludges to be promptly removed and disposed in accordance with procedures approved by EGLE.
- Improved safety for GLWA Operations staff: The flushing system eliminates the need for Operations personnel from entering and operating machinery in the confined space.
- Reduced O&M labor costs for sediment removal compared to current process: Currently, it takes about three personnel about one week to clean the entire basin and occurs about four times per year. This represents a cost of about $50,000 per year.
- Potential reduction in flushing water usage: The existing spray system uses up to about 7 MG of City water after each event. The proposed flushing water system could eliminate the use of City water if river water can be used as the source of flushing water.
- Some other CSO basins in the area (i.e., Milk River) have removed flushing nozzle systems because they are ineffective.

The disadvantages of this system include:

- High capital cost. The cost estimate for the required modifications to the facility to construct a new flushing gate system is significant.
- Additional systems that require O&M: Adding about 37 flushing gates, hydraulic control system, and secondary flushing water system would add the number of assets that require preventative maintenance and replacement. Secondary flushing system pump operation power requirements would increase the facility's overall electrical consumption.
- New concrete used to construct the flushing system will displace approximately 1.8 million gallons of volume in the contact basin. This will reduce the contact time and may impact the CSO facility's ability to meet regulatory permit requirements. GLWA should assess this impact in more detail during final design of this improvement.
- Difficulty of Construction: Factors that make the construction of the flushing gates difficult include construction of the concrete flushing gates and training walls inside a covered basin, relatively tight site conditions, and the need to keep treating CSO flows. (It is noted that Basin 1 could be completely isolated during construction and allow treatment through Basin 2; however, it is not possible under current configuration to isolate Basin 2 and allow flow to be routed only through Basin 1)

The alternative evaluation for these alternatives is presented in Table 9-8. The sources of costs used in this evaluation are listed in the following bullets:

- The capital cost for Alternative 1 and 2 is based on the replacement cost of the piping and spray nozzle system in about 2014, inflated to 2021 dollars.

- The O&M costs for Alternative 1 includes GLWA labor cost for four cleanouts per year and associated water usage. The labor cost is based on GLWA labor cost of three staff for 40 hours per week and four times per year, or about $48,000 per year. The water usage is estimated to be 7 MG per clean-out. At $4,000 per MG, the cost is about $112,000 per year.
- The O&M costs for Alternative 2 includes assumed Contractor labor cost for 12 cleanouts per year (average of one per month) and associated water usage. The labor cost is assumed to be about $20,000 per clean-out, or about $240,000 per year. This cost is an estimated cost to provide reliable cleaning of the basin on a periodic basis. The water usage is estimated to be 7 MG per clean-out. At $4,000 per MG, the cost is about $336,000 per year.
- The capital cost for the flushing system (Alternative 3) is included in Volume 6 – Appendices, Appendix C under this project title.
- The O&M costs for Alternative 3 includes $10,000 for annual maintenance of the new equipment and electricity costs for the river water pumping.

This evaluation shows that Alternative 1 – Continue Current Operation has the lowest NPV/Benefit cost and is shown to be the Best Value Alternative. The poor health and safety conditions for GLWA operations personnel, however, are not properly conveyed in this analysis and the current four cleanings per year is not believed to be adequate to meet EGLE requirements to have the basin ready for subsequent storm events. Using contracted labor would allow GLWA to have the basin cleaned after most storm events; however, the NPV/Benefit cost is higher than Alternative 3. Alternative 3 provides the benefit of improved health and safety by not having to enter the basin for cleaning, and it is easily operated by the O&M staff after every storm. The Total Benefit score for Alternative 3 is about 2.0 points higher than Alternative 2. **As such, Alternative 3 – New Basin Flushing System is the recommended alternative.**

Table 9-8. Alternative Evaluation for Basin Flushing System (Project HS-FD-1)

Alt.	Description		Benefit Category	Benefit Score	Total Benefit	Capital Costs	Annual O&M	NPV	NPV/Benefit (prefer low value)	Best Value Alternative
1	*Alt. Name:*	Do Nothing/ Continue Current Operation	Health and Safety	1	1.80	$ 2,400,000	$ 160,000	$ 5,774,341	$ 3,207,967	Best Value Alternative
	Definition:	Replace existing flushing system in-kind	Water Quality & Compliance	3						
	Adv.:	Known approach; minimal mechanical equipment	Capacity Enhancement	3						
	Disadv.:	Labor intensive	Component Performance	1						
	Comments:	None	O&M Ease	1						
2	*Alt. Name:*	Contractor Clean out	Health and Safety	1	2.02	$ 2,400,000	$ 576,000	$ 14,547,629	$ 7,213,700	
	Definition:	Replace existing flushing system in-kind	Water Quality & Compliance	3						
	Adv.:	Known approach; minimal mechanical equipment	Capacity Enhancement	3						
	Disadv.:	Relies on Contractor.	Component Performance	1						
	Comments:	None	O&M Ease	2						
3	*Alt. Name:*	New Basin Flushing System	Health and Safety	5	3.98	$ 24,800,000	$ 10,000	$ 25,010,896	$ 6,278,886	
	Definition:	Flushing gates/reservoirs in the contact basins and an improved spray system in the shunt channel	Water Quality & Compliance	3						
	Adv.:	Easier maintenance. Safer operation.	Capacity Enhancement	2						
	Disadv.:	High capital cost; loss of treatment volume in basin	Component Performance	4						
	Comments:	None	O&M Ease	5						

Dewatering and Sump Pump Improvements (Project HS-FD-2). Sump pumps for Basin 1 and 2 were originally installed next to the basin dewatering pumps. Due to the large accumulations of solids in the sump, these pumps were routinely overwhelmed with solids. As such, O&M staff have removed them from both basins, but they indicated these pumps are beneficial for proper flushing and removal of solids.

There are two alternatives for addressing this issue:

1) **Alternative 1: Do Nothing/ Replace In-Kind.** Replace the dewatering and sump pumps in-kind.
2) **Alternative 2: Upgrade Basin Dewatering Pumps and Reinstall Sump Pumps and Fluidization System.** Two new 200 gpm, sump pumps should be installed. It is recommended that a solids fluidization system be installed under the intake of the new sump pumps and the dewatering pumps. This fluidization system could consist of a water jet to fluidize the accumulated grit before the pump turns on. The project should also provide a new base elbow, cleaning of the discharge pipes, replacement of valves on the discharge line, and replacement of the pump rail system.

   O&M staff also requested that the type of dewatering pump be investigated to ones that better handle heavy grit loads. The existing four pumps are manufactured by Vaughan. The N-Series submersible pump by Flygt has replaced a number of dewatering pumps at other CSO facilities and are recommended at this location. Based on input from Kennedy Industries, a Flygt Model NP-3202 would be an appropriate replacement pump. The preliminary sizing indicated that these pumps have a slightly lower horsepower than the existing pumps. Detailed design is needed to confirm pump sizing. The elevation of each dewatering pumps should also be investigated (consider one higher than the other to avoid the heavy grit loads).

   This project should be incorporated into the flushing gate project (Project HS-FD-1), if the new basin flushing system moves forward.

The alternative evaluation for these alternatives is presented in Table 9-9. The sources of costs used in this evaluation are listed below:

- The capital cost for Alternative 1 is based on the pump replacement costs from the SRP.
- The capital cost for Alternative 2 is included in Volume 6 – Appendices, Appendix C under this project title. It includes a new fluidizing system to allow the sump pumps to function properly. It also includes new piping to replace the existing and allow the pump elevations to be modified.

Alternative 1 is shown as the Best Value Alternative. The scope of Alternative 2 is generally similar to Alternative 1; however, there are additional improvements in Alternative 2 that are necessary to allow the system to function properly. As such, **Alternative 2 - Upgrade Basin Dewatering Pumps and Reinstall Sump Pumps and Fluidization System is the recommended alternative.**

Table 9-9. Alternative Evaluation for Dewatering and Sump Pump Improvements (Project HS-FD-2)

Alt.	Description		Benefit Category	Benefit Score	Total Benefit	Capital Costs	Annual O&M	NPV	NPV/Benefit (prefer low value)	Best Value Alternative
1	*Alt. Name:*	Do Nothing/ Replace In-Kind	Health and Safety	3	2.58	$ 429,000	$ -	$ 429,000	$ 166,065	Best Value Alternative
	Definition:	Replace the dewatering pumps and sump pumps in-kind.	Water Quality & Compliance	3						
	Adv.:		Capacity Enhancement	3						
	Disadv.:	Difficulty with flushing and removal of solids.	Component Performance	1						
	Comments:	None	O&M Ease	2						
2	*Alt. Name:*	Upgrade Basin Dewatering Pumps and Reinstall Sump Pumps and Fluidization System	Health and Safety	3	3.42	$ 950,000	$ -	$ 950,000	$ 278,049	
	Definition:	New dewatering and sump pumps and appurtenances will be installed. A solids fluidization system will be installed under the intake of the new sump pumps.	Water Quality & Compliance	3						
	Adv.:	Proper flushing and removal of solids	Capacity Enhancement	3						
	Disadv.:	None.	Component Performance	5						
	Comments:	None	O&M Ease	4						

Access to Effluent Channel (Project HS-FD-3). There is no manned access to the effluent channel area (i.e., the area between the effluent weirs and the effluent flap-gates). GLWA needs to access this area to allow equipment to be lowered into this space for removal of settled solids from the floor.

There are two alternatives for addressing this issue:

1) **Alternative 1: Do Nothing**
2) **Alternative 2: Equipment Access to Effluent Channel.** A hatched opening is desired for this area in a location shown in Figure HS-FD-3-ALT-2 in Volume 6 – Appendices, Appendix B. One option is to cut an opening in one pre-stressed concrete plank and use removable covers, similar to the existing hatch shown in the photos in the Appendix. Another option that should be considered during design is providing an aluminum hatch opening, so that a boom truck is not needed to remove the cover.

   This project should be incorporated into the flushing gate project (Project HS-FD-1), if the new basin flushing system moves forward.

The alternative evaluation for these alternatives is presented in Table 9-10. The capital cost for Alternative 2 is included in Volume 6 – Appendices, Appendix C under this project title.

Due to need to access this location for solids clean-out, **Alternative 2 - Equipment Access to Effluent Channel is recommended.**

Table 9-10. Alternative Evaluation for Access to Effluent Channel (Project HS-FD-3)

Alt.	Description		Benefit Category	Benefit Score	Total Benefit	Capital Costs	Annual O&M	NPV	NPV/Benefit (prefer low value)	Best Value Alternative
1	*Alt. Name:*	Do Nothing	Health and Safety	3	2.78	$ -	$ -	$ -	$ -	Not Applicable
	Definition:	Do nothing.	Water Quality & Compliance	3						
	Adv.:	None	Capacity Enhancement	3						
	Disadv.:	Inability to access the effluent channel area	Component Performance	3						
	Comments:	None	O&M Ease	2						
2	*Alt. Name:*	Equipment Access to Effluent Channel	Health and Safety	3	3.22	$ 126,000	$ -	$ 126,000	$ 39,171	Not Applicable
	Definition:	Cut an opening in one pre-stressed concrete plank and use removable covers	Water Quality & Compliance	3						
	Adv.:	Easier access	Capacity Enhancement	3						
	Disadv.:	Maintenance of hatch	Component Performance	3						
	Comments:	None	O&M Ease	4						

9.2.5 HVAC

9.2.5.1 Description of Existing System

The Hubbell-Southfield CSO Facility consists of a Headworks Building and a Process Building. The buildings contain a Headworks area, chemical room, utility support (electrical and mechanical rooms), control room, odor control rooms and other miscellaneous rooms. The facility also includes a retention basin. Table 9-11 provides a summary of the major HVAC equipment for this facility.

Plumbing services for the facility consist of city water service, natural gas service, sanitary system, electric water heater, emergency shower/eye wash and washroom regular shower. Emergency shower/eye washes are addressed, if safety issues were discovered, in Section 9.2.10.

Table 9-11. Major HVAC Equipment at Hubbell-Southfield CSO Facility

Location	Unit No.	Description	Capacity (Per Unit)
Headworks	HVU-3	Heating Ventilating Unit	25,000 CFM
Basin 1	SF-1 to 6	6 × Supply Fans	50,000 CFM
Basin 2	SF-7 to 13	7 × Supply Fans	50,000 CFM
Chemical Room (Headworks Bldg)	EF-2	Exhaust Fan (Hypochlorite Rm)	2,200 CFM
	HVU-2	Heating Ventilating Unit	10,500 CFM
Process Control Bldg	PACU-1	Packaged Air Conditioning Unit	3,400 CFM

Note:
HVU = Heating Ventilation Unit

Table 9-12 provides a summary of the basis of design performance criteria for HVAC systems at Hubbell-Southfield and Table 9-13 provides the outdoor Basis of Design conditions.

Table 9-12. Hubbell-Southfield Original Indoor Basis of Design Performance Criteria Summary

Location	Area Electrical Classification	Basis of Design		
		Indoor Design Temperature		Ventilation Design Criteria
		Winter (°F)	Summer (°F)	
Odor Control Room – Process Building	Unclassified (Per As-Built Drawings)	70	N/A	12 ACH
Work Area, Electric Room, Toilet, Storage, etc., – Process Building	Unclassified	70 (Occupied) 60 (Unoccupied)	78	6 ACH
Dewatering Room – Process Building	Unclassified	70	N/A	3 ACH
Mechanical Room – Headworks Building	Unclassified	60	N/A	6 ACH
Odor Control Room – Headworks Building	Unclassified (Per As-Built Drawings)	70	N/A	12 ACH
NaOCl Room –Headworks Building	Unclassified	60	N/A	6 ACH
Headworks Room –Headworks Building	Class I, Div 1, Group D (Per As-Built Drawings)	70	N/A	12 ACH

Table 9-13. Hubbell-Southfield Original Outdoor Basis of Design Conditions

Outdoor Design Temperature		
Winter (Dry Bulb °F)	Summer (Dry Bulb °F)	Summer (Wet Bulb °F)
3	91	73

9.2.5.2 Identified Needs and Issues

During discussions with GLWA O&M staff and GLWA's HVAC contractor, the following HVAC issues were noted:

- Heating in the dewatering room (basement of Process Building) was reported to be insufficient. No freezing of pipes was reported.

  Jacobs further investigated this issue through review of design information and site visit. All spaces in the Process Building have a basis of design winter dry bulb temperature of 70°F. The dewatering room's HVU duct heater has a design capacity of 125,000 Btu/h which should be sufficient to heat the dewatering room to 70°F using 80 percent return air, as designed. EF-7 was not observed to be operating. Given the significant amount of corrosion that was observed on EF-7's motorized damper, it is very likely that the damper is seized. This could not be verified in the field due to the inaccessible location of the damper. The observed cold air temperatures in the dewatering room are most likely the result of HVU-4's outside air supply damper remaining fully open during heating mode and/or the return air damper remaining in its minimum position. Given the age of the equipment serving the dewatering room, a replacement in-kind of HVU-4, EF-7 and associated supply, return, and exhaust dampers is recommended and should resolve this issue. This project will come from the SRP.
- O&M staff requested that air conditioning in the Process Building odor control room. Upon further discussion, the main activity routinely performed in this area is sample preparation and analysis. Instead of air conditioning the entire odor control room, it was recommended to move the sample sink to the work area, which is already air conditioned. This is currently an on-going project to be completed by GLWA maintenance staff
- Heating and cooling issues in Process Building. Staff reported that improvements were needed.
- Historical Issues with Heating and Ventilation Units: GLWA's HVAC contractor noted there had been issues with the HVUs which had been resolved. They did not note any out of the ordinary wear or capacity issues with the units.

During Jacobs site investigations (June 2020) the following observations were noted:

- It was observed during the site visit that the air balance of PACU-1 in the Process Building had been adjusted since installation. It is very likely that this adjustment came from a desire to improve thermal comfort in occupied spaces. Additionally, it was noted that the supply air duct from PACU-1 runs from the West side to the East side of the Process Building; however, the return air duct terminates at the entrance to the odor control room (see Figure 9-2 below). This is likely to result in poor air quality as a result of a lack of air circulation in spaces on the East side of the Process Building.

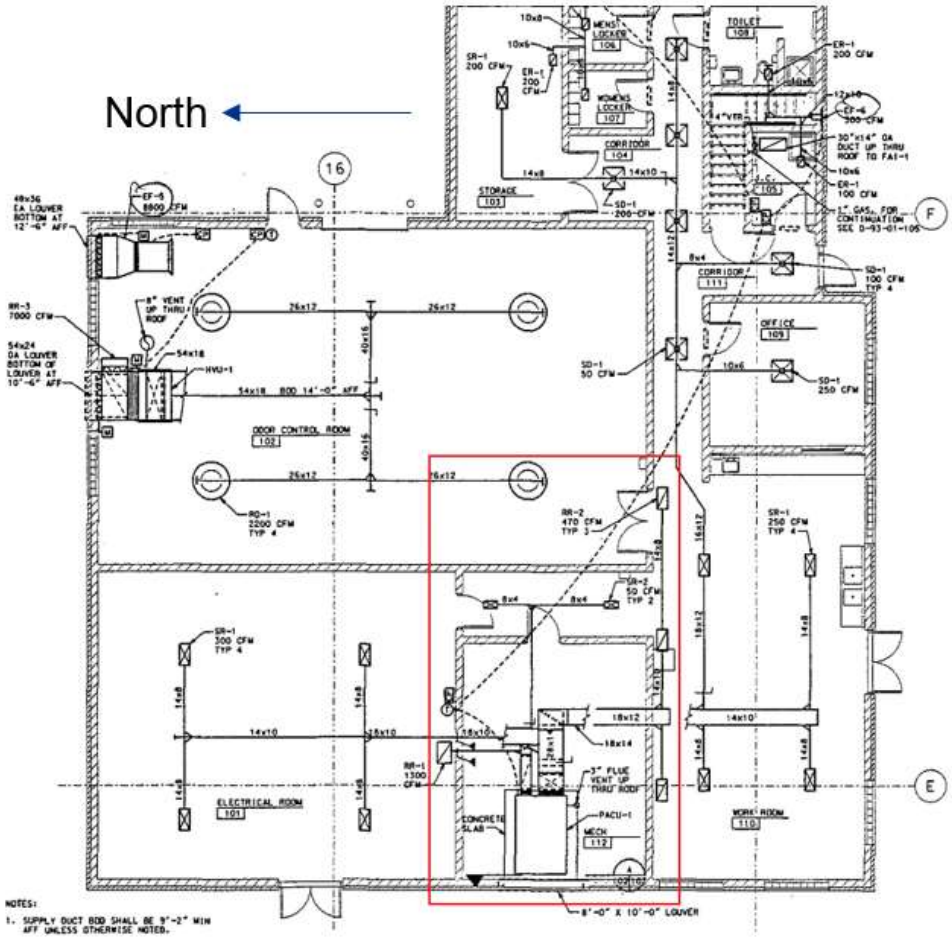


Figure 9-2. PACU-1 Return Air Ductwork

- The doors between the Process Building odor control room and the Work Area were observed to be open. Additionally, ventilation in the odor control room was switched off. Condensation was noted on the PACU-1 supply air duct directly in front of the Odor Control Room.
- Condensation was noted on the floor at the top of the dewatering room (basement) stairway. HVU-4, which serves the dewatering room was supplying ventilation air but EF-7 which provides relief for the air supplied to the dewatering room was not operating despite having its motorized damper in the open position. Additionally, significant corrosion was observed on the body of the dewatering room's duct mounted gas furnace (Figure 9-3).

Figure 9-3. Corrosion on EF-7 Ductwork

- HVU-2's supply fan, which provides ventilation to the odor control room in the Headworks Building, was observed to be running; however, EF-1, EF-2, EF-3 were not operating.

9.2.5.3 Description and Evaluation of Alternatives

Projects to address the needs and issues identified above are presented in this section. The evaluation of alternatives is also included in this section, along with the recommended alternative.

Process Building Air Balance Study. An air balance is recommended for the Process Building to determine if the heating and cooling issues are the result of a poorly balanced system. It is noted that the operators occasionally leave the door to the odor control room open to cool this area, as observed during the site visit. This may be contributing to the issues related to poor cooling provided by PACU-1. Also, it should be noted that the spaces in the Process Building which are cooled are only designed to be cooled to 78°F.

If the air balance does not improve conditions in the Process Building, extending the return air to PACU-1 should be considered. This should improve air circulation and increase supply air flow to the spaces on the East side of the facility, including the Office.

Scheduled Replacement Plan: As noted in Section 9.2.5.2, many of the relatively small HVAC-related equipment at this facility is recommended to be replaced in-kind. Therefore, it is included in the SRP.

9.2.6 Electrical

9.2.6.1 Description of Existing System

The Hubbell Southfield facility's electrical system consists of one DTE utility feed from a 1,500 kVA, 480 V, 3-phase outdoor transformer (secondary metering) and one diesel generator feed from a 600 kW, 480 V, 3-phase stationary generator. The feeds are connected to a 2,500 A switchboard MDP with electrically operated breakers and automatic source transfer controls for a 1,200 A bus. The MDP switchboard also has a 2,000 A breaker before the ATS, which feeds a main circuit breaker panel switchboard (MCBP). The MDP and MCBP have breakers that

feed motor control centers (MCCs) and distribution panels. The MCCs and distribution panels then feed the various pumps, valves, motors, transformers, panels, etc. at the facility. Table 9-14 provides a summary of the major electrical equipment for this facility.

Table 9-14. Major Electrical Equipment at Hubbell-Southfield

Location	Major Electrical Equipment	Description
Electrical Room	Main Switchboard/ATS (MDP)	2,500 A, 480/277 V, 3-Phase
Outdoors	Generator (Diesel)	600 kW, 480 V, 3-Phase
Electrical Room	MCC-P1	600 A, 480/277 V, 3-Phase
Odor Control Room	MCC-H1	250 A, 480/277 V, 3-Phase
Electrical Room	MCC-P2	1,200 A, 480/277 V, 3-Phase
Odor Control Room	MCC-H2	600 A, 480/277 V, 3-Phase

9.2.6.2 Identified Needs and Issues

The needs and issues were identified from meetings with O&M staff and Jacobs team site visit and investigations. The lighting is poor or non-existent in some locations, making for unsafe working conditions. This issue is further described in the next section.

9.2.6.3 Description and Evaluation of Alternatives

A project to address the needs and issues identified above are presented in this section. The evaluation of alternatives is also included in this section, along with the recommended alternative.

Electrical Improvements (Project HS-ELEC-1). The lighting is poor or non-existent in some locations, making for less safe conditions. There are two alternatives to address the issue:

1) **Alternative 1: Do Nothing.** Do not add the lighting or receptacles, however it will be less safe when operating at night and select locations within the basin.
2) **Alternative 2: Electrical Improvements.** Add Lighting and Exterior Power Receptacles at the following locations (and shown on the electrical drawings - Figure HS-ELEC-1-ALT-2 - included in Volume 6 – Appendices, Appendix B):
   - Basin Nos. 1 and 2—Add interior explosion-proof LED lighting fixtures to provide lighting within the basins.
   - Access road—Add light poles and associated LED light fixtures. Lighting foot-candles shall meet the requirements of the local outdoor lighting ordinances.
   - Outfall area—Add a light pole and overhead lighting at the facility's outfall. Lighting foot-candles shall meet the requirements of the local outdoor lighting ordinances.
   - External lighting on top of Basins—Add light poles and LED lighting fixtures on the facility's basins. Lighting foot-candles shall meet the requirements of the local outdoor lighting ordinances.
   - Add exterior power receptacles to assist in the maintenance and operations of the facility including receptacles every 75 ft on top of the basins for maintenance and operational needs.

   This project should be incorporated into the flushing gate project (Project HS-FD-1,) if the new basin flushing system moves forward because of the amount of work on and in the basins.

The alternative evaluation is presented in Table 9-15. The sources of costs used in this evaluation are listed in the following bullets:

- The capital costs for Alternative 2 are included in Volume 6 – Appendices, Appendix C under this project title.
- The increased O&M costs for the lighting is assumed to be negligible and would not affect the alternative evaluation.

This evaluation shows that Alternative 2 – Electrical Improvements has a total benefit score about 0.8 higher than the Do Nothing Alternative (Alternative 1) based on the improved health and safety and improved O&M provided by the added lighting and receptacles. The NPV/Benefit cost for Alternative 2 is $100,000, which is a moderate cost compared to other projects recommended in this assessment. **Because of the improved safety with this alternative, Alternative 2 – Electrical Improvements is the recommended alternative.**

Table 9-15. Alternative Evaluation for Electrical Improvements (Project HS-ELEC-1)

Alt.	Description		Benefit Category	Benefit Score	Total Benefit	Capital Costs	Annual O&M	NPV	NPV/Benefit (prefer low value)	Best Value Alternative
1	*Alt. Name:*	Do Nothing	Health and Safety	2	2.72	$ -	$ -	$ -	$ -	Not Applicable
	Definition:	Do nothing.	Water Quality & Compliance	3						
	Adv.:	Less maintenance and energy usage	Capacity Enhancement	3						
	Disadv.:	Less safe when operating at night and when accessing select locations within the basin.	Component Performance	3						
	Comments:	None	O&M Ease	3						
2	*Alt. Name:*	Electrical Improvements	Health and Safety	4	3.50	$ 349,000	$ -	$ 349,000	$ 99,714	Not Applicable
	Definition:	Add additional lighting and receptacles at identified locations	Water Quality & Compliance	3						
	Adv.:	Improved safety for staff and workers.	Capacity Enhancement	3						
	Disadv.:	Increased maintenance and energy usage	Component Performance	3						
	Comments:	None	O&M Ease	4						

9.2.7 I&C

9.2.7.1 Description of Existing System

Control System: The original control system at Hubbell Southfield was installed in 1996 under PC-694. Since then, several modifications to the original control system have taken place. In 2002 under PC-713, the facility's PLC control system was upgraded to interface with the Ovation system to enable remote monitoring and control the facility from SCC. In 2009, PC-761 replaced the control system and workstations with new Allen Bradley ControlLogix redundant PLCs and new operator workstations with Factory Talk View SE software. The existing hardwired back-up control panel and other miscellaneous PLCs and subsystems are incorporated into the overall control system. The current system is equipped with a back-up radio system to communicate critical monitoring points back to the SCC on wide area network failure.

The current PLC control system and back-up panels are obsolete and do not meet GLWA SCADA Governance standards, which stipulate that all CSO facilities use Ovation workstations with high-performance graphics.

Flow and Level Sensors: Table 9-16 summarizes the level sensors and flow meters at the Hubbell-Southfield CSO Facility for monitoring flows through the treatment system, chemical dosing, and chemical storage tanks levels.

Table 9-16. Summary of Flow Meters and Level Sensors at Hubbell-Southfield CSO Facility

Area	Quantity	Instrument Type
CSO Flow Meters		
Influent channel (Upstream of inflatable dams)	2	Transit-Time (AccuSonic)
Shunt Channel (Shunt and bypass)	2	Transit-Time (AccuSonic)
Dewatering Flow	1	Magnetic
CSO Facility Level Sensors		
Influent channel (Upstream of inflatable dams)	2	Ultrasonic
Shunt Channel (Shunt and bypass)	2	Ultrasonic
Screening area (upstream and downstream of bar racks)	2	Ultrasonic
Basins	2	Ultrasonic
Dewatering Wells	2	Ultrasonic
Effluent Channel	1	Ultrasonic
Rouge River	1	Ultrasonic
Chemical System Flow Meters		
Chemical Feed	1	Ultrasonic

9.2.7.2 Identified Needs and Issues

The needs and issues were identified from meetings with O&M staff and Jacobs team site visit and investigations. These issues are listed in the following bullets and further described in the next section.

- Evaluate level sensors and flow meters to determine redundancy and identify sensors or meters that could potentially be removed. Jacobs further evaluated this issue and found that the flow meter in the Shunt Channel is redundant to the flow meters for the Bypass Channel and Influent Channel and could possibly be eliminated. Under the current operation of first flush capture, the Shunt Channel flow meter provides the flow

rate for flow to Basin 2 (after Basin 1 is full) and flow to the Bypass Channel (when the Bypass gates are open). Since there is a flow meter on the influent and one on the Bypass, the Shunt Channel flow meter is redundant and could be removed. However, it does provide redundancy if the Influent flow meter fails and it was recently replaced. It is recommended that the Shunt Channel flow meter be considered for elimination when it is near the end of its useful life.

- Need for remote control capability of the Chemical Feed area from the Control Building
- Need for remote control of VR-8 gate. This need is scheduled to be addressed in Spring 2021 by SCC under CS-090A. This project will provide remote control of this gate from either the Hubbell Southfield CSO Basin or SCC.
- Need for local remote control for dewatering pumps
- Need for tank level indication at Chemical Fill Station
- Need for process cameras at select locations
- Update Ovation control system to the latest version and increased monitoring capabilities

9.2.7.3 Description and Evaluation of Alternatives

Projects to address the needs and issues identified above are presented in this section. The evaluation of project alternatives is also included in this section, by potential project, along with the recommended alternative.

I&C Improvements (Project HS-I&C-1). Due to the relatively small nature of some of the I&C related projects identified as improvements, all of the identified I&C improvements, with the exception of the Ovation Control System Upgrade, are proposed to be in one project – I&C Improvements. This project could be split into multiple delivery projects, if needed. As such, there are two alternatives for this project:

1) **Alternative 1: Do Nothing**
2) **Alternative 2: I&C Improvements** including,
    - Provide remote control capability of the Chemical Feed area from the Control Building
    - Provide local remote control for dewatering pumps
    - Provide tank level indication at Chemical Fill Station
    - Provide process cameras at select locations

    Each of the I&C related improvements listed above is described further below:

    Provide remote control capability of the Chemical Feed area from the Control Building. A Remote I/O panel will be required at the Chemical Feed area which will be connected to the Control Building via a fiber optic cable. The Remote I/O panel will interface with the existing motor starter control circuits to be able to operate the equipment remotely.

    Provide local remote control for dewatering pumps. Provide local control for the four Dewatering Pumps in accordance with Section 5.4.9.

    Provide tank level indication at Chemical Fill Station. Tank level indication is described and recommended in Section 5.4.5.

    Provide process cameras at select locations. A list of the desired locations for process cameras is included in Section 5.4.8.

The alternative evaluation is presented in Table 9-17. The sources of costs used in this evaluation are listed in the following bullets:

- The capital costs for Alternative 2 are included in Volume 6 – Appendices, Appendix C under this project title.

- The increased O&M costs for the remaining improvements in Alternative 2 are difficult to quantify and would not affect the alternative evaluation. Similarly, it is difficult to quantify the monetary benefits of the improved operations through the improved monitoring and control.

This evaluation shows that Alternative 2 – I&C Improvements has a total benefit score about 0.3 higher than the Do Nothing Alternative (Alternative 1) based on the improved component performance and ease of O&M provided by the various I&C improvements. The NPV/Benefit cost for Alternative 2 is $120,000, which is a moderate cost compared to other projects recommended in this assessment. **Because of the improved safety with this alternative, Alternative 2 – I&C Improvements is the recommended alternative.**

Table 9-17. Alternative Evaluation for I&C Improvements (Project HS-I&C-1)

Alt.	Description		Benefit Category	Benefit Score	Total Benefit	Capital Costs	Annual O&M	NPV	NPV/Benefit (prefer low value)	Best Value Alternative
1	*Alt. Name:*	Do Nothing	Health and Safety	3	3.00	$ -	$ -	$ -	$ -	Not Applicable
	Definition:	Do Nothing	Water Quality & Compliance	3						
	Adv.:	Less maintenance. Known existing system.	Capacity Enhancement	3						
	Disadv.:	Performance isn't met with regards to safety and compliance - flows and volumes, alarms, disinfection, system status, etc.	Component Performance	3						
	Comments:	None	O&M Ease	3						
2	*Alt. Name:*	I&C Improvements	Health and Safety	3	3.32	$ 274,000	$ 7,000	$ 421,627	$ 127,124	Not Applicable
	Definition:	Provide local control capability of the Chemical Feed area from the Control Building; provide local remote control for dewatering pumps; provide tank level indication at Chemical Fill Station; provide process cameras at select locations.	Water Quality & Compliance	3						
	Adv.:	Higher performance, improved safety, improved compliance control, more efficient operations.	Capacity Enhancement	3						
	Disadv.:	Increased complexity and higher maintenance.	Component Performance	4						
	Comments:	None	O&M Ease	4						

Control System Upgrade (Project HS-I&C-2). The current facility's PLC control system, network, workstations and control system back-up panels are obsolete and should be replaced in the near future. The control system does not meet GLWA SCADA Governance standards, which require that all CSO facilities use Ovation workstations with new high-performance graphics. GLWA's standards for local CSO facility's control systems can be either the latest Allen Bradley PLC system with Ovation workstations or a complete Ovation system. This approach is being used on an ongoing project at Leib, Seven Mile, and St. Aubin.

Because of the approach used on the ongoing project, there is only one overall control system alternative considered. The project should include decommissioning and removal of the original hardwired back-up local control panels. These local panels are no longer required with today's redundant control system processors and local Operator Interface Terminal (OIT) as local back-up to the facility's workstations.

Table 9-18 provides the summary of the **Control System Upgrade, which is the recommended alternative.** Capital costs are included in Volume 6 – Appendices, Appendix C under this project title. Consideration should be given to replacing various field instruments; however, these are not included in the capital costs.

Table 9-18. Alternative Evaluation for Control System Upgrade (Project HS-I&C-2)

Alt.	Description		Benefit Category	Benefit Score	Total Benefit	Capital Costs	Annual O&M	NPV	NPV/Benefit (prefer low value)	Best Value Alternative
1	*Alt. Name:*	Control System Upgrade	Health and Safety	3	3.00	$ 2,457,000	$ -	$ 2,457,000	$ 819,000	Best Value Alternative
	Definition:	Install current technology, higher performing control system hardware and software that is standardized across all CSO facilities. Ovation is the recommended system.	Water Quality & Compliance	3						
	Adv.:	Improved performance, standardized HMI screens, can have standardized redundant "on-the-shelf" parts.	Capacity Enhancement	3						
	Disadv.:	No performance related disadvantages.	Component Performance	3						
	Comments:	None	O&M Ease	3						

9.2.8 Site

9.2.8.1 Description of Existing Site

The Hubbell-Southfield CSO Facility was constructed in 1994. The Hubbell-Southfield facility has two buildings situated on top of the basin, namely the Headworks Building over the north influent end of the basin and the Process Building over the dewatering pumps at the center of the basin. The access entrance to the site is through a 24-ft wide sliding vehicular gate. Security around the perimeter of the site is provide by an 8-ft high chain link fence. Site pavement consists of 9-in. reinforced concrete on undisturbed earth. There are no sidewalks near the basin. The access road from Rotunda Dr. to the basin consists of 10-in. asphalt on 12 in. of gravel base.

Under a separate task of CS-299, all site utilities have been located and included in GLWA's GIS. Site utilities include water, sewer (sanitary, storm and combined sewer), process, natural gas, electric, and communications. The information provided in the GIS includes attributes for each asset type within each utility such as unique identification (ID), name, ownership, horizontal location (coordinates), vertical elevation and depth, utility type, size (diameter, length, dimensions, etc.), material type, the type of surface at the utility (i.e., asphalt, concrete, grass, etc.), installation year, as-built reference drawing number, contract number, section map number, GPS date, and location accuracy.

The information from the GIS is being used to develop the SRP under CS-299 for horizontal assets at all nine CSO facilities. As such, renewal needs related to underground site utilities are not included in this report.

9.2.8.2 Identified Needs and Issues

The needs and issues were identified from meetings with O&M staff and Jacobs team site visit and investigations. These issues are listed below and further described in the section below.

- The existing 2-in NPW header line for flushing the basins provides insufficient pressure for washdown after storm event.
- Poor condition of the service drive around the basin
- Localized ponding of water on the basin surface. In the winter, this water freezes and causes safety concerns
- Poor condition of security fencing
- The detention ponds drainage from the gold course discharged over the access road creates an issue for GLWA vehicles driving through
- The following needs are generally preventative maintenance items intended to ensure that the site features or utilities are serviceable throughout their expected service lives.
  - Remove vegetation from the fence line around the perimeter of the basin
  - Re-caulk expansion joints at the base of the exterior walls around the Headworks and Control Buildings
  - Replace expansion joint membranes and expansion joint cover plates on the basin service drive.

9.2.8.3 Description and Evaluation of Alternatives

Projects to address the needs and issues identified above are presented in this section. The evaluation of project alternatives is also included in this section, by potential project, along with the recommended alternative.

Flushing Water Pressure in Headworks Area (Project HS-Site-1). A 6-in. watermain services the Headworks Building and supplies the NPW service to the hose bibs in the basin. The 6-in. watermain is tapped from an 8-in. watermain outside of Headworks Building. The NPW is supplied through a 2-in. header that runs through the length of the basin with drop connections at hose bibs spaced approximately 100 ft apart. GLWA Operations staff

indicate that there is little pressure in the 2-in. NPW line for hose washdown inside the basin after a storm event. There are two alternatives for this project:

1) **Alternative 1: Do Nothing.**
2) **Alternative 2: Increase Flushing Water Pressure and Add Hose Bibs in Headworks Area.** To increase pressure in the NPW line, it is recommended to demolish and replace approximately 950-ft of the existing 2-in. header in the basin with a 4-in. header (See Figures HS-SITE-1-ALT-2). The size of this header should be confirmed during detailed design.

The alternative evaluation is presented in Table 9-19. The capital costs for Alternative 2 are included in Volume 6 – Appendices, Appendix C under this project title.

This evaluation shows that Alternative 2 has a total benefit score about 0.7 higher than the Do Nothing Alternative (Alternative 1) based on the improved component performance and ease of O&M. The NPV/Benefit cost for Alternative 2 is $33,000, which is a relatively low cost compared to other projects recommended in this assessment. **Because of the improved safety with this alternative, Alternative 2 – Increase Flushing Water Pressure and Add Hose Bibs in Headworks Area, is the recommended alternative.**

Table 9-19. Alternative Evaluation for Flushing Water Pressure in Headworks Area (Project HS-SITE-1)

Alt.	Description		Benefit Category	Benefit Score	Total Benefit	Capital Costs	Annual O&M	NPV	NPV/Benefit (prefer low value)	Best Value Alternative
1	*Alt. Name:*	Do Nothing	Health and Safety	3	2.68	$ -	$ -	$ -	$ -	Not Applicable
	Definition:	Do nothing.	Water Quality & Compliance	3						
	Adv.:	None.	Capacity Enhancement	3						
	Disadv.:	Insufficient water pressure for washdown after storm event.	Component Performance	2						
	Comments:	None	O&M Ease	2						
2	*Alt. Name:*	Increase Flushing Water Pressure and Add Hose Bibs in Headworks Area	Health and Safety	3	3.42	$ 112,000	$ -	$ 112,000	$ 32,780	Not Applicable
	Definition:	To increase the pressure in the non-potable water line, it is recommended to replace the existing 2" header with a 4" header in the basin.	Water Quality & Compliance	3						
	Adv.:	Easier washdown	Capacity Enhancement	3						
	Disadv.:	None.	Component Performance	5						
	Comments:	None	O&M Ease	4						

Site Improvements (Project HS-SITE-2). Due to the relatively small nature of some of the site related projects identified as improvements, all of the identified site improvements are proposed to be in one project – Site Improvements. This project could be split into separate multiple delivery projects, if needed. As such, there are two alternatives for this project:

1) **Alternative 1: Do Nothing.**
2) **Alternative 2: Site Improvements** including,

   - Resurface Service Drive Around Basin
   - Improve Basin Roof Surface Drainage
   - Replace Security Fencing
   - Culvert for Golf Course Drainage

   Each of the site related improvements listed above are described further below:

   Resurface Service Drive Around Basin: The existing service drive around the basin is in poor condition. The service drive along the east side of the basin consists of reinforced concrete slab, which is the roof of the Dearborn Channel and Shunt Channel. The remaining portion of the service drive that runs across the basin and then along the west side of the basin to the headworks building consists of 4-in. concrete topping reinforced with welded wire fabric (WWF) on top of double tee beams of the basin roof.

   To restore the service drive along the east side, it is recommended to hydro-demolish the top surface of the Dearborn and Shunt Channels roof slab up to 2 in. below the top layer of reinforcement and reconstruct the slab. To restore the service drive across the basin and along the west side of the basin, it is recommended to hydro-demolish the entire 4-in. thick concrete topping and replace it with new air entrained reinforced concrete topping. The reconstruction of the slab along the east and west sides of the service drive should be sloped to provide drainage away from the structure and towards grassy areas.

   It is noted that the hydro-demolition and reconstruction activities will require a temporary support system from below to maintain the integrity of existing structural systems (roof slab/double Tees) during construction activities. Representative concrete core samples should be taken and tested by a material testing company to check the integrity of the slabs prior to any demolition activities.

   Improve Basin Roof Surface Drainage: There are numerous areas on the basin roof surface where localized ponding of water occurs (See Figure HS-SITE-2-ALT-2 in Volume 6 – Appendices, Appendix B). Ponding of water can become a safety issue for personnel who must navigate around these areas to access equipment or facilities during winter months when the surfaces turn to ice. It is recommended at the larger areas of ponding water that cores be made through the basin roof to drain the area. Recessed plaza deck drains should be installed in the cored holes to drain ponded water directly to the basin. As an alternative, to prevent stormwater from entering the basin, consideration could be given to piping the ponded water drainage on the underside of the basin through the basin exterior walls and discharge to drainage swales on either side of the basin. It is estimated that there are 10 to 15 significant sites of ponded water on the basin surface.

   Replace Security Fencing: There are two locations where fencing needs to be replaced because it is in disrepair:

   - The fencing at the entrance to the service drive from Rotunda Drive (see Figure HS-SITE-2-ALT-2 in Volume 6 – Appendices, Appendix B, for location). The fencing extends on the south side of the service road from Rotunda Drive to the gate on the service drive at the Tournament Players Club golf course maintenance building. This includes 360 ft of 5-ft tall cyclone fencing.
   - The fencing on the north side of the access road from Rotunda Drive to the facility access gate (also shown in Figure HS-SITE-2-ALT-2 in Volume 6 – Appendices, Appendix B). This includes approximately 2,300 ft of 5-ft tall cyclone fencing.

It should be noted that the as-built drawings for this facility (PC-694) do not include fencing. As such, it appears the fencing was existing when the facility was built and may not be the responsibility of GLWA.

Culvert for Golf Course Drainage: Periodically, the Tournament Players Club golf course must drain detention ponds located on the course. This is generally accomplished by pumping pond contents through hoses and discharging over the access road to allow the water to drain to the Rouge River. To minimize soil erosion from this method of pumping, GLWA has proposed to create a drainage culvert beneath the access road so that the pond water can be discharged beneath the road rather than across its surface where it is tracked by GLWA vehicles. The new drain should be located beneath the access road in the vicinity of the Tournament Players Club Maintenance Building and should include a catch basin on the north side of the road and a rip rapped discharge with a headwall (or spillway) on the Rouge River side of the access road.

The alternative evaluation is presented in Table 9-20. The capital costs for Alternative 2 are included in Volume 6 – Appendices, Appendix C under this project title.

This evaluation shows that Alternative 2 has a total benefit score about 1.0 higher than the Do Nothing Alternative (Alternative 1) based on the improved health and safety, and ease of O&M. The NPV/Benefit cost for Alternative 2 is $258,000. **Because of the improved drainage and safety and restoration of the road with Alternative 2 – Site Improvements, Alternative 2 is the recommended alternative.**

Table 9-20. Alternative Evaluation for Site Improvements (Project HS-SITE-2)

Alt.	Description		Benefit Category	Benefit Score	Total Benefit	Capital Costs	Annual O&M	NPV	NPV/Benefit (prefer low value)	Best Value Alternative
1	*Alt. Name:*	Do Nothing	Health and Safety	2	2.50	$ -	$ -	$ -	$ -	Not Applicable
	Definition:	Do nothing.	Water Quality & Compliance	3						
	Adv.:	None.	Capacity Enhancement	3						
	Disadv.:		Component Performance	3						
	Comments:	None	O&M Ease	2						
2	*Alt. Name:*	Site Improvements	Health and Safety	4	3.50	$ 902,000	$ -	$ 902,000	$ 257,714	Not Applicable
	Definition:	Resurface Service Drive Around Basin; improve basin roof surface drainage; replace security fencing; culvert for Golf Course drainage	Water Quality & Compliance	3						
	Adv.:	Improved drainage & improved safety for accessing facility.	Capacity Enhancement	3						
	Disadv.:	None.	Component Performance	3						
	Comments:	None	O&M Ease	4						

9.2.9 Architectural

9.2.9.1 Description of Existing Facilities

The Hubbell-Southfield CSO Facility consists of Headworks Building and Process Building. The Headworks Building includes a screen room, chemical room, a mechical room and an odor control room. the Process Building includes a control room, utility support (electrical and mechanical), odor control room, and other miscellaneous rooms. The facility also includes the retention basin.

9.2.9.2 Identified Needs and Issues

The needs and issues for architectural issues were identified by a roof replacement evaluation and a detailed assessment of architectural issues, as described in the following paragraphs.

Evaluation of Type of Future Roof Replacement. Jacobs reviewed the results of a roof assessment and prepared a 60-year life-cycle cost analysis between shingled roof and metal roof. Based on the results of this evaluation, which shows lower life cycle cost for shingled roof, Jacobs recommends replacement of the shingled roof with shingles when the roof is ready for replacement. The analysis is presented in Table 9-21. As such, the roof should be replaced in-kind and the costs and schedule for the roof replacement will come from the SRP.

Table 9-21. 60-Year Life Cycle Cost Evaluation of Shingled vs. Metal Roof for Hubbell-Southfield Facility

	Shingle Roof	Metal Roof
Replacement Cost [1]	$282,000	$940,000
Replacement Interval	20 years	60 years
Number of Roof Replacements During 60 Years	3	1
Total Life Cycle Cost (NPV) Discounted at 2.4%	$766,000	$940,000

[1] Based on 18,800 ft^2 roof area; $15 ft^2 for shingle roof and $50/$ft^2$ for metal roof.

CS-299 Architectural Assessment: Jacobs conducted an assessment of the architectural-related defects at the CSO facilities. Jacobs used the architectural-related information in NTH's Structural Rehabilitation Needs Assessment (referenced in Section 5.5) for the above-ground buildings as a starting point and included additional items, as observed during the assessments conducted in January 2021 under CS-299. The architectural assessments included:

- Doors
- Windows, including sealant
- Room finishes
- Floors and ceiling coating/covering systems
- Stairways
- Corrosion of visible steel members

The architectural assessment did not include structural related defects, such as cracks in walls, spalling concrete, roofs and roofing system, because these items will be accounted for in the on-going Structural Rehabilitation project and the condition of the roofs was assessed recently by NTH. It also does not include assessment of furnishings, such as office furniture, desks, built-in cabinets, audio/video equipment, etc.

9.2.9.3 Description and Evaluation of Alternatives

A project to address the needs and issues identified above are presented in this section. The evaluation of alternatives is also included in this section, along with the recommended alternative.

Architectural Rehabilitation (HS-ARCH-1). Jacobs identified numerous architectural-related defects that should be addressed within the next five years. There are two alternatives to address these issues:

1) **Alternative 1: Do Nothing.**
2) **Alternative 2: Architectural Rehabilitation.** Perform the architectural repairs identified under the NTH and CS-299 assessments. The major rehabilitation includes the following:
    - Remove and replace sealant around doors, windows and other wall penetrations
    - Remove and replace sealant at all control/ expansion wall joints
    - Remove and replace isolation/ cove joint sealant and around building perimeter
    - Install floor expansion joint in Process Building
    - Paint wood truss and plywood roof deck in Process Building
    - Remove corrosion on bollards, and clean and coat
    - Remove existing paint, clean and paint wood roof deck and framing
    - Install vertical expansion joint and repair concrete and wall in Headworks Building
    - Replace damaged/stained/missing acoustic ceiling tiles in Process Building
    - Address door hardware issues
    - Caulk gap of fascia board on Process Building

The detailed list of rehabilitation items are included in the capital cost estimate for this project and are shown in drawings (Figure HS-ARCH-1-ALT-2) in Volume 6 – Appendices, Appendix B. Consideration should be given to making some or all of these repairs under the Structural Rehabilitation project.

The alternative evaluation is presented in Table 9-22. The capital costs for Alternative 2 are included in Volume 6 – Appendices, Appendix C under this project title.

Because of the benefit of preventing more costly damage in the future from not addressing these issues, Alternative 2 is the recommended alternative.

Table 9-22. Alternative Evaluation for Architectural Rehabilitation (Project HS-ARCH-1)

Alt.	Description		Benefit Category	Benefit Score	Total Benefit	Capital Costs	Annual O&M	NPV	NPV/Benefit (prefer low value)	Best Value Alternative
1	*Alt. Name:*	Do Nothing	Health and Safety	3	2.90	$ -	$ -	$ -	$ -	Not Applicable
	Definition:	Do Nothing	Water Quality & Compliance	3						
	Adv.:	Lower cost	Capacity Enhancement	3						
	Disadv.:	Repairs may become more costly in the future.	Component Performance	2						
	Comments:	None	O&M Ease	3						
2	*Alt. Name:*	Architectural Rehabilitation	Health and Safety	3	3.10	$ 371,000	$ -	$ 371,000	$ 119,677	Not Applicable
	Definition:	Architectural Rehabilitation	Water Quality & Compliance	3						
	Adv.:	Repairs building defects before they become more severe and costly issues.	Capacity Enhancement	3						
	Disadv.:	Higher cost	Component Performance	4						
	Comments:	None	O&M Ease	3						

9.2.10 Safety

9.2.10.1 Description of Existing System

Safety related items include fall protection, exit signage, hatch access, and other miscellaneous safety-related issues.

9.2.10.2 Identified Needs and Issues

The safety issues identified during Jacobs Safety Inspection, described in Section 5.7, are listed in Table 9-23. The capital improvement project to address these issues is included in the table.

Table 9-23. Identification of Capital Improvements for Safety Issues

Location	Description	Corrective Action from Safety Inspection Report	Capital Improvement Project
Headworks	Mid-rail missing between bar screen 2 and 3	Add mid rail	Safety Improvements (Project HS-SAFE-1)
Basin Odor Control Room	At top of ladders, mid-rail chain needed	Add swing gate (original recommendation was to add chain; however, this is no longer current GLWA practice)	Safety Improvements (Project HS-SAFE-1)
Process Building Odor Control Room	Eyewash 0922552 too low	Adjust height of eyewash	Eyewash/Shower Improvements (Project HS-SAFE-1)
Basin Odor Control Room	Eyewash 0947279 too low	Adjust height of eyewash	Eyewash/Shower Improvements (Project HS-SAFE-1)
Fall Protection	Fall Protection	See Section 5.7.3 and Volume 6 – Appendices, Appendix E	Safety Improvements (Project HS-SAFE-1)

9.2.10.3 Description and Evaluation of Alternatives

A project to address the needs and issues identified above is presented in this section. The evaluation of project alternatives is also included in this section, along with the recommended alternative.

Safety Improvements (Project HS-SAFE-1). This project should address the safety issues identified above. These issues include:

- Extend railing between bar screen #2 and #3 to eliminate fall hazard
- Add swing gate at top of ladders in the basin odor control room
- Adjust height of eyewash in the Process Building odor control room and basin odor control room
- Address fall protection

Because the importance of these issues related to safety, it is the only alternative considered. As such, it is the recommended project. For consistency in this report, Table 9-24 shows the one alternative.

Table 9-24. Alternative Evaluation for Safety Improvements (Project HS-SAFE-1)

Alt.	Description		Benefit Category	Benefit Score	Total Benefit	Capital Costs	Annual O&M	NPV	NPV/Benefit (prefer low value)	Best Value Alternative
1	*Alt. Name:*	Safety Improvements	Health and Safety	5	3.78	$ 158,000	$ -	$ 158,000	$ 41,762	Best Value Alternative
	Definition:	Safety improvements to address fall protection, eye wash.	Water Quality & Compliance	3						
	Adv.:	Improved safety for staff and workers.	Capacity Enhancement	3						
	Disadv.:	None.	Component Performance	3						
	Comments:	None	O&M Ease	4						

9.2.11 Supporting Infrastructure

9.2.11.1 Description of Existing System

Supporting infrastructure refers to equipment or needs that may not fit into one of the processes or discipline-specific sections above.

9.2.11.2 Identified Needs and Issues

The needs and issues were identified from meetings with O&M staff and Jacobs team site visit and investigations. These issues are listed in the following bullets and further described in the following section.

- The VR-8 Regulator upstream of the Hubbell-Southfield CSO Facility is located in the center median of Michigan Avenue east of the Southfield Freeway. The VR-8 Regulator consists of two stainless steel slide gates that are adjusted by SCADA control to regulate flow from the Hubbell-Southfield sewer to the NWI. A rehabilitation project was designed in 2013 by Metco, but not implemented. Rehabilitation of the VR-8 Regulator is still needed. It should be noted that the control system for the regulator is being upgraded in early 2021 under Project No. CS-090A. This upgrade will provide remote control of the two regulator gates from the Hubbell Southfield CSO Facility or SCC.

9.2.11.3 Discussion and Evaluation of Alternatives

A project to address the needs and issues identified above are presented in this section. The evaluation of alternatives is also included in this section, along with the recommended alternative.

VR-8 Regulator Rehabilitation (Project HS-SUPP-1). As described in the 2013 Final Basis of Design Report by Metco, the rehabilitation of the VR-8 Regulator included 1) Replacement of the slide gates and actuator; 2) SCADA system modifications; and 3) Access improvements in the median near the gates and control panel. As noted above, the SCADA system modifications are being addressed as part of a control system project. As such, Jacobs based the proposed rehabilitation on the cost estimate generated for this project (inflated to current dollars), excluding the SCADA system improvements. It was noted in the Metco report that the access improvements using geoblock units had not been approved by the Michigan Department of Transportation. These details would need to be resolved during detailed design.

The alternative evaluation is presented in Table 9-25. The capital cost is included in Volume 6 – Appendices, Appendix C under this project title. Since this is rehabilitation of an existing system, there is only one alternative considered. As such, **Alternative 1 is the recommended alternative**.

Table 9-25. Alternative Evaluation for VR-8 Regulator Rehabilitation (Project HS-SUPP-1)

Alt.	Description		Benefit Category	Benefit Score	Total Benefit	Capital Costs	Annual O&M	NPV	NPV/Benefit (prefer low value)	Best Value Alternative
1	*Alt. Name:*	VR-8 Regulator Rehabilitation	Health and Safety	3	3.00	$ 1,956,000	$ -	$ 1,956,000	$ 652,000	Best Value Alternative
	Definition:	Replacement of the slide gates and actuator; and access improvements in the median.	Water Quality & Compliance	3						
	Adv.:	Maintains system reliability and functionality.	Capacity Enhancement	3						
	Disadv.:	None.	Component Performance	3						
	Comments:	None	O&M Ease	3						

9.2.12 Confirmation of Asset Replacement in Capital Planning

This section includes a review of the CS-299 Asset Assessment to confirm that any assets that requires replacement or rehabilitation are addressed through a capital outlay or capital improvement project.

As described in Section 4, one of the goals of the CS-299 Facilities Assessment is to develop the capital replacement and rehabilitation needs for the assets at each facility. The sections above have evaluated performance enhancement improvement alternatives to address regulatory compliance, safety, or enhance the operability or maintainability of the assets. For recommended alternatives, any assets included in the alternative would be replaced in a CIP project at some time during the expected useful life of the assets.

To ensure that all the assets are being addressed in a capital outlay or improvement project at the Hubbell Southfield CSO facility, Table 9-26 provides a listing of the asset types and the number of assets in each asset type. The table also provides the number of condition assessments (visual or detailed) performed under CS-299 for these assets and the overall percentage of assets that received condition assessments. (The reader is referred to the CS-299 Asset Assessment Report in Volume 3, Section 15 for the results of these assessments.) As shown in the Table 9-26, all of the assets in each asset type were assessed either visually or in detail, with explanation of minor exceptions included in the footnotes. The condition rating and the expected useful life of the assets are used to develop the schedule for replacement of these assets in the SRP.

Table 9-26. Listing of Asset Condition Assessments for Hubbell Southfield Facility

Asset Type	Total No. of Assets in Asset Type	# of Visual Condition Assessments	# of Detailed Condition Assessments	% of Assets with Condition Assessment
ACTUATOR	45	45	0	100%
AHU	5	0	5	100%
AIRDRYER	1	1	0	100%
BACKFLOW	8	8	0	100%
BASIN	1	1	0	100%
BATTERY	0	0	0	N/A
BREAKER	2	2	0	100%
BUILDING	4	2	0	50%[a]
CAMERA	0	0	0	N/A
COMPRESSOR	3	3	0	100%
COND-AIR	2	2	0	100%
CONVEYOR	1	0	1	100%
CRANE	1	1	0	100%
CTRLPANEL	0	0	0	N/A
DAM	2	0	2	100%
DAMPER	3	3	0	100%
DISCONNECT	0	0	0	N/A
DOOR	3	3	0	100%
DRIVE-ELEC	5	5	0	100%
ELEVATOR	0	0	0	N/A

Asset Type	Total No. of Assets in Asset Type	# of Visual Condition Assessments	# of Detailed Condition Assessments	% of Assets with Condition Assessment
EMERGLIGHT	1	1	0	100%
EYEWASHSTA	6	6	0	100%
FAN	2	0	2	100%
FANVENT	20	20	0	100%
FENCE	1	1	0	100%
FIREALARM	1	1	0	100%
FIRESUPRES	0	0	0	N/A
GASDETECTO	1	0	0	0%[b]
GASMONITOR	4	4	0	100%
GATE	26	26	0	100%
GEARBOX	7	0	7	100%
GENERATOR	1	0	1	100%
GRINDER	0	0	0	N/A
GROUNDS	0	0	0	N/A
HYDPACK	0	0	0	N/A
HYDRANT	0	0	0	N/A
LIGHTING	1	1	0	100%
MANHOLE	0	0	0	N/A
MAU	0	0	0	N/A
MCC	6	0	6	100%
METER	7	7	0	100%
MIXER	23	23	0	100%
MOTOR	16	7	9	100%
PANEL	13	13	0	100%
PIPING	4	4	0	100%
PUMP	21	10	8	86%[c]
ROOF	2	2	0	100%
SAMPLER	0	0	0	N/A
SCADA	3	3	0	100%
SCREEN	6	0	6	100%
SCRUBBER	2	0	2	100%
SENSOR	12	12	0	100%
SMOKE	0	0	0	N/A
SPRINKLER	0	0	0	N/A
STRAINER	1	1	0	100%
SWITCH	0	0	0	N/A

Asset Type	Total No. of Assets in Asset Type	# of Visual Condition Assessments	# of Detailed Condition Assessments	% of Assets with Condition Assessment
SWITCHGR	0	0	0	N/A
SYSTEM	0	0	0	N/A
TANK-PROC	2	2	0	100%
TANK-STOR	2	2	0	100%
TIPBUCKET	0	0	0	N/A
TRANSFRMR	1	0	1	100%
UNITHEATER	0	0	0	N/A
UPS	3	3	0	100%
VALVE	26	26	0	100%
WATERHTR	0	0	0	N/A

[a] One of the building assets listed as "EQUIPMENT - TRAVEL/INSPECTION/TROUBLESHOOT (FOR ELECTRICIANS, MILLWRIGHTS and PLUMBERS ONLY)", which is not an asset. Another one of the building asset listed as "PLANNING - ORDERING PARTS/FILLING OUT WORK ORDER/COMPLETING INVENTORY OF PARTS ON HAND. (FOR ELECTRICIANS, MILLWRIGHTS and PLUMBERS ONLY)", which is also not an asset.

[b] The one gas detector is a portable unit and was not assessed.

[c] Two pumps are listed in WAM - Basin 1 Sample Pump and Shunt Channel Sample Pump. These umps are being considered for removal from WAM.

Jacobs also reviewed all the assets with a condition rating of 3, 4 or 5 for this facility based on the CS-299 Asset Assessment to determine if there were assets that required capital outlay or a capital improvement. Recall, that the intent of the SRP is to develop capital replacement schedules based on asset condition. Therefore, all the assets that were rated in poor condition will be scheduled to be replaced in the near future. Based on the review of the Hubbell-Southfield Asset Assessment results, there are no additional capital projects to address the assets in the WAM database.

9.3 Capital Planning for Hubbell-Southfield CSO Facility

9.3.1 Summary of Capital Improvement Plan Projects

Table 9-27 provides a summary of the recommended CIP projects and associated capital costs for the Hubbell Southfield CSO facility based on the alternative evaluations conducted for this facility.

Table 9-27. Summary of Recommended Projects at Hubbell-Southfield CSO Facility

Project No.	Alternative	Description	Total Project Cost
HS-SCR-1	2	Screening Improvements	$ 195,000
HS-DIS-1	3	Chemical Feed Utilizing Manifold Pump Distribution and Centrifugal Pumps	$ 534,000
HS-DIS-2	2	Provide Flow-paced and TRC-paced Chemical Feed Control System	$ 220,000
HS-DIS-3	2	Add a New Chemical Storage Tank	$ 753,000
HS-FD-1	3	New Basin Flushing System	$ 24,800,000
HS-FD-2	2	Upgrade Basin Dewatering Pumps and Reinstall Sump Pumps and Fluidization System	$ 950,000
HS-FD-3	2	Provide Equipment Access to Effluent Channel	$ 126,000
HS-ELEC-1	2	Electrical Improvements	$ 349,000
HS-I&C-1	2	I&C Improvements	$ 274,000
HS-I&C-2	1	Control System Upgrade	$ 2,457,000
HS-HVAC	N/A	Process Building Air Balance Study	$ 5,000
HS-SITE-1	2	Increase Flushing Water Pressure and Add Hose Bibs in Headworks Area	$ 112,000
HS-SITE-2	2	Site Improvements	$ 902,000
HS-ARCH-1	2	Architectural Rehabilitation	$ 371,000
HS-SAFE-1	1	Safety Improvements	$ 158,000
HS-SUPP-1	1	VR-8 Regulator Rehabilitation	$ 1,956,000

9.3.2 Capital Improvement Project Bundling and Scheduling

Initial bundling of the recommended capital improvement projects for this facility is presented in Table 9-28. The goal of the bundling is to optimize the efficiency of the project delivery by grouping similar discipline work or work in similar areas together, thus optimizing design and construction activities for GLWA operations and engineering staff. A new project title and Project ID are provided for each project. These projects will be rolled up into the overall CIP for the CSO facilities, and may be further bundled with similar projects from other CSO facilities. Some of the recommended capital projects for this facility are recommended to be capital outlay projects, and are presented later in this section.

Table 9-28. Capital Improvement Plan Projects for Hubbell-Southfield CSO Facility

Bundled Capital Improvement Project	Total Project Cost (Sum of Individual Projects)	Proposed Year of Construction Completion	Capital Improvement Project		
			Project ID	Project Total	Project Cost
HS-1 Disinfection System Improvements	$ 1,507,000	2029 *Timing based on asset condition*	HS-DIS-1	Chemical Feed Utilizing Manifold Pump Distribution and Centrifugal Pumps	$ 534,000
			HS-DIS-2	Provide Flow-paced and TRC-paced Chemical Feed Control System	$ 220,000
			HS-DIS-3	Add a New Chemical Storage Tank	$ 753,000
HS-2 Flushing System Improvements	$ 27,239,000	2026 *Timing based on safety issues*	HS-FD-1	New Basin Flushing System	$ 24,800,000
			HS-FD-2	Upgrade Basin Dewatering Pumps and Reinstall Sump Pumps and Fluidization System	$ 950,000
			HS-FD-3	Provide Equipment Access to Effluent Channel	$ 126,000
			HS-ELEC-1	Electrical Improvements[a]	$ 349,000
			HS-SITE-1	Increase Flushing Water Pressure and Add Hose Bibs in Headworks Area	$ 112,000
			HS-SITE-2	Site Improvements[b]	$ 902,000
HS-3 Facility-Wide I&C Improvements	$ 2,731,000	2029 *Timing based on asset condition*	HS-I&C-1	I&C Improvements	$ 274,000
			HS-I&C-2	Control System Upgrade	$ 2,457,000
HS-4 VR-8 Regulator Rehabilitation	$ 1,956,000	2030 *Timing based on best judgment*	HS-SUPP-1	VR-8 Regulator Rehabilitation	$ 1,956,000
HS-5 Facility-Wide Safety and Architectural Improvements	$ 529,000	2023 *Project should be initiated as soon as possible*	HS-ARCH-1	Architectural Rehabilitation	$ 371,000
			HS-SAFE-1	Safety Improvements	$ 158,000

Notes:
[a] Electrical Improvements were combined with Flushing System Improvements because most of electrical improvements are related to lighting within and on top of basin.
[b] Site Improvements were combined with Flushing System Improvements because road around basin will likely need to be repaired after construction.

The scheduling of projects that are replacing existing assets is influenced by the condition and remaining life of the existing assets. Table 9-29 and Table 9-30 provide information related to the assets in these projects to aid in the scheduling of these projects. For example, Table 9-29 indicates that HS-DIS-1 project has 12 assets that has an average condition score of 1.57 and an average replacement date of 2029. This information was used to propose a scheduled construction completion date of 2029.

Table 9-29. Information for Assets with Condition 1-4 in Capital Improvement Projects

NA PROJECT NUMBER	TOTAL NO. OF ASSETS (Condition 1-4	AVG CoF SCORE	AVG CONDITION SCORE	AVG RISK SCORE	AVG LIFE EXPECTANCY	AVG REPLACEMENT DATE	TOTAL REPLACEMENT COST
HS-DIS-1	12	1.57	1.57	2.86	12	2029	$ 969,900
HS-FD-2	3	1.57	1.20	2.51	20	2039	$ 302,100
HS-I&C-1	4	1.14	1.23	1.85	14	2033	$ 447,179
HS-I&C-2	3	2.29	1.57	4.08	12	2029	$ 1,481,175

Table 9-30. Information for Assets with Condition 5 in Capital Improvement Projects

NA PROJECT NUMBER	TOTAL NO. OF ASSETS (Condition 5)	AVG CoF SCORE	AVG CONDITION SCORE	AVG RISK SCORE	AVG LIFE EXPECTANCY	AVG REPLACEMENT DATE	TOTAL REPLACEMENT COST
HS-DIS-1	0	0.00	0.00	0.00	N/A	N/A	$ -
HS-FD-2	3	1.38	5.00	4.83	20	2021	$ 126,900
HS-I&C-1	0	0.00	0.00	0.00	N/A	N/A	$ -
HS-I&C-2	0	0.00	0.00	0.00	N/A	N/A	$ -

There is a recommended capital improvement project presented in Table 9-28 that could be better delivered under capital outlay projects. This project is listed in the following bullet:

- Screening Improvements (HS-SCR-1)

9.3.3 20-Year Capital Outlay Plan

Table 9-31 provides a summary of the recommended 20-Year Capital Outlay Plan for this facility, based on SRP results from the CS-299 condition assessment ratings and existing life of the assets, and based on the recognition that the assets included in any CIP project would be replaced as part of that project. Note, the table below is representative of the results based on WAM data available at the time of this report. WAM data is constantly evolving and the SRP model should be used with the most current WAM data set to continuously update results.

Table 9-31. 20-Year Capital Outlay Plan for Hubbell-Southfield CSO Facility

CSO Facility and SRP Year	Annual Total	Common Support Systems	Screening Systems	Retention System	Disinfection System	Pumping System	Odor Control System	HVAC System	Electrical Distribution System	SCADA System	Safety and Security System	Road and Grounds System	Infrastructure System
2021	$ 461,382	$ 7,482	$ -	$ -	$ -	$ 453,900	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2022	$ 336,501	$ -	$ -	$ 313,841	$ 22,660	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2023	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2024	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2025	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2026	$ 46,226	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 46,226	$ -	$ -	$ -	$ -
2027	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2028	$ 1,404,270	$ -	$ -	$ -	$ 1,285,218	$ -	$ 115,608	$ 3,444	$ -	$ -	$ -	$ -	$ -
2029	$ 1,945,736	$ -	$ 15,428	$ 53,999	$ -	$ -	$ -	$ -	$ -	$ 1,876,308	$ -	$ -	$ -
2030	$ 1,057,677	$ 19,833	$ -	$ -	$ 767,207	$ -	$ 171,466	$ -	$ -	$ -	$ 99,172	$ -	$ -
2031	$ 498,895	$ 19,218	$ -	$ 357,885	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 121,792
2032	$ 551,340	$ -	$ -	$ 25,288	$ -	$ -	$ 526,052	$ -	$ -	$ -	$ -	$ -	$ -
2033	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2034	$ 1,383,384	$ 13,217	$ 399,963	$ -	$ -	$ -	$ -	$ 970,204	$ -	$ -	$ -	$ -	$ -
2035	$ 1,433,863	$ 56,420	$ -	$ 986,965	$ 179,091	$ -	$ -	$ -	$ -	$ -	$ 211,388	$ -	$ -
2036	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2037	$ 3,861,037	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,861,037	$ -	$ -	$ -	$ -
2038	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2039	$ 3,645,566	$ 1,508,672	$ -	$ -	$ -	$ 1,227,138	$ 136,195	$ 285,133	$ -	$ -	$ -	$ 488,428	$ -
2040	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total	**$ 16,625,877**	**$ 1,624,841**	**$ 415,392**	**$ 1,737,978**	**$ 2,254,175**	**$ 1,681,038**	**$ 949,321**	**$ 1,258,781**	**$ 3,907,263**	**$ 1,876,308**	**$ 310,560**	**$ 488,428**	**$ 121,792**

Notes:

Explanation of large capital outlays in first two years:

- Retention System: Influent slide gate (ISG-2) received a score of 5 at the time of the Condition Assessment since the actuator was on the ground and not mounted to the gate.
- Pumping System: Flushing Water Pump (FWP-2; $327,000) received a score of 5 since the unit was out of service at the time of the Condition Assessment. Dewatering Pump No. 4 ($100,700) was not functional during electrical testing at the time of the assessment. The two immersible sump pumps (ISMP-1 and 2; $13,100 each) have been removed from service for some time.

Appendix L.
Population Projections

WADE TRIM

GLWA Service Area Population Projections

County	Population and Households	ACS 2020	Cencus 2010	Change 2010-2020	Pct Change 2010-2020	SEMCOG July 2023	SEMCOG 2050	SEMCOG Predicted Change 2023-2050	SEMCOG Predicted Pct Change 2023-2050
Macomb	Total Population	690,694	655,935	34,759	5.3%	686,963	761,303	74,340	10.8%
Macomb	Group Quarters Population	5,254	4,092	1,162	28.4%	5,808	7,372	1,564	26.9%
Macomb	Household Population	685,440	651,843	33,597	5.2%	681,155	753,931	72,776	10.7%
Macomb	Housing Units	289,894	277,884	12,010	4.3%	294,588			
Macomb	Households (Occupied Units)	277,938	258,955	18,983	7.3%	285,444	309,879	24,435	8.6%
Macomb	Residential Vacancy Rate	4.1%	6.8%	-2.7%		3.1%			
Macomb	Average Household Size	2.47	2.52	-0.05	-2.0%	2.39	2.43	0.05	1.9%
Oakland	Total Population	929,633	880,949	48,684	5.5%	925,075	1,000,813	75,738	8.2%
Oakland	Group Quarters Population	11,172	8,548	2,624	30.7%	14,637	17,218	2,581	17.6%
Oakland	Household Population	918,461	872,401	46,060	5.3%	910,438	983,595	73,157	8.0%
Oakland	Housing Units	404,012	385,927	18,085	4.7%	409,785			
Oakland	Households (Occupied Units)	382,031	355,768	26,263	7.4%	392,005	413,953	21,948	5.6%
Oakland	Residential Vacancy Rate	5.4%	7.8%	-2.4%		4.3%			
Oakland	Average Household Size	2.40	2.45	-0.05	-2.0%	2.32	2.38	0.05	2.3%
Wayne	Total Population	1,488,151	1,520,873	(32,722)	-2.2%	1,479,057	1,498,077	19,020	1.3%
Wayne	Group Quarters Population	18,217	21,556	(3,339)	-15.5%	19,980	24,170	4,190	21.0%
Wayne	Household Population	1,469,934	1,499,317	(29,383)	-2.0%	1,459,077	1,473,907	14,830	1.0%
Wayne	Housing Units	658,984	691,820	(32,836)	-4.7%	664,682			
Wayne	Households (Occupied Units)	584,556	583,846	710	0.1%	598,288	590,788	(7,500)	-1.3%
Wayne	Residential Vacancy Rate	11.3%	15.6%	-4.3%		10.0%			
Wayne	Average Household Size	2.51	2.57	-0.05	-2.1%	2.44	2.49	0.06	2.2%
TOTAL	Total Population	3,108,478	3,057,757	50721	1.7%	3,091,095	3,260,193	169,098	5.5%
TOTAL	Group Quarters Population	34,643	34,196	447	1.3%	40,425	48,760	8,335	20.6%
TOTAL	Household Population	3,073,835	3,023,561	50274	1.7%	3,050,670	3,211,433	160,763	5.3%
TOTAL	Housing Units	1,352,890	1,355,631	-2741	-0.2%	1,369,055			
TOTAL	Households (Occupied Units)	1,244,525	1,198,569	45956	3.8%	1,275,737	1,314,620	38,883	3.0%
TOTAL	Residential Vacancy Rate	8.0%	11.6%	-3.6%		6.8%			
TOTAL	Average Household Size	2.47	2.52	-0.05	-2.1%	2.39	2.44	0.05	2.1%

https://wadetrimgroup.sharepoint.com/:x:/t/GLWACSO-internal/ERJ6KTKMzd5NpF5yNii1J1MBUwOKoaazUBmcV5nRm1mj1A?e=Wr3CvN