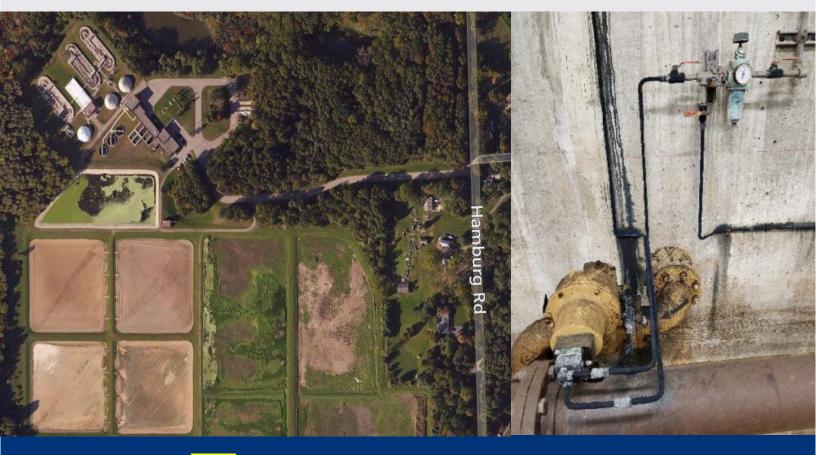


2025 Clean Water State Revolving Fund Project Plan

Wastewater Treatment Plant Improvements



SRF Project Number: xxxx-xx March 2024



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Wastewater Treatment Plant Improvements

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March 2024

PRESENTED TO

City of Brighton

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APPENDICES

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
BOD	Biochemical Oxygen Demand
EGLE	Michigan Department of Environmental, Great Lakes, & Energy
EQ	Equalization basin
gpm	Gallons per minute
lb	Pound
MGD	Million gallons per day
mg/L	Milligrams per Liter
MNFI	Michigan Natural Features Inventory
MOR	Monthly operating report
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
RAS	Return Activated Sludge
SCADA	Supervisory control and data acquisition
SRF	State Revolving Fund
US EPA	United States Environmental Protection Agency
UV	Ultraviolet Disinfection
VFD	Variable frequency drive
WAS	Waste activated sludge
WWTP	Wastewater Treatment Plant

1.0 SUMMARY AND RECOMMENDATIONS

1.1 SUMMARY

The 2025 Project Plan for the City of Brighton Wastewater Treatment Plant (WWTP) Improvements has been prepared using the Clean Water State Revolving Fund (SRF) Project Plan Preparation Guidance Manual, and with assistance from the Michigan Department of Environment, Great Lakes, and Energy's (EGLE's) Water Infrastructure Funding and Financing Section (WIFFS). The SRF provides for financial assistance in the form of low interest loans, currently at 2.5% for a 20-year loan. These rules call for compliance with the Federal Planning Requirements and the National Environmental Policy Act (NEPA). This Project Plan will serve as a basis for project prioritization and must be submitted to EGLE by May 1, 2024, in order to be on the project priority list for fiscal year 2025 (October 1, 2024 to September 30, 2025).

1.2 RECOMMENDATIONS

The City's WWTP has been reviewed to evaluate the existing and future treatment capacities, the condition of major equipment and facilities, and operational and maintenance concerns. The Project Plan details the projects recommended for implementation within the next five years. These projects were prioritized because of an immediate need for improvement of the existing facilities, or because they provide an immediate return on investment through projected energy savings, labor savings, and/or treatment efficiency.

The recommended WWTP projects are based on the 2023 City of Brighton *Wastewater Treatment Plant Evaluation* report. *Figure 4-1* shows the locations for the recommended alternatives. The projects are summarized as follows:

• Project W-1, Influent Screenings and Grit Removal System Replacement.

The influent screening and grit removal system equipment is near the end of its useful life and has experienced frequent failures. The existing equipment should be replaced and the addition of odor control equipment should be considered. With residential development in the area surrounding the WWTP it is an important consideration to minimize odors.

Project W-2, Pneumatic Valve Operator Replacement.

Pneumatic valves on the sludge pumping system have failed and many of them are not fully operable. The valves are beyond their expected useful life and have to be repaired with replacement parts when needed, availability of the replacement parts is becoming limited. The existing pneumatic operators should be replaced with electrical motor operators. This will provide reduced maintenance and operating costs.

Project W-3, Chemical Feed System Replacement.

The WWTP utilizes multiple different chemicals as part of the treatment system: ferric chloride, polymer, and chlorine. The chlorine gas system and ferric chloride feed piping and pumps have been replaced.

The ferric chloride and polymer bulk storage tanks are nearing the end of their expected life and should be replaced to provide safe chemical storage and prevent leaking.

Project W-4, Equalization Valve Replacement.

The equalization basin is used during period of high flows and maintenance for flow storage. The existing pinch valves that control the influent rate to the basin are inoperable and should be replaced. There is also concrete rehabilitation necessary on the basin structure.



• Project W-5, Secondary Clarifier Replacement.

The three secondary clarifier mechanisms and drives are nearing the end of their expected life and in need of replacement. The electrical conduit and wiring power the mechanisms have deteriorated due to poor ventilation within the clarifier covers. Some structural issues including wear of steel tension cables, brittle dome covers, and deteriorating concrete have also been identified and require repair. Replacement of mechanisms is recommended to maintain operation of the secondary clarifiers.

• Project W-6, Service Building Improvements.

The service building fixtures and finishes are original to the building and are showing signs of wear. These should be updated to maintain the service building's functionality and safety.

Project W-7, WWTP Electrical Upgrades.

The existing diesel generator provides standby power for the WWTP. This generator has reached the end of its expected life and should be replaced to insure the WWTP maintains operations during a power outage. The associated underground fuel storage tank is also past its expected useful life and is no longer insurable by the insurance company. This tank should be replaced with a new above ground storage tank. The Third Street pump station generator is the same age as the WWTP's generator and should be replaced as well.

The main incoming switchgear and main MCC A/B is original to the WWTP and is nearing the end of its expected life and replacement parts are becoming hard to find. The current equipment layout and clearance do not meet safety standards. To ensure proper WWTP operation and safety the switchgear and main MCC A/B should be replaced. In addition, MCC G and H indicate signs of corrosion and the current equipment layout does not meet code. These MCC's should also be replaced.

Project W-8, WWTP SCADA Upgrades.

The WWTP SCADA system was installed in 2002 and the life expectancy for a control system is 20 years therefore the existing system is at the end of its expected life. The SCADA system communicates by proprietary ControlNet system this communication is over a variety of communication cables. The recommendation is to convert the communication system infrastructure to Ethernet so it is no longer proprietary. The PLC processor and Operator interface computers shall start to be replaced to maintain current software and security.

Project W-9, Service Building Drainage, Plumbing, and Water Service Upgrades.

The service building drainage, plumbing, and water service are original to the building and should be upgraded to maintain operation.

Project W-10, WWTP Boiler, Ductwork, Ventilation and Heating System Replacement.

Replacing the two boilers, ductwork, ventilation, and heating system will update equipment past or approaching the expected useful life. The boilers have had operational issues and the ductwork is corroded.

Project W-11, Oxidation Ditch Improvements.

The oxidation ditch motors, gear boxes, and brush rotors have reached the end of their useful life and need to be replaced. The units should be replaced with new disc rotors and motors with variable frequency drives to control the rotors based on the oxygen demand in the ditch. The City would also like to add high level float controls to monitor water levels which they have no way of doing now. To improve treatment operation and reduce chemical cost an anoxic selector shall be constructed at each oxidation ditch to provide biological phosphorus removal.



Project W-12, Infiltration and Disinfection Improvements

Performance of the infiltration bed has decreased over time because of the collection of phosphorus and other fines between the sand particles in the upper layer of media. In addition, the bed media may contain trace amounts of PFOA and PFOS that are affecting the WWTP final effluent. The recommendation is to construct a new tertiary filter building to house a cloth filter unit for final effluent filtering prior to discharge instead of utilizing the filter beds.

In addition, with changes in the regulatory requirement the WWTP may be required to dechlorinate the effluent, which they are not currently required to do. A new chemical feed building and storage shall be constructed adjacent to the Irrigation Pump Station to house the chemical tanks, feed system and piping for feeding chemical to the effluent.

Project W-13, Solids Handling System

The thickening centrifuges were installed as part of the original WWTP construction and are nearing the end of their useful life and need to be replaced. The City has done an excellent job of maintaining the equipment to extend its useful life and the City has had the centrifuges rebuilt to maintain operation. In the future, availability of spare parts may become more difficult to maintain operation. The existing sludge piping valves need to be replaced. The existing wedge wire screens on the thickener tanks also need to be replaced.

The WWTP is also monitoring the biosolids for PFOA and PFOS contamination. If the level exceeds the regulatory limit, land application of solids will become difficult and require the WWTP to change its solids handling approach. It is recommended that the City develop a Solids Handling Management plan and seek funding for landfill disposal alternatives.

The recommendation is to construct a new solids handling building to handle solids handling equipment. This will provide the City flexibility to handle changing regulatory requirements between land application and landfill disposal of solids.

Project C-1, Bauer Road Force Main Improvements.

The force main between the Third Street Pump Station and WWTP along Bauer Road is approaching the end of its useful life. These pipes are the main conveyance between the City's sewer and WWTP. Monitoring this force main should be prioritized to avoid future issues.



2.0 PROJECT BACKGROUND

The City has completed comprehensive reviews of its Separate Stormwater Collection Systems, Separate Sanitary Sewerage Systems, and the Wastewater Treatment Plant. Reports were prepared for each of these systems that described the existing facilities, and these reports made recommendations for improvements to meet operational needs. These findings and recommendations are documented in the following reports:

- Wastewater Treatment Plant Evaluation, May 2023
- City of Brighton Capital Improvement Plan, June 2021
- Wastewater and Stormwater Asset Management Plan, November 2018
- City of Brighton Master Plan, November 2018
- Force Main Corrosion Study, February 2024

This Project Plan was developed using the information collected and presented in the reports listed above and was prepared to apply for funding assistance for the recommended projects that may be implemented in the next five years.

2.1 DELINEATION OF STUDY AREA

The study area for this Project Plan includes the existing service area for the City of Brighton WWTP, which includes the City of Brighton and portions of Genoa and Hamburg Townships. The study area is limited to the WWTP's existing service area because the City does not intend to provide additional wastewater service outside this boundary.

Figure 2-1 presents a map of the wastewater service area.

2.2 LAND USE

The existing and proposed land uses in the study area are shown in *Figure 2-2*.. The majority of the land use is residential with some commercial and industrial areas. Land use changes are primarily expected on the west side of the City over the next 20 years to residential areas.



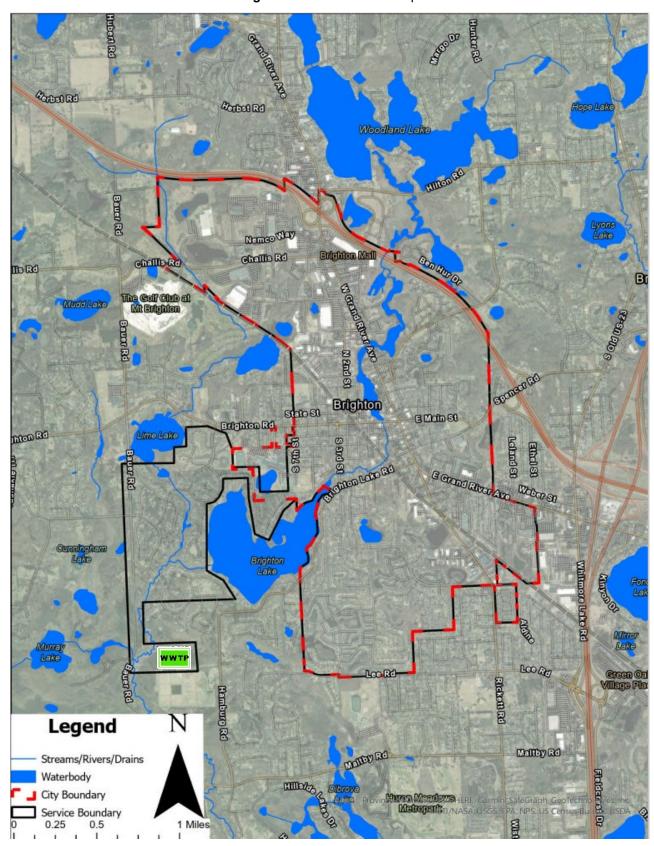


Figure 2-1. Service Area Map

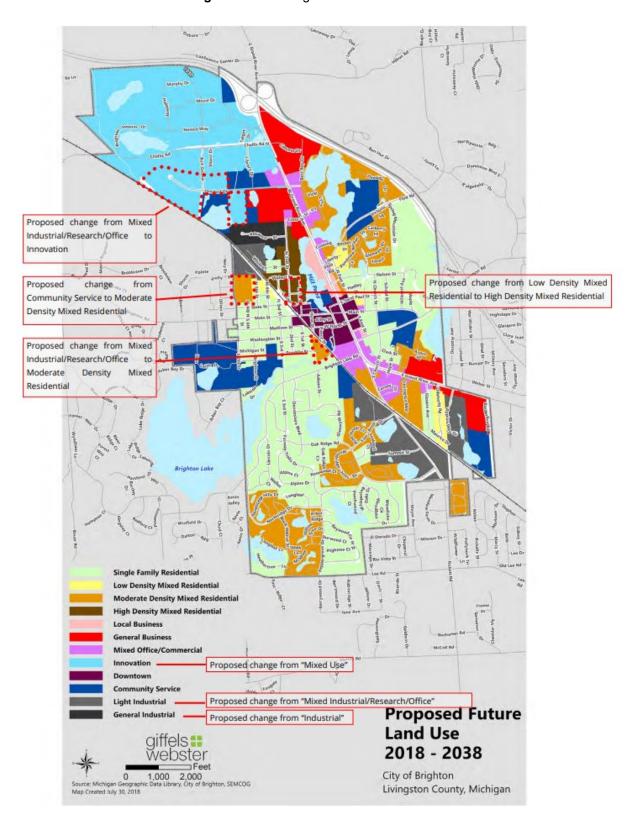


Figure 2-2. Existing and Future Land Use

Source: City of Brighton Master Plan, November 2018



2.3 POPULATION DATA

The population in the City of Brighton in Livingston County has experienced some growth during the decade between the 2010 and 2020 Census. The current U.S. Census Bureau estimate as of 2020 shows a slight population increase in Brighton. Population projections are based on the flow projection increase of 1.1% from expected service area expansions presented in the *WWTP Evaluation Report*. Population projections are summarized in *Table 2-1*.

Table 2-1. Population Projections

Year	City of Brighton
2010 Census	7,444
2020 U.S. Census Bureau	7,446
2023 projection*	7,694
2028 projection*	8,127
2033 projection*	8,583
2038 projection*	9,066
2043 projection*	9,576

Note: * Population projections, as described in the preceding paragraph, are italicized

2.4 EXISTING FACILITIES – COLLECTION SYSTEM

The City's wastewater collection system includes sewers constructed as far back as the 1940's. The collection system contains separate sanitary and storm sewers. The collection system also includes pump stations and force mains. There are no system bypasses or sanitary sewer overflows (SSOs).

2.4.1 Sanitary Sewers and Interceptors

All of the City's wastewater service area has separate sanitary sewers. The City has 45 miles of sanitary sewers that range in diameter from 4 to 24 inches. There are four primary sanitary interceptors. *Table 2-2* summarizes the sanitary sewer by material, diameter, and age.

Table 2-2. Sanitary Sewer Summary

PIPE MATERIAL				
Pipe Material	Length (Feet)	% of System		
Concrete	8,627	3.6%		
Ductile Iron	607	0.3%		
Liner Material	14,127	5.9%		
PVC	143,680	60.4%		
Cast Iron	1,023	0.4%		
Vitrified	66,058	27.8%		
Truss	3,924	1.6%		
PIPE DIAMETER				
Diameter	Length (Feet)	% of System		
12" Diameter and Smaller	210,206	88.3%		
Larger than 12" Diameter	27,840	11.7%		
PIPE A	AGE			
Year Length (Feet) % of System				
1940 - 1975	67,594	28.4%		
1976 - 2000	128,590	54.0%		
2001 - Present	41,862	17.6%		

2.4.2 Pump Stations and Force Main

The City maintains 9 miles of force main and 13 pump stations for its sanitary collection system. The force main ranges from 4 to 8 inches except for the force main between the Third Street Pump Station and WWTP which is two parallel 12-inch mains to convey all the sanitary sewer flow within the system. The oldest pump station was constructed in 1972. *Table 2-3* summarizes the force main by material, diameter, and age. *Table 2-4* summarizes the pump stations by pump capacity and age.

Table 2-3. Force Main Summary

Pump Station	Installation	Force Main		
	Date	Diameter (in)	Material	Length (Feet)
Brighton Cove Apartment	2023	6	HDPE	203
Brighton Mall	1997 1971	6 6	HDPE Cast Iron	2,698 300
Brighton Lake Road	Late 1970's	4	Ductile Iron	601
Rickett Road	2021	8	HDPE	2,610
Oak Meadows	1997	6	Ductile Iron	1,411
Pine Creek No. 1	1991	6	Ductile Iron	170
Post Office	1994	6	Ductile Iron	4,937
Ewing	1990	4	Steel	39
Woodfield Square	1995	4	Ductile Iron	1,392
Pine Creek No. 2	1996	4	Ductile Iron	134
Pine Creek No. 3	1997	4	Ductile Iron	95
Aberdeen	2005	4	Ductile Iron	1,277
Third Street Pump Station	1987	(2) 12	Ductile Iron	(2) 15,490
			Total	46,536

 Table 2-4. Pump Station Summary

Pump Station Name	Location	Pump Capacity	Year Installed
Brighton Cove Apartment	Wayside Drive, Brighton Cove Apartments	2 Pumps: 175 gpm each	2023
Brighton Mall	8485 Best Buy Drive	2 Pumps: 200 gpm each @ 39' TDH	2006
Brighton Lake Road	971 Brighton Lake Road	Not Available	2001
Rickett Road	Rickett Road, South of Oak Ridge Drive	2 Pumps: 375 gpm each, 52' TDH	2006
Oak Meadows	Peppergrove Drive, north of Baywood Circle	Not Available	1997

Pump Station Name	Location	Pump Capacity	Year Installed
Pine Creek #1	5397 Hidden Pines Drive	2 Pumps: 250 gpm each @ 70' TDH	1991
Post Office	400 Orndorf Road	2 Pumps: 850 gpm each @ 83' TDH	1997
Ewing	Ciao Amici (Behind Building)	Not Available	1990
Woodfield Square	261 Woodfield Square Lane	Not Available	1995
Pine Creek #2	5352 Arbor Bay	2 Pump: 100 gpm @ 75' TDH	1996
Pine Creek #3	5642 Wyndam Lane	2 Pumps: 100 gpm each @ 37' TDH	1997
Aberdeen	4282 Deeside Drive	2 Pumps: 100 gpm each @ 37' TDH	2005
Third Street Pump Station	Third Street, north of Brighton Lake Road	4 Pumps: 1150 gpm each @ 114' TDH	2010

2.4.3 Storm Sewers

All of the City's wastewater service area has separate storm sewers. The City has 35 miles of storm sewers with 637 inlets and 157 outfalls. *Table 2-5* summarizes the storm sewer by age.

 PIPE AGE

 Year
 Length (Feet)
 % of System

 1940 – 1975
 45,480
 24.9%

 1976 – 2000
 115,956
 63.4%

 2001 – Present
 21,433
 11.7%

Table 2-5. Storm Sewer Summary

2.5 EXISTING FACILITIES - WWTP

The City's Wastewater Treatment Plant is located at 6570 Hamburg Road and provides wastewater treatment for the City of Brighton, Genoa Township, and Hamburg Township. The facility was constructed in 1988 and expanded in 2002 to provide a design treatment capacity of 2.25 MGD and a maximum hydraulic capacity of 6.5 MGD. The current average annual daily flow is approximately 0.9 MGD. The treatment process consists of screening and grit removal, oxidation ditches, secondary clarifiers, tertiary clarifiers, infiltration beds, chlorine disinfection, and effluent aeration. *Figure 2-3* presents a general site plan of the facility and *Figure 2-4* provides a schematic of the treatment process.

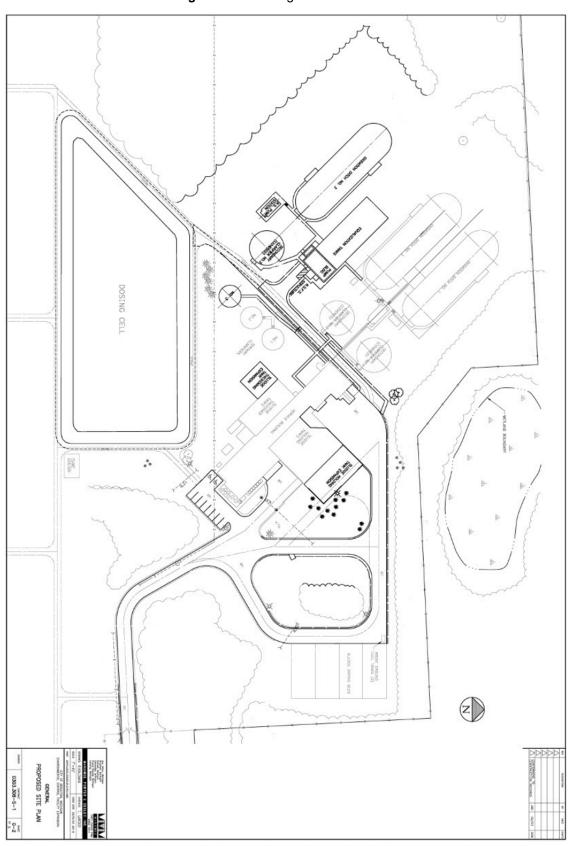


Figure 2-3. Existing WWTP Site Plan



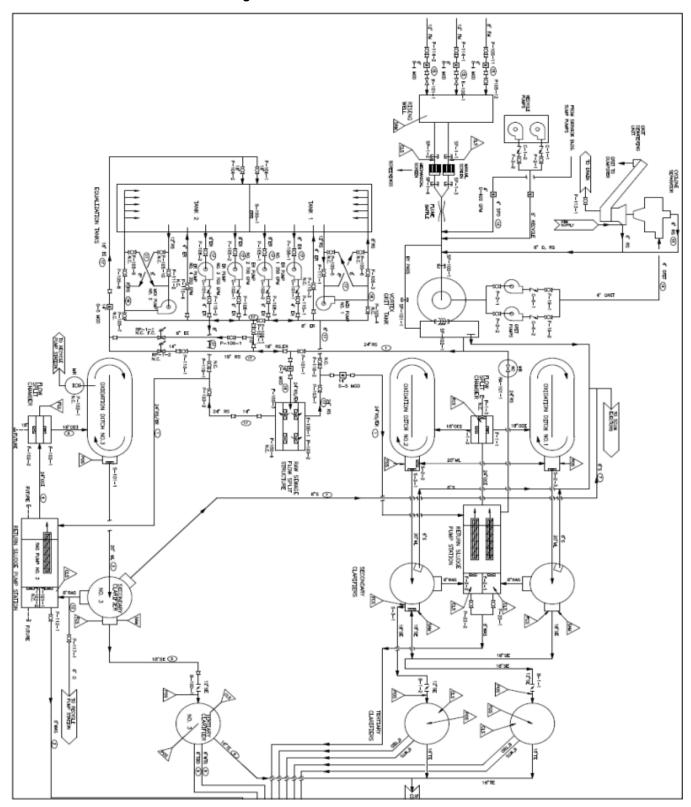


Figure 2-4. WWTP Process Schematic

The City's WWTP is effectively treating the wastewater flows. Appendix B is a copy of the City's current NPDES, which includes the plant's effluent limitations and monitoring requirements. The City is not under any corrective action or enforcement order from EGLE or United States Environmental Protection Agency (EPA).

The City has an active Industrial Pretreatment Program that monitors, samples, and inspects the pre-treatment facility for March Coatings on Summit Street. The WWTP discharges to the South Ore Creek and dewatered sludge is land applied, in accordance with the requirements of its NPDES permit. *Table 2-6* summarizes the 2022 WWTP average influent and effluent quality.

Flow (MGD) Influent (mg/L) Effluent (mg/L) Avg. Max. BOD₅ **TSS** NH₃-N BOD₅ **TSS** Total P **Total P** NH₃-N **Daily Daily** 0.92 1.19 5.9 216 154 32.6 1.27 1.04 0.09 0.01

Table 2-6. 2022 Average WWTP Data

Table 2-7 summarizes the current influent wastewater loading conditions of the monthly operating reports (MOR) and the 1986 WWTP Basis of Design.

Parameter	Current MOR Influent Loading (lbs/day)	Original Basis of Design Loading (lbs/day)
BOD ₅	1,654	4,354
TSS	1,185	4,354
Total P	45.5	116
NH ₃ -N	249.5	544

Table 2-7. Current WWTP Loading Conditions (2020-2023)

2.6 SYSTEM FLOWS

The current dry weather flow at the WWTP, which includes wastewater flows and dry weather infiltration, was estimated from MORs.

The collection system includes flows caused by rainfall. In separate sanitary sewer areas, there are fewer direct inflow sources but there still can be a significant wet weather response because of infiltration due to pipe defects and historical plumbing codes that allowed footing drains to be connected to the sanitary sewer.

Table 2-8 is from the 2023 WWTP Evaluation Report and summarizes the future average and max flows and anticipated year of occurrence. The max day is expected to be 1.5 times the average daily flow and the peak hourly flow rate is expected to be 2.5 times the average daily flow. The WWTP has a rated treatment capacity of 2.25 MGD and an influent peak design firm capacity of 6.5 MGD.

Table 2-8. Existing and Proposed WWTP Flows

	Planning Year Flows, MGD		
WWTP Flow Statistic	Existing (2023)	2028 (5 year)	2043 (20 year)
Ave Daily future flow increase		0.12	0.23
Annual Ave Daily Flow	0.90	1.02	1.25
Max Day future flow contribution		0.23	0.35
Max Day flow	1.20	1.43	1.78
Max. Month future flow contribution		0.15	0.27
Max. Month Daily flow	0.95	1.10	1.37

3.0 FACILITIES CONDITION AND NEED FOR PROJECTS

The WWTP complies with the requirements of its NPDES permit and there are no orders of enforcement in place. Maintenance at the WWTP has kept equipment in good condition. However, there will be additional needs at the WWTP for projects to replace equipment and structures that are beyond their useful life and to provide improved operational efficiency. The City's collection system similarly complies with State requirements and there are no orders of enforcement in place, but improvements are required to maintain the targeted levels of service and replace aging infrastructure.

The 2018 Wastewater and Stormwater Asset Management Plan and the 2023 Wastewater Treatment Plant Evaluation Report have comprehensive reviews of the City's treatment facilities and sewage conveyance and made recommendations for various improvement projects. The recommendations made in these plans were revisited and updated to reflect current operations and anticipated needs.

3.1 EXISTING FACILITIES CONDITION – COLLECTION SYSTEM

The text below summarizes the information provided in the *Wastewater and Stormwater Asset Management Plan*. Further information on the existing storm sewers is included in the AMP but is not here since the CWSRF loans do not fund stormwater improvements.

3.1.1 Sanitary Sewers and Interceptors

The primary method of assessing the condition of the sanitary sewers and interceptors is through televising. The City has completed televising of many of its sewers with help from the SAW Grant Program. As defects are found, the City makes a plan to rehabilitate or replace them. The City's operational records indicate no sanitary sewer overflows. All of the City's sanitary sewers have capacity for current and future peak flow rates. *Table 3-1* lists the recommended sanitary sewer improvements; these improvements are scheduled to take place as part of the City's current Capital Improvements Planning Program.

Table 3-1. Sanitary Sewer Improvements

Street	Recommended Improvement	Year
Flint and North East Street	Replacement	2024-2028
Robertson Street	Replacement	2024-2028
Main Street Alley	Replacement	2028-2033
Advance Street	Utility upgrades	2033-2038
Rickett Road	Replacement	2024-2028
Brighton Lake Road and 3 rd Street	Replacement	2033-2038



3.1.2 Pump Stations and Force Main

All 13 pump stations' capacity and condition were assessed. Seven (7) of the pump stations were identified for improvements in the 2018 asset management plan. All pump stations are well maintained. No further pump improvements are needed for now.

Force main conditions are difficult to assess, and rating is based on age, material, and work order history. Many of the force mains are estimated to be in good condition and at low risk of failure. The Bauer Road (Third Street Pump Station) force main is critical to convey wastewater to the WWTP and nearing the end of its useful life. The Post Office force main is also critical to convey the northern portion of the systems wastewater flow and at the end of its useful life. Both force mains are recommended for further assessment to consider possible improvements.

A conditions assessment of the Bauer Road force main was completed in February 2024. No pipe deterioration was found, but frequent monitoring every five years is recommended given the age of the force main. The *Corrosion Study* in Appendix D includes more information on how the force main condition was evaluated.

3.2 EXISTING FACILITIES CONDITION – WWTP

The information presented below summarizes the condition assessment made during development of the *Wastewater Treatment Plant Evaluation Report*. The existing WWTP has a rated capacity of 2.25 MGD.

3.2.1 Preliminary Treatment System

The preliminary treatment system includes influent screening, grit removal, and pump system. Wastewater enters the plant through two force mains from the Third Street Pump Station. The influent flow enters a rising well and flows through a channel to mechanical bar screens. After screening, grit removal occurs in a vortex type grit chamber. Removed debris and grit is transported to a dumpster. Raw wastewater goes to a flow split structure.

The influent raw sewage pipe, valves, and flow meter need replacement.

The screening and grit removal equipment is nearing the end of its useful life and should be replaced. Additionally, property around the WWTP has been developed for residential homes. The preliminary treatment system has the highest odors within the WWTP and increased odor complaints are expected. The addition of odor control to the screening area should be considered to minimize complaints but also improve work environment and longevity of the equipment.

3.2.2 Equalization Basin

During high flow periods flow can be diverted to the equalization (EQ) basin. The amount of flow diverted is controlled by pinch valves in the equalization building. Under normal flows these valves are closed and all flow proceeds to the raw sewage flow split structure. After the high flow event and influent flows have returned to normal, the equalization pumps will pump the wastewater from the tanks to the secondary treatment system.

The equalization tanks are equipped with a mixing header to prevent settling and aerate the wastewater. Two mixing pumps provide flow to the header while two blowers provide air.

The City does not typically operate the EQ basin because of the condition of the equipment and the high operating cost. The pumps that return and recirculate flow within the basin are in good condition. The pinch valves that control the influent rate to the basin are inoperable and should be replaced. There is also concrete rehabilitation necessary on the basin structure.



The EQ Basin does provide the WWTP flexibility to store and transfer flow between oxidation ditches during start up and maintenance periods. Therefore, the existing system should be maintained to ensure operation when necessary.

3.2.3 Secondary Treatment System

The raw wastewater flows to the raw sewage flow split structure from the grit removal tanks, where flow can be split to either chamber No.1, to oxidation ditches No.1 and 2, or chamber No. 2 to oxidation ditch No.3 and future fourth ditch. The flow enters the return activated sludge screw pump effluent wells, mixes with the return activated sludge and flows to the oxidation ditch.

The rotors in the oxidation ditch entrain oxygen into the flow for microbial growth and to keep the contents of the ditch mixed. Each oxidation ditch has two mechanical aeration rotors for aerating the mixed liquor. Each ditch can operate with one rotor out of service.

Each of the three oxidation ditches is 196 feet long (overall) with a 28-foot-wide channel by 13-foot maximum side water depth. The oxidation ditches have a volume of 1,002,000 gallons per tank and 3,006,000 gallons total (all three tanks).

The mixed liquor from the oxidation ditch flows to the secondary clarifier. There are three 55-foot diameter by 12-foot side water depth clarifiers. The clarifiers are center feed type and are covered to minimize temperature effects during winter operations. Volume for each tank is 28,510 cubic feet and all three tanks total 639,000 gallons. In the clarifier the sludge settles to the bottom of the tank and the effluent overflows the effluent weirs and flows to the tertiary clarifiers.

The clarifier mechanism pushes the settled sludge to the center of the tank. The sludge weir gate controls the removal rate and the settled sludge flows by gravity to the inlet well of the RAS screw pumps.

The three (3) return activated sludge pump stations have 2.2 MGD enclosed incline screw pumps, which provide a lift of approximately 11.1 feet. The RAS is then mixed with the influent raw sewage and returned to the oxidation ditch.

A portion of the RAS flow is drawn from the RAS pump influent well of the RAS pumps by WAS pump Nos.1 and 2 located in the lower level of the service building and transferred to the sludge holding tanks. The WAS flow is measured by a flow meter on the pump discharge. The WAS pumps also draw sludge off of the tertiary clarifiers.

The WWTP staff prefers to operate all ditches under normal conditions. They have found when operating only two ditches the effluent quality is closer to the discharge limit and the clarifiers and claricones do not operate as well.

The oxidation ditch motors, gear boxes, and rotors have reached the end of their useful life and need to be replaced. The WWTP has experienced one unit failure. The existing units are single speed, rotor type mixers. This technology could be replaced with more energy-efficient variable speed drive units to pace oxygen transfer with demand. The new style rotors are larger diameter plastic disk aerators than the current brush type aerators. Therefore, the modification would require changes in the shaft elevation and water surface. There currently is no way to monitor the water surface elevation in the oxidation ditches. The City would also like to add high level float control alarms to monitor tank levels. The oxidation ditch structures are showing signs of concrete deterioration that require repair.

The existing RAS screw pump Nos. 2 and 3 are in fair condition and have recently been rebuilt and No.1 is scheduled to be rebuilt in the future. This will extend the life of the units, but they may require replacement in the next ten years. The City may want to look into changes in pump style if the replacement parts for the screw pump become more difficult to find in the future.

The secondary clarifier mechanisms and drives are at the end of their useful life and in need of replacement. The electrical conduit and wiring have deteriorated and should be replaced. The ventilation under the clarifiers covers



is limited and has likely contributed to the deterioration of the components. Portions of the clarifier structures are showing spalled concrete that should be repaired. The clarifier effluent trough concrete is deteriorating and should be coated or rehabilitated.

The clarifier covers are in fair condition with deterioration of the steel tension cables. If the covers were to require replacement in the future the covers could be removed and launder covers could be installed over the effluent trough as an alternative.

The WAS pumps are in good condition. The pump bases have deteriorated and need to be replaced. The electrical components are also in need of replacement.

The WAS pumps utilize pneumatic operated valves on the pump suction to control which process the sludge is withdrawn from. These pneumatic operators have failed and are in need of replacement. The operators should be replaced with electric motorized operators.

3.2.4 Tertiary Treatment System

Flow from the secondary clarifiers flows to the three 36.5-foot-diameter tertiary clarifiers for second-stage chemical phosphorus removal. Ferric chloride is added to the secondary clarifier effluent and polymer is added at each tertiary clarifier influent. Flow is fed at the bottom of the clarifier where it mixes with the chemicals. Floc and a sludge blanket develop in the clarifier. The effluent continues to flow up through the clarifier and overflows the effluent weirs. The sludge is removed at the concentrator cone or heavier sludge from the bottom of the tank and pumped to thickener tanks by WAS pumps in the lower level of the service building.

The tertiary clarifier mechanism is in fair condition. The City has replaced the gear boxes in the past and the units are operating in good manner. The City is having the clarifier tank repainted in the coming year. The 12-inch inlet control valve and chemical feed piping have been replaced.

The WAS pumps are in good condition, but the concrete bases are deteriorating and need to be replaced. Also, the pneumatic valve operators are in poor condition and in need of replacement.

3.2.5 Infiltration Beds and Pump Station

Effluent from the tertiary clarifiers flows to dosing cells. When a dosing cell's water level reaches a pre-set point, water is slowly released to one of six sand filter beds. A system of drains under neath the infiltration beds allow filtered water to be collected and returned to the irrigation pump station where it can be directed to an irrigation cells or discharged to the South Ore Creek. The dosing cells can be bypassed directly to the sand filters or used as a contact tank for chlorine added after the tertiary clarifiers. Chlorine can also be added to the water between the infiltration beds and irrigation outflow.

Underdrainage collected in the filter cell underdrains flows by gravity to the Irrigation Pump Station wet well. Two (2) 1,600-gpm vertical turbine pumps pump the flow to any one of the four (4) irrigation cells. Continuous flow monitoring is provided for the pumped irrigation flow by a pipeline sonic flow meter. The pumped water is distributed via a multi-port distribution header.

Mechanical re-aeration and flow monitoring is provided in the irrigation pump station prior to the discharge to South Ore Creek. Two (2) 40-cfm rotary positive blowers and 256 fine bubble diffusers with header are provided. This amount of air is capable of re-aerating 2.25 MGD from 0.01 mg/L to 5.0 mg/L.

Sand media within the upper portion of the infiltration beds needs to be replaced due to a buildup of phosphorus and other solids which is reducing the infiltration rate. The irrigation pumps, and blower and aeration equipment are all in good condition. The diffuser likely requires replacement to meet dissolved oxygen requirements.



The performance of the infiltration beds has decreased over time as the upper portion of the beds has begun to plug with phosphorus and other fines, decreasing infiltration rate. The upper portion of the bed sand should be replaced with new, clean material. The City performed an analysis of the phosphorus within the beds, and it was distributed through the entire sample depth, exceeding 6 ft. To improve infiltration, a portion of the existing sand within the bed shall be removed and replaced. It should be further reviewed whether the removed sand can be relocated onsite, as the disposal cost of the sand media may be expensive and disposal at a Type II landfill may be required. An alternative to disposal of the sand would be to enlarge the existing berms with the remove sand and placing new a layer of new sand.

The two irrigation pumps have been rebuilt and are in good condition.

The blower and aeration equipment are in good condition. The WWTP sometimes struggles to meet the dissolved oxygen requirements. The diffuser likely requires replacement to improve oxygen transfer.

The WWTP staff has been testing the WWTP flow to monitor if the infiltration beds are a source of PFOA and PFOS in the WWTP effluent. The WWTP is working to determine if this is a historical containment or in the current WWTP influent.

3.2.6 Disinfection

The effluent from the infiltration beds is disinfected with chlorine before it discharges to South Ore Creek. Chlorine solution can also be fed to the influent raw sewage channel at the screens, the equalization tank, return sludge pump well, and the tertiary clarifiers for process control.

The chlorine disinfection system has been replaced and is in good condition. The feed piping is in need of replacement.

The WWTP currently has no means for dichlorination of the effluent prior to outfall. This would require installation of new chemical feed system.

3.2.7 Chemical Systems

Ferric chloride and polymer are used for phosphorus removal. The chemical storage tanks and feed pumps are located in the service building, which was constructed as part of the original WWTP. Ferric chloride can be fed to the oxidation ditch flow split structures or the secondary clarifier effluent boxes. Polymer can be added at the following locations: oxidation ditch outlet structure, tertiary clarifier influent pipe, and center of tertiary clarifier.

The existing chemical storage tanks have exceeded their useful life and should be replaced to prevent leaking of the chemicals. The existing chemical feed piping and pumps were replaced in 2023.

3.2.8 Solids Handling System

Waste activated sludge is withdrawn from the return sludge flow from secondary clarifiers by a rotary positive displacement pump, which discharges to the sludge thickener tanks. Sludge from the tertiary clarifiers is automatically transferred with the same pumps to the sludge thickener tanks. Two (2) pumps, located in the basement of the service building, are capable of pumping 100 gpm each. One pump is dedicated to pumping waste activated sludge and the other for tertiary sludge. Each pump will serve as the other pump's backup. A system is provided to allow wasting of sludge on a timed batch basis. The wasting rates are recorded.

Four (4) sludge thickener tanks are provided to hold the waste activated sludge prior to centrifuging. Two (2) tanks are 21.5 feet by 40 feet by 15 feet, while the remaining two are 21.5 feet by 80 feet by 15 feet in dimension. Water is decanted off the tanks through the wedge wire screen to thicken the sludge. Four (4) sludge blowers are provided, rated at 310 cfm each. The blowers are adequately flexible to provide air to any of the tanks for mixing and providing oxygen for volatile solids reduction. Air is available to the thickened sludge holding tanks to



keep the thickened sludge from becoming anaerobic. Waste sludge, as an alternate mode, can be pumped directly to the centrifuges.

Thickened sludge from the centrifuge discharges into a thickened sludge holding tank. The centrifuges are the solid bowl type with a 75-gpm feed sludge capacity. The centrifuge feed pumps (two) are rotary lobe type with a 75-gpm capacity.

Two (2) tanks, each 44.5 feet by 134 feet by 15 feet side water depth, are used as thickened sludge holding tanks. The tanks have submersible mechanical mixers to stir the tanks before pumping. Air piping is also provided. The thickened sludge holding tanks have a total storage capacity of 178,890 cubic feet or 1,345,000 gallons.

Two (2) sludge transfer pumps with the capacity of 300 gpm are provided. These pumps have the capacity to take suction from the sludge thickener tanks or the thickened sludge holding tanks.

The normal operation of the sludge transfer pumps is to pump thickened sludge to the truck loading station or the sludge drying beds. As an alternate mode, the pumps have the capacity to pump to either the sludge thickener tanks or the thickened sludge holding tanks.

Four (4) sludge drying beds, each 40 feet by 100 feet by 2 feet side water depth, are provided for backup or emergency purposes. The drying beds are paved and provided with underdrain piping. The area under the beds is sealed with a synthetic liner to prevent seepage to the groundwater. The underdrainage intercepted discharges into the plant sanitary sewer. The drying beds volume provides an additional 40 days of sludge storage at the WWTP design flow.

The thickened sludge pumps were recently replaced. The centrifuges are nearing the end of their useful life and need to be replaced. The City has serviced the existing centrifuges, but replacement parts are difficult to find and becoming more expensive. In the future, availability of spare parts may become more difficult. The existing sludge piping valves need to be replaced. The existing wedge wire screens on the thickener tanks also need to be replaced. The aeration blowers are in poor condition. The storage tank mixers are in need of replacement.

The biosolids stored in the holding tanks are land applied by a third-party contractor. Given possible regulatory changes and public acceptance of the method, the future of land application is unknown. The City should develop a Solids Handling Management plan to determine alternatives.

The WWTP has been testing the biosolids to monitor PFOA and PFOS contamination. The WWTP is working to determine if this is a historical containment or in the current WWTP influent.

3.2.9 Electrical and Control System

The service building houses the main and standby power distribution gear. There is a single utility feed into the plant that connects to switchgear LVUS-1 in the service building. There is a diesel generator with an underground fuel storage tank that provides the standby (backup) power to the entire plant. LVUS-1 accepts power from the utility feed and the generator and distributes it to two motor control centers (MCCs), A and B.

The generator and fuel storage tank need to be replaced because of age and insurance issues. The remaining electrical equipment is original to the plant and should be replaced to maintain plant operations and comply with updated safety standards.

3.2.10 Service and Site Buildings

The service building and many of the additional buildings on site are original to the WWTP and have not been upgraded. The WWTP includes three buildings.



- Service Building:
 - administrative offices
 - laboratory
 - locker rooms
 - break room
 - samplers
 - maintenance area
 - garage
 - electrical switchgear
 - sludge thickeners
 - · chemical feed pumps and storage
 - screening equipment
- Irrigation Pump Station Building:
- Equalization Tank Pump Building

The buildings have not been modified since their original construction and need updates. The bathrooms do not meet ADA standards. The service building exterior has stained and deteriorating bricks and grouting. Metal doors should be replaced due to rusting. The roofing system is showing signs of wear and should be replaced. Various structures throughout the buildings should be painted to extend their useful life. More garage space is needed for protection, storage, and light maintenance of additional vehicles. The drainage and compressed air systems are corroded and requires upgrades. The HVAC is in good condition due to recent improvements, but the boilers and ductwork need replacement.

3.3 SUMMARY OF PROJECT NEED

The proposed projects will ensure continued compliance with the City's NPDES permit requirements by replacing aging equipment within the service area. The recommended near-term collection system projects that will be considered in detail in this Plan are summarized as follows:

1. Collection System Project C-1 — Bauer Road Force Main Improvements.

The force main is nearing the end of its useful life but remains in good condition based on inspection. Monitoring the force main regularly every five years is recommended given the age of the pipe to avoid potential future failure.

The WWTP projects that are required in the near-term are summarized as follows:

WWTP Project W-1 – Influent Screenings and Grit Removal System Replacement

The WWTP has one mechanical bar screen that receives all the influent raw sewage. If the screen fails flow will have to be diverted to the manually cleaned bar screen. This increases the chance of the screen face blinding off and overflowing during high flow events. Also, the manual screen does not remove the same amount of material as the mechanical screen. This will lead to plugging of pipes and equipment in downstream process effecting treatment.

The WWTP grit system removed sand and other material that cause wear on equipment and plugging of the piping. If the grit system fails, the grit tank will be bypassed resulting in the grit effecting the



downstream processes. The grit system has had regular failures requiring the WWTP to operate system manually.

With residential development in the area around the WWTP the number of odor complaints have increased. It is important for the WWTP control orders to maintain a good relationship with the nearby residents.

2. WWTP Project W-2 - Pneumatic Valve Operator Replacement

Pneumatic valves on the waste activated sludge (WAS) and thickened sludge piping system have failed in the past and are becoming too hard to locate replacement parts for. Without proper operation of the valves the WWTP will need to be manually operated during the pumping process. This is time consuming and requires extra attention for WWTP staff.

3. WWTP Project W-3 - Chemical Feed System Replacement

The chemical storage tanks are beyond its expected useful life. The storage tanks should be replaced to prevent leaking of chemicals and maintain operation. If the system were to fail this would greatly affect the WWTP treatment and result in possible violation of effluent requirements. A large chemical leak would be a staff safety and possible environmental concern.

4. WWTP Project W-4 - Equalization Valve Replacement

The existing pinch valves do not work and need to be replaced. If the EQ basin is not operable the WWTP will not be able to store influent flow during high flow events or maintenance periods. This could result in overwhelming the treatment system causing solids washout and resulting in permit violations.

5. WWTP Project W-5 - Secondary Clarifier No. 1 and 2 Replacement

The secondary clarifier mechanisms and drives along with electrical conduit and wiring have deteriorated due to poor ventilation under the clarifier covers. Some structural issues including wear of steel tension cables, brittle dome covers, and deteriorating concrete are also in need of repair. The secondary clarifiers are a critical component of the treatment process. Failure of the clarifier would affect the WWTP treatment capacity and the effluent quality.

6. WWTP Project W-6 - Service Building Improvements

The service building fixtures and finishes are original to the building and showing signs of wear. These should be upgraded to maintain the service building's functionality and safety. The facility lacks suitable men's and women's locker room space.

7. WWTP Project W-7 – WWTP Electrical Upgrades

There is only one generator to provide standby power for the WWTP during electrical power outages. That generator has reached the end of its life expectancy. The associated fuel storage tank is also past its expected useful life and is no longer insurable. The generator at the Third Street pump station is the same age as the WWTP's generator and should be replaced as well. Without suitable standby power generator, the WWTP and Third Street pump station would not be able to operate during a power outage. This would result in no flow being conveyed to the WWTP or treated.

The switchgear and electrical gear are original to the WWTP. Replacement of the switchgear and electrical is recommended to update everything to current safety standards. Failure of the WWTP Switchgear and Electrical system would result in the WWTP not being able to operate fully. Failure to replace the electrical gear will risk WWTP staff safety.

8. WWTP Project W-8 - WWTP SCADA Upgrades

The WWTP SCADA system was installed in 2002. Upgrades are recommended to update the system to current technological advancements and maintain plant operational efficiency. The SCADA system is



essential to proper operation of the systems at the WWTP. Without up-to-date software and equipment, the WWTP would have to manually operate components. This would be a complicated task for the WWTP to operate for any extended time. It would affect treatment efficiency and increase operating costs.

9. WWTP Project W-9 - Service Building Drainage, Plumbing, and Water Service Upgrades

The service building drainage, plumbing, and water service are original to the building and should be upgraded to maintain operation.

10. WWTP Project W-10 - WWTP Boiler, Ductwork, Ventilation, and Heating System Replacement

Replacing the two boilers, ductwork, ventilation, and heating system will update equipment past or approaching the expected useful life. The boilers have had operational issues and the ductwork is corroded.

11. WWTP Project W-11 - Oxidation Ditch Improvements

The oxidation ditch motors, gear boxes, and brush rotors have reached the end of their useful life and need to be replaced. The city has already experience one unit failure that required costly replacement. The City would also like to add high level float controls to monitor water levels. They have no way of doing so now. As part of the replacement, the brush rotors should be replaced with disc rotors that include VFD's on the drive motor. This will allow the speed of the rotor to be varied to match the oxygen demand for treatment. Also, an anoxic selector shall be constructed at the inlet of the oxidation ditch to allow for developing conditions for biological phosphorus removal. This will reduce the chemical usage for phosphorus control. Without an operating oxidation ditch rotor, the necessary oxygen transfer for treatment cannot be met. This will result in poor treatment and effluent quality.

12. WWTP Project W-12 – Infiltration and Disinfection Improvements

Performance of the infiltration bed has decreased over time by collecting phosphorus and other fines. Replacement of at least the upper portion of the bed sand should be completed. The operation of infiltration beds needs to be addressed to maintain WWTP effluent quality requirements. WWTP staff is sampling the WWTP flow between process steps to determine if the infiltration bed media is the source PFOA and PFOS in the WWTP effluent. If this is found to be a source, the media must be removed and a new process step added.

The City does not currently dechlorinate the effluent before discharge. The addition of this process may be a future regulatory requirement and should be added to treatment process.

13. WWTP Project W-13 -Solids Handling System

The thickening centrifuges are at the end of their useful life and are in need of replacement. The existing sludge piping valves and wedge wire screens on the thickener tanks also need to be replaced. If the thickening system fails, the City will need to bring in temporary dewatering operations to handle solids and increased cost.

The City is monitoring the PFOA and PFOS levels in their solids. If the level exceeds the regulatory limit the applied for land application will be greatly reduced. The City is monitoring if this is a historical containment or in their current influent flow. It is recommended that the City develop a Solids Handling Management plan and seek funding for landfill disposal alternatives.

3.3.1 Effect of Future Growth on Needs

Future flow projections were based on an estimate of expected WWTP service area expansion, as described in Section 2, as well as information from the 2023 WWTP Evaluation Report. The projects prioritized for



implementation in this Project Plan are not affected by growth and/or increased flows and would be required even if flows remained the same.

3.3.2 Capacity for Future Flows

An evaluation of both the hydraulic capacity and the biological treatment capacity of the WWTP was originally made as part of the 2023 WWTP Evaluation Report and the 2018 Wastewater and Stormwater Asset Management Plan. Capacity of the WWTP accommodate projected future flows. The primary concern is age and failure of the equipment.



4.0 ALTERNATIVE ANALYSIS

The alternatives considered for each proposed project are described below. A technical basis has been developed for each project alternative and a present worth economic comparison of project alternatives completed where appropriate.

4.1 COLLECTION SYSTEM- NO ACTION

No action would result in continued use of infrastructure beyond its useful life. Without the construction of the proposed projects, the water quality of the South Ore Creek watershed would be degraded as equipment fails and operations of the City's collection system suffer. Thus, this alternative will not be considered further.

4.2 WWTP - NO ACTION

No action at the WWTP would result in future equipment failure or insufficient treatment processes at the WWTP. Without the proposed improvements projects, the water quality of the South Ore Creek watershed would be degraded as equipment fails and operations of the City's treatment system suffer. Thus, this alternative will not be considered further.

4.3 OPTIMUM PERFORMANCE OF EXISTING FACILITIES

The existing facilities, including the collection system and WWTP, are performing as well as they can and additional monitoring, treatment and disposal process modifications are not likely to improve the performance of the system because the primary concerns are related to the condition and age of the infrastructure. Therefore, this alternative was not considered further.

4.4 REGIONALIZATION

The total estimated cost to construct the infrastructure to transport and treat the wastewater from Brighton to the next nearest wastewater treatment plant with ability to have treatment capacity (the Genoa-Oceola WWTP located in Howell) is estimated to be \$57,400,000. This is more than the total cost of the projects being considered for this study and does not include costs for property/ROW acquisition or connection charges and operating costs to Genoa-Oceola WWTP. An additional 2.2 MGD treatment capacity at Genoa-Oceola is assumed to be needed to accommodate additional flow from the City. Also, it is not known if there could be a political agreement between the communities for this alternative. Thus, this alternative was not considered further.

4.5 COLLECTION SYSTEM ALTERNATIVES

4.5.1 Collection System Project C-1 - Force Main Improvements

The dual 12-inch force main from the Third Street pump station to the WWTP along Bauer Road is nearing the end of its useful life. Three alternatives were considered to improve the force main. All alternatives would extend the force main's useful life and reduce the risk of failure. *Figure 4-1* shows the location of the force main improvements.



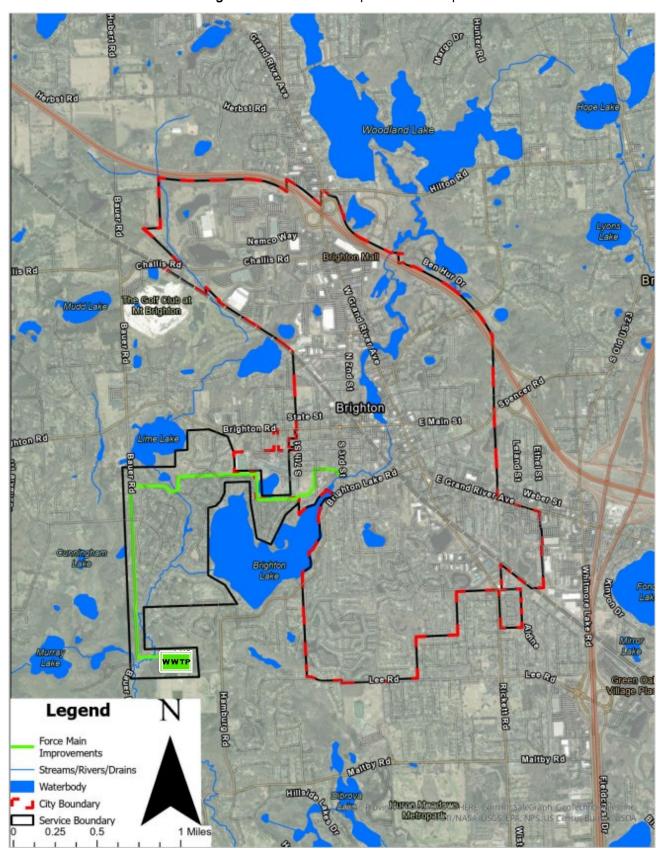


Figure 4-1. Force Main Improvements Map

4.5.1.1 Alternative A, Force Main Rehabilitation

Alternative A includes the rehabilitation of all six miles of 12-inch force main between the Third Street Pump Station and WWTP. Lining the force main will extend the life of the force main and prevent potential future failure.

4.5.1.2 Alternative B, Additional 12" Force Main Construction

Alternative B includes adding a third 12-inch force main parallel to the existing two between the Third Street Pump Station and WWTP. This ensures a backup conveyance route if one of the existing force mains were to fail unexpectedly due to age.

4.5.1.3 Alternative C, Force Main Condition Monitoring

Alternative C includes evaluating the condition of the force main every five years. This is the recommended action from the 2024 *Force Main Corrosion Study*. The existing force main shows no signs of deterioration but given the age of the pipe and key role within the collection system of conveying wastewater to the plant, monitoring is necessary to reduce risk of failure. Frequent cleaning and inspection of the air relief sanitary vault structures for any uncharacteristic deleterious conditions will give an indication of pipe health. It is also recommended the City conduct video examinations of the interior linings in the next 5-10 years to document actual conditions and make informed decisions on additional thickness testing locations.

4.5.1.4 Present Worth Analysis

Project cost for Alternatives A through C, as well as the present worth analysis, can be found in Appendix E. *Table 4-1* summarizes the present worth for project C-1, Alternatives A through C.

Cost Category	Alternative A	Alternative B	Alternative C
Capital Cost	\$535,000	\$8,590,000	\$20,000
Present Worth of Salvage Value	(\$179,000)	(\$2,903,000)	(\$0)
Present Worth of Annual OM&R	\$0	\$0	\$0
Total Present Worth	\$356,000	\$5,687,000	\$20,000

Table 4-1. Project C-1, Present Worth of Alternatives

4.6 WWTP PROJECTS ALTERNATIVES

4.6.1 WWTP Project W-1 – Influent Screenings and Grit Removal System Improvements

The influent screenings and grit removal system are at the end of their expected useful life and need to be replaced. The existing grit system has frequent failures and must be manually operated daily. Two alternatives were considered to improve the influent screenings and grit removal system. Both alternatives would provide influent screening and grit removal for influent wastewater and reduce the risk of failure. Any additional maintenance to extend the useful life for this system would have minimal return since the equipment is old.



4.6.1.1 Alternative A, Influent Screenings and Grit Removal System Replacement

Alternative A includes replacement of the influent screenings and grit removal system at the WWTP. The improvements would include installation of new mechanical fine screen unit in the existing channel. A new compactor/washer unit would be installed to clean screenings before discharging to dumpster.

The existing grit removal system would be replaced with similar equipment including tank mechanism, pumps, and grit classifier.

In addition, an odor control system would be added to the building.

4.6.1.2 Alternative B, Fine Screening Building Construction at 3rd Street Pump Station

Alternative B includes construction of a fine screening building at the 3rd Street Pump Station. There are no additional wastewater inflows after the pump station. Screening the wastewater before pumping to the WWTP will allow the existing screening equipment at the WWTP to be bypassed. The existing grit system at the WWTP will still require replacement.

This alternative would require construction of a screening channel at the pump station for installation of two influent fine mechanical screens. An above ground building would be constructed to house the screening equipment and roll off dumpster for debris. Odor control would also be included because the station is located in a residential area.

4.6.1.3 Present Worth Analysis

Project costs for Alternatives A and B, as well as the present worth analysis, can be found in Appendix E. *Table* **4-2** presents the present worth comparison of Project W-1, Alternatives A and B.

Cost Category	Alternative A	Alternative B
Capital Cost	\$2,624,000	\$7,124,000
Present Worth of Salvage Value	(\$132,000)	(\$1,002,000)
Present Worth of Annual OM&R	\$189,000	\$189,000
Total Present Worth	\$2,681,000	\$6,311,000

Table 4-2. Project W-1, Alternative A Present Worth

4.6.2 WWTP Project W-2 - Pneumatic Valve Operator Improvements

The pneumatic valves have failed in the past and need replacement. Two alternatives were considered to address the failing valves.

4.6.2.1 Alternative A, Pneumatic Valve Operator Replacement

Alternative A includes replacement of the existing pneumatic valve operators in kind. This would include replacing corroded or leaking portions of compressed air piping and control wiring.

4.6.2.2 Alternative B, Motorized Valve Operators

Alternative B includes replacing the existing pneumatic valves with electric motorized operating valves. This includes installation of conduit and wire to control and power valve operation. The electrical motorized valves will not require the operation of the compressed air system, reducing energy consumption and maintenance on that system.



4.6.2.3 Present Worth Analysis

Project costs for Alternatives A and B, as well as the present worth analysis, can be found in Appendix E. *Table* **4-3** presents the present worth comparison of Project W-2, Alternatives A and B.

Table 4-3. Project W-2, Alternatives A and B Present Worth

Cost Category	Alternative A	Alternative B
Capital Cost	\$795,000	\$585,000
Present Worth of Salvage Value	(\$0)	(\$0)
Present Worth of Annual OM&R	\$88,000	\$2,000
Total Present Worth	\$883,000	\$587,000

4.6.3 WWTP Project W-3 - Chemical Feed System Improvements

The chemical feed system is at the end of its expected useful life and needs to be replaced. Two alternatives were considered to address the chemical feed system. Any additional maintenance to extend the useful life for this system would have minimal return since the equipment is old.

4.6.3.1 Alternative A, Chemical Feed System Replacement

Alternative A includes replacement of the chemical feed system. This would include replacement of storage tanks. To facilitate the replacement, the existing exterior wall panels need to be removed for tank replacement. The City has replaced the chemical feed piping and pumps.

4.6.3.2 Alternative B, Construction of New Chemical Feed Building and Storage Tanks

Alternative B includes constructing a new chemical feed building and storage tanks. A new chemical feed building would be constructed adjacent to the Screen Building. This would separate the chemical storage from the main building operations. The building would include two chemical storage tanks for redundancy, new chemical feed pumps, piping to connect to the existing distribution system, HVAC system, and electrical and controls.

4.6.3.3 Present Worth Analysis

Project costs for Alternatives A and B, as well as the present worth analysis, can be found in Appendix E. *Table* **4-4** presents the present worth comparison of Project W-3, Alternatives A and B.

Table 4-4. Project W-3, Alternatives A and B Present Worth

Cost Category	Alternative A	Alternative B
Capital Cost	\$722,000	\$2,594,000
Present Worth of Salvage Value	(\$151,000)	(\$433,000)
Present Worth of Annual OM&R	\$0	\$0
Total Present Worth	\$571,000	\$2,161,000



4.6.4 WWTP Project W-4 - Equalization Valve Improvements

The equalization valve is at the end of its expected useful life and needs to be replaced. Any additional maintenance to extend the useful life for this equipment would have minimal return since the equipment is old. Two alternative were considered.

4.6.4.1 Alternative A, Equalization Valve, No Replacement

Alternative A would be a no replacement option. This would prevent the WWTP from efficiently operating the system. They would not be able to mix and return the flow from the tank. When the tank is used, they would have to install a temporary pump to return flow and then have to clean the tank of solids after draining.

4.6.4.2 Alternative B, Equalization Valve Replacement

Alternative B includes replacement of the equalization valve and structural rehabilitation.

4.6.4.3 Present Worth Analysis

Project costs for Alternative A, as well as the present worth analysis, can be found in Appendix E. *Table 4-5* presents the present worth comparison of Project W-4, Alternative A.

Cost Category	Alternative A	Alternative B
Capital Cost	\$0	\$394,000
Present Worth of Salvage Value	(\$0)	(\$58,000)
Present Worth of Annual OM&R	\$1,014,000	\$63,000
Total Present Worth	\$1,014,000	\$399,000

Table 4-5. Project W-4, Alternative A Present Worth

4.6.5 WWTP Project W-5 – Secondary Clarifier Improvements

The secondary clarifiers are at the end of their useful life and need to be addressed. Two alternatives were considered, rehabilitation and replacement.

4.6.5.1 Alternative A, Secondary Clarifier Rehabilitation

Alternative A recommends rehabilitation of the three secondary clarifiers. This would include replacement of the mechanical components and spot repair of the structure. The mechanism would be broken down. A new mechanism would be installed along with current density baffles and weirs. The existing electrical conduit and wiring would be replaced. The existing concrete would be repaired. Dome covers would be removed and replaced at all three clarifiers.

4.6.5.2 Alternative B, Secondary Clarifier Replacement

Alternative B recommends replacement of the three secondary clarifier mechanisms. The electrical conduit and wiring would be replaced. The existing concrete would be repaired. In place of new domes, covers would be put over the effluent troughs to control algae growth at all three clarifiers.

4.6.5.3 Present Worth Analysis

Project costs for Alternatives A and B, as well as the present worth analysis, can be found in Appendix E. *Table* **4-6** presents the present worth comparison of Project W-5, Alternatives A and B.



Table 4-6. Project W-5, Alternatives A and B Present Worth

Cost Category	Alternative A	Alternative B
Capital Cost	\$3,865,000	\$2,494,000
Present Worth of Salvage Value	(\$563,000)	(\$44,000)
Present Worth of Annual OM&R	\$78,000	\$78,000
Total Present Worth	\$3,380,000	\$2,528,000

4.6.6 WWTP Project W-6 – Service Building Improvements

The service building doors are at the end of their expected useful life and need to be replaced. The building finishes and painting is original to the building construction and beginning to fail. Only one alternative was considered since there are no other options. Any additional maintenance to extend the useful life for this system would have minimal return since the equipment is old.

4.6.6.1 Alternative A, Service Building Improvements

Alternative A includes improvements to the Service Building. These include upgrades to the building bathroom room to provide equitable facilities for both men's and women's facilities, upgrades to the control room and laboratory, architectural rehabilitation to the exterior and doors, painting, and stair replacement. There are no other alternatives to replacement.

4.6.6.2 Present Worth Analysis

Project costs for Alternative A, as well as the present worth analysis, can be found in Appendix E. *Table 4-7* presents the present worth comparison of Project W-6, Alternative A.

Table 4-7. Project W-6, Alternative A Present Worth

Cost Category	Alternative A
Capital Cost	\$1,128,000
Present Worth of Salvage Value	(\$414,000)
Present Worth of Annual OM&R	\$0
Total Present Worth	\$714,000

4.6.7 WWTP Project W-7 - Electrical Upgrades

The generator and fuel storage tank that power the WWTP during electric outages as well as the Third Street pump station generator are at the end of their expected useful life and need to be replaced. Without replacement the WWTP and pump station will not be able to maintain operation during a power outage.

The switchgear and electrical system are original to the construction of the WWTP and need to be updated to current standards. Any additional maintenance to extend the useful life for this system would have minimal return since the equipment is old.

Two alternatives were considered for the generators. Switchgear and electrical system upgrades were included in both alternatives.



4.6.7.1 Alternative A, Diesel Generator Replacement

Alternative A includes the replacement of the diesel generator and above ground fuel storage tank at the WWTP and replacement of the Third Street pump station diesel generator. Switchgear and electrical system updates are also included.

4.6.7.2 Alternative B, Natural Gas Generator Upgrade

Alternative B includes replacement of the two existing diesel generators with a natural gas generator. The existing fuel storage tank would be removed at the WWTP. The generator will be connected to the WWTP main natural gas line. Switchgear and electrical system updates are also included.

4.6.7.3 Present Worth Analysis

Project costs for Alternatives A and B, as well as the present worth analysis, can be found in Appendix E. *Table 4-8* presents the present worth comparison of Project W-7, Alternatives A and B.

Cost Category	Alternative A	Alternative B
Capital Cost	\$1,144,000	\$2,981,000
Present Worth of Salvage Value	(\$226,000)	(\$898,000)
Present Worth of Annual OM&R	\$183,000	\$239,000

\$1,101,000

Table 4-8. Project W-7, Alternatives A and B Present Worth

4.6.8 WWTP Project W-8 - SCADA Improvements

The SCADA system has reached the end of its useful life and needs to be upgraded. If the system components were replaced in kind, it is likely the current equipment and support service would be discontinued soon, limiting future service and repair. Only one alternative was considered since there are no other options.

4.6.8.1 Alternative A, SCADA System Upgrades

Total Present Worth

Alternative A includes SCADA system upgrades. There are no other alternatives.

4.6.8.2 Present Worth Analysis

Project costs for Alternative A, as well as the present worth analysis, can be found in Appendix E. *Table 4-9* presents the present worth comparison of Project W-8, Alternative A.

Table 4-9. Project W-8, Alternative A Present Worth

Cost Category	Alternative A
Capital Cost	\$550,000
Present Worth of Salvage Value	(\$0)
Present Worth of Annual OM&R	\$0
Total Present Worth	\$550,000



\$2,322,000

4.6.9 WWTP Project W-9 – Service Building Drainage, Plumbing, and Water Service Improvements

The service building has had no major improvements since construction of the WWTP. The drainage, plumbing, and water service systems all need to be updated to replace deteriorating equipment. Only one alternative was considered since there are no other options.

4.6.9.1 Alternative A, Service Building Drainage, Plumbing, and Water Service Upgrades

Alternative A includes upgrades to drainage, plumbing, and water service within the service building. There are no other alternatives.

4.6.9.2 Present Worth Analysis

Project costs for Alternative A, as well as the present worth analysis, can be found in Appendix E. *Table 4-10* presents the present worth comparison of Project W-9, Alternative A.

Table 4-10. Project W-9, Alternative A Present Worth

Cost Category	Alternative A
Capital Cost	\$1,047,000
Present Worth of Salvage Value	(\$384,000)
Present Worth of Annual OM&R	\$0
Total Present Worth	\$663,000

4.6.10 WWTP Project W-10 – Boiler, Ductwork, Ventilation, and Heating System Improvements

The service building has had no major improvements since construction of the WWTP. The two boilers, ductwork, ventilation, and heating system all need to be updated to replace deteriorating equipment. Only one alternative was considered since there are no other options.

4.6.10.1 Alternative A, Boiler, Ductwork, Ventilation, and Heating System Replacement

Alternative A includes replacement of both boilers, ductwork, ventilation, and heating system. There are no other alternatives.

4.6.10.2 Present Worth Analysis

Project costs for Alternative A, as well as the present worth analysis, can be found in Appendix E. *Table 4-11* presents the present worth comparison of Project W-10, Alternative A.

Table 4-11. Project W-10, Alternative A Present Worth

Cost Category	Alternative A
Capital Cost	\$743,000
Present Worth of Salvage Value	(\$273,000)
Present Worth of Annual OM&R	\$0
Total Present Worth	\$470,000



4.6.11 WWTP Project W-11 - Oxidation Ditch Improvements

The oxidation ditch motors, gear boxes, and brush rotors have reached the end of their useful life and need to be replaced. There has already been one failure at the oxidation ditches. The City would also like to add high level float controls to monitor water levels which they have no way of doing now. Two alternatives were considered.

4.6.11.1 Alternative A, Oxidation Ditch Brush Replacement

Alternative A includes replacement of the existing oxidation ditches brush rotor and motors in kind.

4.6.11.2 Alternative B, Oxidation Ditch Upgrades with VFD Drive

The existing brush rotors, gear boxes and motors will be replaced with new system. The system will utilize disc rotors that provide improved oxygen transfer efficiency, and the motors will be equipped with VFDs to modulate the rotor speed. A control system will be provided to control the rotor speed based on the oxygen demand of the system and allow for a reduction in energy consumption. Also, as part of the improvements, an anoxic selector will be constructed at the oxidation ditch inlet to develop biological phosphorus removal. This will allow the phosphorus removal without the addition of ferric chloride.

4.6.11.3 Present Worth Analysis

Project costs for Alternatives A and B, as well as the present worth analysis, can be found in Appendix E. *Table 4-12* presents the present worth comparison of Project W-11, Alternatives A and B.

Cost Category	Alternative A	Alternative B
Capital Cost	\$3,228,000	\$5,087,000
Present Worth of Salvage Value	(\$130,000)	(\$370,000)
Present Worth of Annual OM&R	\$3,977,000	\$1,723,000
Total Present Worth	\$7,075,000	\$6,440,000

Table 4-12. Project W-11, Alternatives A and B Present Worth

4.6.12 WWTP Project W-12 - Infiltration and Disinfection Improvements

Performance of the infiltration beds has decreased over time because of the collection of phosphorus and other fines between the sand particles.

The WWTP currently does not dechlorinate the effluent before it is discharged from the plant. As part of regulatory changes, this treatment step may be required.

The City is also monitoring the beds for residual PFOS and PFOA in the effluent from the underdrain system.

Two alternatives were considered to improve the effluent water quality.

4.6.12.1 Alternative A, Infiltration Bed Sand Replacement

Alternative A includes the replacement of at least the upper portion of the bed sand. This will lower effluent phosphorus concentration. The top two feet of media will be removed and disposed of offsite. New sand media will be placed and graded.

A new dechlorination building will be constructed adjacent to the Irrigation Pump Station. The building will house a chemical system for sodium bisulfate to be used for dechlorination of the effluent before discharge. This will include two storage tanks, chemical feed pumps and piping to the effluent.



Additional treatment may be necessary for the effluent if PFOS and PFOA residuals are found to exceed any regulatory limit changes.

4.6.12.2 Alternative B, Cloth Media Filtration and UV Disinfection

Alternative B includes a different tertiary treatment technology, cloth media filtration. The filters will be used for final filtration of the effluent to meet the phosphorus removal limit. This alternative also addresses concerns about PFOA and PFOS present in the sand of the infiltration beds. Bypassing the infiltration beds to a cloth media filtration system will alleviate PFOA and PFOS concentrations in effluent water.

Also, as part of the installation of the filtration system, ultraviolet disinfection will be added for effluent disinfection. The UV units will be located downstream of the filters before discharging to effluent pipe. The installation of the UV will remove the need for chlorine gas handling as part of disinfection and the requirement for dechlorination.

Additional treatment may be required for the residuals in the abandoned filter beds if they exceed any regulatory limit changes.

4.6.12.3 Present Worth Analysis

Project costs for Alternatives A and B, as well as the present worth analysis, can be found in Appendix E. *Table 4-12* presents the present worth comparison of Project W-12, Alternatives A and B.

Cost Category	Alternative A	Alternative B
Capital Cost	\$21,189,000	\$9,981,000
Present Worth of Salvage Value	(\$6,115,000)	(\$901,000)
Present Worth of Annual OM&R	\$343,000	\$858,000
Total Present Worth	\$15,417,000	\$9,938,000

Table 4-13. Project W-12, Alternatives A and B Present Worth

4.6.13 WWTP Project W-13 - Solids Handling System

The thickening centrifuges are at the end of their useful life and are in need replacement. The existing sludge piping valves and wedge wire screens on the thickener tanks also need to be replaced. If the thickening system fails, the City will need to bring in temporary dewatering operations to handle solids at increased cost.

The City is monitoring the PFOA and PFOS levels in their solids. If the level exceeds the regulatory limit the applied for land application will be greatly reduced. The City is monitoring if this is a historical containment or in their current influent flow. The alternatives will provide the City with the flexibility between a land application and landfill disposal approach for the biosolids if the regulatory requirements change in the future.

Two alternatives were considered for the WWTP Solids Handling System.

4.6.13.1 Alternative A, Centrifuges Replacement and Land Application

Alternative A includes the replacement of the existing components and to maintain land applications of solids. This includes replacement of the thickening centrifuges, tank mixers, sludge piping valves, wedge wire screens, concrete repair, and electrical replacement.

A new building will be constructed above the existing sludge storage tanks to house the equipment.

This alternative was determined to be more cost-effective but future regulatory changes may affect that. The City is monitoring the solids for PFOA and PFOS contamination. If the level increases, the acceptance of the solids by landowners for land application will likely decrease and result in higher disposal costs.



4.6.13.2 Alternative B, Screw Press Solids Dewatering and Landfill Disposal

Alternative B includes changing from land application to landfill disposal. This requires the solids to be dewatered so they are accepted by the landfill. This will require the installation of dewatering equipment. For this alternative screw presses were used. The presses would be in a new building constructed above the sludge holding tanks. The building would house the dewatering equipment, polymer storage and feed equipment, conveyors to discharge material into roll off dumpsters, and electrical and mechanical equipment.

4.6.13.3 Present Worth Analysis

Project costs for Alternatives A and B, as well as the present worth analysis, can be found in Appendix E. *Table 4-12* presents the present worth comparison of Project W-13, Alternatives A and B.

Cost Category	Alternative A	Alternative B
Capital Cost	\$6,298,000	\$5,696,000
Present Worth of Salvage Value	(\$993,000)	(\$1,034,000)
Present Worth of Annual OM&R	\$951,000	\$1,637,000
Total Present Worth	\$6,256,000	\$6,299,000

Table 4-14. Project W-13, Alternatives A and B Present Worth

4.7 MONETARY EVALUATION

The monetary evaluation compares the present worth of the alternatives over a 20-year planning period. It does not include costs accrued before or during the Project Plan phase. The real discount rate used for the present worth analysis is 2.5 percent (from the United States Office of Management and Budget when the project planning began in December 2023).

The above sections summarize the proposed costs. Detailed cost estimates are provided for the projects in Appendix E.

4.8 ENVIRONMENTAL EVALUATION

The environmental evaluation was completed by Orbis Environmental Consulting and their full reports are in Appendices F and G. All alternatives have potential environmental impacts which can be beneficial or adverse, short- or long-term, and reversible or irreversible.

4.8.1 Cultural Resources

The State Historical Protection Office (SHPO) was contacted as part of the Project Plan concerning the project study areas. The preliminary information provided is included in Appendix G. Eight archaeological sites and three historical properties are located within one mile of the proposed study areas. None of these are expected to be impacted since they are located past the project area boundaries. The project area has not been surveyed in the past, but all projects are contained to previously disturbed land by other construction projects. There will be no impacts on historical projects.

4.8.2 Natural Environment

4.8.2.1 Climate

The City of Brighton has humid, continental-type climates with wide seasonal temperature fluctuations and even distribution of precipitation throughout the year. The Great Lakes impact the climate. Precipitation occurs mostly in the form of snow in the winter months. Heavy rainstorms are a common occurrence in the summer. The mean yearly precipitation in the area is 33.13 inches, and the temperature ranges from an average low of 16.7 degrees Fahrenheit (°F) to an average high of 81.2°F. The weather information was reported at the Howell Wastewater Treatment Plant (10 miles from Brighton) from 1991 to 2020.

Construction is typically limited to the period between April and November since soil and pavement restoration is more difficult during the winter months. Excavation also can be more difficult in winter due to frozen soil.

4.8.2.2 Air Quality

National Ambient Air Quality Standards are health-based standards set by the EPA. The City is in attainment for carbon dioxide, lead, nitrogen dioxide, particulate matter, sulfur dioxide, and ozone. The principal alternatives are not anticipated to negatively impact the air quality. The proposed projects are not anticipated to negatively impact the air quality.

The area has the noise pollution characteristics typical of an urban community. No noise pollution problems exist in residential areas, other than from traffic noise from major roadways. Commercial and business areas experience normal traffic noise.

4.8.2.3 Wetlands

Wetlands exist primarily along the South Ore Creek. Wetland areas may be present in the vicinity of any of the proposed projects. During the design phase of this project, all the necessary permits will be obtained and any impacts to wetlands would be minimized and/or mitigated. Wetlands maps in the project areas are shown in *Figure 4-2*.

4.8.2.4 Coastal Zones

There are no coastal zones within the study area.

4.8.2.5 Floodplains

The floodplains in the study area primarily result from the Brighton Lake drainage areas. Project C-1 is in the vicinity of the 100-year floodplain. During the design phase of this project, all the necessary permits will be obtained and any impacts to the floodplain would be minimized and/or mitigated. *Figure 4-3* shows the 100-year floodplain defined by FEMA.



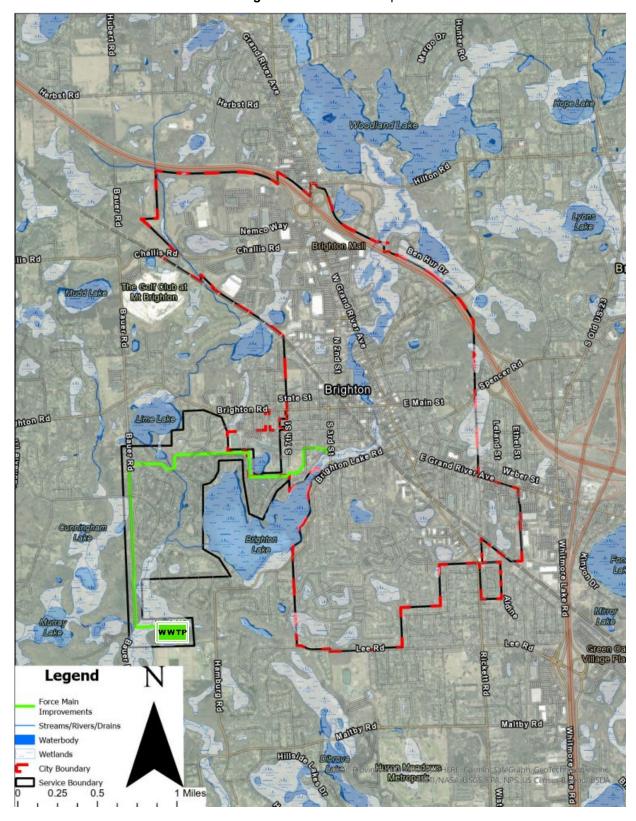


Figure 4-2. Wetlands Map

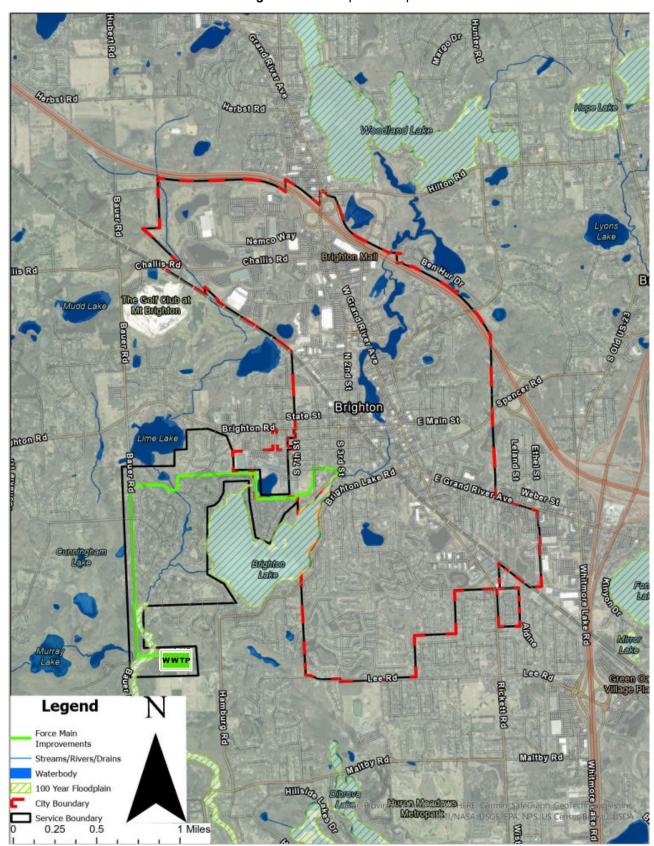


Figure 4-3. Floodplains Map

4.8.2.6 Natural or Wild and Scenic Rivers

There are no designated Michigan Natural Rivers listed by the Michigan Department of Natural Resources (DNR) or National Wild and Scenic Rivers listed by the United States Fish and Wildlife Service (FWS) within the study area.

4.8.2.7 Watershed and Surface Waters

The City lies within the South Ore watershed, which is part of the Huron River Basin. The South Ore watershed has an area of approximately 34 square miles and is located primarily in Livingston County. The creek originates near Hartland Township then flows southwesterly through Brighton Township and the City of Brighton before joining Ore Lake which drains into the Huron River in Hamburg Township.

South Ore Creek is not protected by EGLE, but the Huron River is protected for agricultural uses, navigation, industrial water supply, public water supply at the point of water intake, warm water fishery, other indigenous aquatic life and wildlife, partial body contact recreation, and total body contact recreation (May through October).

4.8.2.8 Geology, Topography, and Soils

The terrain in the study area varies from flat plains to gently rolling hills. *Figure 4-4* presents a topographic map of the study area.

The general soils information for the project areas can be found in Appendix A. As part of the final design process, previous soil borings would be reviewed and additional borings made to determine whether any special construction methods would be needed.

4.8.2.9 Agricultural Resources

There is no agricultural land withing the service area.

4.8.2.10 Recreational Facilities

The City offers residents and visitors numerous recreational opportunities via its community center, community and neighborhood parks, and recreation facilities. Highlights include state parks, Island Lake, and Brighton Recreational Areas, as well as Huron Meadows and Kensington Metroparks.



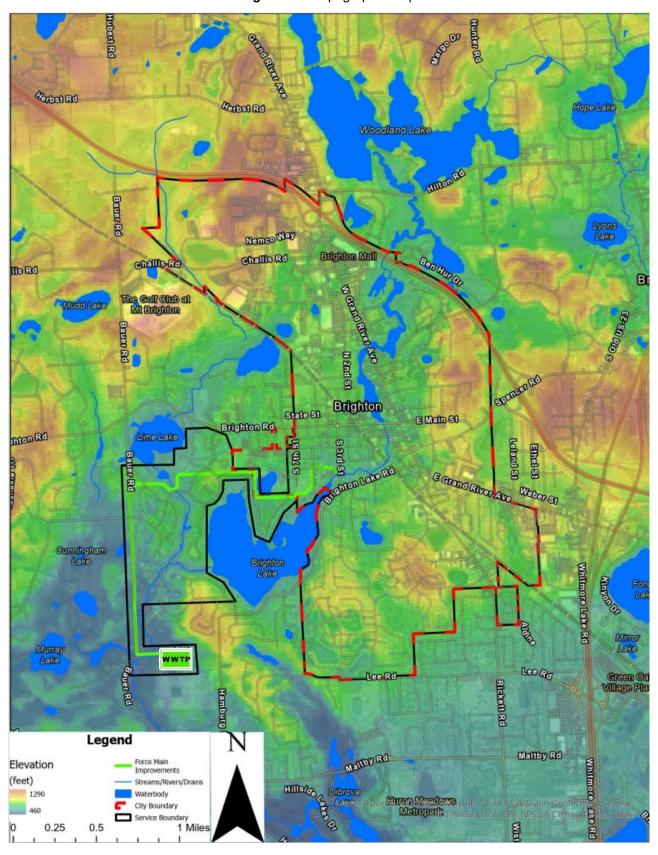


Figure 4-4. Topographic Map

4.8.2.11 Existing Plant and Animal Communities

The existing plant and animal species are typical to urbanized areas. No habitat for animals of economic or sport value is within the area. The Michigan Natural Features Inventory (MNFI) was contacted for a review of protected species. Their response can be found in Appendix F. MNFI identified a total of eight endangered species and 12 threatened species in Livingston County. Information on federally protected species by the U.S. Fish and Wildlife Service for five species was also provided.

Endangered species listed as having a presence in Livingston County include the Indiana bat and snuffbox mussel. Indiana bats hibernate in caves and/or abandoned mines and live in wooded areas in the summer. To protect the bats, any required tree clearing will be conducted between October 1 and March 31. The snuffbox mussel is located in aquatic or wetland environments. Proper stormwater pollution prevention practices will be utilized to avoid any adverse aquatic effects.

Threatened species include six animal species and one plant species. The black sandshell, bridled madtom, eastern sand darter, slippershell mussel, wavyrayed lampmussel are all aquatic or wetland animal species. To protect the cerulean warbler, tree clearing will be avoided between April 22 through July 20. Proper stormwater pollution prevention practices will be utilized to avoid any adverse aquatic effects. White lady slipper grows in wetland environments. No hydrology is expected be altered within the project area which will protect the plant species.

The federally protected species include the endangered Indiana bat (discussed previously), Northern long-eared bat, snuffbox mussel (discussed previously). The tree clearing measures described above would provide protection for both bat species. Minimizing stream impacts as described above would protect the mussel species. The eastern prairie fringed orchid is federally threatened. The orchid lives in wetland habitats. Similar to the bats, vegetation clearing should be done during the dormant period between October 1 and March 31. Also federally threatened is the Eastern massasauga rattlesnake. The proposed projects are within Tier 1 habitat for the snake. There are no ideal construction months to avoid rattlesnakes. Rattlesnakes are active during summer months, but also may be affected by soil excavation during hibernation. Coordination with the FWS may be required to minimize impacts to the rattlesnake species.

Most of the work Is proposed in already-developed areas where there is minimal habitat present for the listed species. However, there are portions of force main project that may impact habitat along the South Ore Creek, nearby wetlands, and natural areas.

When the limits of ground-disturbing activities are further refined during the design phases for the various projects, additional review will be made to determine if the habitat for the species will be impacted. If there are any concerns, appropriate actions would be taken to avoid these areas and/or mitigate any disturbance so that the species are protected.

4.9 MITIGATION

Traffic, noise pollution, and soil erosion are potential short-term issues that will need to be mitigated for any alternatives selected. Traffic will be managed with proper signage and controls. Construction likely will occur during daylight hours to minimize excess noise unless significant traffic impacts are expected, or other construction needs arise during design. All disturbed soils will have erosion control and will be restored during construction. Impacts to threatened and endangered species will be minimized by scheduling tree and vegetation removal during inactive periods (October 1 to March 15 and April 22 to July 20) as well as enacting a stormwater pollution prevention plan. No long-term impacts are expected from the proposed projects.



5.0 SELECTED ALTERNATIVES

The selected alternatives are the most cost-effective and environmentally-sound alternatives. The assessment of alternate solutions and sites for the proposed project included identification of any important resources of either historic or environmental value which are protected by law. Impacts to historic and environmentally protected sites should be avoided.

5.1 DESIGN PARAMETERS

The recommended near-term collection sewer projects are summarized as follows:

- 1. Project W-1, Influent Screenings and Grit Removal System Replacement. Alternative A includes the replacement of the influent screenings and grit removal system as well as structural rehabilitation.
- Project W-2, Pneumatic Valve Operator Replacement. Alternative B has the lowest present worth of the
 two alternatives and includes the replacement of existing pneumatic valves on RAS and WAS pumps with
 motorized operated pneumatic valves.
- 3. **Project W-3, Chemical Feed System Replacement.** Alternative A includes replacing the storage tanks to prevent chemical leaks.
- **4. Project W-4, Equalization Valve Replacement.** Alternative B includes replacing pinch valves and structural rehabilitation to the EQ basin.
- **5. Project W-5, Secondary Clarifier Replacement.** Alternative B has the lowest cost of the two alternatives and includes replacement of clarifier mechanisms, baffles, trough cover, and electrical work.
- Project W-6, Service Building Improvements. Alternative A includes bathroom upgrades, laboratory renovations, stair replacement, door replacements, control room renovation, and building exterior maintenance.
- 7. Project W-7, WWTP Electrical Upgrades. Alternative A has the lowest cost and includes replacement of the diesel generators and fuel storage tank as well as electrical system upgrades to meet current standards and increase energy efficiency.
- **8. Project W-8, WWTP SCADA Upgrades.** Alternative A includes upgrades to the SCADA system to maintain plant operational efficiency.
- Project W-9, Service Building Drainage, Plumbing, and Water Service Upgrades. Alternative A includes replacement of sanitary piping, sump pump and drain, water piping, emergency shower, and plumbing fixtures.
- 10. Project W-10, WWTP Boiler, Ductwork, Ventilation, and Heating System Replacement. Alternative A includes replacement of the two hot water boilers, lower gallery ductwork, chlorine room unit heater, intake damper, ventilation system, and heating system.
- **11. Project W-11, Oxidation Ditch Improvements.** Alternative B has the lowest present worth of the two alternatives due to projected energy savings of the VFD instead of motor starter. This includes replacement of the aerator disc, gearbox, and BNR control system.
- **12. Project W-12, Infiltration and Disinfection Improvements.** Alternative B includes the addition of a cloth filter system and UV disinfection.
- **13. Project W-13, Solids Handling System.** Alternative A for replacement of existing equipment in a new solids handling building and maintaining land application.
- **14. Project C-1, Bauer Road Force Main Improvements.** Alternative C has the lowest cost with no improvements and continued monitoring. Evaluating the force main condition every five years will minimize risk of failure, but not replace force main before it is necessary.



5.2 USEFUL LIFE

The useful life of the selected projects is calculated on the present worth spreadsheets in Appendix E. *Table 5-1* summarizes the useful life for each of the collection system and WWTP projects, all of which are over 40 years.

Table 5-1. Useful Life for Selected Projects

Project	Useful Life (years)
Project W-1: Influent Screenings and Grit Removal System Replacement	24.1
Project W-2: Pneumatic Valve Operator Replacement	20.0
Project W-3: Chemical Feed System Replacement	37.1
Project W-4: Equalization Valve Replacement	32.0
Project W-5: Secondary Clarifier Replacement	21.4
Project W-6: Service Building Improvements	50.0
Project W-7: WWTP Electrical Upgrades	36.1
Project W-8: WWTP SCADA Upgrades	20.0
Project W-9: Service Building Drainage, Plumbing, Compressed Air and Water Service Upgrades	50.0
Project W-10: WWTP Boiler, Ductwork, Ventilation and Heating System Replacement	50.0
Project W-11: Oxidation Ditch Improvements	25.9
Project W-12: Infiltration and Disinfection Improvements	27.4
Project W-13: Solids Handling System	32.9
Project C-1: Bauer Road Force Main Improvements	N/A

5.3 PROJECT MAPS

Project maps are in Section 4.5 and 4.6

5.4 WATER AND ENERGY EFFICIENCY

Energy efficiency was considered when evaluating the alternatives. The collection system alternatives will not improve water or energy efficiency directly. The projects also do not reduce the amount of stormwater being transported to the WWTP and will not reduce the amount of wastewater treated at the WWTP. The updated equipment, especially the generator and electrical replacements, will reduce the operation and maintenance (O&M) costs and improve energy efficiency and reliability at the WWTP.

The WWTP has an opportunity to realize energy savings by improving treatment efficiency and reducing energy and chemical consumptions through additional instrumentation, monitoring and piping modifications. The modification to the oxidation ditch will allow the aerators to be operated to meet oxygen demand and the construction of the biological selector will reduce chemical usage.

5.5 SCHEDULE

Table 5-2 provides a proposed schedule for the Project Plan submittal and associated deadlines. **Table 5-3** presents the anticipated funding schedule for projects proposed for implementation within the first five years.

Table 5-2. Proposed SRF Project Schedule

Task	Complete On or Before
Public Meeting Notice	March 15, 2024
Place Draft Project Plan on Public Record	March 15, 2024
Formal Public Meeting	April 2, 2024
Council Approval of Project Plan	April 23, 2024
Submit Final Project Plan to EGLE for SRF Consideration	May 1, 2024

Table 5-3. Anticipated Funding Schedule for Proposed Projects

Project	SRF Fiscal Year
Project W-1: Influent Screenings and Grit Removal System Replacement	2026
Project W-2: Pneumatic Valve Operator Replacement	2026
Project W-3: Chemical Feed System Replacement	2026
Project W-4: Equalization Valve Replacement	2026
Project W-5: Secondary Clarifier Replacement	2026
Project W-6: Service Building Improvements	2026
Project W-7: WWTP Electrical Upgrades	2026
Project W-8: WWTP SCADA Upgrades	2026
Project W-9: Service Building Drainage, Plumbing, Compressed Air and Water Service Upgrades	2026
Project W-10: WWTP Boiler, Ductwork, Ventilation and Heating System Replacement	2026
Project W-11: Oxidation Ditch Improvements	2026
Project W-12: Infiltration and Disinfection Improvements	2028
Project W-13: Solids Handling System	2028
Project C-1: Bauer Road Force Main Improvements	2029

5.6 COST ESTIMATE

The estimated 2025 total project cost for all projects outlined herein is \$32,800,000. All projects are fully fundable according to SRF guidelines. *Table 5-4* provides a summary of the opinion of probable costs for the selected projects. A complete cost estimate breakdown for all projects is in Appendix E.

Table 5-4. Cost Summary, Selected Projects

Project	Project Cost	Present Worth	SRF Eligible	SRF Eligible Cost	Annual Equivalent Cost
Project W-1: Influent Screenings and Grit Removal System Replacement	\$2,624,000	\$2,681,000	100%	\$2,624,000	\$169,000
Project W-2: Pneumatic Valve Operator Replacement	\$585,000	\$587,000	100%	\$585,000	\$38,000
Project W-3: Chemical Feed System Replacement	\$722,000	\$571,000	100%	\$722,000	\$47,000
Project W-4: Equalization Valve Replacement	\$394,000	\$399,000	100%	\$394,000	\$26,000
Project W-5: Secondary Clarifier Replacement	\$2,494,000	\$2,528,000	100%	\$2,494,000	\$160,000
Project W-6: Service Building Improvements	\$1,128,000	\$714,000	100%	\$1,128,000	\$73,000
Project W-7: WWTP Electrical Upgrades	\$1,144,000	\$1,101,000	100%	\$1,144,000	\$74,000
Project W-8: WWTP SCADA Upgrades	\$550,000	\$250,000	100%	\$550,000	\$36,000
Project W-9: Service Building Drainage, Plumbing, Compressed Air and Water Service Upgrades	\$1,047,000	\$663,000	100%	\$1,047,000	\$68,000
Project W-10: WWTP Boiler, Ductwork, Ventilation and Heating System Replacement	\$743,000	\$470,000	100%	\$743,000	\$48,000
Project W-11: Oxidation Ditch Improvements	\$5,087,000	\$6,440,000	100%	\$5,087,000	\$327,000
Project W-12: Infiltration and Disinfection Improvements	\$9,981,000	\$9,938,000	100%	\$9,981,000	\$641,000
Project W-13: Solids Handling System	\$6,298,000	\$6,256,000	100%	\$6,298,000	\$404,000
Project C-1: Bauer Road Force Main Improvements	\$20,000	\$20,000	100%	\$20,000	\$2,000

5.7 IMPLEMENTABILITY

The City Council has the legal authority to implement the Project Plan. A copy of the draft resolution is in Appendix I.

The City's Department of Public Works maintains a full-time engineering staff and will implement the selected alternative with in-house engineering staff and assistance from engineering consultants. The City has the managerial capability and financial means to implement the selective alternatives.

5.8 FISCAL SUSTAINABILITY PLAN

The 2014 Water Resources Reform and Development Act requires the completion and implementation of a Fiscal Sustainability Plan (FSP) as a new condition of the SRF loan agreement. The FSP includes the following 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. Evaluation and implementation of water and energy conservation efforts; and
- 4. A plan for maintaining, repairing, funding and, as necessary, replacing the treatment works.

The assets included in the FSP are those located at the WWTP that are proposed to be rehabilitated or replaced in Projects W-1 through W-13. The FSP is in Appendix C.

5.9 USER COSTS

The costs for the projects described herein will be paid for by user charges. The user charges in **Table 5-5** were calculated over the useful life of the project. The City intends to implement these projects over a five-year period, as indicated in **Table 5-3**, so the rate increases will also be staged as the projects proceed. All projects are eligible for SRF funding. **Table 5-5** shows the typical bi-monthly user charge per residential user in the service area for each project.

The bi-monthly user charge in the last column is calculated per the following steps:

Column 2: SRF Eligible Project Cost

Column 3: Annual Debt Service = Project Cost times Capital Recovery Factor based on 20-year SRF loan at 2.5%

Column 4: Additional Annual O&M Cost

Column 5: Total Annual Cost= Column 3 plus Column 4

Column 6: Bi-Monthly User Charge = Total Annual Cost/4,061 customer accounts/6 bill periods per year

Table 5-5. Estimated User Charge Summary, All Projects

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Project	SRF Project Cost	Annual Debt Service	Additional Annual O&M	Total Annual Cost	Bi-Monthly User Charge
Project W-1: Influent Screenings and Grit Removal System Replacement	\$2,624,000	\$168,300	\$12,100	\$180,400	\$7.40
Project W-2: Pneumatic Valve Operator Replacement	\$585,000	\$37,500	\$100	\$37,600	\$1.54
Project W-3: Chemical Feed System Replacement	\$722,000	\$46,300	\$0	\$46,300	\$1.90
Project W-4: Equalization Valve Replacement	\$394,000	\$25,300	\$4,000	\$29,300	\$1.20
Project W-5: Secondary Clarifier Replacement	\$2,494,000	\$160,000	\$5,000	\$165,000	\$6.77
Project W-6: Service Building Improvements	\$1,128,000	\$72,400	\$0	\$72,400	\$2.97
Project W-7: WWTP Electrical Upgrades	\$1,144,000	\$73,400	\$11,700	\$85,100	\$3.49



Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Project W-8: WWTP SCADA	\$550,000	\$35,300	\$0	\$35,300	\$1.45
Upgrades	ψ550,000	ψ00,000	ΨΟ	ψ00,000	Ψ1.40
Project W-9: Service Building					
Drainage, Plumbing, Compressed Air	\$1,047,000	\$67,200	\$0	\$67,200	\$2.76
and Water Service Upgrades					
Project W-10: WWTP Boiler,					
Ductwork, Ventilation and Heating	\$743,000	\$47,700	\$0	\$47,700	\$1.96
System Replacement					
Project W-11: Oxidation Ditch	\$5,087,000	\$326,300	\$110,500	\$436,800	\$17.93
Improvements	φ5,067,000	φ320,300	\$110,500	Φ430,000	Φ17.93
Project W-12: Infiltration and	¢0 004 000	¢640,200	ΦEE 000	¢605 200	#20 E2
Disinfection Improvements	\$9,981,000	\$640,300	\$55,000	\$695,300	\$28.53
Project W-13: Solids Handling System	\$6,298,000	\$404,000	\$61,000	\$465,000	\$19.08
Project C-1: Bauer Road Force Main Improvements	\$20,000	\$1,300	\$0	\$1,300	\$0.05



6.0 ENVIRONMENTAL IMPACTS

The anticipated environmental impacts resulting from the construction of the selected projects include beneficial and adverse, short-term and long-term, and irreversible impacts. The following is a discussion of the environmental impacts of the selected plan.

6.1 DIRECT IMPACTS

6.1.1 Archaeological, Historical, and Cultural Resources

No historical, archaeological, or tribal resources will be affected during these projects. When construction plans are prepared for work, the appropriate agencies will be contacted to ensure provisions in the contract address restoration efforts.

The WWTP is generally not viewed or accessed by the public, and therefore the work proposed at the WWTP will not impact the cultural setting. For the force main project, the proposed work will all be located below grade and will not be seen by the public when complete. The proposed projects will include restoration of the areas temporarily impacted by any work. There will be no long-term impacts to the visual or aesthetic feel of the neighborhood.

6.1.2 Local Air Quality and Noise Pollution

There will be minimal direct impacts on local air quality during the construction phases of these projects. Any effects on air quality will be due to dust and emissions from construction equipment and limited to the construction phase. Excess noise pollution due to construction will be limited to daylight hours primarily during the work week.

6.1.3 Water Quality

Surface water and ground water quality will not be negatively impacted from the construction of the proposed projects. Appropriate measures will be taken during construction to avoid detrimental impact to surface waters through soil erosion and sedimentation controls. All necessary permits will be obtained prior to the proposed activities. There are no impacts anticipated to the local groundwater.

Water quality will be improved with the force main and WWTP improvements. Regularly evaluating the condition of the force main will minimize exfiltration which may occur. The quality of the South Ore Creek is anticipated to be improved by the collection system and WWTP projects, as wastewater treatment failures or force main leaks will be reduced.

6.1.4 Land/Water Interface

All the proposed projects may be located within the floodplain and wetland areas. The contractor will be required to follow soil and erosion control requirements to minimize sedimentation. All construction areas will be restored to previous conditions. The necessary Part 41 permits will be applied for during the construction process. If there are minor encroachments into wetland or other sensitive areas, the appropriate permits will be applied for and the work performed in accordance with all laws and regulations.

6.1.5 Endangered Species

Threatened or endangered species or their habitat may be affected by the force main project in previously undeveloped, wetland, and aquatic areas such as the South Ore Creek. Some endangered and threatened species could be in these areas. Additional reviews and the appropriate environmental agency will be contacted during project design to mitigate disturbances to listed species.



Projects at the WWTP are not expected to impact listed species or their habitat.

6.1.6 Social/Economic Impact

Short term social and economic impacts may occur during the construction phase. Increased construction traffic will occur and may temporarily interfere with pedestrian and vehicular traffic in the area of proposed projects. Construction activities associated with WWTP will take place on the existing treatment plant property, reducing negative impacts to the public. All users of the sewerage system will experience beneficial long-term impacts due to the level of service to which they expect being maintained by these improvements. The local economy will be stimulated for contractors and suppliers of the materials, labor, and equipment necessary to construct the project. A long-term negative impact would be increased user costs.

6.1.7 Construction/Operational Impact

The proposed projects are recommended based on improving operation of the WWTP and collection system over the long-term. Construction of the proposed facilities will be coordinated and sequenced to allow for continued operation of all facilities during the temporary construction process.

The following impacts are anticipated:

- Tree removal: Individual tree removals along the force main may be needed, but no large clearing is expected.
- Hazardous material exposure: No hazardous material is expected.
- Traffic patterns: Traffic may need to be stopped or redirected in the project areas.
- Construction chemicals, dust, air emissions, and noise: Use of construction chemicals will follow safety
 procedures. Water will be used for dust control. Well maintained equipment will be used to minimize air
 emissions. Construction will occur during daylight on weekdays to reduce noise unless significant traffic
 changes are required. If night work is necessary, proper permitting will be acquired.
- Groundwater/dewatering impacts and proximity to wetlands: Work will be limited as much as possible in wetland areas. The appropriate permits will be acquired if necessary.
- Soil erosion: Soil erosion prevention will be implemented during excavation activities and the project area will be revegetated shortly after construction completion.

6.2 INDIRECT IMPACTS

6.2.1 Changes in Development and the Associated Transportation Changes

There are no changes anticipated to development or transportation changes upon completion of the projects. There may be some temporary disruptions due to the construction.

6.2.2 Changes in Land Use

No changes are anticipated to land use based on the projects. The projects are to improve wastewater handling in currently served areas.

6.2.3 Changes in Air or Water Quality due to Facilitated Development

There will be no changes to air quality due to development. The water quality in the South Ore Creek is anticipated to improve, due to the replaced WWTP equipment and force main monitoring. There will be no direct correlation to development as a result of this project.



6.2.4 Changes to the Natural Setting or Sensitive Features Resulting from Secondary Growth

There are no anticipated changes to the natural setting or sensitive features resulting from secondary growth.

6.2.5 Impacts on Cultural, Human, Social, and Economic Resources

The proposed projects are to improve WWTP operations. The projects will decrease the possibility of untreated wastewater being released into the local watershed. Beneficial impacts include the creation of construction and equipment manufacturing related jobs, and local contractors would have an equal opportunity to bid on the construction contracts.

6.2.6 Impacts of Area Aesthetics

All of the proposed WWTP work will be completed on the existing site which is currently used for wastewater treatment and is generally not viewed or accessed by the public. For the force main work, all the areas affected by proposed work will be restored to their existing conditions or better.

6.3 CUMULATIVE IMPACTS

6.3.1 Siltation

Siltation may occur during the construction phase of the project. Proper soil erosion and sedimentation control practices will be followed to reduce the impacts of siltation on surrounding areas.

6.3.2 Water Quality Impacts from Direct Discharges and Non-Point Sources

The water quality of the South Ore Creek should be improved upon the completion of the projects due to improved operational efficiency of the WWTP processes and force main.

6.3.3 Indirect Impacts from Development

These projects will not cause an increase in development. They are necessary to improve the performance of the existing system.

6.3.4 Impacts of Multiple Projects in Close Proximity and Successive Years

All selected alternatives are scheduled for construction over multiple years. Construction will be completed with specified staging plans and seasonally between April 1 and October 15 to avoid significant traffic delays/detours for multiple years.

6.3.5 Fiscal Impacts

The proposed projects are necessary to maintain compliance with the City's NPDES permit. The lowest cost alternatives were selected to minimize negative fiscal impacts.



7.0 MITIGATION

7.1 SHORT-TERM, CONSTRUCTION RELATED MITIGATION

The short-term adverse impacts associated with construction activities would be minimal, and mitigatable, in comparison to the resulting long-term beneficial impacts. Short-term impacts include traffic disruption, dust, and noise.

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

The soil erosion impact will be mitigated through the contractor's required compliance with a program for control of soil erosion and sedimentation, as specified in Part 91 of Michigan Act 451, P.A. of 1994. The use of soil erosion and sedimentation controls, such as straw bales, sedimentation basins, and silt fence, will protect the South Ore Creek and local storm water facilities. Catch basins will be protected where earth changing activities will take place. Controlling sedimentation in the South Ore Creek will also protect threatened mussel species.

Floodplain and wetland fill will require a compensating cut if the fill exceeds thresholds in Part 31 or Part 303 regulations, respectively. Impacts to threatened and endangered species will be minimized by scheduling tree and vegetation removal during inactive periods (October 1 to March 15). Design and construction will follow the requirements for the protection of rare species, if any are located in these areas.

Construction equipment will be maintained in good condition to decrease noise. All access roads will be swept as necessary to avoid tracking dirt onto public roads. The Contractor's schedule will have restrictions, per City of Brighton Ordinance, to avoid disturbing surrounding residential areas during evenings and weekends.

7.2 MITIGATION OF LONG-TERM IMPACTS

No long-term negative impacts are anticipated. The long-term positive impacts include increased operational efficiency. In addition, the installation of updated electrical equipment and new generator will result in long term energy savings in relation to the costs to operate the WWTP. The WWTP is located between Hamburg and Bauer Rd and odor concerns are expected to increase within the developing area. No historical neighborhoods or features will be impacted.

7.3 MITIGATION OF INDIRECT IMPACTS

In terms of indirect impacts, the selected projects are not anticipated to contribute to growth within the study area. The force main monitoring will aid in reducing exfiltration to the groundwater.

The investment in non-recoverable resources committed to the Project Plan would be traded off for the improved performance of the facilities during the life of the system. The commitment of resources includes public capital, energy, labor, and unsalvageable materials. These non-recoverable resources would be foregone for the provision of the proposed improvements. Construction activity, in general, may produce accidents that cause irreversible injuries to workers or damage to equipment and other resources. The contractor will be required to follow all State and Federal rules related to health and safety in order to minimize the possibility of accidents and injuries.



8.0 PUBLIC PARTICIPATION

The City welcomes public participation in the planning process for transparency, to garner support for the projects from the citizens, and accept comments on the Project Plan.

8.1 PUBLIC MEETING

The public meeting was held April 2, 2024, to review the work associated with the proposed Project Plan, including estimated user costs, and to receive comments and views of interested persons. A summary of the public meeting and attendance list is included in Appendix H.

8.1.1 Advertisement

A legal notice of the availability of this Project Plan for review to the public was placed online at the City's website for review by the public by March 15, 2024. In addition, copies were sent to the EGLE Water Infrastructure Financing Section and District Engineer for review.

8.1.2 Public Meeting Summary

A summary of the meeting presentation, public comments, attendees, and a final Project Plan was provided to the EGLE project manager for review.

8.1.3 Contents

The public meeting agenda covered the wastewater treatment plant problems targeted in the Project Plan, possible alternatives to each improvement, anticipated user costs and financing, and potential community impacts and mitigation.

8.1.4 Comments Received and Answered

No comments were received from the public.

8.2 ADOPTION OF PROJECT PLAN

The City Council adopted the Project Plan on April 23, 2024. The signed Resolution of Adoption is included in Appendix H.



9.0 GLOSSARY

Term	Definition
Activated Sludge	Product that results when primary effluent is mixed with bacteria- laden sludge and then agitated and aerated to promote biological treatment, speeding the breakdown of organic matter in raw sewage undergoing secondary waste treatment.
Activated Sludge Process	Biological treatment process in which wastewater and biological sludge is mixed and aerated to facilitate aerobic decomposition by microbes.
Aeration	Addition of air/oxygen to wastewater to maintain aerobic biological conditions.
Aeration Tanks	A chamber used to inject air into water.
Average Flow	The average quantity of flow that passes a point over a given period of time.
Biochemical Oxygen Demand (BOD)	The quantity of oxygen used in the aerobic decomposition of organic matter, usually expressed in parts per million. The degree of BOD removal is used as a measure in determining the efficiency of a sewage treatment plant as well as in measuring stream water quality.
Bypass	The measurable diversion of raw sewage out of the sewer system.
Chlorination	The application of chlorine to water, generally for the purpose of disinfection.
Dichlorination	A process of removing residual chlorine from disinfected wastewater prior to discharge into the environment.
Design Flow	The average daily flow that a treatment plant or other facility is designed to accommodate. Usually expressed in millions of gallons per day (MGD) or cubic feet per second (cfs).
Effluent	The flow exiting a treatment process.
Force Mains	Pipes used to transport wastewater under pressure against the force of gravity.
Grit	Sand, gravel, cinders, and other heavy solid matter that have settling velocities substantially higher than those of putrescible organic solids in wastewater.

Term	Definition
Grit Chamber	Detention chamber or an enlargement of a sewer, designed to reduce flow velocity of the liquid so that separation of mineral from organic solids by differential sedimentation is permitted.
Inflow	The water discharged into a sewer system from roof drains, cooling water discharges, drains from springs and swampy areas, manhole covers, cross-connections from storm sewers and combined sewers, catch basins, storm waters, surface runoff, street wash waters or drainage.
Influent	The flow entering a treatment process.
Interceptor	Any pipe, regardless of size that carries wastewater directly to the WWTP. Generally, they are the largest pipes in the collection system.
Lift Station (Pump Station)	A facility within a sanitary sewer system which pumps flows from a lower elevation to a higher elevation.
NH ₃	The chemical formula for ammonia, which is a compound of hydrogen and nitrogen that occurs extensively in nature.
Peak Flow	The maximum quantity of flow over a given period of time.
Preliminary Treatment System	A system of treatment steps that generally includes screening, grit removal, pre-aeration, and/or flow equalization that prepare wastewater influent for further treatment.
Primary Clarifier	The first settling tank for the removal of settleable solids through which wastewater is passed in a treatment works.
Primary Treatment	The process to remove settable pollutants. Treatment steps including sedimentation to produce an effluent suitable for biological treatment.
Sanitary Sewer	A sewer intended to carry only sanitary and industrial wastewater from residences, commercial buildings, industrial plants, and institutions, including service connections.
Sanitary Sewer System	The entire network of sanitary sewers and pumping stations which collect a municipality's wastewater.
Screening	The removal of relatively coarse floating and suspended solids by straining through racks or screens.
Secondary Treatment	The second step in most publicly owned waste treatment systems in which bacteria consume the organic parts of the waste. It is

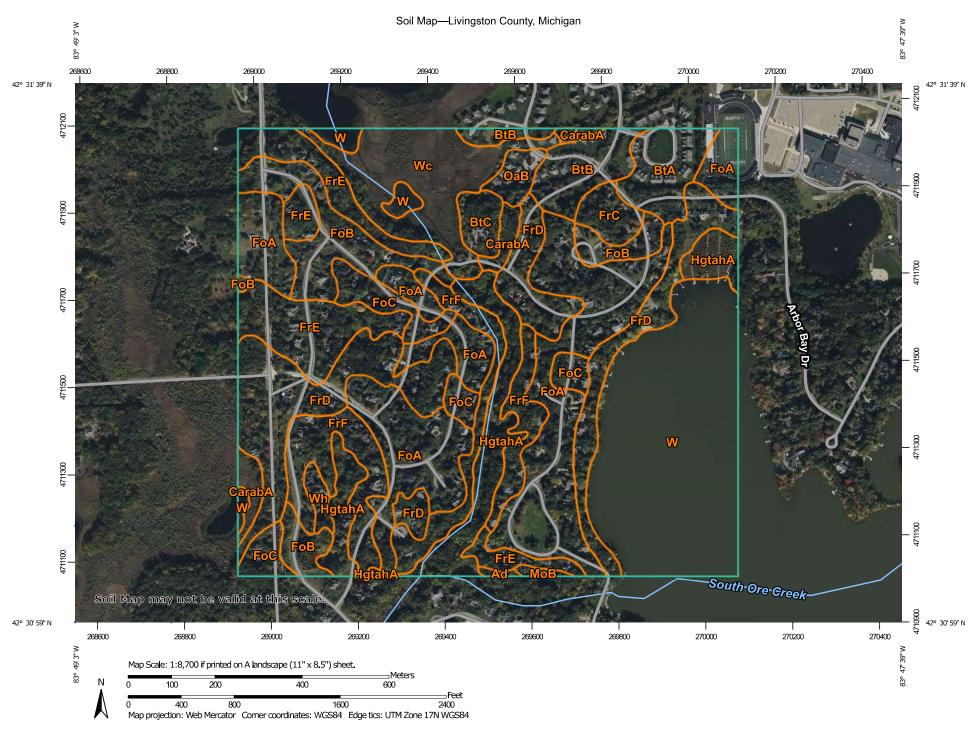


Term	Definition
	accomplished by bringing together waste, bacteria, and oxygen in trickling filters or in the activated sludge process. This treatment removes floating and settleable solids and about 90 percent of the oxygen-demanding substances and suspended solids. Disinfection is the final stage of secondary treatment.
Service Area	The area which will be serviced by a wastewater treatment system.
Sewage	Sewage refers to the wastewater from residential, commercial, and industrial establishments, which flows through the pipes to a treatment plant.
Sewer	Sewer refers to the pipe used to transport wastewater.
Sludge	The accumulated settled solids deposited from sewage or industrial wastes, raw or treated, and containing more or less water forming a semi-liquid mass.
Storm Sewer	A sewer intended to carry only storm waters, surface runoff, street wash waters, and drainage.
Suspended Solids (SS)	Small particles of solid pollutants in sewage that contribute to turbidity and resist separation by conventional means.
Tertiary Treatment	Advanced cleaning of wastewater that goes beyond the secondary or biological stage, removing nutrients such as phosphorus, nitrogen, and most BOD and suspended solids.
TSS	Total Suspended Solids. A measure of the suspended solids in wastewater, effluent, or water bodies, determined by tests for "total suspended non-filterable solids."
Ultraviolet Disinfection (UV)	Disinfection process using light rays beyond the violet region in the visible spectrum; invisible to the human eye. UV light at a wavelength near to 254 nm inactivates microorganisms by directly damaging cellular nucleic acids.
User Charge	Fees levied upon users of a water or wastewater system, based on the volume and/or characteristics of the water.



APPENDIX A: SOILS MAPS





MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

J_...

Stony Spot

Nery Stony Spot

Spoil Area

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

HH Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Livingston County, Michigan Survey Area Data: Version 21, Aug 25, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 9, 2022—Oct 21, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ad	Alluvial land	0.3	0.1%
BtA	Boyer-Oshtemo loamy sands, 0 to 2 percent slopes	7.9	2.7%
BtB	Boyer-Oshtemo loamy sands, 2 to 6 percent slopes	9.2	3.1%
BtC	Boyer-Oshtemo loamy sands, 6 to 12 percent slopes	3.2	1.1%
CarabA	Carlisle muck, 0 to 2 percent slopes	3.9	1.3%
FoA	Fox sandy loam, 0 to 2 percent slopes	57.6	19.6%
FoB	Fox sandy loam, 2 to 6 percent slopes	18.2	6.2%
FoC	Fox sandy loam, 6 to 12 percent slopes	10.1	3.4%
FrC	Fox-Boyer complex, 6 to 12 percent slopes	3.6	1.2%
FrD	Fox-Boyer complex, 12 to 18 percent slopes	39.7	13.5%
FrE	Fox-Boyer complex, 18 to 25 percent slopes	22.8	7.8%
FrF	Fox-Boyer complex, 25 to 40 percent slopes	23.2	7.9%
Gd	Gilford sandy loam, 0 to 2 percent slopes, gravelly subsoil	0.2	0.1%
HgtahA	Houghton muck, 0 to 1 percent slopes	18.6	6.4%
МоВ	Wawasee loam, 2 to 6 percent slopes	0.5	0.2%
ОаВ	Oakville fine sand, 0 to 6 percent slopes	2.7	0.9%
W	Water	50.9	17.4%
Wc	Warners loam	19.1	6.5%
Wh	Washtenaw silt loam	1.5	0.5%
Totals for Area of Interest		293.3	100.0%



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout (2)

Borrow Pit ∞

Clay Spot 莱

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

â

Stony Spot Very Stony Spot

Spoil Area

Wet Spot

Other Δ

Special Line Features

Water Features

Streams and Canals

Transportation

Rails +++

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

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Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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Soil Survey Area: Livingston County, Michigan Survey Area Data: Version 21, Aug 25, 2023

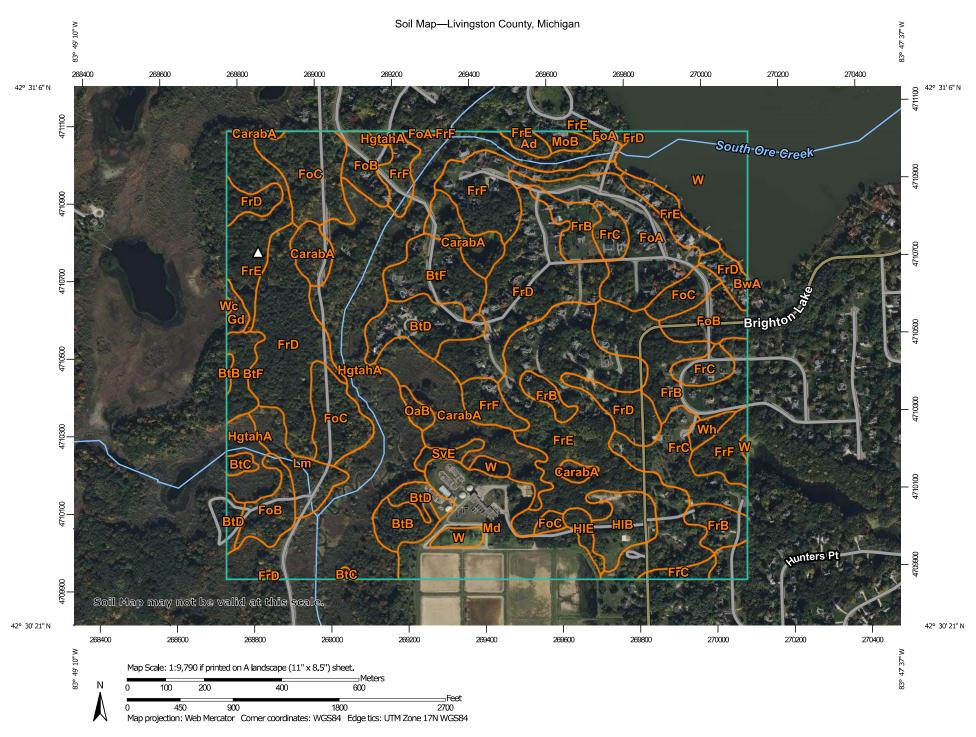
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Date(s) aerial images were photographed: Oct 9, 2022—Oct 21, 2022

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Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BtA	Boyer-Oshtemo loamy sands, 0 to 2 percent slopes	73.0	26.1%
BtB	Boyer-Oshtemo loamy sands, 2 to 6 percent slopes	1.8	0.6%
BtC	Boyer-Oshtemo loamy sands, 6 to 12 percent slopes	17.8	6.4%
BtD	Boyer-Oshtemo loamy sands, 12 to 18 percent slopes	2.0	0.7%
BtE	Boyer-Oshtemo loamy sands, 18 to 25 percent slopes	15.5	5.5%
BwA	Bronson loamy sand, 0 to 2 percent slopes	2.9	1.0%
CarabA	Carlisle muck, 0 to 2 percent slopes	8.6	3.1%
FoA	Fox sandy loam, 0 to 2 percent slopes	12.4	4.4%
FrD	Fox-Boyer complex, 12 to 18 percent slopes	6.3	2.3%
FrE	Fox-Boyer complex, 18 to 25 percent slopes	7.5	2.7%
FrF	Fox-Boyer complex, 25 to 40 percent slopes	1.8	0.6%
Gd	Gilford sandy loam, 0 to 2 percent slopes, gravelly subsoil	3.1	1.1%
HgtahA	Houghton muck, 0 to 1 percent slopes	3.9	1.4%
HID	Hillsdale sandy loam, 12 to 18 percent slopes	8.1	2.9%
HIE	Hillsdale sandy loam, 18 to 25 percent slopes	6.6	2.4%
HmB	Hillsdale-Miami loams, 2 to 6 percent slopes	0.2	0.1%
MwB	Minoa-Thetford complex, 0 to 4 percent slopes	5.7	2.0%
OaB	Oakville fine sand, 0 to 6 percent slopes	13.5	4.8%
SvC	Spinks-Oakville loamy sands, 6 to 12 percent slopes	13.5	4.8%
SvD	Spinks-Oakville loamy sands, 12 to 18 percent slopes	3.7	1.3%
W	Water	71.6	25.6%
Totals for Area of Interest		279.5	100.0%



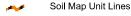
MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons



Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

* *

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

.,

Stony Spot

Nery Stony Spot

Spoil Area

🖖 Wet Spot

△ Other

Special Line Features

Water Features

Streams and Canals

Transportation

HH Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Livingston County, Michigan Survey Area Data: Version 21, Aug 25, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 9, 2022—Oct 21, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI	
Ad	Alluvial land	1.3	0.3%	
BtB	Boyer-Oshtemo loamy sands, 2 to 6 percent slopes	4.1	1.1%	
BtC	Boyer-Oshtemo loamy sands, 6 to 12 percent slopes	1.1	0.3%	
BtD	Boyer-Oshtemo loamy sands, 12 to 18 percent slopes	11.1	2.9%	
BtF	Boyer-Oshtemo loamy sands, 25 to 35 percent slopes	12.3	3.2%	
BwA	Bronson loamy sand, 0 to 2 percent slopes	0.0	0.0%	
CarabA	Carlisle muck, 0 to 2 percent slopes	22.0	5.7%	
FoA	Fox sandy loam, 0 to 2 percent slopes	14.9	3.9%	
FoB	Fox sandy loam, 2 to 6 percent slopes	14.1	3.6%	
FoC	Fox sandy loam, 6 to 12 percent slopes	21.0	5.4%	
FrB	Fox-Boyer complex, 2 to 6 percent slopes	23.6	6.1%	
FrC	Fox-Boyer complex, 6 to 12 percent slopes	15.5	4.0%	
FrD	Fox-Boyer complex, 12 to 18 percent slopes	48.4	12.5%	
FrE	Fox-Boyer complex, 18 to 25 percent slopes	53.5	13.8%	
FrF	Fox-Boyer complex, 25 to 40 percent slopes	21.5	5.6%	
Gd	Gilford sandy loam, 0 to 2 percent slopes, gravelly subsoil	1.2	0.3%	
HgtahA	Houghton muck, 0 to 1 percent slopes	59.9	15.5%	
HIB	Hillsdale sandy loam, 2 to 6 percent slopes	5.8	1.5%	
HIE	Hillsdale sandy loam, 18 to 25 percent slopes	1.6	0.4%	
Lm	Linwood muck	6.0	1.6%	
Md	Made land	22.0	5.7%	
МоВ	Wawasee loam, 2 to 6 percent slopes	1.4	0.4%	
ОаВ	Oakville fine sand, 0 to 6 percent slopes	1.2	0.3%	

	_		
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
SvE	Spinks-Oakville loamy sands, 18 to 25 percent slopes	1.3	0.3%
W	Water	20.3	5.2%
Wc	Warners loam	0.1	0.0%
Wh	Washtenaw silt loam	1.3	0.3%
Totals for Area of Interest		386.6	100.0%



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons



Soil Map Unit Points

Special Point Features

Blowout (2)

Borrow Pit ∞

Clay Spot 莱

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

â

Stony Spot Very Stony Spot

Spoil Area

Wet Spot

Other Δ

Special Line Features

Water Features

Streams and Canals

Transportation

Rails +++

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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Soil Survey Area: Livingston County, Michigan Survey Area Data: Version 21, Aug 25, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Oct 9, 2022—Oct 21, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BtE	Boyer-Oshtemo loamy sands, 18 to 25 percent slopes	1.8	0.6%
BwA	Bronson loamy sand, 0 to 2 percent slopes	4.3	1.4%
Ву	Brookston loam, 0 to 2 percent slopes	1.0	0.3%
CarabA	Carlisle muck, 0 to 2 percent slopes	24.0	7.7%
FoA	Fox sandy loam, 0 to 2 percent slopes	8.6	2.8%
FoB	Fox sandy loam, 2 to 6 percent slopes	7.9	2.5%
FoC	Fox sandy loam, 6 to 12 percent slopes	6.2	2.0%
FrB	Fox-Boyer complex, 2 to 6 percent slopes	14.5	4.6%
FrC	Fox-Boyer complex, 6 to 12 percent slopes	24.3	7.8%
FrD	Fox-Boyer complex, 12 to 18 percent slopes	13.2	4.2%
FrE	Fox-Boyer complex, 18 to 25 percent slopes	34.6	11.1%
FrF	Fox-Boyer complex, 25 to 40 percent slopes	31.2	10.0%
HID	Hillsdale sandy loam, 12 to 18 percent slopes	10.1	3.2%
HIE	Hillsdale sandy loam, 18 to 25 percent slopes	1.6	0.5%
HmB	Hillsdale-Miami loams, 2 to 6 percent slopes	10.9	3.5%
МоА	Wawasee loam, 0 to 2 percent slopes	14.3	4.6%
МоВ	Wawasee loam, 2 to 6 percent slopes	3.0	0.9%
MoC	Wawasee loam, 6 to 12 percent slopes	9.6	3.1%
MoD	Miami loam, 12 to 18 percent slopes	9.4	3.0%
MoF	Miami loam, 25 to 35 percent slopes	8.6	2.7%
OkB	Oakville fine sand, loamy substratum, 0 to 6 percent slopes	12.5	4.0%
Rf	Rifle muck	14.0	4.5%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
SvC	Spinks-Oakville loamy sands, 6 to 12 percent slopes	2.6	0.8%
SvF	Spinks-Oakville loamy sands, 25 to 35 percent slopes	4.8	1.5%
W	Water	40.1	12.8%
Totals for Area of Interest		312.9	100.0%

APPENDIX B: BRIGHTON WWTP NPDES PERMIT



PERMIT NO. MI0020877

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 Clean Water Act (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 2019-06,

City of Brighton

200 North First Street Brighton, MI 48116

is authorized to discharge from the Brighton Wastewater Treatment Plant, located at

6570 Hamburg Road Brighton, MI 48116

designated as Brighton WWTP

to the receiving water named South Ore 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 April 3, 2018 as amended through October 24, 2018.

This permit takes effect on September 1, 2021. 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. MI0020877 (expiring October 1, 2018).

This permit and the authorization to discharge shall expire at midnight on **October 1, 2025**. In order to receive authorization to discharge beyond the date of expiration, the permittee 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, 2025**.

Issued: <u>June 29, 2021.</u>

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

PERMIT NO. MI0020877 Page 2 of 43

PERMIT FEE REQUIREMENTS

In accordance with Section 324.3120 of the NREPA, the permittee 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 permittee shall submit the fee in response to the Department's annual notice. Payment may be made electronically via the Department's MiWaters system. The MiWaters website is located at https://miwaters.deq.state.mi.us. Payment shall be submitted or postmarked by January 15 for notices mailed by December 1. Payment shall be submitted or postmarked no later than 45 days after receiving the notice for notices mailed after December 1.

Annual Permit Fee Classification: Municipal Major, less than 10 MGD (Individual Permit)

In accordance with Section 324.3132 of the NREPA, the permittee shall make payment of an annual biosolids land application fee to the Department if the permittee land applies biosolids. The permittee shall submit the fee in response to the Department's annual notice. Payment may be made electronically via the Department's MiWaters system. The MiWaters website is located at https://miwaters.deq.state.mi.us. Payment shall be submitted or postmarked no later than January 31 of each year for notices mailed by December 15. Payment shall be submitted or postmarked no later than 45 days after receiving the notice for notices mailed after December 15.

CONTACT INFORMATION

Unless specified otherwise, all contact with the Department required by this permit shall be made to the Lansing District Office of the Water Resources Division. The Lansing District Office is located at 525 West Allegan Street, 1st Floor, South Tower, Lansing, MI 48933, Telephone: 517-284-6651, Fax: 517-241-3571.

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.

1. Final Effluent Limitations, Monitoring Point 001A

During the period beginning on the effective date of this permit and lasting until the expiration date of this permit, the permittee is authorized to discharge treated municipal wastewater from Monitoring Point 001A through Outfall 001. Outfall 001 discharges to South Ore Creek at Latitude 42.50867, Longitude -83.81133. Such discharge shall be limited and monitored by the permittee as specified below.

	Maximum Limits for Quantity or Loading			Maximum Limits for Quality or Concentration				Monitoring	Sample	
<u>Parameter</u>	Monthly	7-Day	<u>Daily</u>	<u>Units</u>	Monthly	<u>7-Day</u>	<u>Daily</u>	<u>Units</u>	Frequency	Type
Flow	(report)		(report)	MGD					Daily	Report Total Daily Flow
Carbonaceous Bioch	emical Oxyge	n Dema	nd (CBOE	05)						
May – November December – April	75 470	190 750	(report) (report)	lbs/day lbs/day	4 25	40	10 (report)	mg/l mg/l	Daily 5×Weekly	24-Hr Composite
Total Suspended Sol	ids (TSS)									
May – November December – April	380 560	560 840	(report) (report)	lbs/day lbs/day	20 30	30 45	(report) (report)	mg/l mg/l	5×Weekly 5×Weekly	24-Hr Composite
Ammonia Nitrogen (a	s N)									
May – November December – March April	9.4 (report) 380	38 	(report) (report) (report)	lbs/day lbs/day lbs/day	0.5 (report) 20	 	2.0 (report) (report)	mg/l mg/l mg/l	Daily 5×Weekly 5×Weekly	24-Hr Composite
Total Phosphorus (as	P) (see k. be	low)								
	(report)		(report)	lbs/day	(report)		(report)	mg/l	Daily	24-Hr Composite
	50			lbs/month					Monthly	Calculation
	12-Month Rolling Total									
	600			lbs/year					Monthly	Calculation
Fecal Coliform Bacteria					200	400	(report)	cts/ 100 ml	5×Weekly	Grab
Total Residual Chlorine							38	ug/l	Daily	Grab
	Monthly									
Total Selenium	0.11		(report)	lbs/day	5.7		(report)	ug/l	Monthly	Grab
Bis(2-ethylhexyl)phth	alate								•	
	0.56	5.3	(report)	lbs/day	30		280	ug/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)	ug/l	Quarterly	Grab
Irrigation Area Loadir	ng Rate									
March – November		5.5		gpd/ft²					Daily	Calculation

PARTI

Section A. Limitations and Monitoring Requirements

	Maximum Limits for Quantity or Loading			Maximum Limits for Quality or Concentration				Sample		
<u>Parameter</u>	Monthly	7-Day	<u>Daily</u>	<u>Units</u>	Monthly	7-Day	<u>Daily</u>	<u>Units</u>	Monitoring Frequency	Type
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 Avg				12-Month Rolling Avg					
Total Mercury	0.000038			lbs/day	2.0			ng/l	Quarterly	Calculation
					Minimum % Monthly		Minimum % Daily			
CBOD5 Minimum %	Removal									
December – April					85		(report)	%	Monthly	Calculation
TSS Minimum % Rer	noval									
December – April					85		(report)	%	Monthly	Calculation
					Minimum <u>Daily</u>		Maximum <u>Daily</u>			
рН					6.5		9.0	S.U.	5×Weekly	Grab
Dissolved Oxygen					•					
May – November December – March April					7.0 3.0 6.0			mg/l mg/l mg/l	Daily 5×Weekly Daily	Grab Grab Grab

The following design flow was used in determining the above limitations, but is not to be considered a limitation or actual capacity: 2.25 MGD.

Narrative Standard a.

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

Al samples shall be taken after disinfection. Samples for CBOD5 shall be properly seeded prior to analysis. The Department may approve alternate sampling locations that are demonstrated by the permittee 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 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).

d. Disinfection

The permittee shall use chlorination to ensure compliance with the final effluent limitations for fecal coliform bacteria set forth in Part I.A.1., and a Total Residual Chlorine (TRC) limit shall apply. Compliance with the TRC limit shall be determined on the basis of one (1) 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 at least 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.

If disinfection other than chlorination will be used, the permittee shall notify the Department in accordance with Part II.C.12. of this permit. If the permittee elects to use ultraviolet light for disinfection, the TRC limit would no longer apply. TRC monitoring is only required during periods of chlorine use and subsequent discharge. 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. Percent Removal Requirements

Monthly percent removal shall be calculated based on the monthly average effluent CBOD5 and TSS concentrations and the monthly average influent concentrations for approximately the same period. Daily percent removal shall be calculated based on the daily effluent CBOD5 and TSS concentrations and the daily influent concentrations for the same day. Reporting of Daily percent removal is only required on days on which an influent sample is obtained.

f. Monitoring Frequency Reduction for Total Selenium

After the submittal of 24 months of data, the permittee may request, in writing, Department approval for a reduction in monitoring frequency for Total Selenium. 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 Total Selenium 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.

g. Monitoring Frequency Reduction for Bis(2-ethylhexyl)phthalate
After the submittal of 12 months of data, the permittee may request, in writing, Department approval for
a reduction in monitoring frequency for Bis(2-ethylhexyl)phthalate. 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 Bis(2-ethylhexyl)phthalate 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.

- h. Monitoring Frequency Reduction for Perfluorooctane Sulfonate (PFOS) and/or Perfluorooctanoic Acid (PFOA)
 - After the submittal of 36 months of quarterly data or at least 10 equally spaced sample results obtained over a minimum of three (3) months, 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.
- i. 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 quarter is less than or equal to the LCA, the permittee will be considered to be in compliance for total mercury for that quarter, provided the permittee is also in full compliance with the Pollutant Minimization Program for Total Mercury, set forth in Part I.A.5. of this permit.
- j. 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,"
 EPA-821-R-02-019, August 2002. 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 permittee 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 permittee 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 permittee 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 permittee 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 permittee 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.

k. Total Phosphorus Calculations

The permittee shall calculate the total phosphorus load (in lbs/month) for the reporting month by multiplying the monthly average total phosphorus load (in lbs/day) for the reporting month by the total number of days in which a discharge occurred during the reporting month. The 12-Month Rolling Total shall be calculated by summing the total phosphorus load (in lbs/month) for the reporting month and each of the total phosphorus loads (in lbs/month) reported during the 11 months prior to the reporting month. The 12-Month Rolling Total loading shall not exceed 600 pounds per year. This limit shall be for the net total phosphorus load contributed from the wastewater treatment facility, excluding any total phosphorus load contained in the off-site groundwater collected by the underdrain system.

2. Quantification Levels and Analytical Methods for Selected Parameters

Maximum acceptable quantification levels (QLs) are specified for selected parameters in the table below. These QLs shall be considered the maximum acceptable unless a higher QL is appropriate because of sample matrix interference. Justification for higher QLs shall be submitted to the Department within 30 days of such determination. Where necessary to help ensure that the QLs specified herein can be achieved, analytical methods may also be specified in the table below. The sampling procedures, preservation and handling, and analytical protocol for all monitoring conducted in compliance with this permit, including monitoring conducted to meet the requirements of the application for permit reissuance, shall be in accordance with the methods specified herein, or in accordance with Part II.B.2. of this permit if no method is specified herein, unless an alternate method is approved by the Department. The Department will consider only alternate methods that meet the requirements of Part II.B.2. and whose QLs are at least as sensitive (i.e., low) as those specified herein. **Not all QLs are expressed in the same units in the table below**. The table is continued on the following page:

Parameter	QL	Units	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	
4-Chloro-3-Methylphenol	7.0	ug/l	
4,4'-DDD	0.01	ug/l	
4,4'-DDE	0.01	ug/l	
4,4'-DDT	0.01	ug/l	
Acrylonitrile	1.0	ug/l	
Aldrin	0.01	ug/l	
Alpha-Endosulfan	0.01	ug/l	
Alpha-Hexachlorocyclohexane	0.01	ug/l	
Antimony, Total	1	ug/l	
Arsenic, Total	1	ug/l	
Barium, Total	5	ug/l	
Benzidine	0.1	ug/l	
Beryllium, Total	1	ug/l	
Beta-Endosulfan	0.01	ug/l	
Beta-Hexachlorocyclohexane	0.01	ug/l	
Bis (2-Chloroethyl) Ether	1.0	ug/l	
Bis (2-Ethylhexyl) Phthalate	5.0	ug/l	
Boron, Total	20	ug/l	
Cadmium, Total	0.2	ug/l	
Chlordane	0.01	ug/l	
Chloride	1.0	mg/l	
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	

Parameter	QL	Units	Analytical Method
Delta-Hexachlorocyclohexane	0.01	ug/l	,
Dieldrin	0.01	ug/l	
Di-N-Butyl Phthalate	9.0	ug/l	
Endosulfan Sulfate	0.01	ug/l	
Endrin	0.01	ug/l	
Endrin Aldehyde	0.01	ug/l	
Fluoranthene	1.0	ug/l	
Heptachlor	0.01	ug/l	
Heptachlor Epoxide	0.01	ug/l	
Hexachlorobenzene	0.01	ug/l	
Hexachlorobutadiene	0.01	ug/l	
Hexachlorocyclopentadiene	0.01	ug/l	
Hexachloroethane	5.0	ug/l	
Lead, Total	1	ug/l	
Lindane	0.01	ug/l	
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	
PCB-1221	0.1	ug/l	
PCB-1232	0.1	ug/l	
PCB-1242	0.1	ug/l	
PCB-1248	0.1	ug/l	
PCB-1254	0.1	ug/l	
PCB-1260	0.1	ug/l	
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)	0.002	ug/l	ASTM D7979 or an isotope dilution method
			(sometimes referred to as Method 537 modified)
Phenanthrene	1.0	ug/l	
Phosphorus (as P), Total	10	ug/l	
Selenium, Total	1.0	ug/l	
Silver, Total	0.5	ug/l	
Strontium, Total	1000	ug/l	
Sulfate	2.0	mg/l	
Sulfides, Dissolved	20	ug/l	
Thallium, Total	1	ug/l	
Toxaphene	0.1	ug/l	
Vinyl Chloride	1.0	ug/l	
Zinc, Total	10	ug/l	

3. Additional Monitoring Requirements

Section A. Limitations and Monitoring Requirements

As a condition of this permit, the permittee shall monitor the discharge from monitoring point 001A 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 <u>October 2021</u>, <u>May 2022</u>, <u>March 2023</u>, and <u>August 2024</u>. Grab samples shall be collected for available cyanide, 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*, for a total of four (4) tests on each 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. The permittee 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.

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 permittee shall notify the Department within 14 days of completing the monitoring for each month specified above in accordance with Part II.C.5. Additional requirements are specified in Part II.C.11. 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

acute toxicity chronic toxicity

<u>Hardness</u>

calcium carbonate

Pentachlorophenol

Metals (Total Recover	<u>able), Cyanide and Total Phe</u>	<u>nols</u>	
antimony	arsenic	available cyanide	nickel
beryllium	cadmium	chromium	zinc
copper	lead	thallium	silver
total phenolic compou	nds		
Valatila Organia Cana			

phenol

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	1		
4-chloro-3-methylphenol	2-chlorophenol	2,4-dichlorophenol	2,4-dimethylphenol
4.6-dinitro-o-cresol	2.4-dinitrophenol	2-nitrophenol	4-nitrophenol

2,4,6-trichlorophenol

PART I

Section A. Limitations and Monitoring Requirements

Base/Neutral Compounds acenaphthene benzo(a)anthracene benzo(k)fluoranthene 4-bromophenyl phenyl ether 4-chlorophenyl phenyl ether dibenzo(a,h)anthracene 3,3'-dichlorobenzidine 2,6-dinitrotoluene Hexachlorobenzene indeno(1,2,3-cd)pyrene n-nitrosodi-n-propylamine pyrene

acenaphthylene
benzo(a)pyrene
bis(2-chloroethoxy)methane
butyl benzyl phthalate
chrysene
1,2-dichlorobenzene
diethyl phthalate
1,2-diphenylhydrazine
hexachlorobutadiene
isophorone
n-nitrosodimethylamine
1,2,4-trichlorobenzene

anthracene
3,4-benzofluoranthene
bis(2-chloroethyl)ether
2-chloronaphthalene
di-n-butyl phthalate
1,3-dichlorobenzene
dimethyl phthalate
fluoranthene
hexachlorocyclo-pentadiene
naphthalene
n-nitrosodiphenylamine

benzidine benzo(ghi)perylene bis(2-chloroisopropyl)ether

di-n-octyl phthalate 1,4-dichlorobenzene 2,4-dinitrotoluene fluorene hexachloroethane nitrobenzene phenanthrene

4. Pollutant Minimization Program for Total Mercury

The goal of the Pollutant Minimization Program is to maintain the effluent concentration of total mercury at or below 1.3 ng/l. The permittee shall continue to implement the Pollutant Minimization Program approved on February 5, 2008, 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 entering the wastewater collection system;
- b. a program for quarterly monitoring of influent and periodic monitoring of sludge for mercury; and
- implementation of reasonable cost-effective control measures when sources of mercury are discovered.
 Factors to be considered include significance of sources, economic considerations, and technical and treatability considerations.

On or before March 31 of each year, the permittee shall submit a status report to the Department for the previous calendar year that includes 1) the monitoring results for the previous year, 2) an updated list of potential mercury sources, and 3) a summary of all actions taken to reduce or eliminate identified sources of mercury.

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. above.

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

5. 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 PFOS and/or PFOA and to reduce and maintain the effluent concentrations of PFOS and/or PFOA at or below the water quality-based effluent limitations (WQBELs). The WQBELs are 12 ng/l for PFOS and 20 ug/l for PFOA.

On or before <u>December 1, 2021</u> 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 Industrial Pretreatment Program Per- and Polyfluoroalkyl Substances (IPP PFAS) 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, as well as 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; and
- 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 <u>May 1 of each year</u> 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; and
- 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.

6. 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 permittee shall immediately, but not more than 24 hours after the discharge begins, notify local health departments, a daily newspaper of general circulation in the county in which the permittee is 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 permittee shall also notify the Department via its MiWaters system on the form entitled "Report of Discharge (CSO\SSO\RTB)." The MiWaters website is located at https://miwaters.deq.state.mi.us. At the conclusion of the discharge, the permittee shall make all such notifications specified in, and in accordance with, Section 324.3112a of the NREPA, and shall notify the Department via its MiWaters system on the form entitled "Report of Discharge (CSO\SSO\RTB)."

The permittee 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 permittee's discharge of untreated or partially treated sewage, and if those municipalities wish to be notified in the same manner as specified above, the permittee shall provide such notification.

Additionally, in accordance with Section 324.3112a of the NREPA, each time a discharge of untreated or partially treated sewage occurs, the permittee 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 results of this testing shall be submitted to the Department via MiWaters as part of the notification specified above, or, if the results are not yet available, submitted as soon as they become available. This testing is not required if it has been waived by the local health department, or if the discharge(s) did not affect surface waters. The testing shall be done at locations specified by each affected local county health department but shall not exceed 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.

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.

7. Facility Contact

The "Facility Contact" was specified in the application. The permittee may replace the facility contact at any time, and shall notify the Department in writing <u>within 10 days</u> 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 releases the permittee from properly submitting reports and forms as required by law.

8. Monthly Operating Reports

Part 41 of Act 451 of 1994 as amended, specifically Section 324.4106 and associated R 299.2953, requires that the permittee 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 30 days of the effective date of this permit, the permittee 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 permittee 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 https://www.michigan.gov/egle/0,9429,7-135-3313_71618_44117---,00.html. The permittee may use alternate forms if they are consistent with the approved treatment facility monitoring program. Unless the Department provides written notification to the permittee 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.

9. Asset Management

The permittee shall at all times properly operate and maintain all facilities (i.e., the sewer system and treatment works as defined in Part 41 of the NREPA), and control systems installed or used by the permittee to operate the sewer system and treatment works and achieve and maintain compliance with the conditions of this permit (also see Part II.D.3 of this permit). The requirements of an Asset Management Program function to achieve the goals of effective performance, adequate funding, and adequate operator staffing and training. Asset management is a planning process for ensuring that optimum value is gained for each asset and that financial resources are available to rehabilitate and replace those assets 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 minimum life-cycle costs; and the best long-term funding strategy.

- a. Asset Management Program Requirements The permittee shall continue to implement the Asset Management Plan approved on July 28, 2015, and approved modifications thereto. The Asset Management Plan contains a schedule for the development and implementation of an Asset Management Program that meets the requirements outlined below in 1) – 4):
 - 1) Maintenance Staff. The permittee shall provide an adequate staff to carry out the operation, maintenance, repair, and testing functions required to ensure compliance with the terms and conditions of this permit. The level of staffing needed shall be determined by taking into account the work involved in operating the sewer system and treatment works, planning for and conducting maintenance, and complying with this permit.
 - 2) Collection System Map. The permittee shall complete a map of the sewer collection system it owns and operates. The map shall be of sufficient detail and at a scale to allow easy interpretation. The collection system information shown on the map shall be based on current conditions and shall be kept up-to-date and available for review by the Department. Note: Items below referencing combined sewer systems are not applicable to separate sewer systems. Such map(s) shall include but not be limited to the following:
 - a) all sanitary sewer lines and related manholes;
 - b) all combined sewer lines, related manholes, catch basins and CSO regulators;
 - c) all known or suspected connections between the sanitary sewer or combined sewer and storm drain systems;
 - d) all outfalls, including the treatment plant outfall(s), combined sewer treatment facility outfalls, untreated CSOs, and any known SSOs;
 - e) all pump stations and force mains;
 - f) the wastewater treatment facility(ies), including all treatment processes;
 - g) all surface waters (labeled);
 - h) other major appurtenances such as inverted siphons and air release valves;
 - a numbering system which uniquely identifies manholes, catch basins, overflow points, regulators and outfalls;
 - j) the scale and a north arrow;

- k) the pipe diameter, date of installation, type of material, distance between manholes, and the direction of flow; and
- the manhole interior material, rim elevation (optional), and invert elevations.
- 3) Inventory and assessment of fixed assets. The permittee shall complete an inventory and assessment of operations-related fixed assets including portions of the collection system owned and operated by the permittee. Fixed assets are assets that are normally stationary (e.g., pumps, blowers, buildings, manholes, and sewer lines). The inventory and assessment shall be based on current conditions and shall be kept up-to-date and available for review by the Department.
- a) The fixed asset inventory shall include the following:
 - (1) a brief description of the fixed asset, its design capacity (e.g., pump: 120 gallons per minute), its level of redundancy, and its tag number if applicable;
 - (2) the location of the fixed asset;
 - (3) the year the fixed asset was installed;
 - (4) the present condition of the fixed asset (e.g., excellent, good, fair, poor); and
 - (5) the current fixed asset (replacement) cost in dollars for year specified in accordance with approved schedules;
- b) The fixed asset assessment shall include a "Business Risk Evaluation" that combines the probability of failure of the fixed asset and the criticality of the fixed asset, as follows:
 - (1) Rate the probability of failure of the fixed asset on a scale of 1-5 (low to high) using criteria such as maintenance history, failure history, and remaining percentage of useful life (or years remaining);
 - (2) Rate the criticality of the fixed asset on a scale of 1-5 (low to high) based on the consequence of failure versus the desired level of service for the facility; and
 - (3) Compute the Business Risk Factor of the fixed asset by multiplying the failure rating from (1) by the criticality rating from (2).
- 4) Operation, Maintenance & Replacement (OM&R) Budget and Rate Sufficiency for the Sewer System and Treatment Works. The permittee shall complete an assessment of its user rates and replacement fund, including the following:
- a) beginning and end dates of fiscal year;
- b) name of the department, committee, board, or other organization that sets rates for the operation of the sewer system and treatment works;
- amount in the permittee's replacement fund in dollars for year specified in accordance with approved schedules;
- d) replacement fund strategy of all assets with a useful life of 20 years or less;
- e) expenditures for maintenance, corrective action and capital improvement taken during the fiscal year;

- f) OM&R budget for the fiscal year; and
- g) rate calculation demonstrating sufficient revenues to cover OM&R expenses. If the rate calculation shows there are insufficient revenues to cover OM&R expenses, the permittee shall document, within three (3) fiscal years after submittal of the Asset Management Plan, that there is at least one rate adjustment that reduces the revenue gap by at least 10 percent. The permittee may prepare and submit an alternate plan, subject to Department approval, for addressing the revenue gap. The ultimate goal of the Asset Management Program is to ensure sufficient revenues to cover OM&R expenses.

b. Annual Reporting

The permittee shall develop a written report that summarizes asset management activities completed during the previous year and planned for the upcoming year. The written report shall be submitted to the Department on or before <u>August 1 of each year</u>. The written report shall include:

- 1) a description of the staffing levels maintained during the year;
- 2) a description of inspections and maintenance activities conducted and corrective actions taken during the previous year;
- 3) expenditures for collection system maintenance activities, treatment works maintenance activities, corrective actions, and capital improvement during the previous year;
- a summary of assets/areas identified for inspection/action (including capital improvement) in the upcoming year based on the five (5) core elements and the Business Risk Factors computed in accordance with condition a.3)b)(3) above;
- 5) a maintenance budget and capital improvement budget for the upcoming year that take into account implementation of an effective Asset Management Program that meets the five (5) core elements;
- 6) an updated asset inventory based on the original submission; and
- 7) an updated OM&R budget with an updated rate schedule that includes the amount of insufficient revenues, if any.

10. Discharge Monitoring Report – Quality Assurance Study Program

The permittee 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 permittee 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.

11. Continuous Monitoring

If continuous monitoring equipment is used and becomes temporarily inoperable, the permittee shall manually obtain a minimum of three (3) equally spaced grab samples/readings within each 24-hour period for the affected parameter(s). On such days, in the comment field on the Daily tab of the DMR, the permittee shall indicate "continuous monitoring system inoperable," the date on which the system is expected to become operable again, and the number of samples/readings obtained during each 24-hour period.

Section B. Storm Water Pollution Prevention

Section B. Storm Water Pollution Prevention is not required for this permit.

Section C. Industrial Waste Pretreatment Program

1. Michigan Industrial Pretreatment Program

- a. The permittee shall implement the Michigan Industrial Pretreatment Program (MIPP) approved on June 25, 2002, and any subsequent modifications approved up to the issuance of this permit.
- b. The permittee shall comply with R 323.2301 through R 323.2317 of the Michigan Administrative Code (Part 23 Rules) and the approved MIPP.
- c. The permittee shall have the legal authority and necessary interjurisdictional agreements that provide the basis for the implementation and enforcement of the approved MIPP 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 permittee shall develop procedures which describe, in sufficient detail, program commitments which enable implementation of the approved MIPP and the Part 23 Rules in accordance with R 323.2306(c).
- e. The permittee 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 MIPP 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 MIPP within the tributary governmental jurisdiction's boundaries.
- f. The permittee shall prohibit discharges that:
 - 1) cause, in whole or in part, the permittee's 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 permittee 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 permittee shall develop an enforcement response plan which describes, in sufficient detail, program commitments which will enable the enforcement of the approved MIPP and the Part 23 Rules in accordance with R 323.2306(g).
- i. The Department may require modifications to the approved MIPP which are necessary to ensure compliance with the Part 23 Rules in accordance with R 323.2309.

Section C. Industrial Waste Pretreatment Program

- j. The permittee shall not implement changes or modifications to the approved MIPP without notification to the Department.
- k. The permittee shall maintain an adequate revenue structure and staffing level for effective implementation of the approved MIPP.
- I. The permittee shall develop and maintain, for a minimum of three (3) years, all records and information necessary to determine nondomestic user compliance with the Part 23 Rules and the approved MIPP. 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 permittee shall evaluate the approved MIPP for compliance with the Part 23 Rules and the prohibitions set forth in item f. above. Based upon this evaluation, the permittee shall propose to the Department all necessary changes or modifications to the approved MIPP no later than the next Industrial Pretreatment Program Annual Report due date (see item p. below).
- n. The permittee shall develop and enforce local limits to implement the prohibitions set forth in item f. above. Local limits shall be based upon data representative of actual conditions demonstrated in a maximum allowable headworks loading analysis.
- o. 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; or
 - 4) 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.
- p. On or before April 1 of each year, the permittee 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 Reports data identified in Appendix A to 40 CFR Part 127 NPDES Electronic Reporting;
 - 2) a summary of changes to the approved MIPP that have not been previously reported to the Department;

Section C. Industrial Waste Pretreatment Program

- a summary of results of all the sampling and analyses performed of the wastewater treatment plant'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.

Section D. Residuals Management Program

1. Residuals Management Program for Land Application of Biosolids

The permittee is authorized to land-apply bulk biosolids or prepare bulk biosolids for land application in accordance with the permittee's approved Residuals Management Program (RMP) approved on November 30, 2000, and approved modifications thereto, and 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/egle/ and near the top of the screen click on Water, then towards the bottom right of the screen click on Permits, Wastewater, 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 permittee 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 Annual Report Form for Reporting Biosolids, available at https://miwaters.deg.state.mi.us.
- b. Modifications to the Approved RMP

Prior to implementation of modifications to the RMP, the permittee 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 (5) 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 shall be made to the Department.

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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, Soil and Sedimentation Control, 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.

CAFO means concentrated animal feeding operation.

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/IC₂₅, where the maximum acceptable toxicant concentration (MATC) and IC₂₅ 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, Land Application of Biosolids, promulgated under Part 31 of the NREPA. 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.

Composite sample is a sample collected over time, either by continuous sampling or by mixing discrete samples. A composite sample represents the average wastewater characteristics during the compositing period. Various methods for compositing are available and are based on either time or flow-proportioning, the choice of which will depend on the permit requirements.

Continuous monitoring refers to sampling/readings that occur at regular and consistent intervals throughout a 24-hour period and at a frequency sufficient to capture data that are representative of the discharge. The maximum acceptable interval between samples/readings shall be one (1) hour.

Daily concentration

FOR PARAMETERS OTHER THAN pH, DISSOLVED OXYGEN, TEMPERATURE, AND CONDUCTIVITY – Daily concentration is the sum of the concentrations of the individual samples of a parameter taken within a calendar day divided by the number of samples taken within that calendar day. The daily concentration will be used to determine compliance with any maximum and minimum daily concentration limitations. For guidance and examples showing how to perform calculations using results below quantification levels, see the document entitled "Reporting Results Below Quantification," available at https://www.michigan.gov/documents/deq/wrd-npdes-results-quantification 620791 7.pdf.

FOR pH, DISSOLVED OXYGEN, TEMPERATURE, AND CONDUCTIVITY – The daily concentration used to determine compliance with maximum daily pH, temperature, and conductivity limitations is the highest pH, temperature, and conductivity readings obtained within a calendar day. The daily concentration used to determine compliance with minimum daily pH and dissolved oxygen limitations is the lowest pH and dissolved oxygen readings obtained within a calendar day.

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

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

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

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

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

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

Fecal coliform bacteria monthly

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

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

Fecal coliform bacteria 7-day

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

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

Flow-proportioned composite sample is a composite sample in which either a) the volume of each portion of the composite is proportional to the effluent flow rate at the time that portion is obtained, or b) a constant sample volume is obtained at varying time intervals proportional to the effluent flow rate.

General permit means an NPDES permit 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 a 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.

MBTU/hr means million British Thermal Units per hour.

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 POTW 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 Clean Water 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 Clean Water 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.

Nonstructural controls are practices or procedures implemented by employees at a facility to manage storm water or to prevent contamination of storm water.

NPDES means National Pollutant Discharge Elimination System.

Outfall is the location at which a point source discharge first enters a surface water 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 control activities under Part 615, Supervisor of Wells; Part 631, Reclamation of Mining Lands; or Part 632, Nonferrous Metallic Mineral Mining, of the NREPA, 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 permittee's NPDES 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, Spillage of Oil and Polluting Materials, promulgated under Part 31 of the NREPA (R 324.2001 through R 324.2009 of the Michigan Administrative Code).

POTW is a publicly owned treatment work.

Predevelopment is the last land use prior to the planned new development or redevelopment. **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 waters or groundwaters of the 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 permittee 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 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 the 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, Hazardous Waste Management, 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 storm water discharges for which the Department has determined that additional monitoring is needed from: 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.

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.

Structural controls are physical features or structures used at a facility to manage or treat storm water.

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 Clean Water 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. If the calendar week begins in one month and ends in the following month, the analytical result, reading, value, or observation shall be reported in the month in which monitoring was conducted.

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 and in which the volume of each portion is proportional to the discharge flow rate at the time that portion is taken. A time-proportioned composite sample may be used upon approval from the Department if the permittee demonstrates it is representative of the discharge.

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 Clean Water 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**. For lists of approved test methods, go to https://www.epa.gov/cwa-methods. 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 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 permittee may use such procedures upon approval.

The permittee 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 permittee's laboratory Quality Assurance/Quality Control program.

3. Instrumentation

The permittee 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 permittee 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, 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.

1. Start-Up Notification

The permittee shall notify the Department of start-up if one of the following conditions applies and in accordance with the applicable condition:

a. Non-CAFOs

- 1) If this is an individual permit and the permittee will not discharge during the first 60 days following the effective date of this permit, the permittee shall notify the Department via MiWaters within 14 days following the effective date of this permit, and then again 60 days prior to commencement of the discharge.
- 2) If this is a general permit and the permittee will not discharge during the first 60 days following the effective date of the Certificate of Coverage (COC) issued under this general permit, the permittee shall notify the Department via MiWaters within 14 days following the effective date of the COC, and then again 60 days prior to commencement of the discharge.

b. CAFOs

- 1) If this is an individual permit and the permittee will not populate with animals during the first 60 days following the effective date of this permit, the permittee shall notify the Department via MiWaters within 14 days following the effective date of this permit, and then again 60 days prior to populating with animals.
- 2) If this is a general permit and the permittee will not populate with animals during 60 days following the effective date of the Certificate of Coverage (COC) issued under this general permit, the permittee shall notify the Department via MiWaters within 14 days following the effective date of the COC, and then again 60 days prior to populating with animals.

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 permittee shall submit self-monitoring data via the Department's MiWaters system.

The permittee 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 permittee 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 permittee 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 permittee shall certify, in writing, to the Department, on or before <u>January 10th (April 1st for animal feeding operation facilities) of each year</u>, 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 permittee 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 a permittee by notification in writing from the Department. In such cases, the permittee 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 permittee. Reissuance or modification of this permit or reissuance or modification of an individual permittee's authorization to discharge shall not affect previous approval or denial for retained self-monitoring unless the Department provides notification in writing to the permittee.

4. Additional Monitoring by Permittee

If the permittee monitors 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, 1987 PA 96, as amended, for assurance of proper facility operation, shall be submitted as required by the Department.

5. Compliance Dates Notification

<u>Within 14 days</u> of every compliance date specified in this permit, the permittee shall submit a written notification to the Department via MiWaters (https://miwaters.deq.state.mi.us) 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 permittee 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 permittee accomplishes this, a separate written notification is not required.

6. Noncompliance Notification

Compliance with all applicable requirements set forth in the Clean Water 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 permittee becomes aware of the noncompliance 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). A written submission shall also be provided via MiWaters (https://miwaters.deq.state.mi.us) within five (5) days.

b. Other Reporting

The permittee shall report, in writing via MiWaters (https://miwaters.deq.state.mi.us), all other instances of noncompliance not described in a. above <u>at the time monitoring reports are submitted</u>; or, in the case of retained self-monitoring, <u>within five (5) days</u> from the time the permittee becomes aware of the noncompliance.

Reporting shall include: 1) a description of the discharge and cause of noncompliance; 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 3) the steps taken to reduce, eliminate, and prevent recurrence of the noncomplying discharge.

7. Spill Notification

The permittee shall immediately report any release of any polluting material which occurs to the surface waters or groundwaters of the state, unless the permittee has 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, by calling the Department's 24-hour Pollution Emergency Alerting System telephone number, 1-800-292-4706.

<u>Within 10 days</u> of the release, the permittee shall submit to the Department via MiWaters (https://miwaters.deq.state.mi.us) a full written explanation as to the cause of the release, the discovery of the release, response measures (clean-up and/or recovery) 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 permittee) has occurred, the permittee 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 permittee 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 permittee 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 permittee, 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 permittee submitted notices as required under b. or c. below.
- b. Notice of Anticipated Bypass

If the permittee knows in advance of the need for a bypass, the permittee shall submit written notification to the Department before the anticipated date of the bypass. This notification shall be submitted at least 10 days before the date of the bypass; however, the Department will accept fewer than 10 days advance notice if adequate explanation for this is provided. The notification shall 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 specified in a. above.

c. Notice of Unanticipated Bypass

As soon as possible but no later than 24 hours from the time the permittee becomes aware of the unanticipated bypass, the permittee shall notify the Department by calling the number indicated on the second page of this permit (or, if this is a general permit, on the COC); or, if notification is provided after regular working hours, call the Department's 24-hour Pollution Emergency Alerting System telephone number, 1-800-292-4706.

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 permittee 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 a., b., c., and d., above. This provision does not relieve the permittee 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 permittee is 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 permittee shall notify the Department, via MiWaters (https://miwaters.deq.state.mi.us), as soon as possible but within no more 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 written 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 written 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 ownership or control of facilities from which the authorized discharge emanates, the following requirements apply: Not less than 30 days prior to the actual transfer of ownership or control – for non-CAFOs, or within 30 days of the actual transfer of ownership or control – for CAFOs, the permittee shall submit to the Department via MiWaters (https://miwaters.deq.state.mi.us) a written agreement between the current permittee and the new permittee 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 permittee is 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 Clean Water Act and the NREPA.

The Clean Water 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 permittee shall submit electronically via MiWaters (https://miwaters.deq.state.mi.us) all such reports or notifications as required by this permit, on forms provided by the Department.

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 permittee 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 Clean Water Act and constitutes grounds for enforcement action; for permit or COC termination, revocation and reissuance, or modification; or denial of an application for permit or COC renewal.

It shall not be a defense for a permittee 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 permittee 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 permittee shall, at all times, properly operate and maintain all treatment or control facilities or systems installed or used by the permittee 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 permittee shall either:

- a. provide an alternative power source sufficient to operate facilities utilized by the permittee 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 permittee to maintain compliance with the effluent limitations and conditions of this permit, the permittee 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 permittee 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.

Section D. Management Responsibilities

6. Containment Facilities

The permittee 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 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 permittee 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 Clean Water Act and Rule 2128 (R 323.2128 of the Michigan Administrative Code), all reports prepared in accordance with the terms of this permit and required to be submitted to the Department shall be available for public inspection via MiWaters (https://miwaters.deq.state.mi.us). As required by the Clean Water 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 Clean Water Act and Sections 3112, 3115, 4106 and 4110 of the NREPA.

10. Duty to Provide Information

The permittee shall furnish to the Department via MiWaters (https://miwaters.deq.state.mi.us), 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 permittee shall also furnish to the Department, upon request, copies of records required to be kept by this permit.

Where the permittee becomes 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.

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 permittee 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 permittee from any responsibilities, liabilities, or penalties to which the permittee may be subject under Section 311 of the Clean Water 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 permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 510 of the Clean Water 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 C: FISCAL SUSTAINABILITY PLAN



FISCAL SUSTAINABILITY PLAN

The City of Brighton recently completed an Asset Management Program (AMP) Report in November 2018, which was prepared under a Stormwater, Asset Management, and Wastewater (SAW) Grant. The following tables summarize the WWTP assets that are proposed to be replaced due to condition, as part of this 2025 SRF Project Plan.

The City will be implementing energy savings as part of the SRF Project Plan Amendment by replacing the existing oxidation ditches brushes with variable frequency drives, replacing pneumatic valve operators with motorized valve operators, updating the electrical system to more efficient technology,

The user rates were designed to provide sufficient revenue to maintain the assets in the collection system and at the WRRF.

The tables below summarize the available inventory information collected as part of the AMP Report for the assets that are proposed to be replaced under W-1 Influent Screenings and Grit Removal System Replacement, W-2 Pneumatic Valve Replacement, W-3 Chemical Feed System Replacement, W-4 Equalization Valve and VFD Replacement, W-5 Secondary Clarifier No. 1 and 2 Replacement, W-6 Service Building Improvements, W-7 Electrical Upgrades, W-8 SCADA Upgrades, W-9 Service Building Drainage, Plumbing, and Water Service Upgrades, W-10 WWTP Boiler, Ductwork, Ventilation, and Heating System Replacement, W-11 Oxidation Ditch Improvements, W-12 Infiltration and Disinfection Improvements, and W-13 Solids Handling System.

Asset ID In	formation			Asset Invento	ry Information				Asset Cı	riticality			Asset Renewal Cos	t		
Equipment	Location	Quantity	Installation Year	Asset Life (Years)	Remaining Life Based on Installation Date (Years)	Condition	Predicted Remaining Life Based on Condition of Equipment (Years)	COF	Redundancy	POF	BRE	Replacement Year	Replacement Cost 2016 Dollars	Replacement Cost 2018 Dollars	Depreciation Value	Asset Notes
Weirs																
Autoclave	Administration Building	1	2015	20	19	2	24	2	0.0	1	2	2040	\$ 4,500	\$ 4,900	\$ 4,300.0	
Autoclave	Administration Building	1	1996	20	0	2	5	2	0.0	3	6	2021	\$ 4,500	\$ 4,900	\$ -	
J-2 Oxidation Ditch 5 DS (200A)	Administration Building	1	2010	30	24	4	29	4	0.0	2	8	2045	\$ 8,100	\$ 8,800	\$ 6,500.0	
J-3 Return Sludge Pump 3 DS (60A)	Administration Building	1	1988	30	2	4	2	4	0.0	3	12	2018	\$ 23,400	\$ 25,200	\$ 1,600.0	
J-4 Secondary Clarifier 3 DS (30A)	Administration Building	1	1988	20	0	4	5	4	0.0	2	8	2021	\$ 8,100	\$ 8,800	\$ -	
LP-C	Administration Building	1	2002	30	16	4	16	4	0.0	3	12	2032	\$ 10,800	\$ 11,700	\$ 5,800.0	
P-110-1	Administration Building	1	1988	30	2	3	7	3	0.5	3	4.5	2023	\$ 9,000	\$ 9,700	\$ 600.0	
P-111-1	Administration Building	1	1965	30	0	3	5	3	0.5	3	4.5	2021	\$ 9,000	\$ 9,700	\$ -	
P-111-2	Administration Building	1	2002	20	6	3	6	3	0.0	3	9	2022	\$ 2,200	\$ 2,400	\$ 700.0	
P-115-1	Administration Building	1	2010	20	14	3	19	3	0.0	2	6	2035	\$ 4,500	\$ 4,900	\$ 3,200.0	
P-115-2	Administration Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 11,700	\$ 12,600	\$ 800.0	
P-115-3	Administration Building	1	1988	20	0	3	0	3	0.0	3	9	2016	\$ 2,900	\$ 3,200	\$ -	
P-115-4	Administration Building	1	2013	20	17	3	22	3	0.0	2	6	2038	\$ 500	\$ 600	\$ 500.0	
P-118-1	Administration Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 7,400	\$ 8,000	\$ 4,000.0	
P-118-2	Administration Building	1	2016	20	20	3	25	3	0.0	1	3	2041	\$ 5,800	\$ 6,300	\$ 5,800.0	
Process Blower 3 DS (30A)	Administration Building	1	2016	20	20	3	25	3	0.0	1	3	2041	\$ 4,200	\$ 4,600	\$ 4,200.0	
480V Tap Box	Equalization Tank Pump Building	1	2002	15	1	2	8	4	0.0	2	8	2024	\$ 5,100	\$ 5,500	\$ 340.0	
AC Valve 1	Equalization Tank Pump Building	1	2002	15	1	2	8	4	0.0	2	8	2024	\$ 10,000	\$ 10,800	\$ 666.7	
AC Valve 2	Equalization Tank Pump Building	1	2002	15	1	2	8	2	0.0	2	4	2024	\$ 3,000	\$ 3,300	\$ 200.0	
AC-1-1	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 75,500	\$ 81,200	\$ 40,300.0	500 scfm
AC-1-2	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 34,600	\$ 37,300	\$ 18,500.0	16"
Actuator on damper 1	Equalization Tank Pump Building	1	2002	15	1	2	8	2	0.0	2	4	2024	\$ 3,000	\$ 3,300	\$ 200.0	
Actuator on damper 2	Equalization Tank Pump Building	1	2002	15	1	2	8	2	0.0	2	4	2024	\$ 3,000	\$ 3,300	\$ 200.0	
AD-1	Equalization Tank Pump Building	1	2002	15	1	2	8	2	0.0	2	4	2024	\$ 3,000	\$ 3,300	\$ 200.0	
AD-2	Equalization Tank Pump Building	1	2002	15	1	2	8	2	0.0	2	4	2024	\$ 3,000	\$ 3,300	\$ 200.0	
AD-3	Equalization Tank Pump Building	1	2002	15	1	2	8	2	0.0	2	4	2024	\$ 3,000	\$ 3,300	\$ 200.0	
AD-4	Equalization Tank Pump Building	1	2002	15	1	2	8	2	0.0	2	4	2024	\$ 3,000	\$ 3,300	\$ 200.0	
AD-6	Equalization Tank Pump Building	1	2002	40	26	2	8	3	0.0	2	6	2024	\$ 500	\$ 600	\$ 325.0	
AD-7	Equalization Tank Pump Building	1	2002	20	6	2	12	2	0.0	2	4	2028	\$ 4,100	\$ 4,500	\$ 1,230.0	1650 CFM, 100 MBH (1/10 HP)
B-10-1	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,800	\$ 2,000	\$ 1,000.0	4"
B-10-2	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,800	\$ 2,000	\$ 1,000.0	4"
B-10-3	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,800	\$ 2,000	\$ 1,000.0	4"
B-5-1	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 85,900	\$ 92,400	\$ 45,900.0	24"
B-5-2	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 85,900	\$ 92,400	\$ 45,900.0	24"
B-6-1	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 41,800	\$ 45,000	\$ 22,300.0	18"
B-9-1	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,800	\$ 2,000	\$ 1,000.0	4"
B-9-10	Equalization Tank Pump Building	1	2003	20	8	3	3	3	0.0	3	9	2018	\$ 14,115	\$ 15,200	\$ 5,645.9	1568.316761
B-9-11	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 22,100	\$ 23,800	\$ 11,800.0	350 gpm @ 28 ft TDH
B-9-12	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 28,400	\$ 30,600	\$ 15,200.0	700 gpm @ 27 ft TDH
B-9-13	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 28,400	\$ 30,600		700 gpm @ 27 ft TDH
B-9-14	Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 22,100	\$ 23,800		350 gpm @ 28 ft TDH
B-9-15	Pump Building Equalization Tank Pump Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 66,500			

Asset ID Ir	nformation			Asset Invento	ry Information				Asset C	riticality			Asset Renewal C	ost		
Equipment	Location	Quantity	Installation Year	Asset Life (Years)	Remaining Life Based on Installation Date (Years)	Condition	Predicted Remaining Life Based on Condition of Equipment (Years)	COF	Redundancy	POF	BRE	Replacement Year	Replacement Co 2016 Dollars	t Replacement Cost 2018 Dollars	Depreciation Value	Asset Notes
B-9-16	Equalization Tank Pump Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 66,5	00 \$ 71,50	0 \$ 4,500.0	256 scfm
B-9-17	Equalization Tank Pump Building	1	2003	60	48	3	40	3	0.1	3	8.1	2055	\$ 1,123,1	53 \$ 1,207,60	0 \$ 898,522.1	5615.762979
B-9-18	Equalization Tank Pump Building	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 12,1	00 \$ 13,10	0 \$ 6,500.0	48" x 30"
B-9-19	Equalization Tank Pump Building	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 12,1	00 \$ 13,10	0 \$ 6,500.0	48" x 30"
B-9-2	Equalization Tank Pump Building	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 12,1	00 \$ 13,10	0 \$ 6,500.0	48" x 30"
B-9-20	Equalization Tank Pump Building	1	2002	30	16	3	16	3	0.0	4	12	2032	\$ 12,1	00 \$ 13,10	0 \$ 6,500.0	48" x 30"
B-9-21	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,5	00 \$ 1,70	0 \$ 800.0	6"
B-9-22	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,5	00 \$ 1,70	0 \$ 800.0	6"
B-9-23	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,8	00 \$ 2,00	0 \$ 1,000.0	8"
B-9-24	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,8	00 \$ 2,00	0 \$ 1,000.0	8"
B-9-3	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,8	00 \$ 2,00	0 \$ 1,000.0	8"
B-9-4	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,8	00 \$ 2,00	0 \$ 1,000.0	8"
B-9-5	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,8	00 \$ 2,00	0 \$ 1,000.0	8"
B-9-6	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,8	00 \$ 2,00	0 \$ 1,000.0	8"
B-9-7	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,8	00 \$ 2,00	0 \$ 1,000.0	8"
B-9-8	Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,8	00 \$ 2,00	0 \$ 1,000.0	4"
B-9-9	Pump Building Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,8	00 \$ 2,00	0 \$ 1,000.0	4"
BOD Incubator	Pump Building Equalization Tank	1	2002	40	26	2	8	3	0.0	2	6	2024			0 \$ 325.0	
Butterfly Valve 1	Pump Building Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 41,8	00 \$ 45,00	0 \$ 22,300.0	18"
Butterfly Valve 3	Pump Building Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037		00 \$ 5,00		
C-101-1	Pump Building Equalization Tank	1	2002	20	6	2	12	2	0.0	2	4	2028	\$ 3,0	00 \$ 3,30		1480 CFM, 48.6 MBH
C-101-2	Pump Building Equalization Tank	1	2002	20	6	2	12	2	0.0	2	4	2028			0 \$ 1,170.0	(1/30 HP) 1480 CFM, 80 MBH (1/20
C-102-1	Pump Building Equalization Tank	1	2002	20	6	2	12	2	0.0	2	4	2028		00 \$ 4,20		HP) 1480 CFM, 80 MBH (1/20
C-102-2	Pump Building Equalization Tank	1	2002	40	26	2	8	3	0.0	2	6	2024			0 \$ 325.0	HP)
Check Valve 1	Pump Building Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037		00 \$ 5,00		8"
Check Valve 2	Pump Building Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037		00 \$ 5,00		8"
CP-4	Pump Building Equalization Tank	1	2002	40	26	2	8	4	0.0	2	8	2024			0 \$ 780.0	
CP-5	Pump Building Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037		00 \$ 5,00		8"
CUH-1	Pump Building Equalization Tank	1	2002	40	26	2	8	4	0.0	2	8	2024		00 \$ 1,30		
D-10	Pump Building Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037		00 \$ 5,00		8"
DC-101-1	Pump Building Equalization Tank	1	2002	40	26	2	8	4	0.0	2	8	2024			0 \$ 416.0	
DC-101-2	Pump Building Equalization Tank	1	2002	40	26	2	8	4	0.0	2	8	2024			0 \$ 295.8	
DC-102-1	Pump Building Equalization Tank	1	2002	40	26	2	8	4	0.0	2	8	2024		50 \$ 1,00		
DC-102-2	Pump Building Equalization Tank	1	2002	40	26	2	8	4	0.0	2	8	2024		50 \$ 1,00		
Dessicator	Pump Building Equalization Tank	1	2002	20	6	2	15	2	0.0	2	4	2031		00 \$ 2,70		
Dishwasher	Pump Building Equalization Tank	1	2002	20	6	2	15	2	0.0	2	4	2031		60 \$ 5,90		
Dissolved Oxygen	Pump Building Equalization Tank	1	2002	20	6	2	15	2	0.0	2	4	2031		00 \$ 6,50		
Meter E-1 Irrigation Pump 1	Pump Building Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037		00 \$ 5,00		8"
DS (100A) E-2 Reaeration Blower		1	2002	30	16	3	21	3	0.0	2	6	2037			0 \$ 2,500.0	8"
1 DS (30A) E-3 PEW Pump 1 DS		1	2002	30	16	3	21	3	0.0	2	6	2037		00 \$ 5,00		8"
(30A) E-4, F-4 LP-E	Pump Building Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037		00 \$ 5,00		8"
E-4, F-4 LP-E	Pump Building Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037		00 \$ 5,00		
Transformer (10KVA) EF-2	Equalization Tank	1	2002		26	2	0	J		2	0	2024				0
EF-Z	Pump Building	1	2002	40	20	Z	δ	4	0.0	2	δ	202 4	\$ 2,2	2,40	0 \$ 1,446.3	

Asset ID Ir	nformation			Asset Invento	ry Information				Asset Cr	riticality		4	Asset Renewal Cos	t		
Equipment	Location	Quantity	Installation Year	Asset Life (Years)	Remaining Life Based on Installation Date (Years)	Condition	Predicted Remaining Life Based on Condition of Equipment (Years)	COF	Redundancy	POF	BRE	Replacement Year	Replacement Cost 2016 Dollars	Replacement Cost 2018 Dollars	Depreciation Value	Asset Notes
EF-3	Equalization Tank Pump Building	1	2002	40	26	2	8	4	0.0	2	8	2024	\$ 2,225	\$ 2,400	\$ 1,446.3	
EF-4	Equalization Tank Pump Building	1	2002	40	26	2	8	4	0.0	2	8	2024	\$ 455	\$ 500	\$ 295.8	
EQ Building Roof	Equalization Tank Pump Building	1	2002	40	26	2	8	4	0.0	2	8	2024	\$ 980	\$ 1,100	\$ 637.0	
Eq Pump VFD 1 (10HP)	Equalization Tank Pump Building	1	2002	40	26	2	8	4	0.0	2	8	2024	\$ 980	\$ 1,100	\$ 637.0	
Eq Pump VFD 2 (10HP)	Equalization Tank Pump Building	1	2002	15	1	2	8	2	0.0	2	4	2024	\$ 3,000	\$ 3,300	\$ 200.0	
Eq Pump VFD 3 (10HP)	Equalization Tank Pump Building	1	2002	15	1	2	8	2	0.0	2	4	2024	\$ 3,000	\$ 3,300	\$ 200.0	
Eq Pump VFD 4 (10HP)	Equalization Tank Pump Building	1	2002	40	26	2	8	3	0.0	2	6	2024	\$ 5,800	\$ 6,300	\$ 3,770.0	
Eq Pumps Control Panel	Equalization Tank Pump Building	1	2002	40	26	2	8	4	0.0	2	8	2024	\$ 90,000	\$ 96,800	\$ 58,500.0	
EQ Return Pump #1	Equalization Tank	1	2002	40	26	2	8	4	0.0	2	8	2024	\$ 455	\$ 500	\$ 295.8	
EQ Return Pump #2	Pump Building Equalization Tank	1	2002	30	16	2	25	2	0.0	2	4	2041	\$ 1,400			500 CFM 11"x11" opening
EQ Return Pump #3	Pump Building Equalization Tank	1	2002	30	16	2	25	2	0.0	2	4	2041	\$ 1,800			1000 CFM 17"x17"
EQ Return Pump #4	Equalization Tank	1	2002	30	16	2	25	2	0.0	2	4	2041	\$ 4,300	,	·	opening 48"x72" (Aluminum)
EQ Tank Blower 1	Pump Building Equalization Tank	1	2002	30	16	2	25	2	0.0	2	4	2041	\$ 4,300			
EQ Tank Blower 2	Pump Building Equalization Tank	1	2002	30	16	2	25	2	0.0	2	4	2041	\$ 4,300			48"x72" (Aluminum)
EQ Tanks	Pump Building Equalization Tank	1	2002	25	11	2	20	2	0.0	2	4	2036	\$ 1,200			
F-1 Irrigation Pump 2	Pump Building Equalization Tank	1	2002	30	16	2	21	2	0.0	2	6	2037	\$ 4,600			8"
DS (100A) F-2 Reaeration Blower	Pump Building Equalization Tank	1	2002	30	16	2	21	2	0.0	2	6	2037	\$ 4,600			8"
2 DS (30A) F-3 PEW Pump 2 DS	Pump Building Equalization Tank	1						3		2	6					
(30A)	Pump Building Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 4,600			8"
FIT-6	Pump Building Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 8,300			10"
FIT-8	Pump Building Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 2,700			6"
Fume Hood	Pump Building Equalization Tank	1	2002	20	6	2	15	2	0.0	2	4	2031	\$ 6,000			48"x72" (Electric)
Gate Valve 1	Pump Building Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 2,700	\$ 3,000	\$ 1,500.0	6"
Gate Valve 2	Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 2,700	\$ 3,000	\$ 1,500.0	6"
Gates	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 2,700	\$ 3,000	\$ 1,500.0	6"
GUH-1	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 2,700	\$ 3,000	\$ 1,500.0	6"
GUH-2	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 41,800	\$ 45,000	\$ 22,300.0	
Hood	Equalization Tank Pump Building	1	2002	20	6	2	15	2	0.0	2	4	2031	\$ 200	\$ 300	\$ 60.0	Resistant, Electric)
Incubator	Equalization Tank Pump Building	1	2002	20	6	2	15	2	0.0	2	4	2031	\$ 200	\$ 300	\$ 60.0	8"dia. (Corrosion Resistant, Electric)
Irrigation Pump 1, E-1	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 11,200	\$ 12,100	\$ 6,000.0	12"
Irrigation Pump 2, F-1	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 11,200	\$ 12,100	\$ 6,000.0	12"
МСС-Е	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,800	\$ 2,000	\$ 1,000.0	4"
MCC-F	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,800	\$ 2,000	\$ 1,000.0	4"
Muffle Furnace	Equalization Tank Pump Building	1	2002	15	1	2	8	4	0.0	2	8	2024	\$ 40,000	\$ 43,100	\$ 2,666.7	
new pump building	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,800	\$ 2,000	\$ 1,000.0	4"
new pump building	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,800	\$ 2,000	\$ 1,000.0	4"
new pump building	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 4,600	\$ 5,000	\$ 2,500.0	8"
new pump building	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 4,600	\$ 5,000		8"
PEW PUMP 1	Equalization Tank	1	2002	20	6	3	11	3	0.0	2	6	2027	\$ 8,100			
PEW Pump 1	Pump Building Equalization Tank	1	2002	20	6	3	11	3	0.0	2	6	2027	\$ 31,800			
PEW PUMP 2	Pump Building Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 12,100			
PEW Pump 2	Pump Building Equalization Tank	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,100			
pH Meter	Pump Building Equalization Tank	1	2002	15	1	2	10	2	0.0	2	4	2023	\$ 2,100			250 CFM, 6/3 kW (1/20
	Pump Building Equalization Tank	1				2		2		2	4					HP)
pH Meter	Pump Building	1	2002	20	6	2	15	2	0.0	2	4	2031	\$ 4,000	\$ 4,400	\$ 1,200.0	30"x30" curb

Asset ID Ir	nformation			Asset Invento	ry Information				Asset Cr	riticality		,	Asset Renewal Cos	t		
Equipment	Location	Quantity	Installation Year	Asset Life (Years)	Remaining Life Based on Installation Date (Years)	Condition	Predicted Remaining Life Based on Condition of Equipment (Years)	COF	Redundancy	POF	BRE	Replacement Year	Replacement Cost 2016 Dollars	Replacement Cost 2018 Dollars	Depreciation Value	Asset Notes
pump hose roof	Equalization Tank Pump Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,100	\$ 2,300	\$ 200.0	3"
RA-102-1	Equalization Tank Pump Building	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 35,900	\$ 38,600	\$ 19,200.0	
RA-102-2	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 45,300	\$ 48,800	\$ 24,200.0	1470 gpm @ 23 ft TDH
RA-102-3	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 45,300	\$ 48,800	\$ 24,200.0	1470 gpm @ 23 ft TDH
RA-102-4	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 75,500	\$ 81,200	\$ 40,300.0	500 scfm
Refrigerator	Equalization Tank Pump Building	1	2002	20	6	2	15	2	0.0	2	4	2031	\$ 2,500	\$ 2,700	\$ 750.0	675 CFM @0.375" (1/4 HP) 19"x19" curb
RP-1-1	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 3,300	\$ 3,600	\$ 1,800.0	8"
RP-2-1	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 3,300	\$ 3,600	\$ 1,800.0	8"
RV-1	Equalization Tank Pump Building	1	2002	20	6	3	11	3	0.0	2	6	2027	\$ 9,900	\$ 10,700	\$ 3,000.0	8"
RV-2	Equalization Tank Pump Building	1	2002	20	6	3	11	3	0.0	2	6	2027	\$ 9,900	\$ 10,700	\$ 3,000.0	8"
S-100-1	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 2,300	\$ 2,500	\$ 1,300.0	4"
Samplers	Equalization Tank Pump Building	1	2002	20	6	2	15	3	0.0	2	6	2031	\$ 10,000	\$ 10,800	\$ 3,000.0	11,775 CFM @0.625" (3 HP) 46"x46" curb
Scale	Equalization Tank Pump Building	1	2002	15	1	2	8	4	0.0	2	8	2024	\$ 5,100	\$ 5,500	\$ 340.0	, 33.3
Spectrophotometer	Equalization Tank Pump Building	1	2002	15	1	2	8	4	0.0	2	8	2024	\$ 5,100	\$ 5,500	\$ 340.0	
TT-L-1	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 2,300	\$ 2,500	\$ 1,300.0	4"
TT-L-2	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 2,200	\$ 2,400	\$ 1,200.0	6"
TT-L-3	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 2,200	\$ 2,400	\$ 1,200.0	6"
TT-T-10	Equalization Tank Pump Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 2,400	\$ 2,600	\$ 1,300.0	6"
Unknown Plug Valve 1	Equalization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 2,400	\$ 2,600	\$ 1,300.0	6"
Unknown Plug Valve 2	Faualization Tank	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,800	\$ 2,000	\$ 1,000.0	4"
Water Bath (fecal coliforms)	Equalization Tank Pump Building	1	2002	15	1	2	8	4	0.0	2	8	2024	\$ 5,100	\$ 5,500	\$ 340.0	
A-5-1	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
A-5-2	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
Course Bubble Diffusers	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
Course Bubble Diffusers	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
Course Bubble Diffusers	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
IB-110-1	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
IB-110-2	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
IB-110-3	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
IB-110-4	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
oxidation ditch	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
oxidation ditch 2	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
oxidation ditch 3	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
Oxidation Ditch Rotor 5	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
Oxidation Ditch Rotor 6	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
pump house	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
pump house	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
pump house	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
pump house	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
pump station new	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
pump station original	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
RF-14	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
SP-4	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"

Asset ID	Information			Asset Invento	ry Information				Asset C	riticality			Asset Renewal Cos	t		
Equipment	Location	Quantity	Installation Year	Asset Life (Years)	Remaining Life Based on Installation Date (Years)	Condition	Predicted Remaining Life Based on Condition of Equipment (Years)	COF	Redundancy	POF	BRE	Replacement Year	Replacement Cost 2016 Dollars	Replacement Cost 2018 Dollars	Depreciation Value	Asset Notes
SP-5	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
TT-SP-4	Filter Cells	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 3,300	\$ 3,600	\$ 300.0	12"
P-102-1	Irrigation Areas	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 9,500	\$ 10,300	\$ 700.0	16"
Rotating Weir Plate and Operator 1	Irrigation Areas	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 9,500	\$ 10,300	\$ 700.0	16"
Rotating Weir Plate and Operator 2	Irrigation Areas	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 9,500	\$ 10,300	\$ 700.0	16"
Rotating Weir Plate and Operator 3	Irrigation Areas	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 34,600	\$ 37,300	\$ 18,500.0	16"
Rotor #1	Irrigation Areas	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 34,600	\$ 37,300	\$ 18,500.0	16"
Rotor #2	Irrigation Areas	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 34,600	\$ 37,300	\$ 18,500.0	16"
Rotor #3	Irrigation Areas	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 34,600	\$ 37,300	\$ 18,500.0	16"
4" Piping to Grit Washer	Irrigation Pump Station	1	1987	50	22	3	30	3	0.0	3	9	2045	\$ 9,873			
6" Drain Pipe	Irrigation Pump Station	1	2003	60	48	3	40	3	0.0	3	9	2055	\$ 218,177			
6" WAS Piping A-12 Hydronic Pump	Irrigation Pump Station	1	1987	60	32	3	30	3	0.0	3	9	2045	\$ 61,640			
3 DS (30A)	Irrigation Pump Station	1	1987	20	-9	3	10	2	0.0	2	4	2026	\$ 3,000	\$ 3,300		6" pump well
A-6-1	Irrigation Pump Station	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 10,900			
A-6-2	Irrigation Pump Station	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 10,900		\$ 800.0	12"
Cover	Irrigation Pump Station	1	1988	30	2	3	7	3	1.0	2	0	2023	\$ 36,300	\$ 39,100		1600 gpm @ 42 ft TDH
Cover	Irrigation Pump Station	1	1988	30	2	3	7	3	1.0	2	0	2023	\$ 36,300	\$ 39,100	\$ 2,500.0	1600 gpm @ 42 ft TDH
Cover	Irrigation Pump Station	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 30,000	\$ 32,300	\$ 9,000.0	
F-100-1	Irrigation Pump Station	1	1987	25	-4	2	15	2	0.0	2	4	2031	\$ 5,500	\$ 6,000	\$ -	3 HP
F-100-2	Irrigation Pump Station	1	1987	25	-4	2	15	2	0.0	2	4	2031	\$ 5,500	\$ 6,000	\$ -	3 HP
F-100-3	Irrigation Pump Station	1	1987	20	-9	2	10	2	0.0	2	4	2026	\$ 1,820		\$ -	60"x16" (Pneumatic) 440 CFM, 23.4 MBH
F-100-4	Irrigation Pump Station	1	1987	20	-9	2	5	2	0.0	2	4	2021	\$ 2,000		\$ -	(1/100 HP)
F-101-1	Irrigation Pump Station	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 40,000			
F-101-2	Irrigation Pump Station	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 850			
F-102-1	Irrigation Pump Station	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 455			
F-102-2	Irrigation Pump Station	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 455			
F-1-1	Irrigation Pump Station		1988	40	12	3	5	3	0.0	2	6	2021	\$ 5,800			
F-1-2	Irrigation Pump Station	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 4,225			
F-1-3	Irrigation Pump Station	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 850			
F-2-1	Irrigation Pump Station	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 455			
F-2-2	Irrigation Pump Station	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 455			440 CFM, 23.4 MBH
FIT-1	Irrigation Pump Station	1	1987	20	-9	2	5	2	0.0	2	4	2021	\$ 2,000			(1/100 HP)
FIT-2	Irrigation Pump Station	1	1987	20	-9	2	15	2	0.0	2	4	2031	\$ 3,800			10" pump well
FIT-3	Irrigation Pump Station	1	1987	20	-9	2	15	2	0.0	2	4	2031	\$ 3,800			10" pump well 1436 CFM @0.375" (1/6
FIT-4A	Irrigation Pump Station		1987	20	-9	2	10	2	0.0	2	4	2026	\$ 3,000			HP) 24"x24" curb
FIT-4B	Irrigation Pump Station		1987	20	-9	2	15	2	0.0	2	4	2031	\$ 3,000			6" pump well
FIT-5A	Irrigation Pump Station		1987	20	-9	2	8	2	0.0	2	4	2024	\$ 1,560			1/2 HP
LP-D	Irrigation Pump Station		1987	20	0	4	3	3	0.0	3	9	2018	\$ 7,990			
Mechanism	Irrigation Pump Station		1988	40	12	3	5	4	0.0	2	8	2021	\$ 30,000			
Mechanism	Irrigation Pump Station		2003	50	38	3	38	3	0.0	3	9	2053	\$ 39,345			
Mechanism	Irrigation Pump Station	1	2003	50	38	3	38	3	0.0	3	9	2053	\$ 14,723			420.6548987
P-22-1	Irrigation Pump Station	1	1988	15	-13	3	5	2	0.0	2	4	2021	\$ 3,000			
P-22-2	Irrigation Pump Station	1	1988	15	-13	3	5	2	0.0	2	4	2021	\$ 3,000	\$ 3,300	D -	

Asset ID	Information			Asset Invento	ry Information				Asset C	riticality		,	Asset Renewal Cos	t		
Equipment	Location	Quantity	Installation Year	Asset Life (Years)	Remaining Life Based on Installation Date (Years)	Condition	Predicted Remaining Life Based on Condition of Equipment (Years)	COF	Redundancy	POF	BRE	Replacement Year	Replacement Cost 2016 Dollars	Replacement Cost 2018 Dollars	Depreciation Value	Asset Notes
RAS Pump 1	Irrigation Pump Station	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,100	\$ 2,300	\$ 200.0	3"
RAS Pump 2	Irrigation Pump Station	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,100	\$ 2,300	\$ 200.0	3"
RAS Pump 3	Irrigation Pump Station	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 36,300	\$ 39,100	\$ 2,500.0	24" x 48"
Rotor #4	Irrigation Pump Station	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 3,300	\$ 3,600	\$ 300.0	12"
S-101-1	Irrigation Pump Station	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 3,300	\$ 3,600	\$ 300.0	12"
S-2-1	Irrigation Pump Station	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 11,800	\$ 12,700	\$ 800.0	18"?
S-2-2	Irrigation Pump Station	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 11,800	\$ 12,700	\$ 800.0	18"
S-2-3	Irrigation Pump Station	1	1988	20	0	3	5	3	0.0	2	6	2021	\$ 35,300	\$ 38,000	\$ -	24"
S-3-1	Irrigation Pump Station	1	2003	50	38	3	38	3	0.0	3	9	2053	\$ 20,892	\$ 22,500	\$ 15,878.2	
secondary clarifier 1	Irrigation Pump Station	1	2003	50	38	3	38	3	0.0	3	9	2053	\$ 10,885	\$ 11,800	\$ 8,272.6	
secondary clarifier 2	Irrigation Pump Station	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 14,300	\$ 15,400	\$ 1,000.0	50 gpm @ 185 ft TDH
secondary clarifier 3	Irrigation Pump Station	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 14,300	\$ 15,400	\$ 1,000.0	50 gpm @ 185 ft TDH
W-1	Irrigation Pump Station	1	1987	50	22	3	30	3	0.0	3	9	2045	\$ 15,882	\$ 17,100	\$ 6,988.2	
W-2	Irrigation Pump Station	1	1987	50	22	3	30	3	0.0	3	9	2045	\$ 10,009	\$ 10,800	\$ 4,404.0	
W-3	Irrigation Pump Station	1	1987	50	22	3	30	3	0.0	3	9	2045	\$ 15,636	\$ 16,900	\$ 6,880.0	
A-14 Sump Pump 1 DS (30A)	Oxidation Ditches	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 4,600	\$ 5,000	\$ 400.0	8"
A-15 Air Compressor DS (100A)	Oxidation Ditches	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 4,600	\$ 5,000	\$ 400.0	8"
Panel A Transformer		1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 1,800	\$ 2,000	\$ 1,000.0	8"
A-22, B-22 LP-LA	Oxidation Ditches	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,800	\$ 2,000	\$ 1,000.0	8"
A-4-1	Oxidation Ditches	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 1,800	\$ 2,000	\$ 1,000.0	8"
Panel LA Transforme	r Oxidation Ditches	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 1,800	\$ 2,000	\$ 1,000.0	8"
A-5, B-5 LP-A Sectio	n Oxidation Ditches	1	2003	60	48	3	40	4	0.1	3	10.8	2055	\$ 2,188,518	\$ 2,353,000	\$ 1,750,814.2	
A-5, B-5 LP-A Sectio 2	Oxidation Ditches	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 4,600	\$ 5,000	\$ 2,500.0	8"
A-8-1	Oxidation Ditches	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 12,100	\$ 13,100	\$ 6,500.0	20" Diameter
AC-2-1	Oxidation Ditches	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 12,100	\$ 13,100	\$ 900.0	24" x24"?
AC-2-2	Oxidation Ditches	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 12,100	\$ 13,100	\$ 900.0	24" x24"?
AC-2-3	Oxidation Ditches	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 12,100	\$ 13,100	\$ 900.0	24" x24"?
Course Bubble Diffusers	Oxidation Ditches	1	1988	30	2	4	2	4	0.0	3	12	2018	\$ 199,300	\$ 214,300	\$ 13,300.0	0
MCC-C	Oxidation Ditches	1	1988	30	2	4	2	4	0.0	3	12	2018	\$ 14,400	\$ 15,500	\$ 1,000.0	
MCC-D	Oxidation Ditches	1	1988	30	2	4	2	4	0.0	3	12	2018	\$ 14,400	\$ 15,500	\$ 1,000.0	
P-16-1	Oxidation Ditches	1	2002	30	16	4	21	4	0.0	2	8	2037	\$ 199,300	\$ 214,300	\$ 106,300.0	0
P-16-2	Oxidation Ditches	1	1988	30	2	4	2	4	0.0	3	12	2018	\$ 27,200	\$ 29,300	\$ 1,900.0	0
P-16-3	Oxidation Ditches	1	1988	30	2	4	2	4	0.0	3	12	2018	\$ 27,200	\$ 29,300	\$ 1,900.0	0
P-16-4	Oxidation Ditches	1	2002	30	16	4	21	4	0.0	2	8	2037	\$ 27,200	\$ 29,300	\$ 14,600.0	0
Light Recep Fan	Oxidation Ditches	1	1987	60	32	4	30	3	0.1	3	8.1	2045	\$ 2,139,397	\$ 2,300,200	\$ 1,141,011.8	
Light Recep Fan	Oxidation Ditches	1	2002	30	16	4	16	4	0.0	3	12	2032	\$ 14,400	\$ 15,500	\$ 7,700.0	
Sludge Loading Piping	g Oxidation Ditches	1	1988	30	2	4	2	4	0.0	3	12	2018	\$ 199,300	\$ 214,300	\$ 13,300.0	0
Standby Generator	Oxidation Ditches	1	1987	60	32	4	30	3	0.1	3	8.1	2045	\$ 2,142,230	\$ 2,303,300	\$ 1,142,522.8	
Submersible Mixer 1	Oxidation Ditches	1	1988	30	2	4	2	4	0.0	3	12	2018	\$ 199,300	\$ 214,300	\$ 13,300.0	0
Submersible Mixer 2	Oxidation Ditches	1	1988	30	2	4	2	4	0.0	3	12	2018	\$ 199,300	\$ 214,300	\$ 13,300.0	0
Telephone System	Oxidation Ditches	1	2002	30	16	4	21	4	0.0	2	8	2037	\$ 199,300	\$ 214,300	\$ 106,300.0	0
AC-2-4	Return Sludge Pump Station	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 2,700	\$ 3,000	\$ 200.0	6"
AD-5	Return Sludge Pump Station	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 12,100	\$ 13,100	\$ 6,500.0	18" x 42"

Asset ID Ir	nformation			Asset Invento	ry Information				Asset Cr	riticality		Į.	Asset Renewal Cos	t		
Equipment	Location	Quantity	Installation Year	Asset Life (Years)	Remaining Life Based on Installation Date (Years)	Condition	Predicted Remaining Life Based on Condition of Equipment (Years)	COF	Redundancy	POF	BRE	Replacement Year	Replacement Cost 2016 Dollars	Replacement Cost 2018 Dollars	Depreciation Value	Asset Notes
AD-5	Return Sludge Pump Station	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 2,700	\$ 3,000	\$ 200.0	6"
AD-6	Return Sludge Pump Station	1	2002	30	16	3	21	3	0.0	1	3	2037	\$ 12,100	\$ 13,100	\$ 6,500.0	18" x 42"
AD-7	Return Sludge Pump Station	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 12,100	\$ 13,100	\$ 6,500.0	42" x 24"
AO Smith Pressurized Tank	Return Sludge Pump Station	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 12,100	\$ 13,100	\$ 6,500.0	42" x 24"
Auto Strainer Panel	Return Sludge Pump Station	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 12,100	\$ 13,100	\$ 900.0	42" x 24"
B-1	Return Sludge Pump Station	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 12,100	\$ 13,100	\$ 900.0	42" x 24"
4 DS (30A)	P- Return Sludge Pump Station	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 12,100	\$ 13,100	\$ 900.0	42" x 24"
(30A)	Return Sludge Pump Station	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 12,100	\$ 13,100	\$ 900.0	18" x 42"
DS (100A)	Return Sludge Pump Station	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 12,100	\$ 13,100	\$ 900.0	18" x 42"
B-16 Vacuum Pump DS (30A)	Station	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 2,700	\$ 3,000	\$ 200.0	6"
Circulator P-2 DS	Station	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 2,700	\$ 3,000	\$ 200.0	6"
B-2	Return Sludge Pump Station	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 374,400	\$ 402,600	\$ 25,000.0	1600 gpm
B-4 25KW Humidifier DS (100A)	Station	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 374,400	\$ 402,600	\$ 25,000.0	1600 gpm
Bar Screen Control Panel	Return Sludge Pump Station	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 374,400	\$ 402,600	\$ 199,700.0	1600 gpm
Boiler Control Panel	Secondary Clarifiers	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 241,600	\$ 259,800	\$ 16,200.0	0
C-1-1	Secondary Clarifiers	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 241,600	\$ 259,800	\$ 16,200.0	0
C-1-2	Secondary Clarifiers	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 241,600	\$ 259,800	\$ 128,900.0	0
C-3-1	Secondary Clarifiers	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 12,100	\$ 13,100	\$ 900.0	18" diam
C-3-2	Secondary Clarifiers	1	1987	60	32	3	30	3	0.0	3	9	2045	\$ 916,262	\$ 985,200	\$ 488,673.1	
C-4-1	Secondary Clarifiers	1	1987	60	32	3	30	3	0.0	3	9	2045	\$ 916,723	\$ 985,700	\$ 488,918.7	
C-4-2	Secondary Clarifiers	1	2003	60	48	3	48	3	0.0	3	9	2063	\$ 936,890	\$ 1,007,300	\$ 749,512.0	
C-5-1	Secondary Clarifiers	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 18,900	\$ 20,400	\$ 1,300.0	0
C-5-2	Secondary Clarifiers	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 18,900	\$ 20,400	\$ 1,300.0	0
C-6-1	Secondary Clarifiers	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 18,900	\$ 20,400	\$ 10,100.0	0
Submersible Mixer 3	Secondary Clarifiers	1	1988	30	2	4	2	4	0.0	3	12	2018	\$ 166,100	\$ 178,600	\$ 11,100.0	55 ft diameter
Submersible Mixer 4	Secondary Clarifiers	1	1988	30	2	4	2	4	0.0	3	12	2018	\$ 166,100	\$ 178,600	\$ 11,100.0	55 ft diameter
Submersible Mixer 5	Secondary Clarifiers	1	2002	30	16	4	16	4	0.0	3	12	2032	\$ 166,100	\$ 178,600	\$ 88,600.0	55 ft diameter
B-100-1	Service Building	1	1987	20	0	4	3	3	0.0	4	12	2018	\$ 38,159	\$ 41,100	\$ -	
C-6-2	Service Building	1	1988	50	22	3	22	3	0.0	4	12	2038	\$ 5,000	\$ 5,400	\$ 2,200.0	4"
CC-1	Service Building	1	1988	50	22	3	22	3	0.0	4	12	2038	\$ 7,000	\$ 7,600	\$ 3,100.0	6"
CC-2	Service Building	1	1988	50	22	3	22	3	0.0	4	12	2038	\$ 3,400	\$ 3,700		6"
CC-3	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 455			
Centrifuge 1	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980			
Centrifuge 2	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 850			
CFS Pump 1	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 8,075			
CFS Pump 2	Service Building	1	1988	40	12	3	5	3	0.0	2	6	2021	\$ 5,800			
Chatterbox	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 2,700			6"
Chemical Feed Panel		1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 6,275			
Chlorine Gas Detector		1	1988	40	12	3	5	3	0.0	2	6	2021	\$ 5,800			
Clow Valve 1	Service Building	1	1988	40	12	3	5	3	0.0	2	6	2021	\$ 5,800			
Clow Valve 2	Service Building	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 24,600	\$ 26,500	\$ 1,700.0	14 to 16"
Clow Valve 3	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,600			5"
Clow Valve 4	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,600	\$ 2,800	\$ 200.0	5"

Asset ID In	formation			Asset Invento	ry Information				Asset Cr	riticality			Asset Renewal Cos	t		
Equipment	Location	Quantity	Installation Year	Asset Life (Years)	Remaining Life Based on Installation Date (Years)	Condition	Predicted Remaining Life Based on Condition of Equipment (Years)	COF	Redundancy	POF	BRE	Replacement Year	Replacement Cost 2016 Dollars	Replacement Cost 2018 Dollars	Depreciation Value	Asset Notes
Coarse Bubble Air Diffusers	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,600	\$ 2,800	\$ 200.0	5"
CP-1	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,600	\$ 2,800	\$ 200.0	5"
CP-2	Service Building	1	0		0	3	5	3	0.0	3	0	2021	\$ 1,600	\$ 1,800	#DIV/0!	0
D-1	Service Building	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 10,000	\$ 10,800	\$ -	
D-2	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 455	\$ 500	\$ 136.5	
D-3	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980	\$ 1,100	\$ 294.0	
D-4	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 850	\$ 1,000	\$ 255.0	
DC-103-3	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 455	\$ 500	\$ 136.5	
DC-103-4	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 455	\$ 500	\$ 136.5	
Drain Valve	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 850	\$ 1,000	\$ 255.0	
Duplex Scum Receiver 1	Service Building	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 20,000	\$ 21,600	\$ -	
EF-1	Service Building	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 20,000	\$ 21,600	\$ -	
EH-1	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 2,300	\$ 2,500	\$ 200.0	4"
Ferric Chloride Feed Panel	Service Building	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 2,300	\$ 2,500	\$ 200.0	4"
FF-1	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 2,300	\$ 2,500	\$ 200.0	4"
FF-2	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 2,300	\$ 2,500	\$ 200.0	4"
FF-3	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,300	\$ 2,500	\$ 200.0	4"
FF-4	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,300	\$ 2,500	\$ 200.0	4"
FIT-16-1	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,200	\$ 2,400	\$ 200.0	6"
FIT-16-2	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,200	\$ 2,400	\$ 200.0	6"
FIT-5B	Service Building	1	2014	20	18	2	20	2	0.0	2	4	2036	\$ 1,920	\$ 2,100	\$ 1,728.0	52"x12" (Electric)
FIT-7	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 2,300	\$ 2,500	\$ 200.0	4"
FIT-8	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 2,300	\$ 2,500	\$ 200.0	4"
FIT-9	Service Building	1	1987	20	-9	3	2	2	0.0	2	4	2018	\$ 900	\$ 1,000	\$ -	4.3 MBH, 0.5 GPM @180°F
FO Cable Junction Box	Service Building	1	2002	20	6	2	6	2	0.0	3	6	2022	\$ 2,900	\$ 3,200	\$ 870.0	39"x39" (Electric)
G-1 Mechanical Bar Screen DS (30A)	Service Building	1	1987	20	-9	3	2	2	0.0	2	4	2018	\$ 900	\$ 1,000	\$ -	4.3 MBH, 0.5 GPM @180°F
G-10 LP Blower 2 DS (100A)	Service Building	1	1987	20	-9	3	2	2	0.0	2	4	2018	\$ 1,000	\$ 1,100	\$ -	6.7 MBH, 0.7 GPM @180°F
Removal System DS	Service Building	1	2002	30	16	3	16	3	0.0	4	12	2032	\$ 60,400	\$ 65,000	\$ 32,300.0	4"
G-15 Centrifuge 1 Control Panel	Service Building	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 60,400	\$ 65,000	\$ 32,300.0	4"
G-2 Sludge Transfer Pump 1 DS (30A)	Service Building	1	1988	15	-13	3	5	2	0.0	2	4	2021	\$ 2,000	\$ 2,200	\$ -	
G-20 Grit Room Exhaust Fan DS (30A)	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 7,200	\$ 7,800	\$ 500.0	0
G-21 Grit Room Supply Fan DS (30A)	Service Building	1	1988	15	-13	3	5	3	0.0	2	6	2021	\$ 3,000	\$ 3,300	\$ -	
G-22 Grit Removal Control Panel	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 2,600	\$ 2,800	\$ 200.0	4"
G-3 Centrifuge Pump 1 DS (30A)	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 2,600	\$ 2,800	\$ 200.0	4"
G-5 Tertiary Sludge Pump DS (30A)	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 2,600	\$ 2,800	\$ 200.0	4"
G-9 LP Blower 1 DS (100A)	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 2,600	\$ 2,800	\$ 200.0	4"
grit	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 14,400	\$ 15,500	\$ 1,000.0	
Hazardous Gas	Service Building	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 40,000	\$ 43,100	\$ -	
grit building	Service Building	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 40,000	\$ 43,100	\$ -	
Grit Classifier	Service Building	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 2,400	\$ 2,600	\$ 1,300.0	6"
Grit Dewatering Escalator	Service Building	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 2,400	\$ 2,600	\$ 1,300.0	6"
Grit Pump 1	Service Building	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 600	\$ 700	\$ 100.0	4"
Grit Pump 2	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 35,900	\$ 38,600	\$ 2,400.0	50 gpm @ 25 ft TDH

Asset ID In	nformation			Asset Invento	ry Information				Asset Cı	riticality		,	Asset Renewal Cos	t		
Equipment	Location	Quantity	Installation Year	Asset Life (Years)	Remaining Life Based on Installation Date (Years)	Condition	Predicted Remaining Life Based on Condition of Equipment (Years)	COF	Redundancy	POF	BRE	Replacement Year	Replacement Cost 2016 Dollars	Replacement Cost 2018 Dollars	Depreciation Value	Asset Notes
grit roof	Service Building	1	2002	20	6	3	2	3	0.0	3	9	2018	\$ 26,430	\$ 28,500	\$ 7,929.0	6760 CFM @0.25" (3/4 HP)
grit roof	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 7,200	\$ 7,800	\$ 500.0	
Grit Snail Control Panel	Service Building	1	1987	20	-9	3	2	2	0.0	2	4	2018	\$ 2,000	\$ 2,200	\$ -	200 CFM, 11.1 MBH, 0.5 GPM (1/20 HP)
GUH-3	Service Building	1	2014	20	18	2	20	2	0.0	2	4	2036	\$ 3,500	\$ 3,800	\$ 3,150.0	52"x40" (Electric)
GUH-4	Service Building	1	2014	20	18	2	20	2	0.0	2	4	2036	\$ 3,500	\$ 3,800	\$ 3,150.0	52"x40" (Electric)
GUH-5	Service Building	1	1987	25	-4	2	10	2	0.0	2	4	2026	\$ 50,000	\$ 53,800	\$ -	1440000/1209600 BTUH @160 PSI
GUH-6	Service Building	1	1987	25	-4	2	10	2	0.0	2	4	2026	\$ 50,000	\$ 53,800	\$ -	1440000/1209600 BTUH @160 PSI
H-1 Screen Conveyor DS (30A)	Service Building	1	1988	15	-13	3	5	2	0.0	2	4	2021	\$ 3,000	\$ 3,300	\$ -	
H-10 LP Blower 4 DS (100A)	Service Building	1	1988	15	-13	3	5	2	0.0	2	4	2021	\$ 3,000	\$ 3,300	\$ -	
H-11 Heating System DS (30A)	Service Building	1	1988	15	-13	3	5	2	0.0	2	4	2021	\$ 3,000	\$ 3,300	\$ -	
H-14 FECL3 Storage Sump Pump DS (30A)	Service Building	1	1988	15	-13	3	5	2	0.0	2	4	2021	\$ 3,000	\$ 3,300	\$ -	
H-15 Centrifuge 2 Control Panel	Comico Duilding	1	1988	15	-13	3	5	2	0.0	2	4	2021	\$ 3,000	\$ 3,300	\$ -	
Panel B Transformer	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 1,750	\$ 1,900	\$ 525.0	
H-16, G-16 LP-B Section 1	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 850	\$ 1,000	\$ 255.0	
H-16, G-16 LP-B Section 2	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 2,225	\$ 2,400	\$ 667.5	
Thickening Blower 1	Service Building	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 20,000	\$ 21,600	\$ -	
H-2 Sludge Transfer Pump 2 DS (30A)	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980	\$ 1,100	\$ 294.0	
Thickening Blower 2	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 1,750	\$ 1,900	\$ 525.0	
H-3 Centrifuge Pump 2 DS (30A)	Service Building	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 20,000	\$ 21,600	\$ -	
H-5 WAS Pump DS	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980	\$ 1,100	\$ 294.0	
(30A) Tr-o Ternary Clariner Sample Pump 3 DS	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980	\$ 1,100	\$ 294.0	
H-7 Raw Sample Pump DS (30A) T1-7 Secondary	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 850	\$ 1,000	\$ 255.0	
Clarifier Sample Pump	Service Building	1	1987	50	22	3	30	3	0.0	3	9	2045	\$ 54,064	\$ 58,200	\$ 23,788.1	
H-9 LP Blower 3 DS (100A)	Service Building	1	1988	15	-13	3	5	3	0.0	2	6	2021	\$ 3,000	\$ 3,300	\$ -	
Heating Unit Control Panel	Service Building	1	1987	50	22	3	30	3	0.0	3	9	2045	\$ 33,553	\$ 36,100	\$ 14,763.2	
High Temperature Panel	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 9,700	\$ 10,500	\$ 700.0	175 gpm @ 42 TDH
HV-2	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 9,700	\$ 10,500	\$ 700.0	175 gpm @ 42 TDH
HV-3	Service Building	1	1987	20	0	3	2	3	0.0	3	9	2017	\$ 53,468	\$ 57,500	\$ -	
HVAC-1	Service Building	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 20,000	\$ 21,600	\$ -	
IB-101-1	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 1,750	\$ 1,900	\$ 525.0	
IB-101-2	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 850	\$ 1,000	\$ 255.0	
IB-102-1	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 455	\$ 500	\$ 136.5	
IB-102-2	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980	\$ 1,100	\$ 294.0	
IB-103-1	Service Building	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 20,000	\$ 21,600	\$ -	
IB-103-2	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 6,275	\$ 6,800	\$ 1,882.5	
IB-104-1	Service Building	1	1988	40	12	3	5	3	0.0	2	6	2021	\$ 5,800	\$ 6,300	\$ 1,740.0	
IB-104-2	Service Building	1	1988	40	12	3	5	3	0.0	2	6	2021	\$ 5,800	\$ 6,300	\$ 1,740.0	
IB-104-3	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 850	\$ 1,000	\$ 255.0	
IB-104-4	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980	\$ 1,100	\$ 294.0	
IB-105-1	Service Building	1	1987	20	-9	2	8	2	0.0	2	4	2024	\$ 1,330	\$ 1,500	\$ -	36"x14" (Corrosion Resistant, Pneumatic)
IB-105-2	Service Building	1	1987	20	-9	2	8	2	0.0	2	4	2024	\$ 1,400			36"x16" (Corrosion
IB-106-1	Service Building	1	1987	20	-9	2	8	2	0.0	2	4	2024	\$ 1,720			Resistant, Pneumatic) 24"x18" (Corrosion
IB-106-2	Service Building	1	1987	20	-9	2	8	2	0.0	2	4		\$ 1,560			Resistant, Electric) 60"x12" (Pneumatic)

Asset ID In	nformation			Asset Invento	ory Information				Asset C	riticality			Asset Renewal Cost	t		
Equipment	Location	Quantity	Installation Year	Asset Life (Years)	Remaining Life Based on Installation Date (Years)	Condition	Predicted Remaining Life Based on Condition of Equipment (Years)	COF	Redundancy	POF	BRE	Replacement Year	Replacement Cost 2016 Dollars	Replacement Cost 2018 Dollars	Depreciation Value	Asset Notes
IB-106-3	Service Building	1	1987	15	-14	2	3	2	0.0	2	4	2019	\$ 17,000	\$ 18,300	\$ -	3430 CFM, 24.15 kW
IB-106-4	Service Building	1	1987	20	-9	2	5	2	0.0	2	4	2021	\$ 2,000	\$ 2,200	\$ -	200 CFM, 11.1 MBH, 0.5 GPM (1/20 HP)
IB-107-1	Service Building	1	1987	20	-9	2	5	2	0.0	2	4	2021	\$ 2,000	\$ 2,200	\$ -	200 CFM, 11.1 MBH, 0.5 GPM (1/20 HP)
IB-107-2	Service Building	1	1987	20	-9	2	5	2	0.0	2	4	2021	\$ 2,000	\$ 2,200	\$ -	200 CFM, 11.1 MBH, 0.5 GPM (1/20 HP)
IB-107-3	Service Building	1	2002	40	26	2	8	4	0.0	2	8	2024	\$ 1,750	\$ 1,900	\$ 1,137.5	4330 CFWI (# 1.0 (3
IB-108-1	Service Building	1	2014	20	18	2	20	2	0.0	2	4	2036	\$ 35,000	\$ 37,700	\$ 31,500.0	HP), 480 MBH HEAT,
IB-108-2	Service Building	1	2014	25	23	2	25	2	0.0	2	4	2041	\$ 4,000	\$ 4,400	\$ 3,680.0	900 CFM @0.625" (1/4 HP)
IB-109-1	Service Building	1	2014	30	28	2	30	2	0.0	2	4	2046	\$ 5,860	\$ 6,400	\$ 5,469.3	52"x104" (Baked enamel)
IB-109-2	Service Building	1	1988	30	2	2	7	2	0.0	4	8	2023	\$ 2,700	\$ 3,000	\$ 200.0	24" x 28"
IB-109-3	Service Building	1	2002	15	1	2	8	3	0.0	2	6	2024	\$ 1,000	\$ 1,100	\$ 66.7	
IB-2-1	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 850	\$ 1,000	\$ 255.0	
IB-2-2	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980	\$ 1,100	\$ 294.0	
IB-2-3	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980	\$ 1,100	\$ 294.0	
IB-2-4	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980	\$ 1,100	\$ 294.0	
IB-3-1	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 1,750	\$ 1,900	\$ 525.0	
IB-3-2	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980	\$ 1,100	\$ 294.0	
IB-3-3	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 850	\$ 1,000	\$ 255.0	
IB-3-4	Service Building	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 10,000	\$ 10,800	\$ -	
IB-4-1	Service Building	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 20,000	\$ 21,600	\$ -	
IB-4-2	Service Building	1	1987	20	-9	3	3	2	0.0	2	4	2019	\$ 28,080	\$ 30,200	\$ -	100-675 CFM @ 0.244", 0.5 GPM @ 0.64'
IB-4-3	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,800	\$ 2,000	\$ 1,000.0	8"
IB-4-4	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,800	\$ 2,000	\$ 1,000.0	8"
IB-4-5	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,500	\$ 1,700	\$ 800.0	6"
IB-4-6	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,500	\$ 1,700	\$ 800.0	6"
IB-5-1	Service Building	1	1988	30	2	4	2	4	0.0	3	12	2018	\$ 538,200			0
IB-5-2	Service Building	1	2002	30	16	4	21	4	0.0	2	8	2037	\$ 286,800	\$ 308,400	\$ 153,000.0	0.25 MGD
IB-5-3	Service Building	1	2002	30	16	4	21	4	0.0	2	8	2037	\$ 18,000		\$ 9,600.0	0
IB-5-4	Service Building	1	1987	20	0	4	3	3	0.0	3	9	2018	\$ 16,214	\$ 17,500		
IB-6-1	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,500	\$ 1,700		6"
IB-6-2	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,500	\$ 1,700	\$ 800.0	6"
IF-16	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,800			8"
Intercom System Panel Intercom System		1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,800			8" 35 GPM @ 33 FT TDH
Terminal Box J-10 Eq Pump 2 DS	Service Building	1	1987	20	-9	2	5	2	0.0	2	4	2021	\$ 1,000			(3/4 HP)
J-10 Eq Pump 2 DS (60A) J-11 Eq Pump 1 DS	Service Building	1	1988	30	2	2	2	2	0.0	5	10	2018	\$ 7,200			1765 CFM @0.375" (1/4
J-11 Eq Pump 1 DS (60A) J-12 Process Blower 1	Service Building	1	2014	20	18	2	20	2	0.0	2	4	2036	\$ 3,200			HP) 1200 CFM @0.75" (1/3
DS (60A) J-13 Process Blower 2	Service Building	1	2014	20	18	2	20	2	0.0	2	4	2036	\$ 3,000			HP) 200 CFM @0.73 (1/3 HP)
DS (30A) J-14 Odor Control	Service Building	1	2014	20	18	2	20	2	0.0	2	4	2036	\$ 1,200			HP) 480 CFM @0.375" (1/6
Blower 1 DS (100A) J-15 Odor Control	Service Building	1	1987	20	-9	2	10	2	0.0	2	4	2026	\$ 1,750			HP) 24"x24" curb 1985 CFM @0.75" (1/2
Blower 2 DS (100A) J-16 Mixer Pump 1 DS	Service Building	1	1987	20	-9	2	10	2	0.0	2	4	2026	\$ 3,500			HP) 28"x28" curb
(100A)	Service Building	1	2014	20	18	2	20	2	0.0	2	4	2036	\$ 1,750			HP) 24"x24" curb
J-17 Mixer Pump 2 DS (100A) J-7 Cabinet Unit Heater	Service Building	1	2014	20	18	2	20	2	0.0	2	4	2036	\$ 1,500			200 CFM @ 0.375" (1/6 HP) 300 CFM @ 0.375" (1/6
1 DS (30A)	Service Building	1	2014	20	18	2	20	2	0.0	2	4	2036	\$ 1,500			HP)
J-8 Eq Pump 4 DS (30A)	Service Building	1	1987	30	1	2	10	2	0.0	2	4	2026	\$ 6,200	\$ 6,700	\$ 206.7	8470 CFM 52"x48" curb, 63"x63" hood

Asset ID In	nformation			Asset Invento	ry Information				Asset Cr	riticality			Asset Renewal Cos	t		
Equipment	Location	Quantity	Installation Year	Asset Life (Years)	Remaining Life Based on Installation Date (Years)	Condition	Predicted Remaining Life Based on Condition of Equipment (Years)	COF	Redundancy	POF	BRE	Replacement Year	Replacement Cost 2016 Dollars	Replacement Cost 2018 Dollars	Depreciation Value	Asset Notes
J-9 Eq Pump 3 DS (30A)	Service Building	1	1987	30	1	2	10	2	0.0	2	4	2026	\$ 3,800	\$ 4,100	\$ 126.7	900 CFM
Jet Aeration System	Service Building	1	2002	20	6	2	4	2	0.0	2	4	2020	\$ 18,720	\$ 20,200	\$ 5,616.0	6760 CFM @ 0.5" (1-1/2 HP)
K-100-1	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,800	\$ 2,000	\$ 1,000.0	8"
K-100-2	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,800	\$ 2,000	\$ 1,000.0	8"
L-1	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,600	\$ 2,800	\$ 200.0	5"
Lateral Flow Thickener 1	Service Building	1	1987	20	-9	4	2	2	0.0	3	6	2018	\$ 26,442	\$ 28,500	\$ -	100-675 CFM @ 0.244", 0.5 GPM @ 0.64'
Lateral Flow Thickener 1A	Service Building	1	1987	20	0	4	3	3	0.0	4	12	2018	\$ 14,441	\$ 15,600	\$ -	
Lateral Flow Thickener 2	Service Building	1	2002	30	16	4	16	4	0.0	3	12	2032	\$ 71,800	\$ 77,200	\$ 38,300.0	
Lateral Flow Thickener 2A	Service Building	1	1988	30	2	4	2	4	0.0	4	16	2018	\$ 18,000	\$ 19,400	\$ 1,200.0	
Lateral Flow Thickener 3	Service Building	1	1987	20	0	4	3	3	0.0	3	9	2018	\$ 34,253	\$ 36,900	\$ -	
Lateral Flow Thickener 4	Service Building	1	1987	30	1	4	1	4	0.0	4	16	2017	\$ 3,510	\$ 3,800	\$ 117.0	
LIT-1	Service Building	1	2002	25	11	2	8	2	0.0	2	4	2024	\$ 3,000	\$ 3,300	\$ 1,320.0	400 CFM @ 0.625" (1/2 HP)
LIT-2	Service Building	1	1987	25	-4	2	10	2	0.0	2	4	2026	\$ 31,200	\$ 33,600	\$ -	25 HP
Lower Gallery Sump Control Panel	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,600	\$ 2,800	\$ 200.0	5"
LP-J	Service Building	1	1987	25	-4	2	10	2	0.0	2	4	2026	\$ 31,200	\$ 33,600	\$ -	25 HP
LVUS-1	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,600	\$ 2,800	\$ 200.0	5"
maint garage roof	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,600	\$ 2,800	\$ 200.0	5"
maint. garage	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,600	\$ 2,800	\$ 200.0	5"
Manual Bar Screen	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,600	\$ 2,800	\$ 200.0	5"
MCC-A	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,600	\$ 2,800	\$ 200.0	5"
МСС-В	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,600	\$ 2,800	\$ 200.0	5"
MCC-G	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 1,800	\$ 2,000	\$ 200.0	8"
МСС-Н	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 1,800	\$ 2,000	\$ 200.0	8"
MCC-J	Service Building	1	1987	25	-4	2	10	2	0.0	2	4	2026	\$ 2,340	\$ 2,600	\$ -	
МСР	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 1,800	\$ 2,000	\$ 200.0	8"
Mechanical Bar Screen	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 1,800	\$ 2,000	\$ 200.0	8"
Mechanism	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 1,800	\$ 2,000	\$ 200.0	8"
Mix Pump #1	Service Building	1	1987	25	-4	2	10	2	0.0	2	4	2026	\$ 2,340	\$ 2,600	\$ -	
Mix Pump #2	Service Building	1	1987	15	-14	2	15	3	0.0	2	6	2031	\$ 6,000	\$ 6,500	\$ -	40 MBH, 40 GAL
Odor Control Blower 1	Service Building	3	2002	15	1	2	5	2	0.8	2	1	2021	\$ 4,680	\$ 5,100	\$ 312.0	
Odor Control Blower 2	Service Building	1	1987	20	-9	2	5	2	0.0	2	4	2021	\$ 3,000	\$ 3,300	\$ -	
Office Computer	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 1,800	\$ 2,000	\$ 200.0	8"
P-10-1	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 1,800	\$ 2,000	\$ 200.0	8"
P-101-1	Service Building	1	1987	20	-9	2	5	2	0.0	2	4	2021	\$ 2,400	\$ 2,600	\$ -	5 GPM @ 7 FT TDH
P-10-2	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 1,800	\$ 2,000	\$ 200.0	8"
P-10-3	Service Building	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 10,000	\$ 10,800	\$ -	
P-103-1	Service Building	2	1987	15	-14	2	3	2	0.5	2	2	2019	\$ 10,000	\$ 10,800	\$ -	1 HP
P-103-2	Service Building	2	1987	20	-9	2	10	2	0.5	2	2	2026	\$ 10,218	\$ 11,000	\$ -	1/2 HP
P-104-1	Service Building	3	1987	35	6	2	25	2	0.8	2	1	2041	\$ 39,000	\$ 42,000	\$ 6,685.7	(3) 230 GAL W/ (2) 1/3 HP MIXER & (1) 0.43
P-104-2	Service Building	2	1987	35	6	2	25	2	0.5	2	2	2041	\$ 50,000	\$ 53,800	\$ 8,571.4	(2) 100 GAL $W/(2)$ 0.65
P-105-1	Service Building	1	1987	25	-4	2	15	2	0.0	2	4	2031	\$ 1,170	\$ 1,300	\$ -	110 PSI @ 650°F, 30"DIA 84"H
P-105-1	Service Building	1	1987	25	-4	2	15	2	0.0	2	4	2031	\$ 5,148	\$ 5,600	\$ -	80 GAL @ 150 PSI, 180°F
P-105-10	Service Building	1	1987	25	-4	2	15	2	0.0	2	4	2031	\$ 1,170	\$ 1,300	\$ -	

Asset ID I	Information			Asset Invento	ry Information				Asset C	riticality		Į.	Asset Renewal Cos	t		
Equipment	Location	Quantity	Installation Year	Asset Life (Years)	Remaining Life Based on Installation Date (Years)	Condition	Predicted Remaining Life Based on Condition of Equipment (Years)	COF	Redundancy	POF	BRE	Replacement Year	Replacement Cost 2016 Dollars	Replacement Cost 2018 Dollars	Depreciation Value	Asset Notes
P-105-2	Service Building	2	1987	25	-4	2	15	2	0.5	2	2	2031	\$ 5,304	\$ 5,800	\$ -	18 GPM @ 15 PSI
P-105-2	Service Building	1	1987	25	-4	2	15	2	0.0	3	6	2031	\$ 65,000	\$ 69,900	\$ -	8000 GAL
P-105-3	Service Building	1	1987	25	-4	2	3	2	0.0	2	4	2019	\$ 2,700	\$ 3,000	\$ -	543 CFM, 14.3 MBH, 1.47 GPM (1/20 HP)
P-105-4	Service Building	1	1987	25	-4	2	3	2	0.0	2	4	2019	\$ 2,800	\$ 3,100	\$ -	815 CFM, 27.4 MBH, 2.83 GPM (1/20 HP)
P-105-5	Service Building	1	1987	25	-4	2	3	2	0.0	2	4	2019	\$ 2,400	\$ 2,600	\$ -	543 CFM, 14.3 MBH, 1.47 GPM (1/20 HP)
P-105-6	Service Building	1	2014	15	13	2	15	2	0.0	2	4	2031	\$ 1,600	\$ 1,800	\$ 1,386.7	75-750 CFM @ 0.058"
P-105-7	Service Building	1	2014	15	13	2	15	2	0.0	2	4	2031	\$ 1,600	\$ 1,800		100-675 CFM @ 0.244", 0.5 GPM @ 0.64'
P-105-8	Service Building	1	2014	15	13	2	15	2	0.0	2	4	2031	\$ 2,000	\$ 2,200	\$ 1,733.3	200-1765 CFM @ 0.132", 1.0 GPM @ 0.33'
P-105-9	Service Building	1	2014	15	13	2	15	2	0.0	2	4	2031	\$ 1,600	\$ 1,800	\$ 1,386.7	40-390 CFM @ 0.176", 0.5 GPM @ 0.64'
P-106-1	Service Building	1	2014	15	13	2	15	2	0.0	2	4	2031	\$ 1,600	\$ 1,800	\$ 1,386.7	0-900 CFM @ 0.404", 0.75 GPM @ 1.3'
P-11-1	Service Building	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 8,300	\$ 9,000	\$ 4,500.0	12"
P-11-2	Service Building	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 8,300	\$ 9,000	\$ 4,500.0	12"
P-113-1	Service Building	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 20,000	\$ 21,600	\$ -	
P-114-1	Service Building	1	1988	40	12	3	5	5	0.0	2	10	2021	\$ 250,000	\$ 268,800	\$ 75,000.0	
P-114-2	Service Building	1	1987	50	22	3	30	3	0.0	3	9	2045	\$ 30,262	\$ 32,600	\$ 13,315.5	
P-116-1	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 60,000	\$ 64,600	\$ 18,000.0	
P-116-2	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 70,000	\$ 75,300	\$ 21,000.0	
P-116-3	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 60,000	\$ 64,600	\$ 18,000.0	
P-12-1	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 60,000	\$ 64,600	\$ 18,000.0	
P-12-2	Service Building	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 40,000	\$ 43,100	\$ -	
P-12-3	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 27,000	\$ 29,100	\$ 14,400.0	6.45 MGD
P-12-4	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 1,800	\$ 2,000	\$ 200.0	4"
P-13-1	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 1,800	\$ 2,000	\$ 200.0	4"
P-13-2	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 1,800	\$ 2,000	\$ 200.0	4"
P-14-1	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 1,800	\$ 2,000	\$ 200.0	4"
P-14-2	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 1,800	\$ 2,000	\$ 200.0	4"
P-14-3	Service Building	1	2002	30	16	3	16	3	0.0	4	12	2032	\$ 2,100	\$ 2,300	\$ 1,200.0	3"
P-15-1	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 11,200	\$ 12,100	\$ 6,000.0	12"
P-19-1	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 11,200	\$ 12,100	\$ 6,000.0	12"
P-19-2	Service Building	1	2002	20	6	3	11	3	0.0	2	6	2027	\$ 24,300	\$ 26,200	\$ 7,300.0	6"
P-2	Service Building	1	2002	20	6	3	6	3	0.0	3	9	2022	\$ 36,400	\$ 39,200	\$ 11,000.0	6"
P-20-1?	Service Building	1	2002	20	6	3	6	3	0.0	3	9	2022	\$ 36,400	\$ 39,200	\$ 11,000.0	6"
P-2-1	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 4,600	\$ 5,000	\$ 400.0	8"
P-21-1	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 4,600	\$ 5,000	\$ 400.0	8"
P-21-2	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 4,600	\$ 5,000	\$ 400.0	8"
P-2-2	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 4,600	\$ 5,000	\$ 400.0	8"
P-3	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700	\$ 3,000	\$ 200.0	6"
P-3-1	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700	\$ 3,000	\$ 200.0	6"
P-3-2	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700	\$ 3,000	\$ 200.0	6"
P-4	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700	\$ 3,000	\$ 200.0	6"
P-4-1	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700	\$ 3,000	\$ 200.0	6"
P-4-2	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 4,600	\$ 5,000	\$ 400.0	8"
P-4-3	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 1,800	\$ 2,000	\$ 200.0	4"

Asset ID II	nformation			Asset Invento	ry Information				Asset C	riticality		,	Asset Renewal Cos	t		
Equipment	Location	Quantity	Installation Year	Asset Life (Years)	Remaining Life Based on Installation Date (Years)	Condition	Predicted Remaining Life Based on Condition of Equipment (Years)	COF	Redundancy	POF	BRE	Replacement Year	Replacement Cost 2016 Dollars	Replacement Cost 2018 Dollars	Depreciation Value	Asset Notes
P-4-4	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 1,800	\$ 2,000	\$ 200.0	4"
P-5-1	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 1,800	\$ 2,000	\$ 200.0	4"
P-5-2	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 1,800	\$ 2,000	\$ 200.0	4"
P-5-3	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700	\$ 3,000	\$ 200.0	6"
P-5-4	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700	\$ 3,000	\$ 200.0	6"
P-5-5	Service Building	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 1,800	\$ 2,000	\$ 200.0	4"
P-5-6	Service Building	1	1987	20	-9	3	4	3	0.0	2	6	2020	\$ 13,728	\$ 14,800	\$ -	111 GPM @ 60 FT TDH (3 HP)
P-6-1	Service Building	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 1,800	\$ 2,000	\$ 200.0	4"
P-6-2	Service Building	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 1,800	\$ 2,000	\$ 200.0	4"
P-7-1	Service Building	1	1987	20	-9	3	4	3	0.0	2	6	2020	\$ 13,728	\$ 14,800	\$ -	111 GPM @ 60 FT TDH (3 HP)
P-7-2	Service Building	1	1988	20	0	3	0	3	0.0	3	9	2016	\$ 12,200	\$ 13,200	\$ -	6"
P-7-3	Service Building	1	1988	20	0	3	0	3	0.0	4	12	2016	\$ 12,200	\$ 13,200	\$ -	6"
P-7-4	Service Building	1	1988	20	0	3	0	3	0.0	4	12	2016	\$ 12,200	\$ 13,200	\$ -	6"
P-8-1	Service Building	1	1988	20	0	3	0	3	0.0	3	9	2016	\$ 12,200	\$ 13,200	\$ -	6"
P-8-2	Service Building	1	2002	20	6	3	6	3	0.0	3	9	2022	\$ 12,200	\$ 13,200	\$ 3,700.0	6"
P-8-3	Service Building	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 2,700	\$ 3,000	\$ 200.0	6"
P-8-4	Service Building	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 2,700	\$ 3,000	\$ 200.0	6"
P-9-1	Service Building	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 2,700	\$ 3,000	\$ 200.0	6"
P-9-2	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 1,800	\$ 2,000	\$ 200.0	4"
P-9-3	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 1,800	\$ 2,000	\$ 200.0	4"
P-9-4	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 1,800	\$ 2,000	\$ 200.0	4"
P-9-5	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 1,800	\$ 2,000	\$ 200.0	4"
P-9-6	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700	\$ 3,000	\$ 200.0	6"
P-9-7	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700	\$ 3,000	\$ 200.0	6"
Panel 1	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700	\$ 3,000	\$ 200.0	6"
Panel 2	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700	\$ 3,000	\$ 200.0	6"
Parshall Flume 1	Service Building	1	1988	20	0	3	0	3	0.0	4	12	2016	\$ 9,800	\$ 10,600	\$ -	3"
PEW Gate Valve	Service Building	1	1988	20	0	3	0	3	0.0	4	12	2016	\$ 9,800	\$ 10,600	\$ -	3"
PEW Strainer	Service Building	1	1988	20	0	3	0	3	0.0	4	12	2016	\$ 9,800	\$ 10,600	\$ -	3"
PEW Tank	Service Building	1	1988	20	0	3	0	3	0.0	4	12	2016	\$ 9,800	\$ 10,600	\$ -	3"
PEW Valve Newer 1	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700	\$ 3,000	\$ 200.0	6"
PEW Valve Newer 2	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700	\$ 3,000	\$ 200.0	6"
PEW Valve Odd	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700	\$ 3,000	\$ 200.0	6"
PEW Valves 1	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700	\$ 3,000	\$ 200.0	6"
PEW Valves 2	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700	\$ 3,000	\$ 200.0	6"
PEW Valves 3	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700			6"
PEW Valves Small 1	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 2,700			6"
PEW Valves Small 2	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 7,200	\$ 7,800	\$ 500.0	0
Piping along wall opposite roll up door	Service Building	1	1988	30	2	3	7	3	0.0	2	6	2023	\$ 7,200	\$ 7,800	\$ 500.0	0
Polymer Feed Panel	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 13,000	\$ 14,000	\$ 900.0	0
Potable Water System?	? Service Building	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 2,700	\$ 3,000		6"
Recycle Plant Flow FIT 1-2	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 4,400			0
Recycle Pump 1	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 15,400	\$ 16,600	\$ 1,100.0	1325 gal

Asset ID Ir	nformation			Asset Invento	ry Information				Asset C	riticality			Asset Renewal Cos	t		
Equipment	Location	Quantity	Installation Year	Asset Life (Years)	Remaining Life Based on Installation Date (Years)	Condition	Predicted Remaining Life Based on Condition of Equipment (Years)	COF	Redundancy	POF	BRE	Replacement Year	Replacement Cost 2016 Dollars	Replacement Cost 2018 Dollars	Depreciation Value	Asset Notes
Recycle Pump 2	Service Building	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 400	\$ 500	\$ 300.0	3"
RF-10	Service Building	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 400	\$ 500	\$ 300.0	3"
RF-11	Service Building	1	1988	30	2	3	2	3	0.0	5	15	2018	\$ 5,700	\$ 6,200	\$ 400.0	2"
RF-15	Service Building	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 400	\$ 500	\$ 100.0	3"
RF-2	Service Building	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 400	\$ 500	\$ 100.0	3"
RF-3	Service Building	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 400	\$ 500	\$ 100.0	3"
RF-4	Service Building	1	1988	30	2	3	2	3	0.0	5	15	2018	\$ 300	\$ 400	\$ 100.0	2"
RF-5	Service Building	1	1988	30	2	3	2	3	0.0	5	15	2018	\$ 300	\$ 400	\$ 100.0	2"
RF-6	Service Building	1	1988	50	22	3	22	3	0.0	4	12	2038	\$ 12,500	\$ 13,500	\$ 5,500.0	3" and 6"
RF-7	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 7,200			
RF-8	Service Building	1	1988	15	-13	3	5	2	0.0	2	4	2021	\$ 3,000			
RF-9	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 14,400			5 , -
RV-1	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 14,400	\$ 15,500	\$ 1,000.0	200 gpm @ 45 ft TDH 719 CFM @0.625" (1/6
RV-2	Service Building	1	1987	20	-9	3	8	2	0.0	2	4	2024	\$ 1,900		\$ -	HP) 24"x24" curb
S-5-1	Service Building	1	1987	20	-9	3	5	2	0.0	2	4	2021	\$ 3,800	\$ 4,100	\$ -	2360 CFM @1.25" (1.5 HP) 28"x28" curb
S-5-2	Service Building	1	1987	20	-9	3	5	2	0.0	2	4	2021	\$ 1,750	\$ 1,900	\$ -	494 CFM @ 0.375" (1/6 HP) 18"x18" curb
Scale 1	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 12,100	\$ 13,100		
Scale 2	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 12,100	\$ 13,100	\$ 900.0	21" x 21"
Screenings Conveyor	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 5,400	\$ 5,900	\$ 400.0	
service building	Service Building	1	1987	50	22	3	30	2	0.0	3	6	2045	\$ 29,397	\$ 31,700	\$ 12,934.8	
service building	Service Building	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 5,400			
service building	Service Building	1	1987	50	22	3	30	3	0.0	3	9	2045	\$ 24,498			
service building roof	Service Building	1	1987	50	22	3	30	4	0.0	4	16	2045	\$ 73,473			
SF-1	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 75,500			
SF-2 Sludge Holding Tank	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 75,500			
Blower 1 Sludge Holding Tank	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 66,500			
Blower 2 Sludge Thickening	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 66,500			
Tank Blower 1 Sludge Thickening	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 66,500			
Tank Blower 2 Sludge Thickening	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 66,500			
Tank Blower 3 Sludge Thickening	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 44,900			
Tank Blower 4	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 44,900			400 gpm @ 60 ft TDH
sludge thickening tanks Sludge Transfer Pump		1	1987	25	-4	4	1	4	0.0	4	16	2017	\$ 5,460			40" 57"
1 Sludge Transfer Pump	Service Building	I	2002	20	6	3	11	3	0.0	2	6	2027	\$ 6,100			
2	Service Building	I	2002	20	6	3	11	3	0.0	2	6	2027	\$ 6,100			
SP-100-1	Service Building	1	2002	20	6	3	11	3	0.0	2	6	2027	\$ 6,100			
SP-101-1	Service Building	I	1988	20	0	3	0	3	0.0	3	9	2016	\$ 6,100			24" x 48"
SP-102-1	Service Building	2	1988	20	0	3	0	3	0.0	3	9	2016	\$ 6,100			24" x 48"
SP-1-1	Service Building	2	1987	20	-9 12	3	4	2	0.5	2	2	2020	\$ 6,000			3/4 HP
SP-1-2	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 1,750			
SP-2 & 3	Service Building	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 1,750			
Spare DS 1 (30A)	Service Building	1	1988	50	22	3	22	3	0.0	4	12	2038	\$ 2,100			4"
Spare DS 2 (30A)	Service Building	1	0		0	3	5	3	0.0	3	0	2021	\$ 1,600		#DIV/0!	
SPD Piping	Service Building	1	0		0	3	5	3	0.0	3	0	2021	\$ 1,600	\$ 1,800	#DIV/0!	

Asset ID In	nformation			Asset Invento	ry Information				Asset Cı	riticality			Asset Renewal Co	est		
Equipment	Location	Quantity	Installation Year	Asset Life (Years)	Remaining Life Based on Installation Date (Years)	Condition	Predicted Remaining Life Based on Condition of Equipment (Years)	COF	Redundancy	POF	BRE	Replacement Year	Replacement Cos 2016 Dollars	Replacement Cost 2018 Dollars	Depreciation Value	Asset Notes
Submersible Mixer 6	Service Building	1	1988	30	2	4	2	4	0.0	3	12	2018	\$ 538,20	0 \$ 578,700	\$ 35,900.0	
Sump Pump 1	Service Building	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 10,00	0 \$ 10,800	\$ -	
Sump Pump 2	Service Building	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 10,00	0 \$ 10,800	\$ -	
Tertiary Clarifier 2	Service Building	1	2002	25	11	5	0	2	0.0	4	8	2016	\$ 6,10	0 \$ 6,600	\$ 2,684.0	4200 CFM, 173.5 MBH, 8.4 GPM (1/3 HP)
tertiary clarifier 3	Service Building	1	2002	25	11	5	0	2	0.0	4	8	2016	\$ 6,10	0 \$ 6,600	\$ 2,684.0	4200 CFM, 173.5 MBH, 8.4 GPM (1/3 HP)
Tertiary Clarifier 3	Service Building	1	2002	25	11	5	0	2	0.0	4	8	2016	\$ 6,10	0 \$ 6,600	\$ 2,684.0	4200 CFM, 173.5 MBH, 8.4 GPM (1/3 HP)
Train Control Panel	Service Building	1	1987	25	-4	3	8	2	0.0	2	4	2024	\$ 3,00	0 \$ 3,300	\$ -	1 HP
Train Control Panel	Service Building	1	1987	30	1	3	15	2	0.0	2	4	2031	\$ 3,05	0 \$ 3,300	\$ 101.7	36"x78"
TT-AC-1	Service Building	1	1987	30	1	3	15	2	0.0	2	4	2031	\$ 2,11	0 \$ 2,300	\$ 70.3	36"x54"
TT-AC-2	Service Building	1	1987	30	1	3	15	2	0.0	2	4	2031	\$ 1,17	0 \$ 1,300	\$ 39.0	36"x30"
TT-AD-1	Service Building	1	1987	30	1	3	15	2	0.0	2	4	2031	\$ 3,59	0 \$ 3,900	\$ 119.7	72"x46"
TT-BFP-1	Service Building	3	2002	15	1	3	5	2	0.8	3	1.5	2021	\$ 4,68	0 \$ 5,100	\$ 312.0	
TT-ESS-1	Service Building	2	2002	20	6	3	10	2	0.5	2	2	2026	\$ 18,00	0 \$ 19,400	\$ 5,400.0	100 GPM @ 50 FT TDH (7.5 HP)
TT-ESS-2	Service Building	1	1987	20	-9	3	5	2	0.0	2	4	2021	\$ 2,00	0 \$ 2,200	\$ -	
TT-ESS-3	Service Building	1	1987	25	-4	3	2	2	0.0	3	6	2018	\$ 2,70	0 \$ 3,000	\$ -	595 CFM, 17.8 MBH, 1.83 GPM (1/25 HP)
TT-GWH-1	Service Building	1	1987	25	-4	3	2	2	0.0	2	4	2018	\$ 2,70	0 \$ 3,000	\$ -	595 CFM, 17.8 MBH, 1.83 GPM (1/25 HP)
TT-L-2	Service Building	1	1987	25	-4	3	2	2	0.0	2	4	2018	\$ 2,80	0 \$ 3,100	\$ -	815 CFM, 27.4 MBH, 2.83 GPM (1/20 HP)
TT-L-3	Service Building	1	1987	25	-4	3	2	2	0.0	2	4	2018	\$ 2,80	0 \$ 3,100	\$ -	815 CFM, 27.4 MBH, 2.83 GPM (1/20 HP)
TT-L-4	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 1,80	0 \$ 2,000	\$ 1,000.0	8"
TT-L-5	Service Building	1	1988	20	0	3	0	3	0.0	3	9	2016	\$ 2,50	0 \$ 2,700	\$ -	3"
TT-P-1, 2, 3 Polymer Feed	Service Building	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 4,60	0 \$ 5,000	\$ 2,500.0	8"
TT-P-11 Sample	Service Building	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 4,60	0 \$ 5,000	\$ 400.0	8"
TT-P-12	Service Building	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 4,60	0 \$ 5,000	\$ 400.0	8"
TT-P-4, 5, 6 Ferric Chloride Feed	Service Building	1	1987	50	22	3	30	3	0.0	3	9	2045	\$ 67,11	1 \$ 72,200	\$ 29,528.7	
TT-P-7, 8 Cationic Polymer Feed	Service Building	1	1987	50	22	3	30	3	0.0	3	9	2045	\$ 68,56	6 \$ 73,800	\$ 30,169.1	
TT-P-9, 10 Boiler Recirc	Service Building	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 60,40	0 \$ 65,000	\$ 32,300.0	100 gpm @ 45' TDH
TT-SP-1, 2	Service Building	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 60,40	0 \$ 65,000	\$ 32,300.0	100 gpm @ 45' TDH
Weirs	Service Building	1	2002	25	11	5	0	2	0.0	4	8	2016	\$ 6,10	0 \$ 6,600	\$ 2,684.0	4200 CFM, 173.5 MBH, 8.4 GPM (1/3 HP)
Weirs	Service Building	1	1987	25	-4	5	0	2	0.0	5	10	2016	\$ 2,40	0 \$ 2,600	\$ -	543 CFM, 14.3 MBH, 1.47 GPM (1/20 HP)
B-1-1	Site	1	2002	30	16	4	16	4	0.0	3	12	2032	\$ 9,00	0 \$ 9,700	\$ 4,800.0	
B-1-2	Site	1	1987	45	17	4	17	3	0.0	3	9	2032	\$ 8,34	6 \$ 9,000	\$ 3,153.0	
P-107-1	Site	1	2002	40	26	2	8	4	0.0	2	8	2024	\$ 1,20	0 \$ 1,300	\$ 780.0	
P-108-1	Site	1	2002	40	26	2	8	4	0.0	2	8	2024	\$ 1,20	0 \$ 1,300	\$ 780.0	
P-108-2	Site	1	2002	40	26	2	8	4	0.0	2	8	2024	\$ 3,22	5 \$ 3,500	\$ 2,096.3	
P-108-3	Site	1	2002	40	26	2	8	4	0.0	2	8	2024	\$ 3,22	5 \$ 3,500	\$ 2,096.3	
P-108-4	Site	1	2002	40	26	2	8	4	0.0	2	8	2024	\$ 1,20	0 \$ 1,300	\$ 780.0	
P-109-1	Site	1	2002	40	26	2	8	4	0.0	2	8	2024	\$ 98	0 \$ 1,100	\$ 637.0	
TT-SP-3	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 1,20	0 \$ 1,300	\$ 360.0	
TT-T-1, 2, 3 Cationic Polymer w/mixer	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 1,20	0 \$ 1,300	\$ 360.0	
TT-T-4, 5 Anionic Polymer w/mixer	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 2,22	5 \$ 2,400	\$ 667.5	
TT-T-6	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 1,20	0 \$ 1,300	\$ 360.0	
TT-T-7	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 1,20	0 \$ 1,300	\$ 360.0	
TT-T-8	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 3,22	5 \$ 3,500	\$ 967.5	

Asset ID II	nformation			Asset Invento	ry Information				Asset Cr	riticality		,	Asset Renewal Cos	t		
Equipment	Location	Quantity	Installation Year	Asset Life (Years)	Remaining Life Based on Installation Date (Years)	Condition	Predicted Remaining Life Based on Condition of Equipment (Years)	COF	Redundancy	POF	BRE	Replacement Year	Replacement Cost 2016 Dollars	Replacement Cost 2018 Dollars	Depreciation Value	Asset Notes
TT-T-9	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 3,225	\$ 3,500	\$ 967.5	
TT-WS-1, 2	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 1,200	\$ 1,300	\$ 360.0	
UH-1	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980	\$ 1,100	\$ 294.0	
UH-10	Site	1	1988	15	-13	3	5	4	0.0	2	8	2021	\$ 40,000	\$ 43,100	\$ -	
UH-11	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 3,225	\$ 3,500	\$ 967.5	
UH-12	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 3,225	\$ 3,500	\$ 967.5	
UH-2	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 1,200	\$ 1,300	\$ 360.0	
UH-3	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980	\$ 1,100	\$ 294.0	
UH-4	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980	\$ 1,100	\$ 294.0	
UH-5	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980	\$ 1,100	\$ 294.0	
UH-6	Site	1	1988	40	12	3	5	3	0.0	2	6	2021	\$ 20,000	\$ 21,600	\$ 6,000.0	
UH-7	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980	\$ 1,100	\$ 294.0	
UH-8	Site	1	1988	40	12	3	5	3	0.0	3	9	2021	\$ 10,000	\$ 10,800	\$ 3,000.0	
UH-9	Site	1	1988	40	12	3	5	3	0.0	2	6	2021	\$ 5,800	\$ 6,300	\$ 1,740.0	
Unknown IB Valve	Site	1	1988	40	12	3	5	3	0.0	2	6	2021	\$ 5,800	\$ 6,300	\$ 1,740.0	
Unknown Valve	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 40,000	\$ 43,100	\$ 12,000.0	
Unknown Valve 1	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 50,000	\$ 53,800	\$ 15,000.0	
Unknown Valve 2	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980	\$ 1,100	\$ 294.0	
Unknown Valve 3	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 980	\$ 1,100	\$ 294.0	
upper gallary	Site	1	1988	40	12	3	5	4	0.0	2	8	2021	\$ 200,000	\$ 215,100	\$ 60,000.0	
upper gallery	Site	1	1988	40	12	3	5	3	0.0	2	6	2021	\$ 10,000	\$ 10,800	\$ 3,000.0	
upper gallery roof	Sludge Drying Beds	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 1,800	\$ 2,000	\$ 200.0	4"
VV-1	Sludge Drying Beds	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 1,800	\$ 2,000	\$ 200.0	4"
VV-2	Sludge Drying Beds	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 1,800	\$ 2,000	\$ 200.0	4"
VV-3	Sludge Drying Beds	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 1,800	\$ 2,000	\$ 200.0	4"
VV-4	Sludge Drying Beds	1	1988	50	22	3	22	3	0.0	4	12	2038	\$ 8,400	\$ 9,100	\$ 3,700.0	
A-11 Sludge Mixer 5 DS (60A)	Sludge Holding Tanks	1	1988	20	0	3	0	3	0.0	3	9	2016	\$ 72,500	\$ 78,000	\$ -	20 hp
A-18 Sludge Mixer 1 DS (60A)	Sludge Holding Tanks	1	1988	20	0	3	0	3	0.0	3	9	2016	\$ 72,500	\$ 78,000	\$ -	20 hp
A-19 Sludge Mixer 2 DS (60A) B-13 Treating/Cooling	Sludge Holding Tanks	1	2002	20	6	3	11	3	0.0	2	6	2027	\$ 72,500	\$ 78,000	\$ 21,800.0	20 hp
Outdoor Unit DS	Sludge Holding Tanks	1	2002	20	6	3	11	3	0.0	2	6	2027	\$ 72,500	\$ 78,000	\$ 21,800.0	20 hp
VV-5	Sludge Holding Tanks	1	2002	30	16	3	16	3	0.0	3	9	2032	\$ 28,800	\$ 31,000	\$ 15,400.0	
WAS Pump	Sludge Holding Tanks	1	1988	20	0	3	0	3	0.0	3	9	2016	\$ 72,500	\$ 78,000	\$ -	20 hp
Waste Tertiary Sludge Pump (WTS)	Sludge Holding Taliks	1	1988	20	0	3	0	3	0.0	3	9	2016	\$ 72,500	\$ 78,000	\$ -	20 hp
B-18 Sludge Mixer 3 DS (60A)	Sludge Thickener Tanks	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 1,500	\$ 1,700	\$ 100.0	6"
B-19 Sludge Mixer 4 DS (60A)	Sludge Thickener Tanks	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 1,500	\$ 1,700	\$ 100.0	6"
3-9 Sludge Mixer 6 DS (60A)	Tanks	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 1,500	\$ 1,700	\$ 100.0	6"
C-1 Oxidation Ditch 2 DS (200A)	Tanks	1	1988	30	2	3	2	3	0.0	4	12	2018	\$ 1,500	\$ 1,700	\$ 100.0	6"
C-2 Oxidation Ditch 1 DS (200A)	Tanks	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 30,200	\$ 32,500	\$ 2,100.0	60 in x 130 in x 36 in deep
C-3 Return Sludge Pump 1 DS (60A)	Sludge Thickener Tanks	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 30,200	\$ 32,500	\$ 16,200.0	64 in x 132 in x 30 in deep
C-4 Secondary Clarifier 1 DS (30A)	Sludge Thickener Tanks	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 30,200	\$ 32,500	\$ 2,100.0	60 in x 130 in x 36 in deep
Ceramic Plate Fine Bubble Diffuser	Sludge Thickener Tanks	1	2002	30	16	3	21	3	0.0	2	6	2037	\$ 30,200	\$ 32,500	\$ 16,200.0	64 in x 132 in x 30 in deep
CP-3	Sludge Thickener Tanks	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 30,200	\$ 32,500	\$ 2,100.0	60 in x 130 in x 36 in deep
D-1 Oxidation Ditch 3 DS (200A)	Sludge Thickener Tanks	1	1988	30	2	3	2	3	0.0	3	9	2018	\$ 30,200	\$ 32,500	\$ 2,100.0	60 in x 130 in x 36 in deep

Asset ID In	nformation			Asset Invento	ry Information			Asset Criticality					Ass	set Renewal Co	st		
Equipment	Location	Quantity	Installation Year	Asset Life (Years)	Remaining Life Based on Installation Date (Years)	Condition	Predicted Remaining Life Based on Condition of Equipment (Years)	COF	Redundancy	POF	BRE	Replacement	Year	Replacement Cost 2016 Dollars	Replacement Cost 2018 Dollars	Depreciation Value	Asset Notes
D-2 Oxidation Ditch 4 DS (200A)	Sludge Thickener Tanks	1	1987	60	32	3	32	3	0.1	3	8.1	2047	\$	1,077,599	\$ 1,158,600	\$ 574,719.3	
D-3 Return Sludge Pump 2 DS (60A)	Tertiary Clarifiers	1	2002	30	16	3	21	3	0.0	2	6	2037	\$	3,300	\$ 3,600	\$ 1,800.0	12"
D-4 Secondary Clarifier 2 DS (30A)	Tertiary Clarifiers	1	1988	30	2	3	2	3	0.0	3	9	2018	\$	3,300	\$ 3,600	\$ 300.0	12"
Fuel oil containment	Tertiary Clarifiers	1	1988	30	2	3	2	3	0.0	3	9	2018	\$	3,300	\$ 3,600	\$ 300.0	12"
G-14 Grit Tank Mixer DS (30A)	Tertiary Clarifiers	1	1987	45	17	3	17	3	0.0	3	9	2032	\$	178,83	\$ 192,300	\$ 67,559.7	
G-8 Recycle Pump 1 DS (30A)	Tertiary Clarifiers	1	1987	45	17	3	17	3	0.0	3	0	2032	\$	169,45	\$ 182,200	\$ 64,016.9	
General Lighting	Tertiary Clarifiers	1	2003	45	33	3	33	3	0.0	3	9	2048	\$	166,40	\$ \$ 179,000	\$ 122,030.0	
H-8 Recycle Pump 2 DS (30A)	Tertiary Clarifiers	1	2002	30	16	3	21	3	0.0	2	6	2037	\$	26,600	\$ 28,600	\$ 14,200.0	
Intercom System	Tertiary Clarifiers	1	1988	30	2	3	2	3	0.0	3	9	2018	\$	26,600	\$ 28,600	\$ 1,800.0	
J-1 Oxidation Ditch 6 DS (200A)	Tertiary Clarifiers	1	1988	30	2	3	2	3	0.0	3	9	2018	\$	26,600	\$ 28,600	\$ 1,800.0	
Tertiary clarifier 1	Tertiary Clarifiers	1	1988	30	2	4	2	4	0.0	3	12	2018	\$	754,700	\$ 811,500	\$ 50,400.0	800 to 1500 gpm
Tertiary Clarifier 1	Tertiary Clarifiers	1	1988	30	2	4	2	4	0.0	3	12	2018	\$	754,700	\$ 811,500	\$ 50,400.0	800 to 1500 gpm
Tertiary clarifier 2	Tertiary Clarifiers	1	2002	30	16	4	16	4	0.0	3	12	2032	\$	754,700	\$ 811,500	\$ 402,600.0	800 to 1500 gpm

APPENDIX D: FORCE MAIN CORROSION STUDY



Prepared for:

City of Brighton, Michigan

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City of Brighton 2024 Corrosion Study



CORRPRO PROJECT NO.: 4854

CLIENT PO NO.: 24-1734

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REVISION HISTORY

Rev.	Date	Editor	Status	Checked By	Approved By
0	2/21/2024	M. Nordstrom	Issued for Review	TAR	TAR

TPL-084 Revision Date: 22DEC2021

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APPENDIX B: ULTRASONIC THICKNESS DATA

APPENDIX C: TEST PROCEDURES



1. INTRODUCTION

On February 6 and 7, Corrpro measured the thickness of the 12-inch ductile iron water lines, as requested, in the City of Brighton, Michigan. The purpose of this testing is to determine the rate of the corrosion and to determine the remaining serviceable life of the water lines.

This work was performed in accordance with City of Brighton PO Number 24-1734, dated January 2, 2024.

2. DESCRIPTION OF STRUCTURES

The structures under consideration are the two (2) 12-inch diameter ductile iron sewer force mains. The lines run from the Wastewater Treatment Plant to the north and then east around Brighton Lake.

The lines are reported to be 12-inch ductile iron, Class 52. The nominal thickness of the pipe is published to be 0.37 inches. The pipes were installed in March, 1988.

The locations to be tested during this survey were pre-selected by City of Brighton personnel.

3. DATA AND FINDINGS

The thicknesses of the pipes were tested at pre-selected locations. These locations included excavations and lift station locations. The thicknesses of the pipes were measured with an ultrasonic thickness tester, which measures the time for a pulse of sound to travel from the probe, through the pipe material, reflect off the interior surface of the pipeline, and back to the probe on the outside of the pipeline. Because the velocity of the sound signal through ductile iron is known, the measured time can be converted to the distance the sound pulse traveled, or the thickness of the pipe.

Comparing the thickness of the pipe at the various locations along the pipeline route to the nominal thickness of the pipe and to the length of time the pipes have been in the ground (36 years), the corrosion rate can be calculated in terms of mils/year. Corrosion rate of ductile iron can be expected to be between 0.5 mils/year to 1.5 mils/year.

Additionally, the data can be extrapolated to determine the length of remaining useful service in the pipe.

The data collected during this survey are presented in Appendix B of this report. A brief listing of the test procedures used to collect this data is contained in Appendix C.

As can be seen in the data in Appendix B, the maximum corrosion rate observed during this testing was 1.583 mils/year, with the average at just under 1.0 mils/year. Based on this data, the remaining useful life of the pipelines should be 80 years.

It is noted that the testing was only performed at the locations identified by City of Brighton personnel. This only considers general corrosion of the pipelines in the vicinity of the locations tested. Localized corrosion can still occur along the pipeline as a result of stray current (such as caused by impressed-current cathodic protection systems on underground



gas lines), or by different soil types (often found when a pipeline runs through wet, swampy soils and dry soils). A full corrosion study and interference inspection can be performed to determine if additional areas may be areas of concern.

4. CONCLUSIONS

Based upon the preceding data and findings the following conclusions can be made:

- 1. The maximum corrosion rate of the subject ductile iron pipelines was found to be 1.583 mils/year.
- 2. Based on the corrosion rate, the life of the pipeline should exceed 80 additional years.
- 3. Localized corrosion may be occurring on the line at additional areas. The localized corrosion can be caused by a number of factors, such as stray current or by differential soils. More testing is required to identify those areas.

5. RECOMMENDATIONS

Based upon the preceding results and conclusions the following recommendations are made:

1. Have a full corrosion study performed on the pipeline route.



PROJECT PARTICULARS

Location:		
Project Manager	Michael Nordstrom	Phone: 330-723-5082 Email: mnordstrom@aegion.com
Dissipat Dates	Field:	February 6, 2024 to February 7, 2024
Project Dates:	Office:	February 21, 2024
Personnel:	Field:	William Droulliard
Personnei:	Office:	Michael Nordstrom
Document Control:		
*Template is not to be revised except under client specific request	Template Document No.:	TPL-008 Revision Date: 26MAY2021



APPENDIX A: QUALITY ASSURANCE FORM

Customer Name:	City of Bri	City of Brighton, Michigan							
Project Name:	Corrosion	Corrosion Study – 12-inch Ductile Ir			on Type of Document:			Survey	
Project Scope of Work:									
 Ultrasonic Thick Analysis of Data		· ·	on rate and re	emaining	g use	ful life			
Referenced Standards	for Compli	ance							
•									
Compliance / Criteria A	chieved?	Current So	urces Operat	ional?	IR	Consideration	Av	ailable in AIM?	
N/A		N/A			N/	Α	N/	A	
Assumptions Included	in Analysis	:							
•	1								
Corrpro Project Team	Name		Title			Qualifications		Date	
Field Tech Lead	William [Droulliard	Technician			NACE CP1, CIP1		2/7/2024	
Report Author	Michael I	Nordstrom	Senior Engin	eer NACE CP4		NACE CP4		2/21/2024	
Summary of Conclusion	ns:								
The maximumThe remaining			•	33 mils/y	/ear.				
		ame		Timothy Robertson					
Boulous Completed B.	Ti	tle		Engineer II					
Review Completed By:	Q	ualification	s	NACE Cathodic Protection Technologist No. 31681					
	D	,			2/21/2024				





APPENDIX B: ULTRASONIC THICKNESS MEASUREMENTS DATA



APPENDIX B: ULTRASONIC THICKNESS MEASUREMENTS DATA

			South Pip	е				North Pipe		
	Measured		Corrosion	Remaining		Measured		Corrosion	Remaining	
	Thickness	Change	Rate	Thickness	Years	Thickness	Change	Rate	Thickness	Years
	(Inches)	(mils)	(mils/year)	(Inches)	Remaining	(Inches)	(mils)	(mils/year)	(Inches)	Remaining
2/7/2024 South Side Bauer Road										
12:00 (Top)	0.332	38.0	1.056	0.147	139.26	0.335	35.0	0.972	0.150	154.29
3:00 (Side)		47.0	1.306	0.138	105.70	0.352	18.0	0.500	0.167	334.00
6:00 (Bottom)		17.0	0.472	0.168	355.76	0.354	16.0	0.444	0.169	380.25
9:00 (Side)	0.347	23.0	0.639	0.162	253.57	0.337	33.0	0.917	0.152	165.82
2/7/2024 North Side Bauer Road										
12:00 (Top)	0.315	55.0	1.528	0.130	85.09	0.327	43.0	1.194	0.142	118.88
3:00 (Side)	0.335	35.0	0.972	0.150	154.29	0.366	4.0	0.111	0.181	1629.00
6:00 (Bottom)	0.345	25.0	0.694	0.160	230.40	0.378	0.0	0.000	0.193	
9:00 (Side)	0.359	11.0	0.306	0.174	569.45	0.396	0.0	0.000	0.211	
2/6/2024 5250 Hidden Pines										
12:00 (Top)	0.382	0.0	0.000	0.197		0.383	0.0	0.000	0.198	
3:00 (Side)	0.382	0.0	0.000	0.197		0.378	0.0	0.000	0.193	
6:00 (Bottom)	0.386	0.0	0.000	0.201		0.376	0.0	0.000	0.191	
9:00 (Side)	0.396	0.0	0.000	0.211		0.381	0.0	0.000	0.196	
2/6/2024 909 Livingston Road										
North End										
12:00 (Top)	0.317	53.0	1.472	0.132	89.66	0.363	7.0	0.194	0.178	915.43
3:00 (Side)	0.313	57.0	1.583	0.128	80.84	0.330	40.0	1.111	0.145	130.50
6:00 (Bottom)	0.315	55.0	1.528	0.130	85.09	0.344	26.0	0.722	0.159	220.15
9:00 (Side)	0.314	56.0	1.556	0.129	82.93	0.348	22.0	0.611	0.163	266.73
2/6/2024 909 Livingston Road										
South End										
12:00 (Top)	0.326	44.0	1.222	0.141	115.36	0.317	53.0	1.472	0.132	89.66
3:00 (Side)	0.359	11.0	0.306	0.174	569.45	0.331	39.0	1.083	0.146	134.77
6:00 (Bottom)	0.339	31.0	0.861	0.154	178.84	0.328	42.0	1.167	0.143	122.57
9:00 (Side)	0.362	8.0	0.222	0.177	796.50	0.326	44.0	1.222	0.141	115.36

^{* 1000} mils = 1 inch



APPENDIX B: ULTRASONIC THICKNESS MEASUREMENTS DATA

			South Pip	е				North Pipe		
	Measured		Corrosion	Remaining		Measured		Corrosion	Remaining	
	Thickness	Change	Rate	Thickness	Years	Thickness	Change	Rate	Thickness	Years
	(Inches)	(mils)	(mils/year)	(Inches)	Remaining	(Inches)	(mils)	(mils/year)	(Inches)	Remaining
2/6/2024 42.509355, -83.807150								Ι		
Water Treatment Plant										
12:00 (Top)	0.325	45.0	1.250	0.140	112.00	0.348	22.0	0.611	0.163	266.73
3:00 (Side)		27.0	0.750	0.158	210.67	0.331	39.0	1.083	0.146	134.77
6:00 (Bottom)		10.0	0.278	0.175	630.00	0.341	29.0	0.806	0.156	193.66
9:00 (Side)		29.0	0.806	0.156	193.66	0.346	24.0	0.667	0.161	241.50
2/7/2024 F200 Hidden Bines Drive									· I	
2/7/2024 5388 Hidden Pines Drive										
12:00 (Top)		0.0	0.000	0.195		0.376	0.0	0.000	0.191	
3:00 (Side)	0.377	0.0	0.000	0.192		0.378	0.0	0.000	0.193	
6:00 (Bottom)	0.398	0.0	0.000	0.213		0.379	0.0	0.000	0.194	
9:00 (Side)	0.397	0.0	0.000	0.212		0.360	10.0	0.278	0.175	630.00
2/6/2024 42.52439, -83.79752										
5384 Arbor Bay Drive										
12:00 (Top)	0.324	46.0	1.278	0.139	108.78	0.322	48.0	1.333	0.137	102.75
3:00 (Side)		56.0	1.556	0.129	82.93	0.328	42.0	1.167	0.143	122.57
6:00 (Bottom)		44.0	1.222	0.141	115.36	0.345	25.0	0.694	0.160	230.40
9:00 (Side)		34.0	0.944	0.151	159.88	0.364	6.0	0.167	0.179	1074.00

^{* 1000} mils = 1 inch





APPENDIX C: TEST PROCEDURES

Test Procedures:

 WI-FLD-067 Measure Wall Thickness with Handheld Ultrasonic Meter

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APPENDIX E: OPINIONS OF PROBABLE COSTS AND PRESENT WORTH ANALYSIS



PROJECT:	City of Brig	hton, MI CWSRF Pro	ject Plan	DATE:	_	2/27/2024
LOCATION:		Brighton,MI		PROJECT	NO.	200-12766-23009
BASIS FOR ES	TIMATE: [X] CONCEPTUAL	[]PRELIMINARY	[] FINAL	ESTIMATO	OR:	B. Bode
WORK:				CHECKED	BY:	B.Bode
_				CURRENT	ΓENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1	0-5 Year Projects				
2	Influent Screening and Grit Removal Systems	1		\$2,624,000.00	\$2,624,000.00
3	Pneumatic Valve Replacement	1		\$585,000.00	\$585,000.00
4	Oxidation Ditch No.1 and 2 Rotor and Drive Replacement	1		\$3,228,000.00	\$3,228,000.00
5	Chemical Feed System Replacement	1		\$722,000.00	\$722,000.00
6	Equalization Valve and VFD Replacement	1		\$394,000.00	\$394,000.00
7	Secondary Clarifier Mechanism Replacement	1		\$3,865,000.00	\$3,865,000.00
8	WWTP Doors and Roof Replacement	1		\$1,128,000.00	\$1,128,000.00
9	WWTP Generator Replacement	1		\$1,144,000.00	\$1,144,000.00
10	Electrical Switchgear and MCC Replacement	1		\$348,000.00	\$348,000.00
11	SCADA System Upgrades	1		\$550,000.00	\$550,000.00
12	Service Bldg Plumbing, Drain, Air, and Water Service Replacement	1		\$1,047,000.00	\$1,047,000.00
13	Boiler and Heating System Replacement	1		\$743,000.00	\$743,000.00
14	Infiltration and Disinfection Improvements	1		\$9,981,000.00	\$9,981,000.00
15	Solids Handling System	1		\$6,298,000.00	\$6,298,000.00
16	Subtotal				\$32,660,000.00
17					
18					
19					
20					
	TOTAL CONSTRUCTION COST				\$32,660,000.00

3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton,MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL [] PRELIMINARY [] FINAL **ESTIMATOR:** B.Bode WORK: Regionalization pumping to MHOG system **CHECKED BY:** B.Bode **CURRENT ENR:** 13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1					
2	Two 12-inch Forcemains	35,000		\$650.00	\$22,750,000.00
3	Pump Station Modifications	1		\$1,700,000.00	\$1,700,000.00
4					
5	Expansion of WWTP	1		\$12,000,000.00	\$12,000,000.00
6					
7					
8					
9					
10					
11	Subtotal				\$36,450,000.00
12					
13					
14	General Conditions	10	%		\$3,645,000.00
15	Engineering	10	%		\$4,010,000.00
16	Contingencies	30	%		\$13,232,000.00
	TOTAL CONSTRUCTION COST				\$57,337,000.00

PROJECT:	City of Brighton, MI CWSRF Project Plan	DATE:	2/27/2024
LOCATION:	Brighton,MI	PROJECT NO.	200-12766-23009
BASIS FOR ES	STIMATE: [X] CONCEPTUAL [] PRELIMINARY [] FINAL	ESTIMATOR:	B.Bode
WORK:	Influent Screenings and Grit Removal System Replacement	CHECKED BY:	B.Bode
_	Project W-1, Alternative A	CURRENT ENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1					
2	Screen Mechanism Replacement	1	EA	\$219,000	\$219,000
3	Compactor Replacement	1	EA	\$75,000	\$75,000
4	Grit Classifier	1	EA	\$150,000	\$150,000
5	Grit Mixer	1	EA	\$175,000	\$175,000
6					
7	Grit Pump	2	EA	\$55,000	\$110,000
8	Grit Piping and Valves	1	LS	\$84,000	\$84,000
9					
10	Influent Pipe and Valve Replacement	1	LS	\$87,500	\$87,500
11	Flowmeters	3	EA	\$25,000	\$75,000
12					
13	Structural Rehabilation	1	LS	\$55,000	\$55,000
14	Odor Control	1	LS	\$250,000	\$250,000
15	Mechanical	10	%		\$129,000
16	E&I	20	%		\$257,000
17					
18	Subtotal				\$1,667,000
19					
20					
21	General Conditions	10	%		\$167,000
22	Engineering	10	%		\$184,000
23	Contingencies	30	%		\$606,000
	TOTAL CONSTRUCTION COST				\$2,624,000



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR: B.Bode** WORK: Influent Screenings and Grit Removal System Replacement CHECKED BY: B. Bode Project W-1, Alternative A **CURRENT ENR:** 13345

	Construction and Equipment Costs Summary								
	708/PA	Service Life	Piesent Worth of	Salvage Valle at	Net De Sent Worth	* /			
Civil/Site Work/Piping	\$270,000	50	\$270,000	\$99,000	\$171,000				
Structures	\$89,000	50	\$89,000	\$33,000	\$56,000				
Mechanical/Electrical	\$2,265,000	20	\$2,265,000	\$0	\$2,265,000				
Other	\$0	20	\$0	\$0	\$0				

Total \$2,624,000 Total \$2,492,000

Annual Costs (O&M) Summary

Туре	Annu	al Cost	Net Present Worth of O&M
O&M	\$	12,100	\$189,000
	-	-	

Total \$189,000

Net Present Worth \$2,681,000

Weighted Useful Life (years) 24.10

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Brighton, MI CWSRF Project Plan	DATE:	2/27/2024	
LOCATION:	Brighton,MI	PROJECT NO.	200-12766-23009	
BASIS FOR ES	STIMATE: [X] CONCEPTUAL [] PRELIMINARY [] FINAL	ESTIMATOR:	B.Bode	
WORK:	3rd St Screening Building	CHECKED BY:	B.Bode	
_	Project W-1, Alternative B	CURRENT ENR:	13345	

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1					
2	Excavation	711	CYD	\$50	\$35,556
3	Building Foundation	370	CYD	\$2,000	\$740,741
4	Building Structure	1,600	SFT	\$350	\$560,000
5	Site Improvements	1	LS	\$250,000	\$250,000
6	Screening Equipment	2	EA	\$219,000	\$438,000
7	Compactor	2	EA	\$75,000	\$150,000
8					
9	Gates	4	EA	\$35,000	\$140,000
10	Piping	1	LS	\$150,000	\$150,000
11					
12	Odor Control	1	LS	\$250,000	\$250,000
13	Grit Classifier	1	EA	\$150,000	\$150,000
14	Grit Mixer	1	EA	\$175,000	\$175,000
15					
16	Grit Pump	2	EA	\$55,000	\$110,000
17	Grit Piping and Valves	1	LS	\$84,000	\$84,000
18	Mechanical	20	%		\$647,000
19	E&I	20	%		\$647,000
20					
21	Subtotal				\$4,528,000
22					
23					
24	General Conditions	10	%		\$453,000
25	Engineering	10	%		\$499,000
26	Contingencies	30	%		\$1,644,000
	TOTAL CONSTRUCTION COST				\$7,124,000



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR: B.Bode** WORK: Influent Screenings and Grit Removal System Replacement CHECKED BY: B. Bode Project W-1, Alternative A **CURRENT ENR:** 13345

	Cons	truction and Eq	uipment Costs	Summary		
	7000 MeVo	Service Life	Present Worth of	Salvage Valle at	Not program (Month)	
Civil/Site Work/Piping	\$686,000	50	\$686,000	\$252,000	\$434,000	
Structures	\$2,048,000	50	\$2,048,000	\$750,000	\$1,298,000	
Mechanical/Electrical	\$4,390,000	20	\$4,390,000	\$0	\$4,390,000	
Other	\$0	20	\$0	\$0	\$0	

Total \$7,124,000 Total \$6,122,000

Annual Costs (O&M) Summary

			, ,		
Type	Annua	I Cost	Net Present Worth of O&M		
O&M	\$	12,100	\$189,000		
	Total		\$189,000		

Net Present Worth \$6,311,000

Weighted Useful Life (years) 31.51

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Brighton, MI CWSRF Project Plan	DATE:	2/27/2024
LOCATION:	Brighton,MI	PROJECT NO.	200-12766-23009
BASIS FOR ESTIMATI	E: [X] CONCEPTUAL [] PRELIMINARY [] FINAL	ESTIMATOR:	B.Bode
WORK:	Pneumatic Valve Replacement	CHECKED BY:	B.Bode
	Project W-2, Alternative A	CURRENT ENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1					
2	Pneumatic Valve Operator Replacement	8	EA	\$20,000	\$160,000
3	Air Piping Replacement	1	LS	\$150,000	\$150,000
4	Controls Replacement	1	LS	\$50,000	\$50,000
5					
6	Mechanical	20	%		\$72,000
7	E&I	20	%		\$72,000
8					
9	Subtotal				\$504,000
10					
11					
12	General Conditions	10	%		\$51,000
13	Engineering	10	%		\$56,000
14	Contingencies	30	%		\$184,000
	TOTAL CONSTRUCTION COST				\$795,000



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR:** B. Bode WORK: **Pneumatic Valve Replacement** CHECKED BY: B. Bode Project W-2, Alternative A **CURRENT ENR:** 13345

	Cons	truction and Eq	uipment Costs	Summary		
	708/14/8/0 ₇	Solving Life	Peson Work of	Salvage Valle at	Not present worth	
Civil/Site Work/Piping	\$0	50	\$0	\$0	\$0	
Structures	\$0	50	\$0	\$0	\$0	
Mechanical/Electrical	\$795,000	20	\$795,000	\$0	\$795,000	
Other	\$0	20	\$0	\$0	\$0	

Total \$795,000 Total \$795,000

Annual Costs (O&M) Summary

Туре	Annual Cost		Net Present Worth of O&M
O&M	\$	5,615	\$88,000
		,	• ,

Total \$88,000

Net Present Worth \$883,000

Weighted Useful Life (years) 20.00

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

3497 Coolidge Rd, East Lansing, MI 48823

PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024

LOCATION: Brighton,MI PROJECT NO. 200-12766-23009

BASIS FOR ESTIMATE: [X] CONCEPTUAL [] PRELIMINARY [] FINAL ESTIMATOR: B.Bode

WORK: Pneumatic Valve Replacement with Elec CHECKED BY: B.Bode

Project W-2, Alternative B CURRENT ENR: 13345

Telephone: (517) 316-3930 FAX: (517) 484-8140

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
1					
2	Electrical Motor Operated Valves	8	EA	\$20,000	\$160,000
3					
4	Electrical Conduit, Wire and Disconnects	1	LS	\$125,000	\$125,000
5					
6	Mechanical	10	%		\$29,000
7	E&I	20	%		\$57,000
8					
9	Subtotal				\$371,000
10					
11					
12	General Conditions	10	%		\$38,000
13	Engineering	10	%		\$41,000
14	Contingencies	30	%		\$135,000
	TOTAL CONSTRUCTION COST				\$585,000



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR:** B. Bode WORK: **Pneumatic Valve Replacement** CHECKED BY: B. Bode Project W-2, Alternative B **CURRENT ENR:** 13345

	Cons	truction and Eq	uipment Costs	Summary		
	7090 A 1810 O	Somice Life	Present Worth of	Salvage Valle at	Not De Sont Work	
Civil/Site Work/Piping	\$0	50	\$0	\$0	\$0	
Structures	\$0	50	\$0	\$0	\$0	
Mechanical/Electrical	\$585,000	20	\$585,000	\$0	\$585,000	
Other	\$0	20	\$0	\$0	\$0	

Total \$585,000 Total \$585,000

Annual Costs (O&M) Summary

Туре	Annual Cost	Net Present Worth of O&M
O&M	\$10	\$2,000
	-	
	Total	\$2,000

Net Present Worth	\$587,000
Weighted Useful Life (years)	20.00

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Brighton, MI CWSRF Project Plan	DATE:	2/27/2024
LOCATION:	Brighton,MI	PROJECT NO.	200-12766-23009
BASIS FOR ES	TIMATE: [X] CONCEPTUAL [] PRELIMINARY [] FINAL	ESTIMATOR:	B.Bode
WORK:	Oxidation Ditch Brush Replacement	CHECKED BY:	B.Bode
_	Project W-11, Alternative A	CURRENT ENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1	Oxidation Ditch Rotor Replacement - Brush				
2	Aerator Brush, Gear Box, Drive, Motor	5	EA	\$234,000	\$1,170,000
3	Installation	5	EA	\$70,200	\$351,000
4	Concrete Repair	3	LS	\$75,000	\$225,000
5	Electrical	1	LS	\$304,200.00	\$304,200
6					
7	Subtotal				\$2,051,000
8					
9	General Conditions	10	%		\$206,000
10	Engineering	10	%		\$226,000
11	Contingencies	30	%		\$745,000
	TOTAL CONSTRUCTION COST				\$3,228,000



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR:** B. Bode WORK: **Oxidation Ditch Brush Replacement** CHECKED BY: B. Bode Project W-11, Alternative A **CURRENT ENR:** 13345

Construction and Equipment Costs Summary						
	7000 MeVo	Service Life	Present Worth of	Salva Valle at Poro Calle at P	Net present worth	
Civil/Site Work/Piping	\$0	50	\$0	\$0	\$0	
Structures	\$355,000	50	\$355,000	\$130,000	\$225,000	
Mechanical/Electrical	\$2,873,000	20	\$2,873,000	\$0	\$2,873,000	
Other	\$0	20	\$0	\$0	\$0	

\$3,228,000 \$3,098,000 Total Total

Annual Costs (O&M) Summary

Туре	Annual Cost	Net Present Worth of O&M
O&M	\$ 255,100	\$3,977,000
	-	
	Total	\$3,977,000

Net Present Worth	\$7,075,000
Weighted Useful Life (years)	23.30

Assumptions:

Present Worth Factor Salvage Value 0.610270943 Present Worth Factor O&M 15.58916229 Discount Rate (%) 2.5

PROJECT:	City of Brighton, MI CWSRF Project Plan	DATE:	2/27/2024
LOCATION:	Brighton,MI	PROJECT NO.	200-12766-23009
BASIS FOR ESTIM	ATE: [X] CONCEPTUAL [] PRELIMINARY [] FINAL	ESTIMATOR:	B.Bode
WORK:	Oxidation Ditch Upgrades with VFD Drive	CHECKED BY:	B.Bode
	Project W-11, Alternative B	CURRENT ENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1	Oxidation Ditch Rotor Replacement - Disc and VFD				
2	Aerator Disc, Gear Box, Drive, Motor	3	LS	\$402,000	\$1,206,000
3	Installation	3	EA	\$80,400	\$241,200
4	BNR Control System	1	LS	\$96,250	\$96,300
5					
6	VFD	6	EA	\$45,000	\$270,000
7					
8	Bio-P Selector				
9					
10	Excavation	750	CYD	\$30.00	\$22,500
11	Concrete Slab	60	CYD	\$1,800.00	\$108,000
12	Concrete Wall	133	CYD	\$2,000.00	\$266,700
13	Pipe Modification	3	LS	\$45,000.00	\$135,000
14	Gates	3	EA	\$35,000.00	\$105,000
15	Mixer	3	EA	\$45,000.00	\$135,000
16					
17					
18					
19					
20					
21					
22	Electrical	1		\$647,000	\$647,000
23					
24	Subtotal				\$3,233,000
25					
26	General Conditions	10	%		\$324,000
27	Engineering	10	%		\$356,000
28	Contingencies	30	%		\$1,174,000
_	TOTAL CONSTRUCTION COST				\$5,087,000



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR: B.Bode** WORK: Oxidation Ditch Upgrades with VFD Drive CHECKED BY: B. Bode Project W-11, Alternative B **CURRENT ENR:** 13345

	Construction and Equipment Costs Summary					
	7080 PA 1800 P	Service Life	Present Worth of	Salvage Valle at	Net Present World	
Civil/Site Work/Piping	\$417,000	50	\$417,000	\$153,000	\$264,000	
Structures	\$591,000	50	\$591,000	\$217,000	\$374,000	
Mechanical/Electrical	\$4,079,000	20	\$4,079,000	\$0	\$4,079,000]
Other	\$0	20	\$0	\$0	\$0]

Total \$5,087,000 Total \$4,717,000

Annual Costs (O&M) Summary

Туре	Annual Cost		Net Present Worth of O&M
O&M	\$ 110,500		\$1,723,000

Total \$1,723,000

Net Present Worth \$6,440,000

Weighted Useful Life (years) 25.94

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Brighton, MI CWSRF Project Plan	DATE:	2/27/2024
LOCATION:	Brighton,MI	PROJECT NO.	200-12766-23009
BASIS FOR ES	FIMATE: [X] CONCEPTUAL [] PRELIMINARY [] FINAL	ESTIMATOR:	B.Bode
WORK:	Chemical Feed System Replacement	CHECKED BY:	B.Bode
_	Project W-3, Alternative A	CURRENT ENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1					
2	Chemical Feed 6,000 FeCL3 Tank	2	EA	\$45,000	\$90,000
3	Chemical Feed 6,000 Polymer Tank	1	EA	\$45,000	\$45,000
4					
5	Wall panel removal and rigging	1	LS	\$45,000	\$45,000
6					
7	Piping and Valve	1	LS	\$125,000	\$125,000
8					
9					
10					
11	Mechanical	30	%		\$92,000
12	E&I	20	%		\$61,000
13					
14	Subtotal				\$458,000
15					
16					
17	General Conditions	10	%		\$46,000
18	Engineering	10	%		\$51,000
19	Contingencies	30	%		\$167,000
	TOTAL CONSTRUCTION COST				\$722,000



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR:** B. Bode WORK: **Chemical Feed System Replacement** CHECKED BY: B. Bode Project W-3, Alternative A **CURRENT ENR:** 13345

Construction and Equipment Costs Summary						
	7080 MeVO	Solving Life	Present Worth of	Salvage Valle at	Morn in the Month	
Civil/Site Work/Piping	\$198,000	50	\$198,000	\$73,000	\$125,000	
Structures	\$213,000	50	\$213,000	\$78,000	\$135,000	
Mechanical/Electrical	\$311,000	20	\$311,000	\$0	\$311,000	
Other	\$0	20	\$0	\$0	\$0	

Total \$722,000 Total \$571,000

Annual Costs (O&M) Summary

Туре	Annual Cost	Net Present Worth of O&M
O&M	\$ -	\$0
	•	
	Total	\$0

Net Present Worth	\$571,000
Weighted Useful Life (years)	37.08

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Brighton, MI CWSRF Project Plan	_ DATE:	2/27/2024
LOCATION:	Brighton,MI	PROJECT NO.	200-12766-23009
BASIS FOR ES	TIMATE: [X] CONCEPTUAL [] PRELIMINARY [] FINAL	ESTIMATOR:	B.Bode
WORK:	New Chemical Feed System	CHECKED BY:	B.Bode
_	Project W-3, Alternative B	CURRENT ENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1					
2	Excavation	200	CYD	\$50	\$10,000
3	Concrete Foundation	107	CYD	\$2,000	\$213,333
4	Building Structure	900	SFT	\$350	\$315,000
5	Roof	900	SFT	\$150	\$135,000
6					
7					
8					
9					
10	Chemical Feed 6,000 FeCL3 Tank	2	EA	\$45,000	\$90,000
11	Chemical Feed 6,000 Polymer Tank	1	EA	\$45,000	\$45,000
12	Chemical Feed Pump	8	EA	\$8,000	\$64,000
13					
14	Chemical Feed Piping Interior	1	LS	\$150,000	\$150,000
15					
16	Chemical Feed Piping Exterior w/ Carrier Pipe	1	LS	\$75,000	\$75,000
17	Mechanical	30	%		\$330,000
18	E&I	20	%		\$220,000
19					
20	Subtotal				\$1,648,000
21					
22					
23	General Conditions	10	%		\$165,000
24	Engineering	10	%		\$182,000
25	Contingencies	30	%		\$599,000
	TOTAL CONSTRUCTION COST				\$2,594,000



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR:** B. Bode WORK: **New Chemical Feed System** CHECKED BY: B. Bode Project W-3, Alternative B **CURRENT ENR:** 13345

	Cons	truction and Eq	uipment Costs	Summary		
	70/8/1/20/00/20	Service Life	Present Worth of	Salvage Valle at	Net Present World	
Civil/Site Work/Piping	\$136,000	50	\$136,000	\$50,000	\$86,000	
Structures	\$1,044,000	50	\$1,044,000	\$383,000	\$661,000	
Mechanical/Electrical	\$1,414,000	20	\$1,414,000	\$0	\$1,414,000	
Other	\$0	20	\$0	\$0	\$0	

Total \$2,594,000 Total \$2,161,000

Annual Costs (O&M) Summary

Туре	Annual Cost		Net Present Worth of O&M
O&M		60	\$0
	Total		\$0

Net Present Worth \$2,161,000

Weighted Useful Life (years) 33.65

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR:** B. Bode WORK: **Equilization Valve and VFD Replacement** CHECKED BY: B. Bode Project W-4, Alternative A **CURRENT ENR:** 13345

Construction and Equipment Costs Summary						
	70/8/14/16/07/16/07	Service Life	Present Worth of	Salvae Valle at Period Salvae Valle at Period Salvae Valle at Period Salvae at Period Salva	(May), (M	
Civil/Site Work/Piping	\$0	50	\$0	\$0	\$0	
Structures	\$0	50	\$0	\$0	\$0	
Mechanical/Electrical	\$0	20	\$0	\$0	\$0	
Other	\$0	20	\$0	\$0	\$0	
Total	\$0			Total	\$0	

Annual Costs (O&M) Summary

Туре	Annual Cost	Net Present Worth of O&M
O&M	\$65,000	\$1,014,000
	-	
	Total	\$1,014,000

Net Present Worth \$1,014,000

Weighted Useful Life (years) #DIV/0!

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Brighton, MI CWSRF Project Plan	DATE:	2/27/2024
LOCATION:	Brighton,MI	PROJECT NO.	200-12766-23009
BASIS FOR ESTIMAT	E: [X] CONCEPTUAL [] PRELIMINARY [] FINAL	ESTIMATOR:	B.Bode
WORK:	Equilization Valve Replacement	CHECKED BY:	B.Bode
	Project W-4, Alternative B	CURRENT ENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1					
2	Pinch Valve Replacment	2	EA	\$45,500	\$91,000
3					
4	Concrete Repair	1	LS	\$100,000	\$100,000
5					
6	Mechanical	10	%		\$20,000
7	E&I	20	%		\$39,000
8					
9	Subtotal				\$250,000
10					
11					
12	General Conditions	10	%		\$25,000
13	Engineering	10	%		\$28,000
14	Contingencies	30	%		\$91,000
	TOTAL CONSTRUCTION COST				\$394,000



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR:** B. Bode WORK: **Equilization Valve and VFD Replacement** CHECKED BY: B. Bode Project W-4, Alternative B **CURRENT ENR:** 13345

Construction and Equipment Costs Summary						
	7080 PA POOR C	Service Life	Present Worth of	Salva Valle at Poro Calle at P	Net De Sent Worth	
Civil/Site Work/Piping	\$0	50	\$0	\$0	\$0	
Structures	\$157,000	50	\$157,000	\$58,000	\$99,000	
Mechanical/Electrical	\$237,000	20	\$237,000	\$0	\$237,000	
Other	\$0	20	\$0	\$0	\$0	

Total \$394,000 Total \$336,000

Annual Costs (O&M) Summary

Туре	Annual Cost	Net Present Worth of O&M
O&M	\$4,000	\$63,000
	-	
	Total	\$63,000

Net Present Worth	\$399,000
Weighted Useful Life (years)	31.95

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Brighton, MI CWSRF Project Plan	DATE:	2/27/2024
LOCATION:	Brighton,MI	PROJECT NO.	200-12766-23009
BASIS FOR ES	TIMATE: [X] CONCEPTUAL [] PRELIMINARY [] FINAL	ESTIMATOR:	B.Bode
WORK:	Secondary Clarifier No. 1 and 2 Rehabilitation	CHECKED BY:	B.Bode
_	Project W-5, Alternative A	CURRENT ENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1					
2	Remove Ex Mechanism	3	EA	\$25,000	\$75,000
3	Replace Cover	3	EA	\$250,000	\$750,000
4	New Clarifier Mechanism	3	EA	\$252,000	\$756,000
5	Current Density Baffle	3	EA	\$45,000	\$135,000
6	Weir and Scum Baffle	3	EA	\$35,000	\$105,000
7					
8	Structural Rehabilation	3	LS	\$75,000	\$225,000
9					
10	Mechanical	5	%		\$103,000
11	E&I	15	%		\$307,000
12					
13	Subtotal				\$2,456,000
14					
15					
16	General Conditions	10	%		\$246,000
17	Engineering	10	%		\$271,000
18	Contingencies	30	%		\$892,000
	TOTAL CONSTRUCTION COST				\$3,865,000



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR:** B. Bode WORK: Secondary Clarifier No. 1 and 2 Rehabilitation CHECKED BY: B. Bode Project W-5, Alternative A **CURRENT ENR:** 13345

Construction and Equipment Costs Summary						
	7000 MeVo	Solving Life	Present Worth of	Salvage Valle at	Net present worth	
Civil/Site Work/Piping	\$0	50		\$0	\$0	
Structures	\$1,535,000	50	\$1,535,000	\$563,000	\$972,000	
Mechanical/Electrical	\$2,330,000	20	\$2,330,000	\$0	\$2,330,000	
Other	\$0	20	\$0	\$0	\$0	

Total \$3,865,000 Total \$3,302,000

Annual Costs (O&M) Summary

Туре	Annual Cost	Net Present Worth of O&M
O&M	\$5,000	\$78,000
	-	
	Total	\$78,000

Net Present Worth	\$3,380,000
14/ 1 1/ 111 6 1116 /	04.04

Weighted Useful Life (years) 31.91

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Brighton, MI CWSRF Project Plan	DATE:	2/27/2024
OCATION:	Brighton,MI	PROJECT NO.	200-12766-23009
BASIS FOR ES	TIMATE: [X] CONCEPTUAL [] PRELIMINARY [] FINAL	ESTIMATOR:	B.Bode
WORK:	Secondary Clarifier No. 1 and 2 Replacement	CHECKED BY:	B.Bode
	Project W-5, Alternative B	CURRENT ENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1	Remove Cover	3	EA	\$10,000	\$30,000
2	Remove Ex Mechanism	3	EA	\$10,000	\$30,000
3	Concreter Repair	1	LS	\$75,000	\$75,000
4	New Clarifier Mechanism	3	EA	\$252,000	\$756,000
5	Current Density Baffle	3	EA	\$45,000	\$135,000
6	Weir and Scum Baffle	3	EA	\$35,000	\$105,000
7	Effluent Trough Cover	3	EA	\$55,000	\$165,000
8					
9					
10	Mechanical	5	%		\$64,000
11	E&I	20	%		\$254,000
12					
13	Subtotal				\$1,584,000
14					
15					
16	General Conditions	10	%		\$159,000
17	Engineering	10	%		\$175,000
18	Contingencies	30	%		\$576,000
	TOTAL CONSTRUCTION COST				\$2,494,000



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR:** B. Bode WORK: Secondary Clarifier No. 1 and 2 Replacement CHECKED BY: B. Bode Project W-5, Alternative B **CURRENT ENR:** 13345

Construction and Equipment Costs Summary						
	7080 POOR C	Service Life	Present Worth of	Salvage Valle at	Net pe seent worth	
Civil/Site Work/Piping	\$0	50	\$0	\$0	\$0	
Structures	\$120,000	50	\$120,000	\$44,000	\$76,000	
Mechanical/Electrical	\$2,374,000	20	\$2,374,000	\$0	\$2,374,000	
Other	\$0	20	\$0	\$0	\$0	

Total \$2,494,000 Total \$2,450,000

Annual Costs (O&M) Summary

Туре	Annual Cost	Net Present Worth of O&M
O&M	\$5,000	\$78,000
	T	\$70.000
	Total	\$78,000

Net Present Worth \$2,528,000

Weighted Useful Life (years) 21.44

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Brighton, MI CWSRF Project Plan	DATE:	2/27/2024
LOCATION:	Brighton,MI	PROJECT NO.	200-12766-23009
BASIS FOR ES	STIMATE: []CONCEPTUAL []PRELIMINARY []FINAL	ESTIMATOR:	B.Bode
WORK:	Infiltration Bed Media Replacement	CHECKED BY:	B.Bode
•	Project W-12, Alternative A	CURRENT ENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1	Strip and Haul 2 Ft of Sand from Infiltration Beds Dispose	66,000	CYD	\$45.00	\$2,970,000.00
2	Place and Grade 2 ft of Sand to Infiltration Beds	66,000	CYD	\$30.00	\$1,980,000.00
3					
4	Strip and Haul 2 Ft of Sand from Irragation Beds Dispose	70,000	CYD	\$45.00	\$3,150,000.00
5	Place and Grade 2 ft of Sand to Irragatin Beds	70,000	CYD	\$30.00	\$2,100,000.00
6	Treatment System	1	LS	\$2,500,000.00	\$2,500,000.00
7	Excavation and Backfill	139	CYD	\$35.00	\$4,900.00
8	Grading	1	LS	\$10,000.00	\$10,000.00
9	Paving	1	LS	\$50,000.00	\$50,000.00
10					
11	Structure Foundation	64	CYD	\$2,000.00	\$128,800.00
12	Building	625	SFT	\$350.00	\$218,800.00
13					
14	Chemical Feed Tank	1	LS	\$25,000.00	\$25,000.00
15	Chemical Feed Equipment and Piping	1	LS	\$75,000.00	\$75,000.00
16					
17	Mechanical	20	%		\$103,000.00
18	E&I	30	%		\$154,000.00
19					
20					
21					
22	Subtotal				\$13,470,000.00
23					
24					
25	General Conditions	10	%		\$ 1,347,000.00
26	Engineering	10	%		\$ 1,482,000.00
27	Contingencies	30	%		\$ 4,890,000.00
TOTAL CONSTRUCTION COST				\$21,189,000.00	



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR:** B. Bode WORK: Infiltration Bed Media Replacement B. Bode **CHECKED BY:** Project W-12, Alternative A **CURRENT ENR:** 13345

Construction and Equipment Costs Summary							
	/	70'84 Pysic Co.	Service Life	Present Worth of	Salvage Valle at	Not De Sont Worth	
Civil/Site Work/Piping	\$	16,146,000	50	\$16,146,000	\$5,913,000	\$10,233,000	
Structures	\$	549,000	50	\$549,000	\$202,000	\$347,000	
Mechanical/Electrical	\$	4,494,000	20	\$4,494,000	\$0	\$4,494,000	
Other	\$	-	20	\$0	\$0	\$0	

Total \$21,189,000 Total \$15,074,000

Annual Costs (O&M) Summary

Туре	Annual Cost	Net Present Worth of O&M
O&M	\$22,000.00	\$343,000

Total \$343,000

Net Present Worth \$15,417,000

Weighted Useful Life (years) 43.64

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Brig	ghton, MI CWSRF Proje	ct Plan	DATE:	2/27/2024
LOCATION:		Brighton,MI		PROJECT NO.	200-12766-23009
BASIS FOR ESTIMATE	: []CONCEPTUAL	[]PRELIMINARY	[]FINAL	ESTIMATOR:	B.Bode
WORK:	Filte	er and UV		CHECKED BY:	B.Bode
	Project W-	12, Alternative B		CURRENT ENR:	13345
	•			-	

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1					
2					
3					
4	Excavation and Backfill	1,167	CYD	\$50.00	\$59,000.00
5	Grading	1	LS	\$25,000.00	\$25,000.00
6	Paving	1	LS	\$90,000.00	\$90,000.00
7					
8	Structure Foundation	198	CYD	\$2,000.00	\$397,000.00
9	Building	2,500	SFT	\$350.00	\$875,000.00
10					
11	18" SE	100	LFT	\$600.00	\$60,000.00
12	18" Fittings	7	EA	\$8,000.00	\$56,000.00
13					
14	Filter Units	2	EA	\$536,250.00	\$1,072,500.00
15	Control Bfly Valve	5	EA	\$15,000.00	\$75,000.00
16					
17	UV Units	4	EA	\$97,500.00	\$390,000.00
18	Gates	4	EA	\$20,000.00	\$80,000.00
19	18" Flowmeter	1	EA	\$20,000.00	\$20,000.00
20					
21	Treatment System	1	LS	\$1,500,000.00	\$1,500,000.00
22					
23	Mechanical	15	%		\$705,000.00
24	E&I	20	%		\$940,000.00
25					
26	Subtotal				\$6,345,000.00
27					
28					
29	General Conditions	10	%		\$ 635,000.00
30	Engineering	10	%		\$ 698,000.00
31	Contingencies	30	%		\$ 2,303,000.00
	TOTAL CONSTRUCTION COST				\$9,981,000.00



3497 Coolidge Rd, East	Lansing, MI 48823			Telephone: (517) 316-3930	FAX: (517) 484-8140
PROJECT:		City of Brighton, M	I CWSRF Project Plan	DATE:	2/27/2024
LOCATION:		Brigh	nton, MI	PROJECT NO.	200-12766-23009
BASIS FOR ESTIMATE:	[X] CONCEPTUAL	[]PRELIMINARY	[] FINAL	ESTIMATOR:	B. Bode
WORK:		Filter and	UV System	CHECKED BY:	B. Bode
		Project W-12	2, Alternative B	CURRENT ENR:	13345

	Construction and Equipment Costs Summary							
	/	1084/P980FCS	Solving Life	Capian Work	Salvage Valle at Policy Property	Net Present Worth		
Civil/Site Work/Piping	\$	456,000	5	\$456,000	\$167,000	\$289,000		
Structures	\$	2,002,000	5	\$2,002,000	\$734,000	\$1,268,000		
Mechanical/Electrical	\$	7,523,000	2	\$7,523,000	\$0	\$7,523,000		
Other	\$	-	2	\$0	\$0	\$0		

Total \$9,981,000 Total \$9,080,000

Annual Costs (O&M) Summary

Туре	Annual Cost	Net Present Worth of O&M
O&M	\$55,000	\$858,000
	-	

Total \$858,000

Net Present Worth \$9,938,000

Weighted Useful Life (years) 27.39

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Brighton, MI CWSRF Project Plan	DATE:	2/27/2024
LOCATION:	Brighton,MI	PROJECT NO.	200-12766-23009
BASIS FOR ES	TIMATE: []CONCEPTUAL []PRELIMINARY []FINAL	ESTIMATOR:	B.Bode
WORK:	Solids Handling Centrifuge	CHECKED BY:	B.Bode
	Project W-13, Alternative A	CURRENT ENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1					
2	Excavation	1,000	CYD	\$45.00	\$45,000.00
3	Building Foundation	274	CYD	\$2,000.00	\$550,000.00
4	Building	3,000	SFT	\$350.00	\$1,050,000.00
5	Concrete Repair	1	LS	\$75,000.00	\$75,000.00
6					
7					
8					
9	Feed Pumps, piping and valves	1	LS	\$250,000.00	\$250,000.00
10	Centrifuge	2	EA	\$347,875.00	\$696,000.00
11	Transfer Pumps	2	EA	\$80,000.00	\$160,000.00
12	Polymer System	1	LS	\$150,000.00	\$150,000.00
13	Tank Mixers	6	EA	\$75,000.00	\$450,000.00
14					
15	Mechanical	15	%		\$247,000.00
16	E&I	20	%		\$329,000.00
17					
18	Subtotal				\$4,002,000.00
19					
20					
21	General Conditions	10	%		\$ 401,000.00
22	Engineering	10	%		\$ 441,000.00
23	Contingencies	30	%		\$ 1,454,000.00
	TOTAL CONSTRUCTION COST				\$6,298,000.00



3497 Coolidge Rd, East	Lansing, MI 48823		Telephone: (517) 316-3930	FAX: (517) 484-8140
PROJECT:		City of Brighton, MI CWSRF Project Plan	DATE:	2/27/2024
LOCATION:		Brighton, MI	PROJECT NO.	200-12766-23009
BASIS FOR ESTIMATE:	[X] CONCEPTUAL	[]PRELIMINARY []FINAL	ESTIMATOR:	B. Bode
WORK:		Solids Centrifuge	CHECKED BY:	B. Bode
		Project W-13, Alternative A	CURRENT ENR:	13345
				•

	Construction and Equipment Costs Summary							
	/	70'84' Polos C.C.		9//>	Piesent Worth of	Salvage Valle at	Net De Sent Worth	
Civil/Site Work/Piping	\$	72,000		50	\$72,000	\$27,000	\$45,000	
Structures	\$	2,636,000		50	\$2,636,000	\$966,000	\$1,670,000	
Mechanical/Electrical	\$	3,590,000		20	\$3,590,000	\$0	\$3,590,000	
Other	\$	-		20	\$0	\$0	\$0	

Total \$6,298,000 Total \$5,305,000

Annual Costs (O&M) Summary

Туре	Annual Cost	Net Present Worth of O&M
O&M	\$61,000.00	\$951,000

Total \$951,000

Net Present Worth\$6,256,000Weighted Useful Life (years)32.90

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Bri	ghton, MI CWSRF Pr	oject Plan	DATE:	2/27/2024
LOCATION:		Brighton,MI		PROJECT NO.	200-12766-23009
BASIS FOR ESTIMA	TE: []CONCEPTUAL	[]PRELIMINARY	[] FINAL	ESTIMATOR:	B.Bode
WORK:	Solids I	landling Press		CHECKED BY:	B.Bode
	Project W	-13, Alternative B		CURRENT ENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1					
2	Excavation	1,000	CYD	\$45.00	\$45,000.00
3	Building Foundation	274	CYD	\$2,000.00	\$548,000.00
4	Building	3,000	SFT	\$350.00	\$1,050,000.00
5	Paving	1	LS	\$150,000.00	\$150,000.00
6					
7					
8					
9	Feed Pumps, piping and valves	1	LS	\$250,000.00	\$250,000.00
10	Screw Press	2	EA	\$265,650.00	\$531,300.00
11	Conveyors	4	EA	\$80,000.00	\$320,000.00
12	Polymer System	1	LS	\$150,000.00	\$150,000.00
13					
14					
15					
16	Mechanical	15	%		\$247,000.00
17	E&I	20	%		\$329,000.00
18					
19	Subtotal				\$3,620,000.00
20					
21					
22	General Conditions	10	%		\$ 362,000.00
23	Engineering	10	%		\$ 399,000.00
24	Contingencies	30	%		\$ 1,315,000.00
	TOTAL CONSTRUCTION COST				\$5,696,000.00



3497 Coolidge Rd, East	Lansing, MI 48823			Telephone: (517) 316-3930	FAX: (517) 484-8140
PROJECT:		City of Brighton, M	II CWSRF Project Plan	DATE:	2/27/2024
LOCATION:		Brigl	hton, MI	PROJECT NO.	200-12766-23009
BASIS FOR ESTIMATE:	[X] CONCEPTUAL	[]PRELIMINARY	[] FINAL	ESTIMATOR:	B.Bode
WORK:		Solids Ha	ndling Press	CHECKED BY:	B. Bode
		Project W-1	3, Alternative B	CURRENT ENR:	13345

Construction and Equipment Costs Summary							
	/	1084/P980FCS	Sortio Life	Present Worth of	Salvage Valle at Period (1971)	Not De Sont Worth	
Civil/Site Work/Piping	\$	308,000	50	\$308,000	\$113,000	\$195,000	
Structures	\$	2,514,000	50	\$2,514,000	\$921,000	\$1,593,000	
Mechanical/Electrical	\$	2,874,000	20	\$2,874,000	\$0	\$2,874,000	
Other	\$	-	20	\$0	\$0	\$0	

Total \$5,696,000 Total \$4,662,000

Annual Costs (O&M) Summary

Туре	Annual Cost	Net Present Worth of O&M
O&M	\$105,000.00	\$1,637,000
	•	

Total \$1,637,000

Net Present Worth	\$6,299,000
Weighted Useful Life (years)	34.86

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Brighton, MI CWSRF Project Plan	DATE:	2/27/2024
LOCATION:	Brighton,MI	PROJECT NO.	200-12766-23009
BASIS FOR ES	STIMATE: [X] CONCEPTUAL [] PRELIMINARY [] FINAL	ESTIMATOR:	B.Bode
WORK:	Service Building Improvements	CHECKED BY:	B.Bode
_	Project W-6, Alternative A	CURRENT ENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1					
2	Admin Bathroom Upgrades	480		\$800	\$384,000
3					
4	Laboratoty Renovation	680		\$250	\$170,000
5					
6	Stair Replacement	5		\$3,000	\$15,000
7					
8	Overhead Door Replacement	4		\$15,000	\$60,000
9					
10	Admin Building Exterior	1		\$20,000	\$20,000
11					
12	Control Room Renovation	400		\$100	\$40,000
13					
14	Site Painting and Raiings	1		\$5,000	\$5,000
15					
16	Door Replacement	11		\$2,000	\$22,000
17					
18	Subtotal				\$716,000
19					
20					
21	General Conditions	10	%		\$72,000
22	Engineering	10	%		\$79,000
23	Contingencies	30	%		\$261,000
	TOTAL CONSTRUCTION COST				\$1,128,000



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR: B.Bode** WORK: Service Building Improvements CHECKED BY: B. Bode Project W-6, Alternative A **CURRENT ENR:** 13345

Construction and Equipment Costs Summary							
	7080 POR	Service Life	Piesent Worth of	Salvage Valle at	Net De Sent Worth		
Civil/Site Work/Piping	\$943,000	50	\$943,000	\$346,000	\$597,000		
Structures	\$185,000	50	\$185,000	\$68,000	\$117,000		
Mechanical/Electrical	\$0	20	\$0	\$0	\$0		
Other	\$0	20	\$0	\$0	\$0		

Total \$1,128,000 Total \$714,000

Annual Costs (O&M) Summary

Туре	Annual Cost		Net Present Worth of O&M
O&M		60	\$0
	Total		\$0

Net Present Worth	\$714,000
Weighted Useful Life (years)	50.00

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Brighton, MI CWSRF Project Plan	DATE:	2/27/2024
LOCATION:	Brighton,MI	PROJECT NO.	200-12766-23009
BASIS FOR ESTIMATE:	[X] CONCEPTUAL [] PRELIMINARY [] FINAL	ESTIMATOR:	B.Bode
WORK:	Diesel Generator Replacement with Electrical Upgrades	CHECKED BY:	B.Bode
	Project W-7, Alternative A	CURRENT ENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1	Standby Generator				
2	Demolish fuel storage tank	1	LOT	\$10,000.00	\$10,000.00
3	600 kW Diesel Generator and Storge Tank Installation	2	EA	\$185,000.00	\$370,000.00
4	Conduit/Wire to Switchgear/SCADA	1	LOT	\$125,000.00	\$125,000.00
5	Commissioning	1	LOT	\$1,600.00	\$1,600.00
6					
7	Switchgear				
8	Demolish gear	1	LOT	\$10,000.00	\$10,000.00
9	Provide MTM switchgear	1	EA	\$75,000.00	\$75,000.00
10	Commissioning	1	LOT	\$1,600.00	\$1,600.00
11	SCADA Interconnection	1	LOT	\$10,000.00	\$10,000.00
12	Temporary distribution system	1	LOT	\$45,000.00	\$45,000.00
13					
14	Replace MCC-C/D (assumes remain separate)				
15	Demolish MCC-C	1	Lot	\$5,000.00	\$5,000.00
16	Provide MCC-C	1	EA	\$30,000.00	\$30,000.00
17	Provide MCC-D	1	EA	\$30,000.00	\$30,000.00
18	Demolish MCC-D	1	Lot	\$5,000.00	\$5,000.00
19	Commissioning	1	Lot	\$8,000.00	\$8,000.00
20					
21	Subtotal				\$727,000.00
22					
23					
24	General Conditions	10	%		\$73,000.00
25	Engineering	10	%		\$80,000.00
26	Contingencies	30	%		\$264,000.00
	TOTAL CONSTRUCTION COST				\$1,144,000.00



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR: B.Bode** WORK: Diesel Generator Replacement with Electrical Upgrades CHECKED BY: B. Bode Project W-7, Alternative A **CURRENT ENR:** 13345

	Construction and Equipment Costs Summary							
	70/8/1/2/06/2/C	Significal life	Piesent Worth of	Salvage Valle at	Net Present World			
Civil/Site Work/Piping	\$31,000	50	\$31,000	\$12,000	\$19,000			
Structures	\$582,000	50	\$582,000	\$214,000	\$368,000			
Mechanical/Electrical	\$511,000	20	\$511,000	\$0	\$511,000]		
Other	\$20,000	20	\$20,000	\$0	\$20,000]		

Total \$1,144,000 Total \$918,000

Annual Costs (O&M) Summary

Туре	Annual Cost		Net Present Worth of O&M
O&M	\$	11,700	\$183,000
	•		

Total \$183,000

Net Present Worth \$1,101,000

Weighted Useful Life (years) 36.08

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Brighton, MI CWSRF Project Plan	DATE:	2/27/2024
LOCATION:	Brighton,MI	PROJECT NO.	200-12766-23009
BASIS FOR ES	STIMATE: [X] CONCEPTUAL [] PRELIMINARY [] FINAL	ESTIMATOR:	B.Bode
WORK:	Natural Gas Generator Replacement with Electrical Upgrades	CHECKED BY:	B.Bode
	Project W-7, Alternative B	CURRENT ENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1	Standby Generator				
2	Demolish fuel storage tank	1	LOT	\$10,000.00	\$10,000.00
3	Provide NG Generator sized correctly	2	EA	\$750,000.00	\$1,500,000.00
4	Conduit/Wire to Switchgear/SCADA	1	LOT	\$125,000.00	\$125,000.00
5	Commissioning	1	LOT	\$1,600.00	\$1,600.00
6	Gas Line	1,500	LF	\$25.00	\$37,500.00
7	Switchgear				
8	Demolish gear	1	LOT	\$10,000.00	\$10,000.00
9	Provide MTM switchgear	1	EA	\$75,000.00	\$75,000.00
10	Commissioning	1	LOT	\$1,600.00	\$1,600.00
11	SCADA Interconnection	1	LOT	\$10,000.00	\$10,000.00
12	Temporary distribution system	1	LOT	\$45,000.00	\$45,000.00
13					
14	Replace MCC-C/D (assumes remain separate)				
15	Demolish MCC-C	1	Lot	\$5,000.00	\$5,000.00
16	Provide MCC-C	1	EA	\$30,000.00	\$30,000.00
17	Provide MCC-D	1	EA	\$30,000.00	\$30,000.00
18	Demolish MCC-D	1	Lot	\$5,000.00	\$5,000.00
19	Commissioning	1	Lot	\$8,000.00	\$8,000.00
20					
21	Subtotal				\$1,894,000.00
22					
23					
24	General Conditions	10	%		\$190,000.00
25	Engineering	10	%		\$209,000.00
26	Contingencies	30	%		\$688,000.00
	TOTAL CONSTRUCTION COST				\$2,981,000.00



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR:** B. Bode WORK: Natural Gas Generator Replacement with Electrical Upgrades CHECKED BY: B. Bode Project W-7, Alternative B **CURRENT ENR:** 13345

Construction and Equipment Costs Summary							
70/8/1/20/00/20	Service Life	Piesent Worth of	Salvage Valle at	Net De Sent Worth			
\$91,000	50	\$91,000	\$34,000	\$57,000			
\$2,359,000	50	\$2,359,000	\$864,000	\$1,495,000			
\$511,000	20	\$511,000	\$0	\$511,000			
\$20,000	20	\$20,000	\$0	\$20,000			
	\$91,000 \$2,359,000 \$511,000	\$91,000 50 \$2,359,000 50 \$511,000 20	\$91,000 50 \$91,000 \$2,359,000 50 \$2,359,000 \$511,000 20 \$511,000	\$91,000 50 \$91,000 \$34,000 \$2,359,000 50 \$2,359,000 \$864,000 \$511,000 20 \$511,000 \$0	\$91,000 50 \$91,000 \$34,000 \$57,000 \$2,359,000 50 \$2,359,000 \$864,000 \$1,495,000 \$511,000 20 \$511,000		

\$2,981,000 \$2,083,000 Total Total

Annual Costs (O&M) Summary

Туре	Annua	l Cost	Net Present Worth of O&M
O&M	\$	15,300	\$239,000
	•	•	
	Total		\$239,000

\$2,322,000

Weighted Useful Life (years) 44.66

Assumptions:

Present Worth Factor Salvage Value 0.610270943 Present Worth Factor O&M 15.58916229 Discount Rate (%) 2.5

Net Present Worth



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR:** B. Bode WORK: **SCADA Upgrades** CHECKED BY: B. Bode Project W-8, Alternative A **CURRENT ENR:** 13345

Construction and Equipment Costs Summary							
	7000 MeVo	Solving Life	Present Worth of	Salvage Valle at	Morn Most Noon)		
Civil/Site Work/Piping	\$0	50	\$0	\$0	\$0		
Structures	\$0	50	\$0	\$0	\$0		
Mechanical/Electrical	\$550,000	20	\$550,000	\$0	\$550,000		
Other	\$0	20	\$0	\$0	\$0		

Total \$550,000 Total \$550,000

Annual Costs (O&M) Summary

Type	Annual Cost	Net Present Worth of O&M
O&M	\$0	\$0
	-	
	Total	\$0

Net Present Worth \$550,000

Weighted Useful Life (years) 20.00

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Brighton, MI CWSRF Project Plan	DATE:	2/27/2024
LOCATION:	Brighton,MI	PROJECT NO.	200-12766-23009
BASIS FOR ES	TIMATE: [X] CONCEPTUAL [] PRELIMINARY [] FINAL	ESTIMATOR:	B.Bode
WORK:	Drainage, Plumbing, and Water Service Upgrades	CHECKED BY:	B.Bode
_	Project W-9, Alternative A	CURRENT ENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1					
2	Admin Bldg				
3	Sanitary Piping Replacement	1		\$242,000.00	\$242,000.00
4	Sump Pump and Drain Replacement	1		\$137,000.00	\$137,000.00
5	Water Piping Replacement	1		\$186,000.00	\$186,000.00
6	Replace Emergency Shower	1		\$75,000.00	\$75,000.00
7	Replae Plumbing Fixtures	1		\$24,000.00	\$24,000.00
8					
9	Subtotal				\$664,000.00
10					
11					
12	General Conditions	10	%		\$67,000.00
13	Engineering	10	%		\$74,000.00
14	Contingencies	30	%		\$242,000.00
	TOTAL CONSTRUCTION COST				\$1,047,000.00



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR:** B. Bode WORK: Drainage, Plumbing, and Water Service Upgrades CHECKED BY: B. Bode Project W-9, Alternative A **CURRENT ENR:** 13345

Construction and Equipment Costs Summary						
	708/12 10 10 10 10 10 10 10 10 10 10 10 10 10	Service Life	Piesent Worth of	Salvage Valle at	Net De Sent Worth	
Civil/Site Work/Piping	\$1,047,000	50	\$1,047,000	\$384,000	\$663,000	
Structures	\$0	50	\$0	\$0	\$0	
Mechanical/Electrical	\$0	20	\$0	\$0	\$0	
Other	\$0	20	\$0	\$0	\$0	

Total \$1,047,000 Total \$663,000

Annual Costs (O&M) Summary

Туре	Annual Cost	Annual Cost Net Present Worth of				
O&M	(60	\$0			
	<u> </u>					
	Total		\$0			

Net Present Worth	\$663,000
Weighted Useful Life (years)	50.00

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Brighton, MI CWSRF Project Plan	DATE:	2/2/2024
LOCATION:	Brighton,MI	PROJECT NO.	200-12766-23009
BASIS FOR ES	STIMATE: [X] CONCEPTUAL [] PRELIMINARY [] FINAL	ESTIMATOR:	B.Bode
WORK:	Boiler, Ductwork, Ventilation, and Heating System Improvements	CHECKED BY:	B.Bode
	Project W-10, Alternative A	CURRENT ENR:	13345

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1					
2	Admin Bldg				
3	Replace Hot Water Boiler	2		\$217,000.00	\$434,000.00
4	Replace Lower Gallery Ductwork	1		\$10,000.00	\$10,000.00
5	Replace Chlorine Room Unit Heater	1		\$3,000.00	\$3,000.00
6					
7	Intake Damper Replacement	1		\$3,000.00	\$3,000.00
8	Replace Ventilation System	1		\$16,000.00	\$16,000.00
9	Replace Heating System	1		\$5,000.00	\$5,000.00
10					
11	Subtotal				\$471,000.00
12					
13					
14	General Conditions	10	%		\$48,000.00
15	Engineering	10	%		\$52,000.00
16	Contingencies	30	%		\$172,000.00
	TOTAL CONSTRUCTION COST				\$743,000.00



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/27/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR:** B. Bode WORK: Boiler, Ductwork, Ventilation, and Heating System Improvements CHECKED BY: B. Bode Project W-10, Alternative A **CURRENT ENR:** 13345

Construction and Equipment Costs Summary							
	708/12 10 10 10 10 10 10 10 10 10 10 10 10 10	Service Life	Present Worth of	Salvage Valle at	Net Present Work		
Civil/Site Work/Piping	\$743,000	50		\$273,000	\$470,000		
Structures	\$0	50	\$0	\$0	\$0		
Mechanical/Electrical	\$0	20	\$0	\$0	\$0		
Other	\$0	20	\$0	\$0	\$0		

Total \$743,000 Total \$470,000

Annual Costs (O&M) Summary

Туре	Annual Cost	Annual Cost Net Present Worth o		
O&M		03	\$0	
	Total		\$0	

Net Present Worth	\$470,000
Weighted Useful Life (years)	50.00

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/19/2024 LOCATION: Brighton,MI PROJECT NO. 200-12766-23009 L. Roberts BASIS FOR ESTIMATE: [X] CONCEPTUAL [] PRELIMINARY [] FINAL **ESTIMATOR:** Bauer Road Force Main Rehabilitation WORK: J. Barber **CHECKED BY:** Project C-1, Alternative A 13345 **CURRENT ENR:**

ITEM NO.	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
<u> </u>		<u> </u>			
1	Mobilization (5% of Construction, Max \$50k)	1	LS	\$15,500.00	\$16,000.00
2	General Conditions (1% of Construction)	1	LS	\$3,100.00	\$4,000.00
3	Traffic Control (2% of Construction)	1	LS	\$6,200.00	\$7,000.00
4	SESC (1/2% of Construction)	1	LS	\$1,550.00	\$2,000.00
5					
6	12-inch Force Main Rehabilitation	31,000	LF	\$10.00	\$310,000.00
7					
8	Subtotal				\$339,000.00
9					
10					
11	General Conditions	10	%		\$34,000.00
12	Engineering	10	%		\$38,000.00
13	Contingencies	30	%		\$124,000.00
	TOTAL CONSTRUCTION COST				\$535,000.00



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/19/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR:** L. Roberts WORK: **Bauer Road Force Main Rehabilitation** CHECKED BY: J. Barber Project C-1, Alternative A **CURRENT ENR:** 13345

Construction and Equipment Costs Summary							
	7080 MeVO	Service Life	Present Worth of	Salvage Valle at	Morn in the Month		
Civil/Site Work/Piping	\$488,000	50	\$488,000	\$179,000	\$309,000		
Structures	\$0	50	\$0	\$0	\$0		
Mechanical/Electrical	\$0	20	\$0	\$0	\$0		
Other	\$47,000	20	\$47,000	\$0	\$47,000		

Total \$535,000 Total \$356,000

Annual Costs (O&M) Summary

Туре	Annual Cost	Net Present Worth of O&M
O&M	\$0	\$0
	-	
	Total	\$0

Net Present Worth	\$356,000
Weighted Useful Life (years)	47.36

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

PROJECT:	City of Brighton, MI CWSRF Project Plan	DATE:	2/19/2024	
LOCATION:	Brighton,MI	PROJECT NO.	200-12766-23009	
BASIS FOR ES	STIMATE: [X] CONCEPTUAL [] PRELIMINARY [] FINAL	ESTIMATOR:	L. Roberts	
WORK:	Bauer Road Force Main Addition	CHECKED BY:	J. Barber	
	Project C-1, Alternative B	CURRENT ENR:	13345	
-		_		•

ITEM	DESCRIPTION	QUANT.	UNIT	UNIT	TOTAL
NO.				AMOUNT	AMOUNT
1	Mobilization (5% of Construction, Max \$250k)	1	LS	\$247,200.00	\$248,000.00
2	General Conditions (1% of Construction)	1	LS	\$49,440.00	\$50,000.00
3	Traffic Control (2% of Construction)	1	LS	\$98,880.00	\$99,000.00
4	SESC (1/2% of Construction)	1	LS	\$24,720.00	\$25,000.00
5					
6	Removing Existing Curb and Gutter	4,700	LF	\$15.00	\$70,500.00
7	Removing Existing Roadway Pavement	5,200	SYD	\$12.00	\$62,400.00
8	Removing Existing Sewer & Structures	31,000	LF	\$40.00	\$1,240,000.00
9	Concrete Curb and Gutter	4,700	LF	\$35.00	\$164,500.00
10	Gravel Road, 8" thick	6,000	SYD	\$12.50	\$75,000.00
11	21AA Aggregate Base, 8" thick	5,200	SYD	\$12.50	\$65,000.00
12	1.5" MDOT 36A Wearing Course	440	Ton	\$120.00	\$52,800.00
13	1.5" MDOT 13A Leveling Course	440	Ton	\$120.00	\$52,800.00
14	Restoration w/4" Topsoil, Seed & Mulch	6,100	SYD	\$10.00	\$61,000.00
15	12-inch Force Main	15,500	LF	\$200.00	\$3,100,000.00
16	Air Release Structure Removal	5	EA	\$800.00	\$4,000.00
17	Air Release Manhole	5	EA	\$18,000.00	\$90,000.00
18					
19	Subtotal				\$5,460,000.00
20					
21					
22	General Conditions	10	%		\$546,000.00
23	Engineering	10	%		\$601,000.00
24	Contingencies	30	%		\$1,983,000.00
	TOTAL CONSTRUCTION COST				\$8,590,000.00



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/19/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR:** L. Roberts WORK: **Bauer Road Force Main Addition** CHECKED BY: J. Barber Project C-1, Alternative B **CURRENT ENR:** 13345

	Cons	truction and Eq	uipment Costs	Summary		
	708/12 10 10 10 10 10 10 10 10 10 10 10 10 10	Service Life	Present Worth of	Salvage Valle at	Net De Sent Worth	
Civil/Site Work/Piping	\$7,777,000	50	\$7,777,000	\$2,848,000	\$4,929,000	
Structures	\$150,000	50	\$150,000	\$55,000	\$95,000	
Mechanical/Electrical	\$0	20	\$0	\$0	\$0	
Other	\$663,000	20	\$663,000	\$0	\$663,000	

Total \$8,590,000 Total \$5,687,000

Annual Costs (O&M) Summary

Туре	Annual Cost	N	et Present Worth of O&M
O&M	\$	0	\$0
	Total		0.2

Net Present Worth \$5,687,000

Weighted Useful Life (years) 47.68

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5



3497 Coolidge Rd, East Lansing, MI 48823 Telephone: (517) 316-3930 FAX: (517) 484-8140 PROJECT: City of Brighton, MI CWSRF Project Plan DATE: 2/19/2024 LOCATION: Brighton, MI PROJECT NO. 200-12766-23009 BASIS FOR ESTIMATE: [X] CONCEPTUAL []PRELIMINARY []FINAL **ESTIMATOR:** L. Roberts WORK: **Bauer Road Force Main Addition** CHECKED BY: S. Magnan Project C-1, Alternative C **CURRENT ENR:** 13345

	Construction and Equipment Costs Summary					
	7000 MeVo	Solving Life	Present Worth of	Salvage Valle at	Not pe soon work	
Civil/Site Work/Piping	\$0	50	\$0	\$0	\$0	
Structures	\$0	50	\$0	\$0	\$0	
Mechanical/Electrical	\$0	20	\$0	\$0	\$0	
Other	\$20,000	20	\$20,000	\$0	\$20,000	

Total \$20,000 Total \$20,000

Annual Costs (O&M) Summary

Туре	Annual Cost	Net Present Worth of O&M
O&M	\$0	\$0
	-	
	Total	\$0

Net Present Worth	\$20,000
Weighted Useful Life (years)	20.00

Assumptions:

Present Worth Factor Salvage Value 0.610270943
Present Worth Factor O&M 15.58916229
Discount Rate (%) 2.5

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APPENDIX F: MICHIGAN NATURAL FEATURES INVENTORY



Threatened and Endangered Species Desktop Review

Wastewater System Improvements for the City of Brighton Livingston County, Michigan

December 12, 2023

Prepared for: Tetra Tech

Project #2308007



Orbis Environmental Consulting P.O. Box 10235 • South Bend, Indiana 46680 Phone: (574) 635-1338

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APPENDIX

Appendix A - MNFI and IPaC Results

Appendix B - Qualifications

Appendix C - Impacts and Avoidance Measures



THREATENED AND ENDANGERED SPECIES DESKTOP REVIEW WASTEWATER SYSTEM IMPROVEMENTS BRIGHTON, LIVINGSTON COUNTY, MICHIGAN

December 12, 2023

Megan Martin and Brad Slaughter Orbis Environmental Consulting P.O. Box 10235 South Bend. Indiana 46680

EXECUTIVE SUMMARY

Orbis Environmental Consulting conducted a desktop review of Federal Threatened and Endangered species and Michigan Endangered, Threatened, and Special Concern species documented to occur in the vicinity of the Drinking Water Improvement Project in the city of Brighton, Livingston, County, Michigan. Fifty-nine species known from the vicinity of the project were reviewed to determine if suitable habitat exists for them on or near the project boundary. Tier 1 eastern massasauga rattlesnake (EMR) habitat overlaps the project, and EMR has been documented within 1.5 miles of the project. Coordination with USFWS may be necessary to avoid effects to EMR, and this may include surveys for EMR habitat. An additional 39 species may have habitat within or near the project boundary. Best Management Practices (BMPs) such as avoiding impacts to waterbodies and clearing within certain timeframes are recommended to avoid potential impacts these 39 species, although proposed endangered, candidate species, state species of special concern, and birds of conservation concern do not legally require avoidance and minimization.



INTRODUCTION

Orbis Environmental Consulting (Orbis) was contracted by Tetra Tech to conduct a Threatened and Endangered Species review for the Wastewater System Improvements project for Brighton, Livingston County, Michigan (Figures 1 and 2). The project involves potential repair, rehabilitation, or replacement of two parallel ductile iron 12" sanitary force mains, each approximately 2.5 miles long. Sanitary sewage is collected by gravity at the Third Street Pumping Station located immediately north of Ore Creek and then pumped through the 12-inch parallel force mains extending through Brighton High School property and Pine Creek subdivision (Genoa Twp.) before being received at the City of Brighton's wastewater treatment facility located at 6750 Hamburg Road. Three (3) intermediate pumping stations within the parallel force mains might also need repair, rehabilitation, or replacement.



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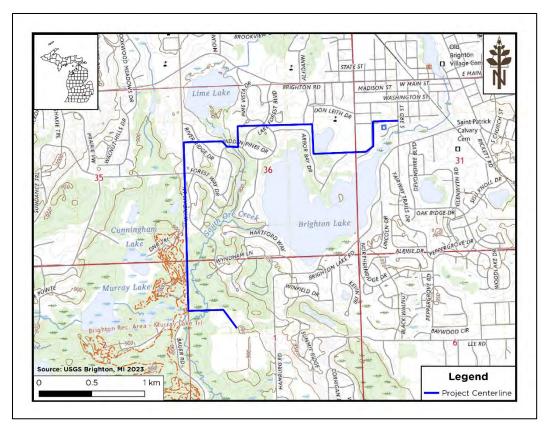


FIGURE 1. TOPOGRAPHIC MAP.



FIGURE 2. AERIAL MAP.



A desktop review of Federal Threatened and Endangered (TE) and Michigan Endangered, Threatened, and Special Concern (ETSC) species was conducted for the entire project.



METHODS

Desktop Review

A desktop review was completed for the project. Orbis submitted a request to Michigan Natural Features Inventory (MNFI) for a rare species review that provided information on known element occurrence records for TE and ETSC plant species. The MNFI query was submitted November 10, 2023, and results were received November 11, 2023. Orbis consulted the Information for Planning and Consultation (IPaC) database to determine federally listed species with ranges that overlap the project. The IPaC query was initially completed December 5, 2023, and updated December 8, 2023, when new species ranges were added by USFWS. The eBird sightings database was consulted December 2023 to review occurrences of listed birds sighted in either 2022 or 2023 and within 0.5 miles of the project (eBird 2023). These references were reviewed in conjunction with aerial photography of the project area to assess the potential presence of suitable habitat for TE and ETSC species known from the surrounding area. See Appendix A for IPaC and MNFI results.



RESULTS

Desktop Review

The combined MNFI and IPaC results indicated a total of 59 listed species known or potentially present within the project vicinity. MNFI indicated 49 ETSC species have been documented within 1.5 miles of the project site, including eight E, 12 T, and 29 SC species. IPaC indicated the potential presence of five federally listed species, one species proposed endangered, one species protected by the Bald and Golden Eagle Protection Act (BGEPA), one candidate species, two species that are considered Under Review (UR), one experimental non-essential species population (EXPN), and 12 Birds of Conservation Concern (BCC). The five federally listed species are the federally endangered Indiana bat (Myotis sodalis), northern long-eared bat (Myotis septentrionalis), and snuffbox mussel (Epioblasma triquetra), and the federally threatened eastern massasauga (Sistrurus catenatus) and eastern prairie fringed orchid (Platanthera leucophaea). The species proposed endangered is the tricolored bat (Perimyotis subflavus); the species protected by the BGEPA is the bald eagle (Haliaeetus leucocephalus); the candidate species is the monarch butterfly (Danaus plexippus); and the species under review are the American bumble bee (Bombus pensylvanicus) and Blanding's turtle (Emydoidea blandingii).



Orbis experts evaluated the potential presence of species within or near the project (qualifications in Appendix B). A total of 40 species may have habitat within or adjacent to the project (Table 1). See Appendix D for detailed documentation of species potentially occurring within the project, suitable habitats, agency comments, and detailed potential impacts and avoidance measures.

Notably, eastern massasauga rattlesnake (EMR) has been documented within 1.5 miles of the project, and Tier 1 habitat occurs within the project. EMR habitat includes seasonal wetlands along forest edges with a short, closed canopy, tall grasses, or low shrubs (USFWS 2022, NatureServe 2023). This habitat primarily occurs where the project crosses South Ore Creek (Figure 3). EMR may commute across habitat during their active period and may hibernate under the ground within this habitat during their inactive period.

Five BCC with habitat within the project were documented in eBird in 2022 and 2023 within 0.5 miles of the project corridor--Chimney swift (*Chaetura pelagica*), lesser yellowlegs (*Tringa flavipes*), red-headed woodpecker (*Melanerpes erythrocephalus*), rusty blackbird (*Euphagus carolinus*), and wood thrush (*Hylocichla mustelina*). These sightings were primarily documented in the Brighton Recreation Area to the west of the project but were also documented within and adjacent to the Brighton Wastewater Plant pools. Brighton Recreation Area has high quality wetland and open water habitat for many species.

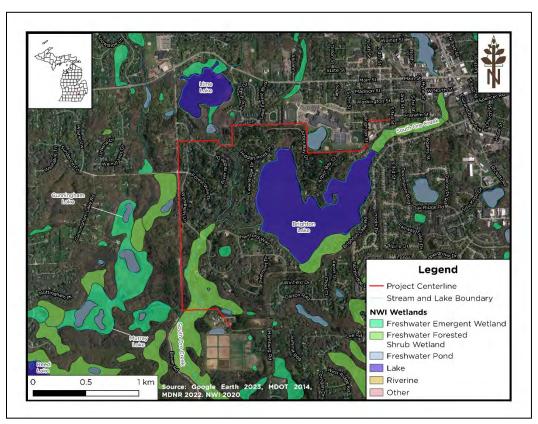


FIGURE 3. NATIONAL WETLAND INVENTORY (NWI) LOCATIONS WITHIN OR NEAR THE PROJECT.



TABLE 1. LISTED SPECIES WITH HABITAT OCCURRING ON THE PROJECT, IMPACTS, AND AVOIDANCE MEASURES. BLUE INDICATES STATE TE SPECIES AND ORANGE FEDERAL TE SPECIES.

Species	State Listing Status ¹	Federal Listing Status ²	Avoidance Measures
Angular spittlebug/ Lepyronia angulifera	SC	-	Avoid impacting prairie fen habitat.
Bald eagle/ <i>Haliaeetus leucocephalus</i>	SC	BGEPA	Minimize disruptive activities and development in the eagles' direct flight path (USFWS 2007).
Black sandshell/ <i>Ligumia recta</i>	Т	-	Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid lake bottom disruption.
Black-billed cuckoo/ Coccyzus erythropthalmus	-	ВСС	Avoid clearing trees May 15 - October 15.
Blanding's turtle/ <i>Emydoidea blandingii</i>	SC	UR	Avoid digging in South Ore Creek and ponds from November through March, cover exposed pits and watch for and avoid individuals commuting through the project from April through October.
Blazing star borer/ Papaipaema berriana	SC	-	Avoid impacting prairie fen habitat.
Brindled madtom/ Noturus miurus	Т	-	Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within South Ore Creek.
Campeloma spire snail/Cincinnatia cincinnatiensis	SC	-	Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within South Ore Creek.
Canada warbler/ Cardellina canadensis	-	ВСС	Avoid tree clearing May through September. Avoid disturbing individuals commuting through the project area.
Cerulean warbler/Dendroica cerulea	Т	всс	Avoid tree clearing April 22 to July 20. Avoid disturbing individuals commuting through the project area.
Chimney swift/ <i>Chaetura pelagica</i>	1	ВСС	Avoid tree clearing March 15 to August 15. Avoid disturbing individuals commuting through the project area.
Eastern massasauga/Sistrurus catenatus	SC	LT	Coordination with USFWS and habitat survey may be required to ensure no impacts to this species. Avoid digging within wetlands September through April.
Eastern sand darter/ Ammocrypta pellucida	Т	-	Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within South Ore Creek.

Species	State Listing Status ¹	Federal Listing Status ²	Avoidance Measures
Elktoe/ Alasmidonta marginata	SC	-	Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within or disrupting the bottom of South Ore Creek.
English sundew/Drosera angelica	SC	-	Avoid altering hydrology or flow of Ore Creek.
Flutedshell/ <i>Lasmigona costata</i>	SC	-	Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within or disrupting the bottom of South Ore Creek.
Indiana bat/ <i>Myotis sodalis</i>	Е	LE	Clear and/or trim all trees October 1 through March 31.
Kidney shell/ Ptychobranchus fasciolaris	SC	-	Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within or disrupting the bottom of South Ore Creek.
Lesser yellowlegs/ <i>Tringa flavipes</i>	-	всс	Avoid harassing individuals using the project area as a migratory corridor April - beginning of May and the end of August - September.
Marsh wren/ Cistothorus palustris	SC	-	Clear and/or trim cattail or other marsh vegetation August through mid-May.
Monarch butterfly/Danaus plexippus	-	С	Avoid impacts to milkweed and other flowering plants used as nectar sources during the growing season.
Mudpuppy/ Necturus maculosus	SC	-	Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within South Ore Creek.
Northern long-eared bat/Myotis septentrionalis	SC	LT	Clear and/or trim all trees October 1 through March 31.
Osprey/ Pandion haliaetus	SC	-	Remove all large snags or utility poles August through mid-April.
Pectoral sandpiper/ Calidris melanotos	-	ВСС	Avoid harassing individuals using the project area as a migratory corridor May and August.
Pickerel frog/ Lithobates palustris	SC	-	Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within South Ore Creek.
Rainbow/ <i>Cambarunio iris</i>	SC	-	Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within or disrupting the bottom of South Ore Creek.
Red-headed woodpecker/ <i>Melanerpes erythrocephalus</i>	SC	всс	Remove or trim trees July through April.
River fingernail clam/ Sphaerium fabale	SC	-	Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within South Ore Creek.
Rusty blackbird/Euphagus carolinus	-	ВСС	Avoid harassing individuals during migration season: January, March - May and October - November.



Species	State Listing Status ¹	Federal Listing Status ²	Avoidance Measures
Short-billed dowitcher/ Limnodromus griseus	-	ВСС	Avoid harassing individuals in August.
Slippershell/ Alasmidonta viridis	T	-	Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within South Ore Creek.
Smooth green snake/ Opheodrys vernalis	SC	-	Avoid harassing individuals and cover all pits while completing project activities in wetlands.
Snuffbox mussel/ Epioblasma triquetra	E	LE	Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within South Ore Creek.
Tricolored bat/ <i>Perimyotis subflavus</i>	SC	PE	Clear and/or trim all trees October 1 through March 31.
Trumpeter swan/ Cygnus buccinator	SC	-	Avoid disturbing wetlands the end of April through the end of July.
Wavyrayed lampmussel/ Lampsilis fasciola	Т	•	Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within South Ore Creek.
White lady slipper/ Cypripedium candidum	Т	•	Avoid altering hydrology/flow of Ore Creek.
Whooping crane/ Grus americana	-	EXPN	Avoid harassing individuals migrating through the area.
Wood thrush/ <i>Hylocichla mustelina</i>	-	ВСС	Clear and/or trim all trees September through April.

E: Endangered; T: Threatened; SC: species of special concern.

² LE: Endangered; LT: Threatened; PE: Proposed Endangered; UR: Under Review for Federal Listing; C: Candidate species being considered for federal status; BGEPA: protected by the Bald and Golden Eagle Protection Act; BCC: Birds of Conservation Concern, EX: Experimental population, non-essential. Avoidance measures not required for EXPN, UR, PE, C, SC or BCC-only species.





CONCLUSIONS AND RECOMMENDATIONS

A desktop review revealed 59 protected species with the potential to occur within the vicinity of the project boundary. Among these, 40 may have habitat potentially occurring within or near the project boundaries.

Notably, records for eastern massasauga rattlesnake occur within 1.5 miles of the project and the project is in Tier 1 EMR habitat. USFWS coordination and/or surveys for habitat by qualified individuals may be required to avoid impacts to this species. Digging work in EMR habitat during the inactive season may impact hibernating EMR. Consequently, there may not be a time in which work can be completed that would completely avoid impacting EMR.

Avoidance and minimization measures may be needed for all other species with habitat on or near the project (although UR, C, PE, SC, and BCC-only species do not legally require avoidance or minimization). Avoidance measures primarily include avoiding wetland habitat associated with South Ore Creek, avoiding disturbing the creek hydrology, creek bottom and any lake bottoms, and avoiding tree, shrub, or brush clearing during time periods when animals are active (Table 1). Clearing within the bat inactive season (October through March) will avoid impacts to federally listed bats and many bird species. Following stormwater pollution prevention plans (SWPPP) and approved chemical spill protocols along with avoidance of the creek or lake bottoms and permanent or temporary impacts to hydrology will avoid impacts to all aquatic species, including federally listed mussels. If digging or other disturbance or change in hydrology must occur to complete the project, then coordination with USFWS will be needed to minimize impacts to aquatic species.



LITERATURE CITED

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- [USFWS] U.S. Fish and Wildlife Service. 2020. National Wetlands Inventory. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.
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Appendix A

MNFI and IPaC Results

Threatened and Endangered Species Desktop Review

Wastewater System Improvements
Brighton, Livingston County, Michigan







United States Department of the Interior



FISH AND WILDLIFE SERVICE

Michigan Ecological Services Field Office 2651 Coolidge Road Suite 101 East Lansing, MI 48823-6360

Phone: (517) 351-2555 Fax: (517) 351-1443

In Reply Refer To: December 08, 2023

Project Code: 2024-0022815

Project Name: Wastewater System Improvements for the City of Brighton

Subject: List of threatened and endangered species that may occur in your proposed project

location or may be affected by your proposed project

To Whom It May Concern:

Official Species List

The attached species list identifies any Federally threatened, endangered, proposed and candidate species that may occur within the boundary of your proposed project or may be affected by your proposed project. The list also includes designated critical habitat if present within your proposed project area or affected by your project. This list is provided to you as the initial step of the consultation process required under section 7(c) of the Endangered Species Act, also referred to as Section 7 Consultation.

Under 50 CFR 402.12(e) (the regulations that implement section 7 of the Endangered Species Act), the accuracy of this species list should be verified after 90 days. You may verify the list by visiting the IPaC website (https://ipac.ecosphere.fws.gov/) at regular intervals during project planning and implementation. To update an Official Species List in IPaC: from the My Projects page, find the project, expand the row, and click Project Home. In the What's Next box on the Project Home page, there is a Request Updated List button to update your species list. Be sure to select an "official" species list for all projects.

Consultation requirements and next steps

Section 7 of the Endangered Species Act of 1973 requires that actions authorized, funded, or carried out by Federal agencies not jeopardize Federally threatened or endangered species or adversely modify designated critical habitat. To fulfill this mandate, Federal agencies (or their designated non-Federal representative) must consult with the Fish and Wildlife Service if they determine their project may affect listed species or critical habitat.

There are two approaches to evaluating the effects of a project on listed species.

<u>Approach 1. Use the All-species Michigan determination key in IPaC.</u> This tool can assist you in making determinations for listed species for some projects. In many cases, the determination key

will provide an automated concurrence that completes all or significant parts of the consultation process. Therefore, we strongly recommend screening your project with the **All-Species Michigan Determination Key (Dkey)**. For additional information on using IPaC and available Determination Keys, visit https://www.fws.gov/media/mifo-ipac-instructions (and click on the attachment). Please carefully review your Dkey output letter to determine whether additional steps are needed to complete the consultation process.

Approach 2. Evaluate the effects to listed species on your own without utilizing a determination key. Once you obtain your official species list, you are not required to continue in IPaC, although in most cases using a determination key should expedite your review. If the project is a Federal action, you should review our section 7 step-by-step instructions before making your determinations: https://www.fws.gov/office/midwest-region-headquarters/midwest-section-7-technical-assistance. If you evaluate the details of your project and conclude "no effect," document your findings, and your listed species review is complete; you do not need our concurrence on "no effect" determinations. If you cannot conclude "no effect," you should coordinate/consult with the Michigan Ecological Services Field Office. The preferred method for submitting your project description and effects determination (if concurrence is needed) is electronically to EastLansing@fws.gov. Please include a copy of this official species list with your request.

For all **wind energy projects** and **projects that include installing communications towers** >**450 feet that use guy wires**, please contact this field office directly for assistance, even if no Federally listed plants, animals or critical habitat are present within your proposed project area or may be affected by your proposed project.

Migratory Birds

Please see the "Migratory Birds" section below for important information regarding incorporating migratory birds into your project planning. Our Migratory Bird Program has developed recommendations, best practices, and other tools to help project proponents voluntarily reduce impacts to birds and their habitats. The Bald and Golden Eagle Protection Act prohibits the take and disturbance of eagles without a permit. If your project is near an eagle nest or winter roost area, see our Eagle Permits website at https://www.fws.gov/program/eagle-management/eagle-permits to help you avoid impacting eagles or determine if a permit may be necessary.

Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your consideration of threatened and endangered species during your project

planning. Please include a copy of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Michigan Ecological Services Field Office 2651 Coolidge Road Suite 101 East Lansing, MI 48823-6360 (517) 351-2555

PROJECT SUMMARY

Project Code: 2024-0022815

Project Name: Wastewater System Improvements for the City of Brighton

Project Type: Wastewater Pipeline - Maintenance / Modification - Below Ground

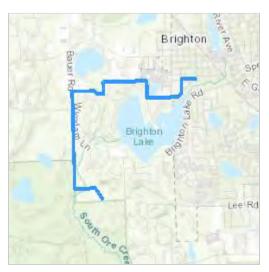
Project Description: Potential repairs, rehabilitation or replacement of two parallel ductile iron

12" sanitary force mains, each approximately 2.5 miles long. Sanitary sewage is collected by gravity at the Third Street Pumping Station located immediately north of Ore Creek, is then pumped through the 12-inch parallel force mains, extend through Brighton High School property and Pine Creek's subdivision (Genoa Twp.), and received within the City of Brighton's wastewater treatment facility located at 6750 Hamburg Road. Three (3) intermediate pumping stations within the parallel force mains

may also need repair, rehabilitation, or replacement.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@42.5165448,-83.81179514515648,14z



Counties: Livingston County, Michigan

ENDANGERED SPECIES ACT SPECIES

There is a total of 8 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 1 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an
office of the National Oceanic and Atmospheric Administration within the Department of
Commerce.

MAMMALS

NAME	STATUS

Indiana Bat *Myotis sodalis*

Endangered

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.

Species profile: https://ecos.fws.gov/ecp/species/5949

General project design guidelines:

 $\underline{https://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJ$

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Northern Long-eared Bat Myotis septentrionalis

Endangered

No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045

Tricolored Bat Perimyotis subflavus

Proposed

No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515

Endangered

BIRDS

NAME	STATUS
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Whooping Crane *Grus americana*

Experimental

Population: U.S.A. (AL, AR, CO, FL, GA, ID, IL, IN, IA, KY, LA, MI, MN, MS, MO, NC, NM, OH, SC, TN, UT, VA, WI, WV, western half of WY)
No critical habitat has been designated for this species.

Population, Non-

Species profile: https://ecos.fws.gov/ecp/species/758

Essential

REPTILES

NAME STATUS

Eastern Massasauga (=rattlesnake) Sistrurus catenatus

Threatened

No critical habitat has been designated for this species.

This species only needs to be considered under the following conditions:

- For all Projects:Project is within Tier1 Habitat
- For all projects:Project is within Tier2 Habitat
- For all Projects: Project is within EMR Range

Species profile: https://ecos.fws.gov/ecp/species/2202

General project design guidelines:

 $\underline{https://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJABQ/nttps://ipac.ecosphere.fws.gov/project/UTQKYYMRGNHEJMA4TLT7FZJ$

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CLAMS

NAME STATUS

Snuffbox Mussel *Epioblasma triquetra*

Endangered

No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4135

INSECTS

NAME STATUS

Monarch Butterfly *Danaus plexippus*

Candidate

No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743

FLOWERING PLANTS

NAME STATUS

Eastern Prairie Fringed Orchid Platanthera leucophaea

Threatened

No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/601

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the <u>National Wildlife Refuge</u> system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act¹ and the Migratory Bird Treaty Act².

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats³, should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

- 1. The <u>Bald and Golden Eagle Protection Act</u> of 1940.
- 2. The Migratory Birds Treaty Act of 1918.
- 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME BREEDING SEASON

Bald Eagle 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 the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (

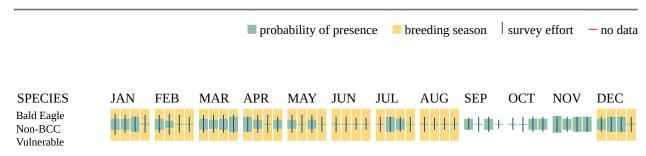
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; 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.



Additional information can be found using the following links:

- Eagle Managment 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 conservation 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

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats³ should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

- 1. The Migratory Birds Treaty Act of 1918.
- 2. The Bald and Golden Eagle Protection Act of 1940.
- 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

12/08/2023

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Black-billed Cuckoo <i>Coccyzus erythropthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9643	Breeds May 20 to Aug 10
Cerulean Warbler <i>Dendroica cerulea</i> 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 <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Eastern Whip-poor-will <i>Antrostomus vociferus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10678	Breeds May 1 to Aug 20
Henslow's Sparrow <i>Ammodramus henslowii</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3941	Breeds May 1 to Aug 31
Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Pectoral Sandpiper <i>Calidris melanotos</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9561	Breeds elsewhere
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10

NAME	BREEDING SEASON
Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9478	Breeds elsewhere
Short-billed Dowitcher <i>Limnodromus griseus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	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 the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (**•**)

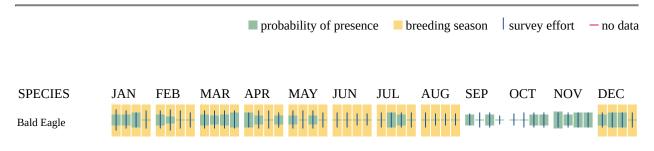
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

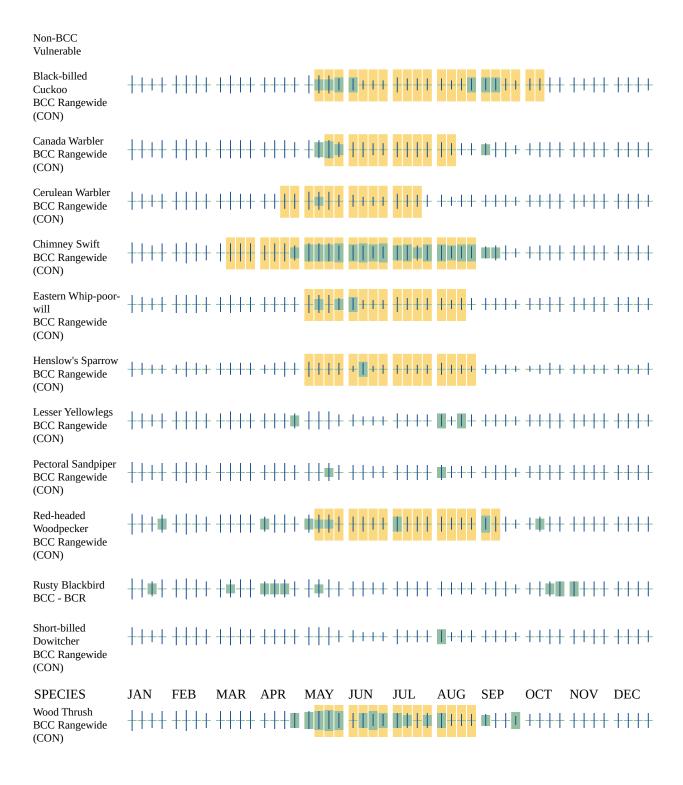
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (-)

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



12/08/2023



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 conservation 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

WETLANDS

Impacts to <u>NWI wetlands</u> 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>U.S. Army Corps of Engineers District</u>.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

RIVERINE

■ R5UBFx

FRESHWATER POND

PUBG

FRESHWATER FORESTED/SHRUB WETLAND

■ PSS1/4C

12/08/2023

IPAC USER CONTACT INFORMATION

Agency: Brighton city
Name: Megan Martin
Address: P.O. Box 10235
City: South Bend

State: IN Zip: 46680

Email mmartin@orbisec.com

Phone: 3178004421

Requestor: Bradford Slaughter

Project Name: improvements to the City of Brighton wastewater system

Project Location: Livingston County, MI

Date Created: 11/17/2023

Use of Data

By acceptance of the information services made available through MNFI the recipient understands that access to the information is provided for primary use only. MNFI requests that the user respect the confidential and sensitive nature of the information. There should be no redistribution of the information. Indiscriminate distribution of information regarding locations of many rare species represents a threat to their protection. Additionally, since the information is constantly being updated MNFI requests that any information service provided by MNFI is destroyed upon completion of the primary use. This information is valid for one year only.

The recipient(s) of the information understand that state endangered and threatened species are protected under state law (Act 451 of 1994, the Natural Resources and Environmental Protection Act, Part 365, Endangered Species Protection). Any questions, observations, new findings, violations or clearance of project activities should be conducted with the Michigan Department of Natural Resources, Wildlife Division. Contact the Endangered Species Coordinator at (517) 284-9453. The recipient(s) of the information understand that federally endangered and threatened species are protected under federal law (Endangered Species Act of 1973). Any questions, observations, new findings, violations or clearance of project activities should be conducted with the U.S. Fish and Wildlife Service in East Lansing at (517) 351-2555. Recipients of the information are responsible for ensuring the protection of protected species and obtaining proper clearance before project activities begin.

Description of Data

The species in this report are listed alphabetically by scientific name. Each record from the database is listed individually. Therefore you may see multiple listings for the same species. The locational and survey date information may be the only differentiating factors when looking at multiple occurrences for a given species. Heritage methodology is followed when entering species occurrences into the MNFI database. Detailed information on heritage methodology can be obtained from NatureServe's website at http://www.natureserve.org. Detailed information on the species listed in this report can be found in abstracts and the rare species explorer on the MNFI website at https://mnfi.anr.msu.edu.

The MNFI database is an ongoing and continuously updated information base. The database is the only comprehensive single source of existing information on Michigan's endangered, threatened, or otherwise significant plant and animal species, natural plant communities, and other natural features. This database cannot provide a definitive statement on the presence, absence, or condition of the natural features in any given locality, since most sites have not been specifically or thoroughly surveyed for their occurrence. Some of the element records are historical. While this historical information may not be important for regulatory purposes, it is important for management and restoration purposes and for scientific use. Furthermore, plant and animal populations and natural communities change with time. Therefore, the information services provided should not be regarded as a complete statement on the occurrence of special natural features of the area in question. In many cases the information may require the interpretation of a trained scientist.

Any comments or questions can be directed to MNFI via our e-mail at mnfi@msu.edu or by calling 517-284-6200.





Plants and Animals

Scientific Name	Common Name	State Status	Federal Status	Count
Alasmidonta marginata	Elktoe	SC		1
Alasmidonta viridis	Slippershell	T		2
Ammocrypta pellucida	Eastern sand darter	T		2
Angelica venenosa	Hairy angelica	SC		1
Bombus pensylvanicus	American bumble bee	E	UR	1
Bouteloua curtipendula	Side-oats grama grass	E		1
Brickellia eupatorioides	False boneset	SC	PS	1
Cambarunio iris	Rainbow	SC		2
Carex richardsonii	Richardson's sedge	SC		1
Cincinnatia cincinnatiensis	Campeloma spire snail	SC		1
Cistothorus palustris	Marsh wren	SC		1
Coregonus artedi	Lake herring or Cisco	T		1
Cygnus buccinator	Trumpeter swan	SC		1
Cypripedium candidum	White lady slipper	Т		3
Drosera anglica	English sundew	SC		1
Eleocharis equisetoides	Horsetail spike rush	SC		1
Emydoidea blandingii	Blanding's turtle	SC	UR	6
Epioblasma triquetra	Snuffbox	E	LE	1
Geum virginianum	Pale avens	Т		1
Hydrastis canadensis	Goldenseal	T		1
Lampsilis fasciola	Wavyrayed lampmussel	T		1
Lasmigona costata	Flutedshell	SC		1
Lepyronia angulifera	Angular spittlebug	SC		1
Ligumia recta	Black sandshell	Т		1
Lithobates palustris	Pickerel frog	SC		2
Muhlenbergia richardsonis	Mat muhly	T		1
Necturus maculosus	Mudpuppy	SC		3
Notropis photogenis	Silver shiner	E		1
Noturus miurus	Brindled madtom	Т		1
Opheodrys vernalis	Smooth green snake	SC		1
Pandion haliaetus	Osprey	SC		2



Plants and Animals

(continued)

Scientific Name	Common Name	State Status	Federal Status	Count
Papaipema beeriana	Blazing star borer	SC		2
Platanthera ciliaris	Orange- or yellow-fringed orchid	Е		1
Ptychobranchus fasciolaris	Kidney shell	SC		1
Pyrgulopsis letsoni	Gravel pyrg	SC		1
Setophaga cerulea	Cerulean warbler	T		1
Sistrurus catenatus	Eastern massasauga	T	LT	2
Sphaerium fabale	River fingernail clam	SC		1
Sporobolus heterolepis	Prairie dropseed	SC		1
Trichophorum clintonii	Clinton's bulrush	SC		1
Valeriana edulis var. ciliata	Edible valerian	Т		1

Number of Species: 41 Number of Occurrences: 57



Natural Communities

Community Type	Count
Oak Barrens	2
Prairie Fen	5



Number of Occurrences: 7

Number of Community Types: 2

Alasmidonta marginata

Elktoe Invertebrate Animal

Federal Status: State Status: SC Global Rank: G4 State Rank: S3?

Last Observed Date: 2016-07-25

County: Livingston
Watershed: Huron

Town Range Section
T01NR05E 22, 23, 24

TO1NRO6E 17, 18, 20, 21, 28

Alasmidonta viridis

Slippershell Invertebrate Animal

Federal Status: State Status: T Global Rank: G4G5 State Rank: S2S3

Last Observed Date: 2001-08-07

County: Livingston
Watershed: Huron

Town Range Section

T01NR06E 9, 17, 18, 20, 21



Alasmidonta viridis

Slippershell Invertebrate Animal

Federal Status: State Status: T Global Rank: G4G5 State Rank: S2S3

Last Observed Date: 2007-06-26

County: Livingston
Watershed: Huron

Town RangeSectionT01NR06E18

Ammocrypta pellucida

Eastern sand darter Vertebrate Animal

Federal Status: State Status: T Global Rank: G4 State Rank: S1S2

Last Observed Date: 1977-07-20

County: Livingston
Watershed: Huron

Town Range Section
T01NR05E 24

Ammocrypta pellucida

Eastern sand darter Vertebrate Animal

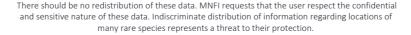
Federal Status: State Status: T Global Rank: G4 State Rank: S1S2

Last Observed Date: 1977-07-20

County: Livingston
Watershed: Huron

Town Range Section T01NR06E 17, 18





Angelica venenosa

Hairy angelica Vascular Plant

Federal Status: State Status: SC Global Rank: G5 State Rank: S3

Last Observed Date: 1905-07-16

County: Livingston
Watershed: Huron

<u>Town Range</u> <u>Section</u>

T01NR06E 8, 9, 10, 11, 14, 15, 16, 17, 21, 22, 23

Bombus pensylvanicus

American bumble bee Invertebrate Animal

Federal Status: UR State Status: E Global Rank: G3G4 State Rank: S1

Last Observed Date: 1921-04-05

County: Livingston
Watershed: Huron

Town Range Section T02NR05E 25, 36

T02NR06E 29, 30, 31, 32





Bouteloua curtipendula

Side-oats grama grass Vascular Plant

Federal Status: State Status: E Global Rank: G5 State Rank: S1

Last Observed Date: 1947-09-18

County: Livingston **Watershed:** Huron

Town Range Section

T01NR06E 4, 5, 8, 9, 10, 15, 16, 17, 20, 21, 22

Brickellia eupatorioides

False boneset Vascular Plant

Federal Status: PS State Status: SC Global Rank: G5 State Rank: S2

Last Observed Date: 1947-09-18

County: Livingston

Watershed: Huron

 Town Range
 Section

 T01NR06E
 8, 9, 10, 11



Cambarunio iris

Rainbow Invertebrate Animal

Federal Status: State Status: SC Global Rank: GNR State Rank: S3

Last Observed Date: 2018-06-06

County: Livingston, Washtenaw

Watershed: Huron

<u>Town Range</u> <u>Section</u>

T01NR04E 22, 23, 25, 33, 34, 35, 36

T01NR05E 21, 22, 23, 24, 27, 28, 29, 31, 32

T01SR04E 1, 2, 3, 12, 13

T01SR05E 5, 6

Cambarunio iris

Rainbow Invertebrate Animal

Federal Status: SC Global Rank: GNR State Rank: S3

Last Observed Date: 2007-06-26

County: Livingston
Watershed: Huron

Town Range Section

T01NR06E 17, 18, 19, 20, 21, 22, 23, 27, 28





Carex richardsonii

Richardson's sedge Vascular Plant

Federal Status: State Status: SC Global Rank: G5 State Rank: S3S4

Last Observed Date: 1898-06-25

County: Livingston

Watershed: Shiawassee, Huron

<u>Town Range</u> <u>Section</u>

TO1NR05E 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24,

25, 26, 27

TO1NRO6E 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20,

21, 22, 23, 27, 28, 29, 30

TO2NR05E 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24, 25, 26, 27, 28, 29,

32, 33, 34, 35, 36

TO2NRO6E 6, 7, 8, 9, 10, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 26,

27, 28, 29, 30, 31, 32, 33, 34, 35, 36

Cincinnatia cincinnatiensis

Campeloma spire snail

Invertebrate Animal

Federal Status: State Status: SC Global Rank: G5 State Rank: S3

Last Observed Date: 1939-07-23

County: Livingston
Watershed: Huron

Town Range Section

T01NR05E 13

T01NR06E 1, 2, 3, 9, 10, 16, 17, 18, 20





Cistothorus palustris

Marsh wren Vertebrate Animal

Federal Status: State Status: SC Global Rank: G5 State Rank: S3

Last Observed Date: 2007-06-03

County: Livingston Watershed: Huron

<u>Town Range</u> <u>Section</u>

T01NR05E 9

Coregonus artedi

Lake herring or Cisco Vertebrate Animal

Federal Status: T Global Rank: GNR State Rank: S3

Last Observed Date: 1991

County: Livingston
Watershed: Huron

Town RangeSectionT01NR05E2, 3

Cygnus buccinator

Trumpeter swan Vertebrate Animal

Federal Status: State Status: SC Global Rank: G4 State Rank: S3

Last Observed Date: 2017-09-25

County: Livingston
Watershed: Huron

Town Range Section T02NR06E 20



Cypripedium candidum

White lady slipper Vascular Plant

Federal Status: State Status: T Global Rank: G4 State Rank: S2

Last Observed Date: 1988-06-07

County: Livingston **Watershed:** Huron

Town RangeSectionT02NR05E28

Cypripedium candidum

White lady slipper Vascular Plant

Federal Status: T Global Rank: G4 State Rank: S2

Last Observed Date: 1996-06-10

County: Livingston
Watershed: Huron

Town Range Section

T01NR05E 2

Cypripedium candidum

White lady slipper Vascular Plant

Federal Status: State Status: T Global Rank: G4 State Rank: S2

Last Observed Date: 2016-05-24

County: Livingston
Watershed: Huron

<u>Town Range</u> <u>Section</u>

T01NR05E 3







Drosera anglica

English sundew Vascular Plant

Federal Status: State Status: SC Global Rank: G5 State Rank: S3

Last Observed Date: 1997-07-01

County: Livingston
Watershed: Huron

<u>Town Range</u> <u>Section</u>

T01NR05E 2

Eleocharis equisetoides

Horsetail spike rush Vascular Plant

Federal Status: State Status: SC Global Rank: G4 State Rank: S3

Last Observed Date: 2011-07-11

County: Livingston
Watershed: Huron

<u>Town Range</u> <u>Section</u>

T01NR05E 3



Emydoidea blandingii

Blanding's turtle Vertebrate Animal

Federal Status: UR State Status: SC Global Rank: G4 State Rank: S2S3

Last Observed Date: 2021-08-30

County: Livingston
Watershed: Huron

 Town Range
 Section

 T01NR05E
 4, 5, 6, 7

T02NR05E 33

Emydoidea blandingii

Blanding's turtle Vertebrate Animal

Federal Status: UR State Status: SC Global Rank: G4 State Rank: S2S3

Last Observed Date: 1960-04-24

County: Livingston
Watershed: Huron

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Town Range Section 25, 36

T02NR06E 29, 30, 31, 32



Emydoidea blandingii

Blanding's turtle Vertebrate Animal

Federal Status: UR State Status: SC Global Rank: G4 State Rank: S2S3

Last Observed Date: 2021-04-05

County: Livingston Watershed: Huron

Town RangeSectionT02NR06E28

Emydoidea blandingii

Blanding's turtle Vertebrate Animal

Federal Status: UR State Status: SC Global Rank: G4 State Rank: S2S3

Last Observed Date: 2019-06-18

County: Livingston **Watershed:** Huron

Town Range Section
TO1NR06E 8



Emydoidea blandingii

Blanding's turtle Vertebrate Animal

Federal Status: UR State Status: SC Global Rank: G4 State Rank: S2S3

Last Observed Date: 2021-04-10

County: Livingston
Watershed: Huron

Town RangeSectionT02NR05E25, 36

T02NR06E 19, 29, 30, 31, 32

Emydoidea blandingii

Blanding's turtle Vertebrate Animal

Federal Status: UR State Status: SC Global Rank: G4 State Rank: S2S3

Last Observed Date: 2021-03-12

County: Livingston

Watershed: Huron

Town Range Section T02NR05E 23



Epioblasma triquetra

Snuffbox Invertebrate Animal

Federal Status: LE State Status: E Global Rank: G3 State Rank: S1S2

Last Observed Date: 2007-06-26

County: Livingston
Watershed: Huron

Town Range Section

T01NR05E 13, 21, 22, 23, 24, 27, 28

T01NR06E 18

Geum virginianum

Pale avens Vascular Plant

Federal Status: State Status: T Global Rank: G5 State Rank: S1S2

Last Observed Date: 1983-07-31

County: Livingston

Watershed: Huron

Town Range Section T02NR05E 28



Hydrastis canadensis

Goldenseal Vascular Plant

Federal Status: T Global Rank: G3G4 State Rank: S2

Last Observed Date: 2021-06-16

County: Livingston
Watershed: Huron

<u>Town Range</u> <u>Section</u>

T01NR05E 3

Lampsilis fasciola

Wavyrayed lampmussel

Invertebrate Animal

Federal Status: State Status: T Global Rank: G5 State Rank: S2

Last Observed Date: 2007-07-03

County: Livingston
Watershed: Huron

Town Range Section

T01NR05E 13, 22, 23, 24, 27

T01NR06E 17, 18, 20, 21, 27, 28



Lasmigona costata

Flutedshell Invertebrate Animal

Federal Status: State Status: SC Global Rank: G5 State Rank: SNR

Last Observed Date: 1932-07-19

County: Livingston
Watershed: Huron

Town RangeSectionT01NR06E17, 20

Lepyronia angulifera

Angular spittlebug Invertebrate Animal

Federal Status: State Status: SC Global Rank: G3 State Rank: S3

Last Observed Date:

County: Livingston
Watershed: Huron

<u>Town Range</u> <u>Section</u>

T01NR05E 3



Ligumia recta

Black sandshell Invertebrate Animal

Federal Status: State Status: T Global Rank: G4G5 State Rank: S1?

Last Observed Date: 2007-06-27

County: Livingston
Watershed: Huron

Town RangeSectionT01NR05E24T01NR06E18

Lithobates palustris

Pickerel frog Vertebrate Animal

Federal Status: State Status: SC Global Rank: G5 State Rank: S3S4

Last Observed Date: 1940-09-20

County: Livingston
Watershed: Huron

Town Range Section

T02NR06E 29, 30, 31, 32



Lithobates palustris

Pickerel frog Vertebrate Animal

Federal Status: State Status: SC Global Rank: G5 State Rank: S3S4

Last Observed Date: 1940-09-20

County: Livingston
Watershed: Huron

 Town Range
 Section

 T01NR05E
 12, 13

 T01NR06E
 7, 18

Muhlenbergia richardsonis

Mat muhly Vascular Plant

Federal Status: State Status: T Global Rank: G5 State Rank: S2

Last Observed Date: 1928-08-29

County: Livingston

Watershed: Huron

Town Range Section

T01NR05E 23, 24, 25, 26, 35, 36

T01NR06E 19, 30, 31



Necturus maculosus

Mudpuppy Vertebrate Animal

Federal Status: State Status: SC Global Rank: G5 State Rank: S3S4

Last Observed Date: 2013-07-01

County: Livingston
Watershed: Huron

 Town Range
 Section

 T01NR05E
 3, 4, 9, 10

Necturus maculosus

Mudpuppy Vertebrate Animal

Federal Status: State Status: SC Global Rank: G5 State Rank: S3S4

Last Observed Date: 2009-12-31

County: Livingston
Watershed: Huron

Town RangeSectionT02NR06E19, 30

Necturus maculosus

Mudpuppy Vertebrate Animal

Federal Status: State Status: SC Global Rank: G5 State Rank: S3S4

Last Observed Date: 2013-07-01

County: Livingston
Watershed: Huron

Town Range Section

T01NR05E 3





Notropis photogenis

Silver shiner Vertebrate Animal

Federal Status: State Status: E Global Rank: G5 State Rank: S1

Last Observed Date: 1927-04-30

County: Livingston
Watershed: Huron

Town Range Section T01NR05E 13

Noturus miurus

Brindled madtom Vertebrate Animal

Federal Status: State Status: T Global Rank: G5 State Rank: S2

Last Observed Date: 1938

County: Livingston **Watershed:** Huron

Town Range Section 701NR05E 24

Oak Barrens

Federal Status: Global Rank: G2? State Rank: S1

Last Observed Date: 2011-08-29

County: Livingston
Watershed: Huron

Town Range Section

T01NR06E 2, 3, 4, 5, 8, 9, 10, 11



Oak Barrens

Federal Status: State Status: Global Rank: G2? State Rank: S1

Last Observed Date: 2011-06-17

County: Livingston
Watershed: Huron

Town RangeSectionT01NR05E14

Opheodrys vernalis

Smooth green snake Vertebrate Animal

Federal Status: State Status: SC Global Rank: G5 State Rank: S3

Last Observed Date: 1902-06-12

County: Livingston

Watershed: Huron

 Town Range
 Section

 T01NR05E
 1

 T01NR06E
 5, 6

 T02NR05E
 25, 36

T02NR06E 29, 30, 31, 32



Pandion haliaetus

Osprey Vertebrate Animal

Federal Status: State Status: SC Global Rank: G5 State Rank: S4

Last Observed Date: 2020

County: Livingston **Watershed:** Huron

Town Range Section 702NR06E 21

Pandion haliaetus

Osprey Vertebrate Animal

Federal Status: State Status: SC Global Rank: G5 State Rank: S4

Last Observed Date: 2019

County: Livingston
Watershed: Huron

Town RangeSectionT02NR06E31

Papaipema beeriana

Blazing star borer Invertebrate Animal

Federal Status: State Status: SC Global Rank: G3? State Rank: S2

Last Observed Date: 2014-09-28

County: Livingston
Watershed: Huron

Town Range Section

T01NR06E 5







Papaipema beeriana

Blazing star borer Invertebrate Animal

Federal Status: State Status: SC Global Rank: G3? State Rank: S2

Last Observed Date: 2017-10-02

County: Livingston **Watershed:** Huron

Town RangeSectionT01NR05E14

Platanthera ciliaris

Orange- or yellow-fringed orchid

Vascular Plant

Federal Status: State Status: E Global Rank: G5 State Rank: S1S2

Last Observed Date: 1912-08-05

County: Livingston, Oakland, Washtenaw

Watershed: Huron, Detroit

Town Range T01NR05E	<u>Section</u> 13, 23, 24, 25, 26, 27, 34, 35, 36
T01NR06E	7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
T01NR07E	19, 29, 30, 31, 32
T01SR05E	1, 2, 3, 10, 11, 12, 13, 14, 15, 23, 24, 25, 26
T01SR06E	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35
T01SR07E	5, 6, 7, 8, 17, 18, 19, 30



Prairie Fen

Global Rank: G3 **Federal Status:** State Rank: S3 **State Status:**

Last Observed Date: 2011-06-16

County: Livingston Watershed: Huron

Town Range Section

T01NR05E

Prairie Fen

Federal Status: Global Rank: G3 State Rank: S3 **State Status:**

Last Observed Date: 2011-06-14

County: Livingston Watershed: Huron

Town Range Section T01NR05E 9, 10

Prairie Fen

Global Rank: G3 **Federal Status: State Status:** State Rank: S3

Last Observed Date: 1985-07-23

County: Livingston Watershed: Huron

Town Range Section T02NR05E 28, 29



Prairie Fen

Federal Status: State Status: Global Rank: G3 State Rank: S3

Last Observed Date: 2011-06-14

County: Livingston **Watershed:** Huron

<u>Town Range</u> <u>Section</u>

T01NR05E 2 T02NR05E 35

Prairie Fen

Federal Status: State Status: Global Rank: G3 State Rank: S3

Last Observed Date: 2009-06-24

County: Livingston **Watershed:** Huron

Town Range Section 18, 19

Ptychobranchus fasciolaris

Kidney shell Invertebrate Animal

Federal Status: State Status: SC Global Rank: G4G5 State Rank: S2

Last Observed Date: 2019-07-24

County: Livingston
Watershed: Huron

Town Range Section T01NR05E 23, 24

T01NR06E 3, 10, 17, 18, 20, 21





Pyrgulopsis letsoni

Gravel pyrg Invertebrate Animal

Federal Status: State Status: SC Global Rank: GU State Rank: SH

Last Observed Date: 1943

County: Livingston, Oakland

Watershed: Huron

<u>Town Range</u> <u>Section</u>

T01NR06E 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19,

20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 34, 35, 36

TO1NRO7E 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 15, 16, 17, 18, 19, 20, 21, 22, 28,

29, 30, 31

TO2NRO6E 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25,

26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36

TO2NRO7E 7, 8, 16, 17, 18, 19, 20, 21, 22, 26, 27, 28, 29, 30, 31, 32,

33, 34, 35

Setophaga cerulea

Cerulean warbler Vertebrate Animal

Federal Status: State Status: T Global Rank: G4 State Rank: S3

Last Observed Date: 1997-06-08

County: Livingston

Watershed: Huron

Town Range Section
T01NR05E 2, 3, 5, 10, 11



Sistrurus catenatus

Vertebrate Animal Eastern massasauga

Global Rank: G3 Federal Status: LT State Status: T State Rank: S3

Last Observed Date: 1951-05-08

County: Livingston Watershed: Huron

Town Range Section T01NR05E 13, 24 T01NR06E 18, 19

Sistrurus catenatus

Vertebrate Animal Eastern massasauga

Federal Status: LT State Status: T Global Rank: G3 State Rank: S3

Last Observed Date: 2019-10-05

County: Livingston Watershed: Huron

Town Range Section

T01NR05E 1, 2, 3, 4, 9, 10

T02NR05E 36





Sphaerium fabale

River fingernail clam Invertebrate Animal

Federal Status: State Status: SC Global Rank: G5 State Rank: SNR

Last Observed Date: 1958

County: Livingston **Watershed:** Huron

<u>Town Range</u> <u>Section</u>

T02NR06E 12, 13, 14, 15, 22, 27, 28

Sporobolus heterolepis

Prairie dropseed Vascular Plant

Federal Status: State Status: SC Global Rank: G5 State Rank: S3

Last Observed Date: 1990-09-29

County: Livingston
Watershed: Huron

Town Range Section 702NR05E 28



Trichophorum clintonii

Clinton's bulrush Vascular Plant

Federal Status: State Status: SC Global Rank: G4 State Rank: S3

Last Observed Date: 1898-06-02

County: Livingston

Watershed: Huron, Shiawassee

Town Range	Section
T01NR05E	1, 2, 3, 11, 12
T01NR06E	2, 3, 4, 5, 6, 7, 8, 9, 10
T02NR05E	1, 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27, 28, 33, 34, 35, 36
T02NR06E	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36
T03NR05E	25, 26, 27, 33, 34, 35, 36
T03NR06E	19, 20, 27, 28, 29, 30, 31, 32, 33, 34, 35

Valeriana edulis var. ciliata

Edible valerian Vascular Plant

Federal Status: T Global Rank: G5T3 State Rank: S2

Last Observed Date: 1947-06-27

County: Livingston, Oakland

Watershed: Huron

Town Range Section
T01NR06E 1, 2, 3, 4, 5, 8, 9, 10, 11, 14, 15, 16, 17

T01NR07E 5, 6 T02NR06E 35, 36





Federal Protection Status Code Definitions

LE = Listed endangered

LT = Listed threatened

LE/LT = Partly listed endangered and partly listed threatened

PDL = Proposed delist

E(S/A) = Endangered based on similarities/appearance

PS = Partial status (federally listed in only part of its range)

C = Species being considered for federal status

State Protection Status Code Definitions

E = Endangered

T = Threatened

SC = Special concern

X = Presumed extirpated (legally 'threatened' if rediscovered)

Global Heritage Status Rank Definitions

The priority assigned by NatureServe 's national office for data collection and protection based upon the element's status throughout its entire world-wide range. Criteria not based only on number of occurrences; other critical factors also apply. Note that ranks are frequently combined.

G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences range-wide or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.

G2 = Imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.

G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g. a single western state, a physiographic region in the East) or because of other factor(s) making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.

G4 = Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.

G5 = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

GH = Of historical occurrence throughout its range, i.e. formerly part of the established biota, with the expectation that it may be rediscovered (e.g. Bachman's Warbler).

GU = Possibly in peril range-wide, but status uncertain; need more information.

GX = Believed to be extinct throughout its range (e.g. Passenger Pigeon with virtually no likelihood that it will be rediscovered).

G? = Incomplete data

Q = Taxonomy uncertain

T = Subspecies

U = Unmappable through out the global geographic extent

? = Questionable

Subnational Heritage Status Rank Definitions

The priority assigned by the Michigan Natural Features Inventory for data collection and protection based upon the element's status within the state. Criteria not based only on number of occurrences; other critical factors also apply. Note that ranks are frequently combined.

S1 = Critically imperiled in the state because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation in the state.

S2 = Imperiled in state because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.

S3 = Rare or uncommon in state (on the order of 21 to 100 occurrences).

S4 = Apparently secure in state, with many occurrences.

S5 = Demonstrably secure in state and essentially ineradicable under present conditions.

SA = Accidental in state, including species (usually birds or butterflies) recorded once or twice or only at very great intervals, hundreds or even thousands of miles outside their usual range.

SE = An exotic established in the state; may be native elsewhere in North America (e.g. house finch or catalpa in eastern states).

SH = Of historical occurrence in state and suspected to be still extant.

SN = Regularly occurring, usually migratory and typically nonbreeding species.

SR = Reported from state, but without persuasive documentation which would provide a basis for either accepting or rejecting the report.

SRF = Reported falsely (in error) from state but this error persisting in the literature.

SU = Possibly in peril in state, but status uncertain; need more information.

SX = Apparently extirpated from state.







Appendix B

Qualifications

Threatened and Endangered Species Desktop Review

Wastewater System Improvements
Brighton, Livingston County, Michigan







Orbis Environmental Consulting PO Box 10235 South Bend, IN 46680 Office - 574-635-1338 Cell - 317-800-4421 mmartin@orbisec.com

Megan K Martin

Summary of Services Provided

Megan has 17 years' experience conducting terrestrial wildlife surveys in the midwestern, eastern, and southern U.S. She is a bat specialist, but also has experience with birds (emphasis in raptors), small mammals, reptiles, amphibians, and invertebrates. She helps clients (government and private) assess and minimize the risk of impacting places with ecological and wildlife value. She also coordinates with agencies and consulting parties to comply with the Endangered Species Act, including writing portions of large regulatory documents such as Habitat Conservation Plans, Biological Assessments, and Environmental Impact Statements. Her bat-related work expertise includes summer and winter habitat assessments, winter bat hibernacula surveys, radio-telemetry, diet analysis, acoustic surveys and qualitative call analysis, mist-netting surveys, harp-trap surveys, and postconstruction wind farm mortality surveys. She is familiar with 13 species of bats and has conducted bat surveys in twelve states including: Indiana, Kentucky, Virginia, West Virginia, Illinois, Michigan, Missouri, Ohio, Pennsylvania, Texas, New York, and Iowa. Her survey experience with birds includes auditory and visual surveys for birds (point counts) and visual surveys for eagle or other raptor nests. She also has experience completing pest bird abatement with falconry-trained hawks and falcons.

Examples of Relevant Work Experience

- Completed 56 acoustic-nights at 28 sites in Hardin and Linn counties, Iowa.
 Visually analyzed 28 acoustic-nights with positive TE bat hits and assigned 64,733 labels, including 36 Indiana bat, 9 northern long-eared bat, 263 little brown bat, and 685 tricolored bat labels. Co-authored technical report analyzing data collected and suggesting potential future management. 2022.
- Identified 65 species of birds during point counts across 3 separate visits to Camp Clark Training Center, Vernon County, Missouri, for the Missouri Army National Guard. Included both diurnal and nocturnal birds. Co-authored technical report analyzing data collected and suggesting potential future management. 2022.
- Identified 55 species of birds during point counts across 3 separate visits to Wappapello Training Center, Wayne County, Missouri, for the Missouri Army National Guard. Included both diurnal and nocturnal birds. Co-authored technical report analyzing data collected and suggesting potential future management. 2022.
- Completed one mist-netting site following updated 2022 NLEB and Indiana bat survey protocols in Boone County, Indiana. Captured 10 bats over 14 net-

- nights. 2022. Co-authored technical report analyzing data collected and suggesting potential future management.
- Completed three mist-netting sites in Clermont County, Ohio. Captured 5 bats over 6 net-nights. 2022.
- Completed a building inspection in Wayne County, Michigan for potential TE bats inhabiting the structure. Followed INDOT Bridge, Culvert, and Building Bat Presence Inspection Protocol. Co-authored technical report documenting bat use and suggesting potential future management. 2022.
- Completed five mist-netting sites in Greene County, PA for a pipeline. Captured a total of 50 bats over 45 net-nights. 2021.
- Completed potential roost tree (PRT) and acoustic surveys for federally listed bats for Schmidt Associates. A total of 48 PRTs were identified by Orbis. A single acoustic site was completed the nights of May 15 and May 16, 2021. Coauthored technical report analyzing data collected and suggesting potential future management.
- Completed mist-netting presence/absence survey for federally listed bats for Graythorne Development, LLC. Followed newly established COVID-19 procedures and precautions to reduce potential COVID-19 transmission to bats. Co-authored technical report analyzing data collected and suggesting potential future management. 2020.
- Completed NABat survey for Ozark National Scenic Riverways including 1) stationary acoustic surveys, 2) mobile transect acoustic surveys, 3) writing final accomplishment report and 4) creating species occurrence summary.
 Drafted long-term passive monitoring report with OZAR-collected data. 2020.
- Completed acoustic survey fieldwork for AEP including placement and monitoring of detectors, and drafted report to determine presence/absence of federally listed bats. Acoustic detectors recorded 576 visually identifiable bats. 2020.
- Successfully abated over 31,000 pest birds (primarily brown-headed cowbirds and house sparrows) from sorghum small plots using falconry-trained lanner falcons, peregrine falcons, and Harris's hawks. Provided detailed wildlife management analysis and recommendations post-abatement. 2019 2020.
- Completed two years of a three-year bat presence/absence survey for the Indiana Department of Natural Resources on Division of Fish and Wildlife lands. Was present for 6 of 15 federally endangered Indiana bats captured, two little brown bats captured, and nine tricolored bats captured. 2018-2019.
- Completed survey for Titley Scientific, assessing viability of potential mitigation sites through listed bat species surveys. Completed both evening and morning mist-netting. Captured and tagged 2 Indiana bats and captured 1 little brown bat. 2019.

- Completed bridge survey for INDOT, including physical and photographic documentation of roosting bats and guano collection for RNA analysis to determine species. Co-authored technical report documenting bat use and suggesting potential future management. 2018.
- Completed potential roost tree documentation and emergence counts on multiple projects for American Electric Power (AEP) and Northern Indiana Public Service Company (NIPSCO). 2018.
- Directed and completed four years of bat acoustic, mist-net, and radiotelemetry surveys in an interstate corridor in Indiana as part of pre- and postconstruction surveys. 2014-2017.
- Prepared technical writing for Lake States Forest Management Habitat Conservation Plan (HCP) to allow forest management of four bat species impacted by White-nose Syndrome in Michigan, Wisconsin, and Minnesota. 2016-2017.
- Prepared Myotid Bat Conservation Plans (MBCP) for seven proposed pipeline projects in West Virginia. 2015-2017.
- Completed two years of mist-net and acoustic surveys for federally listed bats as part of coordinated effort among multiple private organizations to document wildlife species composition and distribution in Morgan-Monroe and Yellowwood State Forests. Co-authored technical report analyzing data collected and suggesting potential future management. 2016-2017.
- Completed mist-net surveys for proposed pipeline project in Roanoke County, Virginia. Captured two eastern small-footed bats. 2017.
- Completed rare bird point count surveys and listed bat mist-net surveys for electrical transmission line upgrades in Noble, DeKalb, and Allen counties, Indiana. 2017.
- Conducted searches for habitat, roost trees, and portals suitable for listed bat habitat for proposed pipeline in Braxton, Doddridge, Greenbrier, Harrison, Nicholas, and Webster counties, West Virginia. 2014-2016.
- Completed mist-net surveys and emergence counts to avoid and minimize impacts of tree removal on tree-roosting bats within an approximately 40.09-acre transmission line rebuild project in Van Buren, Cass, and St. Joseph counties, Michigan. 2016.
- Completed winter hibernacula survey at Wyandotte Cave with Indiana Department of Natural Resources. Counted, photographed, and identified bats hibernating on cave surfaces. 2015.
- Completed summer and winter habitat assessments for federally listed bats in preparation of MBCPs for multiple natural gas pipeline projects in West Virginia. 2015.

- Completed hibernacula survey for Indiana and northern long-eared bats for proposed construction of borehole pad, access road, and waterline to support existing mining operation in Washington County, Ohio. 2015.
- Completed hibernacula survey for Indiana and northern long-eared bats for on 29-acre mining project in Washington County, Pennsylvania. 2015.
- Completed mist-netting along two proposed natural gas pipelines in Greene County, Pennsylvania resulting in capture of 265 bats representing six species. Tagged three northern long-eared bats and tracked them to roosts. 2015.
- Completed mist-netting for federally listed bats on portions of proposed natural gas pipeline transversing Allegheny, Washington, and Greene counties, Pennsylvania. 2015.
- Evaluated three mitigation site locations for potential suitability for use by Indiana bats for natural gas pipeline company. 2015.
- Conducted field surveys of bats using bridges over two streams within an area considered known occupied habitat for the Indiana bat, gray bat, and northern long-eared bat for proposed interstate bypass in Trigg County, Kentucky. 2014.
- Assisted with preliminary study of summer bat community and performed mist-net surveys within a Wind Resource Area (WRA) consisting of approximately 10,984 acres in Grand Traverse and Wexford counties, Michigan. 2014.
- Assisted with preliminary study of the summer bat community and performed mist-net surveys within a WRA consisting of approximately 30,332 acres in Osceola, Wexford, and Missaukee counties, Michigan. 2014.
- Participated in general survey of bats to identify species and determine distribution within Wayne National Forest, as well as inventory bats as part of White-Nose Syndrome monitoring in Athens, Hocking, and Perry counties, Ohio. 2014.
- Conducted mist-net surveys for federally listed bats for natural gas pipeline in eastern Ohio. 2014.
- Conducted mist-net surveys for federally listed bats for proposed transmission line upgrades in Allen County, Indiana. 2014.
- Supervised emergence counts for Indiana bats at proposed pipeline stream crossing site along Clinton River in Rochester, Michigan. 2014.
- Completed mist-net and acoustic monitoring surveys in support of Tier 2 Environmental Impact Studies in Indiana; authored technical report and appendix to Biological Assessment, assisted with editing portions of the Environmental Impact Statement. 2013-2014.

- Completed habitat assessment, mist-netting and acoustic surveys for federally endangered Indiana bat along a pipeline corridor in Livingston, McLean, DeWitt, Macon, Christian, Shelby, Fayette, and Marion counties in Illinois. Three Indiana bats were captured and tracked with radio-telemetry. 2013.
- Completed habitat assessment for Indiana bat on a facility in St. Clair County, Michigan including literature review, desktop review, and on-site assessment. 2013.
- Completed reporting and data management for wildlife hazard assessment in Muskegon County, Michigan. 2013.
- Completed mist-net surveys for federally endangered Indiana bat within an area infested with the Asian long-horned beetle in Clermont County, Ohio. Captured 1 Indiana bat and 14 northern long-eared bats. Radio-tracked two Indiana bats. 2012 and 2013.
- Completed mist-net and acoustic surveys on 20,000-acre site in Saginaw Bay and Tuscola counties, Michigan. 2013.
- Completed mist-netting and acoustic monitoring for federally endangered Indiana bat in Marshall and St. Joseph counties, Indiana for WRA. 2012.
- Completed mist-net and acoustic monitoring surveys in Jennings County, for Indiana for Department of Defense. 2012.
- Completed mortality surveys for bats and birds and insect population inventories on an existing wind farm in Texas. 2012.

Education

Indiana State University, Terre Haute, IN, August 2011

 Master of Science in Biology – Specialization in Forestry and Bat Ecology "Impacts of Different Forest Tree-Harvest Methods on Diets and Populations of Insectivorous Forest Bats" – Spring 2011 M.S. Thesis

Ball State University, Muncie, IN, May 2008

Bachelor of Arts in Biology, minor in Creative Writing

Job-Related Training and Certifications

- Acoustic ID of Eastern Bats, Vesper Bat Detection Services, May 2021.
- Certified Ecologist, Ecological Society of America, 2017
- Habitat Conservation Planning for Endangered Species, certificate of completion, U.S. Department of the Interior, 2016
- Endangered Species Act of 1973 Overview, certificate of completion, U.S.
 Department of the Interior, 2016
- Bat Investigations for Field Personnel, certificate of completion, INDOT University, 2016

- Acoustic analysis including qualitative analysis of eastern bat species and use of acoustic analysis automated programs EchoClass, BCID, and Kaleidoscope, West, Inc., March 2013
- General Class Falconer (Indiana Permit #525)

Presentations

- Martin, Megan K. "Evening bat population resurgence and expansion in Indiana and the upper Midwest." Presented to North American Symposium for Bat Research, October 2016.
- Caylor, Megan K. "Myotis septentrionalis observations of roost selection: Midwest & Northeast Regions." Presented to North American Symposium for Bat Research, October 2014.
- Caylor, Megan K. "Atypical American beech tree used by Indiana bat maternity colony." Presented to Midwest Bat Working Group, March 2014.
- Caylor, Megan K. "Impacts of different forest tree-harvest methods on diets and populations of insectivorous forest bats." Presented to the Indiana Academy of Science and Midwest Bat Working Group, March 2011.
- Caylor, Megan K. "HEE Project Results 2011: Bat Mist Netting, Guano Analysis, WNS Impact." Presented at the Hardwood Ecosystem Experiment Meeting, September 2011.
- Caylor, Megan K. "Diets of insectivorous forest bats." Presented at the Hardwood Ecosystem Experiment Meeting, November 2010.
- Caylor, Megan K. "Bats of Hardwood Ecosystem Experiment. Presented at the Hardwood Ecosystem Experiment Meeting, September 2009.

Publications

- Martin, M.K., J. J Sheets, D. W. Sparks, J. O. Whitaker, Jr. 2020. Diet of bats before and after forest management. Proceedings of the Indiana Academy of Science. 129: 56-64.
- Bishop, L., R. Schnapp, J. Stant, J.E. Belth, R. Brodman, R. Carlson, L. Cole, S. Dunbar, J.D. Holland, R. Kerner, S. Russel, R.P. Jean, L. Koehn, J. Lendemer, T. Maloney, M.A. Milne, G. Mynhardt, P. Rothrock, D. Rupp, J.J Sheets, D.W. Sparks, M.K. Martin, C. Strange, T.M. Rice, J.O. Whitaker, Jr., & A. Chamberlain. 2019. Results of the Indiana Forest Alliance Ecoblitz at Morgan-Monroe/Yellowwood State Forest in Indiana. Proceedings of the Indiana Academy of Science. 128: 153-169.
- Sheets, J. J and M. K. Martin. 2018. Atypical American Beech Tree Used by Indiana Bat Maternity Colony. Proceedings of the Indiana Academy of Science. 127: 55-56.

Holland, J.D. R.W. Dolan, J.J Sheets, M.S. Finkler, B.E. Fisher, R. Hedge, T. Swinford, N. Harby, R.P. Jean, M.K. Martin, B. McKnight, M. Milne, K. Roth, P. Rothrock. C. Strang. 2017. Results of the 2016 Indianapolis biodiversity survey, Marion County, Indiana. Proceedings of the Indiana Academy of Science. 126: 166-175.

Sheets, J. J.; Duchamp, J. E.; M. K. Caylor; L. D'Acunto; J. O. Whitaker, Jr.; V. Brack, Jr.; and D. W. Sparks, 2013. Habitat use by bats in two Indiana forests prior to silvicultural treatments for oak regeneration. General Technical Report NRS-P-108: 203-217.

Current Memberships and Affiliations

- Midwest Bat Working Group (MWBWG)
- Ecological Society of America (ESA)
- The Wildlife Society (TWS)
- Center for Bat Research, Outreach and Conservation
- Indiana Geographic Information Council (IGIC)
- North American Falconers Association (NAFA)
- Indiana Falconers Association (IFA)

Professional References

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Bradford S. Slaughter

Summary of Services Provided

Brad has 18 years of experience managing projects and conducting biological surveys, specializing in floristic inventories, rare plant surveys, vegetation monitoring, and the identification, delineation, and evaluation of remnant plant communities. He has expertise in the classification and description of plant communities and is coauthor of *A Field Guide to the Natural Communities of Michigan*. Brad serves on the Michigan Rare Plant Technical Advisory Committee and oversaw the currency, dissemination, and curation of rare plant element occurrence data in Michigan's Natural Heritage Database prior to joining Orbis. He also coauthored the most recent iteration of Michigan's Floristic Quality Assessment. In addition to his writings, Brad delivers presentations and field trips for a variety of audiences.

Examples of Relevant Work Experience

- Coauthor of several integral resources on Michigan's natural communities and native and non-native flora, including A Field Guide to the Natural Communities of Michigan (Michigan State University Press), A Field Guide to Invasive Plants of Aquatic and Wetland Habitats for Michigan (MNFI, selfpublished), and the 3rd Edition of the Floristic Quality Assessment of Michigan
- Conducted vascular plant inventories and Floristic Quality Assessments (FQAs) at over 400 sites in Michigan and Indiana
- Developed, conducted, and managed inventories of state- and federally-listed plants throughout Michigan
- Surveyed and evaluated over 300 natural community element occurrences totaling over 200,000 acres in Michigan
- Developed habitat evaluation and monitoring protocols for the Indiana Department of Natural Resources and The Nature Conservancy in the Grand Calumet River Area of Concern in Lake County, Indiana
- Instructed plant identification training workshops for a variety of clients
- Conducted rare species surveys and wetland delineations for energy infrastructure projects in southern Michigan and northern Indiana

Education

- MS, Botany, Miami University, Oxford, Ohio, 2005
- BA, Biology, Albion College, Albion, Michigan, 2002

Job-Related Training and Certifications

- Certified in Wetland Delineation (Midwest Biodiversity Institute)
- Wetland Permitting Training (Richard Chinn Environmental Training, Inc.)
- Core Methodology Training (NatureServe)

- Natural Heritage Workshop on Identification, Mapping, Ranking, and Management of Forested Natural Communities I and II (NatureServe)
- Vegetation Monitoring in a Management Context (Natural Areas Training Academy)
- LANDFIRE Vegetation Modeling Workshop: Forest, Woodland, and Wetland Systems of MRLC Map Zone 51 (The Nature Conservancy)
- FFI Ecological Monitoring Utilities Training (United States Forest Service)
- Fire Effects & Smoke Management Training (Michigan Department of Natural Resources)
- Certified in First Aid and CPR/AED (American Heart Association)

Publications

- Slaughter, B.S. 2020. Vascular flora of Pierce Cedar Creek Institute, Barry County, Michigan. *The Great Lakes Botanist* 59: 99–158.
- Slaughter, B.S., and A.K. Klain. 2019. Additions to the vascular flora, and notes on the phytogeography, of Lake County, Michigan. *The Great Lakes Botanist* 58: 144–182.
- Slaughter, B.S., and T. Walters. 2018. *Juncus validus* Coville (Juncaceae) new to the Great Lakes region. *The Great Lakes Botanist* 57: 42-44.
- Slaughter, B.S. 2016. Reports of four rare plants in Michigan, including two non-native species. *The Michigan Botanist* 55: 54-60.
- Slaughter, B.S., A.A. Reznicek, M.R. Penskar, and B.S. Walters. 2015. Notes on the third edition of the Floristic Quality Assessment of Michigan. *Wetland Science and Practice* 32: 28-32.
- Cohen, J.G., M.A. Kost, B.S. Slaughter, and D.A. Albert. 2014. *A Field Guide to the Natural Communities of Michigan*. Michigan State University Press, East Lansing, Ml. 362 pp.
- Slaughter, B.S., and J. Schultz. 2012. The distribution, ecology, and conservation status of *Rubus acaulis* Michx. (dwarf or arctic raspberry) in Michigan. *The Michigan Botanist* 51: 133-148.
- Namestnik, S.A., J.R. Thomas, and B.S. Slaughter. 2012. Two recent plant discoveries in Missouri: *Cladium mariscus* subsp. *jamaicense* (Cyperaceae) and *Utricularia minor* (Lentibulariaceae). *Phytoneuron* 2012-92: 1-6.
- Hochstedler, W.W., B.S. Slaughter, D.L. Gorchov, L.P. Saunders, and M.H.H. Stevens. 2007. Forest floor plant community response to experimental control of the invasive biennial *Alliaria petiolata* (garlic mustard). *Journal of the Torrey Botanical Society* 134: 155-165.
- Slaughter, B.S., W.W. Hochstedler, D.L. Gorchov, and A.M. Carlson. 2007. Response of *Alliaria petiolata* (garlic mustard) to five years of fall herbicide application in a southern Ohio deciduous forest. *Journal of the Torrey Botanical Society* 134: 18-26.
- Slaughter, B.S., and J.D. Skean, Jr. 2003. Comparison of cedar and tamarack stands in a relict conifer swamp at Pierce Cedar Creek Institute, Barry County, Michigan. *The Michigan Botanist* 42: 111-126.

Slaughter, B.S., and J.D. Skean, Jr. 2003. Annotated checklist of vascular plants in the vicinity of Cedar Creek and Brewster Lake, Pierce Cedar Creek Institute, Barry County, Michigan. *The Michigan Botanist* 42: 127-148.

Selected Technical Reports

- Slaughter, B.S. 2022. Ecological and floristic assessment, Arcadia Dunes: The C.S. Mott Nature Preserve, Manistee County, Michigan. Orbis Environmental Consulting, Project No. 2203011, South Bend, Indiana. 105 pp.
- Slaughter, B.S. 2021. Ecological and floristic inventory, Armintrout-Milbocker Nature Preserve, Allegan County, Michigan. Orbis Environmental Consulting, Project No. 2103012, South Bend, Indiana. 67 pp.
- Slaughter, B.S. 2020. Effects of fire management on vegetation: 2019 and 2020 preburn monitoring, Ten O'Clock Line Nature Preserve, Brown County, Indiana. Orbis Environmental Consulting, Project No. 1706004, South Bend, Indiana. 54 pp.
- Slaughter, B.S. 2019. Rapid assessment protocol and evaluation metrics for habitat delisting, Grand Calumet River Area of Concern, Lake County, Indiana. Orbis Environmental Consulting, Project No. 1403005, South Bend, Indiana. 84 pp.
- Slaughter, B.S. 2019. A revised inventory of vascular plants, Pierce Cedar Creek Institute, Barry County, Michigan. Orbis Environmental Consulting, Project No. 1801002, South Bend, Indiana. 131 pp.
- Slaughter, B.S., and D.L. Cuthrell. 2017. Status assessment of Pitcher's thistle and Hart's tongue fern: Acquiring contemporary information for recovery planning and Five-year Reviews. Michigan Natural Features Inventory, Report No. 2017-02, Lansing, MI. 106 pp.
- Cohen, J.G., and B.S. Slaughter. 2015. Natural community surveys and stewardship prioritization of Michigan's coastal zone. Michigan Natural Features Inventory, Report No. 2015-27, Lansing, MI. 244 pp.
- Slaughter, B.S., and M.R. Penskar. 2015. An ecological interpretation of the Humbug Marsh Unit, Detroit River International Wildlife Refuge, Wayne County, Michigan. Michigan Natural Features Inventory, Report No. 2015-22, Lansing, MI. 79 pp.
- Slaughter, B.S., and J.K. Marr. 2015. Arctic-Alpine disjuncts on Isle Royale and the Keweenaw Peninsula of Michigan's Upper Peninsula. Michigan Natural Features Inventory, Report No. 2015-09, Lansing, MI. 12 pp. + appendices.
- Reznicek, A.A., M.R. Penskar, B.S. Walters, and B.S. Slaughter. 2014. Michigan Floristic Quality Assessment Database. Herbarium, University of Michigan, Ann Arbor, MI and Michigan Natural Features Inventory, Michigan State University, Lansing, MI. (http://michiganflora.net/home.aspx).
- Slaughter, B.S., D.A. Hyde, D.L. Cuthrell, Y. Lee, and R.A. Norris. 2013. The conservation and management of prairie fens and associated species: Accomplishments and lessons from the MDNR Landowner Incentive Program 2004 2013. Michigan Natural Features Inventory, Report No. 2013-16, Lansing, MI. 87 pp.

Slaughter, B.S., and M.R. Penskar. 2009. Rare plant surveys of proposed wind energy turbine sites in the vicinity of the Little Garlic River, Marquette County, Michigan. Michigan Natural Features Inventory, Report No. 2009-08, Lansing, MI. 47 pp.

Kost, M.A., D.A. Albert, J.G. Cohen, B.S. Slaughter, R.K. Schillo, C.R. Weber, and K.A. Chapman. 2007. Natural communities of Michigan: Classification and description. Michigan Natural Features Inventory, Report No. 2007-21, Lansing, Ml. 314 pp.

Memberships and Affiliations

- Michigan Botanical Society
- Michigan Rare Plant Technical Advisory Committee
- Michigan Wetlands Association
- Natural Areas Association

Professional References

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Appendix C

Impacts and Avoidance Measures

Threatened and Endangered Species Desktop Review

Wastewater System Improvements
Brighton, Livingston County, Michigan





Common/Scientific Name	State Listed Status ¹	Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
American bumble bee/ Bombus pensylvanicus	E	UR	Species occurs in prairies and grasslands and will visit dunes, mares, forest edges, farmland and urban areas. May be a foraging generalist.	No: No prairies near project area.	MNFI: Occurrences recorded within 1.5 miles of the project area. Last observed 1921.	No	No potential impacts and no avoidance measures necessary.
Angular spittlebug/ Lepyronia angulifera	SC	-	Closely associated with prairie fens and in particular the host plant spike-rush (<i>Eleocharis</i> sp.)	Yes: Documented prairie fen west of Bauer St in Brighton Recreation Area.	MNFI: Occurrences recorded within 1.5 miles of the project area.	No	Impacts from vehicle strike and removal of habitat or ground compaction under host plant. Avoid impacting prairie fen habitat. Avoidance measures not required for species of special concern.
Bald eagle/ <i>Haliaeetus</i> leucocephalus	SC	BGEPA	Nests in tall trees near large bodies of water such rivers, lakes, or reservoirs (NatureServe 2023, USFWS 2007, Andrew and Mosher 1982).	Yes: West of Bauer Rd within Brighton Recreation Area. North and east of project at Lime Lake and Brighton Lake. Documented Dec 2023 600ft southwest of project boundary adjacent Bauer Rd. (eBird 2023).	USFWS: Not a BCC in the area but warrants attention because of the BGEPA. MNFI: No comment.	No: no nests recorded within 1.5 miles of the project.	Minimize disruptive activities and development in the eagles' direct flight path (USFWS 2007). Active/nesting period is from the third week of March to the second week of July.



C	ommon/Scientific Name		Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
E	Black sandshell/ <i>Ligumia</i> <i>recta</i>	Т	-	Occupies rivers with strong currents and lakes with a firm substrate of gravel or sand (Kofron and Schreiber 1985).	Yes: Lime Lake and Brighton Lake if their substrate is gravel or sand, South Ore Creek which is a Group 2 mussel stream (MNFI 2023c).	MNFI: Occurrences recorded within 1.5 miles of the project area. Last observed 2007.	No, provided project does not disturb lake bottoms.	Impacts to this species caused by construction include habitat removal or distruption/siltation, vehicle strike, and chemical or silt runoff from construction adjacent Lime Lake. Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within any lake bottoms.
	Black-billed cuckoo/ <i>Coccyzus</i> <i>erythropthalmus</i>	-	BCC	Forest edge and open woodland, including both deciduous and coniferous trees. Utilizes extensive tracts of dry upland woods (NatureServe 2023).	Yes: Woodlands associated with Brighton Recreation Area to the west of Bauer Rd.	USFWS: BCC throughout its range.	No	Vulnerable to impacts from human activity including habitat removal, vehicle strike, removal of trees containing active nests with eggs and young, and harassment by vehicles and construction equipment around nesting sites during the active season. Avoid clearing trees during the breeding season. Breeds May 15 to October 10. BCC-only species do not require avoidance measures.



Common/Scientific Name		Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Blanding's turtle/ Emydoidea blandingii	SC	UR	Shallow, slow-moving water including ponds, wetlands, and river oxbows, must have soft bottom and aquatic vegetation.	Yes: Southern portion of project crossing South Ore Creek. Ponds to west and north of project.	MNFI: Records within 1.5 miles of the project. Last observed 2021.	Survey recommended but not legally required prior to species federal listing or species upgrading status in Michigan.	Impacts to this species caused by construction during the active period include habitat removal, vehicle strike, entanglement within/digestive compaction from consumption of trash, and falling into pits. Digging within the inactive season may destroy underground hibernacula. Avoid digging in Blanding's turtle habitat during their inactive period, cover exposed pits during the active period, watch for individuals commuting through the project. Active season is from the first week of April to the fourth week of October.
Blazing star borer/ Papaipaema berriana	SC	-	Mesic to wet tall grass prairie with <i>Liatris</i> spicata and <i>Liatris</i> pycnostachya (NatureServe 2023)	Yes: Prairie fens documented to the east of Bauer Rd.	MNFI: Records within 1.5 miles of the project. Last observed 2017.	No	Impacts from vehicle strike and removal of habitat or ground compaction under host plants. Avoid impacting prairie fen habitat. Avoidance measures not required for species of special concern.



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Common/Scientific Name		Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Brindled madtom/ Noturus miurus	Т	-	Slow-moving rivers or streams; primarily pools below riffles. Found over soft substrates with stones, organic matter, woody debris, or vegetation within which they hide.	Yes: Southern portion of project crossing South Ore Creek.	MNFI: Records within 1.5 miles of the project. Last observed 1938.	Survey only recommended if digging occurs within South Ore Creek.	Impacts to this species caused by construction include habitat removal or disruption/siltation, vehicle strike, and chemical or silt runoff from construction adjacent South Ore Creek. Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within South Ore Creek.
Campeloma spire snail/ <i>Cincinnatia</i> cincinnatiensis	SC	-	Widely distributed and found in a variety of aquatic habitats including small creeks, large streams, springs, and lakes.	Yes: Southern portion of project crossing South Ore Creek, Lime Lake, Brighton Lake.	MNFI: Records within 1.5 miles of the project. Last observed 1939.	No	Impacts to this species caused by construction include habitat removal or distruption/siltation, vehicle strike, and chemical or silt runoff from construction adjacent South Ore Creek and Lime Lake. Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within South Ore Creek. Avoidance measures not required for species of special concern.



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Common/Scientific Name	State Listed Status ¹	Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Canada warbler/ <i>Cardellina</i> canadensis	-	BCC	Thickets of woodland undergrowth (especially aspen-poplar), bogs, tall shrubbery along streams or near swamps, deciduous second growth (NatureServe 2023).	Yes: Scrub/shrub areas adjacent to South Ore Creek and drainages both to the west and east.	USFWS: BCC throughout its range.	No	Vulnerable to impacts from human activity including habitat removal, vehicle strike, removal of trees containing active nests with eggs and young, and harassment by vehicles and construction equipment around nesting sites during the active season. Avoid tree clearing during nesting season and disturbing individuals commuting through the project. Active/breeding season is May through September. BCC-only species do not require avoidance measures.
Cerulean warbler/ <i>Dendroica</i> <i>cerulea</i>	Т	BCC	Large tracts of deciduous forest, mature trees for nesting, and diverse canopy (USFWS 2000)	Yes: Brighton Recreation Area to west of project.	USFWS: BCC throughout its range. MNFI: Records within 1.5 miles of the project. Last observed 1997.	No, if BMPs are followed.	Vulnerable to impacts from human activity including habitat removal, vehicle strike, removal of trees containing active nests with eggs and young, and harassment by vehicles and construction equipment around nesting sites during the active season. Avoid tree clearing during breeding/nesting season: April 22 to July 20. Avoid disturbing individuals commuting through project area.



Common/Scientific Name	State Listed Status ¹	Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Chimney swift/ <i>Chaetura</i> pelagica	-	BCC	Found in a variety of habitats including urban areas. Nests found in chimneys and other anthropogenic structures. Natural nests are found in hollow trees (NatureServe 2023).	Yes: Any hollow trees or building removals associated with tree clearing. Documented September 2023 600 feet southwest of project boundary withing Brighton Recreation Area (eBird 2023).	USFWS: BCC throughout its range.	No	Vulnerable to impacts from human activity including habitat removal, vehicle strike, removal of hollow trees or structures containing active nests with eggs and young, and harassment by vehicles and construction equipment around nesting sites during the active season. Breeds March 15 to August 25. Avoid tree and structure removal during breeding season. BCC-only species do not require avoidance measures.
Clinton's bulrush/ <i>Trichophorum</i> clintonii	sc	-	Seasonally moist to wet sandplains in central and eastern Upper Peninsula and wet to wet-mesic prairies in Lower Michigan.	No	MNFI: Recorded within 1.5 miles of the project. Last observed 1898.	No	Historical record from a vague locality (Brighton), and collected material was noted as the only clump observed. No impacts and no avoidance measures necessary.



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Common/Scientific Name		Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Eastern massasauga/ <i>Sistrurus</i> catenatus	SC	LT	Seasonal wetlands along forest edges with a short, closed canopy, as with tall grasses and sedges or low shrubs (NatureServe 2023, USFWS 2022).	Yes: Wetlands associated with South Ore Creek, all of Brighton Recreation Area to west of project.	USFWS: Project occurs in Tier 1 and Tier 2 habitat and is within the EMR range. MNFI: Records within 1.5 miles of project. Last documented October 2019.	Yes, if habitat impact cannot be avoided. Consultation with USFWS may be required to determine appropriate measures beyond standard BMPs.	Impacts to this species caused by construction during the active period include habitat removal, use of plastic erosion control blankets, vehicle strike, entanglement within trash, and poisoning or chemical burning by chemical spills. Impacts to this species during the inactive/hibernation period include digging within wetland habitat and potentially disturbing or taking hibernating individuals. The active period is from the first week of April to the fourth week of October.
Eastern prairie fringed orchid/ <i>Platanthera</i> <i>leucophaea</i>	E	LT	Mesic prairies, wet prairies, tamarack bogs (Swink and Wilhelm 1994)	No	USFWS: No critical habitat has been designated for this species. See consistency letter from USFWS. MNFI: No comment.	No	No impacts and no avoidance measures necessary.



Common/Scientific Name	State Listed Status ¹	Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Eastern sand darter/ Ammocrypta pellucida	Т	-	Streams and rivers with sand substrates; lakes with sandy shoals; frequently found in slow moving water where fine sand is deposited, immediately downstream of a bend but can be found in faster water.		MNFI: Records within 1.5 miles of project boundary. Last recorded in 1977.	Survey only recommended if digging occurs within South Ore Creek	Impacts to this species caused by construction include habitat removal or disruption/siltation, vehicle strike, and chemical or silt runoff from construction adjacent South Ore Creek. Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within South Ore Creek.
Eastern whip-poor- will/ <i>Antrostomus</i> vociferus	SC	ВСС	Intact upland forest with open understory with occasional openings.	No: Majority of adjacent forest is lowland.	USFWS: BCC throughout its range. MNFI: No comment.	No	No potential impacts and no avoidance measures necessary.
Edible valerian/ Valeriana edulis var. ciliata	Т	-	Alkaline fens in southern lower Michigan.	No	MNFI: Records within 1.5 miles of the project boundary. Last observed 1947.	No	Collection was from Island Lake Recreation Area east of Brighton. No impacts and no avoidance measures necessary.



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Common/Scientific Name		Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Elktoe/ <i>Alasmidonta</i> marginata	SC	-	Occurs in small to large- sized streams and small to medium rivers; prefers swifter currents over packed sand and gravel; needs clean, clear water.	Yes: South Ore Creek which is a Group 2 mussel stream (MNFI 2023c).	MNFI: Records within 1.5 miles of the project boundary. Last observed in 2016.	No	Impacts to this species caused by construction include habitat removal or disruption/siltation, vehicle strike, and chemical or silt runoff from construction adjacent South Ore Creek. Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within or disrupting the bottom of South Ore Creek. Avoidance measures not required for species of special concern.
English sundew/ <i>Drosera</i> angelica	SC	-	Occurs on floating peat mats and slightly minerotrophic to calcareous fens, along northern shores, and locally prairie fens in southern Michigan.	Yes: Connected to habitat via hydrology: Murray Lake and unnamed pond west of Bauer Rd.	MNFI: Records within 1.5 miles of the project. Last observed 1997.	No, provided project avoids altering hydrology/flow of Ore Creek.	Species occurs locally in wetlands along Murray Lake and an unnamed pond west of the project area. No direct impacts are likely but work should avoid altering hydrology/flow of Ore Creek.
False boneset/ <i>Brickellia</i> eupatorioides	SC	-	Occurs in sandy fields and prairies in former oak savanna areas.	No	MNFI: Records within 1.5 miles of the project. Last observed 1947.	No	Collection was from Island Lake Recreation Area east of Brighton. No impacts and no avoidance measures necessary.



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Common/Scientific Name	State Listed Status ¹	Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Flutedshell/ <i>Lasmigona</i> costata	SC	-	Occurs in canals, rivers, and lakes. Found on gravel, sand, or mud bottoms (NatureServe 2023).	Yes: South Ore Creek which is a Group 2 mussel stream (MNFI 2023c).	MNFI: Records within 1.5 miles of the project boundary. Last observed 1932.	No	Impacts to this species caused by construction include habitat removal or disruption/siltation, vehicle strike, and chemical or silt runoff from construction adjacent South Ore Creek. Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within or disrupting the bottom of South Ore Creek. Avoidance measures not required for species of special concern.
Goldenseal/ Hydrastis canadensis	Т	-	Southern hardwood forests, moist ravines, riparian forests.	No	MNFI: Records within 1.5 miles of the project boundary. Last recorded in 2021.	No, provided no forest is cleared.	No impacts if there is no planned clearing of forest.
Gravel pyrg/ Pyrgulopsis letsoni	SC	-	Cobble beaches and large rivers. Very little is known about its habitat requirements.	No	MNFI: Records within 1.5 miles of the project boundary. Last observed 1943.	No	No impacts and no avoidance measures necessary.
Hairy angelica/ Angelica venenosa	SC	-	Open, upland oak forests, savanna and prairie remnants, open sandy woodlots.	No	MNFI: Records within 1.5 miles of the project boundary. Last observed 1905.	No	Collection was from Island Lake east of Brighton. No impacts and no avoidance measures necessary.



Common/Scientific Name	State Listed Status ¹	Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Henslow's sparrow/ Ammodramus henslowii	E	BCC	Open fields and meadows with grass interspersed, unmowed hay fields (NatureServe 2023); Habitats include open fields and meadows with grass interspersed, un-mowed hay fields, weedy overgrown fields, and prairies (Kaufman 2000, Norris 2014).	No	USFWS: BCC throughout its range. MNFI: No comment.	No	No potential impacts and no avoidance measures necessary.
Horsetail spike rush/ <i>Eleocharis</i> <i>equisetoides</i>	SC	-	Found in shallow water in emergent marshes, lakeshore edges and ponds, particularly where waters or substrates are slightly acidic.	No	MNFI: Records within 1.5 miles of the project boundary. Last observed 2011.	No	2011 record was from Appleton Lake, well west of project site. No impact and no avoidance measures necessary.
Indiana bat/ <i>Myotis</i> sodalis	E	LE	Summer foraging habitat consists of forest, woods, forest edge, riparian, agricultural fields, wooded fencerows, wooded corridors, wetlands, old fields, pasture. Roosting habitat includes trees ≥5 inches DBH with exfoliating bark, cracks, crevices (USFWS 2023)	Yes: Any trees that may be cleared or trimmed for the project greater than 5 inches DBH, especially those between the wastewater plant and Bauer Rd.	USFWS: Final critical habitat exists, but the project does not overlap it. MNFI: No comment.	No, provided BMPs are followed.	Potential impacts during the active period include habitat removal, and removal of trees containing colonies. Clearing and trimming of all trees during the bat inactive season, or October 1 through March 31 during any given year, will avoid impacts to roosting bats.



Common/Scientific Name	State Listed Status ¹	Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Kidney shell/ Ptychobranchus fasciolaris	SC	-	High water quality creeks, rivers, and lakes with moderate to swift currents and sand or gravel substrate.	Yes: South Ore Creek which is a Group 2 mussel stream (MNFI 2023c).	MNFI: Records within 1.5 miles of the project boundary. Last observed 2019.	No	Impacts to this species caused by construction include habitat removal or disruption/siltation, vehicle strike, and chemical or silt runoff from construction adjacent South Ore Creek. Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within or disrupting the bottom of South Ore Creek. Avoidance measures not required for species of special concern.
Lake herring or Cisco/ <i>Coregonus artedi</i>	Т	-	Found in deep inland lakes and Great Lakes 18-53 m deep; can be found 9-12m deep when spawning over rocky substrates.	No: Adjacent inland lakes are not deep (average depth of Brighton Lake is 2.05 meters; BLSW 1999).	MNFI: Records within 1.5 miles of the project. Last observed in 1991.	No	No potential impacts and no avoidance measures necessary.



Common/Scientific Name	State Listed Status ¹	Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Lesser yellowlegs/ <i>Tringa</i> flavipes	-	ВСС	Along coastlines; marshes, ponds, wet meadows, lakes, mudflats, only present during migration period (NatureServe 2023).	Yes: Wetlands, including those associated with South Ore Creek, wetlands to the west of Bauer Rd, Lime Lake, and Brighton Lake. Frequently sighted at wastewater plant pools 300ft south of project line. Last sighting May 2023 (eBird 2023),	USFWS: Breeds elsewhere. BCC throughout its range.	No	Vulnerable to impacts from human activity including habitat removal, vehicle strike, and harassment by vehicles and construction equipment during the migration season. Avoid harassing individuals while completing project activities. Active during the migration period, the end of April - beginning of May and the end of August - September. BCC-only species do not require avoidance measures.



Common/Scientific Name		Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Marsh wren/ Cistothorus palustris	SC	-	Narrow-leafed cattail and cord-grass marshes; uses dense cattail over standing water for nest placement.	Yes: Wetland habitat to west of Bauer Rd. in Brighton Recreation Area and wetlands associated with South Ore Creek.	MNFI: Records within 1.5 miles of the project. Last observed 2007.	No	Vulnerable to impacts from human activity including habitat removal, vehicle strike, removal of cattail or other marsh vegetation containing active nests with eggs and young, and harassment by vehicles and construction equipment around nesting sites during the active season. Active/breeding season is third week of May to the third week of July. No impacts anticipated if nesting habitat is removed or otherwise impacted outside of the breeding period. Avoidance measures not required for species of special concern.
Mat muhly/ <i>Muhlenbergia</i> richardsonis	Т	-	Limestone pavement and northern fen communities in northern Michigan and prairie fen in southern Lower Michigan.	No	MNFI: Records within 1.5 miles of the project. Last observed in 1928.	No	Old record lacking precise location but likely near Bass Lake, southwest of the project site. No impacts and no avoidance measures necessary.



Common/Scientific Name		Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Monarch butterfly/ <i>Danaus</i> plexippus	-	C	All patches of milkweed (<i>Asclepias</i> sp., NatureServe 2023).	Yes: Milkweed may grow anywhere with full sun along project boundary including along Bauer Rd and Hidden Pines Dr. Also may occur northwest of Hidden Pines Dr.	USFWS: Critical habitat has not been designated for this species. MNFI: No comment.	No	Likely present, but low impact to species. Candidate species do not typically require avoidance measures. Avoid impacts to milkweed and other flowering plants used as nectar sources during the active period. Active period is growing season.
Mudpuppy/ Necturus maculosus	SC	-	Permanent waters including rivers, perennial streams, ponds, inland lakes, Great Lakes bays and shallows, reservoirs, canals, and ditches. Clear and silty waters, waters with or without vegetation.	Yes: South Ore Creek, Lime Lake, Brighton Lake.	MNFI: Recorded within 1.5 miles of the project. Last observed 2013.	No	Impacts to this species caused by construction include habitat removal or disruption/siltation, vehicle strike, and chemical or silt runoff from construction adjacent South Ore Creek and Lime Lake. Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within South Ore Creek. Avoidance measures not required for species of special concern.



Common/Scientific Name		Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Northern long-eared bat/ <i>Myotis</i> septentrionalis	SC	LT	Summer foraging habitat consists of forest, woods, forest edge, riparian, agricultural fields, wooded fencerows, wooded corridors, wetlands, old fields, pasture. Roosting habitat includes trees ≥5 inches DBH with exfoliating bark, cracks, crevices (USFWS 2023)	Yes: Any trees that may be cleared or trimmed for the project greater than 3 inches DBH, especially those between the wastewater plant and Bauer Rd.	USFWS: Critical habitat has not been designated for this species. MNFI: No comment.	No, provided BMPs are followed.	Potential impacts during the active period include habitat removal, and removal of trees containing colonies. Clearing and trimming of all trees during the bat inactive season, or October 1 through March 31 during any given year, will avoid impacts to roosting bats.
Orange- or yellow- fringed orchid/ <i>Platanthera ciliaris</i>	E	-	Orange-fringed orchid is found in acidic soils, primarily in sphagnum bogs but occasionally at fen margins or, at least historically, moist sandy prairies.		MNFI: Records within 1.5 miles of the project. Last observed 1912.	No	Old, vague record. No impact and no avoidance measures necessary.



Common/Scientific Name	State Listed Status ¹	Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Osprey/ <i>Pandion</i> haliaetus	SC	-	Nests in snags, cliffs, or man-made structures such as utility poles and towers, chimneys, windmills, buoys, and platforms; prefers sites above or near water.	Yes: Any snags, utility poles or other towers adjacent to South Ore Creek, Lime Lake, or Brighton Lake.	MNFI: Records within 1.5 miles of the project. Last observed in 2020.	No	Vulnerable to impacts from human activity including habitat removal, vehicle strike, removal of snags, utility poles or towers containing active nests with eggs and young, and harassment by vehicles and construction equipment around nesting sites during the active season. Active/breeding season is third week of April to the fourth week of July. No impacts anticipated if nesting habitat is removed or otherwise impacted outside of the breeding period. Avoidance measures not required for species of special concern.
Pale avens/ <i>Geum</i> virginianum	Т	-	Openings and banks in woods including dry southern forest, drymesic southern forest, hillside prairie, oak barrens, and oak openings	No	MNFI: Records within 1.5 miles of the project. Last observed in 1983.	No	1983 record was from northwest of the project site near Chilson. No impacts or avoidance measures necessary.



Common/Scientific Name		Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Pectoral sandpiper/ Calidris melanotos	-	BCC	Nonbreeding habitat includes wet meadows, grassy marshes and salt meadows, mudflats, flooded fields and golf courses, and shores of ponds, pools, lakes, and rivers (NatureServe 2023).	Yes: All wetlands and ponds, including those associated with South Ore Creek, those to the west of Bauer Rd, Brighton Lake, and Lime Lake.	USFWS: Breeds elsewhere. BCC throughout its range	No	Vulnerable to impacts from human activity including habitat removal, vehicle strike, and harassment by vehicles and construction equipment during the migration season. Avoid harassing individuals while completing project activities. Active during the migration season: May and August. BCC-only species do not require avoidance measures.
Pickerel frog/ Lithobates palustris	SC	-	Occurs in various freshwater aquatic and wetland habitats in wooded regions, including the vicinity of cool clear streams and ponds in the northern part of their range (NatureServe 2023). Breeding habitat includes forested ponds, vernal pools, bog ponds, stream pools, impoundments, and flooded ditches. Hibernate under mud or logs.	Yes: South Ore Creek, Lime Pond, Brighton Pond.	MNFI: Recorded within 1.5 miles of the project boundary. Last observed in 1940.	No	Impacts to this species caused by construction include habitat removal or disruption/siltation, vehicle strike, and chemical or silt runoff from construction adjacent South Ore Creek and Lime Lake. Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within South Ore Creek. Avoidance measures not required for species of special concern.



Common/Scientific Name		Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Prairie dropseed/ Sporobolus heterolepis	SC	-	Variety of habitats including prairie fens in southern Lower Peninsula, mesic sand prairies surrounding by pine barrens in northern Lower Peninsula, alvar grasslands in Upper Peninsula.	No	MNFI: Recorded within 1.5 miles of the project boundary. Last observed 1990.	No	1983 record was from northwest of the project site near Chilson. No impacts or avoidance measures necessary.
Rainbow/ <i>Cambarunio</i> iris	SC	-	Occurs in coarse sand or gravel in small to medium streams.	Yes: South Ore Creek which is a Group 2 mussel stream (MNFI 2023c).	MNFI: Records within 1.5 miles of the project boundary. Last observed 2018.	No	Impacts to this species caused by construction include habitat removal or disruption/siltation, vehicle strike, and chemical or silt runoff from construction adjacent South Ore Creek. Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within or disrupting the bottom of South Ore Creek. Avoidance measures not required for species of special concern.



Common/Scientific Name		Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Red-headed woodpecker/ <i>Melanerpes</i> <i>erythrocephalus</i>	SC	ВСС	Open woodland with scattered trees near parks, cultivated areas, and gardens. Roosts in trees or tree cavities. (NatureServe 2023, Ingold 1994)	Yes: Any yard trees that may be trimmed or cleared as part of the project, including those along Bauer Rd and within the neighborhoods. Last sighted September 2023 500ft south of project in Brighton Recreation Area (eBird 2023).	USFWS: BCC throughout its range. MNFI: No comment.	No	Vulnerable to impacts from human activity including habitat removal, vehicle strike, removal of trees or bird houses containing active nests with eggs and young, and harassment by vehicles and construction equipment around nesting sites during the active season. Active/breeding season is early May to mid-June. Remove or trim trees outside of the active/breeding period.
Richardson's sedge/ Carex richardsonii	SC	-	Common in alvar, bedrock glades, rocky shoreline communities in northern Michigan; occurs in remnant oak savanna areas in southern Lower Michigan.	No	MNFI: Recorded within 1.5 miles of the project boundary. Last observed 1898.	No	Historical record from a vague locality (Brighton), and collected material was noted as the only clump observed. No impacts and no avoidance measures necessary.



Common/Scientific Name		Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
River fingernail clam/ Sphaerium fabale	SC	-	Coarse sand or gravel in both creeks and rivers. Also found in Great Lakes.	Yes: South Ore Creek, a small slow-moving stream with sand and gravel substrate (BLSW 2002).	MNFI: Recorded within 1.5 miles of the project boundary. Last observed 1958.	No	Impacts to this species caused by construction include habitat removal or disruption/siltation, vehicle strike, and chemical or silt runoff from construction adjacent South Ore Creek. Follow approved stormwater pollution prevention plan and chemical spill protocols. Avoid digging within South Ore Creek. Avoidance measures not required for species of special concern.
Rusty blackbird/ <i>Euphagus</i> <i>carolinus</i>	-	BCC	Moist woodland (primarily coniferous), bush bogs and fens, wooded edge of water courses and beaver ponds (NatureServe 2023).	Yes: All wooded wetlands and pond edges, including those associated with South Ore Creek, Brighton Recreation Area, Lime Lake, and Brighton Lake. Last sighted 0.4 miles north of project April 2023 (eBird 2023).	USFWS: Breeds elsewhere. BCC only in particular BCRs.	No	Vulnerable to impacts from human activity including habitat removal, vehicle strike, and harassment by vehicles and construction equipment during the migration season. Avoid harassing individuals while completing project activities. Active January, March - May, and October - November. BCC-only species do not require avoidance measures.



Common/Scientific Name	State Listed Status ¹	Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Short-billed dowitcher/ Limnodromus griseus	-	BCC	Nonbreeding habitat includes mudflats, estuaries, shallow marshes, pools, ponds, flooded fields, and sandy beaches; prefers shallow water with soft, muddy bottom but may visit various wetlands during migration (Morrison et al. 1994).	Yes: Pools and wetlands, including those associated with South Ore Creek. Lime Lake, Brighton Lake.	USFWS: BCC throughout its range.	No	Vulnerable to impacts from human activity including habitat removal, vehicle strike, and harassment by vehicles and construction equipment during the migration season. Avoid harassing individuals while completing project activities. Active in August. BCC-only species do not require avoidance measures.
Side-oats grama grass/ Bouteloua curtipendula	Е	-	Found in dry prairies typically in oak barrens and hillside prairies.	No	MNFI: Records within 1.5 miles of the project. Last observed 1947.	No	Collection was from Island Lake Recreation Area east of Brighton. No impacts and no avoidance measures necessary.
Silver shiner/ <i>Notropis</i> photogenis	E	-	Medium to large streams with moderate to high gradients; pools or eddies 110cm deep below riffles; avoid highly vegetated and silted areas	No: South Ore Creek is a small slow- moving stream (BLSW 2002).	MNFI: Records within 1.5 miles of the project. Last observed 1927.	No	No impacts and no avoidance measures necessary.



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Common/Scientific Name		Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Slippershell/ Alasmidonta viridis	Т	-	Occurs in creeks and headwaters of rivers in sand or gravel substrates; occasionally occurs in larger rivers and lakes with mud substrates.	Yes: South Ore Creek, which is a Group 2 mussel stream (MNFI 2023c), has a sand/gravel bottom (BLSW 2002).	MNFI: Records within 1.5 miles of the project. Last observed 2007.	No, provided project does not disturb bottom of South Ore Creek.	Impacts to this species caused by construction include habitat removal or disruption/siltation, vehicle strike, and chemical or silt runoff from construction adjacent South Ore Creek. No potential impacts and no avoidance measures necessary if bottom of South Ore Creek will not be disturbed. If disturbance is necessary then impacts may occur.
Smooth green snake/ Opheodrys vernalis	SC	-	Moist, grassy habitats such as prairies, savannas, meadows, old fields, pastures, roadsides, vacant lots, stream borders, marsh, and lake edges.	Yes: Wetlands associated with South Ore Creek and Brighton Recreation Area west of Bauer Rd.	MNFI: Records within 1.5 miles of project boundary. Last observed 1902.	No	Vulnerable to impacts from human activity including habitat removal, vehicle strike, and harassment by vehicles and construction equipment during the active season. Avoid harassing individuals and cover all pits while completing project activities in wetlands. Avoidance measures not required for species of special concern.



Common/Scientific Nar	State ne Listed Status	Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Snuffbox mussel/ Epioblasma triquetra	E	LE	Sand, gravel, or cobble substrates in swift small and medium-sized rivers; individuals often buried deep in sediment.	Yes: South Ore Creek, which is a Group 2 Mussel stream (MNFI 2023c) and has a sandy/gravel bottom (BLSW 2002).	MNFI: Records within 1.5 miles of project. Last observed 2007.	No, provided project does not disturb bottom of South Ore Creek.	Impacts to this species caused by construction include habitat removal or disruption/siltation, vehicle strike, and chemical or silt runoff from construction adjacent South Ore Creek. No potential impacts and no avoidance measures necessary if bottom of South Ore Creek will not be disturbed. If disturbance is necessary then impacts may occur.
Tricolored bat/ <i>Perimyotis subflave</i>	sc sc	PE	Forages in a variety of habitats including grasslands, old fields, suburban areas, orchards, urban areas, and woodlands. Roosting habitat includes the foliage of trees and sometimes in buildings (Veilleux et al. 2003).	Yes: Any live trees that may be cleared or trimmed for the project, especially those between the wastewater plant and Bauer Rd along South Ore Creek.	USFWS: Critical habitat has not been designated for this species. MNFI: No comment.	No, provided BMPs are followed.	Potential impacts during the active period include habitat removal, and removal of trees containing breeding bats. Clearing and trimming of all trees during the bat inactive season, or October 1 through March 31 during any given year, will avoid impacts to roosting bats.



Common/Scientific Name	State Listed Status ¹	Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Trumpeter swan/ Cygnus buccinator	SC	-	Variety of wetland types such as marshes, ponds, and lakes; nests frequently placed on muskrat houses.	Yes: Wetlands associated with South Ore Creek and Brighton Recreation Area west of Bauer Rd. Lime Lake, Brighton Lake.	MNFI: Records within 1.5 miles of the project boundary. Last observed 2017.	No	Vulnerable to impacts from human activity including habitat removal, vehicle strike, and harassment by vehicles and construction equipment during the active season. Avoid removing habitat within the nesting season. Nests from the fourth week of April to the fourth week of July. Avoidance measures not required for species of special concern.
Wavyrayed lampmussel/ Lampsilis fasciola	Т	-	Small-medium-sized shallow streams with good current in and near riffles; rarely occurs in medium rivers; substrate preference is sand or gravel.	Yes: South Ore Creek, which is a small Group 2 Mussel stream (MNFI 2023c) and has a sandy/gravel bottom (BLSW 2002).	MNFI: Records within 1.5 miles of the project. Last observed 2007.	No, provided project does not disturb bottom of South Ore Creek.	Vulnerable to impacts from human activity including habitat removal, vehicle strike, and harassment by vehicles and construction equipment during the active season. Avoid removing habitat within the nesting season. No potential impacts and no avoidance measures necessary if bottom of South Ore Creek will not be disturbed. If disturbance is necessary then impacts may occur.



Common/Scientific Name		Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
White lady slipper/ Cypripedium candidum	Т	-	Alkaline wetlands, particularly prairie wetlands in southern Lower Michigan. Occasionally in lakeplain wet and wet-mesic prairies along coastal areas in the Thumb region.	Yes: Connected to habitat via hydrology: Murray Lake and unnamed pond west of Bauer Rd.	MNFI: Recorded within 1.5 miles of the project. Last observed in 2016.	No, provided project avoids altering hydrology/flow of Ore Creek.	Species occurs locally in wetlands along Murray Lake and an unnamed pond west of the project area. No direct impacts are likely but work should avoid altering hydrology/flow of Ore Creek.
Whooping crane/ <i>Grus</i> americana	-	EXPN	Breeding habitat includes wetlands with soft marl bottoms separated by narrow ridges interspersed with potholes. Migration stopover habitat includes small to large seasonally and semi permanently flooded wetlands, crop wetlands, riverine habitats, and sandbars isolated from disturbance (CWS and USFWS 2007).	Yes: Wetlands and ponds associated with Brighton Recreation Area to the west of the project.	USFWS: Critical habitat has not been designated for this species.	No	Vulnerable to impacts from human activity including habitat removal, vehicle strike, and harassment by vehicles and construction equipment during the migration season. Avoid harassing individuals while completing project activities. The population of this species that may occur on this project is experimental and nonessential, and therefore impacts do not require minimization or avoidance measures.



Common/Scientific Name		Federally Listed Status ²	Typical Habitat ³	Desktop Review Habitat Observed ⁴	Agency Comment ⁵	Survey	Potential Impacts and Avoidance Measures
Wood thrush/ <i>Hylocichla</i> mustelina	-	всс	Deciduous or mixed forests with dense tree canopy and well-developed understory, especially where moist. Pine forests with deciduous understory and well-wooded residential areas (NatureServe 2023).	Yes: Trees associated with wetlands including those surrounding South Ore Creek and those to the west of the project in Brighton Recreation Area. Last recorded May 2023, 500 feet southeast of the project in Brighton Recreation Area (eBird 2023).	USFWS: BCC throughout its range.	No	Vulnerable to impacts from human activity including habitat removal, vehicle strike, removal of trees or bird houses containing active nests with eggs and young, and harassment by vehicles and construction equipment around nesting sites during the active season. Active/breeding season is May 10 to the end of August. No impacts anticipated if trees are removed or trimmed outside of the breeding period. BCC-only species do not require avoidance measures.

¹ E: Endangered; T: Threatened; SC: species of special concern.



² LE: Endangered; LT: Threatened; PE: Proposed Endangered; UR: Under Review for Federal Listing; C: Candidate species being considered for federal status; BGEPA: protected by the Bald and Golden Eagle Protection Act; BCC: Birds of Conservation Concern, EX: Experimental population, non-essential.

³ MNFI 2023a and MNFI 2023b unless otherwise noted.

⁴ Brighton Recreation Area is directly adjacent Bauer Rd to the west, with documented occurrences of a wide variety of protected birds.

⁵ Detailed agency comments are attached; BCR: Bird Conservation Regions.

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APPENDIX G: CITY OF BRIGHTON HISTORICAL SITES





January 2, 2024

Steve Magnan Senior Project Manager Tetra Tech 615 Griswold St., Suite 1000B Detroit, MI 48226

Re: Cultural Resources Desktop Review, Brighton Clean Water Project, City of Brighton, Genoa and Hamburg Townships, Livingston County, Michigan

Steve:

PROJECT DESCRIPTION

The proposed project involves improvements to the wastewater system in the City of Brighton Michigan. A preliminary condition assessment will be performed to determine the extent of localized repairs, rehabilitation, or replacement of two (2) parallel, ductile iron (cement-lined) twelve-inch (12") sanitary force mains, each approximately 2.5 miles in length (Figure 1 and 2). Sanitary sewage is collected by gravity at the Third Street Pumping Station located immediately north of Ore Creek, is then pumped through the 12-inch parallel force mains, extend through Brighton High School property and Pine Creek's subdivision (Genoa Twp.), and received within the City of Brighton's wastewater treatment facility located at 6750 Hamburg Road. Three (3) intermediate pumping stations within the parallel force mains would also be evaluated as part of the condition assessment.

CULTURAL RESOURCES DESKTOP REVIEW

The records on file at the MSHPO Office list the following resources within one mile of the project components (study area).

Historic Structures

The records list three historic resources in the study area (Table 1). Two of these are historic homes. The Appleton house was built between 1849 and 1855 by John Appleton, who was a carpenter and joiner. It has not been evaluated to determine its eligibility for listing in the National Register of Historic Places (NRHP). The August Westphal Farmstead was bult slightly later, in 1875. It is an unusually ornate Italianate farmhouse and is listed in the NRHP. The final historic resource is the Saint Patrick Catholic Church, which has not been evaluated for the NRHP. This resource is the closest to the current project area, at approximately 0.5 miles away. None of these resources are likely to be impacted by the proposed work.

Archaeological Sites

The records list eight archaeological sites in the study area (Table 2) (Figure 3). One of these sites is a Nineteenth Century mill (20Lv164), two are turn-of-the-century farmsteads (20Lv251 and 10Lv263), four are Twentieth Century houses or farmsteads (20Lv243-246), and one is a Twentieth Century dump (20Lv267). One of the sites, 20Lv263, contains a small, historic family cemetery. This site is near the southern end of the project area, west of Bauer Road, and according to the site form, the cemetery is "...generally well protected...[as] it is not directly adjacent to a trail or road." (Jackson et al. 1996). None of these sites have been evaluated for National Register eligibility.

Previous Cultural Resource Management Reports

Records on file at the MSHPO indicate that there have been three archaeological surveys in the study area. Unfortunately, detailed information about one of these surveys, ER-1711, has been lost. This survey covered a small portion of the south end of the current project area and it did not identify archaeological resources, but no other information available (Figure 3)

The earliest survey with sufficient documentation to discuss here took place at the proposed location for a wastewater treatment facility. The area covered 76 acres, including the area between the High School in Brighton and Brighton Lake. The survey did not result in the discovery of any new archaeological sites (Holman and Whittier 1982). This survey covered a small portion of the current study area (Figure 3).

An additional survey was conducted by the Office of the State Archaeologist, to locate and document all archaeological and historic sites in Michigan's state parks and recreation areas. The survey covered 52 counties. A preliminary study included an area within the current study area and resulted in the discovery of almost 600 new archaeological sites, including seven of the eight known sites in the study area (Jackson et al. 1996).

Historic Atlas Maps

Orbis reviewed three available historic atlas maps of the study area (Beers 1875, Geo. A. Ogle & Co. 1895, 1915) (Figures 4-8). These maps show slight growth in the city of Brighton from 1875 to 1915. Throughout all periods, the project area begins at the outskirts of the city, but largely passes through more rural areas. The maps suggest that the project area does not intersect with the location of any significant historic resources, though it does pass in front of a small number of historic structures along Bauer Road. These structures appear in 1875 and many remain standing as late as 1915 (Beers 1875, Geo. A. Ogle & Co. 1915).

Orbis also consulted Hinsdale's *Archaeological Atlas of Michigan* (Figure 9). While the map indicates that there were many significant archaeological sites in Livingston County, there is very little of note in or around the project area. Although, a small



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portion of the project area may overlap with the "garden beds" that Hinsdale noted around the city of Brighton (Hinsdale 1931).

Project Area Photographs

Recent photographs show the southwest part of the project area alongside a rural two-lane road, which then transitions to a setting near a modern suburban subdivision west of Brighton High School (Photo Pages) (Figure 10).

CONCLUSIONS AND RECOMMENDATIONS

MSHPO records show eight known archaeological sites within one mile of the project. The nearest site, 20Lv263, sits on the west side of Bauer Road across from the southern end of project corridor. The records show six known historic structures within one mile, the nearest of which are northeast of the project in the City of Brighton. Most of the project has not been previously surveyed, however the records indicate substantial precontact occupation in the Livingston County region. Historic atlas maps show structures along the project area beginning in the 1890s. Archaeological materials may occur in any intact soils in the project area.

These materials may be associated with precontact Native populations in the area and/or related to Euromerican settlement and occupation of the City of Brighton and Livingston County. Precontact sites are likely to occur on upland, well-drained soils associated with the numerous water resources in the regions. Postcontact sites are likely to occur along the established roads, in particular, with the historic structures shown on the atlas maps.

Based on available information the project activities involve exploratory assessment of existing water infrastructure, which is unlikely to contain significant intact archaeological deposits or above-ground resources.

We recommend no further work is necessary and a determination of "No Historic Properties Affected" is appropriate because the project is unlikely to affect intact archaeological deposits or significant historic structures.

Regards,

Ryan Buddleson Senior Archaeologist

James L. Ingermann Heimlich

James of Ingermenn Heimlich

Architectural Historian



cc: #2308007

Attachments

Figure 1: Project Location

Figure 2: Project Aerial

Figure 3: Known Archaeological Resources

Figure 4: 1875 Atlas Map Figure 5: 1895 Atlas Map

Figure 6: 1895 Atlas Map Showing City of Brighton

Figure 7: 1915 Atlas Map

Figure 8: 1915 Atas Map Showing City of Brighton

Figure 9: Archaeological Atlas of Michigan

Figure 10: Photo Location Map

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Table 1: Known Historic Structures in the Study Area

Table 2: Known Archaeological Sites in the Study Area

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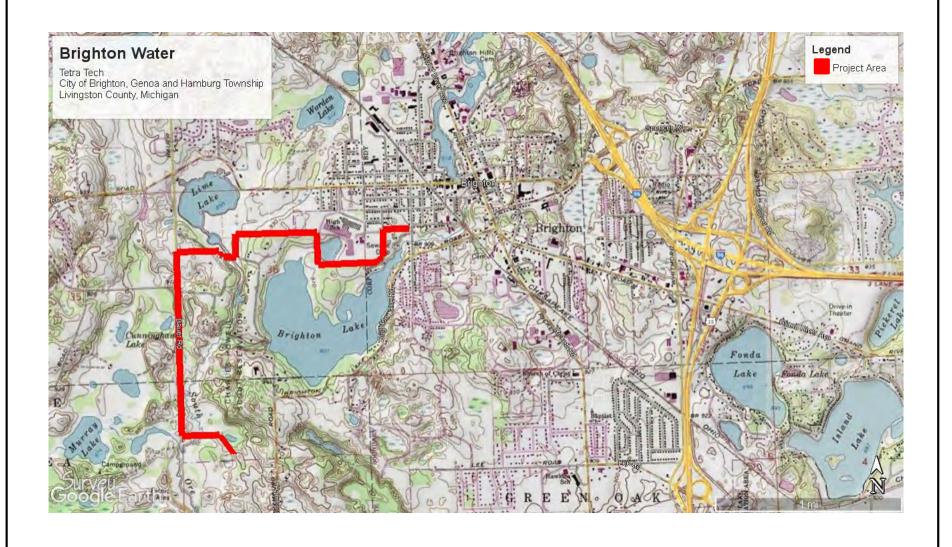




Figure 1
Project Location Map
#2308007

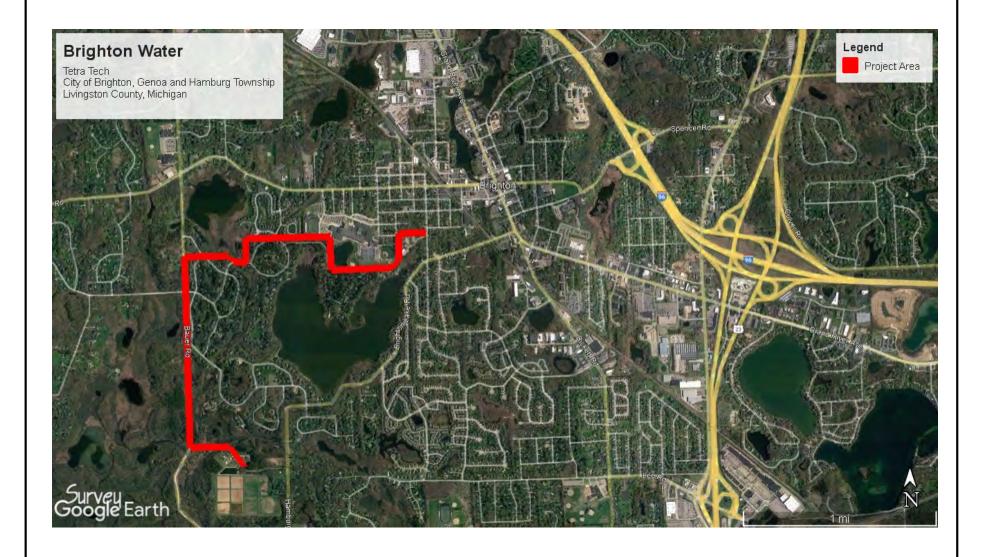




Figure 2
Project Location Aerial
2308007

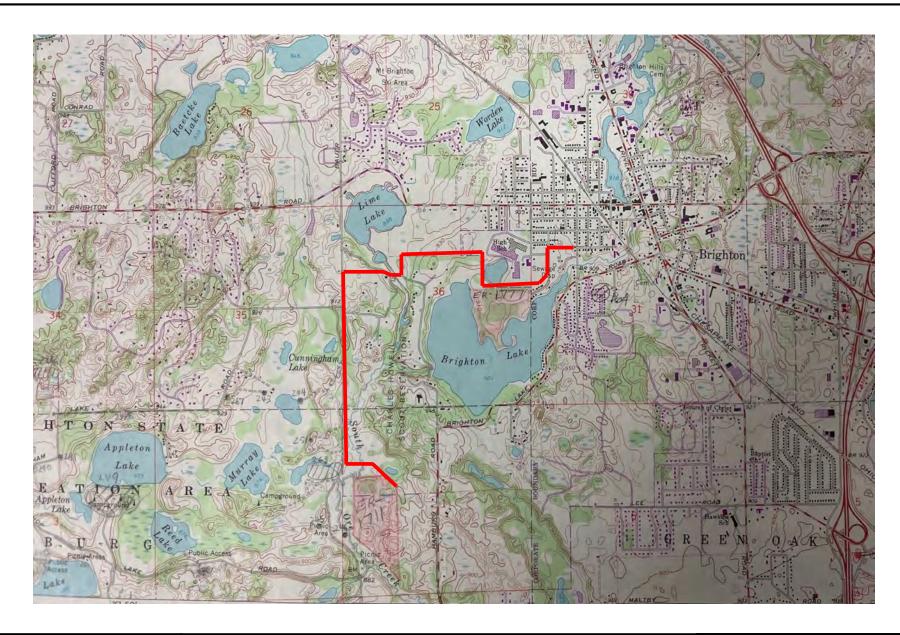




Figure 3
Known Archaeological
Resources
2308007

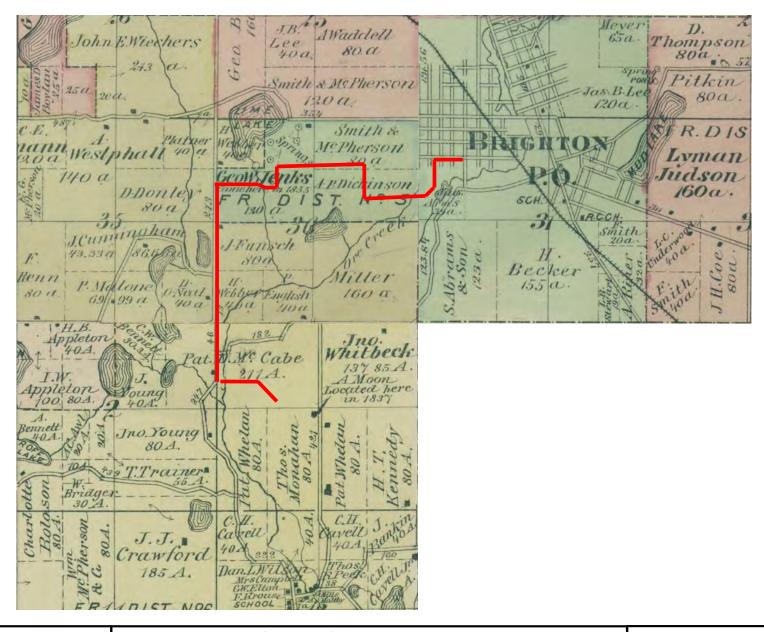




Figure 4 1875 Atlas Map # 2308007

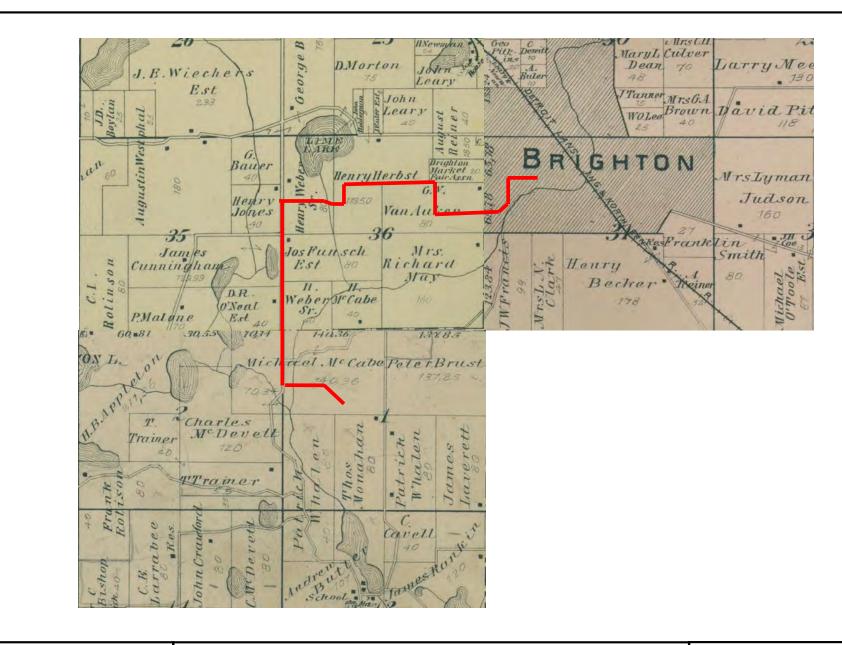




Figure 5 1895 Atlas Map # 2308007

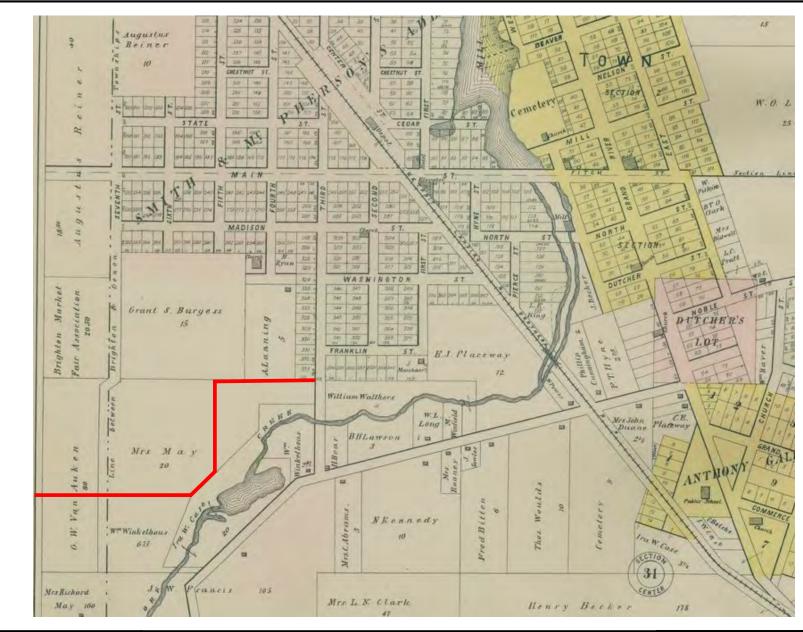




Figure 6
1895 Atlas Map showing City of Brighton
2308007

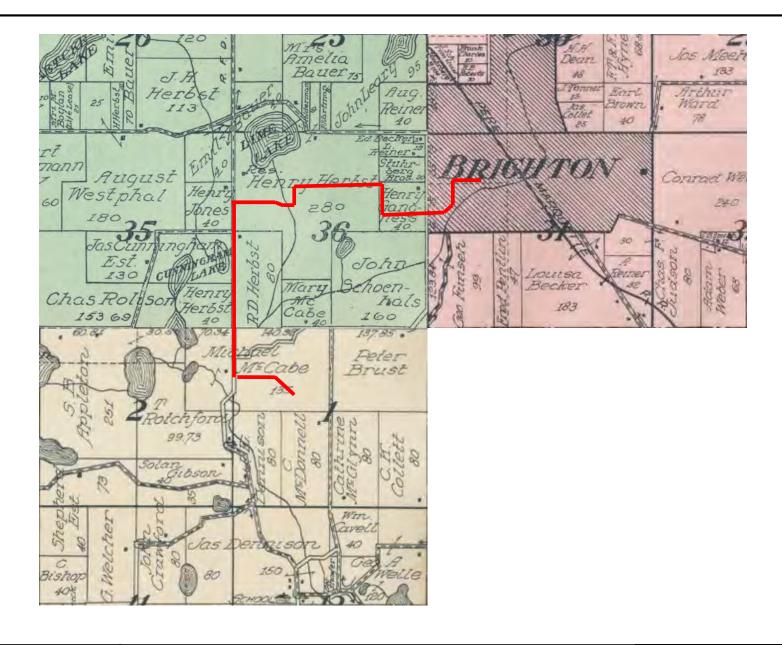




Figure 7 1915 Atlas Map # 2308007

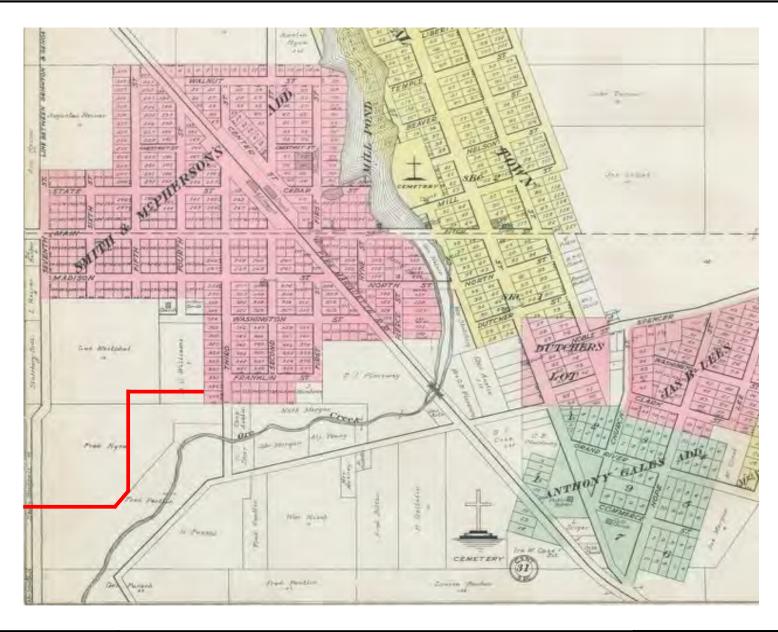




Figure 8

1915 Atlas Map showing City of Brighton

2308007

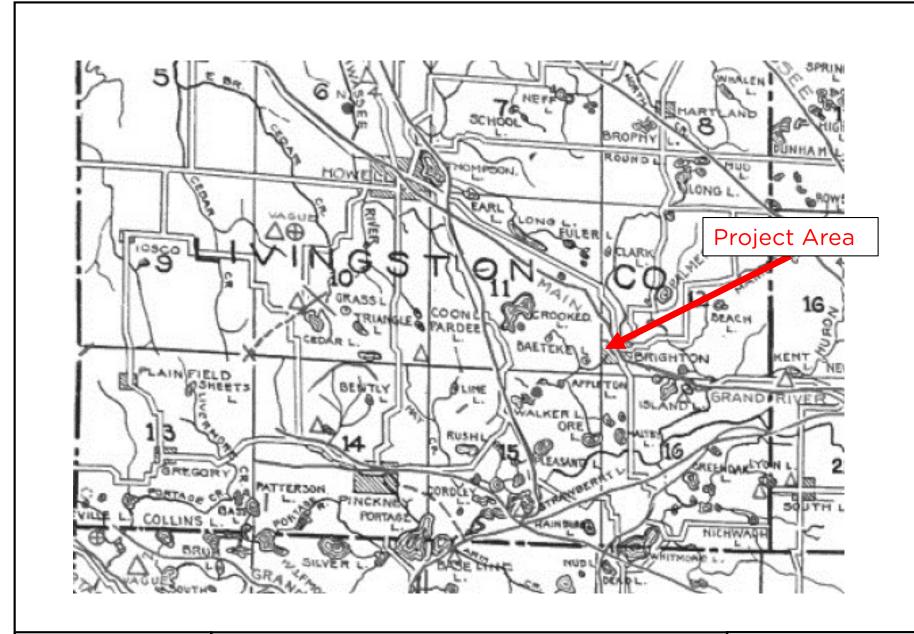




Figure 9
Archaeological Atlas of Michigan
2308007





Figure 10
Photo Location Map
2308007

Site ID	Name	Current NR Status	County	Street	City	Lat	Long
		More Information Needed/No					
P23962	Appleton House	Determination Made	Livingston	325 E Grand River Ave	Brighton	42.5274	-83.77868
P23972		Listed on the NRHP	Livingston	6430 Brighton Rd	Genoa	42.5278	-83.82358
	Saint Patrick Catholic Church						
DE1000		More Information Needed/No		771 8: 1 11 8 1		40 5075	07.77005
P51080	Cemetery	Determination Made	Livingston	711 Rickett Rd	Brighton	42.5235	-83.77605
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	<u> </u>				1		
					1		
			1				
							f

Site					
Number	Period	Culture	Function	NRHP Eligibility	Reference
	Nineteenth Century (1830-				
20Lv164	1850)	American	Mill	More Work Needed/Unevaluated	Branstner 1985
20Lv243	Twentieth Century	American	House	More Work Needed/Unevaluated	Jackson et al. 1996
20Lv244	Twentieth Century	American	Farmstead	More Work Needed/Unevaluated	Jackson et al. 1996
20Lv245	Twentieth Century	American	Farm	More Work Needed/Unevaluated	Jackson et al. 1996
20Lv246	Twentieth Century	American	Homestead	More Work Needed/Unevaluated	Jackson et al. 1996
20Lv251	Turn-of-the-Century	American	Farmstead	More Work Needed/Unevaluated	Jackson et al. 1996
20Lv263	Turn-of-the-Century	American	Farmstead/Cemetery	More Work Needed/Unevaluated	Jackson et al. 1996
20Lv267	Twentieth Century	American	Dump	More Work Needed/Unevaluated	Jackson et al. 1996



1 - Bauer Road near Cunningham Lake Road Intersection, Facing North.



3 - River Ridge Drive, near Wyndham Lane Intersection, Facing Southeast.



2 - Bauer Road near Cunningham Lake Road Intersection, Facing South.



4 - Intersection of River Ridge Drive and Hidden Pines Drive, Facing Northeast.



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5 - 5388 Hidden Pines Drive, Facing North.



7 - Arbor Bay Drive near Hidden Pines Drive Intersection, Facing North.



6 - Hidden Pines Drive and Lake Forest Boulevard Intersection, Facing Northeast.



8 - Arbor By Drive, Facing West.



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APPENDIX H: PUBLIC MEETING DOCUMENTATION



CITY OF BRIGHTON CITY COUNCIL NOTICE OF PUBLIC MEETING

The City of Brighton will hold a public meeting on the proposed Clean Water State Revolving Fund (CWSRF) Sanitary Sewer System Improvements Program for the purpose of receiving comments from interested persons.

The meeting has been scheduled for April 2, 2024, at 6:30 p.m. in the City Council Chambers, located at the City of Brighton City Hall, 200 N 1st St, Brighton, MI 48116.

The purpose of the proposed projects is to ensure that the city can continue to adequately convey and treat all sewerage flows in accordance with its NPDES permit. The projects will address this by replacing equipment past its expected useful life at the wastewater treatment plant and within the collection system.

Project construction will occur from approximately 2025 to 2029 and will involve improvements to the wastewater treatment plant and sewer between Third Street and the plant along Bauer Road.

Impacts of the proposed projects will include temporary traffic disruptions and noise from construction activities during daylight and weekday hours.

The estimated cost to users if all of the projects are constructed based on these approximate costs will be approximately \$97.05 per user bimonthly.

Copies of the draft project planning document detailing the proposed projects are available for inspection on the city website: brightoncity.org, at the Brighton City Hall 200 N. 1st Street, Brighton, MI 48116, or the Brighton Department of Public Services 420 S. Third Street, Brighton, MI 48116.

Brighton City Hall (200 N 1st St, Brighton, MI 48116)

Written comments received before the meeting record is closed on April 2, 2024, at 6:30 pm will receive responses in the final project planning document. Written or emailed comments should be sent to: Mr. Corey Brooks, Wastewater Treatment Plant Superintendent, 6570 Hamburg Road, Brighton, MI 48116 or brooksc@brightoncity.org.

APPENDIX I: RESOLUTION OF ADOPTION

