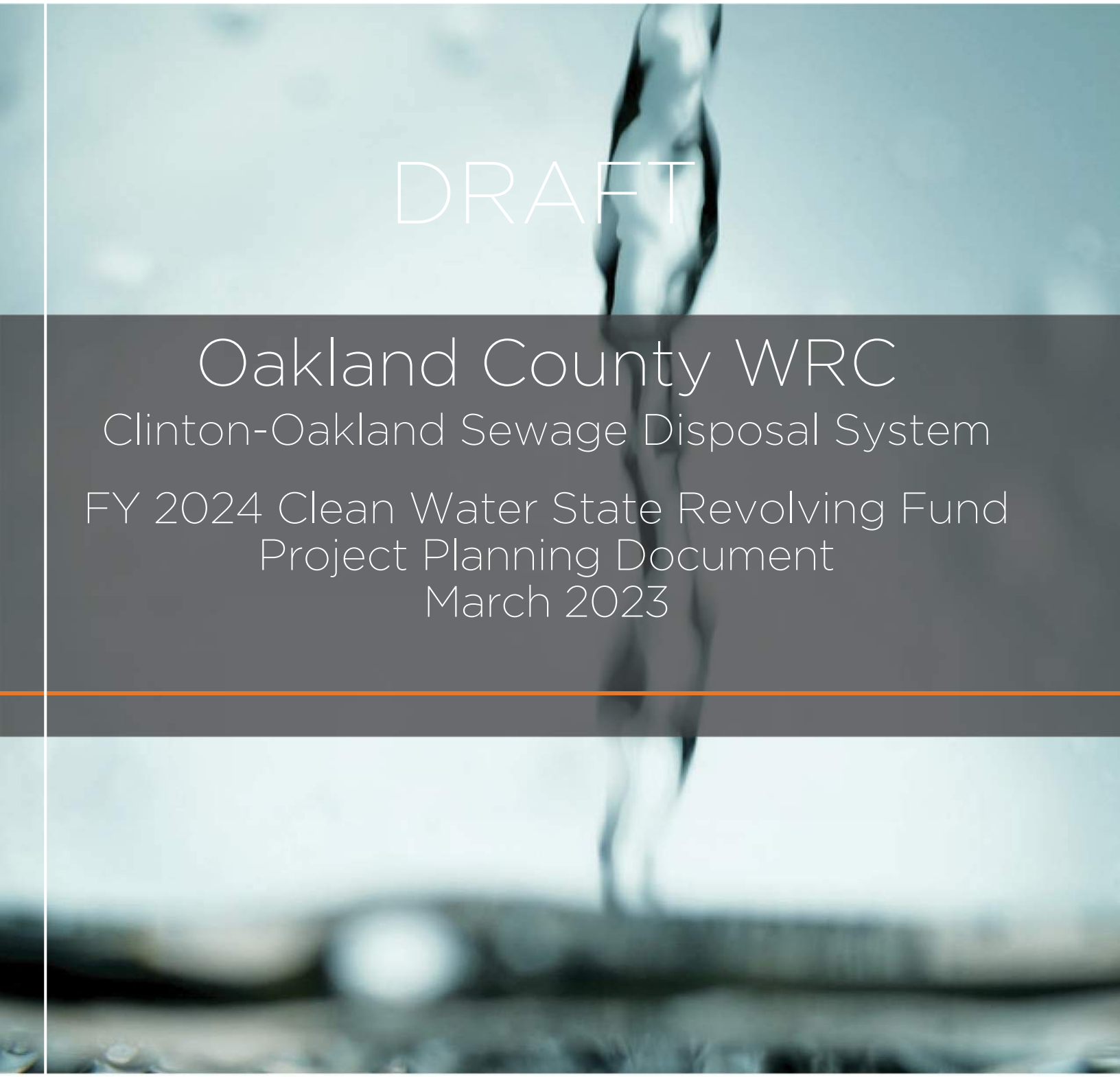

DRAFT

Oakland County WRC

Clinton-Oakland Sewage Disposal System

FY 2024 Clean Water State Revolving Fund Project Planning Document

March 2023

Prepared for:

WRC
WATER RESOURCES COMMISSIONER
Jim Nash

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ABBREVIATIONS

AMP – Asset Management Plan
CFS – Cubic Feet Per Second
CIP – Capital Improvement Plan
CIPP – Cured-In-Place Pipe
COSDS – Clinton-Oakland Sewage Disposal System
CRWRRF – Clinton River Water Resource Recovery Facility
CVT – Cities, Villages, and Townships
CWSRF – Clean Water State Revolving Fund
DCA – District Compliance Agreement
EGLE – Michigan Department of Environment, Great Lakes, and Energy
U.S. EPA – United States Environmental Protection Agency
FSP – Fiscal Sustainability Plan
GLWA – Great Lakes Water Authority
H_2S – Hydrogen Sulfide Gas
I/I – Inflow and Infiltration
IPaC – Information for Planning and Consultation
MDNR – Michigan Department of Natural Resources
MFA – Michigan Finance Authority
MIRIS – Michigan Resource Inventory System
MNFI – Michigan Natural Features Inventory
NASSCO – National Association of Sewer Service Companies
NWI – National Wetland Inventory
OMID – Oakland-Macomb Interceptor Drain
O&M – Operations and Maintenance
PACP – Pipe Assessment Certification Program
RCP – Reinforced Concrete Pipe
SAW – Stormwater, Asset Management, and Wastewater (SAW)
SEMCOG – Southeast Michigan Council of Governments
SSOs – Sanitary Sewer Overflows
USDA NRCS – U.S. Department of Agriculture Natural Resource Conservation Services
USFWS – U.S. Fish and Wildlife Service
WRC – Oakland County Water Resources Commissioner
WRRDA – Water Resources Reform and Development Act
WRRF – Water Resource Recovery Facility
WWTP – Wastewater Treatment Plant

I. INTRODUCTION

The Oakland County Water Resources Commissioner (WRC) is submitting this Project Planning Document to apply for a fiscal year 2024 Clean Water State Revolving Fund (CWSRF) low interest loan to rehabilitate approximately seven miles of interceptor sanitary sewer and to rehabilitate the Elizabeth Lake Pump Station within the Clinton-Oakland Sewage Disposal System (COSDS). The COSDS is a regional sanitary sewer service district that serves thirteen communities in central and northern Oakland County. The WRC owns, operates, and is responsible for all maintenance, operation, and administration of the WRC interceptor sewers that serve the district. The Project Planning Document has been developed using the Michigan Department of Environment, Great Lakes, and Energy (EGLE), CWSRF Project Planning Document Preparation Guidance released in January 2023.

WRC submitted an Intent to Apply form to EGLE dated October 28, 2022. The Intent to Apply form included a description of the desired project and preliminary costs. On November 29, 2022, a multi-jurisdictional webinar was held by EGLE while virtual office hours were held on December 12, 2022, and December 15, 2022, to ask questions about this project and to seek clarification regarding the required level of detail for this Project Planning Document submission.

II. BACKGROUND

A. STUDY AND SERVICE AREAS

The COSDS is 35.3 square miles consisting of 4.0 square miles of surface water and provides sanitary sewer service to 13 cities, villages, and townships (CVTs) and includes a regional interceptor system approximately 57 miles in length. The COSDS service area includes all or part of the Cities of Auburn Hills, Rochester Hills, Rochester, and Lake Angelus; the Townships of Independence, Waterford, West Bloomfield, Oakland, Orion, and Oxford; and the Villages of Clarkston, Lake Orion, and Oxford. The COSDS sends a portion of wastewater flows from these communities for treatment to the Clinton River Water Resource Recovery Facility (CRWRRF), formally known as the Pontiac Wastewater Treatment Plant (WWTP), and the remaining wastewater flows to the Oakland-Macomb Interceptor Drain (OMID), which ultimately receives treatment at the Great Lakes Water Authority (GLWA) Water Resource Recovery Facility (WRRF).

The original COSDS was constructed in the late 1960s and early 1970s. It consists of two interceptor sub-systems referred to as the Clinton-Oakland and the Paint Creek interceptors. There is also the Gibson-Avon Arm, which collects sanitary sewage from a portion of the City of Rochester Hills.

Figure 1 shows a map of the entire COSDS, including the service area and interceptors. Figure 2 shows the proposed fiscal year 2024 Project Planning Document overall project improvement areas including Area 1 – West Walton Boulevard, Area 2 – North Pontiac Road, and Area 3 – Elizabeth Lake Pump Station to County Campus.

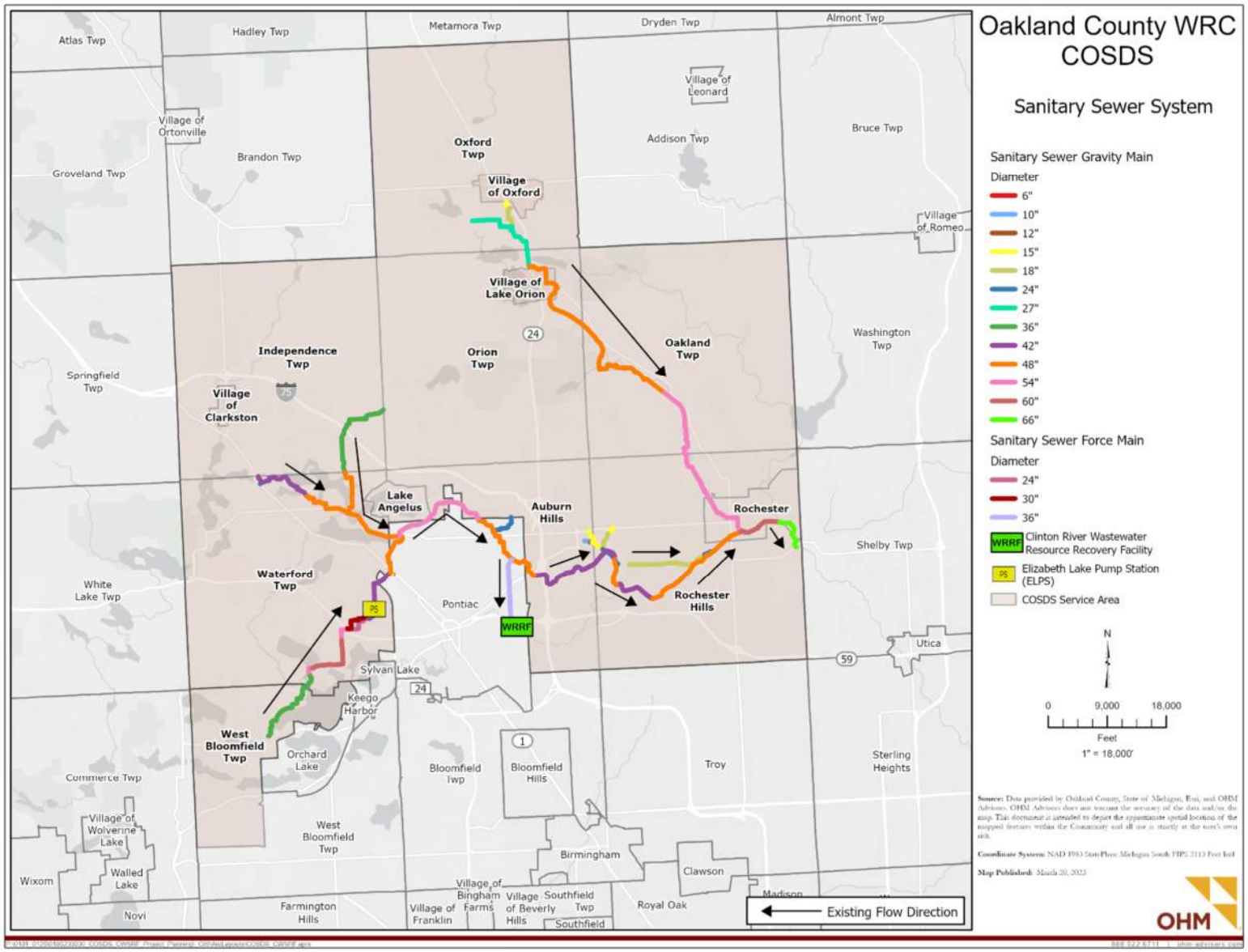

Figure 1. COSDS and Service Area Map

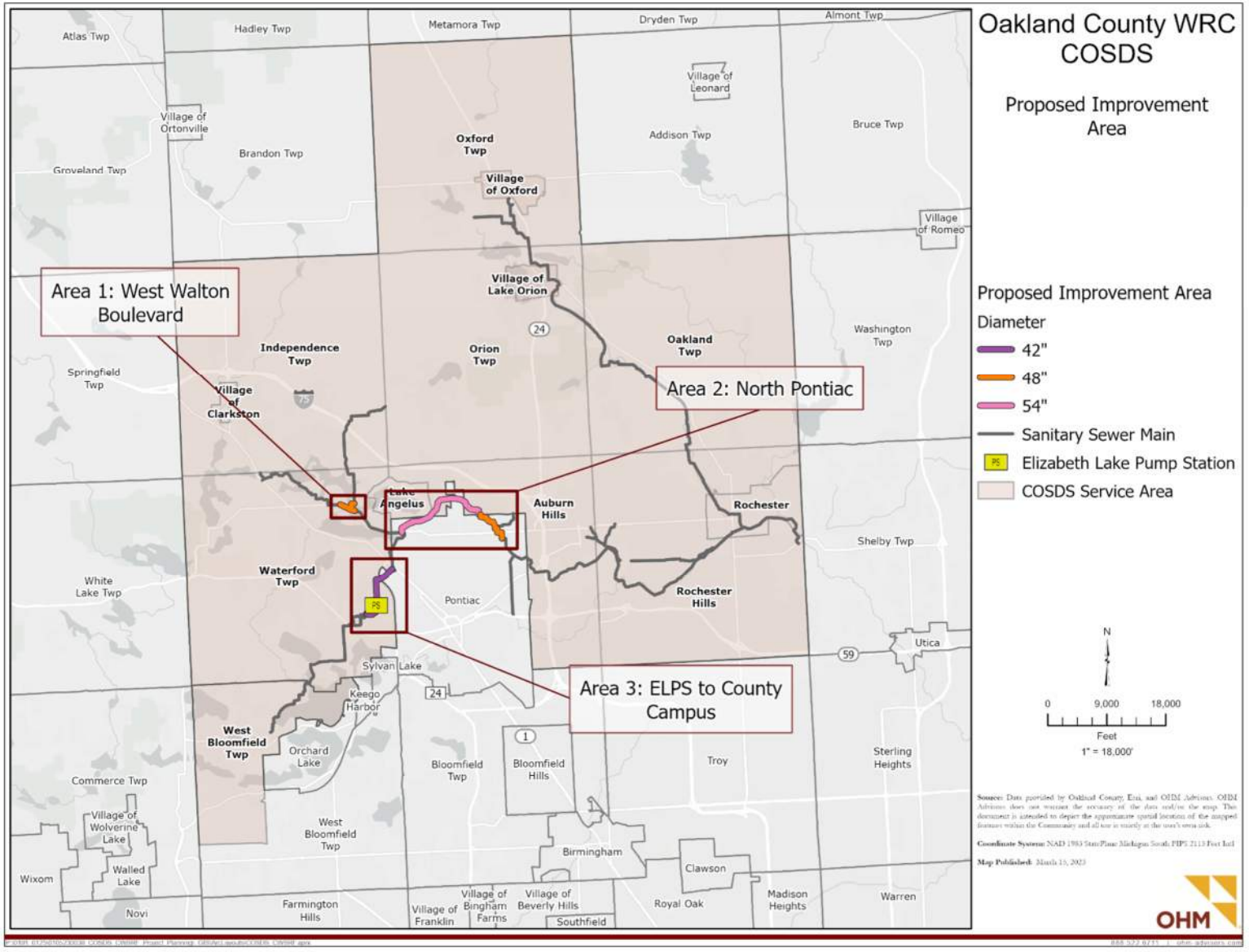

Figure 2. Overall Project Improvement Area Map

B. POPULATION

The COSDS service area population was estimated to be 322,752, according to the 2022 update of the 2015 COSDS Master Plan Addendum. The COSDS service area population increased by approximately 6.2% between the years 2015 and 2022. The predicted 2045 total population equivalency for the COSDS service area is 344,688 residents, which is a 5.9% increase from 2022. There is no substantial seasonal variation in population within the COSDS service area. The projected 20-year population for the COSDS service area is a total of 342,781 residents. Table 1 displays the population data from the 2022 service area population update for the thirteen communities within the COSDS service area.

Table 1. Present and Future Population Projections for COSDS

Community	2022 Existing COSDS Sewered Total Population Equivalencies	2015 Past COSDS Sewered Total Population Equivalencies	Percent Change 2015 to 2022	Projected 2045 COSDS Sewered Total Population Equivalencies	Interpolated 2043 COSDS Sewered Total Population Equivalencies
Independence Township/Village of Clarkston	16,783	17,656	-4.9%	17,805	17,716
Waterford Township	69,937	71,928	-2.8%	73,420	73,117
West Bloomfield Township	21,233	20,717	2.5%	22,317	22,223
City of Auburn Hills/Lake Angelus	66,201	57,889	14.4%	74,685	73,947
Orion Township	34,538	30,657	12.7%	35,928	35,807
Village of Lake Orion	3,117	2,754	13.2%	3,486	3,454
Oakland Township	11,043	9,638	14.6%	13,470	13,259
Oxford Township	9,291	8,224	13.0%	9,508	9,489
Village of Oxford	3,058	3,159	-3.2%	2,373	2,433
City of Rochester Hills	74,724	68,577	9.0%	77,349	77,121
City of Rochester	12,826	12,621	1.6%	14,348	14,216
Service Area Total	**322,752**	**303,820**	**6.2%**	**344,688**	**342,781**

C. EXISTING ENVIRONMENT EVALUATION

1. Cultural and Historic Resources

Many of the homes within the COSDS service area are over 50 years old. There are no historical properties listed by the State of Michigan or the National Historic Registry that are in the vicinity of the project areas.

2. Air Quality

National Ambient Air Quality Standards are health-based standards set by the United States Environmental Protection Agency (U.S. EPA). The entire State of Michigan is in attainment for carbon dioxide, lead, nitrogen dioxide, and particulate matter. Oakland County is in the non-attainment area for ozone. According to the 2021 Michigan Air Quality Annual Report there were six ozone exceedance days in 2021. Although there are non-attainment areas within Michigan for sulfur dioxide, Oakland County is in attainment for this pollutant.

3. Wetlands

Geographic information system (GIS) data were extracted from the EGLE Wetlands Map Viewer aerial imagery. The EGLE Wetlands Map Viewer compiles data from the following sources: National Wetland Inventory (NWI) maps generated by the U.S. Fish and Wildlife Service's (USFWS); land cover maps generated by the Michigan Department of Natural Resources (MDNR)'s Michigan Resource Inventory System (MIRIS); hydric soils mapped by the U.S. Department of Agriculture Natural Resource Conservation Service (USDA NRCS); and additional soil data produced by the National Cooperative Soil Survey operated by the USDA NRCS. As shown in Figure 3, there are numerous wetlands present in the project area.

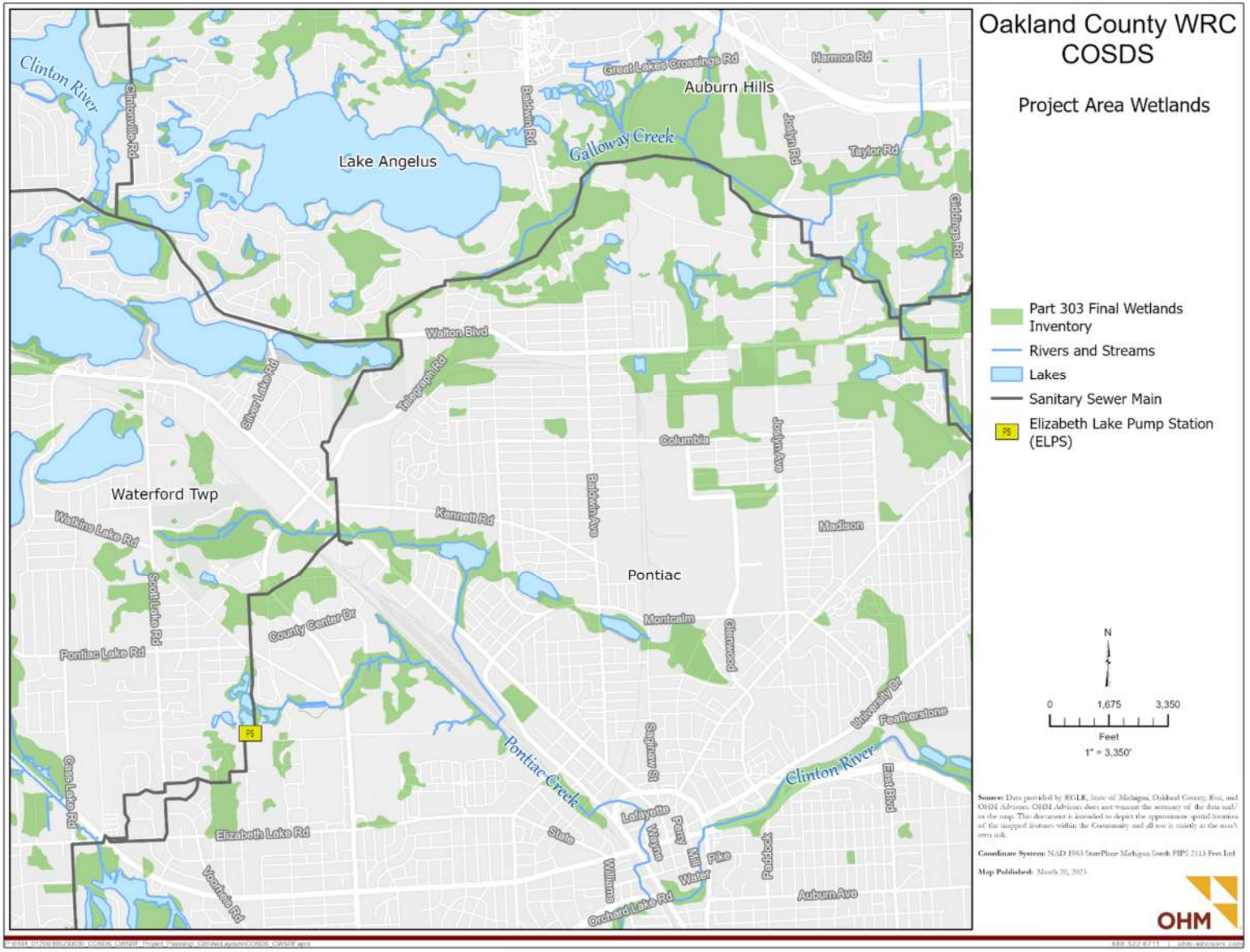

Figure 3. Project Area Wetland Map

4. Great Lakes Shorelands, Coastal Zones, and Coastal Management Areas

There are no Great Lakes shorelands, coastal zones, or coastal management areas within the study area.

5. Floodplains

There are numerous lakes and streams in the project area. Figure 4 shows the 100-year floodplain.

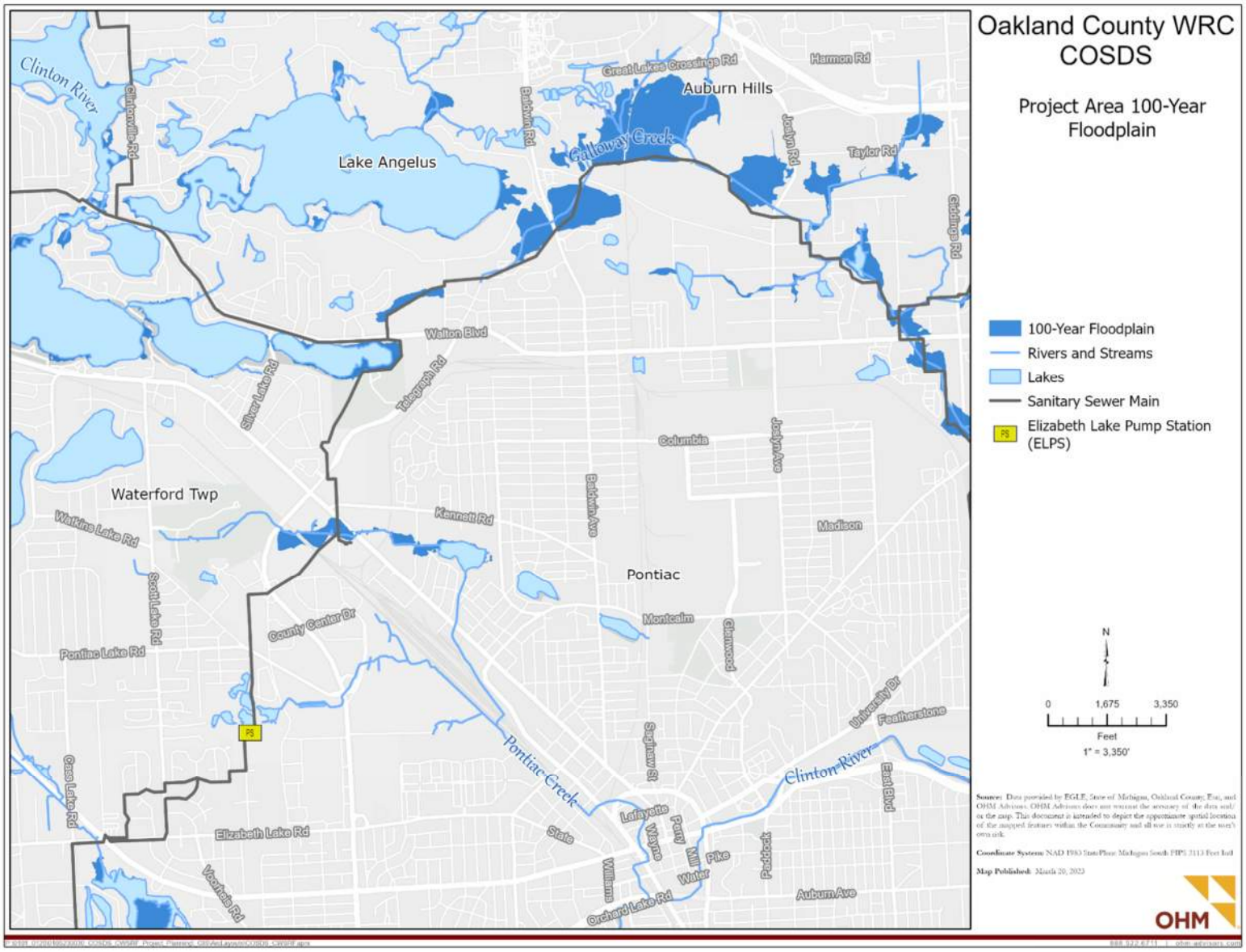

Figure 4. Project Area Floodplain Map

6. Natural or Wild and Scenic Rivers

There are no Natural Rivers as designated by the MDNR or Wild and Scenic Rivers as designated by the National Fisheries and Wildlife Service within the COSDS service area.

7. Major Surface Waters

The COSDS service area encompasses portions of the Clinton Main, Upper Clinton, Paint Creek and Stoney Creek Subwatersheds. There are numerous inland lakes including Cass, Elizabeth, Sylvan, Otter, Voorheis Lakes, Lake Angelus, and Lake Orion. Also within the service area are portions of the Upper Branch and Main Branch of the Clinton River, and Paint and Stoney Creeks, all of which are tributary to the Clinton River.

8. Topography

The terrain in the proposed project area is generally flat plain with some hills near the Elizabeth Lake Pump Station property and has a slope from northwest to southeast.

9. Geology

The surficial geology of the project area is categorized as:

- medium-textured glacial till and
- glacial outwash sand and gravel and postglacial alluvium.

The bedrock within the project area is categorized as Coldwater Shale, which is predominantly gray to bluish gray shale with 5 to 20 feet of red shale present near the bottom of the geologic formation. Coldwater Shale may reach a depth of greater than 500 feet. The geologic formation is of the Mississippian Period.

10. Soil Types

The COSDS service area has varying soil types, which are generally moderately to good draining soils. All work will be required to comply with the State's and County's Soil Erosion and Sedimentation Control requirements. Figure 5 show the soils in the proposed project areas.

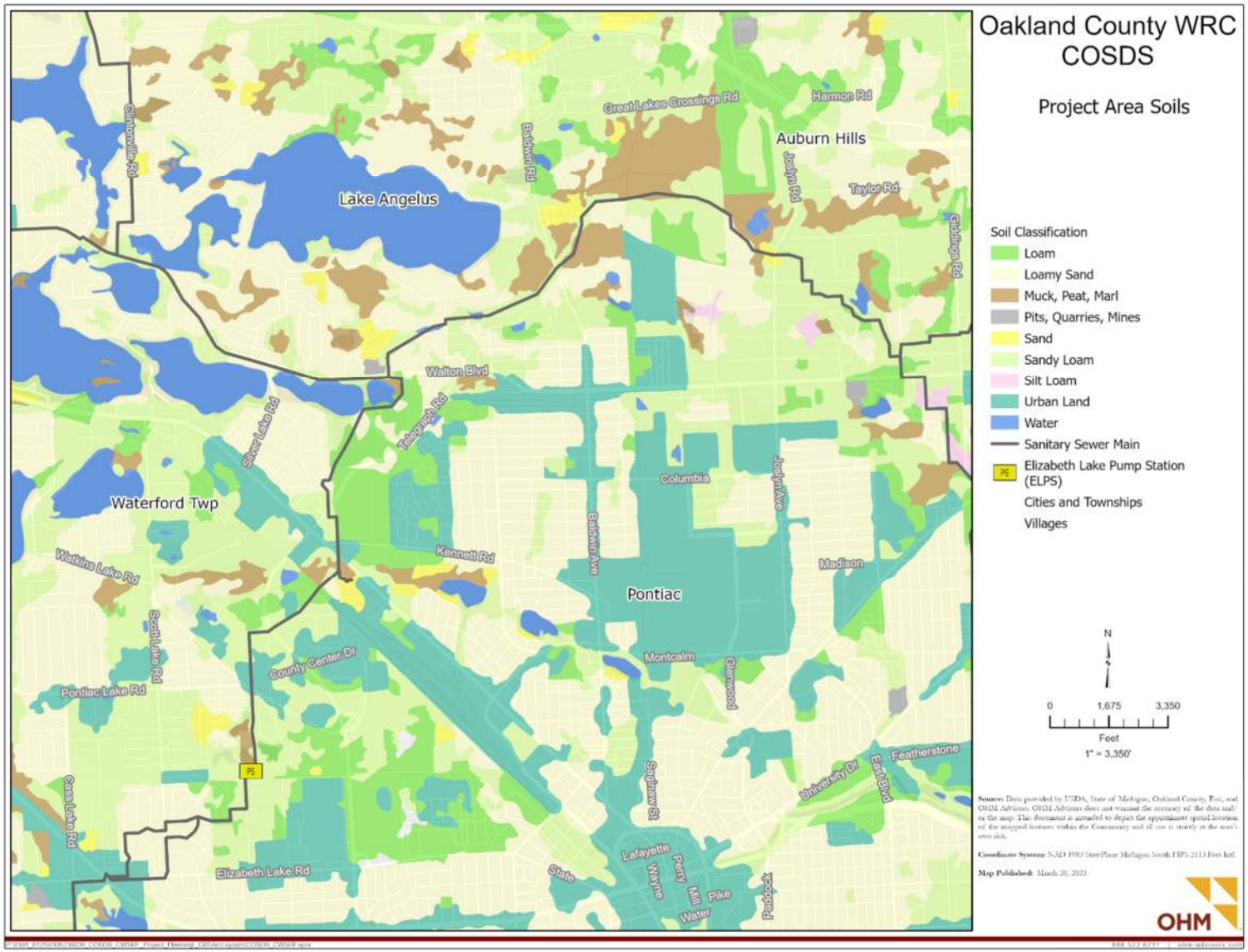

Figure 5. Project Area Soil Map

11. Agricultural Resources

There are no prime or unique agricultural lands within the proposed project areas.

12. Fauna and Flora

A desktop review of the Michigan Natural Features Inventory (MNFI) was conducted to identify threatened, endangered, and rare species that may be present in the project area. The results of the review can be found in Appendix A. No habitat for animals of economic or sport value are within the area. MNFI identified a total of five State threatened, endangered, or species of special concern within the 1.5-mile project area buffer. The species listed are as follows:

- Bastard pennyroyal (Trichostema dichotomum)
- Hairy angelica (Angelica venenose)
- Lake herring (Coregonus artedi)
- Pickerel frog (Lithobates palustris)
- Rainbow mussel (Villosa Iris)

Additionally, seven species were generated via the USFWS Information for Planning and Consultation (IPaC) website and comments were provided for seven Federally listed threatened, endangered, or candidate species. The species listed include the following:

- Indiana Bat (Myotis sodalis)
- Northern Long-Eared Bat (Myotis septentrionalis)
- Tricolored Bat (Perimyotis subflavus)
- Eastern Massasauga Rattlesnake (Sistrurus c. catenatus)
- Snuffbox Mussel (Epioblasma triquetra)
- Rayed Bean (Vilosa fabalis)
- Monarch Butterfly (Danaus plexipuss)

Most of the proposed work is in areas that present no suitable habitat for the identified threatened, endangered, or species of special concern. Suitable water habitat was identified for two of the five (Lake herring and rainbow mussel) State identified threatened, endangered, or species of special concern. No inland lake or stream work will occur for this project.

D. EXISTING SYSTEM

The COSDS includes sewers, manholes, and siphons that collect sanitary sewerage from the thirteen customer communities and convey wastewater to the GLWA WRRF or the CRWRRF. The CRWRRF originally served the City of Pontiac. The City sold the treatment facility to Oakland County WRC in 2014. In order to take advantage of available capacity, a portion of the wastewater from COSDS is directed to the CRWRRF and the remaining flow continues to the GLWA WRRF for treatment. There are approximately 58 miles of 8-inch

to 66-inch diameter gravity sewers, 3.5 miles of forcemain, and 839 manholes in the system. The sewers were constructed between 1969 and 2016.

The Elizabeth Lake Pump Station, which is also part of the COSDS, was constructed in 1968 and consists of five dry-pit centrifugal pumps with vertical motors and one submersible emergency pump. The five centrifugal pumps are equipped with variable frequency drives. There is also a permanent standby diesel generator at the station in case of emergency. Much of the electrical equipment and pumps were last upgraded in 2001, but a few of the assets are original to the pump station.

The COSDS operated under a District Compliance Agreement (DCA) issued by the Michigan Department of Environmental Quality (now EGLE) between 2009 and 2018. The DCA required addressing sanitary sewer overflows (SSOs) that occurred at Locata Street downstream of the Elizabeth Lake Pump Station. The frequency of SSOs were reduced through a combination of measures:

- Upstream system rehabilitation
- Grade protection stations in Waterford Township
- Revisions to the Elizabeth Lake Pump Station operational procedures to store flow in the wet well and interceptor

As a result of these improvements, WRC was able to demonstrate that the COSDS was in compliance with the DCA, and the DCA was subsequently closed. The proposed improvements in this CWSRF Project Planning Document will result in maintaining and upgrading the system to proactively reduce the frequency of SSOs and avoid the need for future compliance action by EGLE.

1. Residuals Handling

Residuals generated during construction will be flushed downstream within the collection system for treatment.

2. Operation and Maintenance

WRC operates and maintains the COSDS. WRC maintains the interceptor system through a perpetual 7-year rotating maintenance program that includes sewer televising, cleaning, inspection, and repair. Issues identified during the inspection process are programmed for maintenance or rehabilitation. A portion of the wastewater from the COSDS is transported for treatment to the CRWRRF and the remaining wastewater flows to the OMID, which ultimately discharges to the GLWA WRRF. The local collector sewers that connect to the COSDS are owned and operated by the individual communities within the COSDS service area. WRC also maintains the Elizabeth Lake Pump Station.

An asset management plan (AMP) was developed under the Stormwater, Asset Management, and Wastewater (SAW) grant program. The initial plan was published in 2021. The AMP established a capital improvement plan (CIP), from which WRC selected the projects contained in this project planning document.

3. Design Capacity

The COSDS contract outlet capacity (which includes flow from the Clinton Oakland and Gibson Arm interceptors) is 140 cubic feet per second (cfs). The signed agreement between the COSDS and the OMID, defines this maximum allowable flow as the COSDS component at the OMID outlet. Current average dry weather flow for the system is approximately 30.8 cfs. Wastes discharged to the COSDS are typical of municipal sewage. The Elizabeth Lake Pump Station has a firm capacity of 53.8 cfs. The CRWRRF receives up to 47 cfs from the COSDS interceptors.

4. Climate Resiliency

Sewers in poor condition could allow greater amount of infiltration and inflow (I/I) to enter the collection system. With increasing precipitation events of higher volumes, reducing I/I becomes more critical. The Elizabeth Lake Pump Station is equipped with a back-up generator in order to maintain operation in the event of a power outage.

E. NEED FOR THE PROJECT

Televising of the sewers and scoring in accordance with the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) identified sewers that had structural ratings of 4s and 5s in three concentrated areas, which require rehabilitation or replacement to prevent future sewer breaks and sanitary sewer overflows. The poor condition of the interceptor in these locations is due to hydrogen sulfide gas (H_2S) induced corrosion. WRC has received odor complaints from properties downwind of the Elizabeth Lake Pump Station despite the existing odor control system consisting of granular activated carbon filtration.

The upstream Elizabeth Lake Pump Station must remain in operation as there is little storage capacity available in the system. The 2021 COSDS Wastewater AMP identified capital improvements for the Elizabeth Lake Pump Station that are scheduled to occur during fiscal year 2024. A summary of the CIP is included in Appendix B with fiscal year 2024 projects outlined as part of this project.

F. PROJECTED FUTURE NEEDS

As detailed in the 2021 COSDS Wastewater AMP, CIP projects identified for the COSDS include system upgrades, rehabilitation, and replacements needed based on previous condition assessments of the wastewater system. The CIP, included in Appendix B details sanitary main, sanitary manhole, and pump station improvements for the 0 to 5-year and 6 to 20-year planning periods.

III. ANALYSIS OF ALTERNATIVES

This section identifies alternatives to the proposed project including the sewer rehabilitation and the Elizabeth Lake Pump Station rehabilitation including no-action, optimization, and regionalization alternatives. Two principal alternatives were considered to rehabilitate the three identified COSDS interceptor locations and one principal alternative was considered to rehabilitate the existing Elizabeth Lake Pump Station.

A. NO-ACTION

The first alternative to consider is no-action. No-action will lead to continued H_2S induced corrosion. As the existing infrastructure ages and undergoes more corrosion, pipe wall thickness will continue to decrease, and the likelihood of failure will increase. The no-action alternative will not be pursued because action must be taken to preserve the existing interceptor system and provide continued sanitary sewer service to the thirteen communities.

B. OPTIMUM PERFORMANCE OF EXISTING FACILITIES

Optimizing the performance of the existing sewer system would allow for the continuation of properly treated sewage; however, this alternative would not aid in the prevention of sewer main failure through degradation of the aged pipeline, which could eventually lead to sanitary sewer overflows if sewer breaks were to occur. The project areas are located near inland lakes and streams, as well as wetlands, which could be negatively impacted if sewer breaks were to occur. This alternative will not be pursued as it would result in sewer main failure and lack of sanitary sewer service to residents.

C. REGIONALIZATION

Another alternative is to consider regionalization. The COSDS discharges a portion of the wastewater to the CRWRRF and is already part of the regional GLWA system. There are no other authorities nearby, therefore this alternative does not apply and will not be pursued further.

D. REHABILITATION ALTERNATIVES

The three locations identified for sewer rehabilitation have structural ratings of Significant (Grade 4) or Most Significant (Grade 5) as defined by NASSCO PACP. These areas include:

- Area 1 – West Walton Boulevard (approximately 4,000 feet of 48-inch diameter sewer generally running east-west north of Loon Lake).
- Area 2 – North Pontiac Road (approximately 22,000 feet of 48-inch and 54-inch diameter sewer traversing east-west north of Silver Lake to Gambrell Drive).
- Area 3 – Elizabeth Lake Pump Station to County Campus (approximately 10,000 feet of 42-inch diameter sewer that extends generally south from County Center Drive to Elizabeth Lake Road).

Figures 6, 7, and 8 show maps of the proposed project areas.

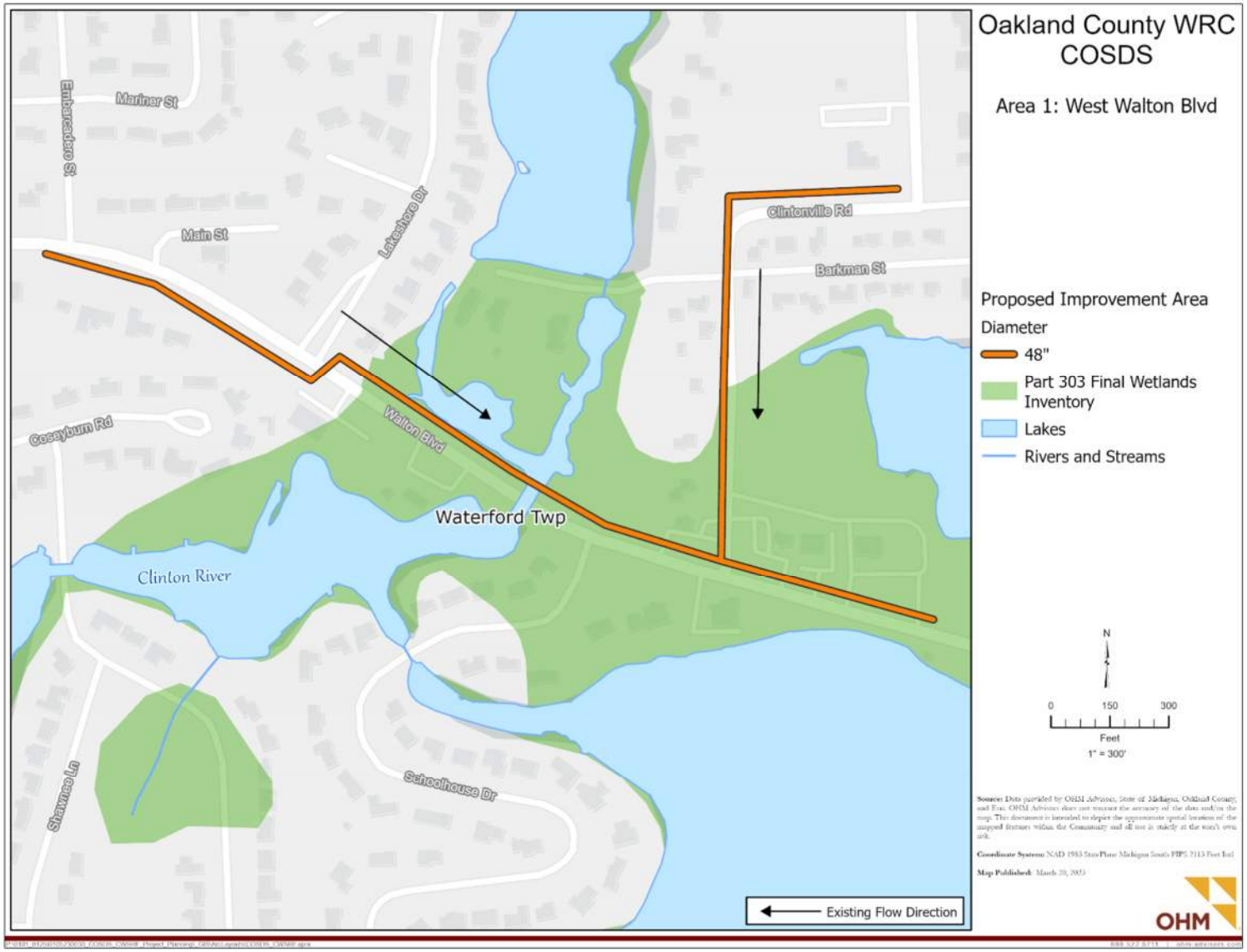

Figure 6. Area 1 – West Walton Boulevard Project Area Map

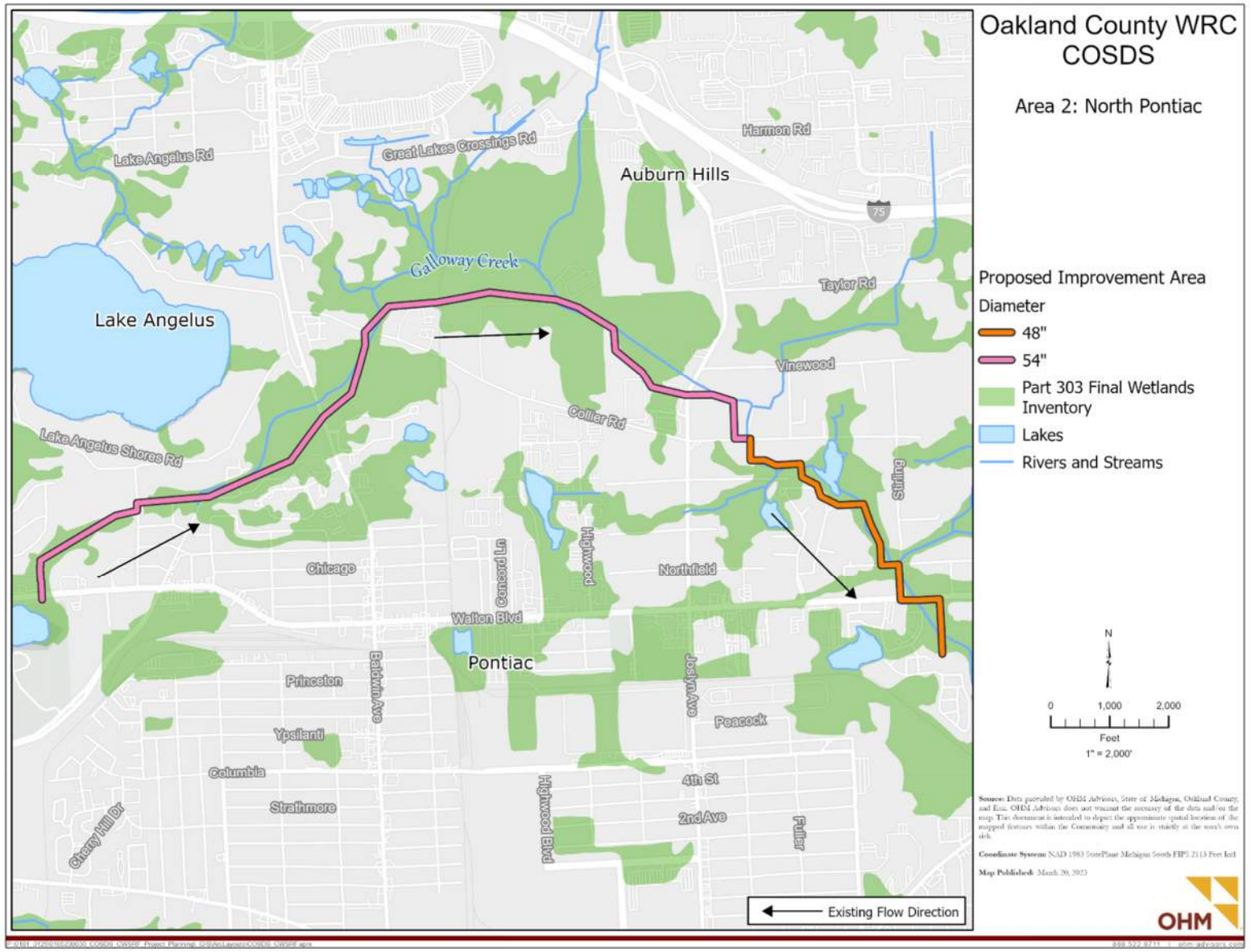

Figure 7. Area 2 – North Pontiac Road Project Area Map

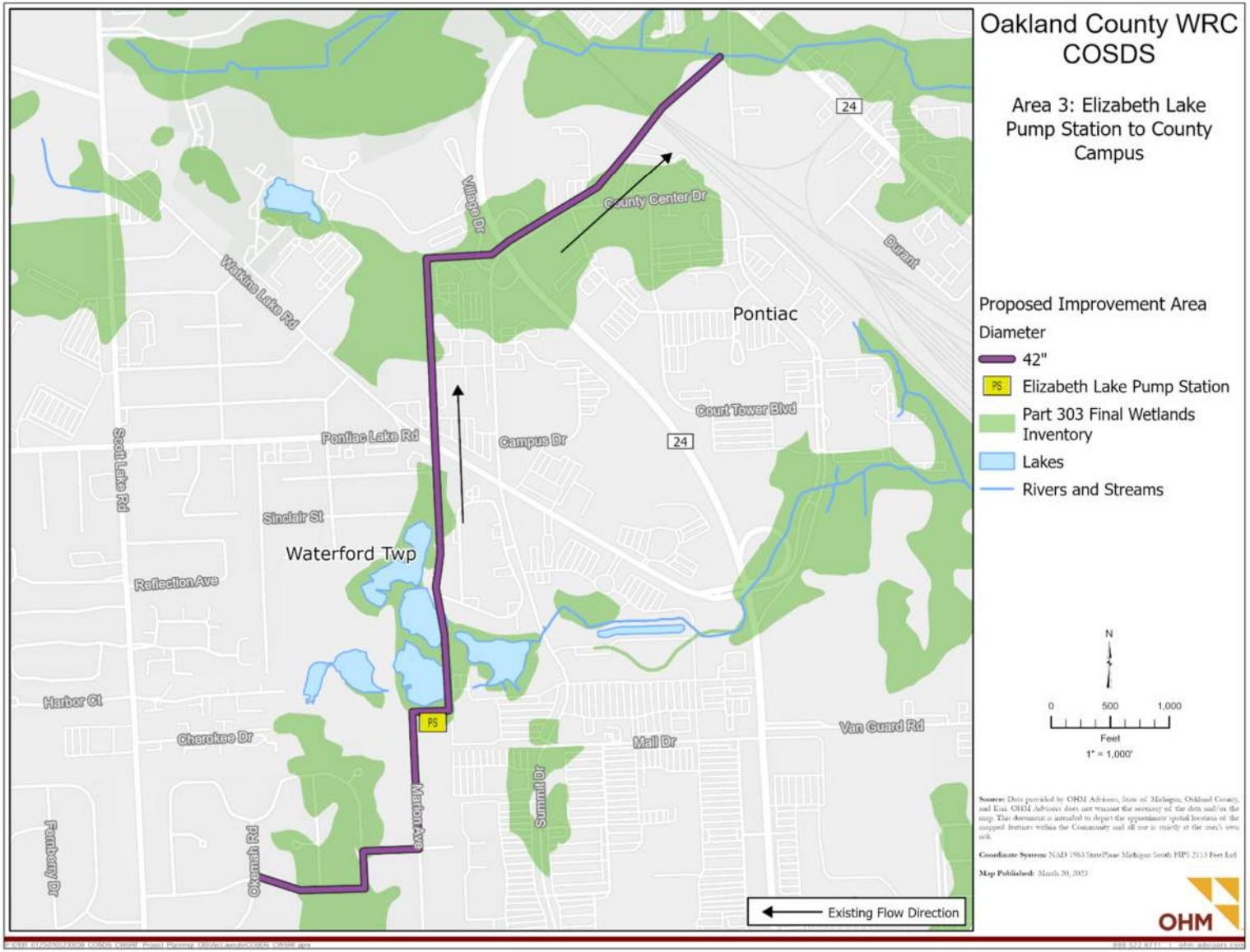

Figure 8. Area 3 – Elizabeth Lake Pump Station to County Campus

Appendix C contains the supporting PACP rating information. The intent of this project is to address a portion of the system's structural damage.

Two principal alternatives were considered to rehabilitate the three identified COSDS interceptor locations. The first principal alternative was replacement of the existing 42-inch, 48-inch, and 54-inch interceptors with new reinforced concrete pipe (RCP) via open cut. The second principal alternative was to rehabilitate the sewers. For cost purposes, cured-in-place pipe (CIPP) lining was used. The actual rehabilitation method(s) will be evaluated and selected during the design phase. Both alternatives would include odor and corrosion control within the collection system. The advantage of addressing hydrogen sulfide in the collection system is the reduced corrosion of the existing piping, as well as protecting the replaced or rehabilitated piping that is included in this project planning document. An allowance for odor and corrosion control has been included. The odor and corrosion control methods and locations will be determined during the design of the project.

One principal alternative was costed to rehabilitate the existing Elizabeth Lake Pump Station. The no action alternative was not considered, as the pump station is a required part of the system. This could also lead to the need for emergency repairs, which in the current economic climate could be difficult to obtain. Replacing the existing pump station with a new pump station was not considered, as the existing pumps were replaced recently and the other assets have been maintained adequately. The use of resources to construct a new pump station would be more expensive than rehabilitating the existing Elizabeth Lake Pump Station.

The planned fiscal year 2024 improvements identified for the Elizabeth Lake Pump Station can be found in Appendix B and are as follows:

- Suction valve 2 (16-inch), suction valve 3 (24-inch), suction valve 4 (24-inch), suction valve 5 (24-inch)
- Discharge valve 1, discharge valve 2, discharge valve 3, discharge valve 4, discharge valve 5, discharge valve 6
- Air compressor suction and discharge valves
- Isolation valve (pump 1), isolation valve (pump 2), isolation valve (pump 3), isolation valve (pump 4), isolation valve (pump 5)
- Crossover valve
- Main effluent discharge valve (24-inch)
- Main effluent discharge valve (30-inch)
- General piping
- Wet well supply fan

These assets are at or near the end of their useful life and are proposed for replacement as part of this project.

E. MONETARY EVALUATION

Capital costs were evaluated and are presented below. Certain cost factors such as sunk costs, as well as operation and maintenance (O&M) costs, are similar between the alternatives and have been excluded from the monetary evaluation. Opinions of probable costs were prepared for alternatives. These cost opinions are organized by sewer rehabilitation/replacement and pump station rehabilitation and are provided in Appendix D of this report.

Present worth analyses for the project were completed using a discount rate of 2%. A present worth analysis for the open cut with RCP and sewer rehabilitation work is presented in Table 2.

Table 2. Open Cut with RCP Pipe Replacement and Sewer Rehabilitation Present Worth Analysis

Category	Alternative 1: Open Cut with RCP Pipe Replacement	Alternative 2: Sewer Rehabilitation
Capital Cost	$80,000,000	$70,000,000
Salvage Value	$19,090,000	$12,820,000
Present Worth of Salvage Value	$12,847,000	$8,627,000
Total Present Worth	**$67,153,000**	**$61,373,000**

Alternative 2, sewer rehabilitation has the lower capital cost and present worth.

The capital cost, salvage value, and present worth to replace the pump station assets nearing the end of their useful life are summarized in Table 3. The assets will be replaced in kind. Therefore, there is no anticipated change in operation and maintenance costs.

Table 3. Elizabeth Lake Pump Station Present Worth Analysis

Category	Elizabeth Lake Pump Station Rehabilitation Cost
Capital Cost	$7,000,000
Salvage Value	$1,160,000
Present Worth of Salvage Value	$781,000
Total Present Worth	**$6,219,000**

Rehabilitation and replacement of the assets at the Elizabeth Lake Pump Station is orders of magnitude lower than the cost to build a brand new pump station of equal capacity, therefore, no Present Worth comparison between the two was made.

The basis for the interceptor and pump station rehabilitation was described in the 2021 COSDS Wastewater AMP. Appendix B contains the CIP outlined in the AMP.

The user cost is contained under Section IV.J; Selected Alternatives.

F. ENVIRONMENTAL EVALUATION

1. Construction Impacts

The proposed projects will require limited excavation and all work will be performed within the existing right-of-way or easements, and on the existing Elizabeth Lake Pump Station property. There are no anticipated negative impacts to the appearance or structural integrity of homes and other buildings along the sewers to be rehabilitated. It is unlikely that cultural or historic resources will be negatively impacted during construction.

The proposed projects are not anticipated to significantly impact air quality, although construction equipment may generate limited emissions. Lane closures would be more extensive with the open cut sewer replacement alternative, which could result in additional traffic emissions due to slower movement of vehicles through the construction area.

Figures 6, 7, and 8 displayed the project areas relative to wetlands. Project Areas 1 and 2 are predominantly located within wetland areas. Significant portions of Project Area 3 is also located within areas of known wetlands. There will be less wetland impacts with the selected sewer rehabilitation method compared to open cut replacement. Most of the asset replacements within the Elizabeth Lake Pump Station will occur within the existing pump station building. Staging of construction materials will need to be reviewed to minimize wetland disturbance on the pump station site.

Figures 9, 10, and 11 show the 100-year floodplain, as well as lakes and streams, in relation to Project Areas 1, 2, and 3, as well as the Elizabeth Lake Pump Station.

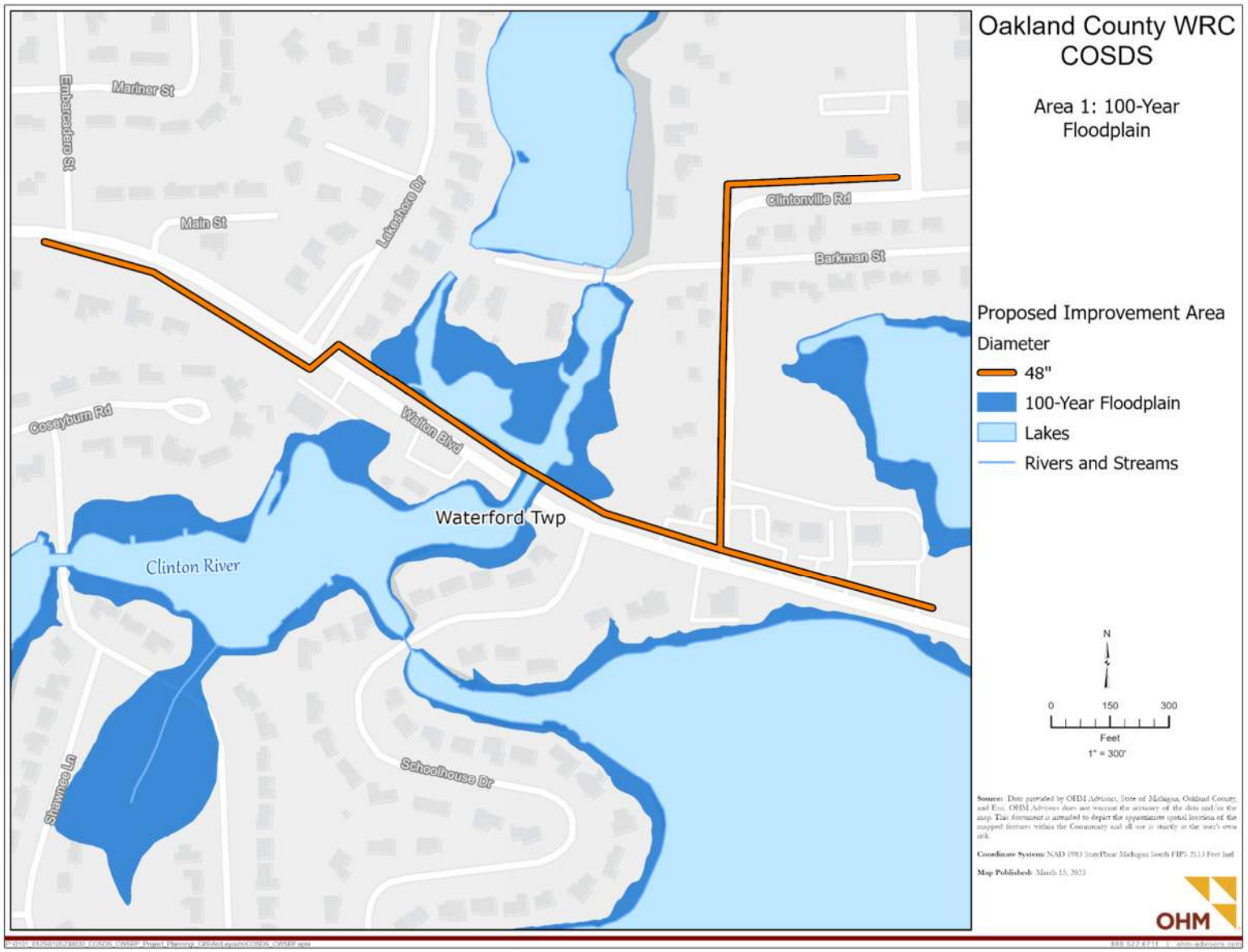

Figure 9. Area 1 – West Walton Boulevard 100-Year Floodplain Map

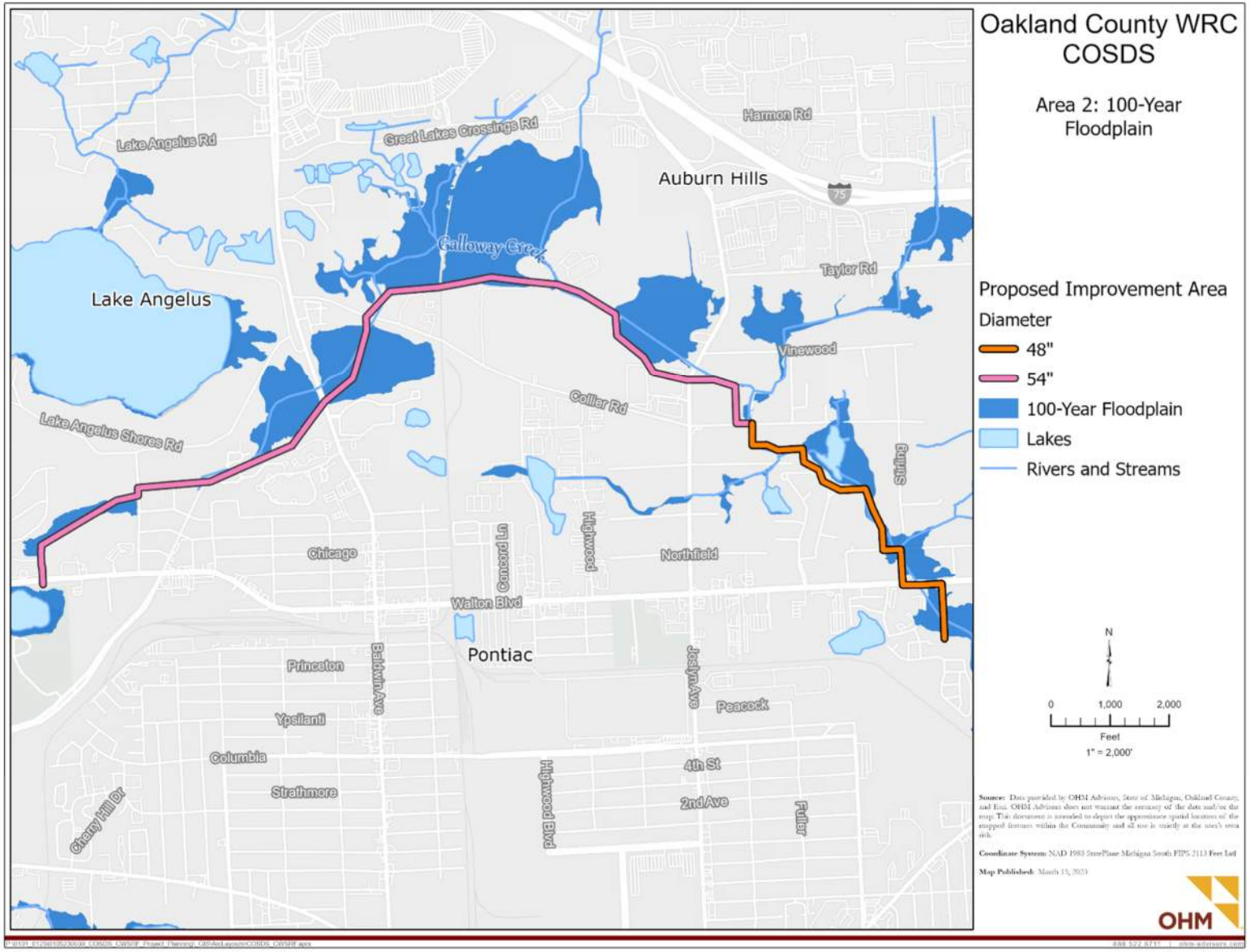

Figure 10. Area 2 – North Pontiac Road 100-Year Floodplain Map

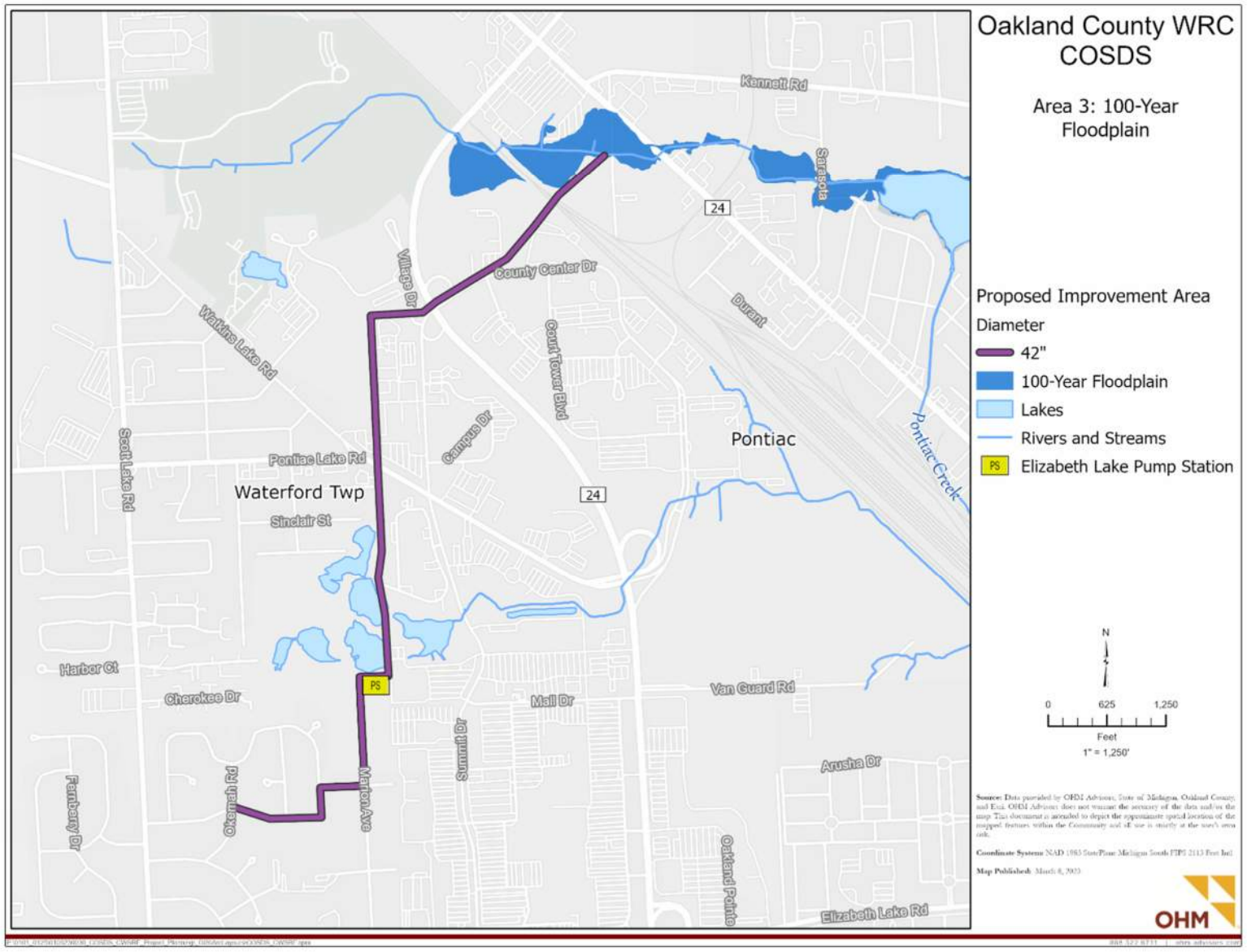

Figure 11. Area 11 – Elizabeth Lake Pump Station and Surrounding Area 100-Year Floodplain Map

Project Area 1 involves one section along Walton Boulevard, which crosses the Clinton River and borders a section of the 100-year floodplain between Lakeshore Drive and School House Drive. Project Area 2, North of Pontiac runs near the Galloway Creek, which has an extensive 100-year floodplain. Project Area 3 is adjacent to lakes from approximately Elizabeth Lake Pump Station north to Watkins Lake Road, and the sewer parallels several small lakes or impoundments. In addition, the northern most section of Project Area 3 intersects an unnamed stream and the 100-year floodplain. Sewer replacement would have more of an impact on the floodplain and inland lakes and streams compared to sewer rehabilitation. The sewer replacement impact could be minimized by utilizing trenchless installation methods such as horizontal directional drilling in these sensitive areas. The Elizabeth Lake Pump Station rehabilitation should have minimal impact of the adjacent lake.

The review of the MNFI database identified five rare, endangered, and threatened species that may be present in the project areas. The MNFI database identifies the type of habitat that is needed to support individual endangered, threatened, or species of special concern. If the needed habitat is no longer present in the area due to changes and development in the area, the observation is considered historical, and the individual species is not anticipated to be present. Table 4 summarizes the species and possible impacts based on a desktop review of the existing projects areas.

Table 4. MNFI Rare Species Review Summary

Species	Potential Impact
Bastard pennyroyal	Historical; Needed habitat not present No effect
Hairy angelica	Historical; Needed habitat not present No effect
Lake herring	No work within identified habitat No effect
Pickerel frog	Additional field survey required Possible effect
Rainbow mussel	No work within identified habitat No effect

The USFWS identified seven additional species that may be present in the project areas, as summarized in Table 5.

Table 5. USFWS Rare Species Review Summary

Species	Potential Impact
Indiana Bat	Not likely to adversely affect
Northern Long-Eared Bat	Not likely to adversely affect
Tricolored Bat	No effect
Eastern Massasauga Rattlesnake	Not likely to adversely affect
Snuffbox Mussel	No effect
Rayed Bean	No effect
Monarch Butterfly	No effect

Most of the work is proposed in already-developed areas where there is minimal habitat present for the listed species. The sewer replacement alternative would have a greater ground disturbance, which could impact threatened and endangered species that may be present.

Impacts at the Elizabeth Lake Pump Station should be minimal, as work will be limited to on-site work and within buildings. Work outside the pump station including equipment replacement will be performed on existing concrete pads.

2. Presence of Contamination

According to EGLE's Inventory of Facilities accessible through the Remediation Information Data Exchange, there are eighteen Part 201 and Part 213 sites within the COSDS project area. Thirteen of these sites are Part 201 Sites and five of these sites are listed as Part 213 leaky underground storage sites. A summary of the addresses is provided in Table 6 and the locations are shown on Figures 12, 13, and 14.

Table 6. Part 201 and Part 213 Sites Located in the COSDS Project Area

Site No.	Site Name	Address	Part 201 or Part 213
1	M H Walton Inc	3235 W Walton Boulevard	Part 213
2	--	2986 W. Walton Boulevard	Part 201
3	--	1350 West Walton Boulevard (Eastern Portion)	Part 201
4	--	724 West Walton Boulevard (North of)	Part 201
5	--	Lake Angelus at Baldwin Rd Drum	Part 201
6	Great Lakes Container Corporation	415 Collier Road	Part 201
7	Columbus Steel Drum Co	415 Collier Road	Part 213
8	Collier Rd LF Pontiac	575 Collier Road	Part 201
9	--	Collier Road, North of Galloway Creek	Part 201
10	--	Northwest corner of Joslyn Road and Auburn Road	Part 201
11	Joslyn Collier Property	NW corner of Joslyn Road & Collier Road	Part 201
12	--	Collier at Joslyn Road	Part 201
13	Upland & Joslyn Road Fill	Upland Road	Part 201
14	--	788 East Walton Boulevard	Part 201
15	Road Commission for Oakland County-Waterford	2420 Pontiac Lake Road	Part 213
16	Building 22-Powerhouse	1200 N Telegraph Road	Part 213
17	Oakland County Central Powerhouse	1200 N Telegraph Road, Building 22	Part 201
18	Spencer Oil Co. - Chavez Avenue Facility	1200 Cesar E Chavez Avenue	Part 213

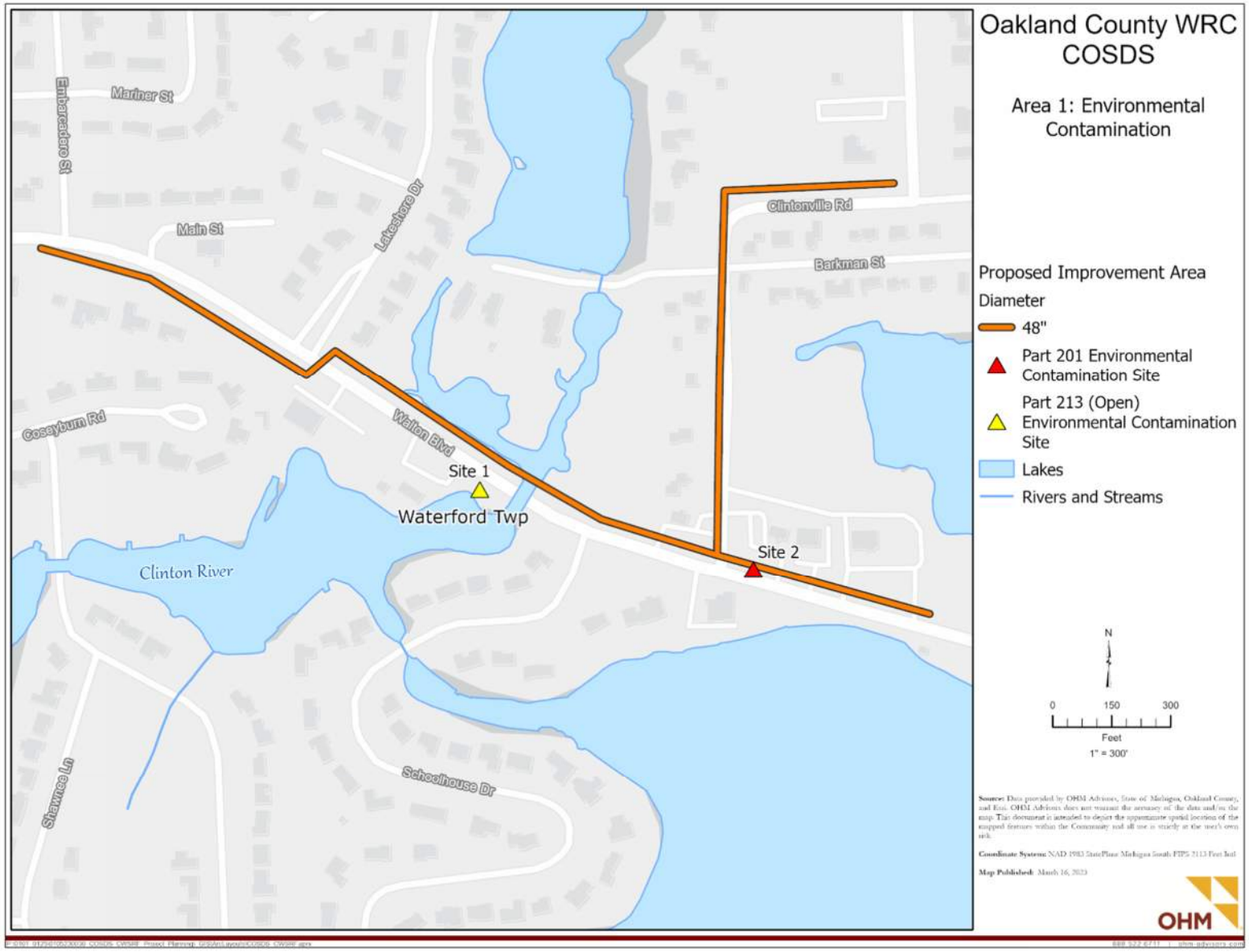

Figure 12. Area 1 – West Walton Boulevard Contamination Sites Map

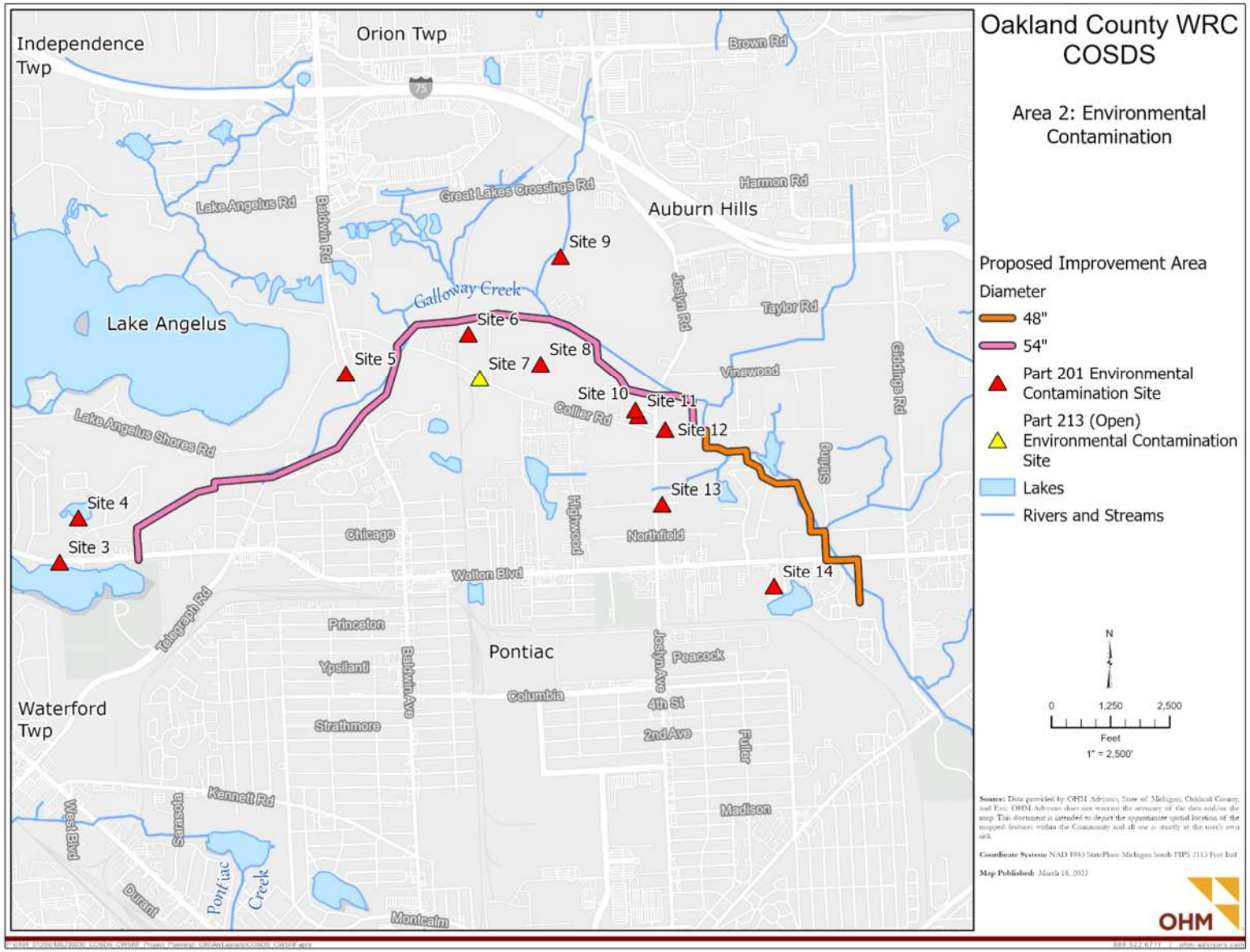

Figure 13. Area 2 – North Pontiac Road Contamination Sites Map

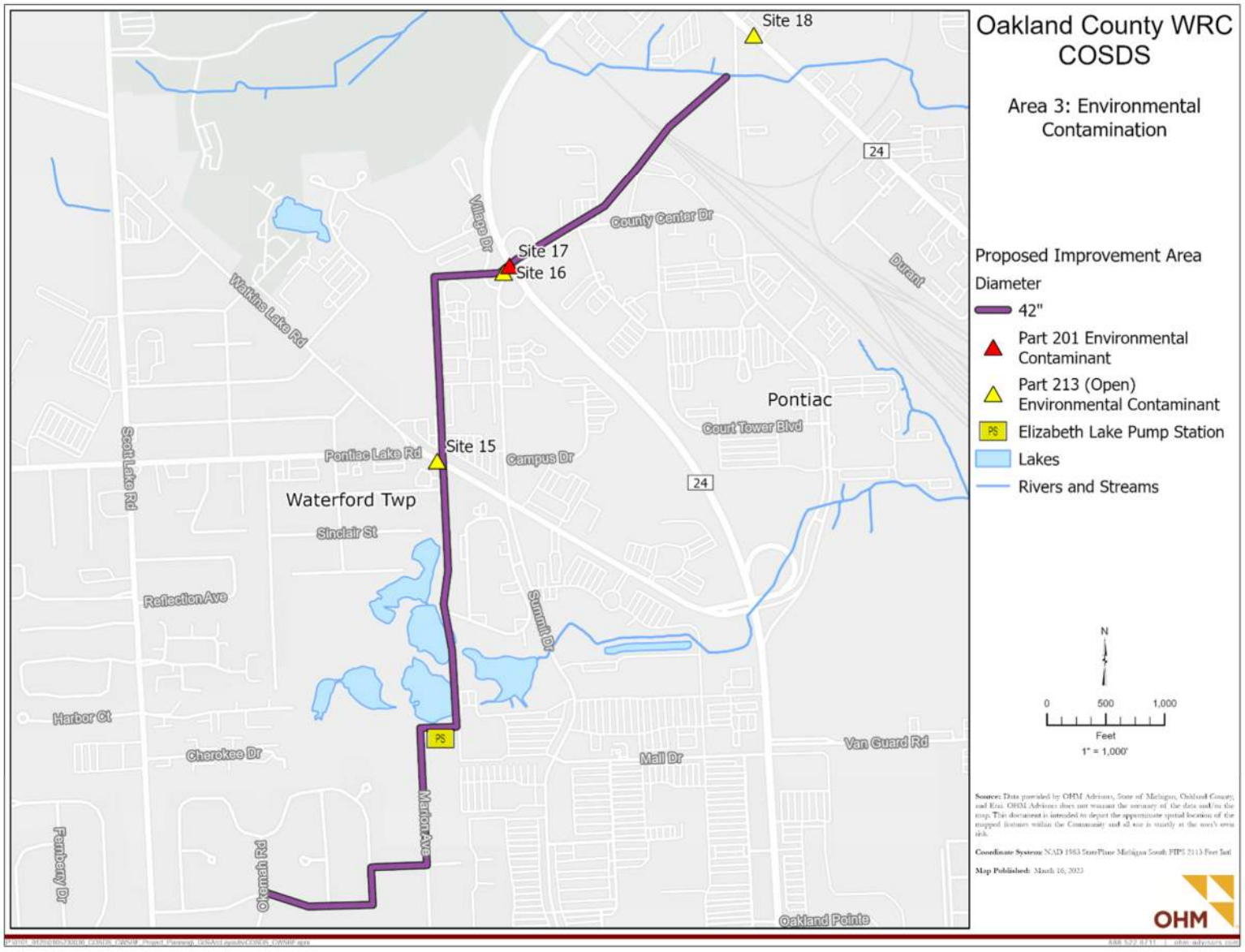

Figure 14. Area 3 – Elizabeth Lake Pump Station Contamination Sites Map

Figure 12 shows that Sites 1 and 2 are adjacent to Project Area 1. There are numerous contamination sites in the vicinity of Project Area 2, although none are immediately adjacent to the sewers that are to be replaced or rehabilitated. Sites 15, 16, and 17 area adjacent to Project Area 3. Replacement of the sewer would have a greater possibility of disturbing contaminated soils compared to sewer rehabilitation. In addition, dewatering may be required for open trench replacement, which could involve contaminated groundwater. A review of the contaminants likely to be present and potential concentration levels would need to be determined to seek approval to discharge the groundwater to CRWRRF or GLWA. If concentration levels were sufficiently high, a pretreatment system could be required by the control authorities. Sewer rehabilitation would have a lower possibility of disturbing contaminated sites.

IV. SELECTED ALTERNATIVE

Due to the larger potential environmental impact to wetlands, floodplains, inland lakes and streams, and the presence of potential contamination sites along the project areas, the selected alternative is sewer rehabilitation of interceptors on or near West Walton Boulevard, North Pontiac Road, and the Elizabeth Lake Pump Station to County Campus. The rehabilitation of Elizabeth Lake Pump Station will also be performed.

F. DESIGN PARAMETERS

A list of all interceptors to be rehabilitated with the proposed diameter can be found in Section II.

The hydraulic model shall be updated with a new Manning's n value for the selected sewer rehabilitation material and the hydraulic effects on the system shall be identified and evaluated. Despite minimal cross section reduction with sewer rehabilitation such as lining, the smoother Manning's n value typically improves flow capacity.

The methods and locations for odor and corrosion control will be selected during the design phase.

A limited amount of wastewater residuals may be generated during the pre-rehabilitation sewer cleaning. The contract documents generated during design shall include a residual handling section. Solids will be disposed of at an authorized landfill, as applicable. Residue will be handled as a Liquid Industrial By-Product (Part 121). Contact shall be made with EGLE's Materials Management Division for disposal.

The Elizabeth Lake Pump Station rehabilitation will comply with Ten State Standards requirements. No change to the pump station capacity is proposed and assets will be replaced in kind.

G. USEFUL LIFE

The weighted useful life for the selected projects was calculated as 39.5 years. The useful life for each asset included in the cost opinion was determined based on the values provided in the CWSRF Project Planning Document Preparation Guidance and Professional Engineer's opinion. Table 7 includes the useful life that was assumed for each asset included in the cost opinion.

Table 7. Useful Life of Assets

Asset	Useful Life (years)
Conveyance (sewers, manholes, inlets, outfalls, weirs)	50
Process Equipment	20
Process Piping	50

H. SCHEDULE FOR DESIGN AND CONSTRUCTION

The WRC is requesting consideration for fiscal year 2024 fourth quarter funding under EGLE's CWSRF program. The proposed design and construction schedule is summarized in Table 8.

Table 8. Design and Construction Schedule

Task	Submittal Date
Draft Documents Submittal to EGLE	February 19, 2024
Environmental Assessments Published No Later Than	April 24, 2024
Part I and Part II Application	May 15, 2024
Final Documents Submittal to EGLE	May 17, 2024
Finding of No Significant Impacts Clearance; Plans & Specs Approved	May 24, 2024
Bid Ad Published No Later Than	May 24, 2024
Part III of Application; Bid Data Submittal (With Tentative Contract Award)	July 8, 2024
EGLE Order of Approval Issued	August 7, 2024
Borrower's Pre-Closing with the Michigan Finance Authority (MFA)	August 21, 2024
MFA Closing	August 28, 2024
Notice to Proceed Issued	September 27, 2024
Construction Completed	December 18, 2026

I. WATER AND ENERGY EFFICIENCY

The sewer rehabilitation portion of the project will require water to clean the pipeline prior to sewer rehabilitation operations and may require water use during sewer rehabilitation operations. Potential water sources for cleaning and sewer rehabilitation include nearby water bodies or municipal water. The exact water source will be identified during the design and construction phase. If a municipal water source is selected, water use will be metered.

Most of the assets that will be replaced as part of the Elizabeth Lake Pump Station rehabilitation do not use energy. Energy efficient assets will be selected when feasible.

J. COST SUMMARY

A summary of the capital cost by project is presented in Table 9.

Table 9. Summary of Costs by Project

Category	Cost
Sewer Rehabilitation	$70,000,000
Elizabeth Lake Pump Station Rehabilitation	$7,000,000
Total Project Cost	**$77,000,000**

User costs have been evaluated and an analysis is provided in Table 10. Loan repayment is proposed using the WRC sewer fund. No added costs are expected for O&M activities. An interest rate of 2.75% was used to calculate user costs.

Table 10. User Cost Analysis

Project Area Name	Initial Capital Investment	Annual Debt Retirement	Annual Cost per Household*	Quarterly Cost per Household*
Sewer Rehabilitation	$70,000,000	$4,597,000	$34.01	$8.50
Elizabeth Lake Pump Station Rehabilitation	$7,000,000	$459,700	$3.40	$0.85
Total	**$77,000,000**	**$5,056,700**	**$37.41**	**$9.35**

*Average household size of 2.12 to 2.93 for each community in the COSDS service area per Southeastern Michigan Council of Governments (SEMCOG).

K. IMPLEMENTABILITY

The selected alternative will be implemented by WRC. All work is under the jurisdiction of the WRC and requires no inter-municipal agreements. The WRC has the legal, institutional, technical, financial, and managerial capacity to implement the project. All work will be performed in road right-of-way, easements, or on property owned by WRC.

V. ENVIRONMENTAL AND PUBLIC HEALTH IMPACTS

The main benefit of the proposed sewer rehabilitation project is to address a portion of the system's structural damage and to prevent future corrosion via sewer rehabilitation. Sewer rehabilitation will provide increased hydraulic capacity in the system. The main benefit of the proposed pump station improvements is to replace pump station assets at the end or near the end of their useful lives.

Adverse environmental and public health impacts for both the sewer rehabilitation and the pump station rehabilitation work are generally limited to short term construction impacts, such as temporary noise, dust, and traffic disruptions.

A. DIRECT IMPACTS

1. Construction Impacts

Normal construction activities have the potential to produce noise and dust. All applicable ordinances will be followed during construction.

The sewer rehabilitation operations will have some impact on traffic in the vicinity of where the construction is occurring. The project will require lane closures when access to the interceptor for lining operations is needed at manholes located within the roadway. The pump station rehabilitation work will have little impact on traffic unless limited lane closures are needed during equipment delivery.

An onsite wetland evaluation will be performed once the limits of construction are further refined during the design phase for the project and required permits will be submitted to EGLE for approval. There should be minimal disturbance of land within the floodplains, but bypass pumping equipment may need to be placed within the 100-year floodplain. Wetlands and adjacent lakes and streams would need to be protected during construction to minimize impacts.

During design, field visits will be scheduled to determine if suitable habitat is present for threatened or endangered species in the project areas.

2. Operational Impacts

There will be no adverse operational impacts associated with this project. Bypass pumping during sewer rehabilitation and pump station rehabilitation shall be provided to maintain continuous sanitary sewer service.

During the proposed Elizabeth Lake Pump Station upgrades, isolating the pump supply piping and valves may be challenging. An allowance for bypass pumping if isolation is not feasible with existing assets has been included. The ability to pump the wastewater must be maintained during construction.

3. Social Impacts

Impacts on materials, land, and energy will be minimized by selection of qualified contractors. All construction activities will take place in previously serviced areas. Construction will increase the number of temporary construction-related jobs and will help to retain existing positions.

No long-term impacts are expected as a result of the proposed project.

B. INDIRECT IMPACTS

There are no anticipated impacts to the rate, density, or type of development due to this project. There are no expected changes in land use. There are no expected changes in air quality due to primary or secondary development. Impacts related to air quality are limited to direct impacts due to traffic and construction equipment.

There are no anticipated changes to the natural setting or ecosystem. Threatened and endangered species are not anticipated to be impacted by the proposed projects. Tree clearing will be avoided to the extent possible.

Impacts on cultural, human, social, and economic sources are expected to be minimal, and occur during the construction phase as a result of the traffic control around the construction area. These impacts are expected to be short-term.

Impacts on area aesthetics will be limited to construction equipment and vehicles within the project area for the duration of construction. There are no anticipated permanent area aesthetic changes. Following construction, the project areas will be restored to their previous condition.

Resource consumption will be required for the manufacturing of the materials used during the sewer rehabilitation and pump station rehabilitation projects.

C. CUMULATIVE IMPACTS

Minimal cumulative impacts are anticipated as a result of the improvement projects.

Siltation will only occur during construction of the project and proper soil erosion and sedimentation control measures will be required and included in the bidding documents.

VI. MITIGATION

A. MITIGATION OF SHORT-TERM IMPACTS

Typical construction mitigation is expected for the proposed project.

Traffic control may be required for portions of the project where access to manholes within the roadway for sewer rehabilitation is needed. Access to some roads may be temporarily restricted to provide a safe working environment.

Dust control will be required during construction. Street sweeping in accordance with local standards shall be implemented.

Soil erosion and sedimentation control measures will be required during the construction process to mitigate siltation. The disposal of spoils in wetlands, floodplains, and other sensitive areas will be prohibited in the contract documents.

Vegetation disrupted by the construction process will be restored to its original condition. Limited tree clearing may be required. During design, if it is determined that tree clearing is required, tree clearing will be scheduled between October 1st and March 31st to avoid disturbing the bat species. If habitat or threatened and endangered species concerns are identified during the field visit, appropriate actions would be taken to avoid these areas and/or mitigate any disturbance so that the species are protected. Additionally, any observations will be reported to Oakland County and MDNR office within 24 hours.

Service will be maintained for residents during construction with the use of bypass pumping. Bypass pumping equipment shall follow all local noise ordinances.

Construction activities are anticipated to start in 2024 and to conclude in 2026.

B. MITIGATION OF LONG-TERM IMPACTS

Wetland disturbance is one long-term impact expected due to sewer rehabilitation construction activities. Manhole access within wetlands is anticipated to perform sewer rehabilitation. A wetland delineation will need to be performed prior to construction to identify exact wetland limits relative to the proposed project area. Temporary construction mats may be required for work within wetlands. Wetland mitigation will be required in areas where access manholes fall within delineated wetlands. All EGLE permit requirements for work within wetlands will be adhered to.

No other long-term impacts due to sewer rehabilitation or pump station rehabilitation are anticipated.

C. MITIGATION OF INDIRECT IMPACTS

The proposed project is intended to improve the reliability of the existing sewer system by replacing degrading sections of the interceptor and making pump station improvements to ensure continued uninterrupted pump station operations. While population growth within the COSDS service area is projected over the next 20-years, the project itself is not intended to induce growth within the COSDS service area.

VII. PUBLIC PARTICIPATION

A. PUBLIC MEETING

A public meeting will be held on April 19, 2023 to review the proposed projects.

B. PUBLIC MEETING ADVERTISEMENT

The public meeting notice will be published on March 31, 2023. The public meeting notice will be published on the WRC website along with a copy of the draft Project Planning Document for public review. A copy of the advertisement for the public meeting can be found in Appendix E.

C. PUBLIC MEETING SUMMARY

The public meeting presentation can be found in Appendix E.

D. ADOPTION OF THE PROJECT PLANNING DOCUMENT

WRC adopted a resolution following the public meeting on April 19, 2023. A signed copy of the resolution is included in Appendix F, along with the CWSRF Submittal Form.

VIII. TECHNICAL CONSIDERATIONS

A. INFILTRATION AND INFLOW

I/I is not a known problem within the COSDS system.

B. STRUCTURAL INTEGRITY

As previously discussed, WRC had sewers televised as part of the SAW Grant program. The videos were reviewed and scored in accordance with NAASCO PACP scoring requirements. All piping proposed for rehabilitation scored as 4s or 5s for structural defects. Short sections of sewers that scored below a 4 were also included if they were between longer sections of piping that scored as 4s or 5s. Appendix C contains the pipe asset ids and associated PACP scores.

C. FISCAL SUSTAINABILITY PLAN

In 2014, the Water Resources Reform and Development Act (WRRDA) was passed, which required that CWSRF Project Planning Documents include a Fiscal Sustainability Plan (FSP). The required elements to be addressed in the FSP include:

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

The asset inventory and condition of assets for the collection system sewer rehabilitation were described in the Structural Integrity Section. Appendix C includes the PACP scores for the collection system rehabilitation projects. In addition, the assets that are proposed to be replaced in the Elizabeth Lake Pump Station are also included in Appendix G along with a copy of the FSP.

APPENDIX A: THREATENED AND ENDANGERED SPECIES WEB DATABASE REVIEW

February 24, 2023

Michigan Natural Features Inventory (MNFI) Web Database Review – WRC COSDS, Oakland County, MI

OHM has reviewed the Threatened and Endangered Species list generated by the MNFI Web Database, conducted on February 24, 2023. During this Review, the project location was checked against known localities for rare species, and **5** State threatened, endangered, or species of special concern have been documented within the 1.5 mile project area buffer and it is possible that without proper management negative impacts may occur. The species listed include the following: Bastard pennyroyal (Trichostema dichotomum), Hairy angelica (Angelica venenose), Lake herring (Coregonus artedi), Pickerel frog (Lithobates palustris) and Rainbow mussel (Villosa Iris). Additionally, ESA Section 7 species were generated via the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) website and comments were provided for **7** Federally listed threatened, endangered, or candidate species and included the Indiana Bat (Myotis sodalis), Northern Long-Eared Bat (Myotis septentrionalis), Tricolored Bat (Perimyotis subflavus), Eastern Massasauga Rattlesnake (Sistrurus c. catenatus), Snuffbox Mussel (Epioblasma triquetra), Rayed Bean (Vilosa fabalis) and the Monarch Butterfly (Danaus plexipuss). Determinations for Federally listed species will be made utilizing the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) website.

The WRC COSDS project involves pipe lining of the existing sanitary sewer system to reduce I&I within the sewer system.

For the **5** State listed species in the document provided OHM Advisors has made preliminary determinations related to potential field surveys for listed species. In response to the Rare Species Review provided by MNFI OHM Advisors has prepared the following strategy and documentation to ensure this project does not result in take of species listed in the review.

Bastard pennyroyal (Trichostema dichotomum) State Threatened. MNFI describes the habitat for this species as dry barrens and prairies and oak savanna areas in southern Lower Michigan. A desktop review of the surrounding landcover has determined that no suitable habitat is located within the project area. The last observation of this species in within 1.5 miles of the project area occurred in 1916 and is considered historical. OHM has determined no effect to this species. In the event Bastard pennyroyal is observed during project activities said observation will be reported to local county MDNR office within 24 hours.

Hairy angelica (Angelica venenose) State Species of Special Concern. MNFI describes the habitat for this species as open, upland oak forests, savanna and prairie remnants, and open, sandy woodlots. A desktop review of the surrounding landcover has determined that no suitable habitat is located within the project area. The last observation of this species in within 1.5 miles of the project area occurred in 1880 and is considered historical. OHM has determined no effect to this species. In the event Hairy angelical is observed during project activities said observation will be reported to local county MDNR office within 24 hours.

Lake herring (Coregonus artedi) State Threatened. MNFI describes the habitat for this species as deep inland lakes as well as the Great Lakes at depths ranging from 18 to 53 meters. They can be found in shallower depths (9-12 m) when spawning over rocky substrates. No in water work will occur during the project. The last observation of this species in within 1.5 miles of the project area occurred in 2014. OHM has determined no effect to this species. In the event Lake herring is observed during project activities said observation will be

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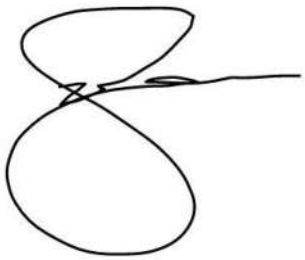
reported to local county MDNR office within 24 hours.

Pickerel Frog (Lithobates palustris) State Species of Special Concern. MNFI describes the habitat for this species as freshwater aquatic and wetland habitats, including fens, bogs, marshes, shrubby/open wet meadows, forested wetlands, ponds, slow-moving streams, springs, and backwater sloughs or swamps. The last observation of this species in within 1.5 miles of the project area occurred in 1928. Additional field surveys will be needed to make a final determination of impact for this species.

Rainbow mussel (Villosa iris) State Species of Special Concern. MNFI describes the habitat for this species as coarse sand or gravel in small to medium streams. No in water work will occur during the project. The last observation of this species in within 1.5 miles of the project area occurred in 2004. OHM has determined no effect to this species. In the event False hop sedge is observed during project activities said observation will be reported to local county MDNR office within 24 hours.

If additional information is needed, please contact me via email at wade.rose@ohm-advisors.com.

Sincerely,



Wade Rose, OHM Advisors Ecologist

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: March 03, 2023
Project code: 2023-0051605
Project Name: COSDS CWSRF Area 1

Subject: Verification letter for the project named 'COSDS CWSRF Area 1' for specified threatened and endangered species that may occur in your proposed project location consistent with the Michigan Endangered Species Determination Key (Michigan DKey)

Dear Wade Rose:

The U.S. Fish and Wildlife Service (Service) received on **March 03, 2023** your effect determination(s) for the 'COSDS CWSRF Area 1' (the Action) using the Michigan DKey within the Information for Planning and Consultation (IPaC) system. The Service developed this system in accordance with the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.).

Based on your answers and the assistance of the Service's Michigan DKey, you made the following effect determination(s) for the proposed Action:

Species	**Listing Status**	**Determination**
Eastern Massasauga (=rattlesnake) (*Sistrurus catenatus*)	Threatened	NLAA
Indiana Bat (*Myotis sodalis*)	Endangered	NLAA
Monarch Butterfly (*Danaus plexippus*)	Candidate	No effect
Northern Long-eared Bat (*Myotis septentrionalis*)	Threatened	NLAA
Rayed Bean (*Villosa fabalis*)	Endangered	No effect
Snuffbox Mussel (*Epioblasma triquetra*)	Endangered	No effect
Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	No effect

The Service will notify you within 30 calendar days if we determine that this proposed Action does not meet the criteria for a "may affect, not likely to adversely affect" (NLAA) determination for Federally listed species in Michigan. If we do not notify you within that timeframe, you may proceed with the Action under the terms of the NLAA concurrence provided here. This verification period allows the Michigan Ecological Services Field Office to apply local

knowledge to evaluation of the Action, as we may identify a small subset of actions having impacts that were unanticipated. In such instances, the Michigan Ecological Services Field Office may request additional information to verify the effects determination reached through the Michigan DKey.

Your agency has met consultation requirements by informing the Service of your “No Effect” determination(s). No consultation is required for species that you determined will not be affected by the Action.

Please provide sufficient project details on your project homepage in IPaC (Define Project, Project Description) to support your conclusions and the Service’s 30-day review period. Failure to disclose important aspects of your project that would influence the outcome of your effects determinations may negate your determinations and invalidate this letter. If you have site-specific information that leads you to believe a different determination is more appropriate for your project than what the Dkey concludes, you can and should proceed based on the best available information.

The Service recommends that you contact the Service or re-evaluate the project in IPaC if: 1) the scope or location of the proposed Action is changed; 2) new information reveals that the action may affect listed species or designated critical habitat in a manner or to an extent not previously considered; 3) the Action is modified in a manner that causes effects to listed species or designated critical habitat; or 4) a new species is listed or critical habitat designated. If any of the above conditions occurs, additional consultation with the Service should take place before project changes are final or resources committed.

For non-Federal representatives: Please note that when a project requires consultation under section 7 of the Act, the Service must consult directly with the Federal action agency unless that agency formally designates a non-Federal representative (50 CFR 402.08). Non-Federal representatives may prepare analyses or conduct informal consultations; however, the ultimate responsibility for section 7 compliance under the Act remains with the Federal agency. If the Federal agency concurs with your determination, the project as proposed has completed section 7 consultation. All documents and supporting correspondence should be provided to the Federal agency for their records.

Bats of Conservation Concern:
Implementing protective measures for bats, including both federally listed and non-listed species, indirectly helps to protect Michigan’s agriculture and forests. Bats are significant predators of nocturnal insects, including many crop and forest pests. For example, Whitaker (1995) estimated that a single colony of 150 big brown bats (Eptesicus fuscus) would eat nearly 1.3 million pest insects each year. Boyles et al. (2011) noted the “loss of bats in North America could lead to agricultural losses estimated at more than $3.7 billion/year, and Maine and Boyles (2015) estimated that the suppression of herbivory by insectivorous bats is worth >1 billion USD globally on corn alone. In captive trials, northern long-eared bats were found to significantly reduce the egg-laying activity of mosquitoes, suggesting bats may also play an important role in controlling insect-borne disease (Reiskind and Wund 2009). Mosquitoes have also been found to be a consistent component of the diet of Indiana bats and are eaten most heavily during pregnancy (6.6%; Kurta and Whitaker 1998). Taking proactive steps to help protect bats may be

very valuable to agricultural and forest product yields and pest management costs in and around a project area. Such conservation measures include limiting tree clearing during the bat active season (April through Octobervaries by location) and/or the non-volant period (June through July), when young bats are unable to fly, and minimizing the extent of impacts to forests, wetlands, and riparian habitats.

Bald and Golden Eagles:
Bald eagles, golden eagles, and their nests are protected under the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended, 16 U.S.C. 668a-d) (Eagle Act). The Eagle Act prohibits, except when authorized by an Eagle Act permit, the "taking" of bald and golden eagles and defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." The Eagle Act's implementing regulations define disturb as "…to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

If the Action may impact bald or golden eagles, additional coordination with the Service under the Eagle Act may be required. For more information on eagles and conducting activities in the vicinity of an eagle nest, please visit https://www.fws.gov/library/collections/all-about-eagles. In addition, the Service developed the National Bald Eagle Management Guidelines (May 2007) in order to assist landowners in avoiding the disturbance of bald eagles. The full Guidelines are available at https://www.fws.gov/media/national-bald-eagle-management-guidelines-0.

If you have further questions regarding potential impacts to eagles, please contact Chris Mensing, Chris_Mensing@fws.gov or 517-351-2555.

Monarch butterfly and other pollinators
In December 2020, after an extensive status assessment of the monarch butterfly, we determined that listing the monarch under the Endangered Species Act is warranted but precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants. Therefore, the Service added the monarch butterfly to the candidate list. The Service will review its status each year until we are able to begin developing a proposal to list the monarch.

The Endangered Species Act does not establish protections or consultation requirements for candidate species. Some Federal and State agencies may have policy requirements to consider candidate species in planning. We encourage implementing measures that will remove or reduce threats to these species and possibly make listing unnecessary.

For all projects, we recommend the following best management practices (BMPs) to benefit monarch and other pollinators.

Monarch and Pollinator BMP Recommendations

Consider monarch and other pollinators in your project planning when possible. Many pollinators are declining, including species that pollinate key agricultural crops and help maintain natural plant communities. Planting a diverse group of native plant species will help support the nutritional needs of Michigan's pollinators. We recommend a mix of flowering trees, shrubs, and

herbaceous plants so that something is always blooming and pollen is available during the active periods of the pollinators, roughly early spring through fall (mid-March to mid-October). To benefit a wide variety of pollinators, choose a wide range of flowers with diverse colors, heights, structure, and flower shape. It is important to provide host plants for any known butterfly species at your site, including native milkweed for Monarch butterfly. Incorporating a water source (e.g., ephemeral pool or low area) and basking areas (rocks or bare ground) will provide additional resources for pollinators.

Many pollinators need a safe place to build their nests and overwinter. During spring and summer, leave some areas unmowed or minimize the impacts from mowing (e.g., decrease frequency, increase vegetation height). In fall, leave areas unraked and leave plant stems standing. Leave patches of bare soil for ground nesting pollinators.

Avoid or limit pesticide use. Pesticides can kill more than the target pest. Some pesticide residues can kill pollinators for several days after the pesticide is applied. Pesticides can also kill natural predators, which can lead to even worse pest problems.

Planting native wildflowers can also reduce the need to mow and water, improve bank stabilization by reducing erosion, and improve groundwater recharge and water quality.

Resources:

https://www.fws.gov/initiative/monarchs
https://www.fws.gov/library/collections/pollinators

Wetland impacts:
Section 404 of the Clean Water Act of 1977 (CWA) regulates the discharge of dredged or fill material into waters (including wetlands) of the United States. Regulations require that activities permitted under the CWA (including wetland permits issued by the Michigan Department of Environment, Great Lakes, and Energy (EGLE)) not jeopardize the continued existence of species listed as endangered or threatened. Permits issued by the U.S. Army Corps of Engineers must also consider effects to listed species pursuant to section 7 of the Endangered Species Act. The Service provides comments to the agencies that may include permit conditions to help avoid or minimize impacts to wildlife resources including listed species. For this project, we consider the conservation measures you agreed to in the determination key and/or as part of your proposed action to be non-discretionary. If you apply for a wetland permit, these conservation measures should be explicitly incorporated as permit conditions. Include a copy of this letter in your wetland permit application to streamline the threatened and endangered species review process.

Bat References
Boyles, J.G., P.M. Cryan, G.F. McCracken, T.H. Kunz. 2011. Economic Importance of Bats in Agriculture. Science 332(1):41-42.
Kurta, A. and J.O. Whitaker. 1998. Diet of the Endangered Indiana Bat (Myotis sodalis) on the Northern Edge of Its Range. The American Midland Naturalist 140(2):280-286.
Reiskind, M.H. and M.A. Wund. 2009. Experimental assessment of the impacts of northern long-eared bats on ovipositing Culex (Diptera: Culicidae) mosquitoes. Journal of Medical Entomology 46(5):1037-1044.

Whitaker, Jr., J.O. 1995. Food of the big brown bat Eptesicus fuscus from maternity colonies in Indiana and Illinois. American Midland Naturalist 134(2):346-360.

Summary of conservation measures for your project You agreed to the following conservation measures to avoid adverse effects to listed species and our concurrence is only valid if the measures are fully implemented. These must be included as permit conditions if a permit is required and/or included in any contract language.

Eastern massasauga
Materials used for erosion control and site restoration must be wildlife-friendly. Do not use erosion control products containing plastic mesh netting or other similar material that could entangle eastern massasauga rattlesnake (EMR). Several products for soil erosion and control exist that do not contain plastic netting including net-less erosion control blankets (for example, made of excelsior), loose mulch, hydraulic mulch, soil binders, unreinforced silt fences, and straw bales. Others are made from natural fibers (such as jute) and loosely woven together in a manner that allows wildlife to wiggle free.

To increase human safety and awareness of EMR, those implementing the project must first review the EMR factsheet (available at https://www.fws.gov/media/eastern-massasauga-rattlesnake-fact-sheet), and watch MDNR's "60-Second Snakes: The Eastern Massasauga Rattlesnake" video (available at https://youtu.be/~PFnXe_e02w).

During project implementation, report sightings of any federally listed species, including EMR, to the Service within 24 hours.

The project will not result in permanent loss of more than one acre of wetland or conversion of more than 10 acres of EMR upland habitat (uplands associated with high quality wetland habitat) to other land uses.

Indiana bat
Any cutting/trimming of potential roost trees for Indiana bat (trees ≥5 inches in diameter [at breast height] with cracks, crevices and/or exfoliating bark) must occur OUTSIDE the non-volant ("pup") season for Indiana bat (June 1 through July 31). Prescribed fire and/or pesticide/herbicide application must also occur outside June-July where potential roost trees are present.

Tree cutting/trimming and/or prescribed burning will not clear ≥20 contiguous acres of forest or fragment a connective corridor between 2 or more forest patches of at least 5 acres.

Northern long-eared bat
Based on the project area you entered into IPaC, the project does not occur within 0.25 miles of a known northern long-eared bat hibernaculum. Tree removal, as defined in the 4(d) rule, will not occur within 150 feet of a known occupied northern long-eared bat maternity roost tree.

Any cutting/trimming of potential roost trees for northern long-eared bat (trees ≥3 inches in diameter [at breast height] with cracks, crevices, cavities, and/or exfoliating bark) will be limited to the inactive season (October 1 through April 14). Prescribed fire and/or pesticide/herbicide application will also occur during the inactive season where potential roost trees are present.

Tree cutting/trimming and/or prescribed burning will not clear ≥20 contiguous acres of forest or fragment a connective corridor between 2 or more forest patches of at least 5 acres.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

COSDS CWSRF Area 1

2. Description

The following description was provided for the project 'COSDS CWSRF Area 1':

> The WRC COSDS project involves pipe lining of the existing sanitary sewer system to reduce I&I within the sewer system. And repairs and upgrades to the existing pump station

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@42.65040465,-83.33644838137403,14z

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: March 03, 2023
Project code: 2023-0051615
Project Name: COSDS CWSRF Area 2

Subject: Verification letter for the project named 'COSDS CWSRF Area 2' for specified threatened and endangered species that may occur in your proposed project location consistent with the Michigan Endangered Species Determination Key (Michigan DKey)

Dear Wade Rose:

The U.S. Fish and Wildlife Service (Service) received on **March 03, 2023** your effect determination(s) for the 'COSDS CWSRF Area 2' (the Action) using the Michigan DKey within the Information for Planning and Consultation (IPaC) system. The Service developed this system in accordance with the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.).

Based on your answers and the assistance of the Service's Michigan DKey, you made the following effect determination(s) for the proposed Action:

Species	**Listing Status**	**Determination**
Eastern Massasauga (=rattlesnake) (*Sistrurus catenatus*)	Threatened	NLAA
Indiana Bat (*Myotis sodalis*)	Endangered	No effect
Monarch Butterfly (*Danaus plexippus*)	Candidate	No effect
Northern Long-eared Bat (*Myotis septentrionalis*)	Threatened	No effect
Snuffbox Mussel (*Epioblasma triquetra*)	Endangered	No effect
Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	No effect

The Service will notify you within 30 calendar days if we determine that this proposed Action does not meet the criteria for a "may affect, not likely to adversely affect" (NLAA) determination for Federally listed species in Michigan. If we do not notify you within that timeframe, you may proceed with the Action under the terms of the NLAA concurrence provided here. This verification period allows the Michigan Ecological Services Field Office to apply local knowledge to evaluation of the Action, as we may identify a small subset of actions having

impacts that were unanticipated. In such instances, the Michigan Ecological Services Field Office may request additional information to verify the effects determination reached through the Michigan DKey.

Your agency has met consultation requirements by informing the Service of your “No Effect” determination(s). No consultation is required for species that you determined will not be affected by the Action.

Please provide sufficient project details on your project homepage in IPaC (Define Project, Project Description) to support your conclusions and the Service’s 30-day review period. Failure to disclose important aspects of your project that would influence the outcome of your effects determinations may negate your determinations and invalidate this letter. If you have site-specific information that leads you to believe a different determination is more appropriate for your project than what the Dkey concludes, you can and should proceed based on the best available information.

The Service recommends that you contact the Service or re-evaluate the project in IPaC if: 1) the scope or location of the proposed Action is changed; 2) new information reveals that the action may affect listed species or designated critical habitat in a manner or to an extent not previously considered; 3) the Action is modified in a manner that causes effects to listed species or designated critical habitat; or 4) a new species is listed or critical habitat designated. If any of the above conditions occurs, additional consultation with the Service should take place before project changes are final or resources committed.

For non-Federal representatives: Please note that when a project requires consultation under section 7 of the Act, the Service must consult directly with the Federal action agency unless that agency formally designates a non-Federal representative (50 CFR 402.08). Non-Federal representatives may prepare analyses or conduct informal consultations; however, the ultimate responsibility for section 7 compliance under the Act remains with the Federal agency. If the Federal agency concurs with your determination, the project as proposed has completed section 7 consultation. All documents and supporting correspondence should be provided to the Federal agency for their records.

Bald and Golden Eagles:
Bald eagles, golden eagles, and their nests are protected under the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended, 16 U.S.C. 668a-d) (Eagle Act). The Eagle Act prohibits, except when authorized by an Eagle Act permit, the “taking” of bald and golden eagles and defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” The Eagle Act’s implementing regulations define disturb as “…to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”

If the Action may impact bald or golden eagles, additional coordination with the Service under the Eagle Act may be required. For more information on eagles and conducting activities in the vicinity of an eagle nest, please visit https://www.fws.gov/library/collections/all-about-eagles. In addition, the Service developed the National Bald Eagle Management Guidelines (May 2007) in

order to assist landowners in avoiding the disturbance of bald eagles. The full Guidelines are available at https://www.fws.gov/media/national-bald-eagle-management-guidelines-0.

If you have further questions regarding potential impacts to eagles, please contact Chris Mensing, Chris_Mensing@fws.gov or 517-351-2555.

Monarch butterfly and other pollinators
In December 2020, after an extensive status assessment of the monarch butterfly, we determined that listing the monarch under the Endangered Species Act is warranted but precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants. Therefore, the Service added the monarch butterfly to the candidate list. The Service will review its status each year until we are able to begin developing a proposal to list the monarch.

The Endangered Species Act does not establish protections or consultation requirements for candidate species. Some Federal and State agencies may have policy requirements to consider candidate species in planning. We encourage implementing measures that will remove or reduce threats to these species and possibly make listing unnecessary.

For all projects, we recommend the following best management practices (BMPs) to benefit monarch and other pollinators.

Monarch and Pollinator BMP Recommendations

Consider monarch and other pollinators in your project planning when possible. Many pollinators are declining, including species that pollinate key agricultural crops and help maintain natural plant communities. Planting a diverse group of native plant species will help support the nutritional needs of Michigan’s pollinators. We recommend a mix of flowering trees, shrubs, and herbaceous plants so that something is always blooming and pollen is available during the active periods of the pollinators, roughly early spring through fall (mid-March to mid-October). To benefit a wide variety of pollinators, choose a wide range of flowers with diverse colors, heights, structure, and flower shape. It is important to provide host plants for any known butterfly species at your site, including native milkweed for Monarch butterfly. Incorporating a water source (e.g., ephemeral pool or low area) and basking areas (rocks or bare ground) will provide additional resources for pollinators.

Many pollinators need a safe place to build their nests and overwinter. During spring and summer, leave some areas unmowed or minimize the impacts from mowing (e.g., decrease frequency, increase vegetation height). In fall, leave areas unraked and leave plant stems standing. Leave patches of bare soil for ground nesting pollinators.

Avoid or limit pesticide use. Pesticides can kill more than the target pest. Some pesticide residues can kill pollinators for several days after the pesticide is applied. Pesticides can also kill natural predators, which can lead to even worse pest problems.

Planting native wildflowers can also reduce the need to mow and water, improve bank stabilization by reducing erosion, and improve groundwater recharge and water quality.

Resources:

https://www.fws.gov/initiative/monarchs
https://www.fws.gov/library/collections/pollinators

Wetland impacts:
Section 404 of the Clean Water Act of 1977 (CWA) regulates the discharge of dredged or fill material into waters (including wetlands) of the United States. Regulations require that activities permitted under the CWA (including wetland permits issued by the Michigan Department of Environment, Great Lakes, and Energy (EGLE)) not jeopardize the continued existence of species listed as endangered or threatened. Permits issued by the U.S. Army Corps of Engineers must also consider effects to listed species pursuant to section 7 of the Endangered Species Act. The Service provides comments to the agencies that may include permit conditions to help avoid or minimize impacts to wildlife resources including listed species. For this project, we consider the conservation measures you agreed to in the determination key and/or as part of your proposed action to be non-discretionary. If you apply for a wetland permit, these conservation measures should be explicitly incorporated as permit conditions. Include a copy of this letter in your wetland permit application to streamline the threatened and endangered species review process.

Summary of conservation measures for your project You agreed to the following conservation measures to avoid adverse effects to listed species and our concurrence is only valid if the measures are fully implemented. These must be included as permit conditions if a permit is required and/or included in any contract language.

To increase human safety and awareness of EMR, those implementing the project must first review the EMR factsheet (available at https://www.fws.gov/media/eastern-massasauga-rattlesnake-fact-sheet), and watch MDNR's "60-Second Snakes: The Eastern Massasauga Rattlesnake" video (available at https://youtu.be/~PFnXe_e02w).

During project implementation, report sightings of any federally listed species, including EMR, to the Service within 24 hours.

The project will not result in permanent loss of more than one acre of wetland or conversion of more than 10 acres of EMR upland habitat (uplands associated with high quality wetland habitat) to other land uses.

Northern long-eared bat
Based on the project area you entered into IPaC, the project does not occur within 0.25 miles of a known northern long-eared bat hibernaculum. Tree removal, as defined in the 4(d) rule, will not occur within 150 feet of a known occupied northern long-eared bat maternity roost tree.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

COSDS CWSRF Area 2

2. Description

The following description was provided for the project 'COSDS CWSRF Area 2':

> The WRC COSDS project involves pipe lining of the existing sanitary sewer system to reduce I&I within the sewer system.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@42.68923065,-83.35367262469329,14z

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: March 03, 2023
Project code: 2023-0051625
Project Name: COSDS CWSRF Area 3

Subject: Verification letter for the project named 'COSDS CWSRF Area 3' for specified threatened and endangered species that may occur in your proposed project location consistent with the Michigan Endangered Species Determination Key (Michigan DKey)

Dear Wade Rose:

The U.S. Fish and Wildlife Service (Service) received on **March 03, 2023** your effect determination(s) for the 'COSDS CWSRF Area 3' (the Action) using the Michigan DKey within the Information for Planning and Consultation (IPaC) system. The Service developed this system in accordance with the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.).

Based on your answers and the assistance of the Service's Michigan DKey, you made the following effect determination(s) for the proposed Action:

Species	**Listing Status**	**Determination**
Eastern Massasauga (=rattlesnake) (*Sistrurus catenatus*)	Threatened	NLAA
Indiana Bat (*Myotis sodalis*)	Endangered	NLAA
Monarch Butterfly (*Danaus plexippus*)	Candidate	No effect
Northern Long-eared Bat (*Myotis septentrionalis*)	Threatened	NLAA
Snuffbox Mussel (*Epioblasma triquetra*)	Endangered	No effect
Tricolored Bat (*Perimyotis subflavus*)	Proposed Endangered	No effect

The Service will notify you within 30 calendar days if we determine that this proposed Action does not meet the criteria for a "may affect, not likely to adversely affect" (NLAA) determination for Federally listed species in Michigan. If we do not notify you within that timeframe, you may proceed with the Action under the terms of the NLAA concurrence provided here. This verification period allows the Michigan Ecological Services Field Office to apply local knowledge to evaluation of the Action, as we may identify a small subset of actions having

impacts that were unanticipated. In such instances, the Michigan Ecological Services Field Office may request additional information to verify the effects determination reached through the Michigan DKey.

Your agency has met consultation requirements by informing the Service of your “No Effect” determination(s). No consultation is required for species that you determined will not be affected by the Action.

Please provide sufficient project details on your project homepage in IPaC (Define Project, Project Description) to support your conclusions and the Service’s 30-day review period. Failure to disclose important aspects of your project that would influence the outcome of your effects determinations may negate your determinations and invalidate this letter. If you have site-specific information that leads you to believe a different determination is more appropriate for your project than what the Dkey concludes, you can and should proceed based on the best available information.

The Service recommends that you contact the Service or re-evaluate the project in IPaC if: 1) the scope or location of the proposed Action is changed; 2) new information reveals that the action may affect listed species or designated critical habitat in a manner or to an extent not previously considered; 3) the Action is modified in a manner that causes effects to listed species or designated critical habitat; or 4) a new species is listed or critical habitat designated. If any of the above conditions occurs, additional consultation with the Service should take place before project changes are final or resources committed.

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Bats of Conservation Concern:
Implementing protective measures for bats, including both federally listed and non-listed species, indirectly helps to protect Michigan’s agriculture and forests. Bats are significant predators of nocturnal insects, including many crop and forest pests. For example, Whitaker (1995) estimated that a single colony of 150 big brown bats (Eptesicus fuscus) would eat nearly 1.3 million pest insects each year. Boyles et al. (2011) noted the “loss of bats in North America could lead to agricultural losses estimated at more than $3.7 billion/year, and Maine and Boyles (2015) estimated that the suppression of herbivory by insectivorous bats is worth >1 billion USD globally on corn alone. In captive trials, northern long-eared bats were found to significantly reduce the egg-laying activity of mosquitoes, suggesting bats may also play an important role in controlling insect-borne disease (Reiskind and Wund 2009). Mosquitoes have also been found to be a consistent component of the diet of Indiana bats and are eaten most heavily during pregnancy (6.6%; Kurta and Whitaker 1998). Taking proactive steps to help protect bats may be very valuable to agricultural and forest product yields and pest management costs in and around

a project area. Such conservation measures include limiting tree clearing during the bat active season (April through Octobervaries by location) and/or the non-volant period (June through July), when young bats are unable to fly, and minimizing the extent of impacts to forests, wetlands, and riparian habitats.

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periods of the pollinators, roughly early spring through fall (mid-March to mid-October). To benefit a wide variety of pollinators, choose a wide range of flowers with diverse colors, heights, structure, and flower shape. It is important to provide host plants for any known butterfly species at your site, including native milkweed for Monarch butterfly. Incorporating a water source (e.g., ephemeral pool or low area) and basking areas (rocks or bare ground) will provide additional resources for pollinators.

Many pollinators need a safe place to build their nests and overwinter. During spring and summer, leave some areas unmowed or minimize the impacts from mowing (e.g., decrease frequency, increase vegetation height). In fall, leave areas unraked and leave plant stems standing. Leave patches of bare soil for ground nesting pollinators.

Avoid or limit pesticide use. Pesticides can kill more than the target pest. Some pesticide residues can kill pollinators for several days after the pesticide is applied. Pesticides can also kill natural predators, which can lead to even worse pest problems.

Planting native wildflowers can also reduce the need to mow and water, improve bank stabilization by reducing erosion, and improve groundwater recharge and water quality.

Resources:

https://www.fws.gov/initiative/monarchs
https://www.fws.gov/library/collections/pollinators

Wetland impacts:
Section 404 of the Clean Water Act of 1977 (CWA) regulates the discharge of dredged or fill material into waters (including wetlands) of the United States. Regulations require that activities permitted under the CWA (including wetland permits issued by the Michigan Department of Environment, Great Lakes, and Energy (EGLE)) not jeopardize the continued existence of species listed as endangered or threatened. Permits issued by the U.S. Army Corps of Engineers must also consider effects to listed species pursuant to section 7 of the Endangered Species Act. The Service provides comments to the agencies that may include permit conditions to help avoid or minimize impacts to wildlife resources including listed species. For this project, we consider the conservation measures you agreed to in the determination key and/or as part of your proposed action to be non-discretionary. If you apply for a wetland permit, these conservation measures should be explicitly incorporated as permit conditions. Include a copy of this letter in your wetland permit application to streamline the threatened and endangered species review process.

Bat References
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Kurta, A. and J.O. Whitaker. 1998. Diet of the Endangered Indiana Bat (Myotis sodalis) on the Northern Edge of Its Range. The American Midland Naturalist 140(2):280-286.
Reiskind, M.H. and M.A. Wund. 2009. Experimental assessment of the impacts of northern long-eared bats on ovipositing Culex (Diptera: Culicidae) mosquitoes. Journal of Medical Entomology 46(5):1037-1044.

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Summary of conservation measures for your project You agreed to the following conservation measures to avoid adverse effects to listed species and our concurrence is only valid if the measures are fully implemented. These must be included as permit conditions if a permit is required and/or included in any contract language.

Eastern massasauga
Materials used for erosion control and site restoration must be wildlife-friendly. Do not use erosion control products containing plastic mesh netting or other similar material that could entangle eastern massasauga rattlesnake (EMR). Several products for soil erosion and control exist that do not contain plastic netting including net-less erosion control blankets (for example, made of excelsior), loose mulch, hydraulic mulch, soil binders, unreinforced silt fences, and straw bales. Others are made from natural fibers (such as jute) and loosely woven together in a manner that allows wildlife to wiggle free.

To increase human safety and awareness of EMR, those implementing the project must first review the EMR factsheet (available at https://www.fws.gov/media/eastern-massasauga-rattlesnake-fact-sheet), and watch MDNR's "60-Second Snakes: The Eastern Massasauga Rattlesnake" video (available at https://youtu.be/~PFnXe_e02w).

During project implementation, report sightings of any federally listed species, including EMR, to the Service within 24 hours.

The project will not result in permanent loss of more than one acre of wetland or conversion of more than 10 acres of EMR upland habitat (uplands associated with high quality wetland habitat) to other land uses.

Indiana bat
Any cutting/trimming of potential roost trees for Indiana bat (trees ≥5 inches in diameter [at breast height] with cracks, crevices and/or exfoliating bark) must occur OUTSIDE the non-volant ("pup") season for Indiana bat (June 1 through July 31). Prescribed fire and/or pesticide/herbicide application must also occur outside June-July where potential roost trees are present.

Tree cutting/trimming and/or prescribed burning will not clear ≥20 contiguous acres of forest or fragment a connective corridor between 2 or more forest patches of at least 5 acres.

Northern long-eared bat
Based on the project area you entered into IPaC, the project does not occur within 0.25 miles of a known northern long-eared bat hibernaculum. Tree removal, as defined in the 4(d) rule, will not occur within 150 feet of a known occupied northern long-eared bat maternity roost tree.

Any cutting/trimming of potential roost trees for northern long-eared bat (trees ≥3 inches in diameter [at breast height] with cracks, crevices, cavities, and/or exfoliating bark) will be limited to the inactive season (October 1 through April 14). Prescribed fire and/or pesticide/herbicide application will also occur during the inactive season where potential roost trees are present.

Tree cutting/trimming and/or prescribed burning will not clear ≥20 contiguous acres of forest or fragment a connective corridor between 2 or more forest patches of at least 5 acres.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

COSDS CWSRF Area 3

2. Description

The following description was provided for the project 'COSDS CWSRF Area 3':

> The WRC COSDS project involves pipe lining of the existing sanitary sewer system to reduce I&I within the sewer system.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@42.68377265,-83.27434389147899,14z

APPENDIX B: CAPITAL IMPROVEMENT PLAN

Table F-1: Recommended Sanitary Sewer CIP and Major Maintenance Projects

0-5 Year CIP: Full Liner

Asset ID	Pipe Diameter (in)	Length of Pipe to Repair (ft)	Upstream Manhole Legacy ID	Downstream Manhole Legacy ID	PowerPlan Event Date	PowerPlan Event Type	Suggested Repair	Priority Score	Cost per Foot	Total Estimated Cost
19506	54	30	WAT101006	WAT101001	N/A	N/A	Full Liner	#N/A	$ 966.00	$ 28,980
19607	42	430	WAT098025	WAT098002	N/A	N/A	Full Liner, Letter to Customer(s)	#N/A	$ 491.16	$ 211,197
19488	42	378.5	WAT096009	WAT095001	N/A	N/A	Full Liner, Letter to Customer(s)	#N/A	$ 469.95	$ 177,877
19484	42	303.1	WAT096008	WAT096002	N/A	N/A	Full Liner, Letter to Customer(s)	#N/A	$ 465.61	$ 141,127
19480	42	619.6	WAT096007	WAT096001	N/A	N/A	Full Liner, Letter to Customer(s)	#N/A	$ 488.75	$ 302,827
19795	54	384.99	POT030004	POT030003	2021	Lining	Full Liner	20.377	$ 600.02	$ 231,000
19505	54	207.31	WAT104001	76-002	2019	Lining	Full Liner	19.265	$ 416.33	$ 86,310
19811	54	395.05	POT020005	POT020004	2021	Lining	Full Liner	19.129	$ 602.46	$ 238,000
19548	48	287.02	WAT041009	WAT041008	2021	Lining	Full Liner	18.863	$ 548.25	$ 157,360
19711	48	739.14	WAT048005	WAT048004	2022	Lining	Full Liner	18.863	$ 555.35	$ 410,480
19553	48	527.86	WAT041006	WAT041005	2021	Lining	Full Liner	18.462	$ 561.21	$ 296,240
19801	54	223.94	POT029002	POT029001	2022	Lining	Full Liner	18.462	$ 602.84	$ 135,000
19789	54	612.24	POT028003	POT028002	2021	Lining	Full Liner	18.061	$ 601.07	$ 368,000
19821	54	584	POT034004	POT034003	2021	Lining	Full Liner	17.881	$ 601.03	$ 351,000
19813	54	103.84	POT020006	POT020003	2021	Lining	Full Liner	17.881	$ 606.70	$ 63,000
19557	48	456.95	WAT041003	WAT041002	2020	Lining	Full Liner	17.258	$ 550.26	$ 251,440
16983	54	618	OAT129009	OAT129008	2018	Lining	Full Liner	17.243	$ 614.71	$ 379,890
19852	48	301.96	POT058010	POT058009	2020	Lining	Full Liner	17.051	$ 548.95	$ 165,760
19492	42	309.42	WAT095002	WAT096006	2021	Lining	Full Liner, Letter to Customer(s)	17.05	$ 478.27	$ 147,987
19842	48	326.64	POT036002	POT036001	2022	Lining	Full Liner	16.845	$ 502.08	$ 164,000
19812	54	316.78	POT020004	POT020006	2021	Lining	Full Liner	16.663	$ 602.94	$ 191,000
19839	48	203.46	POT036007	POT036006	2019	Lining	Full Liner	16.455	$ 501.33	$ 102,000
21690	24	408.25	WBT010004	WBT010008	2018	Lining	Full Liner	16.165	$ 231.48	$ 94,500
19848	48	372.57	POT039004	POT039003	2019	Lining	Full Liner	16.054	$ 501.92	$ 187,000
19870	48	463.43	POT058008	POT058007	2020	Lining	Full Liner	16.054	$ 551.02	$ 255,360
19468	42	434.38	WAT093003	WAT093002	2022	Lining	Full Liner	15.348	$ 483.93	$ 210,210
19850	48	297.2	POT039002	POT039001	2022	Lining	Full Liner	15.348	$ 501.35	$ 149,000
19618	42	338.88	WAT098010	WAT098006	2021	Lining	Full Liner, Letter to Customer(s)	14.971	$ 475.73	$ 161,217
19727	42	645.35	WAT052007	WAT052006	2021	Lining	Full Liner	14.85	$ 473.79	$ 305,760
19495	42	459.23	WAT098001	WAT095003	2022	Lining	Full Liner	14.599	$ 468.41	$ 215,110
20411	24	84.13	AVT059025	AVT059013	2025	Lining	Full Liner	11.852	$ 177.23	$ 14,910
31458	54	314.09	POT027002	POT027008	2025	Rehab	Full Liner	10.907	$ 57.31	$ 18,000
19717	48	451.7	WAT048002	WAT048001	N/A	N/A	Full Liner	10.044	$ 555.41	$ 250,880
19547	48	920.3	WAT042001	WAT041009	N/A	N/A	Grouting, Full Liner	9.65	$ 761.38	$ 700,700
19500	54	355	WAT103001	WAT104002	N/A	N/A	Full Liner	9.176	$ 600.72	$ 213,255
19491	42	324.9	WAT096005	WAT096004	N/A	N/A	Full Liner	8.006	$ 481.10	$ 156,310
19735	60	660	WAT103005	WAT103004	N/A	N/A	Full Liner	7.808	$ 689.39	$ 455,000
19554	48	240.5	WAT041005	WAT041004	N/A	N/A	Grouting, Full Liner	7.3	$ 755.59	$ 181,720
19545	48	828.5	WAT007001	WAT042002	N/A	N/A	Grouting, Full Liner	7.057	$ 761.17	$ 630,630
1130853	54	117.54	WAT104002	WAT104013	2022	Lining	Full Liner	5.048	$ 624.43	$ 73,395
19796	54	613.33	POT030003	POT030002	2021	Lining	Full Liner	4.901	$ 600.00	$ 368,000
20746	48	419.19	ORT005004	ORT005003	2021	Lining	Full Liner	4.801	$ 586.46	$ 245,840

Asset ID	Pipe Diameter (in)	Length of Pipe to Repair (ft)	Upstream Manhole Legacy ID	Downstream Manhole Legacy ID	PowerPlan Event Date	PowerPlan Event Type	Suggested Repair	Priority Score	Cost per Foot	Total Estimated Cost
19818	54	106.05	POT034001	POT033005	2019	Lining	Full Liner	4.775	$ 603.49	$ 64,000
19708	48	743.79	WAT047002	WAT047001	2019	Lining	Full Liner	4.775	$ 553.38	$ 411,600
19546	48	936.41	WAT042002	WAT042001	2019	Lining	Full Liner	4.745	$ 556.17	$ 520,800
19508	54	598.73	WAT103003	WAT103002	2021	Lining	Full Liner	4.724	$ 617.66	$ 369,810
19733	54	436.84	WAT103004	WAT103003	2021	Lining	Full Liner	4.724	$ 621.58	$ 271,530
19709	48	725.26	WAT047001	WAT048005	2021	Lining	Full Liner	4.724	$ 553.62	$ 401,520
19736	60	859.61	WAT137001	WAT103005	2021	Lining	Full Liner	4.724	$ 688.10	$ 591,500
19504	60	578.97	WAT103002	WAT103001	2019	Lining	Full Liner	4.724	$ 693.99	$ 401,800
19787	54	375.39	POT028005	POT028004	2022	Lining	Full Liner	4.724	$ 602.04	$ 226,000
36107	48	446.67	WAT008001	WAT041010	2020	Lining	Full Liner, Letter to Customer(s)	4.715	$ 551.65	$ 246,407
19714	48	541.41	WAT048004	WAT048003	2021	Lining	Full Liner	4.711	$ 569.92	$ 308,560
19800	54	593.19	POT029001	POT020005	2019	Lining	Full Liner	4.711	$ 600.14	$ 356,000
19550	48	467.67	WAT041008	WAT041007	2021	Lining	Full Liner	4.701	$ 554.41	$ 259,280
19816	54	266.83	POT033002	POT033001	2019	Lining	Full Liner	4.701	$ 603.38	$ 161,000
31457	54	83.5	POT027009	POT027001	2023	Lining	Full Liner	4.614	$ 610.78	$ 51,000
19793	54	470.35	POT031002	POT031001	2021	Lining	Full Liner	4.611	$ 601.68	$ 283,000
19781	54	739.2	POT027001	POT028006	2019	Lining	Full Liner	4.611	$ 600.65	$ 444,000
19782	54	744.17	POT028006	POT028005	2019	Lining	Full Liner	4.604	$ 600.67	$ 447,000
19798	54	535.64	POT030001	POT029002	2021	Lining	Full Liner	4.601	$ 601.15	$ 322,000
19791	54	617.28	POT028001	POT031003	2018	Lining	Full Liner	4.543	$ 601.02	$ 371,000
19790	54	618.71	POT028002	POT028001	2020	Lining	Full Liner	4.543	$ 601.25	$ 372,000
19815	54	630.48	POT033003	POT033002	2021	Lining	Full Liner	4.523	$ 601.13	$ 379,000
19788	54	131.23	POT028004	POT028003	2022	Lining	Full Liner	4.523	$ 602.00	$ 79,000
19851	48	614.96	POT039001	POT058010	2020	Lining	Full Liner	4.501	$ 548.20	$ 337,120
19792	54	422.64	POT031003	POT031002	2021	Lining	Full Liner	4.442	$ 600.98	$ 254,000
19713	48	310.38	WAT048003	WAT048002	2021	Lining	Full Liner	4.442	$ 555.71	$ 172,480
19476	42	226.86	WAT093010	WAT093008	2022	Lining	Full Liner	4.423	$ 481.66	$ 109,270
19819	54	352	POT033005	POT033004	2021	Lining	Full Liner	4.41	$ 602.27	$ 212,000
19794	54	546.98	POT031001	POT030004	2021	Lining	Full Liner	4.41	$ 601.48	$ 329,000
19478	42	195.2	WAT096001	WAT093009	2022	Lining	Full Liner	4.41	$ 474.44	$ 92,610
19475	42	204.72	WAT093009	WAT093010	2022	Lining	Full Liner	4.41	$ 492.11	$ 100,744
19853	48	358.88	POT058009	POT058008	2020	Lining	Full Liner	4.401	$ 543.02	$ 194,880
19820	54	585.62	POT034002	POT034001	2022	Lining	Full Liner	4.401	$ 601.07	$ 352,000
19817	54	376	POT033004	POT033003	2018	Lining	Full Liner	4.369	$ 601.06	$ 226,000
19828	54	565.03	POT020001	POT015001	2018	Lining	Full Liner	4.369	$ 601.74	$ 340,000
19556	48	308.88	WAT041004	WAT041002	2019	Lining	Full Liner	4.369	$ 556.59	$ 171,920
19814	54	451.31	POT020003	POT020002	2019	Lining	Full Liner	4.341	$ 600.47	$ 271,000
19829	54	570.9	POT015001	POT034007	2021	Lining	Full Liner	4.341	$ 600.81	$ 343,000
19823	54	362.8	POT034005	POT034004	2021	Lining	Full Liner	4.341	$ 600.88	$ 218,000
19822	54	306.6	POT034003	POT034002	2021	Lining	Full Liner	4.341	$ 600.13	$ 184,000
19698	48	560.82	WAT041002	WAT041001	2022	Lining	Full Liner	4.341	$ 557.18	$ 312,480
19797	54	321.97	POT030002	POT030001	2018	Lining	Full Liner	4.322	$ 602.54	$ 194,000

Asset ID	Pipe Diameter (in)	Length of Pipe to Repair (ft)	Upstream Manhole Legacy ID	Downstream Manhole Legacy ID	PowerPlan Event Date	PowerPlan Event Type	Suggested Repair	Priority Score	Cost per Foot	Total Estimated Cost
19826	54	403.61	POT034007	POT034006	2021	Lining	Full Liner	4.322	$ 602.07	$ 243,000
19838	48	246.86	POT036008	POT036007	2022	Lining	Full Liner	4.322	$ 502.31	$ 124,000
19846	48	429.53	POT036001	POT039005	2022	Lining	Full Liner	4.322	$ 500.55	$ 215,000
19433	42	319.37	WAT013004	WAT013003	2021	Lining	Full Liner	4.313	$ 497.10	$ 158,760
19824	54	698.81	POT034006	POT034005	2021	Lining	Full Liner	4.31	$ 601.02	$ 420,000
19827	54	464.72	POT020002	POT020001	2019	Lining	Full Liner	4.303	$ 600.36	$ 279,000
19467	42	440.7	WAT093004	WAT093003	2022	Lining	Full Liner	4.21	$ 476.99	$ 210,210
19844	48	207.35	POT036003	POT036002	2022	Lining	Full Liner	4.203	$ 501.57	$ 104,000
19466	42	189.8	WAT093005	WAT093004	N/A	N/A	Full Liner	4.201	$ 477.61	$ 90,650
19849	48	361.65	POT039003	POT039002	2022	Lining	Full Liner	4.139	$ 500.48	$ 181,000
19469	42	429.84	WAT093002	WAT093001	2021	Lining	Full Liner	4.11	$ 478.78	$ 205,800
19490	42	322.37	WAT096006	WAT096005	2021	Lining	Full Liner	4.103	$ 481.84	$ 155,330
19486	42	304.96	WAT095001	WAT096003	2021	Lining	Full Liner	4.103	$ 478.82	$ 146,020
19425	42	266.32	WAT014002	WAT014001	2021	Lining	Full Liner	4.102	$ 491.25	$ 130,830
1130848	36	38.27	WBT010008	WBT010003	2018	Lining	Full Liner	4.101	$ 261.30	$ 10,000
19474	42	460	WAT093008	WAT093007	2021	Lining	Full Liner	4.101	$ 480.41	$ 220,990
21207	36	274.96	INT097008	INT097007	2024	Lining	Full Liner	4.101	$ 409.37	$ 112,560
19841	48	229.16	POT036005	POT036004	2018	Lining	Full Liner	4.064	$ 501.83	$ 115,000
19840	48	421.13	POT036006	POT036005	2022	Lining	Full Liner	4.038	$ 501.03	$ 211,000
19465	42	553.56	WAT093006	WAT093005	2021	Lining	Full Liner	4.02	$ 481.54	$ 266,560
21032	54	188.14	OAT129002	OAT129001	2023	Lining	Full Liner, Letter to Customer(s)	4.003	$ 606.13	$ 114,037
20378	54	629.93	AVT011007	AVT011006	2021	Lining	Full Liner	4.003	$ 609.07	$ 383,670
19431	42	119.14	WAT013005	WAT013004	2020	Lining	Full Liner	4.002	$ 468.86	$ 55,860
19847	48	360.42	POT039005	POT039004	2021	Lining	Full Liner	4.001	$ 502.19	$ 181,000
19497	42	414.56	WAT098002	WAT098001	2022	Lining	Full Liner	3.909	$ 483.43	$ 200,410
19606	42	475.1	WAT098003	WAT098002	2024	Lining	Full Liner	3.903	$ 35.07	$ 16,660
19493	42	289.98	WAT095003	WAT095002	2022	Lining	Full Liner	3.901	$ 481.58	$ 139,650
19470	42	443.23	WAT093001	WAT052007	2021	Lining	Full Liner	3.836	$ 484.22	$ 214,620
19483	42	319.25	WAT096003	WAT096002	2022	Lining	Full Liner, Letter to Customer(s)	3.836	$ 46.07	$ 14,707
19843	48	284.58	POT036004	POT036003	2021	Lining	Full Liner	3.819	$ 502.49	$ 143,000
19473	42	443.25	WAT093007	WAT093006	2022	Lining	Full Liner	3.809	$ 484.20	$ 214,620
1087700	24	31.34	AVT059025	AVT059024	2023	Lining	Full Liner	3.661	$ 341.74	$ 10,710
19609	42	314.91	WAT098004	WAT098003	2021	Lining	Full Liner	3.608	$ 463.69	$ 146,020
19615	42	273.33	WAT098006	WAT098005	2021	Lining	Full Liner	3.603	$ 475.07	$ 129,850
19617	42	63.26	WAT098007	WAT098010	2022	Lining	Full Liner	3.601	$ 433.77	$ 27,440
									TOTAL COST =	**$ 26,831,547**

0-5 Year Major Maintenance: Spot Liner

Asset ID	Pipe Diameter (in)	Length of Pipe (ft)	Upstream Manhole Legacy ID	Downstream Manhole Legacy ID	PowerPlan Event Date	PowerPlan Event Type	Suggested Repair	Priority Score	Total Estimated Cost
19610	42	20	WAT098026	WAT098003	N/A	N/A	Spot Liner(s)	#N/A	$ 84,000
19685	48	335	WAT002007	WAT002006	N/A	N/A	Spot Liner(s)	#N/A	$ 56,000
19680	48	85	WAT002006	WAT002002	N/A	N/A	Spot Liner(s), Letter to Customer(s)	#N/A	$ 56,007
20427	48	306	AVT081009	AVT086001	2023	Lining	Grouting, Spot Liner(s)	19.666	$ 175,420
18656	27	339.88	OXT133008	OXT133007	2018	Rehab	Grouting, Spot Liner(s)	19.556	$ 49,175
21031	54	246.59	OAT132002	OAT132001	2023	Lining	Grouting, Spot Liner(s), Letter to Customer(s)	18.863	$ 283,087
21033	54	527.67	OAT132003	OAT132002	2023	Lining	Grouting, Spot Liner(s), Letter to Customer(s)	18.863	$ 378,847
19622	15	42.8	POT049014	POT049013	N/A	N/A	Spot Liner(s)	17.258	$ 7,000
16993	54	262.67	OAT129001	OAT132008	2021	Lining	Grouting, Spot Liner(s)	16.054	$ 430,325
20643	48	481.83	ORT003001	ORT046008	2023	Lining	Spot Liner(s)	16.054	$ 56,000
20473	54	307.14	AVT013010	AVT013007	2024	Lining	Grouting, Spot Liner(s), Letter to Customer(s)	16.054	$ 167,342
21035	54	332.41	OAT132004	OAT132003	2023	Lining	Grouting, Spot Liner(s)	15.739	$ 176,155
16825	48	406	OAT080004	OAT080003	N/A	N/A	Spot Liner(s)	15.501	$ 56,000
19487	42	401.78	WAT096004	WAT095001	2022	Lining	Spot Liner(s), Letter to Customer(s)	15.251	$ 210,007
18965	27	331.8	OXT139008	OXT139007	N/A	N/A	Spot Liner(s)	15.194	$ 14,000
16938	48	313.68	OAT079003	OAT079002	2024	Lining	Spot Liner(s)	14.973	$ 56,000
19428	42	424.12	WAT014001	WAT013008	2025	Lining	Spot Liner(s)	14.47	$ 42,000
20375	54	488.5	AVT011003	AVT011002	N/A	N/A	Spot Liner(s)	14.076	$ 70,000
16985	54	329.2	OAT129007	OAT129006	N/A	N/A	Spot Liner(s)	13.99	$ 70,000
20467	54	377.14	AVT013003	AVT013002	2024	Lining	Spot Liner(s), Letter to Customer(s)	13.85	$ 140,014
16824	48	426.8	OAT080005	OAT080004	N/A	N/A	Spot Liner(s)	13.532	$ 56,000
20254	18	269.3	AVT077003	AVT077002	N/A	N/A	Spot Liner(s)	11.671	$ 8,400
19633	10	207.6	POT049002	AVT070016	2022	Lining	Grouting, Spot Liner(s)	10.188	$ 22,736
20428	48	140.2	AVT086001	AVT059008	N/A	N/A	Spot Liner(s)	4.911	$ 56,000
19689	48	577.2	WAT005001	WAT002005	2018	Lining	Spot Liner(s)	4.745	$ 112,000
21194	36	290.3	INT104004	INT104003	2024	Lining	Spot Liner(s)	4.724	$ 84,000
19687	48	537.35	WAT002004	WAT002003	2018	Lining	Spot Liner(s)	4.702	$ 168,000
36108	48	23.19	WAT041010	WAT041003	2023	Lining	Spot Liner(s), Letter to Customer(s)	4.702	$ 280,007
19688	48	586.28	WAT002005	WAT002004	2018	Lining	Grouting, Spot Liner(s)	4.502	$ 233,590
18869	48	571.4	WAT012002	WAT012001	2024	Lining	Grouting, Spot Liner(s)	4.501	$ 174,230
20380	54	234.48	AVT011005	AVT011008	2023	Lining	Spot Liner(s), Letter to Customer(s)	4.401	$ 140,007
19011	18	456.08	OXT138013	OXT138012	2024	Lining	Spot Liner(s), Letter to Customer(s)	4.372	$ 8,435
21036	54	269.54	OAT132005	OAT132004	2023	Lining	Spot Liner(s)	4.21	$ 140,000
20708	48	538.35	ORT046008	ORT046007	2023	Lining	Spot Liner(s)	4.201	$ 56,000
19661	42	543.4	POT093003	POT093002	N/A	N/A	Spot Liner(s)	4.201	$ 42,000
18314	18	382.86	OXT103004	OXT103003	2018	Rehab	Monitor Closely, Grouting, Spot Liner(s)	4.151	$ 29,880
20379	54	625.75	AVT011006	AVT011005	2023	Lining	Grouting, Spot Liner(s)	4.11	$ 405,615

Asset ID	Pipe Diameter (in)	Length of Pipe (ft)	Upstream Manhole Legacy ID	Downstream Manhole Legacy ID	PowerPlan Event Date	PowerPlan Event Type	Suggested Repair	Priority Score	Total Estimated Cost
19479	42	639.16	WAT096002	WAT096001	2024	Lining	Spot Liner(s), Letter to Customer(s)	4.103	$ 126,007
16989	54	347.19	OAT129003	OAT129002	2024	Lining	Spot Liner(s)	4.02	$ 280,000
19418	42	451.33	WAT014004	WAT014003	2024	Lining	Grouting, Spot Liner(s)	4.012	$ 117,432
20471	54	458.23	AVT013009	AVT013008	2023	Lining	Grouting, Spot Liner(s), Letter to Customer(s)	4.009	$ 282,709
20373	54	401.28	AVT013001	AVT010001	2023	Lining	Grouting, Spot Liner(s), Letter to Customer(s)	4.009	$ 403,809
20377	54	218.31	AVT010001	AVT011007	2023	Lining	Spot Liner(s), Letter to Customer(s)	4.009	$ 210,014
20218	42	429.38	AVT079003	AVT079002	2024	Lining	Spot Liner(s), Letter to Customer(s)	4.009	$ 42,007
20472	54	123.23	AVT013008	AVT013010	2024	Lining	Spot Liner(s), Letter to Customer(s)	4.009	$ 280,007
20711	48	376.61	ORT046005	ORT046004	2023	Lining	Spot Liner(s)	4.003	$ 56,000
20342	54	617.2	AVT043002	AVT043001	N/A	N/A	Grouting, Spot Liner(s)	3.801	$ 262,150
19663	42	230	POT093005	POT093001	N/A	N/A	Spot Liner(s)	3.709	$ 42,000
20466	54	188.15	AVT013002	AVT013001	2024	Lining	Spot Liner(s), Letter to Customer(s)	3.703	$ 70,007
							TOTAL COST =		**$ 6,766,421**

0-5 Year Major Maintenance: Grouting

Asset ID	Pipe Diameter (in)	Length of Pipe (ft)	Upstream Manhole Legacy ID	Downstream Manhole Legacy ID	PowerPlan Event Date	PowerPlan Event Type	Suggested Repair	Priority Score	Total Estimated Cost
19518	42	130	POT089016	POT089006	N/A	N/A	Monitor Closely, Grouting	#N/A	$ 23,688
19652	42	130	POT094007	POT094006	N/A	N/A	Monitor Closely, Grouting	#N/A	$ 21,504
19878	48	485.6	POT060009	POT060008	N/A	N/A	Grouting	19.545	$ 100,590
20740	27	1142	ORT006002	ORT006001	N/A	N/A	Grouting	19.265	$ 237,594
19879	48	115.4	POT060008	POT060007	N/A	N/A	Grouting	19.265	$ 23,310
20406	48	494.5	AVT059008	AVT059007	N/A	N/A	Grouting	19.129	$ 102,060
19769	48	450.5	POT070004	POT070003	N/A	N/A	Grouting	17.826	$ 92,190
19619	15	126.2	POT048001	POT049016	N/A	N/A	Grouting	17.594	$ 5,597
16995	54	378.2	OAT132007	OAT132006	N/A	N/A	Grouting	17.258	$ 115,920
19891	48	434.3	POT055004	POT055003	N/A	N/A	Grouting	17.258	$ 89,670
19896	48	581.6	POT090009	POT090008	N/A	N/A	Grouting	17.258	$ 120,120
20381	54	385.09	AVT011008	AVT011004	2018	Rehab	Grouting	17.051	$ 114,975
19738	60	658.8	WAT137003	WAT137002	N/A	N/A	Grouting	16.438	$ 226,100
19707	48	491.9	WAT047003	WAT047002	N/A	N/A	Grouting	16.438	$ 102,060
20327	54	611.1	AVT038001	AVT037002	N/A	N/A	Grouting	16.054	$ 190,575
19620	15	184.6	POT049016	POT049015	N/A	N/A	Grouting	16.01	$ 8,281
19659	42	505.33	POT094001	POT093004	2018	Rehab	Monitor Closely, Grouting	15.932	$ 83,832
20353	48	227.7	AVT057001	AVT054007	N/A	N/A	Grouting	15.9	$ 46,620
20337	54	422	AVT040002	AVT040001	N/A	N/A	Grouting	15.389	$ 131,985
19757	54	635	WAT136006	WAT136005	N/A	N/A	Grouting	15.389	$ 195,615
19901	48	248	POT090006	POT090005	N/A	N/A	Grouting	15.039	$ 50,190
19875	48	529.2	POT058003	POT058002	N/A	N/A	Grouting	15.039	$ 109,200
20340	54	499.7	AVT043004	AVT043003	N/A	N/A	Grouting	14.973	$ 155,610
18866	48	263.7	WAT012005	WAT012004	N/A	N/A	Grouting	14.895	$ 54,390
19459	48	569.5	WAT007002	WAT007001	N/A	N/A	Grouting	14.895	$ 118,230
19561	48	545	WAT008005	WAT008004	N/A	N/A	Grouting	14.885	$ 112,140
20338	54	153.4	AVT040001	AVT043005	N/A	N/A	Grouting	14.731	$ 45,675
19440	42	418.8	WAT010006	WAT010005	N/A	N/A	Grouting	14.731	$ 69,552
19018	18	236.2	OXT138011	OXT138168	N/A	N/A	Grouting, Letter to Customer(s)	14.532	$ 14,177
19871	48	466.6	POT058007	POT058006	N/A	N/A	Grouting	14.47	$ 95,970
972960	48	62	POT060014	POT060006	N/A	N/A	Grouting	14.275	$ 11,760
18864	48	330.16	WAT012006	WAT012005	2018	Rehab	Monitor Closely, Grouting	14.086	$ 67,830
19442	42	159.7	WAT010008	WAT010007	N/A	N/A	Grouting	13.944	$ 26,208
20298	15	239.7	AVT070011	AVT070010	N/A	N/A	Grouting	13.846	$ 10,693
18086	18	383.9	OXT103001	OXT138013	N/A	N/A	Monitor Closely, Grouting	13.786	$ 22,491
19874	48	515.2	POT058004	POT058003	N/A	N/A	Grouting	13.68	$ 106,680
21702	36	305.9	WBT010016	WBT010015	N/A	N/A	Grouting	13.68	$ 42,042
19762	36	327	WAT136008	WAT136007	N/A	N/A	Grouting	13.627	$ 45,360

Asset ID	Pipe Diameter (in)	Length of Pipe (ft)	Upstream Manhole Legacy ID	Downstream Manhole Legacy ID	PowerPlan Event Date	PowerPlan Event Type	Suggested Repair	Priority Score	Total Estimated Cost
18312	18	412.22	OXT103008	OXT103006	2023	Rehab	Grouting, Letter to Customer(s)	13.585	$ 23,888
19743	60	722.6	WAT139001	WAT137004	N/A	N/A	Grouting	13.549	$ 248,150
19741	60	748.8	WAT137004	WAT137003	N/A	N/A	Grouting	13.549	$ 257,600
20352	48	207.7	AVT057002	AVT057001	2024	Lining	Grouting	13.532	$ 44,310
19512	42	268.8	POT089011	POT089010	N/A	N/A	Cutting and Grouting	13.532	$ 44,016
21396	36	319.4	WBT016002	WBT016001	N/A	N/A	Grouting	13.31	$ 44,240
20413	24	403.5	AVT059011	AVT059010	N/A	N/A	Grouting	13.204	$ 36,309
19751	60	570.6	WAT136002	WAT136001	N/A	N/A	Grouting	13.139	$ 195,650
19750	60	484.2	WAT136001	WAT138002	N/A	N/A	Grouting	13.139	$ 165,900
19653	42	542.14	POT094006	POT094005	2018	Rehab	Monitor Closely, Grouting	13.125	$ 90,216
20343	54	415.42	AVT043001	AVT054012	2018	Rehab	Monitor Closely, Grouting	13.094	$ 130,095
19625	15	397.42	POT049011	AVT070015	2023	Lining	Grouting	13.044	$ 17,927
19623	15	254	POT049013	POT049012	N/A	N/A	Grouting	13.044	$ 11,557
19760	36	365.8	WAT136010	WAT136009	N/A	N/A	Grouting, Letter to Customer(s)	12.993	$ 54,614
20341	54	489.9	AVT043003	AVT043002	N/A	N/A	Grouting	12.855	$ 150,570
19020	18	402.5	OXT138010	OXT138009	N/A	N/A	Grouting, Letter to Customer(s)	12.686	$ 23,643
21355	36	290.5	WBT034002	WBT034001	N/A	N/A	Grouting, Letter to Customer(s)	12.517	$ 40,047
21698	36	256	WBT010011	WBT010010	N/A	N/A	Grouting	12.49	$ 35,140
19551	48	97.4	WAT041007	WAT041006	N/A	N/A	Grouting	12.301	$ 19,530
20345	54	110.6	AVT054011	AVT054010	N/A	N/A	Grouting	12.277	$ 33,075
19456	48	207.3	WAT007004	WAT007003	N/A	N/A	Grouting	12.205	$ 42,420
21703	36	367.3	WBT010015	WBT010014	N/A	N/A	Grouting	12.201	$ 50,680
18863	42	436.1	WAT012007	WAT012006	N/A	N/A	Grouting	12.193	$ 72,408
19863	24	437.6	POT040004	POT040003	N/A	N/A	Grouting	12.124	$ 39,039
20280	15	180.8	AVT028001	AVT069005	N/A	N/A	Grouting	12.044	$ 8,145
19774	48	474.6	POT070001	POT028008	N/A	N/A	Grouting	12.043	$ 98,700
20187	48	529.7	AVT080001	AVT083005	N/A	N/A	Grouting	11.896	$ 108,570
18870	48	676.81	WAT012003	WAT012002	2025	Rehab	Grouting	11.846	$ 140,700
21398	36	308.2	WBT016004	WBT016003	N/A	N/A	Grouting	11.846	$ 42,700
19899	48	347.7	POT090008	POT090007	N/A	N/A	Grouting	11.846	$ 71,610
19439	42	553.4	WAT010005	WAT010004	N/A	N/A	Grouting	11.741	$ 92,568
19015	18	348.7	OXT138012	OXT138011	N/A	N/A	Grouting	11.675	$ 20,468
19725	48	506.5	WAT052004	WAT052003	N/A	N/A	Grouting	11.668	$ 103,110
20346	54	194.4	AVT054010	AVT054009	N/A	N/A	Grouting	11.665	$ 59,850
19522	42	489.9	POT089004	POT089003	N/A	N/A	Grouting	11.664	$ 81,312
19873	48	508.5	POT058005	POT058004	N/A	N/A	Grouting	11.663	$ 103,950
21395	36	190.7	WBT013001	WBT010017	N/A	N/A	Grouting	11.503	$ 26,320
21704	36	359.5	WBT010014	WBT010013	N/A	N/A	Grouting	11.462	$ 49,840

Asset ID	Pipe Diameter (in)	Length of Pipe (ft)	Upstream Manhole Legacy ID	Downstream Manhole Legacy ID	PowerPlan Event Date	PowerPlan Event Type	Suggested Repair	Priority Score	Total Estimated Cost
18862	42	303.7	WAT012008	WAT012007	N/A	N/A	Grouting	11.462	$ 50,400
17810	54	429.2	OAT112007	OAT112006	N/A	N/A	Grouting	11.391	$ 131,670
19746	60	484.2	WAT138001	WAT139002	N/A	N/A	Grouting	11.344	$ 166,250
18867	48	716.4	WAT012004	WAT012003	N/A	N/A	Grouting	11.344	$ 148,470
20348	54	590.2	AVT054008	AVT054004	N/A	N/A	Grouting	11.32	$ 181,755
21402	36	158.3	WBT016011	WBT016010	N/A	N/A	Grouting, Letter to Customer(s)	11.301	$ 19,768
18118	54	336.3	OAT112005	OAT112008	N/A	N/A	Grouting, Letter to Customer(s)	11.301	$ 88,522
20313	24	465	AVT072006	AVT073009	N/A	N/A	Grouting	11.203	$ 41,405
20230	48	489.5	AVT073006	AVT073005	N/A	N/A	Grouting	11.182	$ 99,750
19457	48	340.5	WAT007003	WAT007002	N/A	N/A	Grouting	11.175	$ 70,350
1130854	#N/A	#N/A	#N/A	#N/A	N/A	N/A	Monitor Closely, Grouting	11.108	$ 45,045
20189	48	637.9	AVT080003	AVT080002	N/A	N/A	Grouting	10.992	$ 132,090
21405	36	307.7	WBT015001	WBT016014	N/A	N/A	Grouting, Letter to Customer(s)	10.954	$ 42,574
20336	54	671.6	AVT040003	AVT040002	N/A	N/A	Grouting	10.849	$ 208,845
20210	42	243	AVT076001	AVT079010	N/A	N/A	Grouting	10.795	$ 39,984
16997	54	444.8	OAT132001	AVT013009	N/A	N/A	Grouting, Letter to Customer(s)	10.793	$ 139,237
19881	48	348	POT060006	POT060005	N/A	N/A	Grouting	10.793	$ 72,030
20469	54	449.8	AVT013006	AVT013005	N/A	N/A	Grouting, Letter to Customer(s)	10.678	$ 139,244
19759	36	559.2	WBT010001	WAT136010	N/A	N/A	Grouting	10.678	$ 76,580
21349	36	162.2	WBT034008	WBT034007	N/A	N/A	Grouting	10.623	$ 22,400
19755	60	871.6	WAT136004	WAT136003	N/A	N/A	Grouting	10.441	$ 301,700
19882	48	434.4	POT060005	POT060004	N/A	N/A	Grouting	10.378	$ 89,880
21409	36	285.8	WBT016009	WBT016008	N/A	N/A	Grouting, Letter to Customer(s)	10.344	$ 39,347
21413	36	24.7	WBT016007	WBT016006	N/A	N/A	Grouting	10.344	$ 7,560
19445	42	625.1	WAT010011	WAT010010	N/A	N/A	Grouting	10.326	$ 104,160
19443	42	319.5	WAT010007	WAT010006	N/A	N/A	Grouting	10.326	$ 53,256
21699	36	272.5	WBT010012	WBT010011	N/A	N/A	Grouting	10.273	$ 37,520
21414	36	359.7	WBT016006	WBT016005	N/A	N/A	Grouting, Letter to Customer(s)	10.267	$ 41,447
20335	54	651.5	AVT040004	AVT040003	N/A	N/A	Grouting	10.225	$ 200,340
20192	48	509.1	AVT113002	AVT113001	N/A	N/A	Grouting	10.225	$ 105,210
19890	48	356.2	POT055005	POT055004	N/A	N/A	Grouting	10.225	$ 72,240
21400	36	320.5	WBT016005	WBT016004	N/A	N/A	Grouting	10.137	$ 44,240
21397	36	459.6	WBT016001	WBT013001	N/A	N/A	Grouting	9.95	$ 63,840
17813	54	403.3	OAT112002	OAT112001	N/A	N/A	Grouting	9.933	$ 126,000
19753	60	600.9	WAT136003	WAT136002	N/A	N/A	Grouting	9.902	$ 207,550
19019	18	167	OXT138168	OXT138010	N/A	N/A	Grouting, Letter to Customer(s)	9.842	$ 9,541
19763	36	304	WAT136007	WAT136006	N/A	N/A	Grouting	9.775	$ 41,594
21404	36	138.9	WBT015002	WBT015001	N/A	N/A	Grouting	9.714	$ 19,040

Asset ID	Pipe Diameter (in)	Length of Pipe (ft)	Upstream Manhole Legacy ID	Downstream Manhole Legacy ID	PowerPlan Event Date	PowerPlan Event Type	Suggested Repair	Priority Score	Total Estimated Cost
21691	36	246.5	WBT010003	WBT010002	N/A	N/A	Grouting	9.553	$ 33,880
21350	36	382.7	WBT034007	WBT034006	N/A	N/A	Grouting	9.493	$ 53,060
19887	48	99.3	POT055007	POT055006	N/A	N/A	Grouting	9.387	$ 20,160
21697	36	502.8	WBT010006	WBT010005	N/A	N/A	Grouting	9.387	$ 69,440
20229	48	489.4	AVT073007	AVT073006	N/A	N/A	Grouting	9.387	$ 100,590
19761	36	395.9	WAT136009	WAT136008	N/A	N/A	Grouting	9.359	$ 54,740
21701	36	314	WBT010017	WBT010016	N/A	N/A	Grouting	9.27	$ 43,400
21351	36	375.1	WBT034006	WBT034005	N/A	N/A	Grouting	9.214	$ 52,220
21412	36	153.7	WBT016013	WBT016012	N/A	N/A	Grouting, Letter to Customer(s)	9.203	$ 21,168
21700	36	384.1	WBT010013	WBT010012	N/A	N/A	Grouting	9.176	$ 53,060
19756	54	590	WAT136005	WAT136004	N/A	N/A	Grouting	9.176	$ 182,070
19889	48	342.3	POT055006	POT055005	N/A	N/A	Grouting	9.131	$ 70,140
17812	54	404.7	OAT112003	OAT112002	N/A	N/A	Grouting	9.131	$ 125,055
21399	36	305.7	WBT016003	WBT016002	N/A	N/A	Grouting	9.084	$ 42,140
19883	48	402.3	POT060004	POT060003	N/A	N/A	Grouting	8.886	$ 83,370
19885	48	414.9	POT060002	POT060001	N/A	N/A	Grouting	8.427	$ 85,890
17811	54	387.9	OAT112004	OAT112003	N/A	N/A	Grouting	8.427	$ 121,275
21408	36	254.7	WBT034001	WBT015004	N/A	N/A	Grouting	8.22	$ 35,000
21407	36	423.2	WBT015003	WBT015002	N/A	N/A	Grouting	8.207	$ 58,660
19766	48	444.4	POT070007	POT070006	N/A	N/A	Grouting	8.184	$ 92,190
20227	48	236	AVT073009	AVT073008	N/A	N/A	Grouting	8.007	$ 48,510
21411	36	375.5	WBT016012	WBT016011	N/A	N/A	Monitor Closely, Grouting	7.998	$ 52,080
21401	36	50.6	WBT016010	WBT016009	N/A	N/A	Grouting	7.99	$ 8,680
21354	36	375.5	WBT034003	WBT034002	N/A	N/A	Grouting	7.795	$ 52,220
21406	36	136.2	WBT015004	WBT015003	N/A	N/A	Grouting	7.621	$ 18,060
21352	36	236.1	WBT034005	WBT034004	N/A	N/A	Grouting	7.597	$ 32,340
21410	36	447.7	WBT016008	WBT016007	N/A	N/A	Grouting	7.406	$ 62,020
19884	48	323.5	POT060003	POT060002	N/A	N/A	Grouting	6.506	$ 66,570
19768	48	451.9	POT070005	POT070004	N/A	N/A	Monitor Closely, Grouting	6.276	$ 93,240
19867	24	449.8	POT040008	POT040007	N/A	N/A	Grouting	5.587	$ 40,131
19880	48	332	POT060007	POT060014	N/A	N/A	Grouting	4.804	$ 67,410
19739	60	705	WAT137002	WAT137001	N/A	N/A	Grouting	4.704	$ 243,600
19706	48	710.9	WAT046001	WAT047003	N/A	N/A	Grouting	4.704	$ 148,050
19872	48	567.4	POT058006	POT058005	N/A	N/A	Grouting	4.301	$ 117,180
19877	48	549.4	POT058001	POT060009	2018	Lining	Monitor Closely, Grouting	4.267	$ 114,030
20351	48	480.9	AVT057003	AVT057002	N/A	N/A	Grouting	4.201	$ 99,120
19531	54	613.2	AVT038002	AVT038001	N/A	N/A	Monitor Closely, Grouting	4.001	$ 189,630
19876	48	225.3	POT058002	POT058001	N/A	N/A	Grouting	4.001	$ 46,200

Asset ID	Pipe Diameter (in)	Length of Pipe (ft)	Upstream Manhole Legacy ID	Downstream Manhole Legacy ID	PowerPlan Event Date	PowerPlan Event Type	Suggested Repair	Priority Score	Total Estimated Cost
21403	36	328.5	WBT016014	WBT016013	N/A	N/A	Grouting, Letter to Customer(s)	3.801	$ 45,101
20414	24	305.1	AVT059012	AVT059011	2024	Lining	Grouting	3.661	$ 27,846
19767	48	416.2	POT070006	POT070005	N/A	N/A	Grouting	3.601	$ 86,100
20297	15	224.24	AVT070010	AVT070009	2018	Lining	Grouting	3.483	$ 10,738
								TOTAL COST =	**$ 12,616,547**

0-5 Year Major Maintenance: Miscellaneous

Asset ID	Pipe Diameter (in)	Length of Pipe (ft)	Upstream Manhole Legacy ID	Downstream Manhole Legacy ID	PowerPlan Event Date	PowerPlan Event Type	Suggested Repair	Priority Score	Total Estimated Cost
18313	18	350.7	OXT103002	OXT103001	N/A	N/A	Monitor Closely	16.656	$ -
20333	54	471.7	AVT040006	AVT040005	N/A	N/A	Monitor Closely	13.99	$ -
20332	54	261.4	AVT040007	AVT040006	N/A	N/A	Monitor Closely	11.182	$ -
19636	10	161.2	POT049007	POT049006	N/A	N/A	Cleaning	11.037	$ 858
20363	8	358.74	AVT017003	AVT017002	2018	Lining	Monitor Closely	7.485	$ -
20370	8	350	AVT017010	AVT017009	N/A	N/A	Monitor Closely	6.588	$ -
								TOTAL COST =	**$ 858**

6-20 Year CIP: Full Liner

Asset ID	Pipe Diameter (in)	Length of Pipe to Repair (ft)	Upstream Manhole Legacy ID	Downstream Manhole Legacy ID	PowerPlan Event Date	PowerPlan Event Type	Suggested Repair	Priority Score	Cost per Foot	Total Estimated Cost
1110483	48	262.24	ORT046009	ORT046005	2033	Lining	Full Liner	17.659	$ 503.36	$ 132,000
1124605	15	56.18	POT048003	POT049016	2033	Lining	Full Liner	16.254	$ 124.60	$ 7,000
20319	60	567.85	AVT050002	AVT050001	2034	Lining	Full Liner	16.054	$ 750.20	$ 426,000
20457	66	593.11	AVT052010	AVT052004	2034	Lining	Full Liner	16.054	$ 900.34	$ 534,000
1124606	15	21.07	POT048001	POT048002	2033	Lining	Full Liner	15.161	$ 142.38	$ 3,000
20455	66	552.38	AVT052004	AVT052003	2037	Lining	Full Liner	14.85	$ 901.55	$ 498,000
1130849	54	127.87	WAT137005	WAT137001	2031	Lining	Full Liner	13.139	$ 602.17	$ 77,000
20324	60	644.26	AVT053003	AVT053002	2034	Lining	Full Liner	11.531	$ 751.25	$ 484,000
20459	66	743.88	AVT049002	AVT052010	2034	Rehab	Full Liner	9.933	$ 56.46	$ 42,000
20322	60	559.89	AVT053005	AVT053004	2035	Rehab	Full Liner	9.387	$ 57.15	$ 32,000
20410	24	124.13	AVT059009	AVT059001	2036	Rehab	Full Liner	6.196	$ 40.28	$ 5,000
19466	42	185.63	WAT093005	WAT093004	2027	Lining	Full Liner	4.201	$ 404.03	$ 75,000
20326	60	564.27	AVT053001	AVT050004	2032	Lining	Full Liner	4.002	$ 751.41	$ 424,000
									TOTAL COST =	**$ 2,739,000**

6-20 Year Major Maintenance: Spot Liner

Asset ID	Pipe Diameter (in)	Length of Pipe (ft)	Upstream Manhole Legacy ID	Downstream Manhole Legacy ID	PowerPlan Event Date	PowerPlan Event Type	Suggested Repair	Priority Score	Total Estimated Cost
18656	27	339.88	OXT133008	OXT133007	2031	Lining	Grouting, Spot Liner(s)	19.556	$ 49,175
19622	15	42.8	POT049014	POT049013	2027	Lining	Spot Liner(s)	17.258	$ 7,000
16825	48	422.42	OAT080004	OAT080003	2026	Lining	Spot Liner(s)	15.501	$ 56,000
18965	27	328.11	OXT139008	OXT139007	2035	Lining	Spot Liner(s)	15.194	$ 14,000
20375	54	499.88	AVT011003	AVT011002	2026	Lining	Spot Liner(s)	14.076	$ 70,000
16985	54	329.2	OAT129007	OAT129006	2026	Lining	Spot Liner(s)	13.99	$ 70,000
16824	48	430.48	OAT080005	OAT080004	2027	Lining	Spot Liner(s)	13.532	$ 56,000
20254	18	271.54	AVT077003	AVT077002	2027	Lining	Spot Liner(s)	11.671	$ 8,400
20428	48	140.53	AVT086001	AVT059008	2026	Lining	Spot Liner(s)	4.911	$ 56,000
19661	42	544	POT093003	POT093002	2026	Lining	Spot Liner(s)	4.201	$ 42,000
18314	18	382.86	OXT103004	OXT103003	2031	Lining	Monitor Closely, Grouting, Spot Liner(s)	4.151	$ 29,880
20342	54	614.2	AVT043002	AVT043001	2026	Lining	Grouting, Spot Liner(s)	3.801	$ 262,150
19663	42	230	POT093005	POT093001	2027	Lining	Spot Liner(s)	3.709	$ 42,000
							TOTAL COST =		**$ 762,605**

6-20 Year Major Maintenance: Grouting

Asset ID	Pipe Diameter (in)	Length of Pipe (ft)	Upstream Manhole Legacy ID	Downstream Manhole Legacy ID	PowerPlan Event Date	PowerPlan Event Type	Suggested Repair	Priority Score	Total Estimated Cost
19878	48	485.6	POT060009	POT060008	2035	Lining	Grouting	19.545	$ 100,590
20740	48	1176.21	ORT006002	ORT006001	2032	Lining	Grouting	19.265	$ 237,594
19879	48	115.4	POT060008	POT060007	2035	Lining	Grouting	19.265	$ 23,310
20406	48	492.26	AVT059008	AVT059007	2035	Lining	Grouting	19.129	$ 102,060
19769	48	450.5	POT070004	POT070003	2030	Lining	Grouting	17.826	$ 92,190
19619	27	48.93	POT048002	POT048003	2033	Lining	Grouting	17.594	$ 5,597
16995	54	382.04	OAT132007	OAT132006	2030	Lining	Grouting	17.258	$ 115,920
19891	48	439.21	POT055004	POT055003	2034	Lining	Grouting	17.258	$ 89,670
19896	48	580.16	POT090009	POT090008	2034	Lining	Grouting	17.258	$ 120,120
20381	54	385.09	AVT011008	AVT011004	2026	Lining	Grouting	17.051	$ 114,975
19707	48	493.33	WAT047003	WAT047002	2033	Lining	Grouting	16.438	$ 102,060
19738	60	662.32	WAT137003	WAT137002	2033	Lining	Grouting	16.438	$ 226,100
20327	54	598.44	AVT038001	AVT037002	2033	Lining	Grouting	16.054	$ 190,575
19620	15	181.62	POT049016	POT049015	2034	Lining	Grouting	16.01	$ 8,281
19659	42	505.33	POT094001	POT093004	2031	Lining	Monitor Closely, Grouting	15.932	$ 83,832
20353	48	235.56	AVT057001	AVT054007	2027	Lining	Grouting	15.9	$ 46,620
20337	54	419.74	AVT040002	AVT040001	2032	Lining	Grouting	15.389	$ 131,985
19901	48	247.1	POT090006	POT090005	2029	Lining	Grouting	15.039	$ 50,190
19875	48	529.2	POT058003	POT058002	2026	Lining	Grouting	15.039	$ 109,200
20340	54	509.67	AVT043004	AVT043003	2030	Lining	Grouting	14.973	$ 155,610
18866	48	271.51	WAT012005	WAT012004	2033	Lining	Grouting	14.895	$ 54,390
19459	48	575.59	WAT007002	WAT007001	2033	Rehab	Grouting	14.895	$ 118,230
19018	18	231.12	OXT138011	OXT138168	2032	Lining	Grouting, Letter to Customer(s)	14.532	$ 14,177
19871	48	465.01	POT058007	POT058006	2035	Lining	Grouting	14.47	$ 95,970
18864	48	330.16	WAT012006	WAT012005	2031	Lining	Monitor Closely, Grouting	14.086	$ 67,830
20298	15	236.65	AVT070011	AVT070010	2035	Lining	Grouting	13.846	$ 10,693
18086	18	378.78	OXT103001	OXT138013	2032	Lining	Monitor Closely, Grouting	13.786	$ 22,491
19874	48	515.2	POT058004	POT058003	2035	Lining	Grouting	13.68	$ 106,680
18312	18	412.22	OXT103008	OXT103006	2036	Lining	Grouting, Letter to Customer(s)	13.585	$ 23,888
19743	60	715.74	WAT139001	WAT137004	2033	Lining	Grouting	13.549	$ 248,150
19741	60	736.95	WAT137004	WAT137003	2033	Lining	Grouting	13.549	$ 257,600
19512	42	254.83	POT089011	POT089010	2029	Rehab	Cutting and Grouting	13.532	$ 44,016
21396	36	321.05	WBT016002	WBT016001	2033	Rehab	Grouting	13.31	$ 44,240
20413	24	407.22	AVT059011	AVT059010	2026	Lining	Grouting	13.204	$ 36,309
19653	42	542.14	POT094006	POT094005	2031	Lining	Monitor Closely, Grouting	13.125	$ 90,216

Asset ID	Pipe Diameter (in)	Length of Pipe (ft)	Upstream Manhole Legacy ID	Downstream Manhole Legacy ID	PowerPlan Event Date	PowerPlan Event Type	Suggested Repair	Priority Score	Total Estimated Cost
20343	54	415.42	AVT043001	AVT054012	2031	Lining	Monitor Closely, Grouting	13.094	$ 130,095
19623	15	254.24	POT049013	POT049012	2034	Lining	Grouting	13.044	$ 11,557
19760	36	407.4	WAT136010	WAT136009	2037	Rehab	Grouting, Letter to Customer(s)	12.993	$ 54,614
20341	54	484.21	AVT043003	AVT043002	2030	Lining	Grouting	12.855	$ 150,570
19020	18	398.48	OXT138010	OXT138009	2033	Lining	Grouting, Letter to Customer(s)	12.686	$ 23,643
19551	48	95.22	WAT041007	WAT041006	2034	Lining	Grouting	12.301	$ 19,530
20345	54	109.38	AVT054011	AVT054010	2027	Rehab	Grouting	12.277	$ 33,075
21703	36	368.69	WBT010015	WBT010014	2027	Rehab	Grouting	12.201	$ 50,680
19774	48	472.05	POT070001	POT028008	2027	Rehab	Grouting	12.043	$ 98,700
20187	48	544.42	AVT080001	AVT083005	2035	Lining	Grouting	11.896	$ 108,570
19439	42	552.29	WAT010005	WAT010004	2026	Rehab	Grouting	11.741	$ 92,568
19015	18	356.11	OXT138012	OXT138011	2035	Lining	Grouting	11.675	$ 20,468
19725	48	497.16	WAT052004	WAT052003	2027	Rehab	Grouting	11.668	$ 103,110
20346	54	190.98	AVT054010	AVT054009	2026	Rehab	Grouting	11.665	$ 59,850
19522	42	484.96	POT089004	POT089003	2026	Rehab	Grouting	11.664	$ 81,312
19873	48	507.15	POT058005	POT058004	2035	Lining	Grouting	11.663	$ 103,950
21704	36	356.39	WBT010014	WBT010013	2027	Rehab	Grouting	11.462	$ 49,840
18862	42	300.31	WAT012008	WAT012007	2027	Rehab	Grouting	11.462	$ 50,400
18867	48	712.16	WAT012004	WAT012003	2030	Rehab	Grouting	11.344	$ 148,470
21402	36	134.64	WBT016011	WBT016010	2036	Rehab	Grouting, Letter to Customer(s)	11.301	$ 19,768
20313	24	449.15	AVT072006	AVT073009	2030	Lining	Grouting	11.203	$ 41,405
20230	48	481.31	AVT073006	AVT073005	2033	Lining	Grouting	11.182	$ 99,750
20189	48	637.06	AVT080003	AVT080002	2033	Lining	Grouting	10.992	$ 132,090
21405	36	310.27	WBT015001	WBT016014	2033	Lining	Grouting, Letter to Customer(s)	10.954	$ 42,574
20336	54	670.61	AVT040003	AVT040002	2026	Rehab	Grouting	10.849	$ 208,845
16997	54	444.8	OAT132001	AVT013009	2032	Lining	Grouting, Letter to Customer(s)	10.793	$ 139,237
20469	54	458.64	AVT013006	AVT013005	2033	Rehab	Grouting, Letter to Customer(s)	10.678	$ 139,244
19755	60	871.68	WAT136004	WAT136003	2033	Rehab	Grouting	10.441	$ 301,700
20192	48	499.61	AVT113002	AVT113001	2033	Lining	Grouting	10.225	$ 105,210
20335	54	649.98	AVT040004	AVT040003	2033	Lining	Grouting	10.225	$ 200,340
19019	18	164.98	OXT138168	OXT138010	2033	Lining	Grouting, Letter to Customer(s)	9.842	$ 9,541
21404	36	138.07	WBT015002	WBT015001	2034	Lining	Grouting	9.714	$ 19,040
19887	48	99.5	POT055007	POT055006	2036	Lining	Grouting	9.387	$ 20,160
21697	36	499.22	WBT010006	WBT010005	2036	Rehab	Grouting	9.387	$ 69,440
21412	36	152.72	WBT016013	WBT016012	2036	Rehab	Grouting, Letter to Customer(s)	9.203	$ 21,168

Asset ID	Pipe Diameter (in)	Length of Pipe (ft)	Upstream Manhole Legacy ID	Downstream Manhole Legacy ID	PowerPlan Event Date	PowerPlan Event Type	Suggested Repair	Priority Score	Total Estimated Cost
21411	36	383.96	WBT016012	WBT016011	2033	Rehab	Monitor Closely, Grouting	7.998	$ 52,080
19880	48	332.29	POT060007	POT060014	2026	Lining	Grouting	4.804	$ 67,410
19706	48	713.42	WAT046001	WAT047003	2031	Lining	Grouting	4.704	$ 148,050
19739	60	575.73	WAT137002	WAT137005	2031	Lining	Grouting	4.704	$ 243,600
19872	48	567.92	POT058006	POT058005	2033	Lining	Grouting	4.301	$ 117,180
20351	48	480.49	AVT057003	AVT057002	2026	Lining	Grouting	4.201	$ 99,120
19531	54	606.92	AVT038002	AVT038001	2029	Lining	Monitor Closely, Grouting	4.001	$ 189,630
19876	48	225.3	POT058002	POT058001	2030	Lining	Grouting	4.001	$ 46,200
21403	36	326.14	WBT016014	WBT016013	2033	Lining	Grouting, Letter to Customer(s)	3.801	$ 45,101
19767	48	416.2	POT070006	POT070005	2033	Lining	Grouting	3.601	$ 86,100
							TOTAL COST =		**$ 7,396,342**

6-20 Year Major Maintenance: Miscellaneous

Asset ID	Pipe Diameter (in)	Length of Pipe (ft)	Upstream Manhole Legacy ID	Downstream Manhole Legacy ID	PowerPlan Event Date	PowerPlan Event Type	Suggested Repair	Priority Score	Total Estimated Cost
20741	27	506.49	ORT006003	ORT006002	2033	Lining	Letter to Customer(s)	18.061	$ 7
19025	27	288.34	OXT138004	OXT138003	2032	Lining	Letter to Customer(s)	16.856	$ 21
18313	18	345	OXT103002	OXT103001	2032	Lining	Monitor Closely	16.656	$ -
19026	27	146.27	OXT138003	OXT138002	2029	Lining	Letter to Customer(s)	15.652	$ 14
19028	27	195.52	OXT138008	OXT138007	2033	Lining	Letter to Customer(s)	15.652	$ 14
19027	27	166.42	OXT138009	OXT138008	2033	Lining	Letter to Customer(s)	15.652	$ 14
19648	42	523.8	POT094008	POT094006	2033	Lining	Letter to Customer(s)	15.251	$ 7
19527	48	494.92	AVT082002	AVT082001	2033	Lining	Letter to Customer(s)	15.251	$ 7
20751	48	552.81	ORT008004	ORT008003	2027	Rehab	Letter to Customer(s)	15.223	$ 28
18316	18	181.68	OXT103011	OXT103002	2032	Lining	Letter to Customer(s)	14.919	$ 28
20169	18	128.63	AVT063005	AVT063004	2029	Lining	Letter to Customer(s)	14.248	$ 7
20522	48	241.02	ORT003005	ORT003004	2033	Lining	Letter to Customer(s)	14.208	$ 7
19718	48	170.39	WAT049002	WAT049001	2033	Lining	Letter to Customer(s)	13.951	$ 7
21693	36	230.49	WBT010010	WBT010009	2033	Lining	Letter to Customer(s)	13.64	$ 14
19654	42	376	POT094005	POT094004	2030	Lining	Letter to Customer(s)	13.532	$ 7
19436	42	351.18	WAT010002	WAT009002	2036	Rehab	Letter to Customer(s)	13.422	$ 21
18315	18	166	OXT103003	OXT103011	2030	Lining	Letter to Customer(s)	13.024	$ 14
21694	36	212.63	WBT010009	WBT010008	2031	Lining	Letter to Customer(s)	12.767	$ 14
20712	48	504.41	ORT046004	ORT046003	2030	Lining	Letter to Customer(s)	12.277	$ 14
20710	48	300	ORT046006	ORT046009	2033	Lining	Letter to Customer(s)	12.205	$ 14
19029	27	100.46	OXT138007	OXT138006	2033	Lining	Letter to Customer(s)	11.97	$ 7
20525	48	545.09	ORT003004	ORT008001	2033	Lining	Letter to Customer(s)	11.741	$ 14
21228	48	550.1	OAT078004	OAT078003	2026	Rehab	Letter to Customer(s)	11.664	$ 7
20332	54	259.07	AVT040007	AVT040006	2033	Lining	Monitor Closely	11.182	$ -
19636	10	161.2	POT049007	POT049006	2029	Lining	Cleaning	11.037	$ 858
20159	18	141.93	AVT082007	AVT082006	2035	Lining	Letter to Customer(s)	10.81	$ 7
17252	48	20.03	OAT073016	OAT073011	2036	Rehab	Letter to Customer(s)	10.044	$ 7
19569	48	528.74	OAT073003	OAT073002	2036	Rehab	Letter to Customer(s)	9.65	$ 28
19765	48	478.9	WAT049001	POT070007	2033	Lining	Letter to Customer(s)	9.477	$ 7
20266	18	294.66	AVT078002	AVT078001	2032	Lining	Letter to Customer(s)	8.001	$ 7
20261	18	398.53	AVT078007	AVT078006	2035	Rehab	Letter to Customer(s)	7.321	$ 7
20370	8	349.38	AVT017010	AVT017009	2027	Lining	Monitor Closely	6.588	$ -
20750	48	288.32	ORT008003	ORT008002	2030	Lining	Letter to Customer(s)	4.203	$ 7
							TOTAL COST =		**$ 1,215**

Description	COF	In Service Year	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	FY 2033	FY 2034	FY 2035	FY 2036	FY 2037	FY 2038	FY 2039	FY 2040
Elizabeth Lake	**4.8**	**1968**																						
Suction Valve 1 - 16"	2.8	1968						$ 62,000																
Suction Valve 2 - 16"	2.8	1968						$ 62,000																
Suction Valve 3 - 24"	2.8	1968						$ 68,000																
Suction Valve 4 - 24"	2.8	1968						$ 68,000																
Suction Valve 5 - 24"	2.8	1968						$ 68,000																
Discharge Valve 1	1.2	2001						$ 25,000																
Discharge Valve 2	1.2	2001						$ 25,000																
Discharge Valve 3	1.2	2001						$ 25,000																
Discharge Valve 4	1.2	2001						$ 25,000																
Discharge Valve 5	1.2	2001						$ 25,000																
Discharge Valve 6	1.2	2001						$ 25,000																
Air Compressor - Suction/Discharge Valves	1	2001						$ 23,000																
Transducer - Hydro Tank 1	1	2001													$ 5,000									
Transducer - Hydro Tank 2	1	2001													$ 5,000									
Hydro Tank 1	1.2	2001					$ 20,000																	
Hydro Tank 2	1.2	2001					$ 20,000																	
General Electrical	1	2001													$ 30,000									
Wet Well Lighting	1.2	2016				$ -									$ 40,000									
Building Lighting	1.2	2001													$ 100,000									
Indoor Transformer	1	2001													$ 20,000									
MCC-A	1.6	2001													$ 350,000									
MCC-B	1	2001													$ 45,000									
Main Service Disconnect	2	2001													$ 125,000									
Main Switch	2	2001													$ 150,000									
Main Breaker	1.8	2001													$ 60,000									
Automatic Transfer Switch	2	2001													$ 450,000									
Utility Power Sensor	1	2012																						
Flow Meter - 24"	1.2	2021			R																			
Flow Meter - 30"	1.2	2021			R																			
Transducer - 30" Header	1	2021			R										$ 5,000									
Transducer - 24" Header	1	2021			R										$ 5,000									
Crane	1.2	1968						$ 52,000																
Generator	2.6	2001													$ 1,000,000									
Air Conditioning Unit for VFD Pumps	1	2012							$ 30,000															
Roof Heating Units	1	2012									$ 20,000													
Electric Unit Heater 1	1	1968									$ 10,000													
Electric Unit Heater 2	1	1968									$ 10,000													
Electric Unit Heater 3	1	1968									$ 10,000													
Elevator	1.8	1968			$ 50,000																			
Control Panel	2	2001													$ 100,000									
Wet Well Transducer	1	2001				$ 25,000																		
Wet Well Above Floor Transducer	1	2016							$ 5,000															
Isolation Valve - Pump 1	1.2	2001						$ 16,000																
Isolation Valve - Pump 2	1.2	2001						$ 16,000																
Isolation Valve - Pump 3	1.2	2001						$ 22,000																
Isolation Valve - Pump 4	1.2	2001						$ 22,000																
Isolation Valve - Pump 5	1.2	2001						$ 22,000																
Crossover Valve	1.2	2001						$ 22,000																
Main Effluent Discharge Valve - 24"	1.2	2001						$ 22,000																
Main Effluent Discharge Valve - 30"	1.2	2001						$ 22,000																
General Piping	4.2	2001						$ 1,000,000																
Sump Pump 1	1.2	2001								$ 15,000														
Sump Pump 2	1.2	2001								$ 15,000														
Booster Pump 1	1.2	2001									$ 9,000													
Booster Pump 2	1.2	2001									$ 9,000													
Pump 1	2.2	2021			R										$ 15,000							$ 15,000		
Pump 2	2.2	2001						$ 60,000								$ 15,000							$ 15,000	
Pump 3	2.2	2001				$ 75,000									$ 15,000							$ 15,000		
Pump 4	2.2	2001					$ 75,000									$ 15,000							$ 15,000	
Pump 5	2.2	2001						$ 75,000								$ 15,000							$ 15,000	
Pump 6	1.8	2001				$ 10,000						$ 10,000												
Pump 6 Controls	1	2001													$ 10,000									
Pump 1 Motor	1.8	2021			R																			
Pump 2 Motor	1.8	2001						$ 45,000																
Pump 3 Motor	1.8	2001				$ 80,000																		
Pump 4 Motor	1.8	2001					$ 80,000																	
Pump 5 Motor	1.8	2001						$ 80,000																
Pump 1 Drive Shaft	1.8	2001																						
Pump 2 Drive Shaft	1.8	2001																						
Pump 3 Drive Shaft	1.8	2001																						
Pump 4 Drive Shaft	1.8	2001																						
Pump 5 Drive Shaft	1.8	2001																						
Emegency Bypass Valve Vault	3.6	2001																						
Odor Control System	1	2020							$ 10,000							$ 10,000								
Drive and Grounds	1	2001					$ 15,000																	
Building	4.6	1968																						
Lift Station Roof	2.2	2001				$ 30,000																		
Wet Well Supply Fan	1.8	2001						$ 30,000																
VFD 1	1.2	2015						$ 40,000																
VFD 2	1.2	2012				$ 40,000																		
VFD 3	1.2	2015					$ 60,000																	
VFD 4	1.2	2015							$ 60,000															
VFD 5	1.2	2020																						
Dry Well Exhaust Fan	1.8	2001																						
Wet Well	4.8	1968										$ 100,000												

APPENDIX C: PACP RATING INFORMATION

COSDS PACP RATINGS FOR FY2024 CWSRF

ASSET ID	LENGTH	DIAMETER	PACP STRUCTURAL GRADE
19475	215	42	4
19497	419.7	42	4
19827	464.5	54	4
19469	427.4	42	4
19811	396	54	4
19829	592	54	4
19796	617.4	54	4
19790	624.4	54	4
19487	20	42	4
19483	20	42	4
19618	338.3	42	4
19815	625.1	54	4
19819	352	54	4
19793	471	54	4
19791	617.8	54	4
19847	348.1	48	4
19826	402.5	54	4
19800	589.3	54	4
19610	20	42	4
19823	362.8	54	4
19473	444.5	42	4
19488	378.5	42	4
19839	205.6	48	4
19797	314.3	54	5
19814	350.4	54	4
19842	325.6	48	4
19613	254.6	42	2
19493	291.6	42	4
19838	244.5	48	4
19837	370.2	48	2
19817	376	54	4
19551	97.4	48	2
19781	736.5	54	4
19798	538.6	54	4
19468	435.4	42	4
19852	305.1	48	4
19850	301.6	48	4
19846	429.8	48	4
19466	189.8	42	4
19801	223.1	54	4
19698	570.7	48	4
19607	430	42	4
19609	293.6	42	4
19821	584	54	4
19553	535.7	48	4
19556	314.2	48	4
19795	380.9	54	4
19822	306.6	54	4
19480	619.6	42	4
19486	302.5	42	4
36107	444.3	48	4

ASSET ID	LENGTH	DIAMETER	PACP STRUCTURAL GRADE
19478	194	42	4
19843	285.6	48	4
19871	466.6	48	2
19557	462.1	48	4
19825	252	54	4
19787	372.1	54	4
31457	68	54	4
19465	555.3	42	4
31456	14	54	0
19474	459.1	42	4
19870	462.8	48	4
19813	105	54	4
19816	268.9	54	4
19812	316.3	54	4
19470	449.7	42	4
36108	23.1	48	4
19612	20	42	2
19484	303.1	42	4
19479	20	42	4
19853	354.1	48	4
19789	605.5	54	4
19490	324.2	42	4
19617	63	42	4
19844	207.4	48	4
19840	418.8	48	4
19727	643.2	42	4
19782	746.2	54	4
19849	361.7	48	4
19794	549.8	54	4
31458	318	54	0
19548	286.8	48	4
19606	45	42	4
19495	452.3	42	4
19828	565	54	4
19476	220	42	4
19615	274.3	42	4
19554	240.5	48	1
19841	230.2	48	4
19824	445.5	54	4
19492	309.6	42	4
19818	107	54	4
19559	432.1	48	1
19851	613.8	48	4
19491	324.9	42	1
19550	469.3	48	4
19848	384.4	48	4
19786	257.8	54	0
19792	422.1	54	4
19788	132.4	54	4
19820	583.8	54	4
19467	439	42	4

APPENDIX D: OPINION OF PROBABLE COSTS

Project Summary
Engineer's Opinion of Probable Project Cost

Owner:	**Oakland County Water Resources Commissioner (WRC)**	**Date:**	**3/29/2023**
Project:	**COSDS Project Planning Document 2023**	**Project No.**	**0105-23-0030**
Work:	**Open Cut**	**Prepared By:**	**A. BOGER**
		Reviewer:	**A. STIDAM**
	[X] Conceptual [ ] Preliminary [ ] Final	**Current ENR:**	**13745**

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	$2,287,000	$2,287,000
2	Audio Video Route Survey	1	LSUM	$20,000	$20,000
3	Traffic Maintenance and Control	1	LSUM	$500,000	$500,000
4	Soil Erosion and Sedimentation Control	1	LSUM	$200,000	$200,000
5	Dewatering	1	LSUM	$3,000,000	$3,000,000
6	Access Roads and Site Preparation, including Maintenance Aggregate	1	LSUM	$2,000,000	$2,000,000
7	Bypass Pumping, Furnish, Operate, and Remove	1	LSUM	$2,700,000	$2,700,000
8	Sanitary Sewer, 42 inch	10,200	Ft	$450	$4,590,000
9	Sanitary Sewer, 48 inch	10,200	Ft	$550	$5,610,000
10	Sanitary Sewer, 54 inch	16,100	Ft	$650	$10,465,000
11	Sanitary Structure, 6 inch dia	50	Ea	$13,000	$650,000
12	Sanitary Structure, 7 inch dia	50	Ea	$18,000	$900,000
13	Sanitary Structure, 8 inch dia	75	Ea	$22,000	$1,650,000
14	Odor and Corrosion Control Allowance	1	LSUM	$11,450,000	$11,450,000
15	Wetland Restoration	1	LSUM	$1,000,000	$1,000,000
16	Restoration	1	LSUM	$1,000,000	$1,000,000
				TOTAL ESTIMATED CONSTRUCTION COST	**$48,022,000**
	CONTRACTUAL REQUIREMENTS				
	General Conditions	6%			$2,882,000.00
	General Requirements	5%			$2,402,000.00
				TOTAL CONSTRUCTION COST:	**$53,306,000.00**
	PROJECT COSTS				
	Design and Construction Engineering	25%			$13,327,000.00
	Finance and Legal	5%			$2,666,000.00
	Easements	0.5%			$267,000.00
	Permits	4.5%			$2,399,000.00
	Construction Administration and Inspection	15%			$7,996,000.00
				TOTAL:	**$79,961,000.00**
	ENGINEER'S OPINION OF PROJECT COST				**$80,000,000.00**

Project Summary
Engineer's Opinion of Probable Project Cost

Owner:	**Oakland County Water Resources Commissioner (WRC)**	**Date:**	**3/29/2023**
Project:	**COSDS Project Planning Document 2023**	**Project No.**	**0105-23-0030**
Work:	**CIPP Lining**	**Prepared By:**	**A. STIDAM**
		Reviewer:	**S. SIKLICH**
	[X] Conceptual [ ] Preliminary [ ] Final	**Current ENR:**	**13745**

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	$2,002,000	$2,002,000
2	Audio Video Route Survey	1	LSUM	$20,000	$20,000
3	Traffic Maintenance and Control	1	LSUM	$50,000	$50,000
4	Soil Erosion and Sedimentation Control	1	LSUM	$100,000	$100,000
5	Access Roads and Site Preparation, including Maintenance Aggregate	1	LSUM	$1,000,000	$1,000,000
6	Access Manhole Adjustments	96	Ea	$10,000	$960,000
7	Bypass Pumping, Furnish, Operate, and Remove	1	LSUM	$2,700,000	$2,700,000
8	Sanitary Sewer Cementitious Grouting	1	LSUM	$190,000	$190,000
9	Sanitary Sewer Chemical Grouting	1	LSUM	$740,000	$740,000
10	Sanitary Sewer, CIPP Liner, 42 inch, Full Length, including Cleaning and Televising	10,200	Ft	$425	$4,335,000
11	Sanitary Sewer, CIPP Liner, 48 inch, Full Length, including Cleaning and Televising	10,200	Ft	$525	$5,355,000
12	Sanitary Sewer, CIPP Liner, 54 inch, Full Length, including Cleaning and Televising	16,100	Ft	$725	$11,672,500
13	Odor and Corrosion Control Allowance	1	LSUM	$11,450,000	$11,450,000
14	Wetland Restoration	1	LSUM	$1,000,000	$1,000,000
15	Restoration	1	LSUM	$450,000	$450,000
				TOTAL ESTIMATED CONSTRUCTION COST	**$42,025,000**
	CONTRACTUAL REQUIREMENTS				
	General Conditions	6%			$2,522,000.00
	General Requirements	5%			$2,102,000.00
				TOTAL CONSTRUCTION COST:	**$46,649,000.00**
	PROJECT COSTS				
	Design and Construction Engineering	25%			$11,663,000.00
	Finance and Legal	5%			$2,333,000.00
	Easements	0.5%			$234,000.00
	Permits	4.5%			$2,100,000.00
	Construction Administration and Inspection	15%			$6,998,000.00
				TOTAL:	**$69,977,000.00**
	ENGINEER'S OPINION OF PROJECT COST				**$70,000,000.00**

Assumptions:

1 Assumes no sediment removal in excess of regular cleaning is needed prior to lining.
2 Assumes no open cut repairs are needed prior to lining.
3 Assumes no utility relocation is needed.
4 Does not include manhole rehabilitation work.

Project Summary
Engineer's Opinion of Probable Project Costs

OHM Advancing Communities
Engineering Advisors

Owner:	**Oakland County WRC COSDS**	**Date:**	**3/9/2023**
Project:	**Elizabeth Lake Pumping Station**	**Project No.**	**0105-23-0030**
Work:	**Pump Station Piping and Valves**	**Prepared By:**	**P. FLETCHER**
		Reviewer:	**M. KENNEDY**
	[X] Conceptual [ ] Preliminary [ ] Fina	**ENR:**	**13745**

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	**Demolition**				
	Removal of existing valves and piping	1	LS	$39,000	$39,000
2	**Sitework**				
	Crane	5	DAY	$1,500	$7,500
	Bypass Pumping	1	LS	$200,000	$200,000
	Wet Well Cleaning	1	LS	$100,000	$100,000
3	**Process**				
	Suction Valve 1 - 16"	1	LS	$25,000	$25,000
	Suction Valve 2 - 16"	1	LS	$25,000	$25,000
	Suction Valve 3 - 24"	1	LS	$33,000	$33,000
	Suction Valve 4 - 24"	1	LS	$33,000	$33,000
	Suction Valve 5 - 24"	1	LS	$33,000	$33,000
	Discharge Valve 1	1	LS	$18,000	$18,000
	Discharge Valve 2	1	LS	$18,000	$18,000
	Discharge Valve 3	1	LS	$33,000	$33,000
	Discharge Valve 4	1	LS	$33,000	$33,000
	Discharge Valve 5	1	LS	$33,000	$33,000
	Discharge Valve 6	1	LS	$18,000	$18,000
	Air Compressor - Suction/Discharge Valves	1	LS	$27,000	$27,000
	Isolation Valve - Pump 1	1	LS	$49,000	$49,000
	Isolation Valve - Pump 2	1	LS	$49,000	$49,000
	Isolation Valve - Pump 3	1	LS	$49,000	$49,000
	Isolation Valve - Pump 4	1	LS	$49,000	$49,000
	Isolation Valve - Pump 5	1	LS	$49,000	$49,000
	Isolation Valve - Pump 6	1	LS	$33,000	$33,000
	Crossover Valve	1	LS	$123,000	$123,000
	Main Effluent Discharge Valve - 24"	1	LS	$123,000	$123,000
	Main Effluent Discharge Valve - 30"	1	LS	$123,000	$123,000
	12-inch piping and fittings	1	LS	$58,000	$58,000
	16-inch piping and fittings	1	LS	$425,000	$425,000
	20-inch piping and fittings	1	LS	$1,428,000	$1,428,000
	Wet Well Supply Fan	1	LS	$35,000	$35,000
	Miscellaneous (25% of equipment)	1	LS	$8,750	$8,800
	Electrical (15% of electrical equipment installaton)	1	LS	$33,750	$33,800
	TOTAL ESTIMATED CONSTRUCTION COST				**$3,311,100**
	CONTRACTUAL REQUIREMENTS				
	General Conditions	10%			$332,000
	General Requirements	5%			$166,000
	Contingencies	25%			$828,000
	TOTAL CONSTRUCTION COST:				**$4,637,100**
	PROJECT COSTS				
	Design and Construction Engineering	25%			$1,160,000
	Finance and Legal	5%			$232,000
	Permits	5%			$232,000
	Construction Administration and Inspection	15%			$696,000
	TOTAL:				**$6,957,100**
	ENGINEER'S OPINION OF PROJECT COST				**$7,000,000**

APPENDIX E: PUBLIC MEETING DOCUMENTS

PLACEHOLDER FOR PUBLIC MEETING DOCUMENTS

APPENDIX F: SUBMITTAL FORM AND RESOLUTION FOR CWSRF PROJECT PLANNING DOCUMENT

PLACEHOLDER FOR CWSRF SUBMITTAL FORM AND RESOLUTION

APPENDIX G: PUMP STATION ASSETS AND FISCAL SUSTAINABILITY PLAN

FISCAL SUTAINABILITY PLAN

The Oakland County Water Resources Commissioner's (WRC) Clinton Oakland Sewage Disposal District (COSDS) received Stormwater, Asset Management, and Wastewater (SAW) Grant No. 1296-01 and developed an Asset Management Plan. The Executive Summary was submitted to EGLE in November 2020. Approximately 269,000 lineal feet of sanitary sewer was televised and scored in accordance using National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP) methodology. In fiscal year (FY) 2024, WRC plans to rehabilitate interceptor in the three areas specified in this Project Planning Document. Most of the piping had structural ratings of 4 or 5. There are short stretches of interceptor that had structural rating scores of 2s or 3s and were in between pipe segments that had structural rating scores of 4s and 5s. These interceptors were included to have continuous lined pipe, which will be more efficient than future spot lining as a separate project.

An inventory of assets at the Elizabeth Lake Pump Station was also performed as part of the SAW Grant and Asset Management Plan development. The assets included in this project planning document were identified in an updated capital improvement plan as requiring replacement in FY2024.

The user rates will be reviewed to provide sufficient revenue to maintain the assets in the collection system and at the Elizabeth Lake Pump Station.

Appendix C summarizes the PACP structural scores of the interceptors that are proposed to be CIPP lined. The Elizabeth Lake Pump Station assets to be replaced are summarized in this appendix.

Elizabeth Lake Pump Station Asset Inventory
CWSRF FY2024

			Critical Attributes				CoF Assignments					
Asset Description	**Asset ID**	**Location (Floor/Room/etc.)**	In Service/ Install Date	Cost Year	Replacement Cost CIP	Replacement Cost Estimate	Safety of Public and Staff	Financial Impact	Public Confidence and Agency Image	Regulatory Compliance & Environmental	Service Interruption	CoF Score
Suction Valve 1 and Actuator - 16"	1093208	Floor 1, 3302 W Elizabeth Lake Road, Waterford MI	1/1/1968	2023	$ 62,000	$ 25,000	4	1	3	2	4	2.8
Suction Valve 2 and Actuator - 16"	1093209	Floor 1, 3302 W Elizabeth Lake Road, Waterford MI	1/1/1968	2023	$ 62,000	$ 25,000	4	1	3	2	4	2.8
Suction Valve 3 and Actuator - 24"	1093210	Floor 1, 3302 W Elizabeth Lake Road, Waterford MI	1/1/1968	2023	$ 68,000	$ 33,000	4	1	3	2	4	2.8
Suction Valve 4 and Actuator - 24"	1093211	Floor 1, 3302 W Elizabeth Lake Road, Waterford MI	1/1/1968	2023	$ 68,000	$ 33,000	4	1	3	2	4	2.8
Suction Valve 5 and Actuator - 24"	1093212	Floor 1, 3302 W Elizabeth Lake Road, Waterford MI	1/1/1968	2023	$ 68,000	$ 33,000	4	1	3	2	4	2.8
Discharge Valve 1 and Actuator	1093213	Floor 1, 3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 25,000	$ 18,000	2	1	1	1	1	1.2
Discharge Valve 2 and Actuator	1093214	Floor 1, 3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 25,000	$ 18,000	2	1	1	1	1	1.2
Discharge Valve 3 and Actuator	1093215	Floor 1, 3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 25,000	$ 33,000	2	1	1	1	1	1.2
Discharge Valve 4 and Actuator	1093216	Floor 1, 3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 25,000	$ 33,000	2	1	1	1	1	1.2
Discharge Valve 5 and Actuator	1093217	Floor 1, 3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 25,000	$ 33,000	2	1	1	1	1	1.2
Discharge Valve 6 and Actuator	1093218	Floor 1, 3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 25,000	$ 18,000	2	1	1	1	1	1.2
Air Compressor - Suction/Discharge Valves	1093219	3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 23,000	$ 27,000	1	1	1	1	1	1
5 Ton Mono Rail Crane - Dry Well Grade level	1093254	3302 W Elizabeth Lake Road, Waterford MI	1/1/1968	2023	$ 52,000	$ 55,000	1	1	1	1	2	1.2
Isolation Valve - Raw Sewage Pump 1	1093259	3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 16,000	$ 49,000	2	1	1	1	1	1.2
Isolation Valve - Raw Sewage Pump 2	1093260	3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 16,000	$ 49,000	2	1	1	1	1	1.2
Isolation Valve - Raw Sewage Pump 3	1093261	3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 22,000	$ 49,000	2	1	1	1	1	1.2
Isolation Valve - Raw Sewage Pump 4	1093262	3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 22,000	$ 49,000	2	1	1	1	1	1.2
Isolation Valve - Raw Sewage Pump 5	1093263	3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 22,000	$ 49,000	2	1	1	1	1	1.2
Isolation Valve - Raw Sewage Pump 6	1093263	3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 22,000	$ 49,000	2	1	1	1	1	1.2
Crossover Valve (24" to 30")	1093264	3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 22,000	$ 123,000	2	1	1	1	1	1.2
Main Effluent Discharge 24" Valve	1093265	3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 22,000	$ 123,000	2	1	1	1	1	1.2
Main Effluent Discharge 30" Valve	1093266	3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 22,000	$ 123,000	2	1	1	1	1	1.2
General Piping	1093267	3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 1,000,000	$ 1,911,000	4	5	4	4	4	4.2
Wet Well Supply Fan	1093290	3302 W Elizabeth Lake Road, Waterford MI	1/1/2001	2023	$ 30,000	$ 35,000	3	1	1	2	2	1.8

Fiscal Sustainability Plan Certification Form

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

The Oakland County Water Resources Commissioner proposes to rehabilitate three sections of the sanitary sewer, as well as rehabilitate the Elizabeth Lake Pump Station based on the COSDS Master Plan.

Check one box below:

☐ FSP does not apply because:

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

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

(Name) (Phone)

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

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

Signature of Authorized Representative Date