CWSRF STORMWATER PROJECT PLAN FOR THE JOACHIM DRAIN DRAINAGE DISTRICT IMPROVEMENTS

FOR OAKLAND COUNTY WATER RESOURCES COMMISSIONER

WRC
WATER RESOURCES COMMISSIONER

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Versions:

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SECTION 1.0 — SUMMARY AND RECOMMENDATION

1.1 SUMMARY

The Project Plan for the Joachim Drain Drainage District Improvements Project has been prepared using the Project Plan Preparation Guidance of the Clean Water State Revolving Fund (CWSRF) Administrative Rules. While the rates have not been set yet for FY2024, the rates in FY2023 are 1.875% and 2.125% for 20-year loans and 30-year loans, respectively. These rules call for compliance with the basic Federal Planning Requirements and the National Environmental Policy Act (NEPA). This Project Plan must be submitted to the Michigan Department of Environment, Great Lakes, & Energy (EGLE) by May 1, 2023, in order to be on the project priority list for the fiscal year of 2024.

The Oakland County Water Resources Commissioner's Office (OCWRC) submitted an Intent to Apply for a Stormwater Project Plan for SRF funding on October 28, 2022. This Project Plan is intended to identify projects within Joachim Drain Drainage District, obtain funding, and work toward ensuring the Drain continues to meet its required level of service as established by OCWRC's Asset Management Program.

OCWRC has decided to take action to improve stormwater network and water quality within the Joachim Drain Drainage District. The proposed projects listed herein as part of this CWSRF Project Plan are to address existing structural defects in the storm sewer pipes as well as structural defects in the storm outfall and weir structures. The project proposed in this Project Plan will help reduce stormwater pollutants and manage flow in Joachim Drain by rehabilitating storm pipes, pipe structures, and its weir structure.

Focusing on the pollutant removal within the drainage district will help the County archive EGLE's enforced Total Maximum Daily Load (TMDL) for phosphorous, Escherichia coli (E. coli), dissolved oxygen (D.O.) and biota. The Oakland County Water Resources Commissioner (WRC) welcomes any funding available to assist with the Joachim Drainage District to rehabilitate this aged system at a minimal cost to a community with limited financial resources.

1.2 CONCLUSIONS

The following is a summary of the proposed projects:

- Rehabilitation of the Joachim Drain Drainage District Drop Weir Structure located at Galloway Lake, north of University Drive at Doris Street in the city of Pontiac.
- Pipe rehabilitation, including five storm sewer pipes of the same dimensions and design.
- Spalled concrete on the exiting outfall would be repaired with rehabilitation and new specialty coatings. Backfill would be added around the outfall and the slopes stabilized. A new safety railing would also be installed.

1.3 RECOMMENDATIONS

The selected projects identified in this Plan have been reviewed and found to be the most cost-effective and environmentally-sound alternatives. The following recommendations are therefore to be made:

- A resolution should be formally adopted approving acceptance and implementation of this Plan.
- The WRC should apply for a low-interest loan under the CWSRF program and apply for disadvantaged grant funding and/or principal forgiveness.

SECTION 2.0 — BACKGROUND

2.1 STUDY AND SERVICE AREAS:

The Joachim Drain is an established County Drain under the Chapter 20 Drain Code, Act 40 of 1956. The Drain Code Act 40 of 1956 gives the Oakland County Water Commissioner powers and responsibilities to maintain and govern legally established drainage systems within the County. The Joachim Drain Drainage District is located entirely within the City of Pontiac, Oakland County, Michigan. The Joachim Drain Drainage District consists of approximately 408 acres. The Joachim Drain Drainage District is shown in Figure 2-1

2.1.1 Land Use in Study Area

The largest three land use types within the Joachim Drain Drainage District (excluding open space and utilities) are single–family residential (33%), Public/Institutional (8.4%), and Multiple Family (8.4%). The existing land use within the Joachim Drainage District is shown in Figure 2-3 and summarized the following table. The predicted future land use within the drainage district is expected to be consistent with the existing conditions since much of the drainage district is fully developed.

Table 2-1: Joachim Drainage District Land Use Acreage 2020

Land Cover Type	Acreage	Percent of Total Area
Single Family Residential	133.40	33%
Multiple Family	34.02	8.4%
Mobile Home Park	0	0%
Commercial/Office	19.68	4.86%
Industrial	0	0%
Public/Institutional	81.41	20.1%
Recreation/Open Space	0.67	0.16%
Road ROW	67.06	16.57%
TCU	0.21	0.05%
Vacant	68.04	16.82%
Water	0.07	0.02%
Railroad ROW	0	0%
Total	**404.58**	**100%**

Data provided by SEMCOG land use data: https://semcog.org/community-profiles#Land

2.1.2 Parks and Recreational Areas

See Figure 2-2 the Joachim Drain District Parks and Recreation map for locations of recreation areas within the drainage district.

2.2 POPULATION DATA

According to Southeast Michigan Council of Governments (SEMCOG), the 2020 United States Census estimated the population for the Joachim Drain Drainage District as 5,636, which is an increase of approximately 191 people since 2010. The U.S. 2020 Census Bureau data estimated the average household size in the County at 2.3 people

per household. The population projections for Joachim Drain Drainage District, City of Pontiac, and Oakland County are shown below in Table 2-2:

Table 2-2: Population Projections

Year	Joachim Drain Drainage District	City of Pontiac Population	Oakland County Population
1940	--	66,626	254,068
2000	--	67,506	1,194,156
2010	--	59,515	1,202,362
2020	5,636 **	61,606	1,274,395
2030	--	60,685*	1,286,750*
2040	--	*61,079**	*1,314,016**
2045	--	*61,667**	*1,319,089**

** SEMCOG projections: https://semcog.org/population-estimates*
*** Estimated using 2020 Census parcel data*

Recent projections for the next 20 years show the population to have a slight increase from the 2020 Census in the District. Data shows the population slightly increased after 2010, decrease slightly after 2020, then continue to increase after 2030.

For the purposes of this CWSRF project plan, a 20-year projection is required for calculations of future system demand and total present worth. Forecast from SEMCOG projects population in 2045 to be approximately 5,642. See Appendix A for attached documentation of contact with the SEMCOG, notifying them of this proposed Project Plan.

2.2.1 Economic Characteristics

The Joachim Drain Drainage District is located entirely within the City of Pontiac with costs paid through the City's general fund. The median household income for the City of Pontiac is $36,214 and the average taxable value is $14,274. The median household income is significantly lower than the median Michigan household income of $63,498 and the City (and therefore the District) meets EGLE's criteria for "Significantly Overburdened."

2.3 EXISTING ENVIRONMENT EVALUATION

2.3.1 Cultural Resources:

Oakland County is committed to preserving and protecting historical sites. The Michigan State Historic Preservation Act provides local governments, non-profits, and property owners with historic preservation services and training. The following link was consulted to determine the Historic Places located within the City of Pontiac: National Archives NextGen Catalog (*https://catalog.archives.gov/id/25337646*.)

The National Register of Historic Places noted key historic sites within the City of Pontiac: Casa del Ray Apartments, Central Highschool, Eastern Michigan Asylum Historic Society, Eastern Michigan Asylum Historic District (Boundary Decrease), Fairgrove Avenue Historic District, Franklin Boulevard Historic District, Grinnell Brothers

Music House, Howard, Horatio N. House, Modern Housing Corporation Addition Historic District, Myrick-Palmer House, Oak Hill Cemetery, Pontiac Commercial Historic District, Pontiac Commercial Historic District (Boundary Increase), St. Vincent DePaul Catholic Church, Convent, and School, and Wisner House. While some of the Historical Sites are located within the proposed Project Area, the work being done will not impact the historical sites listed above.

2.3.2 Air Quality:

Through the use of the EGLE Air Monitoring Site Map (Air Monitoring Sites (arcgis.com), it has been determined that Oakland County is in compliance with all applicable standards. This project, and the alternatives discussed will have no impact on the quality of the air in the Project Area. None of the NESHAP or Natural Resources and Environmental Protection Act (NREPA) regulations are anticipated. However, if encountered prior to or during the design and construction phases all hazardous wastes, liquid industrial by-products, solid wastes (including contaminated soils), building materials containing asbestos shall be managed accordingly and disposed of properly.

2.3.3 Wetlands:

There are areas identified as wetlands on the National Wetlands Inventory (NWI) or Michigan Resource Information System (MIRIS) Land Cover maps within the drainage district or associated with the proposed limits of work. The proposed work will be located mainly within the Drain easements and roadway rights-of-way. Since the proposed work will be rehabilitating existing storm pipes and structures, no impacts to any existing wetland areas are expected. However, for final design, any wetlands that may be impacted would be flagged, applications for the appropriate permits will be submitted and necessary mitigation measures will be undertaken to protect the influenced wetlands. However, it is not anticipated to be an issue for this project. The wetland map for the Joachim Drainage District is shown in Figure 2-4.

2.3.4 Great Lake Shorelands, Coastal Zones, and Costal Management Areas:

There are no coastal zones located with the Project Area and therefore no impacts are anticipated.

2.3.5 Floodplains:

We have identified various floodplains located within the Joachim Drain Drainage District based on the Flood Insurance Rate Maps (FIRM) on the Federal Emergency Management Agency (FEMA) website. Since the proposed work will be rehabilitating existing storm pipes and structures no impacts to any existing floodplains are expected. However, if isolated excavations must be located within the 100-year floodplain, construction will only be undertaken after first contacting EGLE and obtaining the appropriate permits. Appropriate mitigation measures and soil erosion efforts will be undertaken to protect the floodplains and surface waters influenced by the project, including but not limited to silt fences, turbidity curtains, stone check dams, gravel access drives, rip-rap, etc. Additionally, excavations will be filled with appropriate backfill materials, compacted and restored to existing grade with surface restoration matching existing vegetation. The floodplain map is shown in Figure 2-5.

2.3.6 Natural or Wild and Scenic Rivers:

Figure 2-6 and Figure 2-7 show that there are no state-designated rivers within the project limits. Therefore, this proposed project should not interface with any River that is considered a state-designated segment.

2.3.7 Major Surface Waters:

While various inland waterways are present throughout the Drainage District, the proposed rehabilitation work will be conducted on the existing storm pipes and structures, and will have no impact on any existing major surface waters.

2.3.8 Topography:

The terrain within the Joachim Drain District is characterized by a sloped topography generally decreasing from west to east and ranging from 1,093 to 857 feet throughout the District. Details of the topography within the District can be seen in Figure 2-9.

2.3.9 Geology:

The Joachim Drain District and surrounding area is typified by Coldwater Shale bedrock, overlain by a thin layer of unconsolidated glacial deposits. The sedimentary strata were deposited during the Mississippian period in the Michigan Basin (360 to 325 million years old); just above or below sea level. The sedimentary deposits consist primarily of sand and gravel.

2.3.10 Soil Types:

According to the United States Department of Agriculture (USDA) online Web Soil Survey, the project area consists of a variety of different types of soils, the most common types of soil are: Urban Land, Loam, Sany Loam, and Pits. Details of the soil types within the District can be found in Figure 2-8.

2.3.11 Agricultural Resources:

There is no agricultural land located within the Project Area limits. Therefore, no agricultural resources will be impacted by the proposed work.

2.3.12 Fauna and Flora:

Please see Figure 2-10 for a complete list of all fauna and flora species within the Project Area that are deemed as threatened, endangered, or in a state of special concern. The work being done in the Project Area will not directly impact any of the species discussed in this section.

2.3.13 Climate:

The project area's climate is controlled by its location with respect to major storm tracks that pass through the Midwest and by the influence of the Great Lakes. The normal wintertime storm track is southeast of the Joachim Drain Drainage District and most passing storms bring periods of snow or rain. The Great Lakes tend to moderate and smooth out most climate extremes. Precipitation is distributed through all months of the year. The most pronounced effect on the climate by the Great Lakes occurs in the colder part of the winter. Arctic air moving across the lakes is warmed and moistened. Cold waves approaching from the northern plains are reduced in intensity, which lessens the severity of these events. However, there is also an excess of cloudiness and very little sunshine in the winter.

Summers in the Detroit metropolitan area are warm and sunny. Showers usually occur every few days, but often fall on only part of the Metropolitan Detroit area. Extended periods of drought are unusual. Each year, there are two or three series of days with temperatures in the nineties. The highest temperatures are often accompanied by high humidity. In winter, skies are cloudy and temperature averages near the freezing point. Day to day changes

typically is not significant. The temperature drops to near or a little below zero once or twice each year. Winter storms may bring rain, snow, or both. Freezing rain and sleet are not unusual. Snowstorms average about three (3) inches of accumulation, but heavier amounts are recorded several times each year.

The growing season averages 180 days in length and historically has ranged from 145 days to 205 days. The average date of the last freezing is April 23; average date of the first freezing temperature is October 21.

Climatological data is collected by the National Oceanic and Atmospheric Administration (NOAA) at Detroit Metropolitan Wayne County Airport. This project, and the alternatives discussed, will have no impact on the climate of the project area.

2.4 EXISTING SYSTEM

2.4.1 General

The Oakland County Water Resources Commissioner's Office is responsible for the design, construction, operation, and maintenance of over 500 stormwater management systems and flood control systems within Oakland County. This includes approximately 500 miles of drains. These range from open channel flow to enclosed systems and lake level controls. Additionally, Oakland County has storm sewer conveyance systems with numerous inlets and catch basins.

All developments discharged to a county-owned system must follow Oakland County's Stormwater Engineering Design Standards. Most communities have also adopted the County's Design Standards, and both new developments and redevelopments are subject to these standards. If construction exceeds one acre of land, then channel protection rate control, channel protection volume control, water quality control, and detention and flood control storage are to be provided. Discussion of the existing municipal sewage conveyance, treatment, and disposal facilities are not applicable to the proposed stormwater improvement projects.

2.4.2 System Assets

The Joachim Drain Drainage District contains the following storm sewer system assets:

- 49 catch basins
- 43 manholes
- 12 inlets
- 2 pipe outlets.
- 11,865.5 lineal feet of (111 segments) of gravity storm pipe ranging from 12" to 54" inch diameter and several elliptical sections of pipe of up to 75" by 112" in size.
- A weir structure located at the lower terminus of the Joachim Drain and Galloway Lake

The Drain outlets to the Galloway Creek surface water course, just upstream of the weir structure. The storm sewer system and weir structure were designed to collect and convey stormwater runoff from a primarily residential area and outlet the flow to the Galloway Creek. The weir structure restricts and attenuates the outflows from the Drain (and upstream Galloway Creek) and fills Galloway Lake. The weir overflows into the lower Galloway Creek, which in turn, flows into the Clinton River.

2.4.3 System Operation and Maintenance

No major rehabilitations have been completed since the Joachim Drain was constructed to date, but the County continues to operate and perform general maintenance as needed, including regular inspections.

2.4.4 Climate Resiliency

The system is somewhat susceptible to climate impacts, particularly flooding if rainfall amounts and intensities continue to increase. The proposed projects are intended to provide additional resiliency by insuring they can continue to meet at least existing design criteria.

2.5 NEED FOR PROJECT

OCWRC has decided to take action to improve stormwater network and water quality within the Joachim Drain Drainage District. An inspection was made of the downstream portion of the storm sewer system, generally along the southern portion of Galloway Lake. The inspection included review of those storm sewer pipes, which included approximately 901 lineal feet of 75" x 112" elliptical pipe and approximately 545 lineal feet of 52" x 77" elliptical pipe, and the adjacent outfall to the surface water. The enclosed pipes were reviewed using the National Association of Sewer Services Companies (NASSCO) Pipeline Assessment Certification Program (PACP) system, which uses a defect scale of 1 to 5 (1 is “minor defect” and 5 is “most significant defect.”) The pipes were also reviewed using evaluation criteria from the American Association of State Highway and Transportation Officials (AASHTO), which uses a scale of 1 to 4 (1 is “good” and 4 is “poor.”). The associated scores and detailed inspection notes, along with recommendations for rehabilitation, are included in the report in Appendix G

Three of the five storm sewer pipes reviewed were found to have Level 4 PACP structural defects (“quick structural pipe scores” of 4100, 4431, and 4333.) The other two pipes were found to have at least Level 3 PACP structural defects (“quick structural pipe scores” scores of 3621 and 3300.) Using the AASHTO system, the pipes and outfall were classified as “fair to poor.” The report recommends rehabilitating the entire stretch of pipe and repairing the outfall at the same time, which will reduce the overall cost as the system must by temporarily dammed and dewatered in order to perform the required repairs.

In addition, subsequent investigations have found that the weir has significant structural issues that are causing flows to bypass the weir, and it is no longer able to function as designed. The weir should be repaired at the same time as the storm sewer improvements. See Appendix G for photos of the weir condition.

The projects proposed in the Alternatives Analysis will help reduce stormwater pollutants and better manage flow in Joachim Drain by rehabilitating the storm pipes, the outfall and the weir structure. Without the proposed projects, the pipes and outfall will continue to deteriorate and be at risk of sudden failure, which will not only cause flooding but also increase the amount of sediment into the surface waters. The weir, as it was originally designed and constructed, helps attenuate flows downstream in the Galloway Creek and Clinton River, which reduces harmful erosion that increases sediment in the surface waters. It also provides detention of flows in the upstream Galloway Lake, which helps improve water quality downstream by using the wetland areas for trapping excess nutrients and sediments.

Focusing on the pollutant removal within the drainage district will help the County archive EGLE’s enforced Total Maximum Daily Load (TMDL) for phosphorous, Escherichia coli (E. coli), dissolved oxygen (D.O.) and biota. The Oakland County Water Resources Commissioner (WRC) welcomes any funding available to assist with the Joachim Drainage District to rehabilitate this aged system at a minimal cost to a community with limited financial resources.

2.6 PROJECTED FUTURE NEEDS

The County has anticipated that possible point source stormwater treatment upgrades and improvements and repairs to the existing storm pipes and structures will be needed within the 20 year planning period. OCWRC has a comprehensive Asset Management Program that includes a GIS inventory of assets, computerized maintenance management system (CMMS, currently Cityworks) that manages work orders and costs, and an asset optimization software package (currently PowerPlan AIO) that is used to track and estimate future investment needs. The proposed improvement projects have been coordinated with these future needs.

2.6.1 NPDES Permit

The NPDES permit program aims to protect water resources by addressing point source water pollution. Initiated by Clean Water Act in 1972, the NPDES permit program controls the discharge of pollutants into surface waters by imposing effluent limitations to protect water quality. Although NPDES is a federal program, Michigan has been granted the authority to implement the program. Most stormwater outfalls into the Clinton River and contributing waterways within Oakland County are permitted NPDES Municipal Separate Storm Sewer Systems (MS4) under the jurisdiction of Oakland County and each individual Community's permit. The permits have six minimum requirements that must be maintained for compliance.

2.6.1.1. Water Quality Problems, Point and Nonpoint Sources of Pollution

Implementation of the stormwater improvements and management practices proposed in this Plan will help achieve those goals identified in the watershed and asset management plans.

Public involvement will be an integral part of the project implementation. Involving the public in the Project Plan development process and increasing the public awareness of the improvements that result from the projects will elevate the public's understanding of their role in protecting and enhancing watershed resources.

The target pollutant associated with stormwater runoff that will be reduced due to the proposed project identified in this Plan is Sedimentation and *E. coli.*

Sedimentation is when particulates settle out of the water. When large amounts of sediment start to settle out, they can clog the pipes, reduce the hydraulic capacity and deteriorate water quality. Sediment can carry pollutants such as chemicals, heavy metals, bacteria into the water body and degrade its overall water quality. Sedimentation is made worse by urban development, industrial activities, agriculture, dredging, channel alterations. The purpose of the TMDL created for sedimentation is to restore water quality to improve the natural habitats, macroinvertebrate populations, and fish populations.

E. coli is a bacterium that can enter the watershed from animal waste and other sources. This is a significant pollutant in the State of Michigan, specifically Oakland County. This has been established through Michigan's Statewide established TMDL for *E coli* (2019) as well as the Lower Clinton River's TMDL (2010). The sources have been attributed, in part, to stormwater runoff caused by urban development.

The proposed improvement projects within this plan are intended to improve conveyance capacity, reduce sediment deposition, and improve water quality.

Figure 2-1: Joachim Drain Drainage District Map

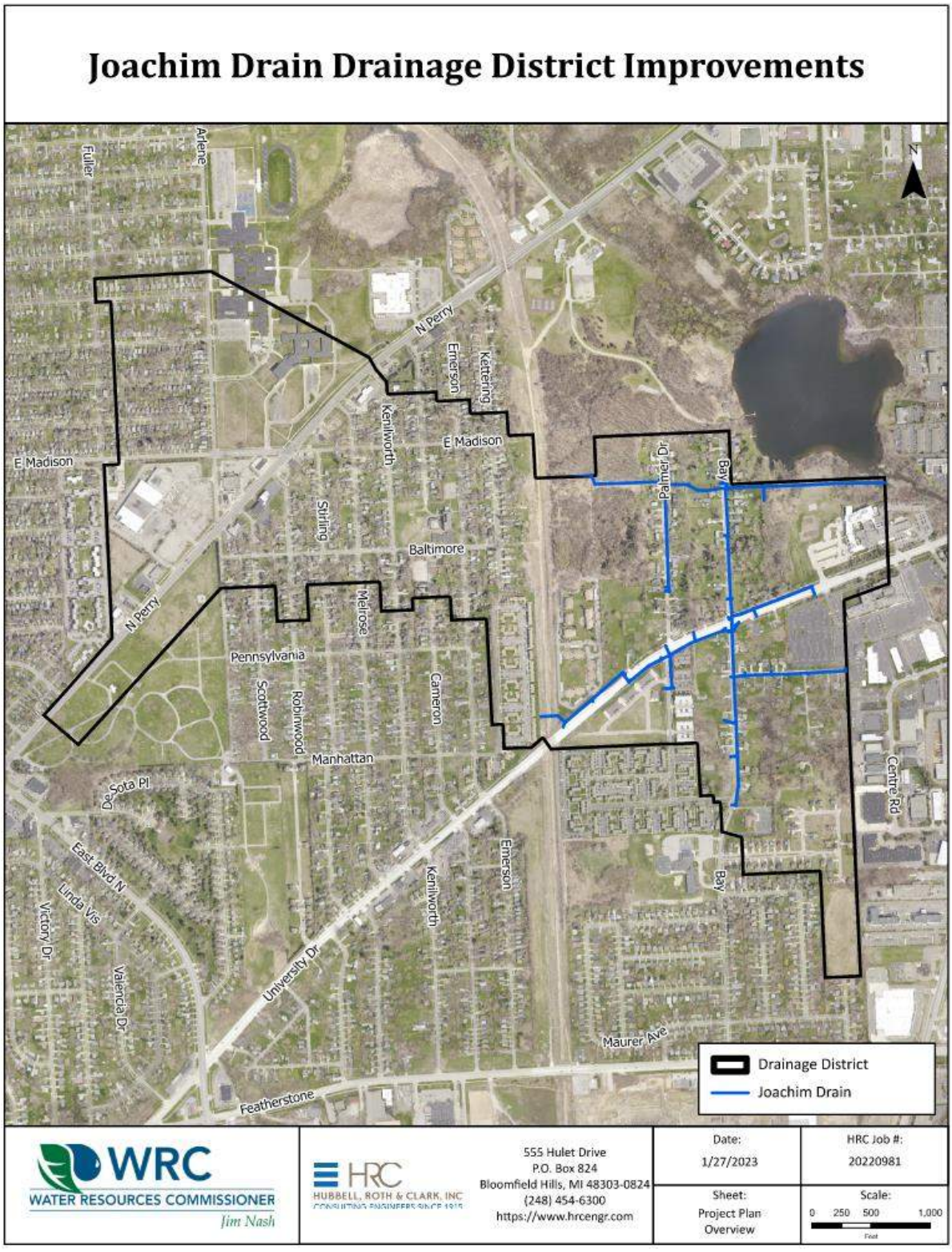


Figure 2-2: Joachim Drain Drainage District Parks and Recreation Map

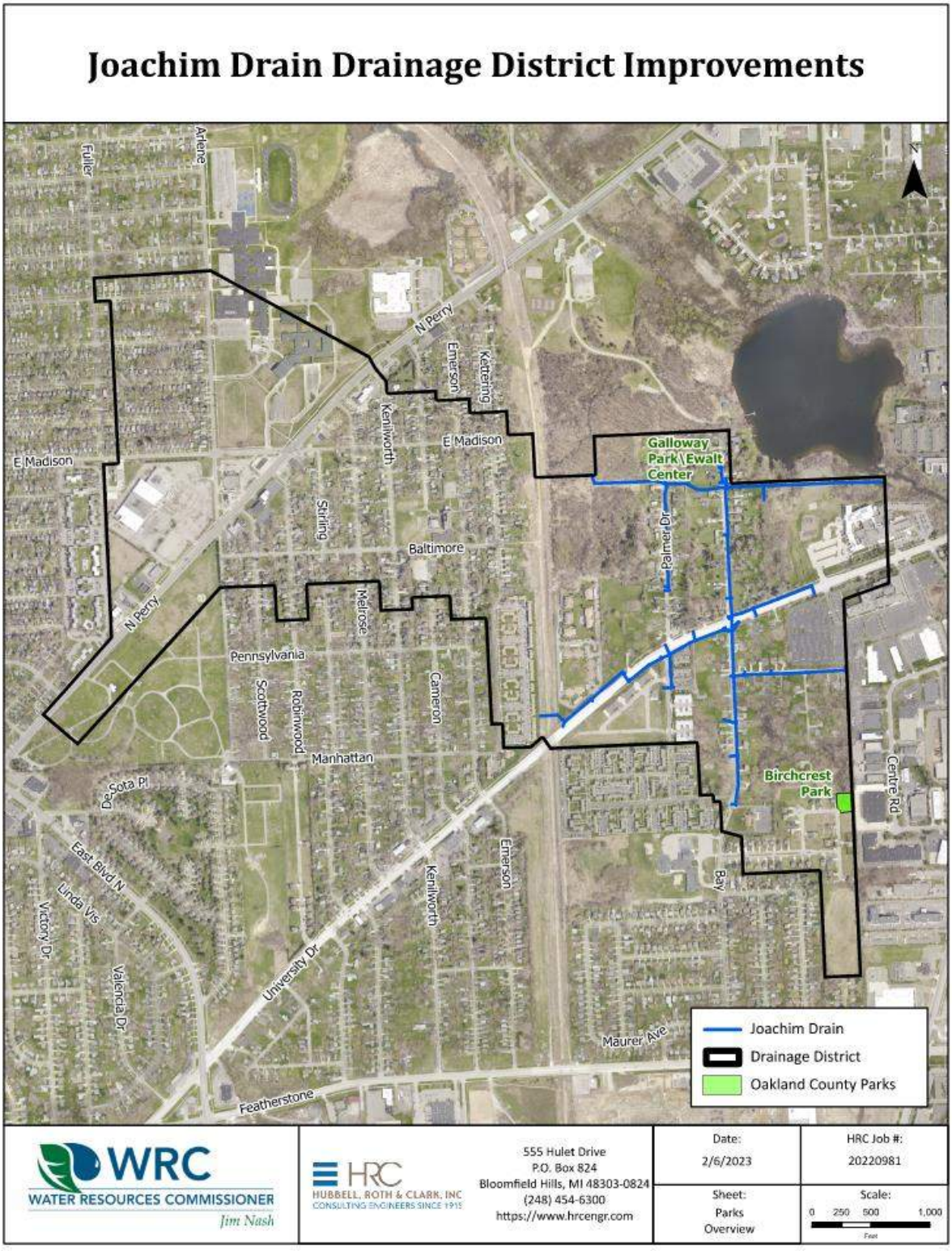


Figure 2-3: Joachim Drain Drainage District Land Use Map

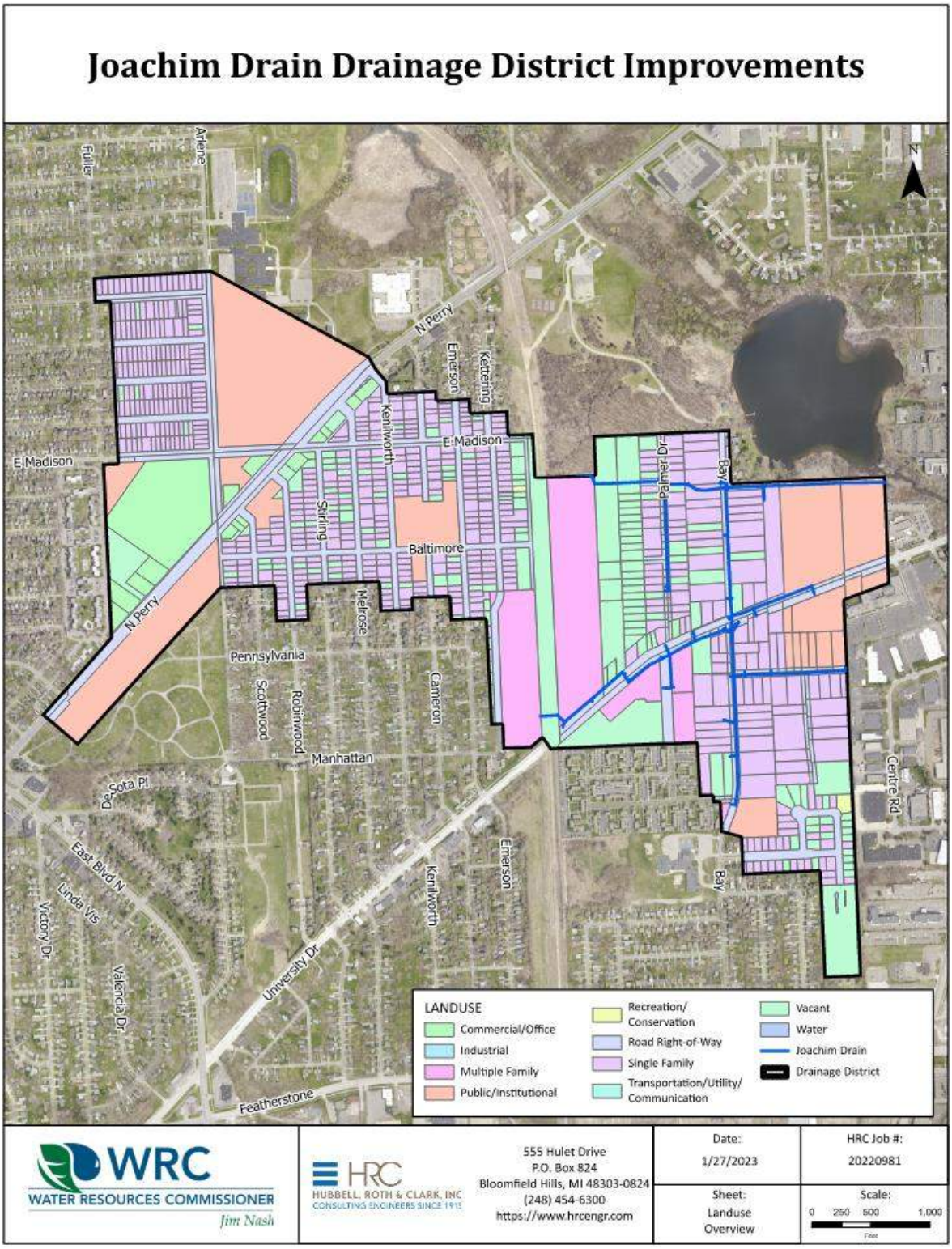


Figure 2-4: Joachim Drain Drainage District National Wetland Map

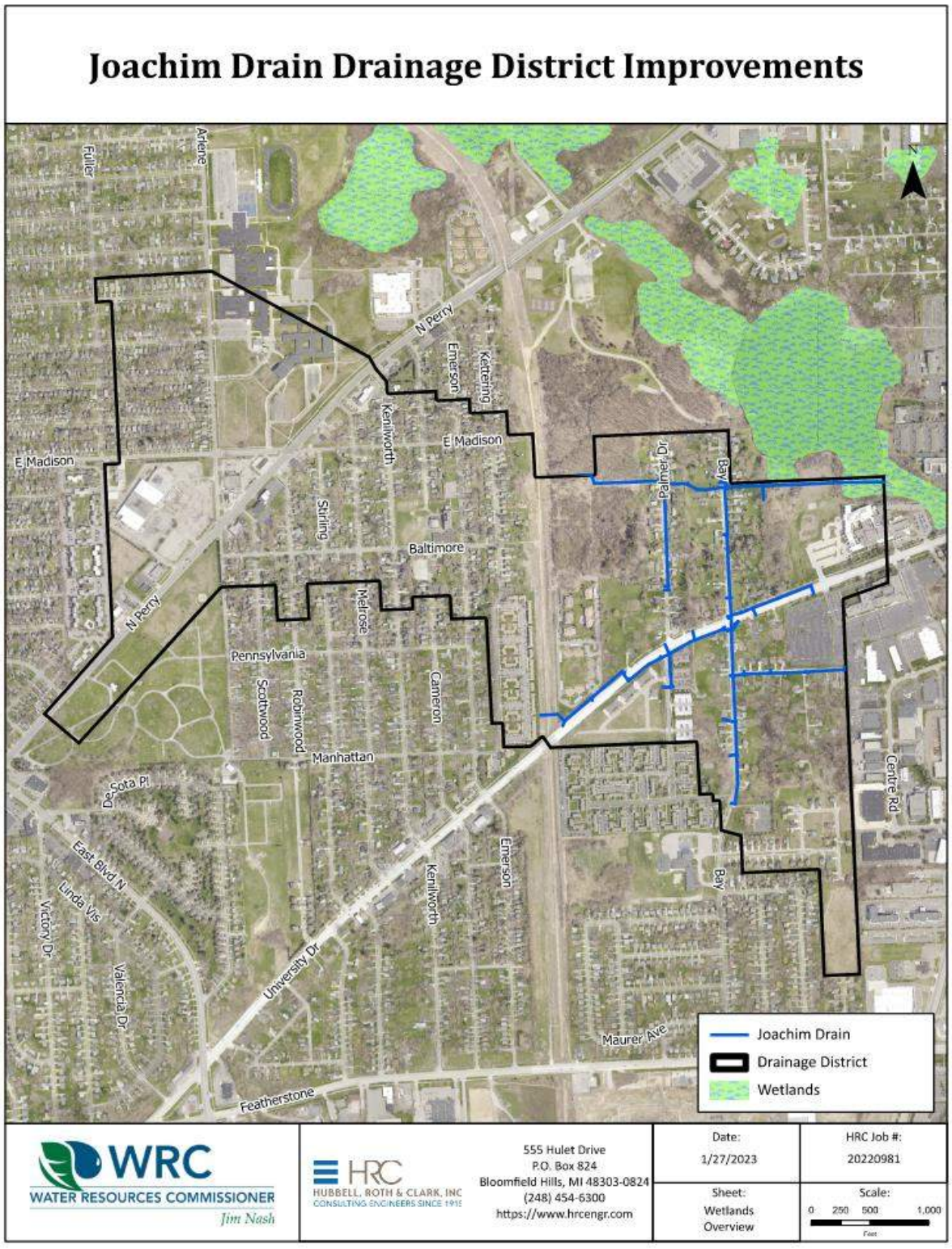


Figure 2-5: Joachim Drain Drainage District Floodplain Area

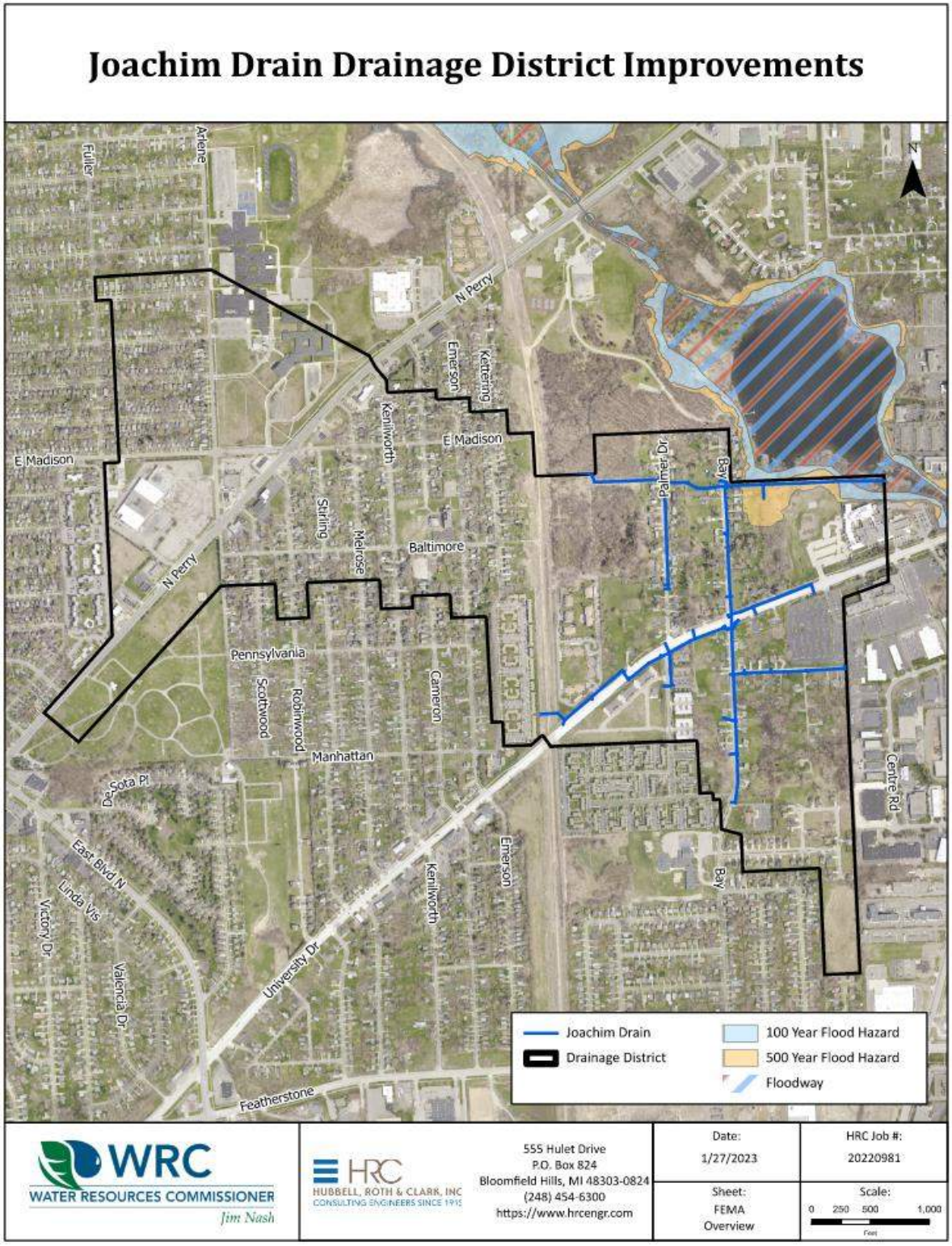


Figure 2-6: National River Inventory Map

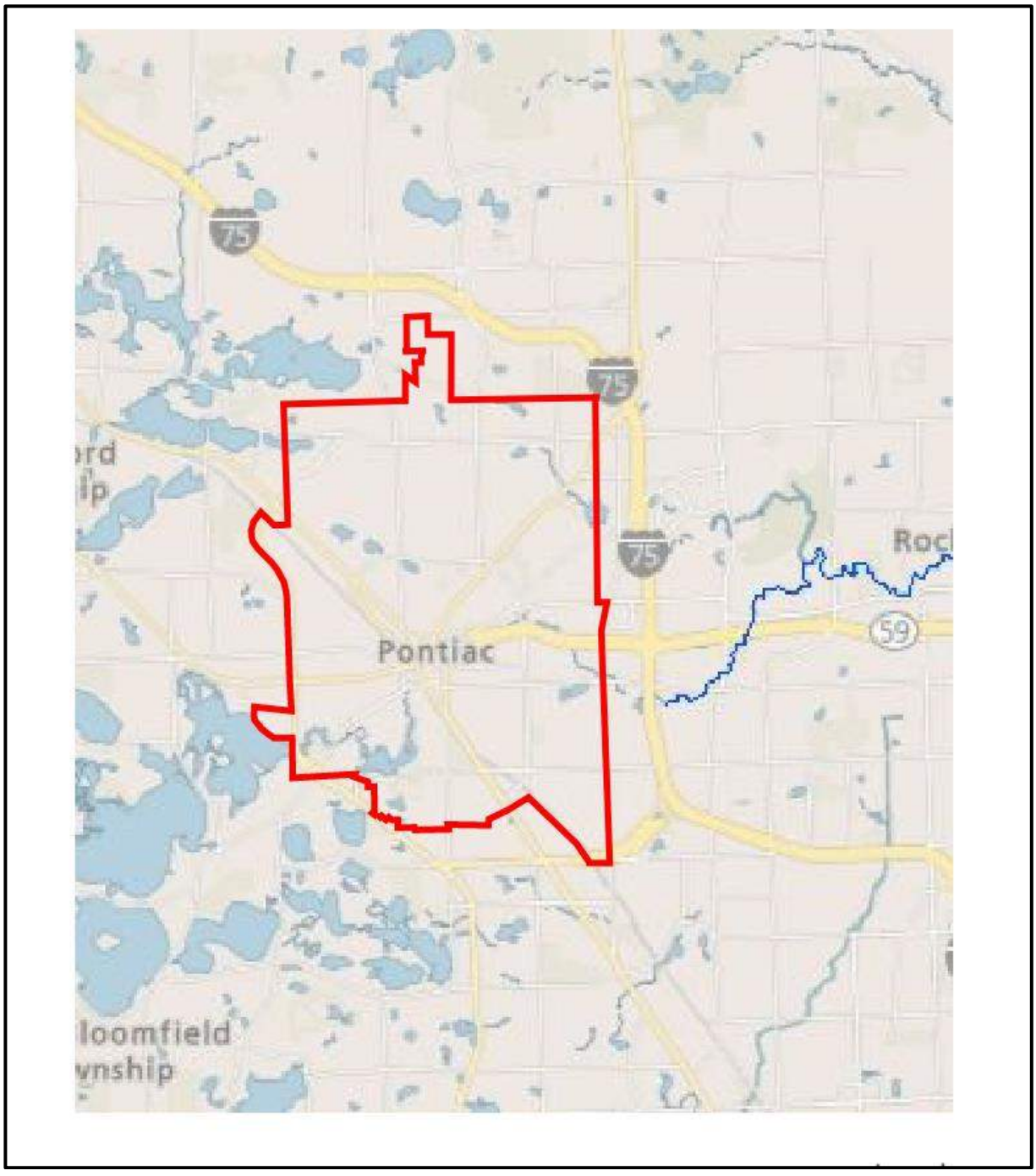


Figure 2-7: Michigan Natural River Inventory Map

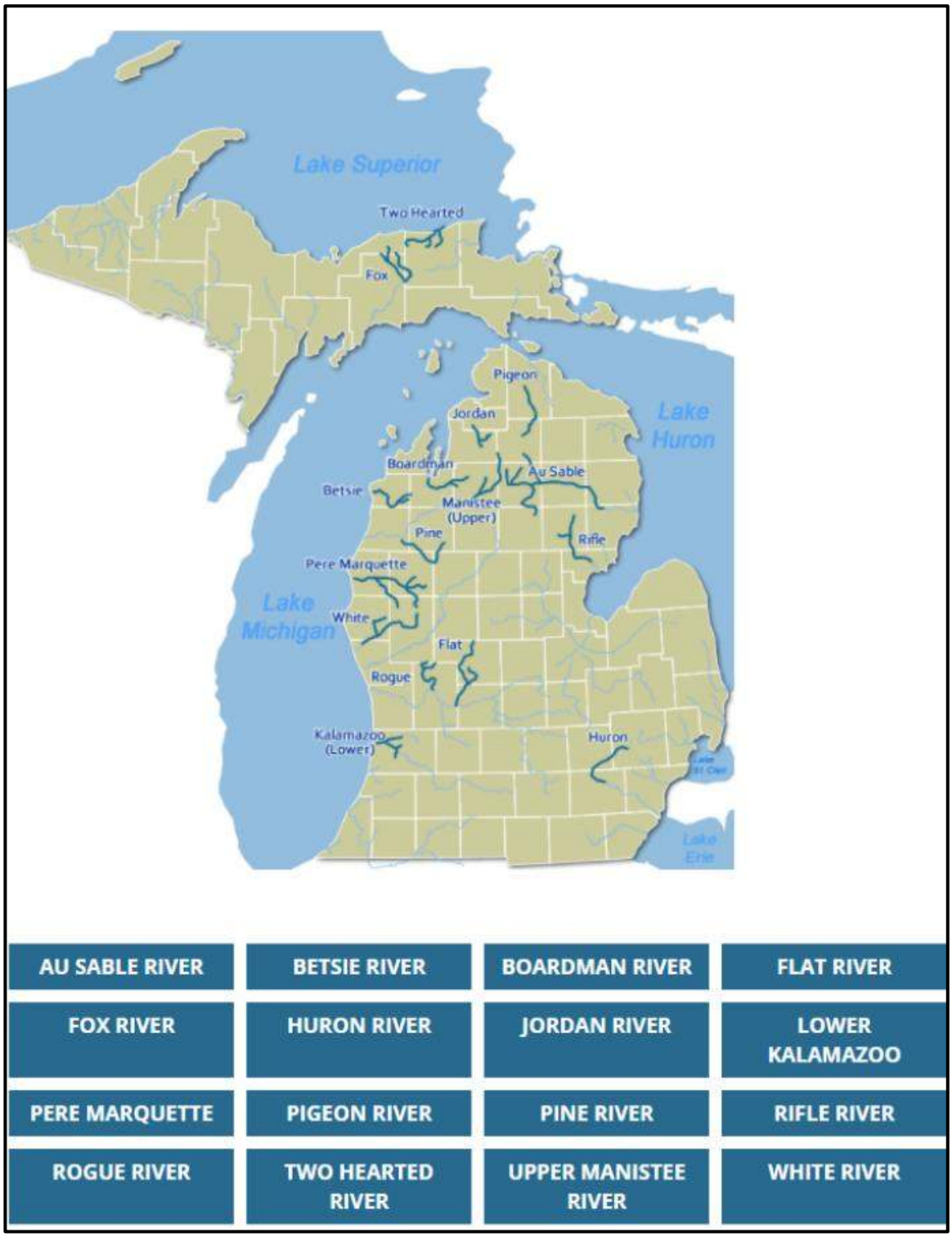


Figure 2-8: Joachim Drain Drainage Soil Map

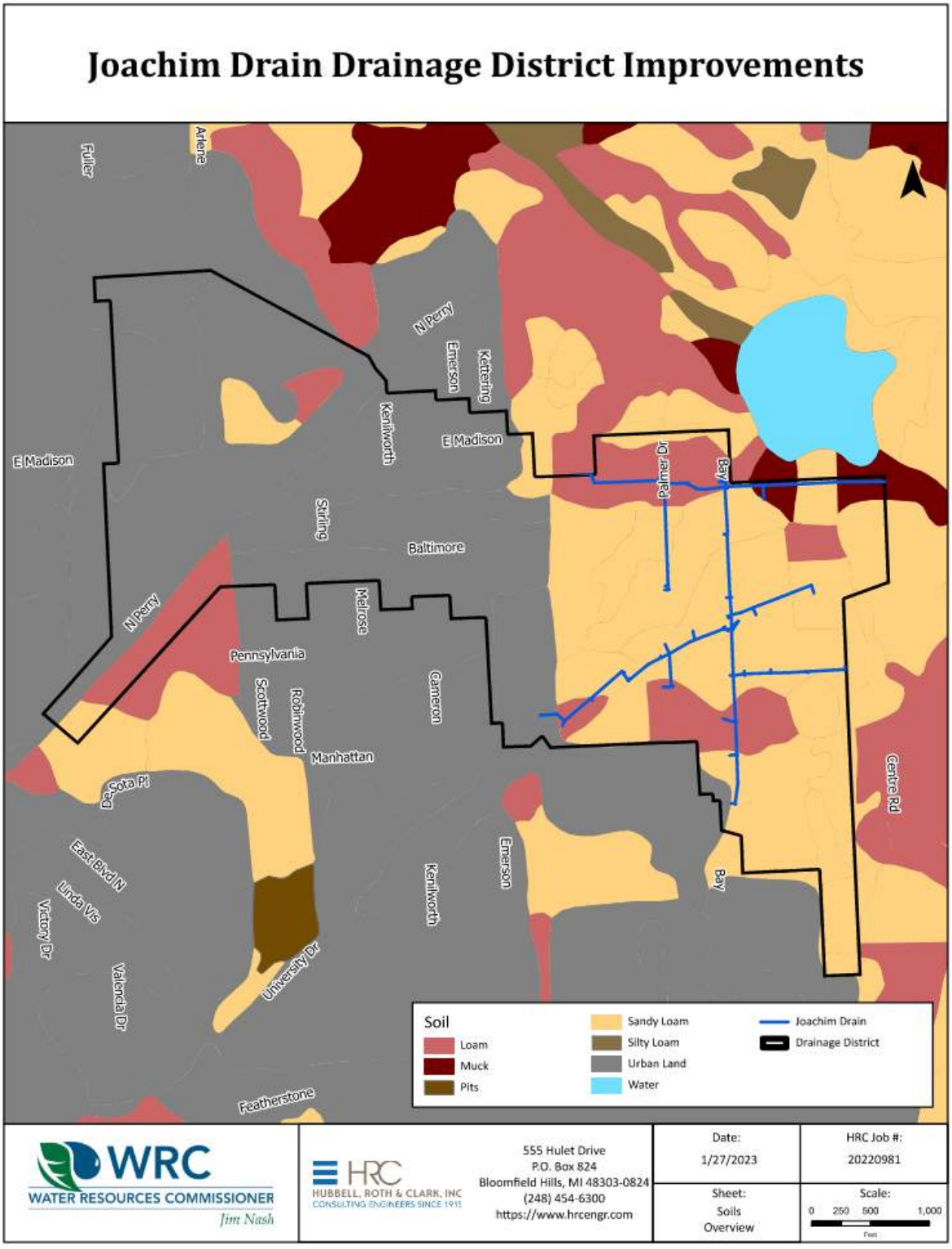


Figure 2-9: Joachim Drain Drainage Topography Map

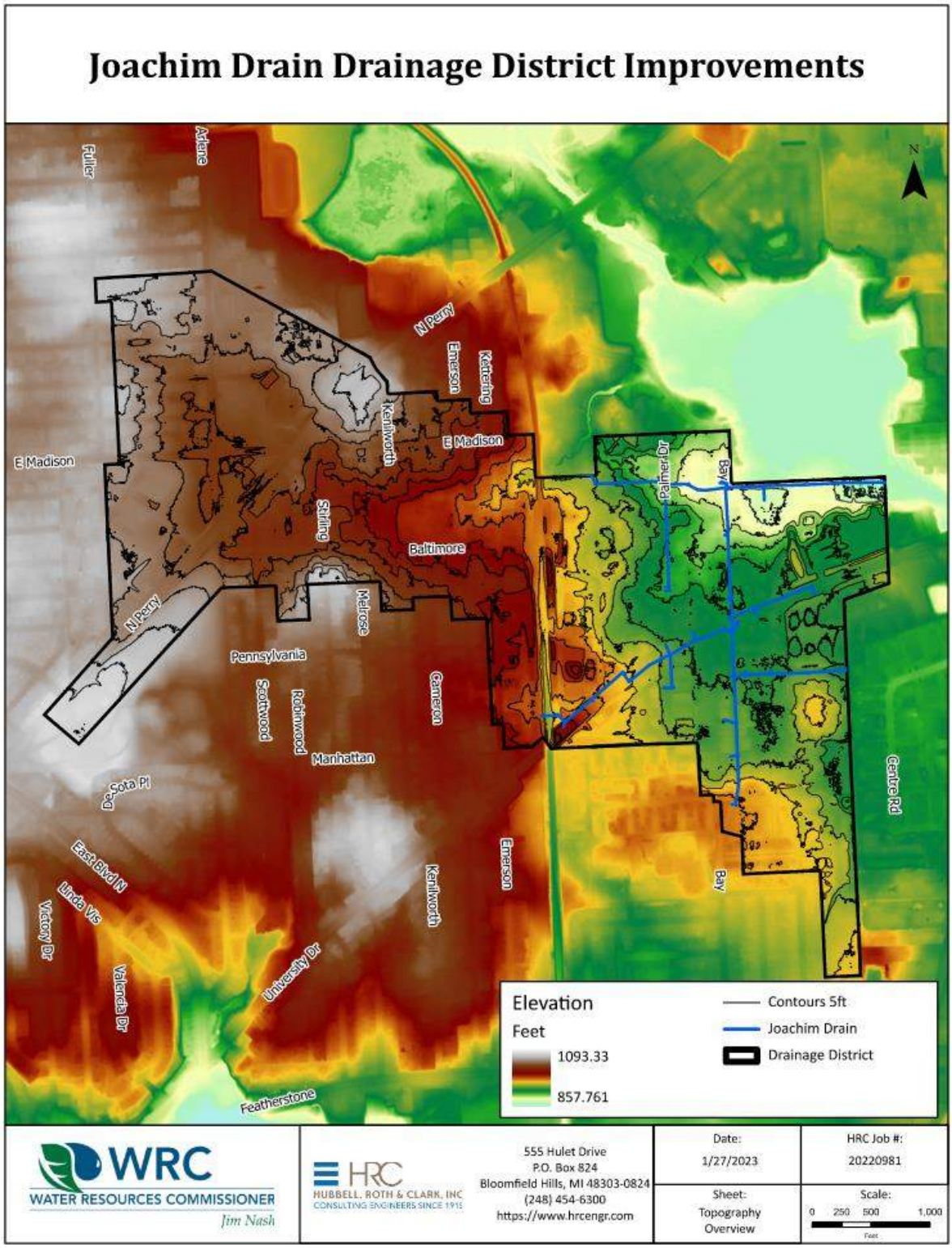


Figure 2-10: Oakland County Flora and Fauna Status

MSU Extension Michigan Natural Features Inventory Element Data: OAKLAND COUNTY

Scientific Name	Common Name	Federal Status	State Status	# in County	Last Seen in County	Scientific Name	Common Name	Federal Status	State Status	# in County	Last Seen in County
Epioblasma triquetra	Snuffbox	LE	E	7	2020	Pantherophis spiloides	Gray ratsnake		SC	1	1992
Villosa fabalis	Rayed bean	LE	E	4	2019	Dichanthelium microcarpon	Small-fruited panic-grass		SC	1	1986
Epioblasma rangiana	Northern riffleshell	LE	E	1	1935	Amorpha canescens	Leadplant		SC	1	1985
Bombus affinis	Rusty-patched bumble bee	LE	SC	4	1965	Sporobolus heterolepis	Prairie dropseed		SC	1	1985
Oarisma poweshiek	Poweshiek skipperling	LE	T	7	2022	Conioselinum chinense	Hemlock-parsley		SC	4	1971
Nerodia erythrogaster neglecta	Copperbelly water snake	LT	E	1	1963	Erynnis martialis	Mottled duskywing		SC	2	1966
Platanthera leucophaea	Prairie white-fringed orchid	LT	E	1	1850	Bombus terricola	Yellow banded bumble bee		SC	2	1965
Sistrurus catenatus	Eastern massasauga	LT	SC	33	2022	Bombus pensylvanicus	American bumble bee		SC	3	1964
Bouteloua curtipendula	Side-oats grama grass		E	2	2021	Bombus borealis	Northern amber bumble bee		SC	1	1961
Falco peregrinus	Peregrine falcon		E	2	2020	Drosera anglica	English sundew		SC	1	1961
Toxolasma parvum	Lilliput		E	2	2020	Angelica venenosa	Hairy angelica		SC	7	1958
Mertensia virginica	Virginia bluebells		E	2	2019	Mesomphix cupreus	Copper button		SC	2	1947
Simpsonaias ambigua	Salamander mussel		E	1	2019	Pyrgulopsis letsoni	Gravel pyrg		SC	2	1943
Gentiana alba	White gentian		E	2	2018	Microtus pinetorum	Woodland vole		SC	1	1935
Notropis anogenus	Pugnose shiner		E	5	2018	Myotis lucifugus	Little brown bat		SC	1	1928
Clinostomus elongatus	Redside dace		E	2	2012	Smilax herbacea	Smooth carrion-flower		SC	1	1927
Centronyx henslowii	Henslow's sparrow		E	2	2007	Pyganodon lacustris	Lake floater		SC	2	1925
Ligumia recta	Black sandshell		E	3	2004	Moxostoma duquesnei	Black Redhorse		SC	1	1924
Toxolasma lividus	Purple lilliput		E	3	2004	Hybanthus concolor	Green violet		SC	1	1921
Setophaga discolor	Prairie warbler		E	1	2003	Cincinnatia cincinnatiensis	Campeloma spire snail		SC	2	1918
Noturus stigmosus	Northern madtom		E	1	2002	Boechera missouriensis	Missouri rock-cress		SC	2	1916
Castanea dentata	American chestnut		E	4	1981	Cirsium hillii	Hill's thistle		SC	1	1896
Ambystoma texanum	Smallmouth salamander		E	1	1963	Graphephorum melicoides	Purple false oats		SC	1	1895
Speyeria idalia	Regal fritillary		E	2	1949	Buteo lineatus	Red-shouldered hawk		T	4	2022
Catinella protracta	A land snail (no common name)		E	1	1946	Clemmys guttata	Spotted turtle		T	7	2021
Platanthera ciliaris	Orange- or yellow-fringed orchid		E	3	1946	Silphium laciniatum	Compass plant		T	1	2021
Agalinis gattingeri	Gattinger's gerardia		E	1	1914	Alasmidonta viridis	Slippershell		T	20	2020
Gentiana puberulenta	Downy gentian		E	1	1848	Coregonus artedi	Lake herring or Cisco		T	9	2020
Lasmigona costata	Flutedshell		SC	1	Historical	Cypripedium candidum	White lady slipper		T	15	2019
Sphaerium fabale	River fingernail clam		SC	1	Historical	Lampsilis fasciola	Wavyrayed lampmussel		T	7	2019
Ventridens suppressus	Flat dome		SC	2	Historical	Muhlenbergia richardsonis	Mat muhly		T	8	2019
Papaipema beeriana	Blazing star borer		SC	3	2022	Panax quinquefolius	Ginseng		T	6	2019
Emydoidea blandingii	Blanding's turtle		SC	50	2021	Silphium integrifolium	Rosinweed		T	1	2018
Euonymus atropurpureus	Wahoo		SC	3	2021	Eutrochium fistulosum	Hollow-stemmed Joe-pye weed		T	2	2017
Haliaeetus leucocephalus	Bald eagle		SC	5	2021	Nelumbo lutea	American lotus		T	2	2016
Lithobates palustris	Pickerel frog		SC	11	2021	Asclepias sullivantii	Sullivant's milkweed		T	1	2012
Pandion haliaetus	Osprey		SC	20	2020	Hydrastis canadensis	Goldenseal		T	9	2010
Pleurobema sintoxia	Round pigtoe		SC	11	2020	Morus rubra	Red mulberry		T	2	2010
Ptychobranchus fasciolaris	Kidney shell		SC	6	2020	Erynnis persius persius	Persius dusky wing		T	1	2007
Venustaconcha ellipsiformis	Ellipse		SC	2	2020	Flexamia huroni	Huron River leafhopper		T	5	2007
Villosa iris	Rainbow		SC	14	2020	Polemonium reptans	Jacob's ladder		T	1	2005
Alasmidonta marginata	Elktoe		SC	6	2019	Poa paludigena	Bog bluegrass		T	1	2004
Nycticorax nycticorax	Black-crowned night-heron		SC	2	2019	Setophaga cerulea	Cerulean warbler		T	4	2002
Brickellia eupatorioides	False boneset		SC	1	2018	Fraxinus profunda	Pumpkin ash		T	3	2001
Cambarus robustus	Big water crayfish		SC	5	2018	Fuirena pumila	Umbrella-grass		T	1	1987
Carex richardsonii	Richardson's sedge		SC	6	2018	Rhynchospora scirpoides	Bald-rush		T	1	1987
Setophaga citrina	Hooded warbler		SC	11	2017	Asio otus	Long-eared owl		T	1	1970
Lasmigona compressa	Creek heelsplitter		SC	7	2016	Acris blanchardi	Blanchard's cricket frog		T	1	1968
Faxonius immunis	Calico crayfish		SC	1	2015	Galearis spectabilis	Showy orchis		T	11	1958
Melanoplus viridipes	Green-legged grasshopper		SC	1	2015	Viola pedatifida	Prairie birdfoot violet		T	1	1955
Terrapene carolina carolina	Eastern box turtle		SC	3	2014	Gavia immer	Common loon		T	1	1952
Baptisia lactea	White or prairie false indigo		SC	2	2012	Valeriana edulis var. ciliata	Edible valerian		T	2	1947
Oecanthus laricis	Tamarack tree cricket		SC	9	2011	Aristida longespica	Three-awned grass		T	1	1942
Utterbackia imbecillis	Paper pondshell		SC	5	2011	Potamogeton vaseyi	Vasey's pondweed		T	2	1939
Jeffersonia diphylla	Twinleaf		SC	2	2010	Ammocrypta pellucida	Eastern sand darter		T	1	1938
Calephelis muticum	Swamp metalmark		SC	4	2008	Cryptotis parva	Least shrew		T	1	1937
Meropleon ambifusca	Newman's brocade		SC	1	2008	Linum virginianum	Virginia flax		T	3	1936
Ammodramus savannarum	Grasshopper sparrow		SC	4	2007	Cyperus acuminatus	Cyperus, Nut grass		T	1	1928
Lepyronia angulifera	Angular spittlebug		SC	1	2007	Gentianella quinquefolia	Stiff gentian		T	1	1923
Cistothorus palustris	Marsh wren		SC	1	2006	Carex lupuliformis	False hop sedge		T	1	1918
Linum sulcatum	Furrowed flax		SC	2	2006	Trillium sessile	Toadshade		T	1	1918
Noturus miurus	Brindled madtom		SC	3	2005	Trichostema dichotomum	Bastard pennyroyal		T	1	1916
Trichophorum clintonii	Clinton's bulrush		SC	4	2003	Astragalus canadensis	Canadian milk vetch		T	1	1914

LEGEND:
E-Endangered, T-Threatened, SC-Special Concern

SOURCE: Michigan State University Extension, Michigan Natural Features Inventory
https://mnfi.anr.msu.edu/resources/county-element-data **2/17/23**

SECTION 3.0 — ANALYSIS OF ALTERNATIVES

3.1 PROJECT ALTERNATIVES

The CWSRF administrative rules require an analysis of alternatives to address the issues identified in the "Need for Project." The alternatives must consider the objectives of the project, technical constraints, and discharge permit requirements. They also require analysis of the following, "no action," "optimum performance of existing system," and "regionalization," along with any system-specific alternatives. A technical basis has been developed for each improvement element and an economic comparison of alternatives has been completed for technically viable alternatives.

3.1.1 No Action

It was determined that the weir structure is in a state of failure. If no action is taken within the weir structure it will continue to fail, and the structure will lose its performance and reliability. If the weir structure fails, there will no longer be adequate flow control, causing flooding and harmful impacts to public health. In addition, sediment and other pollutants will be delivered to the water bodies and negatively impact water quality.

The purpose of the weir structure in the Joachim Drainage District is to control the upstream water level to prevent flooding. Weir structures in drainage systems regulate water flow and maintain a specific water level in the channel and lake. By controlling the flow of water, weir structures help to reduce the risk of flooding in low-lying areas and protect properties and communities. It can also help to prevent erosion, maintain water quality, and conserve water resources in the drainage district. If the County is to take no action and does not make any improvements, then the structure might fail, causing water quality problems and flooding.

The Drain's storm sewer pipes and associated structures have undergone condition assessment and it was determined that there are several areas of high consequence that pose a high risk of failure. If no action is taken within the pipes, manholes, and storm structures, they will continue to fail, and the assets lose their performance and reliability.

For the reasons above, the "No Action" alternative is not considered a viable alternative.

3.1.2 Optimum Performance of Existing System

The existing system is currently sized and operated adequately to meet its required level of service. The primary concern is sudden failure of the outfall and storm pipes and further deterioration of the weir.

3.1.3 Regionalization

The system provides local drainage and management of stormwater and is already part of the Clinton River watershed and is operated by the OCWRC on behalf of the District. There are no further opportunities for regionalization.

3.2 PROJECT 1 – WEIR STRUCTURE IMPROVEMENTS

3.2.1 Alternative 1A: Rehabilitation

It has been determined that the weir structure needs to be repaired to improve water quality and prevent any flooding that might occur when the structure fail. The assessment indicated that some of the existing weir structure

could be rehabilitated. The following recommendations are based on structural assessment of the weir structure conducted by HRC that is included in Appendix G:

- Immediate rehabilitation of the weir structure. The weir structure is in a state of failure as shown in the pictures in Appendix G.
- It would also replace the slide gate that allows for maintenance of levels upstream of the weir.
- For the purposes of the present worth analysis, an anticipated useful life of 20 years was assumed for the rehabilitated weir and 50 years for the new gate.
- **This has an estimated capital cost of $239,000.00.** See Appendix B for additional details.

3.2.2 Alternative 1B: Complete Replacement

For the purpose of the alternative analysis, complete replacement of the weir structure was also evaluated. This would include the following:

- Complete replacement of the weir structure would involve demolition of the existing structure, as well as complete replacement of the sheet pile weir and slide gate as well as include new riprap and restoration of the surrounding area.
- For the purposes of the present worth analysis, an anticipated useful life of 50 years was assumed for the new structure and gate.
- **This has an estimated capital cost of $800,000.00.** See Appendix B for additional details.

3.3 PROJECT 2 – PIPES AND STORM STRUCTURES REHABILITATION

3.3.1 Alternative 2A: Rehabilitation

There are five storm sewer pipes that were found to have “moderate” to “significant” defects using the NASSCO PACP scoring system and the same pipes and the associated outfall were also rated as “fair to poor” using the AASHTO system. The following recommendations are based on structural assessment of the pipes and outfall structure conducted by HRC that is included in Appendix G:

- The report also indicated that, while the defects are important to address to prevent further deterioration, the pipes can successfully be rehabilitated by repairing the pipe joints and grout injection and/or pipe patches.
- Spalled concrete on the exiting outfall would be repaired with rehabilitation and new specialty coatings. Backfill would be added around the outfall and the slopes stabilized. A new safety railing would also be installed.
- For the purposes of the present worth analysis, an anticipated useful life of 20 years was assumed for the rehabilitated pipes and outfall structure.
- **This has an estimated capital cost of $372,000.00.** See Appendix B for additional details.

3.3.2 Alternative 2B: Complete Replacement

For the purpose of the alternative analysis, complete replacement of the weir structure was also evaluated. This would include the following.

- Complete replacement of the five storm sewer pipes with pipes of the same size and design.
- Complete replacement of the outfall structure.

- For the purposes of the present worth analysis, an anticipated useful life of 50 years was assumed for the new pipes and outfall structure.
- **This has an estimated capital cost of $5,000,000.00.** See Appendix B for additional details.

3.4 ALTERNATIVES ANALYSIS

The principal alternatives that will be considered for this analysis are as follows. A complete present worth analysis was performed and is included in Appendix B. A summary of the evaluation is proved in Table 3-1.

- Alternative 1A - Rehabilitation of the Weir Structure
- Alternative 1B - Replacement of the Weir Structure
- Alternative 2A- Storm Pipe and Outfall Structure Rehabilitation
- Alternative 2B- Storm Pipe and Outfall Structure Replacement

3.5 MONETARY EVALUATION

Preliminary cost estimates were prepared for each of the Alternatives discussed above and is included in Appendix B. There are no land costs included as much of the work will be completed within the ROW or existing easements. Any new easements that are necessary will be temporary and will vary based on the selected alternative.

The present worth of the construction cost within the project period of 20 years is determined by using the formula provided below:

$$\text{Present Worth} = \frac{F}{(1+i)^n}$$

where, F – future value/estimated project cost
n – number of years
i – EPA discount rate (-0.05)

The OM&R costs throughout the project period of 20 years are determined by using the formula provided below:

$$\text{Present Worth} = A * [\ (1+i)^n - \frac{1}{i(1+i)^n}\ ]$$

where, A – annual expenditure
n – number of years
i – EPA discount rate (-0.05)

As indicated by the CWSRF guidance document, the salvage value has been calculated based on in-place construction cost with straight-line depreciation over the estimated design life. For newly constructed pipelines, a design life of 50 years has been estimated. The CWSRF guidance document does not provide information on useful life estimates on rehabilitation methods. Therefore, the estimated design life for the anticipated rehabilitation repairs is predicted based on engineering judgement, past sewer rehabilitation experience, manufacturer test data, and manufacturer's recommended service life. The salvage value for rehabilitation repairs has been calculated based on installation and material cost with straight-line depreciation over the anticipated design life of the various projects and components.

Appendix B details the present worth analysis taking into consideration O&M costs and salvage value, considering the Environmental Protection Agency (EPA) discount rate. No operation, maintenance, and replacement costs for the improvements were included as these are expected to be the same as the existing costs for all alternatives, which also are already budgeted. Table 3-1 provides a summary of the monetary evaluation for the principal alternatives.

Table 3-1. Monetary Evaluation Summary

	Alternative 1A: Rehabilitate Existing Weir	Alternative 1B: Replace Existing Weir	Alternative 2A: Rehabilitate Existing Storm Sewers and Structures	Alternative 2B: Replace Existing Storm Sewers and Structures
Capital Costs	**$239,000**	**$800,000**	**$372,000**	**$5,000,000**
Annual OM&R Costs	**$0**	**$0**	**$0**	**$0**
20 Year Salvage Value	**$8,000**	**$323,000**	**$0**	**$2,019,000**
Net Present Worth	**$231,000**	**$477,000**	**$372,000**	**$2,981,000**
Anuual Equivalent Present Worth	**$14,000**	**$29,000**	**$23,000**	**$182,000**

Notes:

Net Present Worth is the sum of capital costs, OM&R costs, and interest during construction, less 20 year salvage value.

Present Worth Costs are based on Straight Line Depreciation and no inflation.

EPA Planning Discount rate = 2.0%

ENR CCI = 13175

This Chapter 20 Drain has costs apportioned to the City's General Fund, which is paid by each parcel owner.

	Total Capital Cost Alt: 1A & 2A	Total Parcels:
	$611,000	21,476

STIMATED MONTHLY USER COST:	**20 Year Loan**
(With no principal forgiveness/grant)	$0.12

3.6 ENVIRONMENTAL EVALUATION

The expected environmental impacts of the proposed alternatives, mainly the impact of the isolated excavations, will be similar in nature. Proper traffic control, soil erosion and sedimentation control, and odor control measures, mitigate impacts to the general public. The costs for increased mitigation measures are minimal in comparison to the major work items involved in each alternative. Social impacts are difficult to measure monetarily but will be considered when choosing the selected alternative should the monetary evaluation be relatively equal.

3.6.1 Conclusions

Alternatives 1A and 2A are recommended as the selected alternatives as they are the most cost-effective and environmentally preferred alternatives to meet the need for project and provide the required level of service.

SECTION 4.0 — SELECTED ALTERNATIVES

4.1 PROPOSED FACILITIES AND DESIGN PARAMETERS

The proposed project consists of all improvements described previously under Alternatives 1A and 2A.

4.2 USEFUL LIFE

$$\textit{Weighted useful life} = \frac{(\text{sum of each asset's dollar value times its estimated useful life})}{\text{Total estimated dollars spent on assets}}$$

The overall effective useful life for each alternative is provided in the cost tables in Appendix B.

4.3 WATER AND ENERGY EFFICIENCY

Ongoing water and energy conservation efforts are also part of WRC's overall Program and any opportunities for increasing conservation were reviewed as part of the alternative. However, there is limited usage of water and energy in the existing collection system and therefore no opportunities for additional efficiency.

4.4 SCHEDULE FOR DESIGN AND CONSTRUCTION

These projects will be coordinated with other District utility projects when applicable. Table 4-1 provides a proposed third quarter loan closing schedule for the projects to be completed in Fiscal Year 2024.

Table 4-1. Proposed Design and Construction Schedule

Engineering Service	FY2024 Q3 Timeframe	
Joachim Drain Drainage Districts Improvements	Design	Feb 2024 – Jun 2024
	Construction Start	Jun 2024
	Construction End	Dec 2024

4.5 COST SUMMARY

The estimated total project cost for the proposed projects is summarized below, and detailed cost estimates for the selected alternatives are presented in Appendix B.

- **Alternative 1A: The Engineer's Opinion of Project Cost Estimate for the rehabilitation of the Weir structure is $239,000.00**. The operation, maintenance and replacement costs are similar to the existing conditions and are already included in the annual budget.
- **Alternative 2A: The Engineer's opinion of Project Costs for rehabilitation of the Drain's storm sewer pipe and outfall structure is $372,000.00**. The operation, maintenance and replacement costs are similar to the existing conditions and are already included in the annual budget.

The total project cost for the recommended projects is therefore: $611,000.00.

4.5.1 User Costs and Cost Sharing

The Joachim Drain Drainage District is a Chapter 20 Drain, and the proposed projects fit into the Chapter 20 category. The costs as described above will be paid through the assessments. In general, project costs will be

assessed based on previously determined apportionment percentages within the appropriate drainage districts. The proposed projects must be presented and approved at a Board of Determination and apportioned entities offered a chance to review their assessments and object, if necessary, at a Public Day of Review. Aggrieved parties have an appeal process as specified in the Drain Code. The City of Pontiac passes the apportionments onto the City's General Fund, which is paid through taxes assessed on all City parcels.

The estimated user cost, which is based on the number of parcels in the City, is approximately $0.12 per month per parcel.

4.6 IMPLEMENTABILITY

The office of the Oakland County Water Resources Commissioner has the legal, financial and institutional authority and resources to successfully implement the recommended projects.

SECTION 5.0 — ENVIRONMENTAL AND PUBLIC HEALTH IMPACTS

5.1 DIRECT IMPACTS

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

5.1.1 Construction Impacts

Construction activities associated with the proposed improvements will take place on existing facilities. Construction and equipment manufacturing related jobs would be generated, and local contractors would have an equal opportunity to bid on the construction contracts.

The environmental impacts for each alternative are expected to be minimal to none. All elements of improvement efforts in this project aim to have the least impact possible on the community and environment. No long-lasting negative impacts are expected for any alternative. Implementation of the Project Plan would create temporary disruption to nearby residents/businesses and customers due to required construction. This includes noise and dust generated by the work and possible erosion of spoils from open excavation. However, there will be no major disruptions to the service connections. The assessment of alternate solutions and sites for the proposed project included identification of any important resources of either historic or environmental value which are protected by law and should be avoided.

The majority of the project locations are existing facilities within the Right-of-Way so no mature trees are anticipated to be impacted as a result of the construction activities.

The short-term adverse impacts associated with construction activities would be minimal, and mitigatable, in comparison to the resulting long-term beneficial impacts. Impacts from the proposed improvements include dewatering during replacement of pipes and temporary damage to surface vegetation. Temporary dewatering would slightly lower the groundwater table in the improvement area if required, but there are few to no residential drinking wells in the area. All restoration required post-rehab/replacement should return the impacted area to existing conditions. Short-term impacts for customers and residents include traffic disruption, dust, and noise. No long-term negative impacts are anticipated.

In addition, there are many assets within the system that require rehabilitation in the immediate future, as described above. Without the construction of the proposed project, the structural integrity of the system may be degraded as the system may not be able to convey the stormwater properly.

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

5.1.2 Operational Impacts

The ongoing function and operation of the system will not be impacted by the proposed projects. All construction projects will be sequenced such that the Drain can continue to function, either by bypass pumping and/or installation of temporary facilities.

5.1.3 Social Impact

The surrounding area will not be impacted other than temporary, short-term impacts associated with construction. After the proposed projects are implemented, the risk of failure of the assets will have been reduced and additional water quality improvements achieved through the riparian buffer strip.

5.2 INDIRECT IMPACTS

Changes in Rate, Density, Or Type of Residential, Commercial, or Industrial Development and the Associated Transportation Changes

No changes are anticipated to the above.

Changes in Land Use

No changes are anticipated to the above. All improvements to the Drainage District will be completed within the existing system footprint.

Changes in Air or Water Quality Due to Facilitated Development

No changes are anticipated to the above.

Resource Consumption Over the Useful Life of the Treatment Works, Especially the Generation of Solid Wastes

No changes are anticipated to the above.

Impacts of Area Aesthetics

All of the proposed work will restore the existing assets and surrounding areas to the existing appearences.

5.3 CUMULATIVE IMPACTS

Local Air Quality

There will be minimal direct impacts on local air quality during the construction phases of these projects. Any effects on air quality will be due to dust and emissions from construction equipment and minimal possible emissions from the coatings, grout, and lining materials.

Archeological, Historical or Cultural Resources

There are no anticipated impacts on archaeological, tribal, historical, or cultural resources due to this Project.

Impacts Upon the Existing or Future Quality of Local Groundwater and Surface Waters

There are no impacts anticipated to the local groundwater, as all construction and improvements will be made within existing facilities.

Impacts Upon Sensitive Features

There are no floodplain or wetland areas within the project footprint as the work is expected to take place within the current locations; therefore, all construction is anticipated to take place outside of the designated floodplain, wetland areas, or other sensitive areas. If adjacent sensitive areas are impacted, all permits and regulations will be adhered to.

Impacts Upon People and The Local Economy

Short-term impacts to people will occur during the construction phase. Minor, temporary disruptions may occur as rehabilitation is completed. The area will experience beneficial long-term impacts due to the level of service to which they expect being maintained by these improvements. The local economy will be stimulated for contractors and suppliers of the materials, labor, and equipment necessary to construct the project.

Operational Impacts

The proposed project will improve the operational efficiency of the storm system and lower future O&M costs for the Drainage District.

Siltation

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

Water Quality Impacts from Direct Discharges and Non-Point Sources

No changes are anticipated to the above, as direct discharges and non-point sources are not a concern within the project limits.

Indirect Impacts from Development

There should not be any development as a result of this project.

The Impacts from Multiple Public Works Projects Occurring in the Same Vicinity

There will only be short-term traffic impacts during the construction phase of this project and proper traffic control measures will be followed.

SECTION 6.0 — MITIGATION

6.1 MITIGATION OF SHORT-TERM IMPACTS

Minimal environmental disruption will occur during construction. Guidelines will be established for cover vegetation removal, dust control, traffic control and accident prevention. Once construction is completed those short-term effects will stop and the area will be returned to the original conditions. The soil erosion impact would be mitigated through the contractor's required compliance with a program for control of soil erosion and sedimentation as specified in Part 91 of Michigan Act 451, P.A. of 1994. The use of soil erosion and sedimentation controls (i.e., straw bales, sedimentation basins, catch basin inserts, silt fencing, etc.) will be properly implemented when necessary.

Careful considerations will be taken during the construction planning process to ensure that the system remains in service while the improvements are underway. No mature trees are anticipated to be impacted because of the construction activities. Construction equipment will be maintained in good condition to decrease noise. All access roads will be swept as necessary to avoid tracking sediment onto public roads.

6.1.1 Siting Decisions

The recommended alternatives include rehabilitation that will be implemented at the location of the existing facilities and therefore siting options are based on the existing locations.

6.1.2 Operational Impacts

The overall operation of the system will remain the same as the existing if the proposed projects are implemented. For operation and maintenance needs will be similar to the existing and are already budgeted.

6.2 MITIGATION OF INDIRECT IMPACTS

The current trend in the District is that the land use is mainly dominated by residential properties. According to the District's planning for land use, this will not change and the area is generally already developed so growth induced by the project is not anticipated. Considering that a vast majority of the residents within the District limits already are connected to the wastewater system, a substantial increase in flow is not expected from within the limits.

6.2.1 Ordinances

All required permits will be applied for during construction of the proposed projects, and local ordinances that impact construction, such as working hours, will be followed. We do not anticipate a need for a variance at this time.

6.2.2 Staging and Construction

Staging Construction

Since the selected alternatives include rehabilitation of the existing structures and pipes, staging is only required to ensure continued operation of the facilities.

Partitioning the Project

No discrete component of this project must be completed prior to completion of the entire project plan to remedy a severe public health, water quality or other environmental problem. Therefore, partitioning of the project is not necessary.

SECTION 7.0 — PUBLIC PARTICIPATION

7.1 PUBLIC MEETING

A Public Meeting is scheduled for April 25th, 2023.

- WRC Office: One Public Works Building #95W, Waterford Twp, MI 48328

7.2 PUBLIC MEETING ADVERTISEMENT

Appendix C includes the following (to be included in the final version):

- EGLE's signed Project Plan Submittal Form
- The signed Project Useful Life and Cost Analysis Certification Form
- The Project Priority List (PPL) Scoring Data Form

7.3 PUBLIC MEETING SUMMARY

A summary of the public meeting, including any comments or questions from the public, will be provided in the final version of the project plan.

7.4 ADOPTION OF THE PROJECT PLANNING DOCUMENT

A resolution adopting the Project Plan, if approved by the Drain Board, will be provided in the final version of the project plan.

SECTION 8.0 — FISCAL SUSTAINABILITY PLAN

A Fiscal Sustainability Plan (FSP) is available for the facilities that will be replaced or rehabilitated under this project. The signed FSP form can be found in Appendix C.

WRC has an active Asset Management Program ("Program") to support the systems that they operate and/or maintain. The Program was developed with a "Common to All" framework that provides the general data standards, workflows, templates, decision trees, specifications and other elements that will be incorporated into Asset Management Plans ("Plans") for the individual funds. The Plan developed for each fund may include modifications to some of the common Program elements to reflect a given fund's individual infrastructure needs and affordability concerns. This Program will be sustained on an ongoing basis by a team of personnel at WRC, currently designated as the Capital Asset Management and Planning "CAMP" unit, together with other departments and personnel as needed.

The existing asset registry for the system will be updated and modified to reflect add any new assets constructed. Data for any existing facilities and assets impacted by the project will be updated with any new data and rehabilitation dates. At the conclusion of the project, the inventory will be fully updated to accurately reflect the improvements, including condition and performance data. This will provide a benchmark to judge future performance by. Lastly, useful life estimates will be updated for rehabilitated assets and solicited from manufacturers of newly installed assets. These estimates will be used to plan for future operation, maintenance and replacement costs to maintain the required level of service for the system.

Ongoing water and energy conservation efforts are also part of WRC's overall Program and any opportunities for increasing conservation were reviewed as part of the alternative. However, there is limited usage of water and energy in the existing collection system and therefore no opportunities for additional efficiency.

Appendix A — CWSRF Agency Correspondence

HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

555 Hulet Drive
Bloomfield Hills, MI 48302-0360

248-454-6300

www.hrcengr.com

February 14, 2023

Region 1 Planning & Development Commission
Southeast Michigan Council of Governments (SEMCOG)
1001 Woodward Avenue, Suite 1400
Detroit, MI 48226-1927

Re: Regional Environmental Planning Review
Joaquim Relief Drain Drainage District
FY24 CWSRF Project Plan

HRC Job No. 20220981

To Whom it May Concern:

The Oakland County Water Resources Commissioner's Office (WRC) is submitting a Project Plan to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) for acceptance into the Clean Water State Revolving Fund (CWSRF) Loan Program. The Project Plan requires a review to determine any potential impacts on any local development plans, area wide waste treatment management plans and/or regional water quality management plans.

On behalf of the WRC, we are requesting information regarding the impacts of the above referenced proposed project upon any local development plans, area wide waste treatment management plans and/or regional water quality management plans in the vicinity of the project. The project construction will involve the following:

- Rehabilitation of the weir structure as well as internal pipe improvements in the Project Area

All population figures and projections referenced in the project plan will be collected from the United States Census Fact Finder Website Profile, which can be found at the following web address: (https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml). We request, on behalf of the WRC, notification if an alternative source for the population data is recommended.

The proposed project site covers mostly urban areas with construction taking place at existing facilities. Excavations will be used throughout the site to help with the rehabilitation of existing facilities. Since the proposed project involves improvements to existing facilities, no impacts are expected from the proposed project upon local development plans, area wide waste treatment management plans and/or regional water quality management plans. On behalf of the WRC, we are requesting a review to confirm that the above referenced project will not cause an impact to any local development plans, area wide waste treatment management plans and/or regional water quality management plans.

We request, on behalf of the WRC, your concurrence with this determination. We appreciate your review and would be grateful for a response by February 24, 2023, so that we may meet program deadlines.

Additionally, a copy of the Project Plan Draft will be sent to your office upon completion for your review and approval.

If you have any questions or require any additional information, please contact the undersigned.

.
Very truly yours,

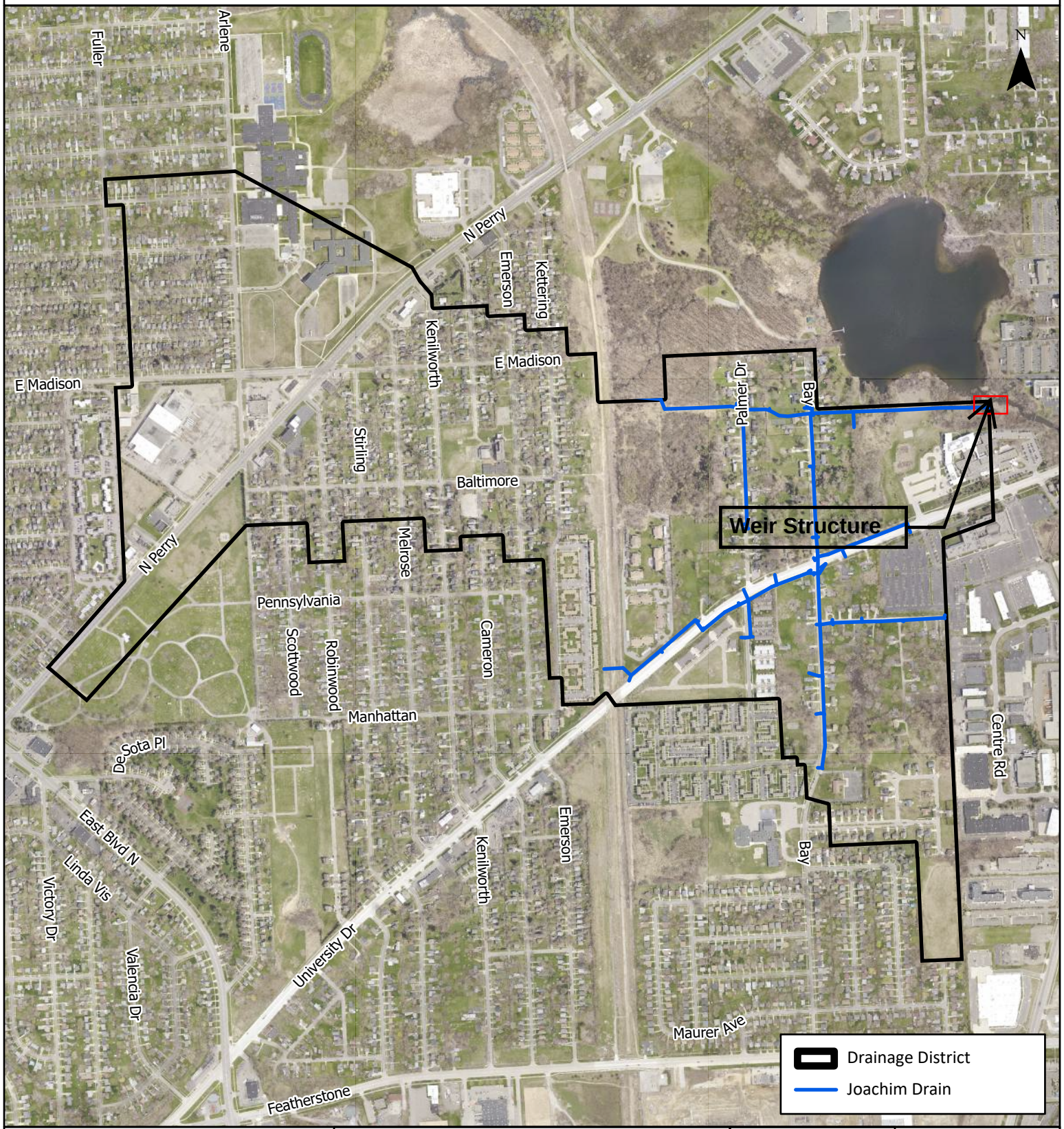
HUBBELL, ROTH & CLARK, INC.

Marisa J. Lavins
Graduate Engineer I

Attachment
Project Location Map

Enclosure
pc: HRC; F. Babakhani, File

Joachim Drain Drainage District Improvements



WRC
WATER RESOURCES COMMISSIONER
Jim Nash

HRC
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Date:	HRC Job #:
1/27/2023	20220981
Sheet: Project Plan Overview	Scale: 0 250 500 1,000 Feet

HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

555 Hulet Drive
Bloomfield Hills, MI 48302-0360

248-454-6300

www.hrcengr.com

February 14, 2023

EGLE Water Resources Division
Warren District Office
27700 Donald Court
Warren, MI 48092-2793

Re: Land-Water Interfaces Review
Joaquim Relief Drain Drainage District
Oakland County, Michigan

HRC Job No. 20220981

To Whom it May Concern:

The Oakland County Water Resources Commissioner's Office (WRC) is submitting a Project Plan to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) for acceptance into the Clean Water State Revolving Fund (CWSRF) Loan Program. The Project Plan requires a review to determine any potential impacts on land-water interfaces, including Inland Lakes and Streams, Floodplains, Wetlands, Great Lakes Shorelands, Navigable Waters and Army Corps of Engineers (ACE) Regulated Activities.

On behalf of the WRC, we are requesting information regarding the impacts of the above referenced proposed project upon the previously detailed land-water interfaces in the vicinity of the project. The project construction will involve the following:

- Rehabilitation of the weir structure as well as internal pipe improvements in the Project Area

The proposed project site covers mostly urban areas with construction taking place at existing facilities. Excavations will be used throughout the site to help with the rehabilitation of existing facilities. In conclusion, there will not be any construction that will impact inland lakes or streams. On behalf of the WRC, we are requesting a review to confirm that the above referenced project will not cause an impact to any Inland Lakes and Streams, regulatory floodplain limits, or any existing wetlands. However, if project work is required within an existing wetland, necessary mitigation measures will be undertaken to protect the wetlands influenced by the project.

Since the proposed project does not involve improvements to existing facilities that are located along a shoreline or within navigable waters of the United States, no impacts are expected from the proposed project upon Great Lakes Shorelands, Navigable Waters or ACE Regulated Activities. On behalf of the WRC, we are requesting a review to confirm that the above referenced project will not cause an impact to any Great Lakes Shorelands, Navigable Waters or ACE Regulated Activities.

If not already obtained, the appropriate joint permit applications will be completed, and the necessary permits obtained prior to any construction activities in this project area.

We request, on behalf of the WRC, your concurrence with this determination. We appreciate your review and would be grateful for a response by February 24, 2023, so that we may meet program deadlines.

If you have any questions or require any additional information, please contact the undersigned.

Very truly yours,
HUBBELL, ROTH & CLARK, INC.

Marisa J. Lavins
Graduate Engineer I

Attachment
FEMA Overview Map
Wetlands Overview Map
Project Rehabilitation Locations

pc: HRC; F. Babakhani, File

Appendix B — CWSRF Cost and Present Worth Analysis

SUMMARY OF MONETARY EVAULATION

	Alternative 1A: Rehabilitate Existing Weir	Alternative 1B: Replace Existing Weir
Capital Costs	**$239,000**	**$800,000**
Annual OM&R Costs	**$0**	**$0**
20 Year Salvage Value	**$8,000**	**$323,000**
Net Present Worth	**$231,000**	**$477,000**
Anuual Equivalent Present Worth	**$14,000**	**$29,000**

Notes:

Net Present Worth is the sum of capital costs, OM&R costs, and interest during construction,

Present Worth Costs are based on Straight Line Depreciation and no inflation.

EPA Planning Discount rate = 2.0%

ENR CCI = 13175

This Chapter 20 Drain has costs apportioned to the City's General Fund, which is paid by eac

	Total Capital Cost Alt: 1A & 2A	**Total Parcels:**
	$611,000	21,476

ESTIMATED MONTHLY USER COST:	**20 Year Loan**
(With no principal forgiveness/grant)	$0.12

ENGINEER'S OPINION OF PROBABLE PROJECT COST

Bloomfield Hills, MI — Telephone: (248) 454-6300

PROJECT: **Alternative 1A: Rehabilitate Existing Weir** — DATE: **4/6/2023**

LOCATION: **Joachim Drain Weir at Galloway Lake** — PROJECT NO. **20220981**

BASIS FOR ESTIMATE: [x] CONCEPTUAL [ ] PRELIMINARY [ ] FINAL — ESTIMATOR: **SLD**

WORK: **Rehabilitate Existing Failed Weir** — CHECKED BY: **DWM**

Repair Failed Portions Only — CURRENT ENR: **13175**

USEFUL LIFE	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
20	Rehabilitation of Top Portions of Weir that have Failed	1	EA	$ 110,000	$110,000
50	New Slide Gate, 12" dia. with handwheel & stem	1	EA	$ 10,000	$10,000
	Unit Cost Subtotal				***$120,000***
	Contractor General Conditions, Overhead and Permits	10	*%*		*$12,000*
	Contingencies	40	*%*		*$48,000*
	Construction Subtotal				***$180,000***
	Engineering, Legal, and Administration	25	*%*		*$45,000*
	Escalation	8	*%*		*$14,000*
	TOTAL PROJECT COST				***$239,000***

Alternative 1A: Rehabilitate Existing Weir

PRESENT WORTH ANALYSIS

CAPITAL COST		FIRST COST[1]	SERVICE LIFE (YEARS)		PRESENT WORTH[2]
Rehabilitate Existing Weir	$	219,000	20	$	219,000
New Slide Gate		20,000	50		12,000
TOTAL CAPITAL COST	**$**	**239,000**	23	$	231,000
PW OF SALVAGE VALUE ***(FIRST COST - PRESENT WORTH)***	$	8,000			
ANNUAL OPERATION AND MAINTENANCE COST					
TOTAL ANNUAL O&M COST[3]			$ 0		
PRESENT WORTH OF O&M COST				$	0
NET PRESENT WORTH				**$**	**231,000**
AVERAGE ANNUAL EQUIVALENT COST OF PRESENT WORTH				**$**	**14,000**

Notes:

(1) January 2023 ENR 20 Cities CCI = 13175

(2) Cost is based on a study period of 20 years and a discount rate of 2.0%
Present Worth Costs are based on Straight Line Depreciation and no inflation.
https://www.whitehouse.gov/omb/information-for-agencies/circulars/

(3) The anticipated O&M is similar for both alternatives and to the existing budgeted OM&R costs, and therefore is not included in this analysis.

ENGINEER'S OPINION OF PROBABLE PROJECT COST

Bloomfield Hills, MI — Telephone: (248) 454-6300

PROJECT: **Alternative 1B: Replace Existing Weir** — DATE: **4/6/2023**

LOCATION: **Joachim Drain Weir at Galloway Lake** — PROJECT NO. **20220981**

BASIS FOR ESTIMATE: [x] CONCEPTUAL [ ] PRELIMINARY [ ] FINAL — ESTIMATOR: **SLD**

WORK: **Replace Failed Weir to** — CHECKED BY: **DWM**

Existing Design Parameters — CURRENT ENR: **13175**

USEFUL LIFE	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
50	New Weir, Gavanized Sheet Piling (PZ-27)	2,400	SQFT	$ 60	$144,000
50	Sheet Pile Installation	2,400	SQFT	$ 30	$72,000
50	New Slide Gate, 12" dia. with handwheel & stem	1	EA	$ 10,000	$10,000
50	Heavy Duty Rip-Rap Mattress	350	CY	$ 150	$52,500
50	Channel Improvments and Restoration	1	EA	$ 100,000	$100,000
	Unit Cost Subtotal				***$378,500***
	Contractor General Conditions, Overhead and Permits	10	*%*		*$37,850*
	Contingencies	40	*%*		*$151,400*
	Construction Subtotal				***$567,750***
	Engineering, Legal, and Administration	25	*%*		*$141,938*
	Escalation	8	*%*		*$45,000*
	TOTAL PROJECT COST				***$800,000***

Alternative 1B: Replace Existing Weir

PRESENT WORTH ANALYSIS

CAPITAL COST		FIRST COST[1]	SERVICE LIFE (YEARS)		PRESENT WORTH[2]
New Weir Structure & Civil	$	779,000	50	$	464,000
New Slide Gate		21,000	50		13,000
TOTAL CAPITAL COST	**$**	**800,000**		$	477,000
PW OF SALVAGE VALUE ***(FIRST COST - PRESENT WORTH)***	$	323,000			
ANNUAL OPERATION AND MAINTENANCE COST					
TOTAL ANNUAL O&M COST[3]			$ 0		
PRESENT WORTH OF O&M COST				$	0
NET PRESENT WORTH				**$**	**477,000**
AVERAGE ANNUAL EQUIVALENT COST OF PRESENT WORTH				**$**	**29,000**

Notes:

(1) January 2023 ENR 20 Cities CCI = 13175

(2) Cost is based on a study period of 20 years and a discount rate of 2.0%
Present Worth Costs are based on Straight Line Depreciation and no inflation.
https://www.whitehouse.gov/omb/information-for-agencies/circulars/

(3) The anticipated O&M is similar for both alternatives and to the existing budgeted OM&R costs, and therefore is not included in this analysis.

ENGINEER'S OPINION OF PROBABLE PROJECT COST

Bloomfield Hills, MI — Telephone: (248) 454-6300

PROJECT: **Alternative 2A: Rehabilitate Existing Storm Sewers and Structures** — DATE: **4/6/2023**

LOCATION: **Joachim Drain Storm Sewer System** — PROJECT NO. **20220981**

BASIS FOR ESTIMATE: [x] CONCEPTUAL [ ] PRELIMINARY [ ] FINAL — ESTIMATOR: **SLD**

WORK: **Rehabilitate Existing Storm Sewers and Structures** — CHECKED BY: **DWM**

CURRENT ENR: **13175**

USEFUL LIFE	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
20	Repair Existing Outfall Structure	1	EA	$ 42,000	$42,000
20	Repair of Storm Sewer Pipe, 75" x 112" elliptical	901	LFT	$ 100	$90,100
20	Repair of Storm Sewer Pipe, 52" x 77" elliptical	545	LFT	$ 100	$54,500
	Unit Cost Subtotal				***$186,600***
	Contractor General Conditions, Overhead and Permits	10	*%*		*$18,660*
	Contingencies	40	*%*		*$74,640*
	Construction Subtotal				***$279,900***
	Engineering, Legal, and Administration	25	*%*		*$69,975*
	Escalation	8	*%*		*$22,000*
	TOTAL PROJECT COST				***$372,000***

Alternative 2A: Rehabilitate Existing Storm Sewers and Structures

PRESENT WORTH ANALYSIS

CAPITAL COST		FIRST COST[1]	SERVICE LIFE (YEARS)		PRESENT WORTH[2]
Rehabilitate Existing Pipes	$	288,000	20	$	288,000
Rehabilitate Existing Outfall		84,000	20		84,000
TOTAL CAPITAL COST	**$**	**372,000**	20	$	372,000
PW OF SALVAGE VALUE ***(FIRST COST - PRESENT WORTH)***	$	0			
ANNUAL OPERATION AND MAINTENANCE COST					
TOTAL ANNUAL O&M COST[3]			$ 0		
PRESENT WORTH OF O&M COST				$	0
NET PRESENT WORTH				**$**	**372,000**
AVERAGE ANNUAL EQUIVALENT COST OF PRESENT WORTH				**$**	**23,000**

Notes:

(1) January 2023 ENR 20 Cities CCI = 13175

(2) Cost is based on a study period of 20 years and a discount rate of 2.0%
Present Worth Costs are based on Straight Line Depreciation and no inflation.
https://www.whitehouse.gov/omb/information-for-agencies/circulars/

(3) The anticipated O&M is similar for both alternatives and to the existing budgeted OM&R costs, and therefore is not included in this analysis.

ENGINEER'S OPINION OF PROBABLE PROJECT COST

Bloomfield Hills, MI — Telephone: (248) 454-6300

PROJECT: **Alternative 2B: Replace Existing Storm Sewers and Structures** — DATE: **4/6/2023**

LOCATION: **Joachim Drain Storm Sewer System** — PROJECT NO. **20220981**

BASIS FOR ESTIMATE: [x] CONCEPTUAL [ ] PRELIMINARY [ ] FINAL — ESTIMATOR: **SLD**

WORK: **Replace Existing Storm Sewers and Outfall** — CHECKED BY: **DWM**

CURRENT ENR: **13175**

USEFUL LIFE	DESCRIPTION	QUANT.	UNIT	UNIT AMOUNT	TOTAL AMOUNT
20	Replace Existing Outfall Structure	1	EA	$ 150,000	$150,000
20	Replace Storm Sewer Pipe, 75" x 112" elliptical	901	LFT	$ 2,000	$1,802,000
20	Replace Storm Sewer Pipe, 52" x 77" elliptical	545	LFT	$ 1,000	$545,000
	Unit Cost Subtotal				***$2,497,000***
	Contractor General Conditions, Overhead and Permits	10	*%*		*$249,700*
	Contingencies	40	*%*		*$998,800*
	Construction Subtotal				***$3,745,500***
	Engineering, Legal, and Administration	25	*%*		*$936,375*
	Escalation	8	*%*		*$300,000*
	TOTAL PROJECT COST				***$5,000,000***

Alternative 2B: Replace Existing Storm Sewers and Structures

PRESENT WORTH ANALYSIS

CAPITAL COST		FIRST COST[1]	SERVICE LIFE (YEARS)		PRESENT WORTH[2]
Replace Existing Pipes	$	4,700,000	50	$	2,802,000
Replace Existing Outfall		300,000	50		179,000
TOTAL CAPITAL COST	**$**	**5,000,000**		$	2,981,000
PW OF SALVAGE VALUE ***(FIRST COST - PRESENT WORTH)***	$	2,019,000			
ANNUAL OPERATION AND MAINTENANCE COST					
TOTAL ANNUAL O&M COST[3]			$ 0		
PRESENT WORTH OF O&M COST				$	0
NET PRESENT WORTH				**$**	**2,981,000**
AVERAGE ANNUAL EQUIVALENT COST OF PRESENT WORTH				**$**	**182,000**

Notes:

(1) January 2023 ENR 20 Cities CCI = 13175

(2) Cost is based on a study period of 20 years and a discount rate of 2.0%
Present Worth Costs are based on Straight Line Depreciation and no inflation.
https://www.whitehouse.gov/omb/information-for-agencies/circulars/

(3) The anticipated O&M is similar for both alternatives and to the existing budgeted OM&R costs, and therefore is not included in this analysis.

Appendix C — EGLE Submittable forms

(To be provided in final version)

Fiscal Sustainability Plan Certification Form

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

Joachim Drain Drainage District Improvements

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:

Sally Duffy (Name) 734-776-7336 (Phone)

I certify that the Joachim Drain Drainage District (Applicant's Name) has developed and implemented a plan that meets 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.

Geoff Wilson, PE, Assistant Chief Engineer

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

Signature of Authorized Representative Date

Project Useful Life and Cost Analysis Certification Form

Project Information

Applicant Name: Joachim Drain Drainage District Improvements

SRF Project to be Funded: _____

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

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

☒ 2) The applicant has selected, to the maximum extent practicable, a project or activity that maximizes the potential for efficient water use, reuse, recapture, and conservation, and energy conservation, taking into account the cost of:
- constructing the project or activity;
- operating and maintaining the project or activity over the life of the project; and
- replacing the project or activity.

☒ 3) The applicant has completed a Project Useful Life analysis for the project or activity. **Attach appropriate documentation**

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

Sally Duffy

Name of Professional Engineer *(Please Print or Type)*

Signature of Professional Engineer Date

Geoff Wilson, PE, Assistant Chief Engineer

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

Signature of Authorized Representative Date

Appendix D — Project Planning Public Meeting

(Summary of Public Meeting to be provided in final version)

NOTICE OF PROJECT PLANNING PUBLIC MEETING

The **Joachim Drain Drainage District** will hold a public meeting on the proposed **Clean Water State Revolving Fund (CWSRF) Storm System Improvements** project for the purpose of receiving comments from interested persons.

The meeting will be held at **2:00 p.m.** on **Tuesday, April 25, 2023, virtually and at the Oakland County Water Resources Commissioner's Office (1 Public Works Dr., Waterford, MI.)**

The purpose of the proposed project is **to make improvements to the existing storm water systems in order to continue to meet the required level of service for the systems.**

Project construction will involve **upgrades to and rehabilitation of existing stormwater pipes and structures.**

Impacts of the proposed project include **temporary noise and disruption to the public due to construction of the required improvements, which will be offset by improvements that will reduce the likelihood of system failures.**

The estimated cost to users for the proposed project is approximately **$0.12 per household over 20 years. However, the Drain will likely qualify as "overburdened" and may be eligible for additional grant funding and/or principal forgiveness, which would reduce the cost. The Drain will also have the opportunity to reduce the scope of work and potential cost during the design phase and/or defer the project should funding not be awarded.**

Copies of the plan detailing the proposed project are available for inspection at the following location: **Oakland County Water Resources Commissioner's Office (1 Public Works Dr., Waterford, MI.)**

Written comments received before the meeting record is closed on **Tuesday, April 25, 2023,** will receive responses in the final project planning document. Written comments should be sent to Stephanie Lajdziak at lajdziaks@oakgov.com before TUESDAY, APRIL 25, 2023 at 2:00 P.M.

Appendix E — Resolution and Project Plan Submittal Form

(To be provided in final version)

A RESOLUTION ADOPTING THE
JOACHIM DRAIN DRAINAGE DISTRICT'S
2024 CLEAN WATER STATE REVOLVING FUND PROJECT PLAN AND
DESIGNATING AN AUTHORIZED PROJECT REPRESENTATIVE

WHEREAS, the Drainage Board for the Joachim Drain Drainage District recognizes the need to make improvements to its existing storm sewer system; and

WHEREAS, the Drainage Board for the Joachim Drain Drainage District authorized Hubbell, Roth & Clark, Inc. to prepare a Clean Water State Revolving Fund Project Plan, which recommends the construction of various improvements to the system; and

WHEREAS, said Project Plan was presented at a Public Hearing held at the offices of the Oakland County Water Resources Commissioner held on April 25, 2023;

NOW THEREFORE BE IT RESOLVED, that the Drainage Board for the Joachim Drain Drainage District formally adopts said Project Plan and agrees to implement the selected alternatives for improvements.

BE IT FURTHER RESOLVED, that the Assistant Chief Engineer, a position currently held by Geoff Wilson, P.E., is designated as the authorized representative for all activities associated with the project referenced above, including the submittal of said Project Plan as the first step in applying to the State of Michigan for a Clean Water Revolving Fund Loan to assist in the implementation of the selected alternative.

Yeas:
Nays:
Abstain:
Absent:

I certify that the above Resolution was adopted by the Drainage Board for the Joachim Drain Drainage District on Tuesday, April 25, 2023.

BY:

_____April 25, 2023
Jim Nash, Oakland County Water Resources Commissioner and Chairperson of the Joachim Drain Drainage District — Date

Michigan Department of Environment, Great Lakes, and Energy
Gretchen Whitmer, Governor
Liesl Eichler Clark, Director

http://www.michigan.gov/egle

Clean Water Revolving Funds
SRF/SWQIF Project Plan Submittal Form

Name of the Project Joachim Drain Drainage District Improvements	**Applicant's Federal Employer Identification Number (EIN)**
Legal Name of Applicant (The legal name of the applicant may be different than the name of the project. For example, a county may be the applicant for bonding purposes, while the project may be named for the particular village or township it serves.) Joachim Drain Drainage District	**Areas Served by this Project** Counties Oakland County Congressional Districts 11 State Senate Districts 7 State House Districts 54
Address of Applicant (Street, P O Box, City, State & Zip) One Public Works Building #95W Waterford Twp, MI 48328	
NPDES Permit Number (if permit holder)	**Associated SAW Grant Number** (if applicable)
Brief Description of the SRF/SWQIF Project Pipe and weir structure rehabilitation	
Disadvantaged Community Determination ☒ The applicant is requesting a disadvantaged community determination, and a completed *Disadvantaged Community Status Determination Worksheet* is attached.	
Estimated Total Cost of the SRF/SWQIF Project $611,000.00	**SRF/SWQIF Construction Start Target Date** June 2024
Name and Title of Applicant's Authorized Representative Geoff Wilson, PE, Assistant Chief Engineer	
Address of Authorized Representative (if different from above) One Public Works Building #95W Waterford Twp, MI 48328	**Telephone** 248-858-0958 **E-Mail Address** wilsong@oakgov.com
Signature of Authorized Representative	**Date**
Joint Resolution(s) of Project Plan Adoption/Authorized Representative Designation is attached. check here ☒	

A final project plan, prepared and adopted in accordance with the Department's *Clean Water Revolving Funds (SRF and SWQIF) Project Plan Preparation Guidance*, must be submitted by July 1st in order for a proposed project to be considered for placement on a Project Priority List for the next fiscal year. Please send your final project plan with this form to:

WATER INFRASTRUCTURE FINANCING SECTION
FINANCE DIVISION
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
P O BOX 30457
LANSING MI 48909-7957

Appendix F — Overburdened and Significantly Overburdened Community Status Determination Worksheet

(To be provided in final version)

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

OVERBURDENED AND SIGNIFICANTLY OVERBURDENED COMMUNITY STATUS DETERMINATION WORKSHEET

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

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

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

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

Mark Conradi
conradim@michigan.gov

Name of Applicant

Joachim Drain Drainage District (Oakland County WRC)

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

DWSRF ☐

CWSRF ☑

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

Yes ☐
No ☑

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

2. Median Annual Household Income from table on the overburdened webpage (blended if applicable)

$36,214

3. Taxable Value Per Capita from table on the overburdened webpage (blended if applicable)

$14,274

4. Total amount of anticipated debt for the proposed project (amount of loan requested for FY24 loan)

5. Annual payments on the existing debt for the system

0

6. Total operation, maintenance, and replacement expenses (OM&R) for the system on an annual basis

N/A

7. Number of residential equivalent users (REUs) in the system

N/A

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

Signature Date

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

Overburdened and Significantly Overburdened Calculation Worksheet

2. Median Annual Household Income (blended if necessary)	$36,214
3. Taxable Value Per Capita (blended if necessary)	$14,274
4. Amount of anicipated debt - FY24 SRF loan only	
Terms	20
Rate	2.75%
New Annual debt from SRF loan	$0
5. Annual Payments on existing debt	
6. Total OM&R	
7. Number of REUs	
Total Annual Cost	$0
Annual User Cost	$0
MAHI Threshold $ amount	**$362**

Applicant Name:
Joachim Drain Drainage District
Oakland County Water Resources Commissioner

			Result
125% of Federal Poverty MAHI	$37,500	**Significantly Overburdened**	**YES**
Lowest 10% TVPC	$15,170	**Significantly Overburdened**	**YES**
Lowest 20% TVPC	$22,920	**Overburdened without calculation needed**	**YES**
Michigan MAHI	$63,498	**Overburdened with calculation**	**NO**

Appendix G — CMP Pipe and Outfall Structure Condition Assessment

HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

MAILING: PO Box 824
Bloomfield Hills, MI 48303-0824

SHIPPING: 555 Hulet Drive
Bloomfield Hills, MI 48302-0360

PHONE: 248-454-6300
WEBSITE: hrcengr.com

Memorandum

To: Mr. Geoff Wilson, P.E., OCWRC

From: HRC

Date: October 11, 2021

Subject: Joachim Drain
CMP Pipe and Outfall Structure Condition Assessment

HRC Job No. 20210753

Per your request, and in accordance with our proposal dated March 28, 2019, a structural condition assessment was completed on August 31, 2021 for the Joachim Drain drainage pipe and outfall structure just north of University Drive in the City of Pontiac. The drainpipe was accessed, and the inspection started at the upstream manhole, identified as Manhole #5 (MH5) located near 880 Palmer Drive, and proceeded approximately 1300 feet north of University Drive. The total length of pipe inspected was 1,450 feet, from the manhole to the outfall structure. The outfall structure consists of a reinforced concrete headwall, wingwalls, and apron. The pipe is a corrugated metal pipe (CMP) arch. Approximately 500 feet of CMP pipe running east from MH5 had a rise of 4'-0" and span of 6'-9" followed by 950 feet of pipe with a rise of 6'-5" and a span of 9'-1."

For the inspection, a steel plate was used at the outfall structure at the edge of the wingwalls to create a dam and a pump was used to minimize the amount of water in the pipe. Video recordings were taken during the inspection and reviewed by a NASSCO PACP certified inspector. See attached PACP inspection ratings report.

Condition ratings presented below are based on the American Association of State Highway and Transportation Officials (AASHTO) "Culvert and Storm Drain System Inspection Guide," with the following rating system:

- Rating of 1 – Good – Like new, with little or no deterioration structurally sound and functionally adequate.
- Rating of 2 – Fair – Some deterioration but structurally sound and functionally adequate.
- Rating of 3 – Poor – Significant deterioration, functional inadequacy, or both, requiring maintenance or repair.
- Rating of 4 – Severe – Very poor conditions that indicate possible imminent failure or failure which could threaten public safety.

Observations:

Outfall Structure

- Large spall with exposed aggregate in headwall at about 2 o'clock position of culvert opening.
- Apron was not visible at time of inspection due to sediment and water level.
- Water noted around the back side of wingwall at south end with some minor soil erosion.
- Chain link fence installed along back face of outfall structure. Vertical post at the above noted erosion area is no longer anchored and is not serving its intended purpose.
- Previous photos indicated a bar screen was attached to the outfall structure, but this had been removed at the time of the inspection.

CMP Pipe - 500-foot 4' x 6'- 9" section

- Black protective lining, likely coal tar, was noted throughout the barrel has deteriorated. Significant cracking was noted throughout and especially along the invert between 5 and 7 o'clock.
- Surface Damage: Some small dents or impact damage were noted in pipe, but no wall breaches (holes) were noted. Rating 2.
- Corrosion: Due to liner in pipe, the majority of the pipe walls were not visible at the time of inspection, at locations of damaged liner freckled rust or minor surface corrosion was noted. Rating 2.
- Abrasion: A few localized abrasions in liner exposing the pipe wall with signs of minor corrosion were noted. Rating 2.
- Shape: Overall shape of barrel is considered to be in fair condition with some minor localized distortion in shape along the top half of the pipe noted, no reverse curvature was noted in the bottom of the pipe. Rating 2.
- Joints: Overall condition of the joints is considered to be in poor condition. Most of the joints are separated or offset, but with little to no signs of distress, backfill was not exposed, and majority of separated joints had no indication of water infiltration. Three joints were noted to have backfill infiltration and one joint was noted to have evidence of groundwater infiltration. Some joint gaskets noted to be hanging down into barrel. Rating 3.

CMP Pipe – 950-foot 6'-5" by 9'-1" section

- Black protective lining, likely coal tar, noted throughout barrel appeared to be in better condition than the 4'x6'-9" section, but significant cracking was noted along the invert between 5 and 7 o'clock along the length of pipe. One area of lining between 11-2 o'clock was noted to be thicker and created a stalactite looking area of the pipe between 772 to 790 feet east of MH5.
- Large connecting drainpipe noted at approximately 520 feet east of MH5 (8 feet east of pipe size transition). Sediment buildup noted along invert of this connecting pipe, potentially due to backfill infiltration.
- Surface crew noted sinkholes and potholes in the pavement over the pipe approximately around the change in pipe size and large connecting drainpipe. No indication of backfill infiltration noted at transition, but evidence of backfill infiltration was noted at the connecting pipe as mentioned above.
- Surface Damage: Large indentations or impact damage were noted to a few localized pipe wall sections, but no wall breaches were noted. Rating 2-3.
    - 533 feet east of MH5 approximately 1'x2' with ½" vertical deflection.
    - 930 feet east of MH5 approximately 6"x 1' with 1" vertical deflection.
    - 965 to 980 feet east of MH5 indeterminate area of potential vertical deflection noted between 12 and 2 o'clock. Lining was thicker at this location so it could not be conclusively determined if the pipe had deflected at this location.
    - 1,358 feet east of MH5 approximately 1'x1' with 3" vertical deflection.
- Corrosion: Due to liner in pipe, the majority of the pipe walls were not visible, at locations of damaged liner freckled rust or minor surface corrosion was noted. Rating 2.
- Abrasion: A few localized abrasions in liner exposing the pipe walls with signs of minor corrosion. Rating 2.
- Shape: Overall shape of barrel is considered to be in fair to poor condition, with some localized areas of distorted shape in the top half of the pipe, but no reverse curvature was noted in the bottom of the pipe, deformations are within 5-10% of original inside diameter, but some visible localized out-of-roundness was noted. Rating 3.
- Joints: Overall condition of the joints is considered to be in poor. Most of the joints are separated or offset. A few joints were noted to have roots growing into the pipe and two were noted to have exposed backfill. A significant number of joints are leaking and have evidence of fines infiltration, especially along the 475 feet of pipe just west of the outfall structure, at the east end.

Overall CMP Pipe and Outfall Structure Evaluation:

The overall condition of the outfall structure, at the time of the condition assessment, can be classified as good to fair. No significant cracks or delaminations were noted.

The overall condition of the CMP pipe, at the time of the condition assessment, can be classified as fair to poor.

In its current structural condition, without any future rehabilitation work, the expected remaining in-service useful life of the outfall structure and CMP pipe is anticipated to be less than ten years.

Recommendations:

Based on the site investigation and experience with similar stormwater systems, it is recommended that the Joachim Drain drainage pipe and outfall structure be rehabilitated in the near future.

Rehabilitation work should, at a minimum, include the following:

Outfall Structure

- Repair the spalled concrete in the headwall with a polymer-modified cementitious concrete repair material, such as SikaTop 123 Plus as manufactured by the Sika Corporation or equal.
- Thoroughly clean all exposed concrete surfaces and apply a penetrating water repellent treatment product with a minimum of 40% silane solids, such as Powerseal 40 by Vexcon Chemicals or MasterProtect H 400 by BASF Construction Chemical.
- Replace eroded backfill on backside of wingwalls and install slope stabilization.
- Remove existing fence and install a proper fall protection fence or railing system.

Estimated range of repair costs for the Outfall Structure is $30,000 to $40,000. Using exisitng as-needed County contractors.

Pipe

- Remove and replace all loose and missing joint filler in pipe joints.
- Repair all leaking joints throughout pipe to reduce/eliminate water and backfill infiltration, especially along the eastern 475 feet of pipe. This should be accomplished with either polyurethane grout injection or installing internal joint bands consisting of stainless-steel bands expanded against rubber seal material over the joints.
    - Any areas identified as having soil loss above or immediately adjacent to the pipe should be injection grouted to fill in voids within the soils as well as further reduce future water and backfill infiltration into the pipe.

Estimated range of repair costs for the 1450 feet of pipe is $100,000 to $150,000. Using existing as-needed county contractors.

After rehabilitation has been completed, with proper follow up inspections and as warranted maintenance, an anticipated in-service useful life of about twenty years would be expected.

Appendix

PACP Report.....10 pages

Inspection Video Notes.....7 pages

HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

Client
Project: Periodic Insp. Joachim Relief Drain
Detail
HRC Job No. 20210753.17

MAILING: PO Box 824,
Bloomfield Hills, MI 48303-0824
SHIPPING: 555 Hulet Drive,
Bloomfield Hills, MI 48302-0360

Tabular Report of PSR

Setup	5	**Surveyor**	Isaac	**Certificate #**	70309486	**System Owner**	OCWRC
Drainage			Ekstrom	**Survey Customer**			
P/O #		**Date**	8/31/2021	**Time**		**Street**	880 Palmer Street
City	City of Pontiac			**Further Location Details**			
Up	MH1	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Down	Outlet	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Use	SW	**Direction**	D	**Flow Control**	D	**Media No**	GOPRO429
Shape	A	**Height (in.)**	75	**Width (in.)**	112	**Date Cleaned**	
Material	CMP	**Joint Length (ft.)**	20	**Total Length (ft.)**	326	**Length Surveyed (ft.)**	326
Lining	XX	**Year Laid**		**Rehabilitated**		**Weather**	
Purpose	Routine Inspection			**Cat**		**Pressure**	
Additional Info	CT coating				**Structural**	**O & M**	
Location	D				**Miscellaneous**	**Construction**	
Project	Periodic Inspection Joachim Relief Drain				**Work Order**		
Northing		**Easting**			**Elevation**		
Coordinate System				**GPS Accuracy**			

Count	CD	Code		D1	D2	%	Joint	From	To	Remarks
0.0		ST	Start of Survey							
0.0		MWL	Miscellaneous Water Level			10				
0.0		AMH	Access Point Manhole							MH1
4.0		DNF	Deposits Ingress Fine				J			
15.0	S1	DSF	Deposits Settled Fine			5				
24.0		IR	Infiltration Runner				J	7		
44.0		DNF	Deposits Ingress Fine				J			
64.0	F1	DSF	Deposits Settled Fine							
64.0		IWJ	Infiltration Weeper Joint							
84.0		IRJ	Infiltration Runner Joint							
100.0	S2	DSF	Deposits Settled Fine			5				
104.0		IRJ	Infiltration Runner Joint					4	7	
110.0	F2	DSF	Deposits Settled Fine			5				

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Tabular Report of PSR

Setup	5	**Surveyor**	Isaac	**Certificate #**	70309486	**System Owner**	OCWRC
Drainage			Ekstrom	**Survey Customer**			
P/O #		**Date**	8/31/2021	**Time**		**Street**	880 Palmer Street
City	City of Pontiac			**Further Location Details**			
Up	MH1	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Down	Outlet	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Use	SW	**Direction**	D	**Flow Control**	D	**Media No**	GOPRO429
Shape	A	**Height (in.)**	75	**Width (in.)**	112	**Date Cleaned**	
Material	CMP	**Joint Length (ft.)**	20	**Total Length (ft.)**	326	**Length Surveyed (ft.)**	326
Lining	XX	**Year Laid**		**Rehabilitated**		**Weather**	
Purpose	Routine Inspection			**Cat**		**Pressure**	
Additional Info	CT coating				**Structural**	**O & M**	
Location	D				**Miscellaneous**	**Construction**	
Project	Periodic Inspection Joachim Relief Drain				**Work Order**		
Northing		**Easting**			**Elevation**		
Coordinate System				**GPS Accuracy**			

Count	CD	Code		D1	D2	%	Joint	From	To	Remarks
124.0		IRJ	Infiltration Runner Joint					4	7	
124.0		JAM	Joint Agular Medium	6						
144.0		IRJ	Infiltration Runner Joint					5		
144.0		DNF	Deposits Ingress Fine							
164.0		IRJ	Infiltration Runner Joint					5		
164.0		LFDL	Lining Feature Delamination							Liner is cracked, peeling
168.0		DBR	Deformed Bulging Round			5		1		
184.0		IRJ	Infiltration Runner Joint					5		
204.0		DNF	Deposits Ingress Fine							
204.0		IRJ	Infiltration Runner Joint					7		
224.0		IRJ	Infiltration Runner Joint					5		
224.0		DNF	Deposits Ingress Fine							
248.0		IRJ	Infiltration Runner Joint					5		
326.0		AEP	Access Point End of Pipe							
326.0		FH	End of Survey							

Structural	**Pipe Rating:**	9	**Pipe Rating Index:**	3	**Quick Rating:**	3300
O&M	**Pipe Rating:**	84.6	**Pipe Rating Index:**	2.8	**Quick Rating:**	4A35
Overall	**Pipe Rating:**	93.6	**Pipe Rating Index:**	5.8	**Quick Rating:**	4A38

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HRC Job No. 20210753.17

MAILING: PO Box 824,
Bloomfield Hills, MI 48303-0824
SHIPPING: 555 Hulet Drive,
Bloomfield Hills, MI 48302-0360

Tabular Report of PSR

Setup	4	**Surveyor**	Isaac	**Certificate #**	70309486	**System Owner**	OCWRC
Drainage			Ekstrom	**Survey Customer**			
P/O #		**Date**	8/31/2021	**Time**		**Street**	880 Palmer Street
City	City of Pontiac			**Further Location Details**			
Up	MH2	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Down	MH1	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Use	SW	**Direction**	D	**Flow Control**	D	**Media No**	IMG4330.MOV
Shape	A	**Height (in.)**	75	**Width (in.)**	112	**Date Cleaned**	N/A
Material	CMP	**Joint Length (ft.)**	20	**Total Length (ft.)**	330	**Length Surveyed (ft.)**	330
Lining	XX	**Year Laid**		**Rehabilitated**		**Weather**	
Purpose	Capital Improvement Programm Assessmen			**Cat**		**Pressure**	
Additional Info	CT Coating				**Structural**	**O & M**	
Location	D				**Miscellaneous**	**Construction**	
Project	Periodic Inspection Joachim Relief Drain				**Work Order**		
Northing		**Easting**			**Elevation**		
Coordinate System				**GPS Accuracy**			

Count	CD	Code		D1	D2	%	Joint	From	To	Remarks
0.0		ST	Start of Survey							
0.0		MWL	Miscellaneous Water Level			10				
0.0		AMH	Access Point Manhole							MH2
10.0	S1	DSF	Deposits Settled Fine			10				
10.0		OBR	Obstacle/Obstruction Rocks			5				
24.0		DNF	Deposits Ingress Fine							
64.0		DNF	Deposits Ingress Fine							
84.0	F1	DSF	Deposits Settled Fine							
84.0		IR	Infiltration Runner							
100.0	S2	DSF	Deposits Settled Fine			5				
164.0		IG	Infiltration Gusher				J	6		
164.0		JAM	Joint Angular Medium			5				
204.0		RFJ	Roots Fine Joint			1		4		
224.0		RFJ	Roots Fine Joint			1				
224.0		DNF	Deposits Ingress Fine				J			

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Project: Periodic Insp. Joachim Relief Drain
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HRC Job No. 20210753.17

MAILING: PO Box 824,
Bloomfield Hills, MI 48303-0824
SHIPPING: 555 Hulet Drive,
Bloomfield Hills, MI 48302-0360

Tabular Report of PSR

Setup	4	**Surveyor**	Isaac	**Certificate #**	70309486	**System Owner**	OCWRC
Drainage			Ekstrom	**Survey Customer**			
P/O #		**Date**	8/31/2021	**Time**		**Street**	880 Palmer Street
City	City of Pontiac			**Further Location Details**			
Up	MH2	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Down	MH1	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Use	SW	**Direction**	D	**Flow Control**	D	**Media No**	IMG4330.MOV
Shape	A	**Height (in.)**	75	**Width (in.)**	112	**Date Cleaned**	N/A
Material	CMP	**Joint Length (ft.)**	20	**Total Length (ft.)**	330	**Length Surveyed (ft.)**	330
Lining	XX	**Year Laid**		**Rehabilitated**		**Weather**	
Purpose	Capital Improvement Programm Assessmen			**Cat**		**Pressure**	
Additional Info	CT Coating				**Structural**	**O & M**	
Location	D				**Miscellaneous**	**Construction**	
Project	Periodic Inspection Joachim Relief Drain				**Work Order**		
Northing		**Easting**			**Elevation**		
Coordinate System				**GPS Accuracy**			

Count	CD	Code		D1	D2	%	Joint	From	To	Remarks
254.0		IR	Infiltration Runner				J	5		
254.0		DNF	Deposits Ingress Fine				J			
264.0		IR	Infiltration Runner				J			
284.0		IR	Infiltration Runner				J			
284.0		DNF	Deposits Ingress Fine				J			
284.0		RFJ	Roots Fine Joint							
295.0	F2	DSF	Deposits Settled Fine							
304.0		IR	Infiltration Runner				J	7		
324.0		IR	Infiltration Runner				J	5	7	
330.0		AMH	Access Point Manhole							MH1
330.0		FH	End of Survey							

Structural	**Pipe Rating:**	4	**Pipe Rating Index:**	4	**Quick Rating:**	4100
O&M	**Pipe Rating:**	156.6	**Pipe Rating Index:**	2.2	**Quick Rating:**	5144
Overall	**Pipe Rating:**	160.6	**Pipe Rating Index:**	6.2	**Quick Rating:**	5145

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CONSULTING ENGINEERS SINCE 1915

Client
Project: Periodic Insp. Joachim Relief Drain
Detail
HRC Job No. 20210753.17

MAILING: PO Box 824,
Bloomfield Hills, MI 48303-0824
SHIPPING: 555 Hulet Drive,
Bloomfield Hills, MI 48302-0360

Tabular Report of PSR

Setup	3	**Surveyor**	Isaac	**Certificate #**	70309486	**System Owner**	OCWRC
Drainage			Ekstrom	**Survey Customer**			
P/O #		**Date**	8/31/2021	**Time**		**Street**	880 Palmer Street
City	City of Pontiac			**Further Location Details**			
Up	MH3	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Down	MH2	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Use	SW	**Direction**	D	**Flow Control**	D	**Media No**	GOPRO402
Shape	Arch	**Height (in.)**	75	**Width (in.)**	112	**Date Cleaned**	N/A
Material	CMP	**Joint Length (ft.)**	20	**Total Length (ft.)**	275	**Length Surveyed (ft.)**	275
Lining	XX	**Year Laid**		**Rehabilitated**		**Weather**	
Purpose	Routine Inspection			**Cat**		**Pressure**	
Additional Info	CT coating				**Structural**	**O & M**	
Location	D				**Miscellaneous**	**Construction**	
Project					**Work Order**		
Northing		**Easting**			**Elevation**		
Coordinate System				**GPS Accuracy**			

Count	CD	Code		D1	D2	%	Joint	From	To	Remarks
0.0		ST	Start of Survey							
0.0		MWL	Miscellaneous Water Level			5				
0.0		AMH	Access Point Manhole							MH3
0.0	S1	DSF	Deposits Settled Fine			5				
28.0		JAM	Joint Angular Medium	5						
99.0		JAM	Joint Angular Medium	6						
108.0		JAM	Joint Angular Medium	6						Soil Visible through the joint.
108.0		DNF	Deposits Ingress Fine							
188.0		JAM	Joint Angular Medium	5						
188.0		DNF	Deposits Ingress Fine							
285.0		OBR	Obstacle/Obstruciton Rocks			5				
285.0		TSD	Tap saddle defective					3		Seal ring hanging into main.
295.0		OBR	Obstacle/Obstruction Rocks			5				
315.0	F1	DSF	Deposits Settled Fine			5				
315.0		AMH	Access Point Manhole							MH2
315.0		FH	End of Survey							

Structural	**Pipe Rating:**	19	**Pipe Rating Index:**	3.8	**Quick Rating:**	4431
O&M	**Pipe Rating:**	142	**Pipe Rating Index:**	2.1	**Quick Rating:**	3422
Overall	**Pipe Rating:**	161	**Pipe Rating Index:**	5.9	**Quick Rating:**	4435

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Bloomfield Hills, MI 48302-0360

Tabular Report of PSR

Setup	3	**Surveyor**	Isaac	**Certificate #**	70309486	**System Owner**	OCWRC
Drainage			Ekstrom	**Survey Customer**			
P/O #		**Date**	8/31/2021	**Time**		**Street**	880 Palmer Street
City	City of Pontiac			**Further Location Details**			
Up	MH3	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Down	MH2	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Use	SW	**Direction**	D	**Flow Control**	D	**Media No**	GOPRO402
Shape	Arch	**Height (in.)**	75	**Width (in.)**	112	**Date Cleaned**	N/A
Material	CMP	**Joint Length (ft.)**	20	**Total Length (ft.)**	275	**Length Surveyed (ft.)**	275
Lining	XX	**Year Laid**		**Rehabilitated**		**Weather**	
Purpose	Routine Inspection			**Cat**		**Pressure**	
Additional Info	CT coating				**Structural**	**O & M**	
Location	D				**Miscellaneous**	**Construction**	
Project					**Work Order**		
Northing			**Easting**		**Elevation**		
Coordinate System				**GPS Accuracy**			

HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

Client
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Detail
HRC Job No. 20210753.17

MAILING: PO Box 824,
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Bloomfield Hills, MI 48302-0360

Tabular Report of PSR

Setup	2	**Surveyor**	Isaac	**Certificate #**	70309486	**System Owner**	OCWRC
Drainage			Ekstrom	**Survey Customer**			
P/O #		**Date**	8/31/2021	**Time**		**Street**	880 Palmer Street
City	City of Pontiac			**Further Location Details**			
Up	MH4	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Down	MH3	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Use	SW	**Direction**	D	**Flow Control**	D	**Media No**	GOPRO394
Shape	A	**Height (in.)**	52	**Width (in.)**	77	**Date Cleaned**	N/A
Material	CMP	**Joint Length (ft.)**	20	**Total Length (ft.)**	275	**Length Surveyed (ft.)**	275
Lining	XX	**Year Laid**		**Rehabilitated**		**Weather**	
Purpose	Capital Improvement Program Assessment			**Cat**		**Pressure**	
Additional Info	CT coating				**Structural**	**O & M**	
Location	D				**Miscellaneous**	**Construction**	
Project	Periodic Inspection Joachim Relief Drain				**Work Order**		
Northing		**Easting**			**Elevation**		
Coordinate System				**GPS Accuracy**			

Count	CD	Code		D1	D2	%	Joint	From	To	Remarks
0.0		ST	Start of Survey							
0.0		MWL	Miscellaneous Water Level			10				
0.0		AMH	Access Point Manhole							MH4
0.0	S1	LFO	Lining Feature Other							Lining cracked
0.0	S2	DSF	Deposits Settled Fine			5		5	7	
9.0		LL	Line Left			30				
10.0		JAM	Joint Angular Medium	5						
10.0		ISSRB	Intruding Sealing Material Seal Ring Broken			2		1		
57.0		SCP	Surface Damage Corrosion					7		12x18 inches
58.0		TB	Tap Break-In/Hammer					5		
100.0	F2	DSF	Deposits Settled Fine			5		5	7	
133.0		OBR	Obstacle/Obstruction Rocks			2		6		
160.0		IDJ	Infiltration Dripper Joint							
163.0	S3	DFBR	Deformed Flexible Bulging Round			5		12	2	
170.0	F3	DFBR	Deformed Flexible Bulging Round			5		12	2	
185.0	S4	DFBR	Deformed Flexible Bulging Round			5		2		
190.0	F4	DFBR	Deformed Flexible Bulging Round			5		2		
220.0		ISSRH	Intruding Sealing Material Sear Ring Hanging				J			
223.0	F1	LFO	Lining Feature Other							Lining cracked
223.0		TSC	Tap Saddle Capped					3		
240.0		RPP	Point Repair Patch				J			Grouted Joint

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Tabular Report of PSR

Setup	2	**Surveyor**	Isaac	**Certificate #**	70309486	**System Owner**	OCWRC
Drainage			Ekstrom	**Survey Customer**			
P/O #		**Date**	8/31/2021	**Time**		**Street**	880 Palmer Street
City	City of Pontiac			**Further Location Details**			
Up	MH4	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Down	MH3	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Use	SW	**Direction**	D	**Flow Control**	D	**Media No**	GOPRO394
Shape	A	**Height (in.)**	52	**Width (in.)**	77	**Date Cleaned**	N/A
Material	CMP	**Joint Length (ft.)**	20	**Total Length (ft.)**	275	**Length Surveyed (ft.)**	275
Lining	XX	**Year Laid**		**Rehabilitated**		**Weather**	
Purpose	Capital Improvement Program Assessment			**Cat**		**Pressure**	
Additional Info	CT coating				**Structural**	**O & M**	
Location	D				**Miscellaneous**	**Construction**	
Project	Periodic Inspection Joachim Relief Drain				**Work Order**		
Northing		**Easting**			**Elevation**		
Coordinate System				**GPS Accuracy**			

Count	CD	Code		D1	D2	%	Joint	From	To	Remarks
243.0		MSC	Misc. Size Change	75	112					CMPA
250.0		TFA	Tap Factory Activity					3		
250.0		DSF	Deposits Settled Fine			5				
259.0		RPP	Point Repair Patch Defective				J			Missing joint grout at invert.
260.0		TSA	Tap saddle Activity					7		
268.0		RPP	Point Repair Patch Defective				J			Missing joint grout at invert.
275.0		AMH	Access Point Manhole							MH3
275.0		FH	End of Survey							

Structural	**Pipe Rating:**	30.2	**Pipe Rating Index:**	3.2	**Quick Rating:**	4333
O&M	**Pipe Rating:**	55	**Pipe Rating Index:**	2.1	**Quick Rating:**	3323
Overall	**Pipe Rating:**	85.2	**Pipe Rating Index:**	5.3	**Quick Rating:**	4335

OTHER OFFICES:
Delhi Township | Howell |Detroit | Jackson
Grand Rapids | Kalamazoo | Lansing

HUBBELL, ROTH & CLARK, INC
CONSULTING ENGINEERS SINCE 1915

Client
Project: Periodic Insp. Joachim Relief Drain
Detail
HRC Job No. 20210753.17

MAILING: PO Box 824,
Bloomfield Hills, MI 48303-0824
SHIPPING: 555 Hulet Drive,
Bloomfield Hills, MI 48302-0360

Tabular Report of PSR

Setup	1	**Surveyor**	Isaac	**Certificate #**	70309486	**System Owner**	OCWRC
Drainage			Ekstrom	**Survey Customer**			
P/O #		**Date**	8/31/2021	**Time**		**Street**	880 Palmer Street
City	City of Pontiac			**Further Location Details**	Manhole South end of Property		
Up	MH5	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Down	MH4	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Use	SW	**Direction**	D	**Flow Control**	D	**Media No**	GOPRO385
Shape	A	**Height (in.)**	52	**Width (in.)**	77	**Date Cleaned**	N/A
Material	CMP	**Joint Length (ft.)**	20	**Total Length (ft.)**	270	**Length Surveyed (ft.)**	270
Lining	XX	**Year Laid**		**Rehabilitated**		**Weather**	
Purpose	Capital Improvement Program Assessment			**Cat**		**Pressure**	
Additional Info	CT coating				**Structural**	**O & M**	
Location	D				**Miscellaneous**	**Construction**	
Project	Periodic Inspection Joachim Relief Drain				**Work Order**		
Northing		**Easting**			**Elevation**		
Coordinate System				**GPS Accuracy**			

Count	CD	Code		D1	D2	%	Joint	From	To	Remarks
0.0		ST	Start of Survey							
0.0		AMH	Access Point Manhole							MH5
0.0	S1	LFO	Lining Feature Detached					8	4	Cracked 8 to 4
0.0		MWL	Miscellaneous Water Level			10				
0.0	S2	DSF	Deposits Settled Fine			5		5	7	
10.0		TB	Tap Break-In/Hammer					3		
20.0		JOM	Joint Offset Medium							
40.0		ISSRH	Intruding Sealing Material Seal Ring Hanging							
98.0		JOM	Joint Offset Medium			5				
159.0		JOM	Joint Offset Medium	2						
162.5		LR	Line Right			30	J			
162.5		SCP	Surface Damage Corrosion				J			
162.5	F2	DSF	Deposits Settled Fine			5		5	7	
183.0		TSA	Tab Saddle Activity					7		
202.0		DFBR	Deformed Flexible Bulging Round			5		12	2	
208.0		ISSRH	Intruding Sealing Material Seal Ring Hanging							
208.0	S3	DSF	Deposits Settled Fine			5		5	7	
225.0		JAM	Joint Angular Medium			5				
225.0	F1	LFO	Lining Feature Detached					8	4	Cracked 8 to 4
225.0	F3	DSF	Deposits Settled Fine			5		5	7	
225.0		FH	End of Survey							

OTHER OFFICES:
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Grand Rapids | Kalamazoo | Lansing

MAILING: PO Box 824,
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Bloomfield Hills, MI 48302-0360

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Drainage			Ekstrom	**Survey Customer**			
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City	City of Pontiac			**Further Location Details**	Manhole South end of Property		
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Down	MH4	**Rim To Invert (ft.)**		**Grade To Invert (ft.)**		**Rim To Grade (ft.)**	
Use	SW	**Direction**	D	**Flow Control**	D	**Media No**	GOPRO385
Shape	A	**Height (in.)**	52	**Width (in.)**	77	**Date Cleaned**	N/A
Material	CMP	**Joint Length (ft.)**	20	**Total Length (ft.)**	270	**Length Surveyed (ft.)**	270
Lining	XX	**Year Laid**		**Rehabilitated**		**Weather**	
Purpose	Capital Improvement Program Assessment			**Cat**		**Pressure**	
Additional Info	CT coating				**Structural**	**O & M**	
Location	D				**Miscellaneous**	**Construction**	
Project	Periodic Inspection Joachim Relief Drain				**Work Order**		
Northing		**Easting**			**Elevation**		
Coordinate System				**GPS Accuracy**			

Structural	**Pipe Rating:**	20	**Pipe Rating Index:**	2.9	**Quick Rating:**	3621
O&M	**Pipe Rating:**	79.6	**Pipe Rating Index:**	2	**Quick Rating:**	2400
Overall	**Pipe Rating:**	99.6	**Pipe Rating Index:**	4.9	**Quick Rating:**	3621

OTHER OFFICES:
Delhi Township | Howell |Detroit | Jackson
Grand Rapids | Kalamazoo | Lansing

HUBBELL, ROTH & CLARK, INC. • CONSULTING ENGINEERS

SHEET 1 OF ____
DATE 9-10 20 21
BY KIS
CK. ____
JOB NO. 20210753
ACC. NO. ____

SUBJECT Joachim Drain

DETAIL Video Notes

GOPRO 386: Sta 0+00 to 0+30 East from MH5
1st jt separation
S. side inlet pipe small cmp
Joint separation 0+20
Vert sep @ crown

GOPRO 387: 0+30 to 0+60
Joint separation w/ jt material in pipe 0+40
no exposed soils
joint damage 0+69
joint separation

GOPRO 388: 0+60 to 1+00
10 O'clock wall damage local area small < 1" Δ
Joint separation 0+69 vert : horz
debris caught in jt - small branch/twig
Joint separation 0+98 vert : horz
Stamp on barrel behind cracked coating

GOPRO 389 1+00 to 1+30
Wall damage 12 O'clock local smal < 1" Δ 1+09
joint separation vert @ crown 1+19
debris in barrel at this location possible fine infiltration

GOPRO 390 1+30 to 1+60
Joint separation 1+51
soil infiltration noted
Bend 1+62.5 outside of bend heading SE
minor surface corrosion at interior of bend

GOPRO 391 1+60 to 2+00
joint separation 1+65
1+75 11 O'clock Small wall damage local area < 1" Δ
inlet pipe N side 1+83 small cmp
joint separation 1+87

HUBBELL, ROTH & CLARK, INC. • CONSULTING ENGINEERS

SHEET 2 OF ____
DATE ____ 20____
BY ____
CK. ____
JOB NO. ____
ACC. NO. ____

SUBJECT ____

DETAIL ____

GOPRO 392 2+00 to
wall damage 12 - 2 o'clock 2+02

GOPRO 393 2+00 to 2+70 @ MH4
2" Δ ~ 2' x 2' area
joint Seperation joint filler hanging into pipe 2+08
joint Seperation 2+25
joint Seperation 2+45 vert : horz
joint Seperation 2+67
MH4 2+70
Corrosion Light Surface rust on riser and steps

GOPRO 394 2+70 MH4 to 3+10
Bend 2+79 turning NE
joint Seperation 2+80 joint material in pipe
joint Seperation horz 2+90
joint Seperation 3+10 slight

GOPRO 395 3+10 to 3+50
3+27 Surface corrosion 7 o'clock minor
3+50 joint Seperation vert : horz

GOPRO 396 3+50 to 3+90
wall damage 3+70 minor 1:00
joint Seperation 3+70
joint Seperation 3+90 12 - 7 o'clock

GOPRO 397 3+90 to 4+40
large debris concrete / boulder in pipe
joint Seperation 4+10 vert : horz
joint Seperation 4+30 vert : horz
ground water infiltration evidenced
Crown to 2 o'clock pipe wall damage 4+33 to 4+ See GOPRO 398

HUBBELL, ROTH & CLARK, INC. • CONSULTING ENGINEERS

SHEET 3 OF ____
DATE ____ 20____
BY ____
CK. ____
JOB NO. ____
ACC. NO. ____

SUBJECT ____

DETAIL ____

GOPRO 398

Crown to 2'0'clock 4" Δ wall damage ~ ~~mmm~~ 8' long

GOPRO399 4+40 to 4+90

wall damage 2' 0 clock 2" Δ ~ 2' x 2'

joint separation 4+50 vert & horz

greater at crown ~ 3" wide

4+85 wall damage 12 - 2' 0'clock two locations ~ 10' apart

4+70 joint separation horz

4+96 joint separation vert : horz

wall damage

GOPRO400 4+90 to 5+12.5

wall dmge 11 - 2 0'clock 2" Δ ~8 long 4+90

joint separation w/ fines w/in jt

coating in better condition at this section coating mostly intact at invert

w/ less cracking

Grouted solid inlet pipe @ 4+93 (plugged pipe) small cmp??

5+00 joint grouted

5+02 drop structure / pipe size change

GOPRO401 5+12.5 to 5+45

Steel plate connection wall between two pipes transition w/ invert drop ~

large pipe at S. wall corrugated then RCP 5+20

~~sediment~~ / buildup sediment buildup along invert of this pipe

coating appears textured along N side ~ 9-11 0'clock

small invert 5+30

5+29 pipe jt separation grout filled along invert separate full circumference

5'-7 0'clock grout missing

wall damage 5+33 minor < ½" ~ 1' x 2'

5+38 joint separation grouted missing 5-7 0'clock

↳ 3-8 0'clock

5+45 MH3

minor corrosion along steps

Top Crew noted sinkholes ~ 35' upstream from MH3

potholes in pave/invert

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SHEET 4 OF
DATE 9-13 2021
BY
CK.
JOB NO. 20210753
ACC. NO.

SUBJECT Joachim Drain

DETAIL Video Notes

GOPRO 402 5+45 to 5+90

joint separation 5+73 horz & vert

GOPRO 403 5+90 to 6+50

joint separation 6+14 horz

" " 6+40 ~3" horz separation ~1/2" vert separation

did not call out 6+50 could have just missed the callout but might be off by 10' on station - called out 6+40 twice so it recorded at 6+41 may be @ 6+34

GOPRO 404 6+50 to 7+00

joint separation 6+53 large horz at crown 9-3 o'clock & vert visible soils at crown

joint separation 6+72 fines in jt.

joint separation 7+93 horz & vert

GOPRO 405 7+00 to 7+50

7+13 joint separation horz

7+33 joint separation vert @ crown soils visible @ crown & horz

GOPRO 406 7+50 to 8+00

joint separation 7+53 horz & vert

" " 7+72 fines accumulated just past jt small coating thicker and hanging down into pipe @ 7+72 to 7+90

joint separation 7+94 horz

GOPRO 407 8+00 to 8+60

joint separation 8+14 horz & vert ~4" horz @ crown

8+30 debris in pipe

outlet pipe cmp small South side

8+34 joint separation horz

8+40 debris and concrete pieces in pipe

8+54 debris and sandy sediment

joint separated

8+90 MH #2 coating intact on riser, some surface corrosion on rungs

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SHEET 5 OF
DATE 9-13 20 21
BY
CK.
JOB NO. 20210753
ACC. NO.

SUBJECT Joachim Drain

DETAIL

IMG 4330 8+60 to 9+00

Debris in pipe 8+70 to 9+00 sand, rocks, bricks, broken concrete deeper at 9+00
8+84 joint separation soil infiltration

IMG 4331 9+00 to 9+20

continued debris and sediment
joint separation 9+04

IMG 4332 9+20 to 10+00

9+24 joint separation fine infiltration
9+30 wall damage 11 O'clock minor < 1"
9+44 joint separation active groundwater infiltration horz & vert
roots growing into joint
9+50 ~ ½" of sediment in pipe
9+64 joint separation horz ~ 3'
9+84 minor jt separation at invert ~ 2" at crown
9+90 ~ 2" sediment in pipe

IMG 4333 9+65 to 9+80

12 - 2 O'Clock deflected pipe potential corrugations full of coatings

IMG 4334 10+00 to 11+00

10+04 joint separation minor
10+15 sediment buildup ~ ½"
10+24 joint separation active groundwater infiltration @ invert
debris / deposit buildup 11-12 o'clock adjacent to jt (sandy silty material)
10+35 sediment buildup is deeper ~ 1"
10+44 minor sep of jt ~ ½"; 11-7 O'clock ~ 1" separation
10+64 jt separation - roots in joint vert & horz
sediment and debris for ~ 2' long at jt
10+84 jt separation rocks in jt vert & horz; soils noted in jt @ crown
10+90 sediment in pipe

HUBBELL, ROTH & CLARK, INC. • CONSULTING ENGINEERS

SHEET 10 OF
DATE 9-13 20 21
BY
CK.
JOB NO. 20210753
ACC. NO.

SUBJECT Joachim Drain

DETAIL

GOPRO 429 11+00 to 11+90

11+14 jt separation 5 o'clock groundwater infiltration, soil infiltration @ crown
sediment buildup just past joint
11+24 jt separation active gw infiltration @ 5 o'clock
11+44 jt separation active gw infiltration, fine infiltration
roots in jt; sediment buildup just down stream of joint ~ 1-2"
11+55 end of sediment buildup
11+64 jt separation horz : vert ~ 2" Δ, active gw infiltration 7 o'clock
11+70 sediment buildup in pipe ~1"
11+80 sediment buildup is deeper ~ 1-2"
11+84 jt separation active gw infiltration 5-7 o'clock; closed jt at crown
sig sediment deposit at jt
11+90 MH #1
coating failure - cracking and peeling in riser
minor surface corrosion on rungs

GOPRO 430 11+90 to 12+90

11+94 jt separation - soil infiltration; previous grouted jt repairs noted
12+05 sediment debris in pipe ~3" deep
12+14 jt separation - gw infiltration; vert displacement and soil infiltration @ crown
& both sides of invert
12+26 2-3" of sediment buildup
12+34 jt separation soil infiltration @ crown, vert ! horz
12+40 ~3" sediment buildup
12+54 jt separation horz minor gw infiltration 7 o'clock
12+74 jt separation active gw infiltration 5 o'clock
12+80 sediment buildup 1-2"
12+90 3" sediment buildup

GOPRO 431 12+90 to 13+20

Sediment : debris buildup ~ 3"
12+94 jt separation gw infiltration 4-7 o'clock
13+00 end of sediment buildup
13+10 ~½" sediment buildup
13+14 jt separation gw infiltration, sig sep horz @ crown ~3-4"

HUBBELL, ROTH & CLARK, INC. • CONSULTING ENGINEERS

SHEET 7 OF

DATE 20

BY

CK.

JOB NO. 20210753

ACC. NO.

SUBJECT Joaquin Drain

DETAIL

-cont GOPRO 431 @ 13+20 to 13+58

13+27 sediment buildup noted

13+30 2-3" sediment build

13+34 jt separation gw infiltration; 5 o'clock soil infiltration at crown

13+54 jt separation gw infiltration 5 o'clock

13+60 invert coating/lining more cracks noted

13+58 wall damage @ crown ~ 1' x

GOPRO432 13+58 to 13+90

wall damage measures ~ 3" Δ 1' x 1'

13+74 jt separation gw infiltration 5 o'clock

13+80 ~½" sediment buildup in pipe

GOPRO433 13+90 to

13+94 jt separation fine infiltration, gw infiltration 7 o'clock

14+10 minor sediment buildup

14+14 jt separation gw infiltration 5 o'clock; soil infiltration 7 o'clock

14+38 jt separation gw infiltration 5 o'clock sediment & debris 1½-2"

14+56 jt minor sep at invert ~2" at crown; wet in jt at 7 o'clock no active gw noted

14+76 jt separated fines noted in jt, horz separation greater at crown wet jt but no active gw noted

14+96 jt separated fine infiltration @ 5 o'clock horz separation increases at up vert & horz separation @ 7 o'clock wet jt but no active gw noted

Joachim Drain Weir Pictures at Galloway Lake

Joachim Drain Weir Pictures at Galloway Lake

HRC OFFICE LOCATIONS

- **Bloomfield Hills**
  555 Hulet Drive
  Bloomfield Hills, MI 48302
  (248) 454-6300 | Fax: (248) 454-6312
- **Detroit**
  Buhl Building, Suite 1650
  535 Griswold Street | Detroit, MI 48226
  (313) 965-3330
- **Howell**
  105 West Grand River
  Howell, MI 48843
  (517) 552-9199
- **Kalamazoo**
  834 King Highway, Suite 107
  Kalamazoo, MI 49001
  (269) 665-2005
- **Delhi Township**
  2101 Aurelius Road, Suite 2
  Holt, MI 48842
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- **Grand Rapids**
  801 Broadway NW, Suite 215
  Grand Rapids, MI 49504
  (616) 454-4286
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  401 S. Mechanic Street, Suite B
  Jackson, MI 49201
  (517) 292-1295
- **Lansing**
  215 South Washington Square
  Lansing, MI 48933
  (517) 292-1488