EGLE

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

Finance Division

CLEAN WATER STATE REVOLVING FUNDS (CWSRF/SWQIF) PROJECT PLANNING DOCUMENT SUBMITTAL FORM

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

Project Name: Final Settling Tank Replacement and Channel Air Upgrade

Project Description: Rebuild three of the Final Settling Tanks and to replace the Channel diffusers with new diffusers

Legal Name of Applicant: Benton Harbor – St Joseph Joint Wastewater Treatment Plant
(Name of the applicant municipality bonding for the project. Ex. A county bonding on behalf of a village or township)

Applicant Address: 269 Anchors Way

City: St. Joseph Zip Code: 49085 County: Berrien

Applicant's Federal Employer Identification Number (EIN): 38-6018193

Congressional District: 4 State Senate District: 20 State House District: 38

NPDES Permit Number: MI0022322 Associated SAW Grant Number:

Estimated Total Project Cost: $5,812,560 Target Construction Start Date: October 2023

Applicant Authorized Representative Name: Kevin Pockrandt

Title: Plant Manager Phone: 269.983.7719 Email: kpockrandt@bhsjwwtp.com

Authorized Representative Address. If same as applicant address above, check here ☒

Address: City: Zip Code:

Kevin Pockrandt 4-12-23

Signature of Authorized Representative Date

Completed Project Useful Life and Cost Analysis Certification Form. Blank copy included for use.
☒ Attached

Completed PPL Scoring Data Form. Blank copy included for use.
☒ Attached

Joint Resolution of Project Planning Document Adoption/Authorized Representative Designation.
☒ Attached

Did you follow the Qualifications Based Selection (QBS) process for obtaining planning services?
☐ Yes ☒ No

A final project planning document, prepared and adopted in accordance with EGLE's CWSRF Project Planning Document Preparation Guidance, must be submitted by the annual deadline as indicated on EGLE's CWSRF website for a proposed project to be considered for placement on Michigan's Project Priority List for the upcoming fiscal year.

Please email your final project planning document and attachments with this form to your EGLE Water Infrastructure Funding and Financing Section Project Manager.

If you need this information in an alternate format, contact EGLE-Accessibility@Michigan.gov or call 800-662-9278.

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PROJECT PLAN

FOR

CLEAN WATER STATE REVOLVING FUND

TO

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BENTON HARBOR – ST. JOSEPH JOINT WASTEWATER TREATMENT PLANT

269 ANCHORS WAY
ST. JOSEPH, MICHIGAN 49085

APRIL 2023

Prepared by

AECOM

303 East Wacker Drive, Suite 1400

Chicago, IL 60601

6069904

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1 PURPOSE AND ACKNOWLEDGEMENTS

1.1 PURPOSE

The Benton Harbor St. Joseph Joint Wastewater Treatment Plant (Joint Plant) provides regional wastewater treatment services to the cities of Benton Harbor and St. Joseph, four surrounding townships, and two villages. The Joint Plant is owned by the cities of Benton Harbor and St. Joseph; however, governance of the facility is vested in the Joint Wastewater Treatment Board. The Joint Wastewater Treatment Board is responsible for the operation, maintenance, repair, and improvement of the facility.

The Joint Wastewater Treatment Board has the legal authority, managerial capability, and financial means to build, operate, and maintain the existing Joint Plant. The Joint Plant owns, operates, and will finance the facilities to be built as part of the proposed project.

The purpose of this Planning document is to request CWSRF funding for near term critical projects due to aging equipment including:

- Why the presented project is needed
- As the project includes replacement of aging equipment, an alternative evaluation is not included
- An assessment of environmental impacts
- Other associated background information

1.2 REFERENCE INFORMATION

The following documents were used or referenced in the preparation of this document:

- Berrien County Master Plan 2022
- Berrien County Master Plan 2015
- Berrien County Development Plan 2020
- Berrien County 2020 Economic Snapshot
- Benton Harbor – St. Joseph Joint Wastewater Treatment Plant Operating and Maintenance Report Fiscal Year 2020 – 21
- U.S. Census Bureau
- City of St. Joseph Master Plan 2016
- Berrien County Trails Master Plan 2022
- Benton Harbor – St. Joseph Joint Wastewater Treatment Plant Strategic Capital Improvement Plant (SCIP) 2004 to 2016
- Benton Harbor – St. Joseph Joint Wastewater Treatment Plant 2015 Update to Strategic Capital Improvement Plan (SCIP)

2 PROJECT BACKGROUND

2.1 STUDY AREA AND SERVICE AREA

The study area includes the area that contributes to the wastewater facility that includes the required upgrades addressed by the proposed project. The study area is considered Berrien County and the following sections will provide information at the county level. Berrien County is located in southwestern Michigan, on the border of Indiana and Lake Michigan. The area to be served by the proposed project includes the following communities,

1. City of Benton Harbor
2. Benton Charter Township
3. Lincoln Charter Township
4. Royalton Township
5. City of St. Joseph
6. St. Joseph Charter Township
7. Village of Shoreham
8. Village of Stevensville

The communities listed above are currently served by the Benton Harbor St. Joseph Joint Wastewater Treatment Plant (Joint Plant). The collection system components are the responsibility of these communities and not the Joint Plant. The system has been designed to convey domestic and industrial wastewater to the Joint Plant for treatment. After treatment, flows are discharged into the St. Joseph River.

There is a possibility that the existing service may expand in future years to include additional communities. The additional communities include Hagar Township, Pipestone Township and Sodus Township.

Figure 2.1 depicts the communities currently served by the Joint Plant and the potential expansion to the existing service area.

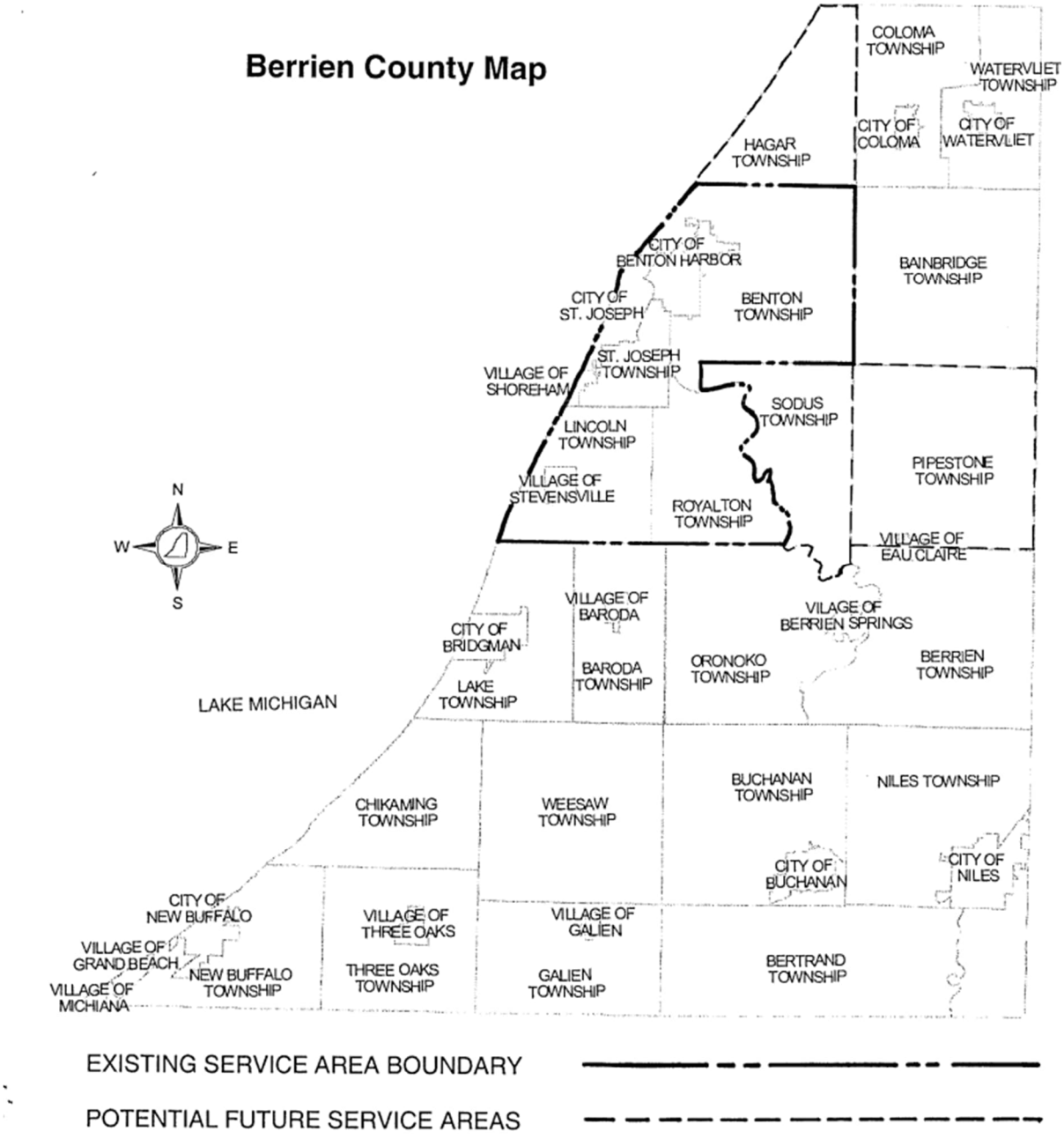


FIGURE 2.1 BERRIEN COUNTY MAP

Figure 2.2 shows the project area and some of the sewer lines that convey flow from the service area communities to the Joint Plant.

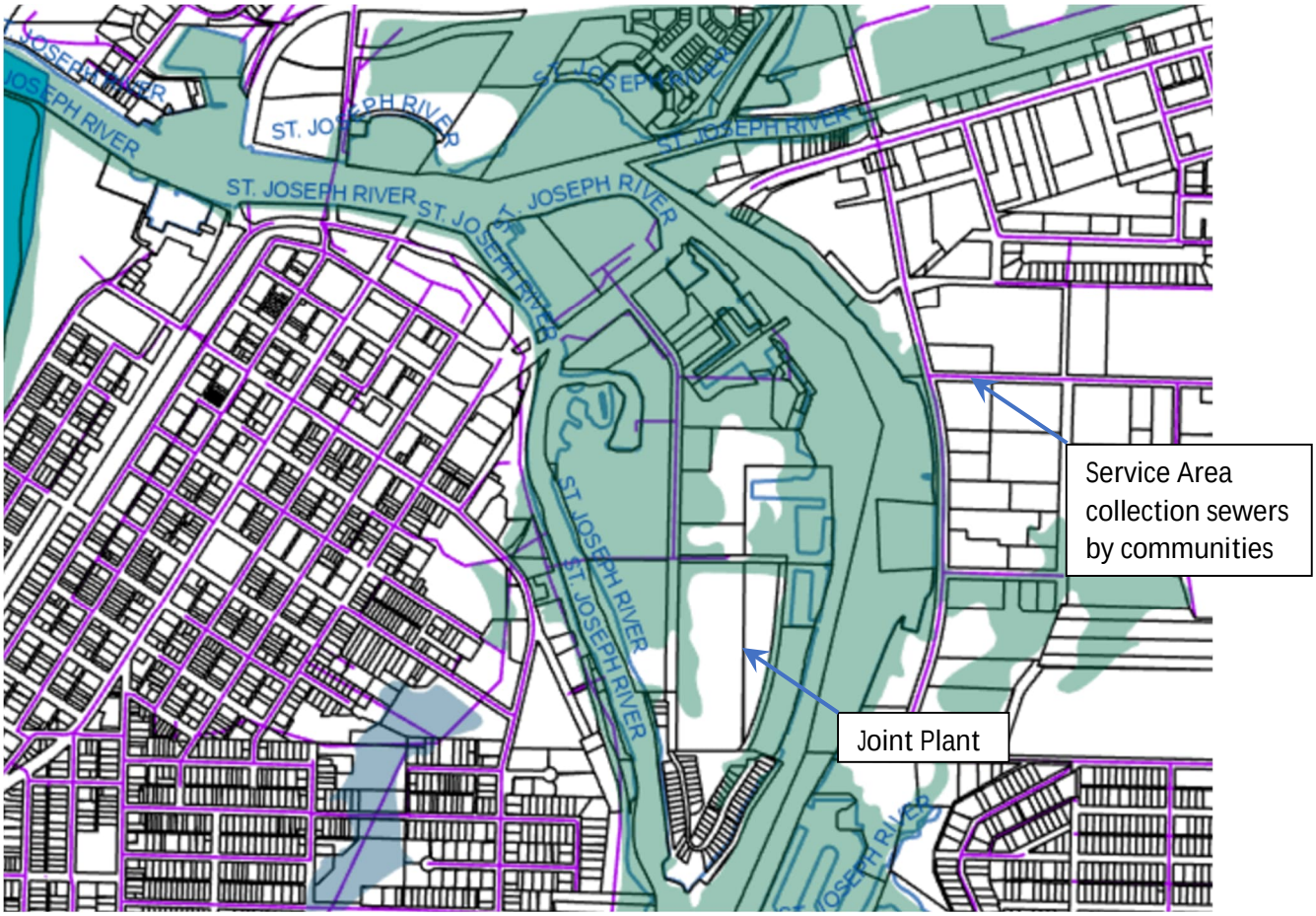


FIGURE 2.2 PORTION OF SEWER MAP NEAR PROJECT AREA

2.2 EXISTING ENVORNMENT EVALUATION

The existing environment in the study area is discussed in the following sections.

2.2.1 CULTURAL AND HISTORICAL RESOURCES

The Joint Wastewater Treatment Board is not aware of any cultural and historical resources that are likely to be impacted by the project described in this Project Plan. The Joint Wastewater Treatment Board understands that EGLE is handling the direct contacts with the National/State Historical Registers, the State Historical Preservation Office, Tribal Historic Preservation Offices, local historical societies, and local/regional planning agencies and will confirm whether there are any concerns or issues regarding cultural resources in the project area.

2.2.2 AIR QUALITY

The project area is expected to remain in the same general condition for the foreseeable future. This area currently does not include any nonattainment areas. There are no known facilities in the area which would significantly impair the air quality. The proposed projects should not cause any changes to the surrounding area which would impact the air quality.

2.2.3 WETLANDS

The wetlands found in Berrien County fall into four categories. These categories are marshes, swamps, bogs and fens. Figure 2.3 is a map produced from the National Wetland Inventory (NWI) of the U.S. Fish & Wildlife Service. There are no known wetlands in the project area. The proposed projects will not revise the current discharge point for the Joint Plant and soil will not be excavated, as such, no changes to site drainage are anticipated. Impacts to wetlands are not anticipated due to the proposed projects.

FIGURE 2.3 WETLANDS IN THE VICINITY OF THE PROJECT AREA

2.2.4 GREAT LAKES, SHORELANDS, COASTAL ZONES, AND COASTAL MANAGEMENT AREAS

There are no known lakes, shorelands, coastal zones and coastal management areas in the project area. The proposed project will not revise the current discharge point for the Joint Plant and soil will not be excavated, as such, no changes to site drainage are anticipated.

Impacts to lakes, shorelands, coastal zones and coastal management areas are not anticipated due to the proposed project.

2.2.5 FLOOD PLAINS

The 100-year floodplain is defined as the flood level which has 1% chance of being reached in any given year. The areas designated by the Federal Emergency Management Agency (FEMA) is the land along the St. Joseph, Paw Paw and Galien Rivers.

The nearest floodplain to the project area is along Anchor's Way directly west of the Joint Plant. The project area is surrounded by Zone X Flood Areas, defined as an area with a 0.2% annual chance flood. The project area is identified on a portion of a Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) in Figure 2.4. The entire map is included in **Appendix A**. The proposed project will not revise the current discharge point for the Joint Plant and soil will not be excavated as such no changes to site drainage are anticipated. Impacts to the floodplain are not anticipated due to the proposed project.

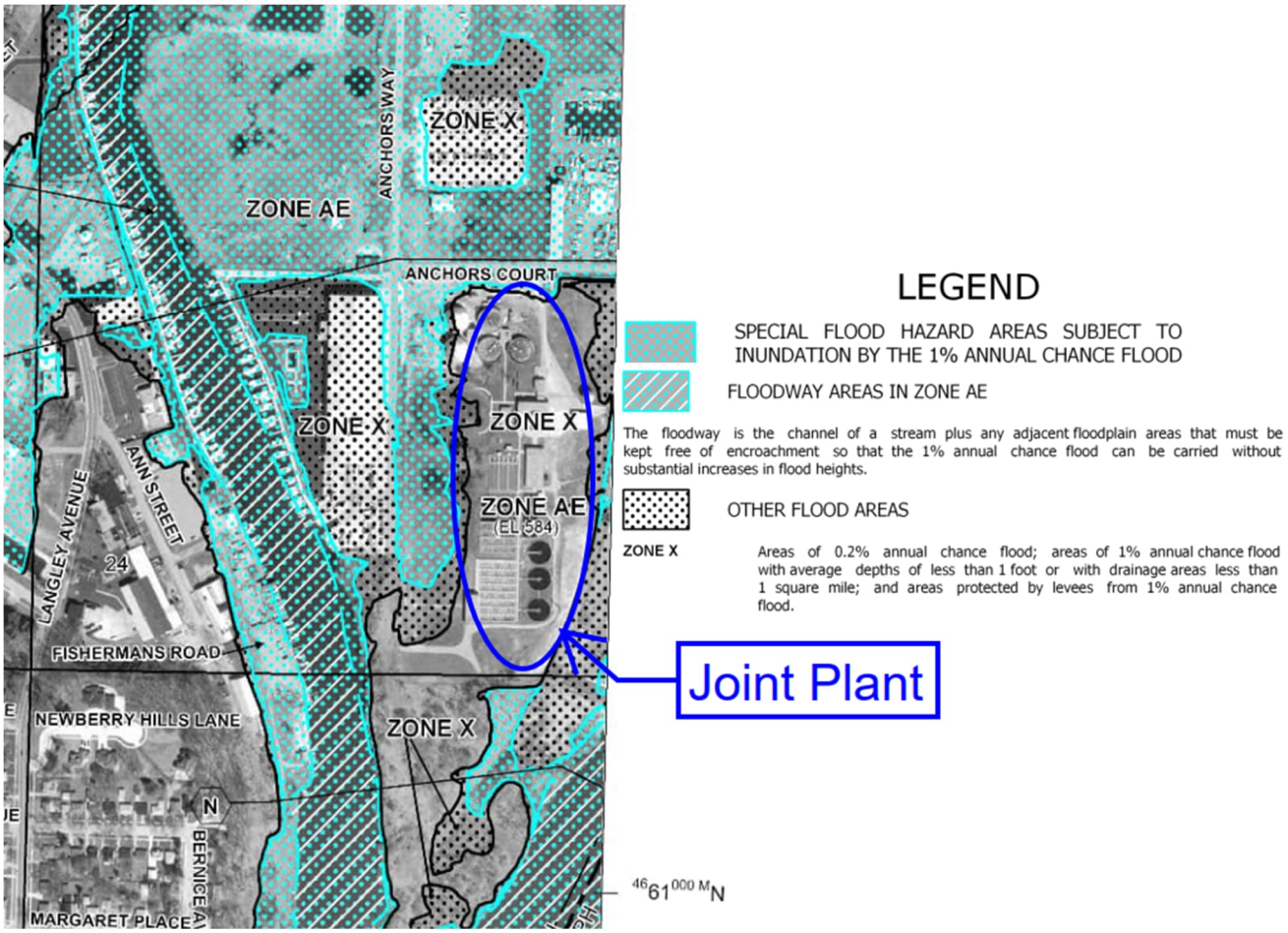


FIGURE 2.4 PORTION OF FLOOD INSURANCE RATE MAP NEAR PROJECT AREA

2.2.6 NATURAL OR WILD AND SCENIC RIVERS

The project area is the Joint Plant located on Marina Island. Marina Island is surrounded by the St. Joseph River on all three sides as shown in the aerial included in Figure 2.5. Brian's Marina and Pier 33 are the two commercial businesses located between the Joint Plant and the river's banks. The St. Joseph River is approximately 200-ft to the east of the project area. The Joint Plant discharges from Monitoring Point 001A through Outfall 001. Outfall 001 discharges to the St. Joseph River. No changes to the discharge point or increases from the discharge point are anticipated due to the proposed project. Soil will not be excavated due to the proposed project, as such, no additional impacts to the St. Joseph River are anticipated.

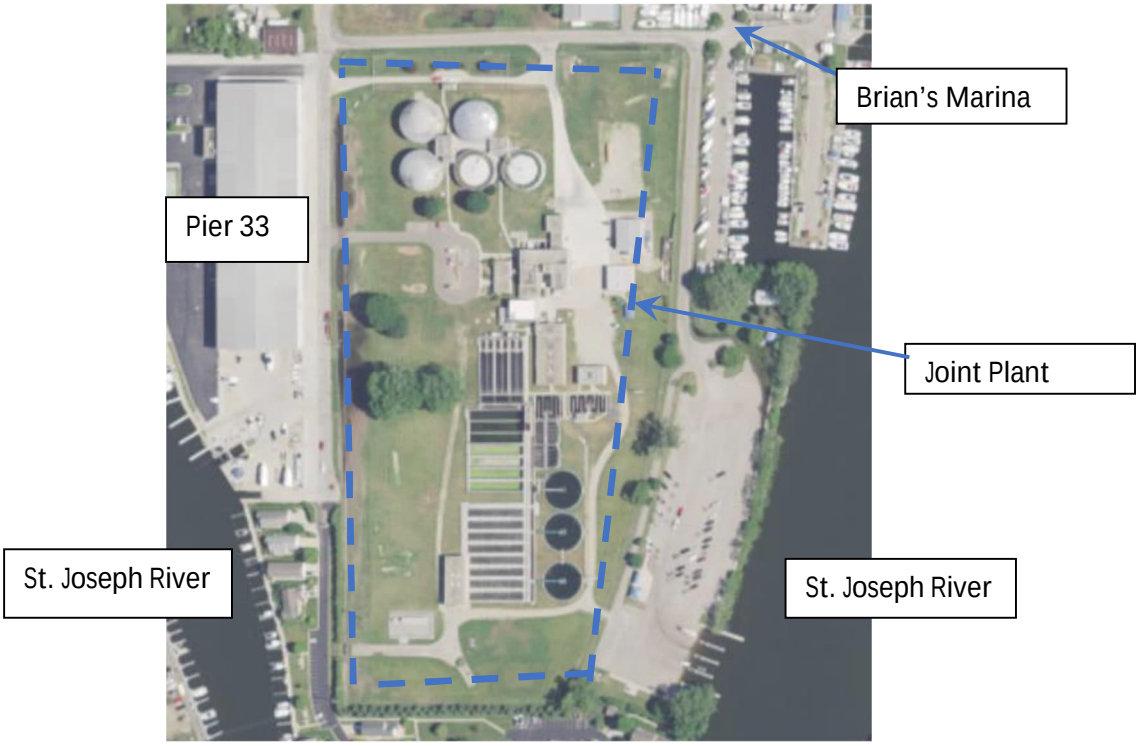
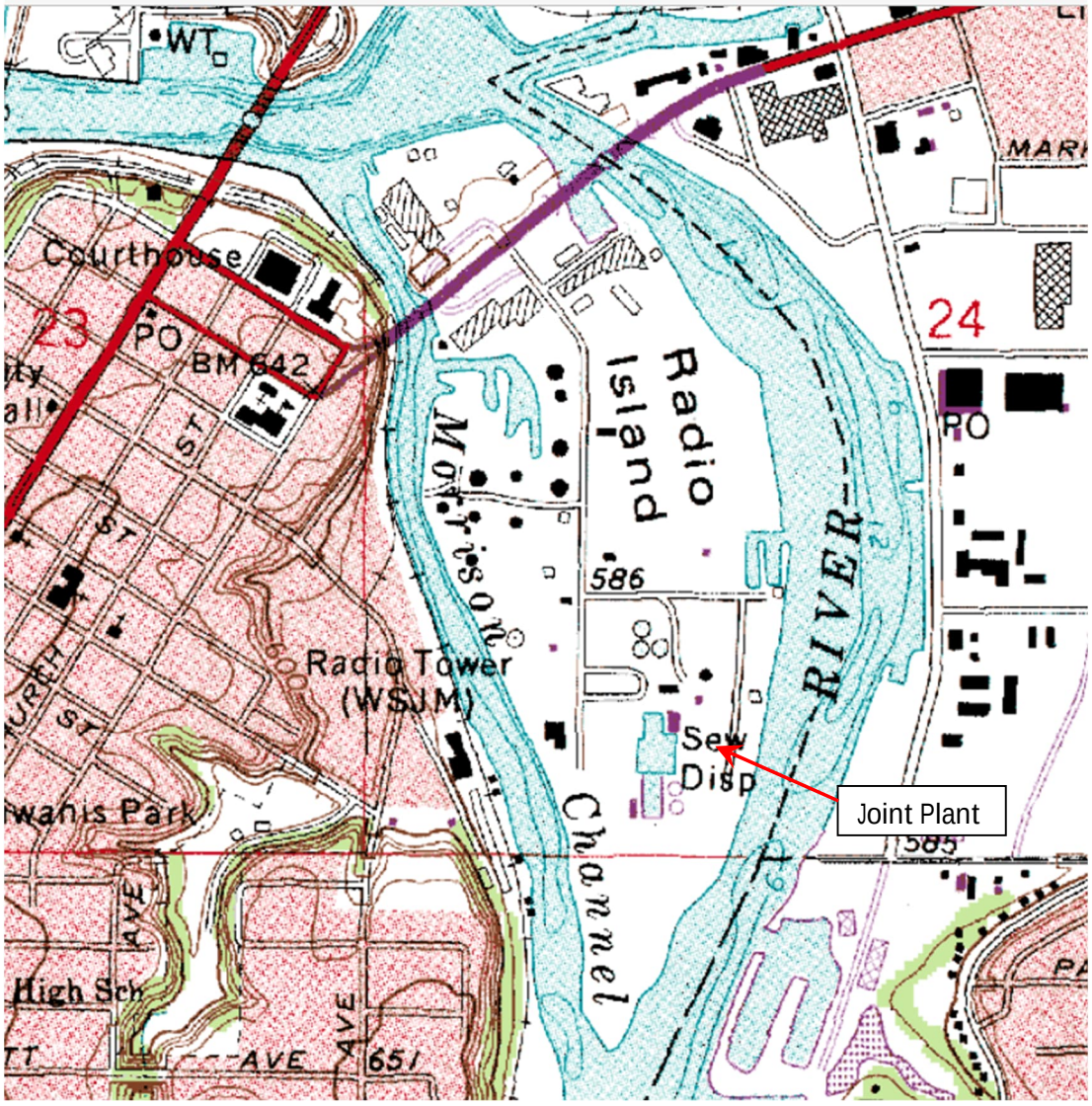


FIGURE 2.5 AERIAL OF PROJECT AREA

2.3.7 MAJOR SURFACE WATERS

The St. Joseph River was discussed in the previous section. The St. Joseph River can be seen in Figure 2.6, a portion of the Benton Harbor USGS Quadrangle. No additional impacts to the St. Joseph River are anticipated due to the proposed project.

The St. Joseph River is a tributary of Lake Michigan. The river is approximately 206 miles in length. The river generally flows in a westward direction through southern Michigan and through northern Indiana. The St. Joseph River terminates on the southeast shore of Lake Michigan. The river primarily provides drainage from the rural farming areas and storm drainage in the watershed of Lake Michigan.



Source MAP from Berrien County Trail Network Master Plan - 2022

FIGURE 2.6 USGS QUADRANGLE FOR PROJECT AREA

2.3.8 TOPOGRAPHY

In Berrien County, along the shores of Lake Michigan, the elevation is approximately 580 feet above sea level. The highest elevation outside of the Joint Plant is approximately 820 feet above sea level, south of the City of Buchanan approximately 20 miles southeast. Except for sand dunes, the topography along the lakefront and running east is predominantly flat. Based on the Berrien County 2000 Master Plan, there are four well defined divisions that run parallel to the Lake Michigan shore. These divisions are summarized in Table 2.1.

The elevation of the project area is approximately 586-ft Mean Sea Level. The project area generally slopes to the north and south towards the Saint Joseph River.

TABLE 2. 1 BERRIEN COUNTY TOPOGRAPHY

Elevation	Topography Description
10 – 15 feet above the lakeshore	Discontinuous lake plain with sand dunes rising 200 feet
40 – 80 feet above Lake Michigan	Level plain from sand dunes to lake bluffs
80 – 120 feet above Lake Michigan	Broad swells, inconspicuous smooth ridges, detached high plains
100 – over 300 feet above Lake Michigan	Broad plateau

Source Berrien County 2020 Master Plan

2.3.9 GEOLOGY AND SOIL TYPES

Soil boring logs collected at the project area for a previous project generally indicated clay soils containing intermittent layers of shale and sandstone. Figure 2.7 is the soil classification map for the project area. The soil classification map for Berrien County is included in **Appendix B**. Soils are classified by the Natural Resource Conservation Service into four Hydrological Soil Groups (HSG) based on the soil's runoff potential. The soil type for the project area is designated as Group A. Group A contains sand, loamy sand, or sandy loamy types of soils. It has low runoff potential and high infiltration rates even when thoroughly wetted. They consist largely of deep, well to excessively drained sands or gravels and have a high rate of water transmission. The soils should be suitable for construction. There are no known adverse soil or subsoil conditions in the project area. The proposed project will not require soil excavation.

FIGURE 2.7 SOIL CLASSIFICATION FOR PROJECT AREA

2.3.10 AGRICULTURAL RESOURCES

There are no known prime or unique farmlands located on the project area.

2.3.11 FAUNA AND FLORA

EGLE is handling the direct contacts with the United States Fish and Wildlife Service, the Michigan Natural Features Inventory and the EGLE-LWM Interface and will confirm whether there are any concerns regarding fauna and flora. Based on these comments, there will be a determination on whether there are any environmentally sensitive habitats, or any species currently listed as threatened, endangered, or state special concern in the project area.

2.4 LAND USE

According to the U.S. Census Bureau, Berrien County has a total area of roughly 567.75 square miles.

Based on Berrien County Master Plan 2023, Berrien County is largely agricultural (50.9%). The next major land use is residential (35.6%), followed by Public Property (4.8%), Commercial (3.9%), Industrial (3.9%), and Institutional (0.9%).

As shown on Figure 2.8, the land use is predominantly residential east along the lake with the remaining of the residential dwellings generally located in rural areas. Commercial land use is typically at the center of urban areas and along major corridors. Industrial land use is typically in urban areas. This figure is not intended to be a precise representation of specific uses, but rather a general tool for evaluating existing land use conditions.

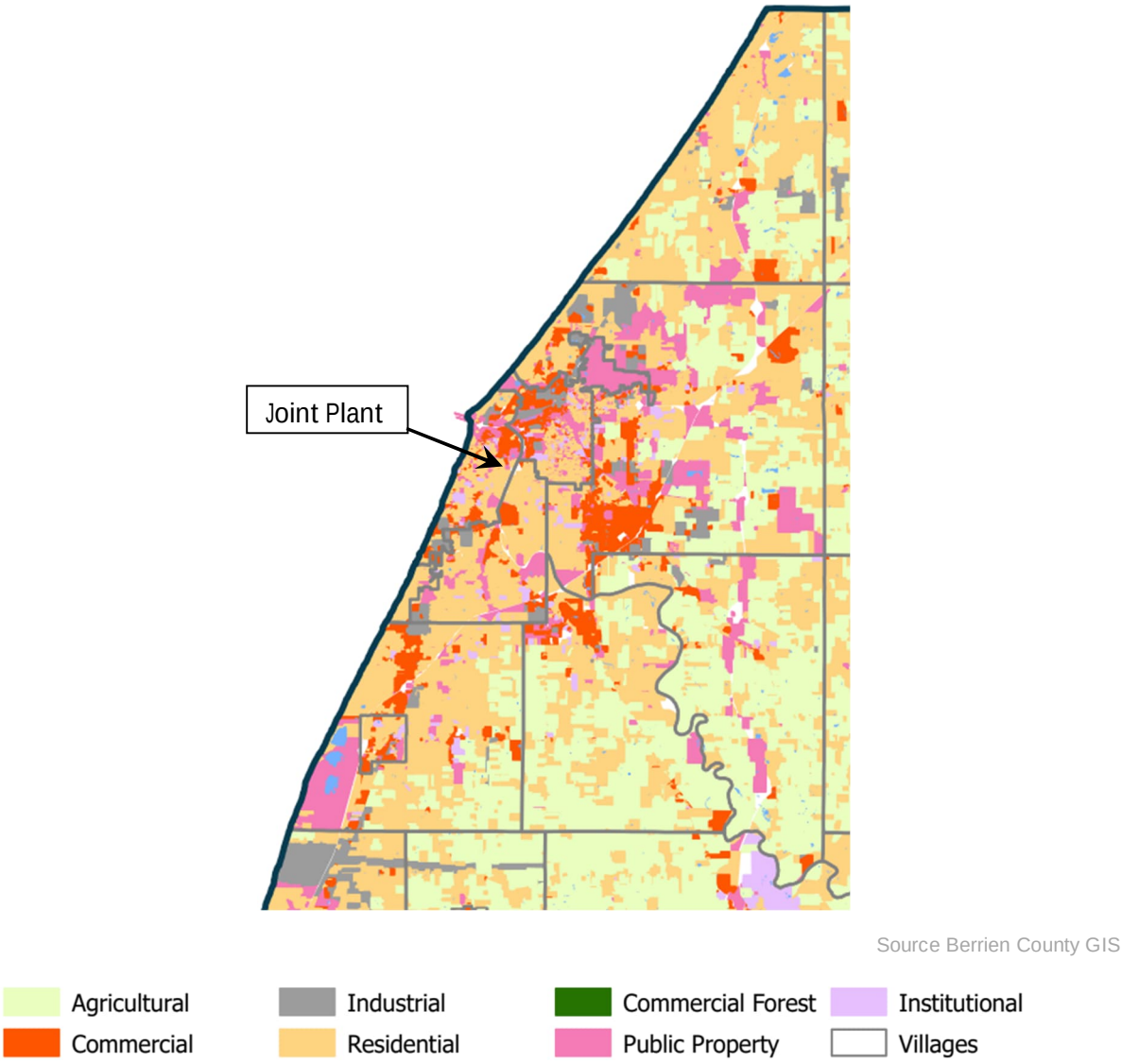


FIGURE 2.8 EXISTING LAND USE BERRIEN COUNTY

Berrien County has an abundance of natural resources and has direct access to Lake Michigan. The County's future goals and objectives are to manage the natural resources and protect the rich ecological habitats. As such, maintenance and development of parks and recreational facilities is key. The existing and future land use maps from the Berrien County 2000 Master Plan are included in **Appendix C**.

For this Project Plan, the existing land use will remain the same. It was also assumed that sewage quantities from future development will be generated at the same ratio of residential, commercial, and industrial levels presently observed but without an infiltration/inflow (I/I) component.

2.5 POPULATION

Since 1970, Berrien County has experienced a decrease in population.

2.5.1 YEAR 2020 POPULATION

Table 2.2 presents the 2020 census population of the eight communities served. The percent of the population served is indicated in Table 2.2 to calculate the Year 2043 population served by the Joint Plant. The percent of the population served is based on the plant's annual report. The total population served in the Year 2020 was estimated to be 54,225.

The number of residential sewer accounts for each community, as previously provided by the Joint Plant, was used to verify the estimated current population tributary to the plant. The average household size, obtained from the Berrien County Housing Diagnosis 2020 report, was multiplied by the number of residential sewer accounts to estimate the population for each community. The total estimated population served by the Joint Plant using this method is 53,727. This is within one percent of the estimate above. Table 2.2 summarizes these calculations.

2.5.2 YEAR 2043 PROJECTED POPULATION

The U.S. Census Bureau data provided estimated population growth at the county level but did not provide estimates for the individual townships and cities. The U.S. Census Bureau data observed a population change in Berrien County of -0.6% between 2020 and 2021. The concern with using this number to estimate the future population tributary to the Joint Plant is that, while some governmental units served by the Joint Plant are experiencing population decreases, some communities are growing. The method of determining the future population needs to consider each individual township and city. The Joint Plant staff has indicated that there is potential for growth in the percent of the population served for Lincoln Charter Township and Royalton Township.

The U.S. Census Bureau population data for 1960, 1970, 1980, 1990, 2000, 2010 and 2020 was graphed for each of the member communities. A trend line was drawn through the data for each community and extrapolated to 2043. The trend line was based on the judgment of the engineer. The 2043 population determined by this method for each community is indicated in Table 2.2. Projected growth rates for the 5-year planning periods were obtained the same way. Table 2.2 summarizes both the current 2023 population and the projected

population for each member community, 5, 10, and 20 years into the future. The estimated total 2043 population for the eighth communities is 64,960.

There are three potential future member communities. They are Hagar Township, Pipestone Township, and Sodus Township. In Table 2.2 the current population and projected population were calculated using the same method used for the eight member communities. The estimated total projected population including these additional communities is 69,703.

TABLE 2. 2 CURRENT AND PROJECTED MEMBER COMMUNITY POPULATION ESTIMATES

Member Community	2020 US Census Data [1]	Current Population (2023) [2]	Projected Population 5-Year (2028) [2]	Projected Population 10-Year (2033) [2]	Projected Population 15-Year (2038) [2]	Projected Population 20-Year (2043) [2]
Existing Service Area						
Benton Charter Township (Twp)	14,374	14,262	14,074	13,887	13,699	13,512
Benton Harbor, City	9,103	8,823	8,355	7,888	7,420	6,953
Lincoln Charter Twp	14,929	15,343	16,033	16,723	17,413	18,103
Royalton Twp	5,141	5,254	5,441	5,629	5,816	6,004
St. Joseph Charter Twp	9,993	10,241	10,655	11,068	11,482	11,895
St. Joseph, City	7,856	7,703	7,449	7,194	6,940	6,685
Village of Shoreham	824	813	794	775	756	737
Village of Stevensville	1,121	1,115	1,104	1,094	1,083	1,073
EXISTING SERVICE AREA TOTAL	63,341	63,554	63,905	64,258	64,609	64,962
Potential Future Service Area Additions						
Hagar Twp	3,243	3,027	2,666	2,306	1,945	1,585
Pipestone Twp	2,177	2,088	1,939	1,791	1,642	1,494
Sodus Twp	1,995	1,952	1,880	1,808	1,736	1,664
POTENTIAL ADDITIONS TOTAL	7,415	7,067	6,485	5,905	5,323	4,743
POTENTIAL FUTURE SERVICE AREA TOTAL	70,756	70,621	70,390	70,163	69,932	69,705

[1] Data from U.S. Census Bureau, Census 2000

[2] Projected population extrapolated from Census Data 1960 – 1920 and trendline applied

While the estimated populations summarized in Table 2.2 are for the entire existing member communities as stated above, and the additional potential communities, this number does not necessarily reflect the actual population that is currently connected to the sanitary sewer system and served by the Joint Plant.

Table 2.3 takes into account the actual population served within each of the member communities. The percent of the population served in the Joint Plant for Benton Charter Township, the City of Benton Harbor, St. Joseph Charter Township, and the City of St. Joseph are estimated to remain unchanged. There is potential for growth in the Lincoln Charter Township and Royalton Township. For planning purposes, it was estimated that an additional 5% of the population would be served. Also, for planning purposes, it was estimated that 10% of the projected population for Hagar Township, Pipestone Township, and Sodus Township would be served by the Joint Plant. The estimated total 2043 population for the eighth communities and the future service area is 58,820.

TABLE 2. 3 CURRENT AND PROJECTED POPULATION SERVED BY THE JOINT PLANT

Member Community	2020 Census Population [1]	Percent Served [2]	Population Served	Projected 2043 Population [3]	Projected Percent Served [4]	Projected 2043 Population Served
Existing Service Area						
Benton Charter Township (Twp)	14,374	80%	11,499	13,512	80%	10,809
Benton Harbor, City	9,103	100%	9,103	6,953	100%	6,953
Lincoln Charter Twp	14,929	85%	12,690	18,103	90%	16,293
Royalton Twp	5,141	60%	3,085	6,004	65%	3,902
St. Joseph Charter Twp	9,993	100%	9,993	11,895	100%	11,895
St. Joseph, City	7,856	100%	7,856	6,685	100%	6,685
Village of Shoreham	824	100%	824	737	100%	737
Village of Stevensville	1,121	100%	1,121	1,073	100%	1,073
EXISTING SERVICE AREA TOTAL	63,341	89%	56,171	64,962	90%	58,347
Potential Future Service Area Additions						
Hagar Twp	3,243	0%	0	1,585	10%	158
Pipestone Twp	2,177	0%	0	1,494	10%	149
Sodus Twp	1,995	0%	0	1,664	10%	166
POTENTIAL ADDITIONS TOTAL	7,415	0%	0	4,743	10%	473
POTENTIAL FUTURE SERVICE AREA TOTAL	70,756	79%	56,171	69,705	84%	58,820

[1] Data from U.S. Census Bureau, Census 2000

[2] Estimated percentage served for Fiscal Year 2020 -21

[3] Projected population extrapolated from Census Data 1960 – 1920 and trendline applied

[4] Projected population extrapolated from Census Data 1960 – 1920 and trendline applied

The Year 2043 projected populations as shown in Table 2.3 are summarized as follows:

Current Service Area	58,347
Potential Additional Future Service Area	473
Total Future	58,820

2.6 ECONOMIC CHARACTERISTICS

The regional economy was significantly negatively impacted by the COVID 2019 pandemic. Employment levels significantly dropped at the start of the COVID 2019 pandemic. The unemployment numbers have started to improve as shown in Figure 2.9. Unemployment is at approximately 5.2%. Based on the last months of data it appears that the unemployment will baseline at approximately 5%.

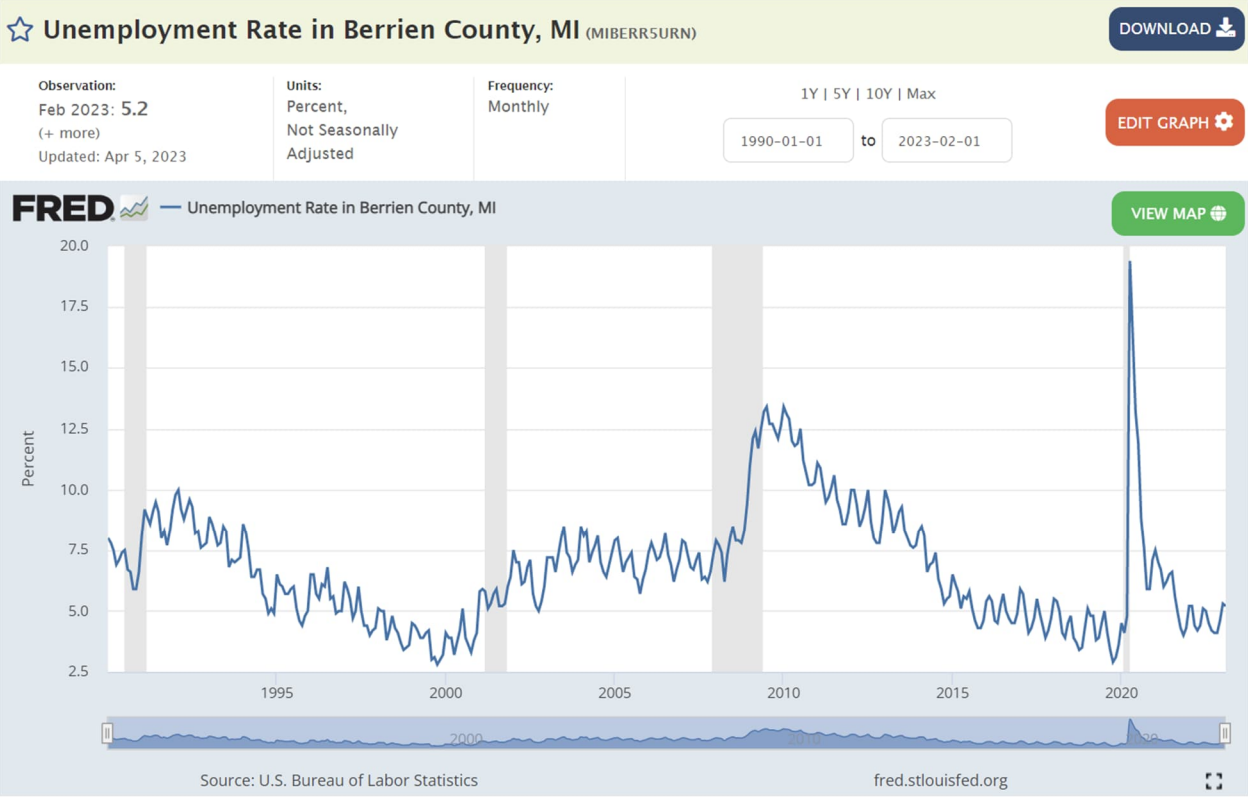


FIGURE 2.9 EXISTING LAND USE BERRIEN COUNTY

The five (5) largest employers in Berrien County are listed in Table 2.5.

TABLE 2. 4 BERRIEN COUNTY TOP EMPLOYERS WITH 150+ EMPLOYEES (UPDATED 5/8/17)

Company	Employees
Whirlpool Corporation	4,000
Lakeland Regional Health System	3,826
Andrew's University	2,104
Four Winds Casino	1,800
Indiana Michigan Power / Cook Nuclear Plant (Generation)	1,200

Source Berrien County 2017

The median household income in the study area per member community is shown in Table 2.6. The majority of the member communities in the service area are above the median household income of Berrien County, which is $55,893. The two member communities with a median household income below the county median household are Benton Charter Township and the City of Benton Harbor.

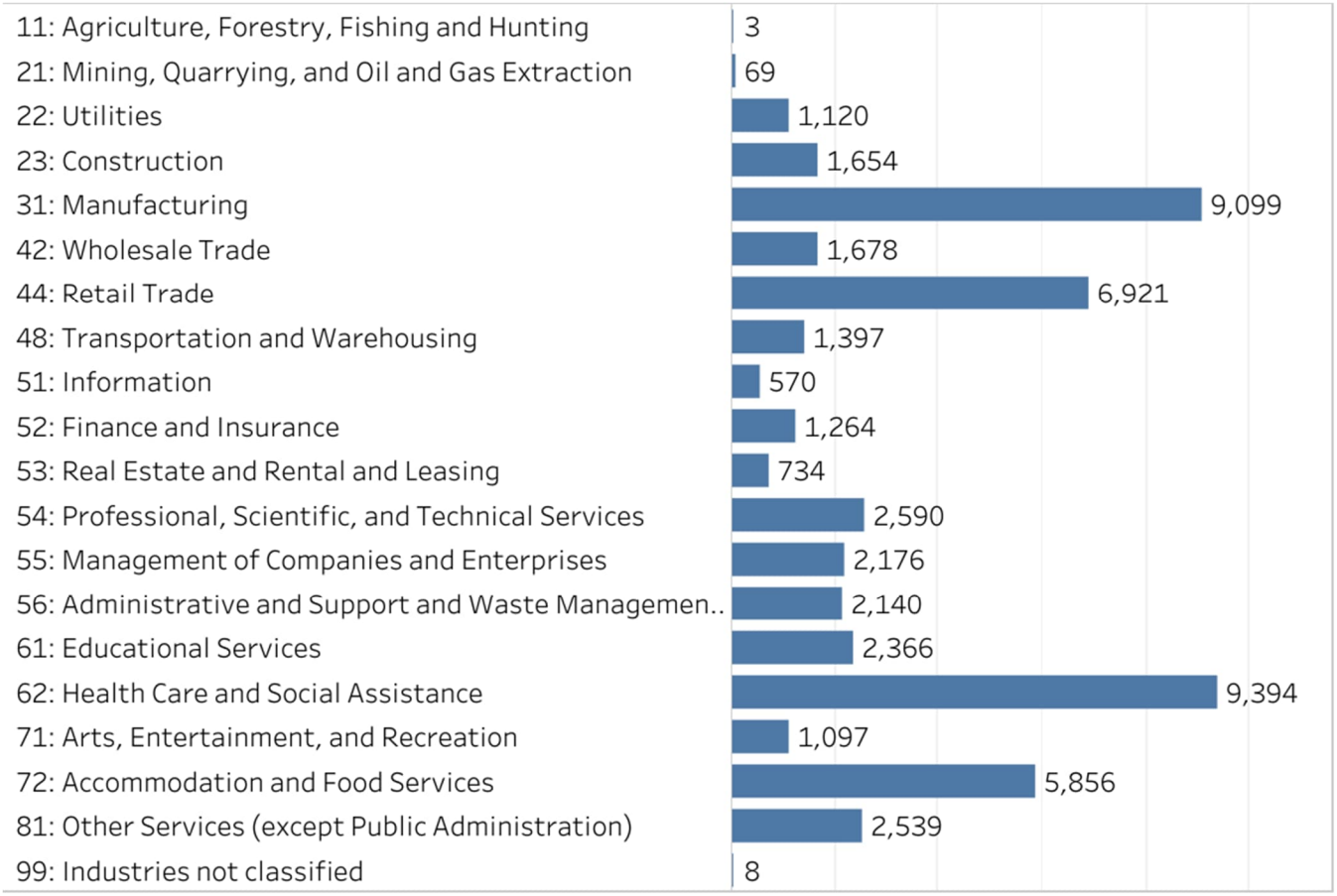
TABLE 2. 5 MEDIAN HOUSEHOLD INCOME IN THE STUDY AREA

Member Community	Median Household Income (2017 – 2021) in 2021 dollars)
Benton Charter Township (Twp)	$33,506
Benton Harbor, City	$24,549
Lincoln Charter Twp	$82,664
Royalton Twp	$97,179
St. Joseph Charter Twp	$80,333
St. Joseph, City	$62,156
Village of Shoreham	$90,500
Village of Stevensville	$65,991

Source United States Census Bureau

The number of employees by industry group for 2020 in Berrien County are listed in Table 2.7. Health care and social assistance and manufacturing are the two industry groups with the largest number of employees.

TABLE 2. 6 BERRIEN COUNTY 2020 NUMBER OF EMPLOYEES BY INDUSTRY GROUP



Source United States Census Bureau

2.7 EXISTING SYSTEM

The following paragraphs describe the existing system.

The Joint Wastewater Treatment Plant (Joint Plant) provides regional wastewater treatment services to the cities of Benton Harbor and St. Joseph, four surrounding townships, and two villages. The Joint Plant is owned by the cities of Benton Harbor and St. Joseph; however, governance of the facility is vested in the Joint Wastewater Treatment Board. The Joint Wastewater Treatment Board is responsible for the operation, maintenance, repair, and improvement of the facility.

Originally constructed in 1951, the Joint Plant has undergone numerous improvements and additions completed in the early 1970s. Beginning in 1986 and continuing to the present, numerous construction projects have also been completed. These projects have encompassed expansion of treatment processes, rehabilitation and replacement of equipment, electrical power upgrades, laboratory improvements, and building maintenance and restoration. During the summer/fall of 2004, construction was completed of the new sodium hypochlorite disinfection facilities, dechlorination facilities, and of a second outfall sewer. A Strategic Capital Improvement Plan (SCIP) was also completed in 2004.

The SCIP was updated in 2015 and included a list of recommended projects through the year 2027. The 2004 and 2015 SCIP have effectively provided a road map that the Joint Plant continues to utilize for the planning of capital projects. The following SCIP recommended projects have been successfully completed.

- New Submersible Pump Station and Electrical Upgrades in 2011,
- Dual Fuel Boiler Upgrade in 2013,
- New Headworks and Miscellaneous Improvements in 2015,
- Aeration System and Blower Improvements in 2015,
- Aeration System Improvements Phase II in 2017, and
- Existing Headworks Upgrade in 2020.

The above projects have resulted in significant energy savings with implementation of high efficiency aeration diffusers, blowers, and dual fuel boilers that utilize excess digester gas.

There are two separate projects currently under construction. The Thickened Sludge Pump Replacement project includes the replacement of two (2) thickened sludge pumps, valves, piping, piping supports and appurtenances. This project is near completion. The other project under construction includes the replacement of three (3) influent pumps and addition of variable frequency drives (VFDs) to two (2) existing influent pumps, the installation of a Combined Heat and Power (CHP) system, replacement of the sludge recirculation pumps, replacement of digester heat exchangers and modifications to the heating and cooling water piping system. There will be further energy savings with the implementation of the CHP system.

2.7.1 METHOD OF WASTEWATER TREATMENT AND CONDITION OF FACILITES

The Joint Plant has a design treatment capacity of 41.5 MGD. Flow is conveyed to the Joint Plant via two separate metering structures. These structures are the St. Joseph – Morrison Channel Sewer Crossing/Control Structure & Metering Flume and the Benton Harbor - St. Joseph River Siphons/Control Structure & Metering Flume.

The St. Joseph – Morrison Channel Sewer Crossing/Control Structure, the land side crossing structure is in good condition for having been built in the 1950s. This structure is maintained quarterly. The Parshall flume structure, was built in the 1980s. The level sensor should be replaced. Flow is conveyed from the control structure to the Joint Plant via a 36-inch diameter line located on the north end of the project area.

The Benton Harbor - St. Joseph River Siphons/Control Structure was built in the 1950s and is in relatively good condition. Buildup and corrosion were observed on the steel in the siphon structure. The structure is also maintained quarterly. The concrete had some corrosion in the manhole immediately upstream of this siphon structure. The gate showed signs of corrosion also, but the stem is new. The level sensor should be replaced.

Figure 2.10 presents a process flow diagram of the existing Joint Plant.

A new headworks facility was constructed in 2019. The new headworks facility processes 100% of the flow from Benton Charter Township, 100% of the flow from the Lake Shore Authority, and the remaining flows under most anticipated peak flow conditions. The older headworks facility processes any peak flows in excesses of 28.29 MGD, the capacity of the new headworks facility.

The existing 20-inch diameter force main from Lake Shore Authority located along Anchors Way was routed east of the new headworks facility. The existing 30-inch diameter force main from Benton Charter Township will be diverted to the new headworks facility in the future. Dedicated meters are used for each force main to measure the flow. The discharge from these meters is combined to a common influent chamber which is fed to two (2) – fine screens.

After the fine screens, the effluent is discharged to a common channel upstream of the Multiple-Tray Grit Tank located outside the new headworks facility. Influent channels tangentially feed the influent into the grit chamber and the flow is evenly distributed over multiple conical trays. Grit settling results from the circular and conical shape of the tank due to vortex and gravity settling based on the surface area in each tray, grit is settled at the bottom of the tank with a sloped floor, and settled grit is removed by a grit pump from the bottom of the tank.

Grit pumps are used to remove the grit accumulated at the bottom hopper of the Multiple-Tray Grit Tank. The grit pumps are located in the basement of the new headworks facility. Settled grit is pumped to a conical-type grit washer/classifier located in the upper level of the new headworks facility. The grit washer/classifier is located in the new headworks facility east of the Multiple-Tray Grit Tank. Flow form the Multiple-Tray Grit Tank is conveyed to the Inlet Control Structure.

The grit collected at the bottom of the grit tank is pumped to a conical-type grit washer/classifier. A screw located in the classifier works to dewater the washed grit and move it to a discharge point

where it is then conveyed into a dumpster for disposal. A conical-type grit washer/classifier is used to treat the settled grit in order to reduce the organics and potential odor concern of the grit.

The grit collected at the bottom of the grit tank is pumped to a grit washer/classifier. Water is added to the grit and the grit/water mixture is fed to the inlet of a washer where slow rotational movement is used to accomplish grit particle settling. Excess water and organic matter overflow back to the influent channel. A screw located in the classifier works to dewater the washed grit and move it to a discharge point where it is then conveyed into a dumpster for disposal. A separate dumpster is used to handle the screenings from the screenings washer/compactor.

As discussed, the older headworks facility remains in service to handle any peak flows beyond the capacity of the new headworks facility. At the older headworks, a 36-inch line discharges upstream of a chain and rake mechanical bar screen. The screenings are conveyed into a dumpster for disposal downstream of a washer/compactor. The flow is discharged into a wet well where it is pumped to the Inlet Control Structure.

Flows up to a maximum of 28.29 MGD come from the new headworks facility. Flows in excess of 28.29 MGD bypass the new Headworks Facility and are pumped to the Inlet Control Structure directly from the raw sewage pumps. The downward opening gate at the Influent Control Structure provides equal flow distribution to the Primary Tanks.

From the Inlet Control Structure, flow is distributed to three primary settling tanks. Each of the three primary tank inlet flows is independently controlled. Effluent from the primary settling tanks flows into the primary effluent channel. Primary effluent is then diverted to secondary treatment which includes two re-aeration tanks and four (4) aeration tanks.

In addition to the primary settling tanks, there is one overflow tank and two reaeration tanks. Originally used as a Nitrification/ Reaeration Tank, the tank was converted for excess flow in the 1980’s. The reaeration tanks were originally provided to accommodate the “Kraus” activated sludge process. This process was provided as part of the original 1970’s design to accommodate food waste. During normal conditions, the reaeration tanks provide a constant flow pattern to the secondary treatment by equalizing the diurnal flow pattern. During wet weather events, both the reaeration tanks and the overflow tanks are used for wet weather treatment. The re-aeration gates are difficult to operate. The replacement of the four re-aeration gates is necessary to allow for flow to be redirected during wet weather conditions.

Flow into the Overflow Tanks is controlled by a downward opening slide gate which is located near the end of the Primary Effluent Channel. Assuming that the Overflow Tank bypass gate is lowered to its minimum position, at the maximum flow in the Primary Effluent Channel the instantaneous flow rate to the Overflow Tanks is projected to be 12.7 MGD.

After the aeration tanks, effluent is diverted into an aeration effluent channel and the mixed liquor flows into the mixed liquor channels. Effluent is distributed to three (3) center-feed 80-ft diameter circular final settling tanks. Final settling tank No. 1 and 2 were constructed in the 1970's. Final tank No. 3 was added in the 1980's. Due to the age of these tanks, maintenance has increased, reducing the reliability and availability of the tanks, necessitating replacement of the collection mechanisms and drives. The original Final Tanks No. 1 and 2 were constructed in the 1950's and

are normally not in service except when needed. Flow can be diverted to Final Tanks No. 1 and 2 with downward opening weir gates when needed.

From the final settling tanks, secondary effluent is disinfected using sodium hypochlorite for disinfection and sodium bisulfite for dechlorination. After dechlorination, disinfected effluent is discharged. A second 36-inch diameter parallel outfall pipeline was constructed in 2004 which allows the plant to handle peak flows. The Joint Plant discharges from Monitoring Point 001A through Outfall 001. Outfall 001 discharges to the St. Joseph River.

2.7.2 METHOD OF SLUDGE HANDLING / DISPOSAL AND STATUS OF RESDIUALS MANAGEMENT PROGRAM

Sludge processing at the Joint Plant includes sludge thickening. The Joint Plant thickens primary sludge by maintaining a sludge blanket within the primary tanks.

Two Dissolved Air Flotation (DAF) Thickeners are used to thicken the Waste Activated Sludge (WAS). Polymer is added to enhance thickening and to achieve 4% solids on an average.

Both primary sludge and WAS are pumped to two anaerobic digesters. The digested sludge is then transferred to three (3) Sludge Holding Tanks, one of which was a secondary digester that was converted to a sludge holding tank. The Joint Plant land applies sludge year-round. The stabilized sludge is stored in three (3) Sludge Holding Tanks until it can be land applied to farm fields. Due to the composition of the stored sludge, it must be mixed to keep the solids in suspension using mixing pumps. Sludge is pumped from the Sludge Storage Tanks into trucks for land application as a liquid. The Joint Plant's Residuals Management Program for biosolids land application is outlined in the National Pollutant Discharge Elimination System (NPDES) permit. The Joint Plant consistently meets all the current NPDES permit limitations. The current NPDES is included in **Appendix D**.

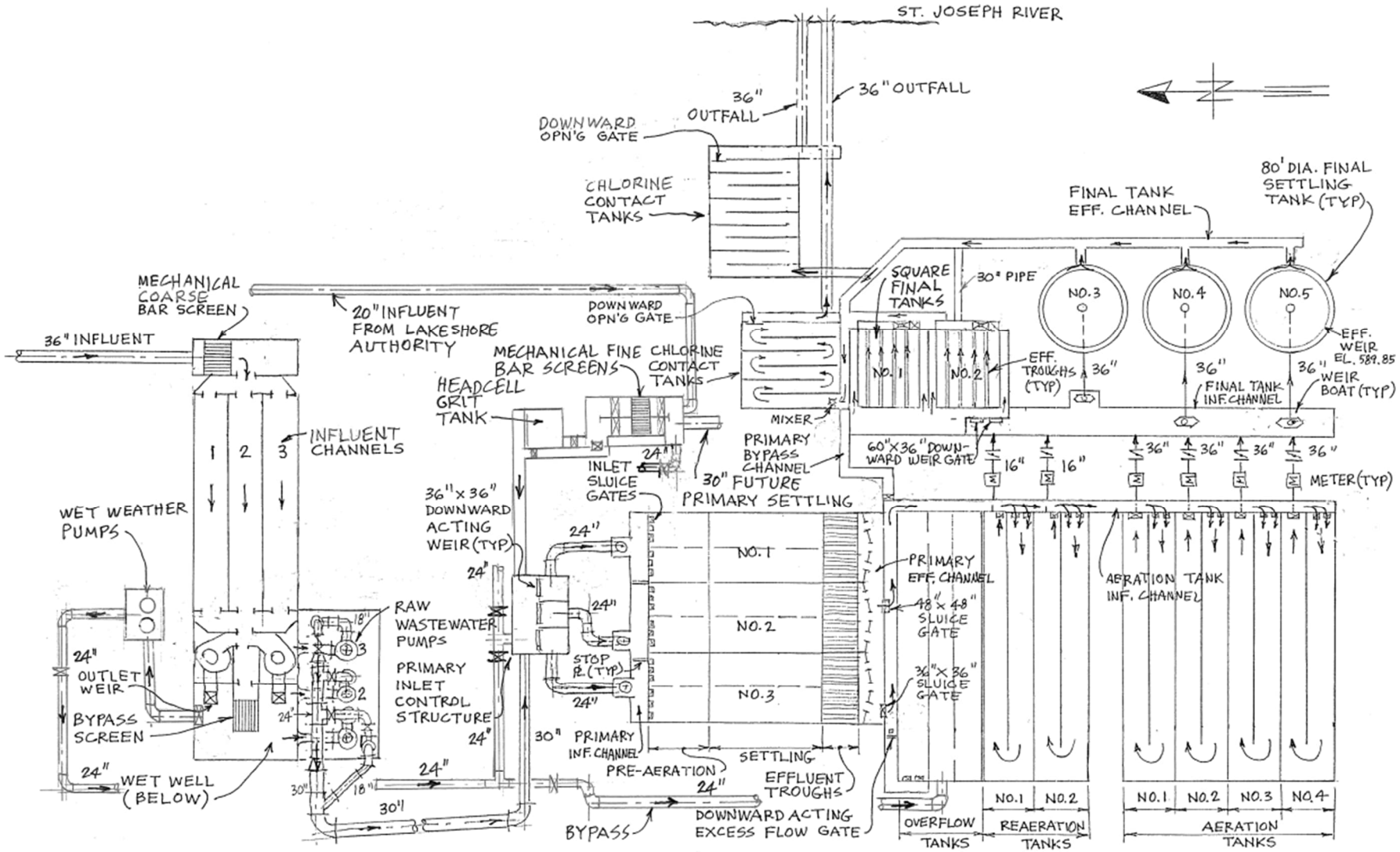


FIGURE 2.10 EXISTING JOINT PLANT PROCESS FLOW DIAGRAM

2.7.3 COLLECTION SYSTEM

According to the U.S. Census Bureau, Berrien County has a total area of roughly 567.75 square miles. The responsibility of the Benton Harbor -- St. Joseph Joint wastewater Treatment Plant (Joint Plant) is limited to the treatment of wastewater as delivered to its treatment site at 269 Anchors Way, St. Joseph, Michigan. Sewer systems tributary to the Joint Plant originate from multiple local governmental units. Each member community listed in Table 2.2 is responsible for the collection system(s) within its jurisdiction and is responsible for maintaining any information or records specific to the type, nature, size, capacity, length or other physical characteristics of the tributary sewer systems. **Appendix E** includes additional information related to the collection system.

The Joint Plant is located outside of a floodplain zone and is not located in a coastal area. Flows to the plant could be affected by increasing storm event frequency and intensity. Based on the information from the USEPA's Climate Scenarios Projection Map, the average annual precipitation at the project area is expected to increase from 0.4 to 5.2-inches per year by 2035. This increased precipitation could result in higher infiltration/inflow (I/I) flows. Proper collection system maintenance and repairs, as needed, can be used to help limit flows due to I/I. However, the collection system is outside of the jurisdiction of the Joint Plant. It should be noted that the expected increase is calculated based on models that have a considerable margin of error.

2.7.4 SIGNIFICANT INDUSTRIAL USERS

There are thirteen (13) Significant Industrial Users and Categorical Industrial Users which contribute flows and loadings to the Joint Plant. The Significant Industrial Users are listed below.

- Freedom Fishing Inc
- Tech Nickel Inc
- Modineer Coatings Division
- LECO Corporation
- Primetals Technologies
- Aludyne Steve PLT
- Aludyne B.H. PLT
- Hoffmann Die Cast Corporation
- Max Casting Company
- New Products Corporation
- Old Europe Cheese
- Ausco Products
- BOSCH Braking Systems

2.8 JOINT PLANT ASSETS (FISCAL SUSTAINABILITY)

Development and implementation of a Fiscal Sustainability Plan (FSP) is required for projects that involve the repair, replacement, or expansion of a treatment facility. The FSP must include an inventory of critical assets that are part of the treatment facility. This inventory is listed in Table 2.8. The FSP also requires a condition and performance evaluation of the inventoried critical assets.This evaluation is listed in Table 2.9. Certification that an evaluation of water and energy conservation efforts has been completed and that implementation of water and energy

conservation efforts will be completed is required as part of the FSP. Additionally, an FSP requires a plan for maintaining, repairing, funding, and as necessary replacing the treatment facility. The FSP is required for the critical assets that are part of CWSRF not for the entire wastewater facility; The FSP is not required to be submitted to EGLE unless requested.

An inventory of the critical assets at the Joint Plant is shown in Table 2.8. An evaluation of the condition and operating status is shown in Table 2.9. A more detailed plan for maintaining, repairing, funding, and as necessary, replacing critical assets will be submitted at a later time. The detailed plan is typically submitted with the Part III Application.

TABLE 2. 7 INVENTORY OF CRITICAL ASSETS FOR THE JOINT PLANT

UNIT PROCESS	PARAMETER	SIZE	UNITS
Coarse Bar Screens	Flow	1 @ 9.76	MGD
Raw Sewage Pumping	Flow	3 @ 7,640	gpm
	TDH	33	ft
	Flow	2 @ 6,000	gpm
	TDH	34	ft
Influent Fine Bar Screens	Flow	2 @ 28.29	MGD
Primary Settling Tanks, No. 1 - 3	Surface Area	11,200	ft^2
	Weir Length	820	ft
Activated Sludge			
Aeration Tanks No. 1 - 4	Volume	253,600	ft^3
Aer. Tanks & 2 Older Tanks	Volume	382,700	ft^3
Blowers	Flow	3 @ 9,000	SCFM
	Pressure	7.5	psi
Final Settling Tanks, No. 1 - 5	Surface Area	19,500	ft^2
	Weir Length	2,090	ft
Chlorine Contact Tanks	Volume	432,200	gallons
Dissolved Air Floatation Tanks	Surface Area	3,710	ft^2
Anaerobic Digestion	Volume	285,900	ft^3
Sludge Holding Tanks	Volume	426,400	ft^3

TABLE 2. 8 EVALUATION OF THE CONDITION AND OPERATING STATUS OF CRITICAL ASSETS FOR THE JOINT PLANT

UNIT PROCESS	DESCRIPTION OF CONDITION	OPERATIIONAL STATUS
Raw Sewage Pumping	Check valves for Pumps No. 2 & 3 are in good condition, replaced in 2017. The 18-inch check valve for Pump No. 1 is in good condition, replaced under the 2015 New Headworks and Miscellaneous Improvements project. Pumps No. 1-3 will be replaced with dry pit submersible pumps with VFD's as part of current construction project. Existing VFDs for Pumps No. 4 and 5 to be replaced as part of the current construction project.	No operational issues. Wet well design does not meet current Hydraulic Institute Standard, no apparent cavitation problems. Redundancy at peak flows was addressed under the 2008 New Submersible Pump Station and Electrical Upgrades project.
Influent Screens	Mechanical bar screens are in good condition.	No operational issues.
Primary Settling Tanks, No. 1 - 3	Minor vertical cracks in the primary settling tank walls. The top of concrete along walkways has spalling concrete and cracks in numerous areas particularly around grating panels, railing posts and other areas. Cracking along north side of raised wall observed. Cracks around stairs. Railing anchors loose. Leakage along walls of main tunnel. Chain and flights are in good condition.	Operational issues with the primary scum pumps.
Aeration Tanks No. 1 - 4	The eight aeration inlet gates, diffusers, diffuser headers and drop pipes were replaced under the 2017 Aeration System Improvements Phase II project. Meters are old and not accurate and should be replaced. They may be difficult to remove.	No operational issues.
Reaeration Tanks No. 1 - 2	Gates and operators are in poor condition. Diffuser sheaths are cleaned and/or replaced every two to four years. The diffuser sheaths are in poor condition. Stainless steel headers and drop pipes are in good condition.	The four reaeration tank sluice gates are difficult to operate. The existing diffusers sheaths do not proportionally distribute the air. Agitation and suspension of solids is weak.
Overflow Tanks	Tight cracks and efflorescence on concrete in walkway areas where Y-walls and have been removed.	No operational issues.

UNIT PROCESS	DESCRIPTION OF CONDITION	OPERATIIONAL STATUS
Blowers No. 1 - 4	Blowers No. 1 and No. 3 are the original Roots-Connersville units, constant speed rotary positive displacement type, motor-driven at 400 Hp, rated at 9000 scfm, 7.5 psig each. Blower No. 3 has been retrofitted with a gear transmission to manually vary the speed. Blowers No. 1 & 3 are in fair condition but are not energy efficient. Blower No. 4 was replaced with a turbo blower in 2015. Blower No. 2 was replaced with a turbo blower in 2017. Blower No. 3 has an oil leak. Several of the blower instruments/gauges are not working.	No operational issues. One of the centrifugal turbo blowers is sufficient to provide the air required to meet most of the air requirements. Blowers No. 1 and 3 will remain on manual control. The flow rate of the new turbo blowers is controlled using dissolved oxygen (DO) sensors.
Final Settling Tanks, No. 1 - 2	Concrete tank is in fair condition.	Flow to these tanks is not proportioned during average flow. Downward opening weir gates control flow to these clarifiers. Tanks No. 1 and 2 are not operated unless necessary.
Final Settling Tanks, No. 3 - 5	The collector mechanisms for the tanks are in poor condition.	Operational issues with collector mechanisms in Tank Nos. 3, 4, and 5.
Channel Air Diffusers	Existing channel air diffusers are not providing sufficient mixing to prevent solids deposition	Some diffusers are inoperable which could lead to carry over of solids to the Final Tanks. Leakage occurs into the lower Gallery at the air pipe penetrations from the channels
Chlorine Contact Tanks	Sodium Hypochlorite Feed System is in fair condition. Sodium Bisulfite Feed System is in poor condition.	Sodium Bisulfite feed pumps have had clogging issues. Pump replacement to be considered. Leak detection and controls are an issue.
Dissolved Air Floatation Tanks	System in poor condition. The chain and flight for the Thickener Bottom Sludge Collector is in poor condition.	Unit No. 2 currently not operational. There are issues with air control for both units. Issues with the operation of the chain and flights.
Anaerobic Digestion	Mixing system in poor condition.	Operational issues with mixing system
Sludge Holding Tanks	Equipment in fair condition.	No operational issues.

2.9 NEED FOR PROJECT

The Joint Plant consistently meets all the current NPDES permit limitations. The current NPDES is included in **Appendix D**.

The Joint Plant has previously completed Strategic Capital Improvement Plans (SCIP) starting in 2004, with an update completed in 2015. The SCIP's included comprehensive condition assessments that resulted in recommended capital projects. See **Appendix F**, for projects recommended in the 2015 SCIP. As part of this planning report, a follow up condition assessment was completed in January 2023 with the major results identified in Table 2.9. As a result, the two near term projects that have been identified for CWSRF funding include Replacement of Final Settling Tanks No. 3 - 5 and Replacement of the Channel Air Diffusers.

2.9.1 REPLACEMENT OF FINAL SETTLING TANKS NO. 3 -5

As previously indicated, Final Settling Tanks No. 4 and 5 were originally constructed in the 1970's and Final Settling Tank No. 3 added in the 1980's. These tanks have performed efficiently and have been maintained over the years but have now reached the end of their useful life. Since the Final Settling Tanks are the major treatment process needed to continue to meet the Total Suspended Solids and BOD_5 NPDES permit limits, it is critical to keep this unit process in reliable operation. Without replacement, there is a risk that a tank could be out of service for an extended period if a failure occurs.

2.9.2 REPLACEMENT OF THE CHANNEL AIR DIFFUSERS

As shown in Figure 2.10, the aeration tank influent channel distributes primary effluent to the aeration tanks and the final tank influent channel distributes flow to the final settling tanks. To prevent solids from settling, these channels include aeration diffusers to keep the solids from settling. The original diffusers were installed in the 1970's. Over the years, the diffusers have been difficult to maintain resulting in inefficient performance and potential solids buildup in the channels that could carry over into the aeration tanks and final settling tanks and adversely impact the treatment processes. In addition, the channels include air piping penetrations that have deteriorated causing leakage on occasion into the lower Gallery, which is considered a safety hazard. The project will include a newer more efficient diffuser system with provisions to remove diffuser drop pipes without draining or entering the channels. New stainless steel air piping will also be included to eliminate the pipe penetrations and leakage.

2.9.3 NPDES PERMIT COMPLIANCE INFORMATION

The Benton Harbor – St. Joseph Joint Board of Commissioners operates the Joint Plant under NPDES Permit MI0022322, which took effect May 1, 2019, and expires October 1, 2022. The current NPDES is included in **Appendix D**.

The Joint Plant has an excellent performance record and consistently meets the current NPDES permit limits. The current influent flow and loads are listed in Table 2.10 and the current monthly average effluent concentrations are listed in Table 2.11.

TABLE 2. 9 CURRENT INFLUENT FLOW AND LOADS FOR THE JOINT PLANT

Parameter	Unit	Value
Flow		
Annual Average	MGD	8.05
Maximum Month	MGD	10.87
$CBOD_5$		
Annual Average	mg/L	171
Maximum Month	mg/L	207
Total Suspended Solids		
Annual Average	mg/L	209
Maximum Month	mg/L	324
Ammonia-Nitrogen		
Annual Average	mg/L	11.0
Maximum Month	mg/L	14.3
Total Phosphorus		
Annual Average	mg/L	3.3
Maximum Month	mg/L	4.1

TABLE 2. 10 CURRENT MONTHLY AVERAGE EFFLUENT CONCENTRATION FOR THE JOINT PLANT

Parameter	Unit	Value
$CBOD_5$	mg/L	3.8
Total Suspended Solids	mg/L	9.8
Ammonia-Nitrogen	mg/L	11.4
Total Phosphorus	mg/L	0.57

2.9.4 PROJECTED NEEDS FOR THE NEXT 20 YEARS

In general, the Joint Plant has the treatment capacity to effectively treat the expected increase in flows and loads for the next 20 years. However, the equipment in certain processes may need to be

replaced/upgraded during this timeframe. The findings from the 2023 SCIP are included in **Appendix F**. In addition, other critical projects identified in the recent condition assessment include:

- The Primary Settling Tanks show minor cracks and spalling, and the primary scum pumps need replacement due to operational issues.
- Sodium Bisulfite feed pumps have had clogging issues and need to be replaced and there are operational issues with the leak detection and controls.
- Dissolved Air Floatation Unit No. 2 is not operational and there are air control issues with Unit No.1. The chain and flight for the Thickener Bottom Sludge Collectors are in poor condition and need to be replaced.
- There are operational issues with the mixing system for the Sludge Holding Tanks.

3 ANALYSIS OF ALTERNATIVES

3.1 IDENTIFICATION OF POTENTIAL ALTERNATIVES

The improvement project selected for this Project Plan is required to allow for continued reliable wastewater effluent. The reasons for the need for a replacement of the collector mechanism for final settling tank No. 3, 4 and 5 and for the replacement of the diffuser sheaths in the influent channels are listed below:

- The existing diffusers are failing and do not provide adequate mixing
- Without replacement there is a risk that solids could carry over and upset the treatment processes
- Maintenance issues due to aging final settling tank collector system and drives.
- Uncertainties of the ability to comply with NPDES effluent limits should a final settling tank be out of service for an extended time.

Since the recommended projects are replacements to aging equipment, other unit process alternatives were not considered. The plans and specifications for the replacement projects will include new reliable equipment that fits within the existing structures.

3.2 NO ACTION

In general, the Joint Plant has the treatment capacity to effectively treat the expected increase in flows and loads for the next 20 years. As noted above, if the collector mechanisms in Final Settling Tanks No. 3, 4 and 5 are not replaced, the Joint Plant may risk violation of its NPDES permit. If the existing channel diffusers are not replaced, the aeration and final settling tanks processes could be upset should solids carry-over from the channels occur.

3.3 OPTIMUM PERFORMANCE OF EXISTING FACILITIES

The optimum performance level possible with the existing process design is currently being achieved. The collector mechanism for Final Settling Tank No. 3 is approximately 34 years old, is unreliable and has approximately 2 years of remaining useful life. The collector mechanisms for Final Settling Tank No. 4 and 5 are approximately 50 years old, are unreliable and have approximately 2 years of remaining useful life.

Additional operating controls and laboratory facilities to monitor or improve the process operations will not improve performance

The existing diffusers for aeration influent channel and for the final settling tank influent channel are replaced every two (2) to four (4) years. The existing diffusers are old technology with continued difficulty to maintain reliable operation. New diffuser technology includes features to prevent fouling and easier ability to remove diffuser drop pipes for inspection and diffuser replacement.

3.5.2 FACILITY LOCATION

The improvement project selected for this Project Plan does not require additional space as it involves replacing existing equipment with no changes to footprint.

3.6 REGIONAL ALTERNATIVES

The Joint Plant has a design treatment of 41.5 MGD. A wastewater treatment facility that would have the ability to process this quantity of wastewater would need to be relatively large. There are no large treatment facilities reasonably close to the plant. The nearest large treatment facility is over 20 miles away from the Joint Plant. It is not practical to pump the influent flow from the Joint Plant this far for further processing.

3.7 COST EVALUATION

The detailed preliminary Opinion of Probable Construction Costs (OPCC) are included as **Appendix G**.

The costs are divided into the two critical projects. These projects are the replacement of the collector mechanisms in Final Settling Tanks No. 3 – 5 and the replacement of the channel air diffusers. A 15% Contractor Overhead and Profit and a 25 % contingency have been included in the costs.

3.7.1 REPLACEMENT OF FNAL SETTLING TANKS NO. 3 -5

A summary of the preliminary OPCC for the replacement of the collector mechanism for Final Settling Tanks No. 3 – 5 project is presented in Table 3.1.

TABLE 3. 1 REPLACEMENT OF FNAL SETTLING TANKS NO. 3 -5
PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Division	Description	Estimated Valve
1	General Requirements	$135,568
2	Sitework	$150,000
5	Metals	$235,119
15	Mechanical	$2,170,856
16	Electrical	$155,400
Subtotal		$2,846,943
Contractor Overhead and Profit (15%)		$427,041
Subtotal		$3,273,984
Planning Level Contingency (25%)		$654,797
Total Cost Opinion		$3,928,781

3.7.2 REPLACEMENT OF THE CHANNEL AIR DIFFUSERS

A summary of the preliminary OPCC for the replacement of the channel air diffusers project is presented in Table 3.2.

TABLE 3. 2 REPLACEMENT OF THE CHANNEL AIR DIFFUSERS PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS

Division	Description	Estimated Valve
1	General Requirements	$54,560
2	Sitework	$129,297
15	Mechanical	$1,181,200
Subtotal		$1,365,057
Contractor Overhead and Profit (15%)		$204,759
Subtotal		$1,569,816
Planning Level Contingency (25%)		$313,963
Total Cost Opinion		$1,883,779

3.7.3 PROPOSED PROJECTS

A summary of the preliminary OPCC for the two proposed projects is presented in summarized below.

Replacement of Final Settling Tanks No. 3 - 5	$3,928,781
Replacement of the Channel Air Diffusers	$1,883,779
Total	$5,812,560

3.8 USEFUL LIFE

The overall useful life of the project assets was determined by assigning the useful life to the various project components. The weighted useful life was then developed using the individual useful lives and the estimated cost of the component asset. Assets with a 75-year useful life were buried piping, conduit and electrical light poles. Assets with a 25-year useful life included the equipment, such as the diffusers and collection mechanisms, and electrical equipment. Based on this, the weighted useful life of the improvement project is approximately 30 years.

3.9 WATER AND ENERGY EFFICIENCY

Energy is required for the air diffusion and for the operation of the collector mechanism. The new final clarifier mechanisms will include more efficient drives than the existing. The new diffuser will require less air for mixing than the existing diffusers with a minor energy saving.

4 SELECTED ALTERNATIVE

4.1 REPLACEMENT OF COLLECTION MECHANISMS AND DIFFUSERS

The replacement of the existing equipment is the preferred alternative compared to the No Action alternative.

4.2 SCHEDULE FOR DESIGN AND CONSTRUCTION

Major project-related activities and scheduled dates for the development and construction of the improvement plan are shown below.

The Joint Plant is not seeking CWSRF financing for the design work associated with the improvement plan. They anticipate that the design will be complete, and that the project will be ready for bid advertisement by July 2023. The Joint Plant is seeking CWSRF financing only for construction of the improvement plan.

The schedule for the associated improvement project is as follows:

- Submit Project Plan to EGLE May 2023
- Award contract for engineering May 2023
- Complete engineering design July 2023
- Project Plan approval September 2023
- Advertisement for bids September 2023
- Tentative contract award October 2023
- Executed construction contract October 2023
- EGLE Order of Approval Issued November 2023
- Loan Closing December 2023
- Substantial completion January 2025
- Final completion March 2025

4.3 USER COST SUMMARY

The Joint Plant is owned by the cities of Benton Harbor and St. Joseph; however, governance of the facility is vested in the Joint Wastewater Treatment Board. The Joint Wastewater Treatment Board is responsible for the operation, maintenance, repair, and improvement of the facility.

Administrative and engineering duties of the wastewater treatment operations include comprehensive system planning, interaction and regulation of development, implementing capital improvement projects and system budget management.

The Joint Wastewater Treatment Board pays for annual debt service through the operating rates charged to users of the system. The last rate increase was effective on January 1, 2023.

Construction costs are estimated at approximately $5.8 million with anticipated funding primarily from the Clean Water State Revolving Funds (CWSRF). The Joint Plant will submit a request for determination of Disadvantage Community Status form to EGLE after the public meeting. Upon

qualification the CWSRF loans are expected to be obtained in the form of a 30-year loan at an interest rate of 2.125%. Principal and interest payments would begin at the next EGLE cycle after initiation of operation. If no CWSRF is available the average monthly increase per user would be $.78/month for the average user.

4.4 EGLE FORMS

EGLE forms are included in appendices of the Project Plan. The Project Priority List Scoring Data Form is included in **Appendix H**. The Project Useful Life and Cost Analysis Certification Form is included in **Appendix I**.

5 EVALUATION OF ENVIRONMENTAL IMPACTS

5.1 GENERAL

The anticipated environmental impacts resulting from implementing the recommendations of this Project Plan include beneficial and adverse; short and long-term; and irreversible and irretrievable impacts. The following is a brief discussion of the anticipated environmental impacts of the selected alternative.

5.2 BENEFICIAL AND ADVERSE IMPACTS

The proposed project will significantly improve the Joint Plant's capability to produce a high-quality effluent water. The project will increase the reliability of the plant operations and reduce energy costs. The project will also generate construction-related jobs, and local contractors would have an opportunity to bid on the contracts.

Noise and dust will be generated during construction of the proposed project. The construction specifications will require contractors to implement efforts to minimize noise, dust and related temporary construction.

Road congestion and disruption of vehicular movement may occur for short periods of time, but access by emergency vehicles and residents will be maintained and any detours will be well marked and approved prior to the start of construction. There will be no interruption of the Joint Plant's wastewater treatment capabilities during the project's construction.

5.3 SHORT AND LONG-TERM IMPACTS

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

No adverse long-term impacts are anticipated.

5.4 IRREVERSIBLE OR IRRETRIEVABLE IMPACTS

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

5.5 ANALYSIS OF IMPACTS

The following discussion addresses the direct impacts, indirect impacts, and cumulative impacts due to project construction.

5.5.1 DIRECT IMPACTS

Construction of the proposed project discussed in this Project Plan is not expected to have an adverse effect on historical, archaeological, geographic or cultural areas. The work will be done within the boundaries of the Joint Plant. Soil excavation is not anticipated for this work. Proposed construction will not detrimentally affect the water quality of the area. Dewatering is not anticipated for this work. The construction will also not detrimentally affect the air quality, wetlands, endangered species, wild and

scenic rivers or unique agricultural lands. Chapter 6 provides a discussion of mitigation measures. The construction activities will all occur within an area that has previously been disturbed by prior construction.

5.5.2 INDIRECT IMPACTS

The project which is the subject of this Project Plan is being performed to improve the water quality and operations at the Joint Plant. Therefore, none of the areas listed below are anticipated to be noticeably negatively affected.

- The pattern of growth and development (also subject to local use and zoning plans)
- Changes in land use
- Changes to any natural setting, sensitive ecosystem or endangered species
- Changes to air or water quality
- Changes to social, cultural, human, and economic resources
- Changes to waste generation (waste generation will be reduced)
- Changes to resource consumption (the use of lime will be eliminated)
- Aesthetic or other impacts

5.5.3 CUMULATIVE IMPACTS

No cumulative adverse impacts are anticipated as a result of the project proposed in this Project Plan. However, primary cumulative beneficial impacts are anticipated, including:

- Reduced energy usage due to installation of diffusers that have stronger agitation and suspension of solids for better solids removal
- Reduced maintenance as diffusers will not need to be replaced every two years
- Reduced maintenance as the existing collector mechanisms require constant repairs
- Increased reliability of the performance of Final Settling Tanks No. 3, 4 and 5

6 MITIGATION

The proposed construction project cannot avoid all adverse impacts, therefore appropriate mitigation measures will be included in each project design and in the execution of construction activities.

6.1 MITIGATION OF SHORT-TERM IMPACTS

Noise, dust, partial road blockage/congestion, and other construction related impacts are the short-term impacts that are expected to occur as a result of the construction of this project. However, the road likely to be impacted by the proposed project is not heavily traveled and relatively short detours are available. These short-term impacts cannot be eliminated; however, their adverse impacts can be minimized through proper design and construction techniques. Mitigation of short-term impacts includes:

- SESC measures
- Noise control measures
- Dust control measures
- Traffic control measures including signs, flaggers, detours, etc.
- Maintaining access to the Joint Plant property
- Notification of emergency services (police, ambulance, fire, etc.)
- Control and attention to safety
- Proper signing and barricades to protect the work area, workers, and non-construction personnel
- Control of work hours such that construction will not normally occur at night or on weekends to minimize disruptions
- Location of work in road rights-or way, easements or at the Joint Plant property
- Design routings and locations to avoiding private property
- Restoration measures

All of the above are standard procedures and measures taken during planning, design and construction. Most of these will be specifically included as requirements in the specifications of the construction contracts to minimize and mitigate any short-term impacts.

6.2 MITIGATION OF LONG-TERM IMPACTS

Restoration of road pavement, stormwater facilities, sanitary facilities and water facilities will be required in the project specifications to ensure that they perform satisfactorily in the future. The aesthetic impacts of construction will be mitigated by comprehensive site restoration, with appropriate landscaping similar to what is currently at the facility.

Any lake body, stream crossings, wetlands or floodplain construction will be covered by a Joint Permit application to EGLE during the design and prior to any construction activity, although such activities are not currently anticipated. The proposed construction activities do not include any permanent modification to any of these features. EGLE (Joint Permit) recommendations will be included in the proposed construction mitigation plans. Although excavation is not anticipated on this project, any construction adjacent to existing wetlands or drainage features will utilize recognized Best Management Practices to prevent soil erosion or any structural modifications to the area, if required.

Although there are no historically significant features currently known to be associated with the proposed project, this will be monitored during construction and if features are found, work will stop while the State Historic Preservation Officer (SHPO) / Tribal Historic Preservation Officer (THPO) is contacted. Once the SHPO has investigated, any further construction activities will be handled in accordance with SHPO requirements.

Since the project is within established treatment works and cultivated areas, no issues regarding endangered or threatened species are anticipated. However, the US Fish and Wildlife Service will be contacted by EGLE for their input and any requested/suggested mitigation measures will be incorporated in the construction documents to assure that there are no adverse impacts.

There are no anticipated significant operation adverse impacts as a result of the proposed project.

6.3 MITIGATION OF INDIRECT IMPACTS

Mitigation of indirect impacts is not generally needed related to the type of improvements proposed in the Project Plan. The project proposed includes the replacement of existing equipment within the Joint Plant. The existing local planning, zoning and land use ordinances for Berrien County already regulate and control the development in the area where the proposed projects are located such that the mitigation of indirect impacts are not expected to be a concern.

7 PUBLIC PARTICIPATION

7.1 PUBLIC MEETING

7.1.1 PUBLIC MEETING ADVERTISEMENT

A notice of a public meeting was published to alert parties interested of this Project Plan and to request input prior to adoption. This notice was published in the existing service area starting April 13, 2023, via their websites as well as submitted to the local newspaper (Herald Palladium). The notice from the local newspaper is included in **Appendix J**.

7.1.2 PUBLIC MEETING SUMMARY

A public meeting on the draft Project Plan was held on Friday, April 28, 2023. The meeting included a description of the project, as well as an opportunity for public comment and questions. A summary of Public Meeting and a copy of the agenda will be included in **Appendix K**, along with the attendance list, once available.

7.2 ADOPTION OF THE PROJECT PLAN

The Benton Harbor St. Joseph Joint Wastewater Treatment Plant (Joint Plant) Board will approve the resolution after the public meeting. An executed copy of the Resolution approving the Project Plan will be included in **Appendix L,** once available.