# Village of Maple Rapids Wastewater System Improvements and Storm Water System Improvements

Michigan Clean Water State Revolving Fund Project Planning Document (2023) Volume 1 – Report Body

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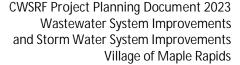


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#### BACKGROUND

This Project Planning Document was authorized by the Village of Maple Rapids via the Qualified Based Selection (QBS) process in accordance with the Michigan Department of Environment, Great Lakes & Energy (EGLE) Clean Water Revolving Fund (CWSRF) Program.

# Study/Service Area

The Village of Maple Rapids is situated along the Maple River in Section 5 of Essex Township in the northwest part of Clinton County in south central Michigan; refer to Figure 1. Project Location and Study/Service Area on the following page, which shows the Village boundary. Maple Rapids is located approximately fifteen miles northwest of the City of St. Johns and seven miles west of US-127.

The most significant natural resource within the Village is the Maple River, which flows southwesterly through the Village, and the corresponding Maple River State Game Area with regulated floodplain and wetland areas contiguous to the Maple River. In addition to the undevelopable areas north of and adjacent to the Maple River, there are also several undeveloped areas south of the Maple River, which area currently zoned agricultural. As such, approximately 70-75 of the land within the Village limits is undeveloped.

The Maple River lies at approximately elevation 650 feet with ground elevations across the developed portion of the Village ranging from approximately 670 to 700 feet. Peck Drain, which is a county drain, also meanders through the developed portion of the Village and eventually outlets to the Maple River near the Maple Avenue Bridge.

For purposes of this CWSRF Project Planning Document, the study/service area was defined during discussions with the Village of Maple Rapids and generally corresponds to the developed area of the Village. The study/service area is located south of the Maple River/Maple River State Game Area (i.e., and the regulated floodplain and wetland areas). Figure 1 Project Location and Study/Service Area on the following page illustrates the study/service area boundary.

The community is primarily single family residential with several multi-family housing units and a downtown/commercial area. Wastewater collection and treatment is by gravity sanitary sewers with one main lift station which pumps the wastewater to facultative treatment lagoons located near the northeast corner of town.





# Population

Table 1 Population Statics includes the U. S. Census population data for the Village of Maple Rapids and the population projections for the twenty year planning period.

Table 1. Population Statistics

Entity	U. S. Census Population				Population Projections		
Entity	1980	1990	2000	2010	2020	2030	2040
Village of Maple Rapids	683	680	643	672	573	625	675

<sup>(1)</sup> For 2030-2040 Village of Maple Rapids, population projections based on an increase of approximately 50 people/10-year period, or approximately 1%/year to re-establish the 2010 population.

According to the U. S. Census, from 2010 to 2020 the Village of Maple Rapids experienced an approximately 15 percent decrease in population, while prior to 2010 the population was relatively stable. Based on discussions with the Village, it is anticipated that the character of the community will remain essentially the same. As such, the population projections for the twenty year planning period assume the population decline from 2010 to 2020 will be re-established by 2040.

# **Existing Environment Evaluation**

The following discussion describes the existing environment within the study/service area including a brief evaluation if elements are present and impacted by the proposed project. Per discussion with and subsequent direction from EGLE, the respective jurisdictional agencies will be contacted later in the Project Planning Document process, if required.

# A. Cultural and Historical Resources

The proposed construction activities will occur within existing public road rights-of-way and on existing Villageowned pump station and lagoon property and easements where no impacts to historical or cultural resources are anticipated.

# B. Air Quality

On average, with an Air Quality Index of approximately 30, the air quality in the Village is considered good. During construction, short term impacts due to equipment operations (i.e., emissions) and construction activities (i.e., dust) will be limited to the various construction sites.



#### C. Wetlands

According to EGLE Wetlands Map Viewer, Part 303 Final Wetlands Inventory, NWI and MIRIS Maps, existing wetlands are located along the Maple River north of the study/service area. The proposed construction activities, which will occur within existing public road rights-of-way and on previously disturbed pump station and lagoon property and easements, are situated outside of wetland areas.

D. Great Lakes Shoreland, Coastal Zones, and Coastal Management Areas – Not Applicable.

# E. Floodplains

According to FEMA National Flood Hazard Layer (NFHL) Viewer, the 100-year floodplain parallels the Maple River and is located north of the study/service area. The proposed construction activities are located outside of the 100-year floodplain boundary

F. Natural of Wild and Scenic Rivers – Not Applicable.

# G. Major Surface Waters

The Maple River flows southwesterly through the undevelopable portion of the Village and is located north of the study/service area. A USGS Staff Gage is installed at the Maple Avenue Bridge.

# H. Topography

The Maple River is at approximately elevation 650 feet with ground elevations across the study/service area ranging from approximately 670 to 700 feet and sloping toward the Maple River.

#### Geology

The local geology consists of glacial outwash and gravel and postglacial alluvium.

# J. Soil Types

The soils within the study/service area consist primarily of Boyer Complex (BoB), which are well drained soils characteristically formed in sand and loamy drift underlain by sand or gravelly sand outwash. While the soils do not present any constructability issues, appropriate temporary control measures will be employed to ensure that run-off and airborne dust impacts caused by construction activities will be minimized; best management practices with regard to the potential for wind erosion during construction will be utilized.





# K. Agricultural Resources

There are no prime or unique farmlands located within the study/service area.

# L. Fauna and Flora

The study/service area is residential and commercial in nature, excepting the lagoon site. No impacts to fauna and/or flora are anticipated within the residential and/or commercial areas. Similarly, no impacts are anticipated at the lagoon site since the proposed improvements will occur within previously disturbed areas.

# **Existing System**

The Village of Maple Rapids wastewater system consists of three main components: wastewater collection system with gravity sanitary sewers and manholes, a wastewater pump station, and wastewater stabilization lagoons. The wastewater system serves 280 customers, which are primarily residential.

The existing wastewater collection system was constructed in the early 1970s and includes approximately 24,100 feet (4.5 miles) of 8-inch diameter vitrified clay gravity sanitary sewer and approximately 100 manholes. The collection system transports the wastewater to the Main Pump Station located at the corner of Maple Avenue and Mill Street; the Main Pump Station pumps the wastewater through approximately 4,000 feet of 6-inch diameter ductile iron force main to the Village of Maple Rapids Wastewater Treatment Facility at the north end of Garfield Street. Figure 2 Existing Wastewater System on the following page illustrates the existing wastewater system including collection system, Main Pump Station, and Wastewater Treatment Facility.

The Main Pump Station, which was also constructed in the early 1970s, is a Puretronics can-type pump station with two 15 hp, constant speed, dry-pit Allis Chalmers pumps running at 1750 rpm and each with a capacity of 150 GPM. The Main pump station is also equipped with a 750 GPM emergency backup pump, which is manually started by DPW staff when the flow exceeds the capacity of the Main Pump Station. A standby generator was more recently added.



Similarly, Lagoon Cells 1 and 2 were constructed as part of the original wastewater system (i.e., in the early 1970s) and Lagoon Cell 3 was constructed in 2007 to provide additional storage, which increased the design capacity to 743 Residential Equivalent Units (REUs) and included a modest level of future development within the Village. Influent flow is split between Cells 1 and 2 and then transferred to Cell 3, which includes a discharge control structure that routes the effluent to original Outfall 001 to discharge to the Maple River each spring and fall. The Wastewater Treatment Facility operates via Certificate of Coverage MIG580260 under General Permit No. MIG580000, copies of which are included in Appendix A. The Permit will expire April 1, 2024.

In addition to Cell 3, which included a double impermeable liner system, the 2007 Wastewater Lagoon Expansion project included control structures/transfer piping and for Cells 1 and 2 included riprapping the interior berms, removing trees encroaching on the exterior berms, gravel surfacing on the tops of the berms.



The wastewater collection system and force main are located within the public road rights-of-way, while the Main Pump Station and Wastewater Treatment Facility, including Outfall 001 (to the Maple River) occupy Village-owned property. All prior wastewater system construction, including collection system, Main Pump Station, and treatment facility in the 1970s and 2007, has occurred south of the Maple River/Maple River State Game Area (i.e., and the regulated floodplain and wetland areas). Additionally, environmental reviews, which were completed in accordance with the National Environmental Policy Act (NEPA), concluded with Finding of No Significant Impact (FONSI).

The existing storm sewer system consists of approximately 6,300 feet (1.2 miles) of storm sewer ranging in size from 6-inch diameter to 18-inch diameter and approximately 45 structures. Storm sewers include mainline sewer, catch basin leads, and culverts constructed with reinforced concrete pipe, corrugated plastic pipe, corrugated metal pipe, and vitrified clay pipe, while storm structures include manholes, catch basins and leaching basins.

The wastewater and storm water systems, as well as the water system and the majority of the roads, are operated and maintained by the Village of Maple Rapids Department of Public Works (DPW) staff. Additionally, and somewhat unique to the Village of Maple Rapids is the portion of Main Street from Maple Street to the east Village boundary, which the Clinton County Road Commission (CCRC) operates and maintains.

In 2015, the Village of Maple Rapids secured approximately \$400,000 in grant funding via the Stormwater, Asset Management, and Wastewater (SAW) to develop an Asset Management Plan (AMP) for its wastewater and storm water systems. Horizontal (i.e., location) and vertical (i.e., elevation) data were collected for manhole and catch basin structures and used in conjunction with existing drawing information to create GIS frameworks for the sanitary sewer and storm sewer systems. Inventories/condition assessments were conducted for the structures and sewers were cleaned and televised. The National Association of Sewer Service Companies (NASSCO) Manhole Assessment Certification Program (MACP) and Pipeline Assessment Certification Program (PACP) were used to identify and code the observations/defects. Data were input into the GIS to facilitate development of the AMP per EGLE's Asset Management Guidance for Wastewater and Stormwater Systems, including a criticality/risk analysis and a Capital Improvement Plan (CIP), which provided the basis for defining the proposed wastewater system and storm water system improvements. In in conjunction with the preparation of the AMP, the Level of Service (LOS) was defined for the wastewater and storm water systems and a Probability of Failure (POF) and a Consequence of Failure (COF) were assigned to each asset. The Executive Summary for the Wastewater Asset Management Plan and the Executive Summary for the Stormwater Asset Management Plan are included in Appendix C.



In 1995, the Village implemented an operation and maintenance program, which involved cleaning/televising the sanitary sewer collection system and using the results to prioritize and define repairs. Subsequently, in 2000 and 2010 additional inspections and repairs were completed. The 1995, 2000, and 2010 data were incorporated into the GIS and provided information essential to the criticality/risk analysis, as well as for the development of the CIP.



# Need for the Project

# Main Pump Station

The Main Pump Station, including, but not limited to, the pumps, electrical and instrumentation/control systems, flow meter, and alarm system, was constructed in the early 1970s and has exceeded its service life. The controls are currently located in the dry well, which is a confirmed space issue, repair parts for the flow meter are not available, and the capacity of the pumps needs to be evaluated.

# **Wastewater Treatment Facility**

Lagoon Outfall 001 to the Maple River, which was constructed in the early 1970s, and the gravel drives, which were constructed in the early 1970s and/or 2007, have exceeded their service lives. At Outfall 001, the pipe has separated from the headwall likely due to the erosion around the headwall and the gravel drives need to be rehabilitated.

# Sanitary Sewer

The GIS and supporting documentation via the MACP and PACP data provided the basis for identifying sanitary sewers with structural defects with ratings of 4 and 5 for rehabilitation by CIPP lining and CIPP spot lining.

#### Storm Sewer

Similarly, the GIS and supporting documentation via the MACP and PACP data provided the basis for identifying problematic storm sewers for replacement; the storm sewers have exceeded their service lives and since more than 70 percent of the storm sewers are smaller than 12 inches, they are undersized. Like most other communities, the Village has no funding mechanism for storm water assets and, as such, has been maintaining a minimum LOS for its residents.





#### ANALYSIS OF ALTERNATIVES

#### No Action

Recognizing the age of the Main Pump Station, the age and condition of the lagoon outfall headwall and gravel berm drives, and the structural integrity of several sanitary sewers and storm sewers, if the No Action alternative was implemented, the impact(s) would be significant.

# Optimum Performance of Existing System

The existing wastewater system would operate more reliably and efficiently by replacing the Main Pump Station and the lagoon outfall headwall, rehabilitating the gravel berm drives and the sanitary sewer system, and replacing the storm sewers.

# Regionalization

The existing lagoon wastewater treatment facility has/will continue to serve the Village of Maple Rapids well. Some of the neighboring communities also have lagoon wastewater treatment facilities and/or on-site sewage disposal systems. The City of St. Johns is more than five miles southeast of the Village of Maple Rapids. A pump station and force main would be required to pump wastewater from the Village to the City and numerous crossings of environmentally sensitive areas such as drains, floodplains, and wetlands would be required to construct the force main. As such, regionalization is not a viable alternative.

Alternative 1 – Wastewater System Improvements and Storm Water System Improvements Main Pump Station Replacement

The existing Main Pump Station will be replaced; the proposed pump station will be constructed adjacent to the existing Main Pump Station. Operation of the existing Main Pump Station shall be maintained while the new pump station is constructed. A well point dewatering system utilized in conjunction with a slide rail excavation system will minimize the construction impacts of the approximately 30-foot deep wet well. The electrical/instrumentation/controls will be located at grade. Figure 2 Proposed Wastewater and Storm Water Improvements on the following page illustrates the proposed improvements.



# Wastewater Treatment Facility Improvements

The existing headwall at Outfall 001 will be replaced in-kind, the pipe connection will be repaired, and the ground around the headwall will be stabilized. The gravel berm drives will also be rehabilitated via the addition/grading of supplemental material to provide a stabilized surface for access for operation and maintenance activities at the wastewater treatment facility.

# Sanitary Sewer Rehabilitation via CIPP

Approximately 4,865 feet of existing 8-inch sanitary sewer will be rehabilitated via CIPP liners and four additional sanitary sewers will be rehabilitated via CIPP spot liners.

# Storm Sewer Replacement and Road Reconstruction

Approximately 2,200 feet of storm sewer will be replaced/constructed along Main Street from Poplar Street to Ashland Street. In addition to the road will be reconstructed.

# **Monetary Evaluation**

A construction cost opinion was prepared from recent bid tabulations and is summarized in Table 3 Construction Cost Opinion below.

Table 2. Construction Cost Opinion

Item	Description	Cost Opinion
1	Wastewater Pump Station Replacement	500,000
2	Lagoon Outfall Headwall Replacement	25,000
3	Lagoon Gravel Berm Drive Rehabilitation	50,000
4	Sanitary Sewer System Rehabilitation via CIPP	275,000
5	Storm Sewer Replacement	295,000
6	Road Reconstruction	465,000
Construction Cost Opinion		1,610,000

#### **Environmental Evaluation**

As discussed with EGLE, the Environmental Evaluation will be completed later in Project Planning Document process.



#### SELECTED ALTERNATIVE

The selected alternative includes replacing the existing wastewater Main Pump Station at Maple Avenue and Mill Street, replacing the headwall at lagoon Outfall 001, rehabilitating the gravel berm drives at the lagoons, rehabilitating existing sanitary sewers via CIPP liners and CIPP spot liners throughout the Village, replacing the storm sewer in Main Street from Poplar to Ashland Streets and the corresponding roadway. Figure 2.1 Proposed Wastewater and Storm Water Improvements, which is included in the previous section illustrates the proposed improvements.

# **Design Parameters**

For the Main Pump Station, the pump station capacity will be reviewed/evaluated. The CIPP liners for the sanitary sewer rehabilitation will be designed based on fully deteriorated pipe. The storm sewer design will be based on the standards of the Clinton County Drain Commissioner.

#### **Useful Life**

The useful lives for the proposed improvements are noted below:

- Pump station including pumps, electrical/instrumentation/controls 20 years (30 years expected based on performance of existing equipment.
- Sanitary sewer rehabilitation 50 years.
- Storm sewer 50 years.



# Schedule for Design and Construction

Table 3. Project Schedule

Description	Target Timeframe	
CWSRF Application Submittal	June 2023	
CWSRF Acceptance	Fall 2023	
Funding Commitment	Fall 2023	
Start Design	Fall/Winter 2023	
Land & Easements Acquisition	Not Applicable	
Permits	Fall 2023	
Advertise for Bids	Winter 2023	
Funding Closing	Spring 2024	
Contract Award	Spring 2024	
Construction	2024-2025	
Substantial Completion	Summer 2025	
Final Completion & Initiate Operation	Fall 2025	

# **Cost Summary**

The total project cost opinion is summarized in Table 5 Project Cost Summary below.

Table 4. Project Cost Summary

Description	Est. Total
Construction	\$1,610,000
CWSRF Project Planning Document	\$35,000
Engineering – Design, Bidding, Construction	\$385,000
Administrative / Legal	\$40,000
Contingencies	\$320,000
Total Project Cost	\$2,390,000



Table 6 User Costs demonstrates the impact on user rates based on the proposed project. The breakdown assumes a 20-year debt service on the bond at an interest rate of 2.75% (FY 2024 per Overburdened Calculation Spreadsheet). While O&M is expected to decrease, it will be maintained at the existing rate (i.e., FY 2021 Audit) for conservative budgeting.

Table 5. User Costs

Description	Existing	Proposed Project	Total
CWSRF Loan Amount		\$2,390,000	
Anticipated Interest Rate		2.75%	
Term		20 Years	
Annual Debt Service		\$156,955	
Monthly Debt Service		\$13,080	
Estimated System REUs	280	280	280
User Rate Impact / REU / Month	\$26.33	\$46.71	\$73.05
User Rate Impact / REU / Quarter	\$79.00	\$186.85	\$265.85

An "Overburdened Community Status Determination Worksheet" was completed and is included with the final Project Planning Document submittal; refer to Appendix D. The Village of Maple Rapids qualifies as an Overburdened Community.

# Implementability

The Village owns and operates the collection system and pump station and therefore has the authority to implement the selected alternatives.



#### 4. ENVIRONMENTAL AND PUBLIC HEALTH IMPACTS

The analysis of environmental impacts includes:

- Direct impacts, which are related to the construction and operation of the project
- Indirect impacts, which are project induced and/or facilitated
- Cumulative impacts, which increase in magnitude over time, or which result from individually minor but collectively significant actions occurring over time.

# **Direct Impacts**

Each project will see no direct impacts regarding land use, air quality, water quality, natural setting and social resources for the service area. No tree removal is anticipated and Maintenance of Traffic plan will be developed for work done in the collection system.

- Construction: Impacts due to construction will be minimal. Construction will take place on site or in existing right-of-way locations.
- Operational: The pump station will remain in operation during construction.
- Social: The project will likely have no social impacts to the community, the in-kind replacements will keep the
  price for managing the pump station the same. A Maintenance of Traffic plan will be developed for work done in
  the collection system.

#### **Indirect Impacts**

- Development: The project segments will take place on previous disturbed areas and should not include changes in rate, density, or type of land development.
- Land Use: The project is not expected to change current land use patterns.
- Air and Water Quality: Air and water quality changes stemming from primary and secondary development are expected to be temporary and minor to non-existent.
- Natural Areas and Sensitive Features: It is anticipated that the project should have no impact on natural areas
  and sensitive features. Mitigation measures will be coordinated with EGLE during the design process and
  permits will be needed in these areas.
- Secondary Growth: Secondary growth is also not expected to be spurred by the other than that affected by any
  well run and maintained system.
- Aesthetics: The project will produce no overall permanent damage to existing area aesthetics;' all work is
  underground and the surface will be restored to previous state. Minor construction destruction will be more
  than offset by improved roads resulting from project restoration efforts.



Resource Consumption: No additional or increased resource consumption will occur due to these projects other
than during construction; material consumption during construction could not be considered significant or
excessive either. Fuel for operating construction equipment and various piping materials would be the primary
materials consumed.

# **Cumulative Impacts**

There will be no adverse cumulative impacts. Each project is either an in-kind replacement, rehabilitation or equipment upgrade and the pump station will remain in similar operation.



#### 5. MITIGATION

Based Where adverse impacts due to installation of the recommended improvements cannot be avoided, mitigation measures will be implemented. Costs for mitigation measures were considered and included where applicable in project opinions of probable cost. Mitigation measures needed during construction will be included in construction contract documents.

# Mitigation of Short-Term Impacts

- General Construction: Construction problems anticipated include groundwater control and areas of inferior structural/pipe bedding and backfill soil material. These are normal occurrences with construction in the area and prior planning/design will create a situation where these problems will pose no significant difficulties for qualified contractors.
- Construction Spoils: Disposal of construction spoils in wetlands, floodplains, shorelines or other sensitive areas will be prohibited. It is anticipated that spoils disposal areas and methods will need to be permitted. All spoils will be disposed of off-site at an approved location.
- Transportation Issues: Any traffic disruptions that occur (such as equipment deliveries or construction related traffic) will be organized and controlled to minimize disruption of local, transient and emergency traffic.
   Construction related traffic will be regulated by construction contract language and Township ordinances/policy.
   All needed barriers and signing will be in conformance with applicable MDOT standards. Disruption is expected to be minor and localized to the construction sites.
- Contaminated Soil: If needed or discovered, contaminated soil and/or construction dewatering discharge will be
  planned and budgeted for with methods covered under project construction specifications. This project does
  not anticipate encountering contaminated soils or groundwater.
- Wetlands: The project segments will not infringe on any designated wetland areas.
- Stream Crossings: No stream crossings are anticipated under the proposed work.
- Endangered and Threatened Species: It is anticipated that the project should have no impact on natural areas and sensitive features. Mitigation measures will be coordinated with EGLE during the design process and permits will be needed in these areas.
- Permitting: Permitting will be obtained during the design process. Construction documents will require the contractor to obtain needed erosion control permits.



- Safety: All work shall comply with Federal, State and local laws governing activities, safeguards, devices and protective equipment. Minimum requirements are defined by the U.S. Department of Labor and the Michigan Occupational Safety and Health Act.
- Dust and Noise: Construction dust and noise will be required to be kept to a minimum. No on-site burning will be allowed. Use of water or other suppressants will be used to control fugitive dust and prevent violation of Rule 901 and contractors will be required to use gas engine muffled exhausts.
- Erosion: Soil Erosion and Sedimentation Control permits will be required for the project. Site-specific mitigation measures will be addressed during design and included in the construction contract documents. At a minimum, mitigation measures will include a silt fence as needed along the work site perimeter.
- Restoration: Damaged curbing, driveway and sidewalk surfaces will be restored to equal or better condition in accordance with best management practices. All disturbed site soil will be restored with topsoil, seed, fertilizer, and mulch.
- Utilities: Disruption of utilities during construction will be kept to the minimum necessary to allow new installations. Repairs will be made in a timely manner.
- Valuable Features: Implementation of the selected alternative is not expected to significantly impact more extensive or valuable existing features such as mature vegetation.

# Mitigation of Long-Term Impacts

- General Construction: The Township does not expect any long-term impacts from the general construction activities.
- Siting Descriptions: Work will be confined to existing disturbed locations.
- Operational Impacts: Long-term operational issues will not be adversely changed by the projects; rather, operations should be enhanced through new more reliable equipment.

# Mitigation of Indirect Impacts

Master Planning and Zoning: Long range planning by the Township identified the project segments evaluated in
this report and all impacts take place within the developed Township streets and would have no effect on
planning and zoning in the community. The work will not impact historical features, agricultural land, or
sensitive features.



- Ordinances: Local ordinances are in place regarding minimum construction and operation standards and site
  erosion control. Wetlands, floodplains, and other sensitive habitats are protected by State laws and permitting
  procedures.
- Land Requirements: None needed for the recommended alternatives.
- Socio-economic and Environmental Justice Issues: Costs and less tangible impacts such as construction traffic would have no disproportionate impact any area group. Impacts are spread evenly amongst community collection system users.
- Noise: Construction dust and noise will be kept to a minimum via construction contract requirements.



# 6. PUBLIC PARTICIPATION

# **Public Meeting**

The Village of Maple Rapids held a formal public meeting to present the proposed improvements included in this Project Planning Document on April 26, 2023 at the Village Hall. The public meeting summary is included in Appendix D.

# Public Meeting Advertisement

The advertisement for the public meeting was posted on the Village of Maple Rapids website on April 10, 2023 in accordance with the minimum fifteen-day prior notification requirement. A copy of the advertisement for the public meeting was also provided/emailed to EGLE. Concurrently, a copy of the Project Planning Document was made available to the public on the Village website and at the Village Offices. A copy of the advertisement for the public meeting is included in Appendix E.

# **Public Meeting Summary**

A copy of the public meeting summary is included in Appendix D.

# Adoption of Project Planning Document

Public comments were incorporated into the final version of this Project Planning Document, which was adopted, via resolution, by the Village of Maple Rapids on April xx, 2023. A copy of the resolution adopting the Project Planning Document is included in Appendix D.