

Green Charter Township

MECOSTA COUNTY, MICHIGAN

CLEAN WATER

STATE REVOLVING FUND (SRF)

PROJECT PLAN

DRAFT

MAIN LIFT STATION IMPROVEMENTS

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EXECUTIVE SUMMARY

This Project Plan was completed to qualify for funding through the State Revolving Fund (SRF) for the replacement of the Main Lift Station in Green Charter Township (Township). The proposed project includes the replacement of the existing lift station that provides service to the entire sanitary sewer collection system. The SRF program assists municipalities in financing certain utility improvements projects over a 20 or 30-year term at favorable interest rates – typically between 1.875% and 2.5%. As such, projects reflect the long-term needs of the community.

This State Revolving Fund Project Plan is the first step in an application for SRF financing of the necessary improvements. This report presents the results of the engineering and scientific evaluations performed to determine the need for the project, develop alternatives to remedy identified problems, and to define the scope of the recommended/selected alternative. Background information on the existing system is also provided along with the rationale used to define alternative projects that could meet the long-term wastewater system needs of the Township.

The existing lift station was originally constructed in 1978. Minor improvements have been completed over the years, but many of the critical assets are original to the 1978 construction and are operating beyond their expected useful life. A Sanitary Sewer Lift Station Evaluation was completed in 2021 to evaluate the condition of the existing lift station and provide recommendations for future improvements. The lift station was found to be in poor condition overall and safety concerns related to the operation and maintenance of the station were also identified. Complete replacement of the station was recommended to address the identified deficiencies. The proposed improvement project will increase the reliability of the lift station and provide safer facilities for Township Staff to operate and maintain.

The Recommended Alternative includes complete replacement of the existing can-style station with a submersible lift station. This principal alternative is identified as Alternative 3. Alternative 3 is the preferred and Recommended Alternative because it is the only alternative that meets the Township's project objectives.

The User Charge for a typical residential customer is expected to increase \$20-26 per quarter, a portion of which has already been included in recent user rate adjustments, if the Recommended Alternative 3 is implemented, based on financing \$800,000 through an SRF loan at the current 1.875% interest for a 20-year bond period. Actual monthly costs will vary depending on financing terms, grant eligibility, individual usage, and community rate structure. It was determined by EGLE that Green Charter Township does not qualify as a disadvantaged community.

I. INTRODUCTION

Green Charter Township was organized in 1858 and is located in Mecosta County, approximately 5 miles north of the City of Big Rapids. The Township, with a population of 3,219 people, owns and maintains the sanitary sewer collection system and a single sanitary lift station.

The Township's sewer system was constructed in 1977 with continuous improvements ongoing. The sanitary sewer system currently serves a small region on the south side of the Township. The collection system includes approximately 2.4 miles of 8" diameter PVC sanitary sewer. The sewer provides service to 262 REUs with a service population of approximately 320 individuals. There is one pump station that serves the sanitary sewer system that was constructed in 1978. A map of the Township's collection system is included as Figure A1, located in Appendix A.

Wastewater is collected throughout the service area and is pumped to the City of Big Rapids collection system, to be treated at the City of Big Rapids Wastewater Treatment Plant (WWTP).

In 2021, a Sanitary Sewer Lift Station Evaluation was completed to determine the condition of the existing lift station. A Sanitary Sewer Feasibility Study was also completed in 2021 to evaluate the potential the future buildout of the service area.

The purpose of this Project Plan is to fulfill and document the requirements found in the state statutes (MCL§324.5303) and rules that govern the State Revolving Fund (SRF) and the Strategic Water Quality Initiation Fund (SWQIF) programs (Michigan Administrative Code R323.952). A copy of these rules can be found at <http://www.michigan.gov/orr/0,1607,7-142-5698---,00.html>.

In addition, this Project Plan will provide a basis for competitively ranking the Township's proposed wastewater system improvements in comparison to projects by other municipalities in a project priority listing for a low-interest State Revolving Fund loan. This is a financially attractive program where municipalities across Michigan compete for limited funds based on the merits of their proposed projects.

The scope of this Project Plan includes a summary of current issues with the Township's wastewater collection system, the development of projected population growth, and the wastewater needs of the service area for the 20-year planning period. The Project Plan identifies principal alternatives to meet the current and future wastewater needs and evaluates the environmental impacts of the recommended alternative.

The Project Plan presents projected user costs necessary to operate the utility and repay the low-interest loan for the recommended alternative. The Draft Project Plan will be available for public review 30 days prior to the public hearing to be held on May 10, 2022. A summary of public participation and public comments solicited by the Township regarding the Project Plan and recommended alternative is included in Appendix E.

The format of this report follows the project planning guidelines for Clean Water Revolving Funds (SRF and SWQIF) prepared by the Michigan Department of Environment, Great Lakes, and Energy (EGLE), Revolving Loan Section. Section II presents extensive background information including a description of the community, the study area characteristics, and the need for the project. Section III presents alternatives for resolution of the problems. Sections IV, V and VI further evaluate the recommended alternative, including a detailed description, evaluation of environmental impacts and mitigation measures. Section VII presents the public participation measures taken throughout the duration of the project planning phase.

II. PROJECT BACKGROUND

The Township's Main Lift Station was constructed in 1978 and is currently in poor condition overall. Significant improvements to the lift station are necessary to maintain reliable wastewater service.

A. Study Area Characteristics

Delineation of Study Area

The Study Area is the Service Area for the Green Charter Township sewer system, which includes a portion of the Township. The lift station service area and project location is shown in Figure A1, in Appendix A.

B. Environmental Setting

Cultural Resources

The proposed project will be constructed within existing utility rights-of-way and Township owned lift station site. No significant landscape changes are proposed, and the sites will be restored to pre-project conditions. There is no anticipated impact on any state registered historical or tribal sites. If equivalency status is determined for this project, additional investigation through the State Historic Preservation Office (SHPO) and tribal review will be completed as required.

The Natural Environment

Climate

Climatological data for the area is based on information from the Michigan State University Climatology Program from 2017 to 2022. The average January climatic conditions include average minimum temperatures of 15.05° F and average maximum temperatures of 29.92° F. The average July climatic conditions include average minimum temperatures of 58.94° F and average maximum temperatures of 83.38° F. The average rainfall is 36 inches, and the average annual snowfall is 67 inches.

These climate conditions, specifically the winter conditions and design frost levels, would have equal design and construction impacts on all the principal alternatives and equally affect the length of construction seasons for all alternatives.

Air Quality

No changes in local Air quality are expected with the proposed project. Air quality impacts due to construction dust and emissions in the area due to construction equipment would be temporary.

Wetlands

A wetlands map was generated at the USFWS National Wetlands Inventory website. The map is included in Appendix A as Figure A2. Areas of freshwater emergent and freshwater forested/shrub wetlands are immediately adjacent to the Muskegon River.

It is not anticipated that this project will have any long-term impacts on area wetlands. The project site is not adjacent to the Muskegon River, a riverine system.

EGLE will review any potential impacts to land-water interfaces. The proper permits will be acquired before any construction commences.

Floodplains

Green Charter Township participates in the FEMA Flood insurance map program. The FEMA issued Flood Insurance Rate Maps (FIRM) are shown in Figure A3. Areas adjacent to the Muskegon River are located in “Zone A”, the 100-year flood area. The 100-year flood plain elevation along the Muskegon River through the Township ranges from approximately 889 feet to 902 feet. None of the proposed work is located in the flood area.

Special Designation Rivers (Trout, Natural, Wild & Scenic)

The Wild and Scenic Rivers Act, as amended by the Michigan Scenic Rivers Act of 1991, prohibits federal assistance to a project which will have a direct and adverse effect on the values for which a river segment listed in the National Wild and Scenic Rivers System or designated for study on the National Rivers Inventory was established.

The Muskegon River is not listed on the National Wild and Scenic Rivers System website, administered by the National Park System, or on the Michigan Department Environment, Great Lakes, and Energy website.

Major Surface Waters

The most noticeable natural feature in the Service Area is the Muskegon River. The Muskegon River provides recreational opportunities and aesthetic beauty to the area. The Muskegon River flows into the Township from the North and flows out to the South. The river continues southwest, emptying into Lake Michigan.

Recreational Facilities

Green Charter Township has a few recreational facilities. These include Stone Hatchery Park and Paris Park. Paris Park is located along the Muskegon River.

No improvements proposed in this Plan are anticipated to impact any of these facilities.

Topography and Geology

Figure A4 shows the existing topography from the USGS quadrangle map. The elevations in the Township gradually slope towards the Grand River. Ground elevations vary from 932 feet to 889 feet.

The regional geology for the area is based on a review of the Quaternary Geology of Michigan Map (W.R. Farrand, 1982), see Figure A5; and the Bedrock Geology of Michigan Map (MDNR Geological Survey Division, 1987), see Figure A6.

The general geology of the Green Charter Township area is characterized by glacial outwash sand and gravel and post glacial alluvium as well as end moraines of coarse textured till and end moraines of fine-textured till which overlie Red Beds and the Grand River Formation.

Soils

Figure A7 is the USDA National Resources Conservation Service soil map for Green Charter Township. Soils located at the lift station site are Mecosta sand, which are somewhat excessively drained.

Agricultural Resources

Figure A8 shows the Farmland Classification for the soil types in the Township. Soils at the lift station site are classified as not prime farmland.

Flora, Fauna, and Unique Natural Features

Because the proposed work is limited to the existing lift station site within the existing road right-of-way, no impacts to federally listed endangered or threatened species are anticipated. Additionally, it is anticipated that no protected resource will be impacted. If additional investigation is required by EGLE, the Township will complete a MNFI review.

Land Use in the Study Area

The land use distribution for Green Charter Township, including residential, commercial, and industrial development, is shown in Table 1. Data used to develop Table 1 came from the Mecosta County Master Plan Maps (April 2001). Figure A9, Current Land Use Map (found in Appendix A) is provided for a graphical summary of Table 1.

Table 1: Land Use Patterns (2001 (Updated Nov. 2014) Master Plan)

Land Use Category	Percent (%)
Agricultural	83.3%
Commercial	2%
Industrial	1.3%
Low Density Residential	12%
Medium Density Residential	1.3%

The future land use distribution for the Township, is shown in Figure A10, and is similar to the existing land use distribution with an expansion of the residential and commercial areas.

C. Population Data

Green Charter Township provides wastewater collection services to residents of a small southern portion of the township. As of the 2010 Census, the Township population included 3,292 residents. Census data and projections for the entire Township and the service area is shown below.

Population Projections

Green Charter Township has been increasing in population from 1970 through 2010, but the population has remained relatively stable over the past 10 years. based on the 2019 census estimates. Historical populations were taken from the Mecosta County Master Plan.

Figure 1 illustrates the historical population of the Township.

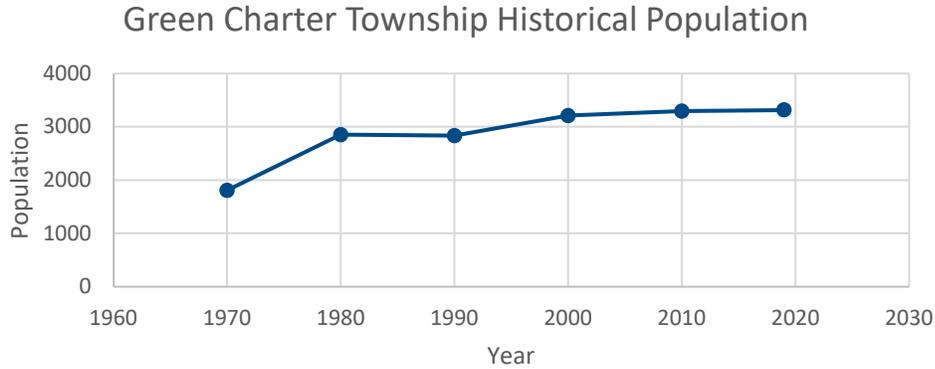


Figure 1 - Population Projections

Service Population

The existing service area includes 262 customers, equating to a population estimate of 320 people. Since there has been no significant expansion of the service area since the original installation, population growth within the existing service area is expected to be marginal.

A sewer feasibility study was completed in 2021 to evaluate the feasibility of expanding the service area to accommodate development along the 19 Mile corridor near US-131. This area was assumed to be rezoned to include additional residential and commercial properties. Flows from this expanded area would ultimately be routed through the main lift station included in the proposed project.

Consideration for future development will be evaluated as part of the design process for critical pieces of infrastructure such as the wet well sizing. However, the basis of the current pump station design will be for the existing service area only.

Economic Characteristics

The people who live in the Township hold jobs in a variety of sectors. The Township’s occupational breakdown is comparable to the breakdown for Mecosta County. Table 2 summarizes the number of people in each sector within the Township in 2019. This information comes from the Census 2019 estimate.

Table 2: Occupational Sectors, 2019

	Green Charter Township		Mecosta County	
	Number	Percentage	Number	Percentage
Management, Business, Science, and Arts	410	27%	5,280	28.4%
Service	326	21.4%	4,099	22%
Sales and Office	277	18.2%	3,516	18.9%
Natural Resources, Construction, and Maintenance	114	7.5%	1,660	8.9%
Production, Transportation, and Material	394	25.9%	4,061	21.8%

Economic statistics from the U.S. Census Bureau for 2019 indicate that the median household income in the Township is comparable to nearby Cities and Villages, but lower than the whole of Mecosta County and the State of Michigan. In 2019, the estimated median household income of the Township was \$39,708. Table 3 shows the median income comparison for the Township and surrounding areas.

Table 3: Median Income Statistics (Census 2019 Estimates)

Study Area	Household Income	% Below Poverty Level
Green Charter Township	\$39,708	20.8%
City of Big Rapids	\$26,227	40.7%
Reed City	\$35,658	25.5%
Village of Hersey	\$49,821	14.0%
Mecosta County	\$45,018	21.2%
State of Michigan	\$59,584	13.0%

D. Existing Facilities

Collection Facilities

A map of the Township's sanitary sewer collection system is included in Appendix A, Figure A1. The collection system consists of 8" mainline sanitary sewer. The sewer system is comprised of polyvinyl chloride (PVC) pipe.

The sewers were constructed in 1977, with upgrades performed as needed.

Lift Station

The collection system is served by a single sanitary lift station that pumps wastewater to the City of Big Rapids. Table 4 presents the lift station details. The lift station is in poor condition but has historically been reliable. The can lift station has had critical assets replaced as needed, but key components of the station are past their useful life and need to be addressed.

Table 4: Green Charter Township Existing Lift Station Information

Lift Station	Location	Year Built	Capacity (GPM)
Main Lift Station	Ross Pkwy @ 205 th Ave	1978	430

Current Wastewater Flows

Average Influent Flow

Historical pump hours indicate that the lift station receives an average influent flow of 22 gpm. This equates to a daily flow of approximately 32,000 gallons. The current peak hour flow at the station is 90 gpm.

There are currently 262 REUs in the Service Area, with an estimated corresponding population of 320 persons. An assumed average flow rate per person of approximately 100 gallons per capita per day (gpcd) was used.

E. Need for the Project

A majority of the original equipment installed when the station was constructed in 1978 remains in service today. Many assets have exceeded their useful life and are at an increased risk of failure. The metal can dry-well structure is experiencing severe corrosion and coating failures along the floor and many joints. Some of the process piping also has significant corrosion. The forcemain isolation valves are seized so the check valves must be relied upon to be able to complete pump maintenance.

The wet well has limited access due to a 24" diameter manhole riser. The configuration and depth of the existing wet well would make modifying the structure to accommodate submersible pumps difficult.

Recent sewer televising identified a sag in the influent sewer from 205th Ave. The pipe is 8" PVC and was installed in 1978.

Pump performance during a typical cycle indicates a potential issue with the pumps or forcemain. During every pumping cycle, flow rates would approach 700-800 gpm and then slowly decrease to 400-500 gpm based on the flow meter readings. Additionally, pump output will periodically drop to a maximum of 400-500 gpm for up to one week until returning to 700-800 gpm.

A potential cause for the flow variations is the accumulation of air pockets in the forcemain, restricting flow. There are six air release valves along the forcemain, with some buried or lost. The valves that have been found are in poor condition and need to be replaced.

There are multiple safety concerns that exist at the station. The control panel does not meet minimum NEC clearance rules to protect the operator while operating or inspecting the control panel. Recent changes in NFPA 820 rules for dry side of below grade pumping stations classify the area as NEC Class 1, Division 2, Hazardous Area. The current electrical installation in the dry well does not meet the standard. The station utilizes a dialer that is located in the high-voltage portion of the cabinet and access to the dialer for programming and normal operation puts the operators at risk.

Orders

The Township is not under any court order, federal or state enforcement order, or administrative consent order.

Water Quality Problems

The proposed project will not be addressing any point or nonpoint sources of pollution.

Projected Needs for the Next 20 Years

The projected 20-year wastewater needs are based on the population projections. The projected wastewater flows for design year 2042 are summarized in Table 5.

Table 5: Projected 2042 Flows

Estimated Flow:	32,000 gpd
Average Flow:	22 gpm
Peak Flow:	90 gpm

The current estimated flow is 32,000 gpd. These projected flows match the existing flows because the project is limited to the existing service area. There is possible future growth along 19 Mile Road , from US-131 to 200th Avenue. The buildout could include existing homes, industrial, commercial, agricultural, and residential. However, the intent of the project is to match the capacity of the existing lift station and replace the aging infrastructure. The current lift station capacity is sufficient for the existing flows as well as some future growth. While future development will be considered as part of the design process, it is not the basis for the project.

Future Environment without the Proposed Project

If the proposed project is not implemented, the existing lift station condition would continue to degrade until failure. Key assets could continue to be replaced but the can structure would continue to corrode, and safety concerns would still exist. The sag in the influent pipe could continue to get worse and could lead to back-ups or sewer failure.

III. ANALYSIS OF ALTERNATIVES

A. Identification of Potential Alternatives

Alternatives to accomplish the Main Lift Station Improvements were developed and evaluated based on their ability to meet the scope of the project while remaining within financial, regulatory, and technical constraints.

Project objectives include:

- Provide reliable wastewater service collection to customers.
- Increase safety of operator servicing Lift Station.
- Minimize financial burden to the sewer system users.
- Minimize environmental impact during construction of the improvements project.

Three alternatives were developed for the Main Lift Station Improvements Project.

1. No Action
2. Optimize Existing Facilities
3. Lift Station Replacment

The No Action alternative was evaluated to meet SRF Project Plan requirements. The other alternatives were developed to address the issues identified. A regional alternative was not evaluated because the lift station must remain in place to pump wastewater to the City of Big Rapids for treatment.

The alternatives are described in detail in the following report subsections. Each alternative was initially screened based on effectiveness, implementability, and financial requirements. Feasible alternatives were then subjected to a comprehensive evaluation with attention to detailed economic, technical, environmental, and public concerns.

Financial analysis of feasible alternatives followed a present worth methodology. Capital costs, operations, maintenance and replacement costs, and salvage values were determined separately and discounted back to present value. The sum of these costs represents the present worth of the project.

Alternative 1 - No Action

The “No Action” alternative must be evaluated in accordance with SRF Project Plan guidance. No improvements would be implemented for this alternative. The “No Action” alternative would maintain current system operations.

The issues at the lift station, including aging equipment, electrical code issues, and structural defects would not be addressed. Aging equipment would continue to operate until ultimate failure and emergency repairs would be required. There would be an increased risk for sanitary sewer overflows and backups.

There is a cost associated with the “No Action” alternative, although it is difficult to quantify that cost currently.

The “No Action” alternative does not meet the project objectives and will not be evaluated further as a principal alternative.

Alternative 2 - Optimize Existing Facilities

Alternative 2 includes optimizing the existing facilities. This alternative would address the aging mechanical and electrical equipment at the station. The project would include removing all equipment and piping from the metal dry pit and replacing it. This alternative does not correct the deterioration of the metal can dry well, and it would also not address the operational and safety hazards associated with the current station configuration.

The “Optimize Existing Facilities” alternative does not meet the project objectives and will not be evaluated further as a principal alternative.

Alternative 3 – Lift Station Replacement

Alternative 3 includes replacing the existing lift station with a new submersible style lift station. A new lift station would be constructed including a wet well, pumps, piping, controls, and an above grade valve package, increasing the ease of maintenance and operator safety.

Replacing the lift station would also include modifications to the influent sewer and effluent forcemain to connect the new station to the existing collection system and address forcemain air relief valves. The existing natural gas generator would be relocated to the new lift station to provide backup power supply.

B. Analysis of Principal Alternatives

One feasible alternative was developed that met the project objectives, identified as Alternative No. 3. This alternative was analyzed further and is summarized in the following sections.

The Monetary Evaluation

The monetary evaluation includes a present worth analysis. This analysis does not identify the source of funds but compares cost uniformly for each alternative over the 20-year planning period. The present worth is the sum which, if invested now at a given interest rate, would provide exactly the same funds required paying all present and future costs. The total present worth is the sum of the initial capital cost, plus the present worth of OM&R costs, minus the present worth of the salvage value at the end of the 20-year planning period. The discount rate used in computing the present worth cost is established by EGLE and has not yet been set for FY2023 SRF Projects. The discount rate of -0.5%, obtained from OMB Circular No. A-94 per SRF guidance, was used for the financial calculations.

The salvage value is calculated at the end of 20 years where portions of the project structures or equipment may have a salvage value, which is determined by using a straight-line depreciation. The present worth of the 20-year salvage value is then computed using the discount rate of -0.5%. The EGLE guidance document establishes the estimated life for the project structures and equipment to assess salvage values at the 20-year planning period. In general, concrete structures, earthwork basins, and piping have a useful life of 30-50 years and equipment has a useful life of 10-20 years.

The cost of labor, equipment and materials is not escalated over the 20-year life since it assumes any increase in these costs will apply equally to all alternatives. The interest charge during construction (capitalized interest) would not significantly influence the comparison of alternatives and was not included in the cost-effective analysis.

The following cost comparison details were specifically addressed and were applied in the present worth analysis as per the EGLE guidance.

- Capital costs were included for all identified improvements.
- Sunk costs were excluded from the present worth cost. Sunk costs for the project include existing land, existing waterworks facilities, and outstanding bond indebtedness.
- Operation, Maintenance, and Replacement, (OM&R) costs were included in the present worth cost.
- The economic comparison is based on a 20-year planning period and a discount rate of -0.5%.
- Salvage values were included in the present worth cost.
- Energy costs escalation was assumed equal between the alternatives and therefore are not adjusted over the 20-year period.
- Land purchase/acquisition costs were not applicable to the principal alternatives.
- Mitigation costs are included in the Project Costs and considered in the present worth cost.
- Total existing and projected user costs for the project are presented.

A detailed breakdown of all identified project costs is included in Appendix B. Table 6 shows the costs for breakdown for the principal Alternative. The net present worth of Alternative No. 3 is estimated at \$787,400.

Table 6: Summary of Present Worth Cost Analysis

	Alternative 3
Capital Cost	\$800,000
Annual OM&R	\$9,560
Net Present Value of OM&R Cost	\$201,600
Total Present Worth	\$1,001,500
Salvage Value	\$214,100
Present Worth of Salvage Value	\$236,700
Net Present Worth	\$787,400

The Environmental Evaluation

The major environmental impacts were analyzed for the principal alternative.

The principal alternative includes construction at the existing lift station site. The mitigation measures will be designed and implemented as required for the construction phase of the project, including dust control and erosion control activities, and restoration. Table 7 evaluates the impacts on various environmental features for Alternative No. 3.

Table 7: Environmental Evaluation for Alternative No. 3

Environmental Feature	Alternative No. 3
Agricultural and Open Space Lands	NSI
Air Quality	T
Archeological Historic Sites	NSI
Drinking Water Supply Source	NA
Endangered or Threatened Species	NSI
Fauna and Flora Communities/ habitat	NSI
Floodplains	NSI
Great Lakes Shoreline	NA
Lakes and Streams	NSI
Parks and Recreational Facilities	NSI
Unique Features	NA
Wetlands	NSI
Wild & Scenic Rivers	NSI

Explanation of Abbreviations:

NSI: No Significant Impact

L: Low, But Measurable Impact

SI: Significant Impact

T: Temporary Impact

B: Beneficial

NA: Not Applicable

No substantial indirect, direct, and cumulative impacts were identified.

Implementability and Public Participation

The draft Project Plan will be placed on display a minimum of 30 days prior to the scheduled Public Hearing, which will be held on May 10, 2021.

A Public Hearing will be held to discuss project alternatives in terms of effectiveness, implementability, project costs, anticipated user rates and environmental impacts. The public notice will be published in the Pioneer. Public input provided either by written comment or presented at the Public Hearing will be considered during the review of the principal alternatives. A transcript of the Public Hearing will be included in Appendix C.

Technical and Other ConsiderationsGrowth Capacity

The principal alternative was designed to meet the existing and 20-year wastewater needs. The station was designed to match the current capacity but has sufficient capacity to handle the possible 19 Mile corridor buildout projections. Those projections were estimated using the best available information.

Reliability

Alternative No. 3 would provide treatment reliability. The alternative provides improved reliability of the lift station by replacing aging assets.

Alternative Sites and Routings

There are no alternative sites or routings within the Principal Alternative. All construction activities will be carried out at the existing lift station site.

Contamination at the Project Site

A review of EGLE's Environmental Mapper website shows no sites of environmental contamination within Green Charter Township.

IV. RECOMMENDED ALTERNATIVE

A. Description of the Recommended Alternative

The objectives of the wastewater collection and treatment system improvements project are identified as:

- Provide reliable wastewater service collection to customers.
- Increase safety of operator servicing Lift Station.
- Minimize financial burden to the sewer system users.
- Minimize environmental impact during construction of the improvements project.

Alternative No.3 - Lift Station Replacement was found to be the only feasible alternative and is therefore the Recommended Alternative.

Additional discussion of Recommended Alternative No. 3 is presented below.

B. Description of Improvements

The lift station has several improvements that are necessary to continue reliable operation. The lift station has unsafe electrical that no longer meet NFPA 820 rules or NEC clearance rules. There is significant corrosion on the bottom/joints in the dry pit as well as on the process piping. It would also address structural defects in the influent sewer as well as issues with the air release valves on the forcemain.

Relevant Design Parameters

The recommended alternative includes a new above grade valve package and wet well utilizing submersible pumps. The pumps would be rated for a flow of 430 gpm at 75 feet total dynamic head (TDH) to match the existing design capacity. A separate meter chamber would be installed, and the existing permanent generator would be relocated to provide standby power.

Project Maps

A Project Location Map showing the location of proposed improvements is included in Appendix A, Figure A1. The proposed improvements will take place at the existing lift station site.

Controlling Factors

Controlling factors that helped to shape the recommended alternative include:

- The ability to keep the existing station in service until the new station is built.
- Increasing operator safety with the above grade valve package.
- Increase station reliability.

Sensitive Features and Mitigation

It is not anticipated that the Recommended Alternative will have permanent negative impacts to sensitive areas (wetlands, floodplains, or habitat for endangered species). Proposed construction is limited to the existing lift station site and existing sewer infrastructure is within rights-of-way and easement locations. All

work will be performed in accordance with necessary permit requirements. Figure A2 shows locations of wetlands. Figure A3 illustrates the flood zones developed by FEMA for the Township.

Project Delivery Method

The Township is reviewing the various methods for delivering the construction of its project. EGLE has published the State Revolving Fund and Drinking Water Revolving Fund Project Delivery Methods Guidance Document in November 2015. The various delivery methods allowed include Design Bid Build (DBB), Construction Management at Risk (CMAR), Fixed-Price Design-Build (FPDB), and Progressive Design-Build (PDB).

The Township is reviewing each of the available methods. A comparison/summary of each are outlined below.

Design-Bid-Build (DBB)

Many public infrastructure projects are delivered using the DBB method. In the DBB method, an engineer works closely with the Township and prepares the project bidding documents including the construction drawings and specifications.

General contractors submit bids based on the plans and specifications, and the lowest, responsible bidder is awarded the project. The general contractor pricing includes their subcontractors, or trade contractors, to perform specialized work such as electrical/controls, mechanical work, concrete work, etc. Typically, the engineering firm that developed the design provides construction observation and construction administration services during the construction phase. In this alternative there are three parties – the Owner, the engineer, and the general contractor.

The following advantages are offered by the DBB method:

- Well understood and accepted.
- Independent oversight of Builder.
- Open to Owner involvement during design.

The following disadvantages are offered by the DBB method:

- Pricing is not known until the design process is complete.
- Contractor selected based on low bid not on value, knowledge, and experience brought to the team.

Construction Management At-Risk (CMAR)

CMAR is similar to DBB in that the engineering/design contract is separate from the construction contract. However, in the CMAR method, a construction management firm (CM) is hired independently by the Township before or early on in the design process. An engineer works closely with the Township and the CM during the entire design process. The CM provides input to the engineer and Owner through the entire design process. The engineer prepares the construction drawings and specifications while the CM prepares the bidding documents and obtains pricing from their subcontractors and suppliers.

The CM develops a Guaranteed Maximum Price (GMP). In this alternative there are three parties, the Owner, the engineer, and the independently contracted CM firm.

The following advantages are offered by the CMAR method:

- Open to Owner involvement during design.

- Early integration of Builder.
- Provides early and continuous constructability review.
- Provides early certainty of costs.
- Pricing and design may be conducted in parallel.
- Reduced likelihood of claims compared to the DBB alternative.

The following disadvantages are offered by the CMAR method:

- Not a single source of responsibility.
- No legal obligation linking Designer to Builder.
- Potential for disputes, claims and change orders.

Fixed Price Design Build (FPDB)

Fixed Price Design Build (FPDB) is a delivery method where the Owner designates one firm, a design-builder (DB), under one contract for the design and construction of the project. The DB provides a fixed price based on a defined scope, requirements, and schedule; but before complete and detailed design documents have been prepared.

Owner involvement during the design process is typically very limited after the fixed price is accepted. The “book is closed” on pricing around the 30% mark of the design process.

This particular project is a rehabilitation of an existing treatment facility and appropriate pricing will probably be too high considering the risk to the contractors until 70 to 90% plans are developed. The Township staff want to be involved throughout the entire design and construction process. Therefore, FPDB was not considered further for this project.

Progressive Design Build (PDB)

The PDB delivery method is similar to the CMAR method with one major distinction – the design-builder (DB) is under one contract for design and construction of the project. Therefore, the Township has one single firm responsible for the design, schedule, construction, and warranty of the project. If there are issues that arise during construction or after construction, the Township has one firm to address the issues.

During the latter part of the design phase, the DB prepares the bidding documents and obtains pricing from their subcontractors and suppliers on an open book basis.

If an agreement is reached on the pricing, the Township will move forward collaboratively to construction. With such flexibility, the PDB method allows the Owner to improve the project outcome by participating directly in design decisions. In this alternative there are two parties – the Owner and the DB firm.

The following advantages are offered by the PDB delivery method:

- The Owner can transfer more risk to the DB since there is a single point of responsibility for the design, permitting, construction, and performance warranty of the project.
- Owner has involvement during the entire design and construction.
- Early integration of Builder.
- Provides early and continuous constructability review.
- Provides early certainty of costs.
- Pricing and design may be conducted in parallel.

Project Delivery Selection

The Township may contract with a third party to act as the Owner's Advisor or use its own staff.

The Township and the engineering firm that developed the Project Plan will have discussions regarding the available project delivery methods and advantages and disadvantages offered by each method to develop the preferred method for the Township. Based on preliminary discussions, it is anticipated that the Township will proceed with the Progressive Design Build delivery method for the project.

Estimated Schedule for Design and Construction

Table 8 presents the proposed project schedule, which follows the SRF FY2023 Q2 milestone schedule for PBD projects. The Township has authorized the design of the lift station improvements, and completion of the design for permitting is anticipated in spring 2022. Additional forcemain investigation work will occur in summer 2022 to finalize that portion of the design.

Table 8: Proposed Schedule for Design and Construction

Anticipated Date	Activity
June 2022	Submit Final SRF Project Plan to EGLE
May 2022	Finalize Design and Submit Permit Applications
December 2022	EGLE Approval of Plans & Specs
March 2022	SRF Loan Closing
May 2023	Begin Construction
November 2023	Complete Construction
December 2023	O&M Manual, Startup Assistance, and Record Drawings

Cost Summary

Table 9 summarizes the estimated costs for the recommended alternative. Appendix B shows the breakdown of the project costs.

Table 9: Cost Summary of the Recommended Alternative

Description	Capital Costs	OM&R Costs PW	Salvage Value PW	NPW
Alternative No. 3 – Lift Station Replacement	\$800,000	\$201,600	\$236,700	\$787,400

Non-SRF, Longer-Term Capital Improvements Project

The SRF Project intends to address the most critical items first. The Township has developed longer-term improvements needed. These improvements include collection system repairs to address defects identified by previous televising. Additionally, the Township would like to create a geographic information system (GIS) map of the area utilities.

C. Authority to Implement the Selected Alternative

Implementation of a selected alternative is the responsibility of Green Charter Township. The Township Council will review the recommended alternative at the May 10, 2022 public hearing. A copy of the resolution will be included in Appendix C.

D. User Costs

Green Charter Township funds sewer operations entirely through user fees. Revenue is generated based on a flat quarterly fee that differs per REU.

The sewer bill increases assume a total SRF 20-year loan of \$800,000 at 1.875% interest. The Township plans to use \$175,000 of American Rescue Plan Act (ARPA) money, \$200,000 from the sewer fund, and 25,000 from the general fund. The remaining balance will be paid through user fees over the 20-year loan period. The user charge for a typical residential customer is expected to increase \$20-26 per quarter based on a \$800,000 20-year loan at 1.875% interest. A portion of this increase has already been included in recent user rate adjustments.

In anticipation of implementing the Recommended Alternative, the Township raised user rates a total of \$26/quarter/REU based on the estimated project cost. The Township will be working with a certified Municipal Financial Advisor to determine the best approach to using existing Township funds to offset a portion of the SRF Project. The increase stated in this Project Plan is an estimate and does not consider grant eligibility or other items which may impact the rate structure.

E. Disadvantaged Community

Part 53, of the NREPA, provides for several benefits to municipalities who meet the state's criteria for disadvantaged community status. Those benefits include additional priority points and extended loan terms. Regardless of their status as a disadvantaged community, Green Charter Township intends to secure a 20-year SRF loan. Based on a review by EGLE, the Township does not qualify as a disadvantaged community.

F. Useful Life

Green Charter Township intends to secure a 20-year SRF loan for the construction of the recommended alternative. The weighted useful life for the Alternative 3 has been calculated to be 66 years, which is greater than the 20-year loan period. The weighted useful life is the total of all calculated life values (each asset's dollar value times its estimated useful life) divided by the total estimate of all the project dollars spent on those assets. The Useful Life Calculations for Alternative 3 are included in Appendix B. This analysis verifies that the components of the recommended alternative will cost-effectively address treatment requirements for the term of the loan. It is not anticipated that all of the equipment will last the entirety of the planning period. The Township will have to annually reserve funds to account for some equipment replacement.

V. EVALUATION OF ENVIRONMENTAL IMPACTS

A. Description of the Impacts

The potential beneficial and detrimental environmental impacts of the selected alternative are evaluated in this section of the project plan. The analyses of impacts are divided into direct, indirect, and cumulative impacts. Direct environmental impacts are those that are directly attributable to the construction and operation of the project. Indirect impacts are caused by the project but are removed in time and/or distance, and are often considered secondary in nature. Cumulative impacts are those impacts which increase in magnitude over time, or which result from individually minor, but collectively significant actions.

Beneficial or Adverse Impacts

A discussion of the full range of potential impacts (i.e., direct, indirect and cumulative) must identify the nature of the impacts in terms of both beneficial and adverse impacts. The following section will describe the positive and negative impacts resulting from the selected alternative with special emphasis on cultural or environmentally sensitive resources.

Short-Term and Long-Term Impacts

The analysis includes trade-offs between short-term uses and the maintenance enhancement of long-term productivity and vice versa.

Irreversible or Irretrievable Resources

The analysis of the environmental impacts also includes any irreversible commitments or use of irretrievable resources, such as the commitment of construction materials, energy, and land to the proposed project.

B. Analysis of Impacts

Direct Impacts

Direct impacts are the environmental impacts directly attributable to the construction and operation of the project. The Township must consider impacts resulting from construction in areas which have not been previously disturbed. The effects of the proposed project are considered for each of the following environmental factors:

Historic, Archaeological, Geological, Cultural, or Recreational Areas

It is not anticipated that any historic properties or tribally important sites will be affected by the proposed improvements.

The proposed project construction is limited to the existing lift station property, therefore minimal disturbances to the surrounding landscape is anticipated.

Natural Settings and Sensitive Ecosystems

Excavation and building construction is planned at the existing lift station site. No long-term impacts to the natural setting of Project Area is anticipated.

Existing and Future Quality of Surface Water and Groundwater

The primary goal of the project is to improve the reliability of the existing wastewater service. The proposed project is not anticipated to cause negative changes to the quality of nearby surface or groundwaters.

Consumption of Materials, Land, Energy, and Construction & Operation

Construction materials, public funds, energy and manpower will be consumed to construct and operate the proposed improvements. No known shortage of these items exist, nor is it expected that a shortage of these items will result from implementing this project.

The only chemicals used during the construction would be the potential use of fertilizers used after the seeding and mulching of disturbed areas from the construction operations.

Energy (both electrical and fossil fuels) will be used during the construction of the improvements. Electrical usage is expected to be similar to what is used currently.

Human, Social, and Economic Impacts

There will be no dislocation of people during the construction. Work for the sewer portions of the project within the road will be coordinated with planned road reconstruction projects, where feasible, to minimize traffic impacts with sections of the road closed off.

Employment of some residents by the contractor(s) is a possibility for certain construction operations.

Construction and Operational Impacts

A minor impact on local traffic may occur during the construction of the proposed lift station improvements. During construction, equipment will increase local noise and dust levels during operations. There will be a short-term adverse impact on air quality during the construction phase due to dust and construction equipment emissions generated during the excavation operations.

Indirect Impacts

Indirect impacts are those caused by the proposed project but removed in time and/or distance. Indirect impacts are often secondary in nature and are generally caused by residential and/or commercial development made possible by the project.

Examples of indirect impacts include undirected growth including additional traffic, over-extended police and fire protection, or heavy financial burden on existing and future residents for the cost of the water system facilities. It is not expected that the proposed project would cause any significant undirected growth that would result in changes to zoning, population density, or types of developments found throughout the Township, including residential, commercial and industrial areas.

Transportation and infrastructure is already in place within the service area, and the proposed wastewater system improvements will only serve to enhance the existing Township infrastructure.

The proposed project will not result in any changes in anticipated land use.

There are no anticipated indirect impacts due to changes to the natural setting or sensitive ecosystems or jeopardy to any endangered species resulting from potential secondary growth.

There are no anticipated changes in air or water quality stemming from any primary or potential secondary development as a result of the improvements since any additional commercial/industrial development would be subject to the Township's existing zoning or land use requirements.

Cumulative Impacts

There are no anticipated cumulative impacts that would increase in magnitude over time or result from individually minor, but collectively significant actions of the project. There is no anticipated new infrastructure proposed in conjunction with the proposed lift station improvements.

VI. MITIGATION

A. General

Structural and non-structural measures which avoid, eliminate, or mitigate adverse impacts on the environment need to be identified in the project plan. The cost of mitigation was considered during the financial analysis and is included in the unit costs and lump sum prices developed during the capital cost evaluation for the principal alternatives.

The structural measures involve the specific design and construction of the improvements while the non-structural measures involve regulatory, institutional, governmental or private plans, policies or regulations of the Township. Mitigation of short-term, long-term, and indirect impacts must be considered in the project plan.

B. Short-Term Construction-Related Mitigation

Traffic and Safety Hazard Control

Traffic control and maintaining access to homes and businesses will be the responsibility of the Contractor. However, access to all homes and businesses will be maintained and emergency vehicle access will be ensured throughout construction. Residents will be notified when construction work is scheduled in their area. Traffic detour signs and flag control will be incorporated to provide non-local traffic with the information they need to navigate the construction site and to travel safely.

Construction site safety is the responsibility of the Contractor. The Contractor will be required to have only trained persons performing all phases of the work. The Contractor will also be required to comply with the Occupational Safety & Health Act (OSHA), including using back up alarms on all equipment, having employees trained in hazard control, and maintaining materials safety data sheets (SDS) for materials that may be used or handled by construction personnel.

Dust Control

Construction activities will result in increased dust in the vicinity of the construction sites during the length of the proposed construction. Mitigation measures to minimize the negative effect of dust on residents and construction workers will be defined in the project specifications. It is anticipated that dust control will be provided by the application of water and/or dust palliative during dry and dusty periods. The Contractor will be required to control dust in accordance with methods described in the project specifications.

Noise Control

Noise levels will increase temporarily during construction of the proposed project. Construction activities will only be allowed during the hours approved by the Township, and would be subject to all local noise control ordinances. Construction workers and site visitors may be required to wear earplugs to minimize the effects of long-term noise during the construction operations.

Soil Erosion and Sedimentation Control

The Contractor will be required to obtain a soil erosion and sedimentation control permit from the local agency prior to the start of the work. It is anticipated that mitigation measures that may be utilized will include silt fence, straw bales, geotextile fabric, and other such methods, as appropriate.

Restoration of Disturbed Areas

Restoration of disturbed areas will also be defined in the specifications. Restoring disturbed lawn areas, roadways, existing utilities, etc. will be completed in a timely fashion and in accordance with the project specifications.

C. Mitigation of Long-Term Impacts

General Construction

Mitigation measures would be developed to ensure that sensitive environments do not suffer permanent damage. Every effort will be made to avoid potential long-term or irreversible adverse impacts during the construction of the wastewater system improvements.

The construction work at the lift station will incorporate “best management practice” methods for installing pipelines or disturbing the earth. The design and project specifications will include the proper use of physical measures to reduce soil erosion to a manageable level and any disturbed slope areas will be immediately seeded, mulched and/or sodded to prevent soil erosion and/or sedimentation.

Siting Decisions

All lift station construction activities proposed by the Recommended Alternative are located within the existing lift station site. Sewer replacement and rehabilitation is expected to be contained within existing utility right-of-way and easement areas. Where traffic must be re-routed for construction, the Township will work closely with MDOT and state authorities to develop detours within urban areas.

Operational Impacts

No significant operational impact is anticipated. Since the existing lift station is not being reused, the majority of the proposed project can be built while the existing station is still in service, minimizing the time that bypass pumping is required.

D. Mitigation of Indirect Impacts

Master Plan and Zoning

The most effective way of mitigating unrestricted growth in any community is proactive creation of zoning districts and effective enforcement of that zoning. The Township has zoning in place, and officials have historically had a significant role in the development of the Township. Unrestricted growth is not anticipated with or without the proposed project.

Ordinances

The proposed project is not anticipated to have any impact on area growth, therefore not directly increasing stormwater and NPS pollution.

Staging of Construction

Significant improvements have not been made to the existing lift station since it was built in 1977. The proposed improvements would not be increasing the capacity or extending the system. The scope of the of

the proposed project is limited to a single site so staged construction for this project is not necessary. The debt retirement burden of existing residents and should not impact the feasibility of other capital improvements.

VII. PUBLIC PARTICIPATION

A. Public Meetings on Project Alternatives

A Public Hearing for the SRF Project Plan will be held on May 10, 2022 at the Green Charter Township Hall to discuss the need for the project, principal alternatives, environmental impacts, description of the Recommended Alternative and associated cost estimates and user charge, and schedule of the proposed project.

A copy of the public hearing transcript and presentation will be included in Appendix C.

B. The Formal Public Hearing

A formal public hearing on project alternatives and user costs will be held on May 10, 2022 at the Green Charter Township Hall.

Public Hearing Advertisement

The Public Hearing will be advertised in a local newspaper on April 10, 2022, 30 days prior to the hearing date, in accordance with SRF guidelines. Copies of the Draft Project Plan detailing the proposed project will be available for inspection on April 8, 2022 at the Green Charter Township Hall. The public hearing advertisement will be included in Appendix C.

Public Hearing Transcript

A verbatim transcript of the public hearing will be included in Appendix C.

Public Hearing Contents

The following items will be discussed at the public hearing:

- Project background.
- A description of the lift station needs and problem areas.
- A description of the principal alternatives considered.
- A breakdown of capital costs and OM&R costs for the recommended alternative.
- Proposed method of financing.
- The environmental impact of the principal alternative.
- Recommended Alternative.
- Proposed monthly user costs for the implementation of the Recommended Alternative for the average residential customer.

Public Hearing Comments Received and Answered

Questions and comments received during the Public Hearing will be addressed as a part of the Question and Answer portion of the presentation.

C. Adoption of the Project Plan

The official period for receiving comments will end at the close of the formal public hearing.

APPENDIX A

MAPS AND FIGURES

PREPARED FOR:

GREEN CHARTER TOWNSHIP

PROPOSED WASTEWATER COLLECTION SYSTEM FOR GREEN TOWNSHIP (MECOSTA COUNTY, MICHIGAN) E.P.A. PROJECT NO. C-263258-02

GREEN TOWNSHIP OFFICERS

SUPERVISOR HERBERT WELLS
 CLERK JOHN E. TODD
 TREASURER JOHN J. MAC FARLANE
 TRUSTEE CLARE REDNER
 TRUSTEE M. DALE FENSTERMACHER

INDEX OF SHEETS

SHEETS... 1-13 GRAVITY SEWER DIVISION A
 SHEETS... 14-23 FORCE MAIN SEWER DIVISION B
 SHEET ... 24 PUMP STATION DETAIL DIVISION B
 SHEET ... 25 STANDARD DETAILS
 SHEETS... 6A & 11A GRANT INELIGIBLE DIVISION A
 GRAVITY SEWER

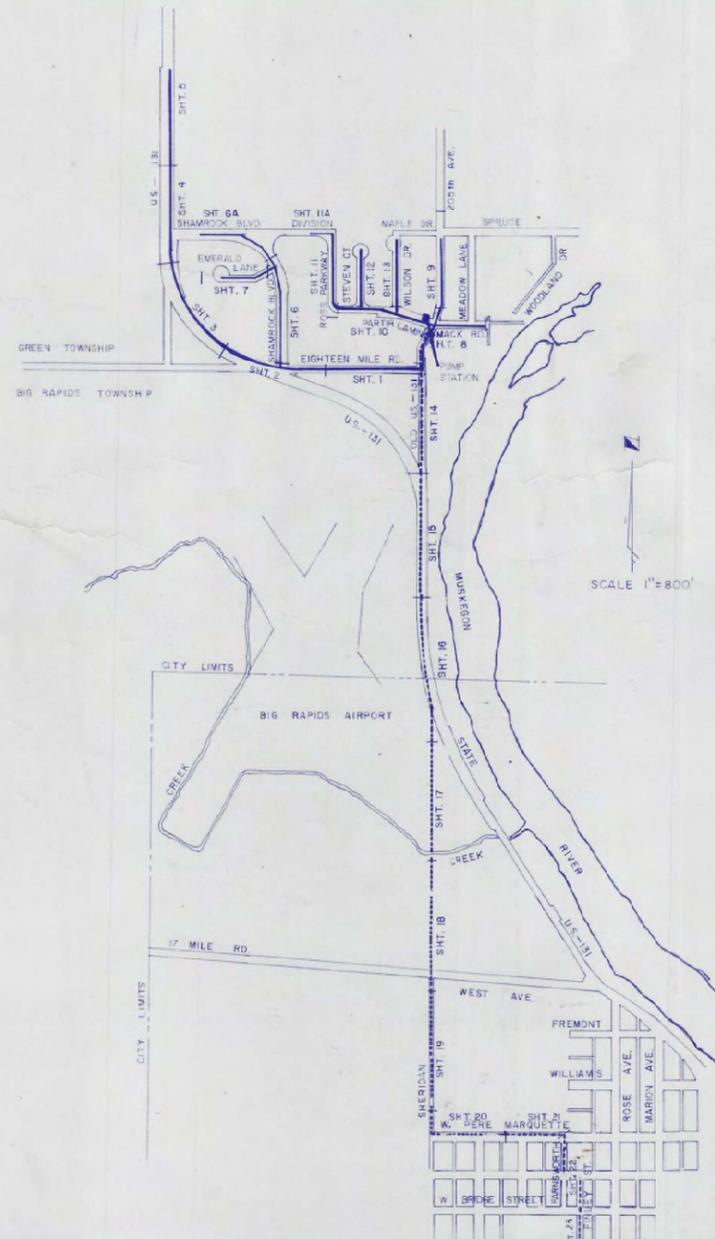
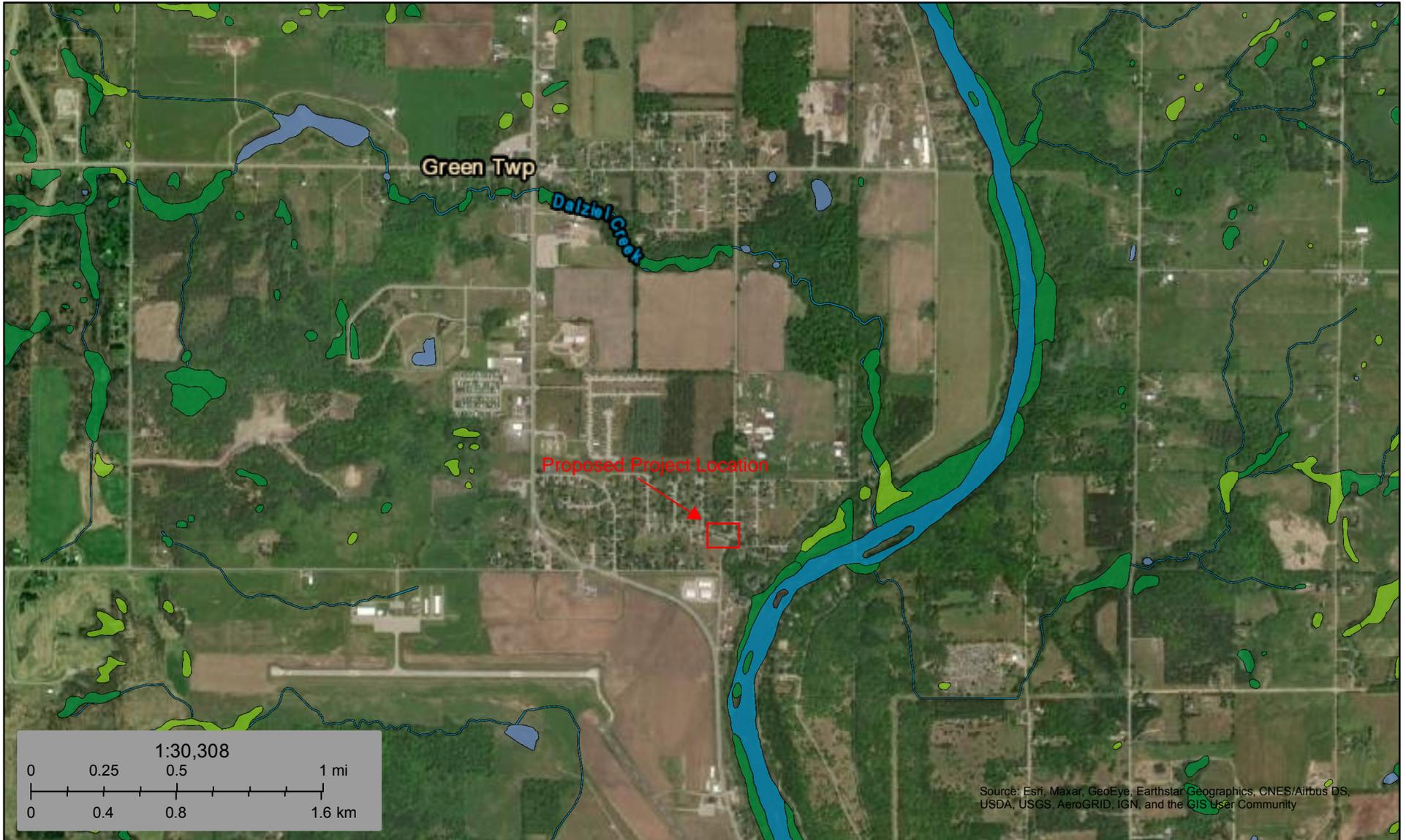


Figure A1 - Sanitary Sewer Collection System Map

PREPARED BY
 GRANGER ENGINEERING INC.
 CIVIL ENGINEERS LAND SURVEYORS
 CADILLAC, MICHIGAN
 JULY, 1977

PRINTED
 MAY 14 1998
 WADETRM



March 11, 2022

Wetlands

- | | | |
|--------------------------------|-----------------------------------|-------|
| Estuarine and Marine Deepwater | Freshwater Emergent Wetland | Lake |
| Estuarine and Marine Wetland | Freshwater Forested/Shrub Wetland | Other |
| Freshwater Pond | Riverine | |

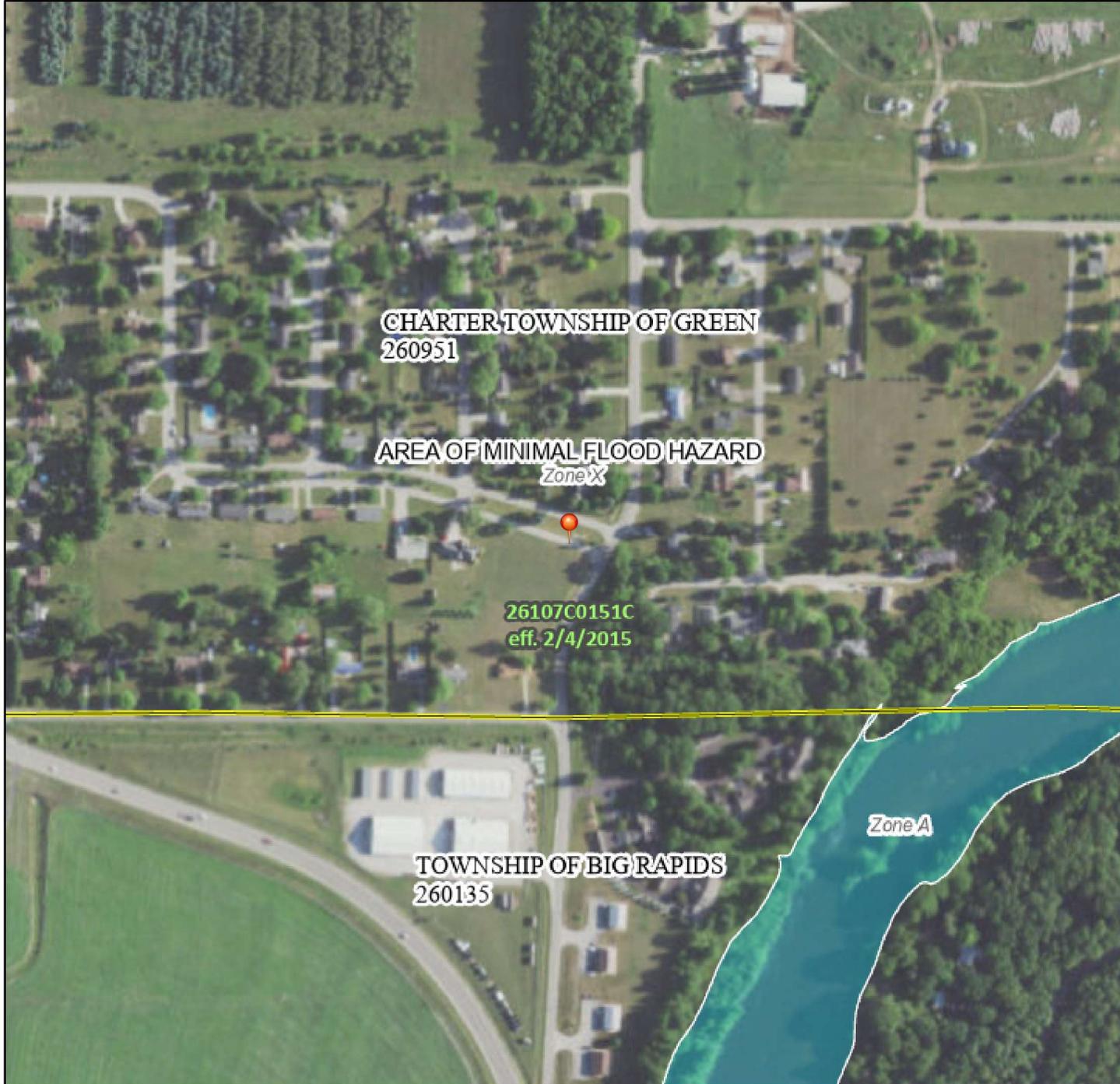
This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Figure A2 - USFWS Wetland Map

National Flood Hazard Layer FIRMMette



85°29'58"W 43°43'59"N



85°29'20"W 43°43'33"N

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D

OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D

GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall

OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature

MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 3/11/2022 at 4:11 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Figure A3 - FEMA FIRM Map

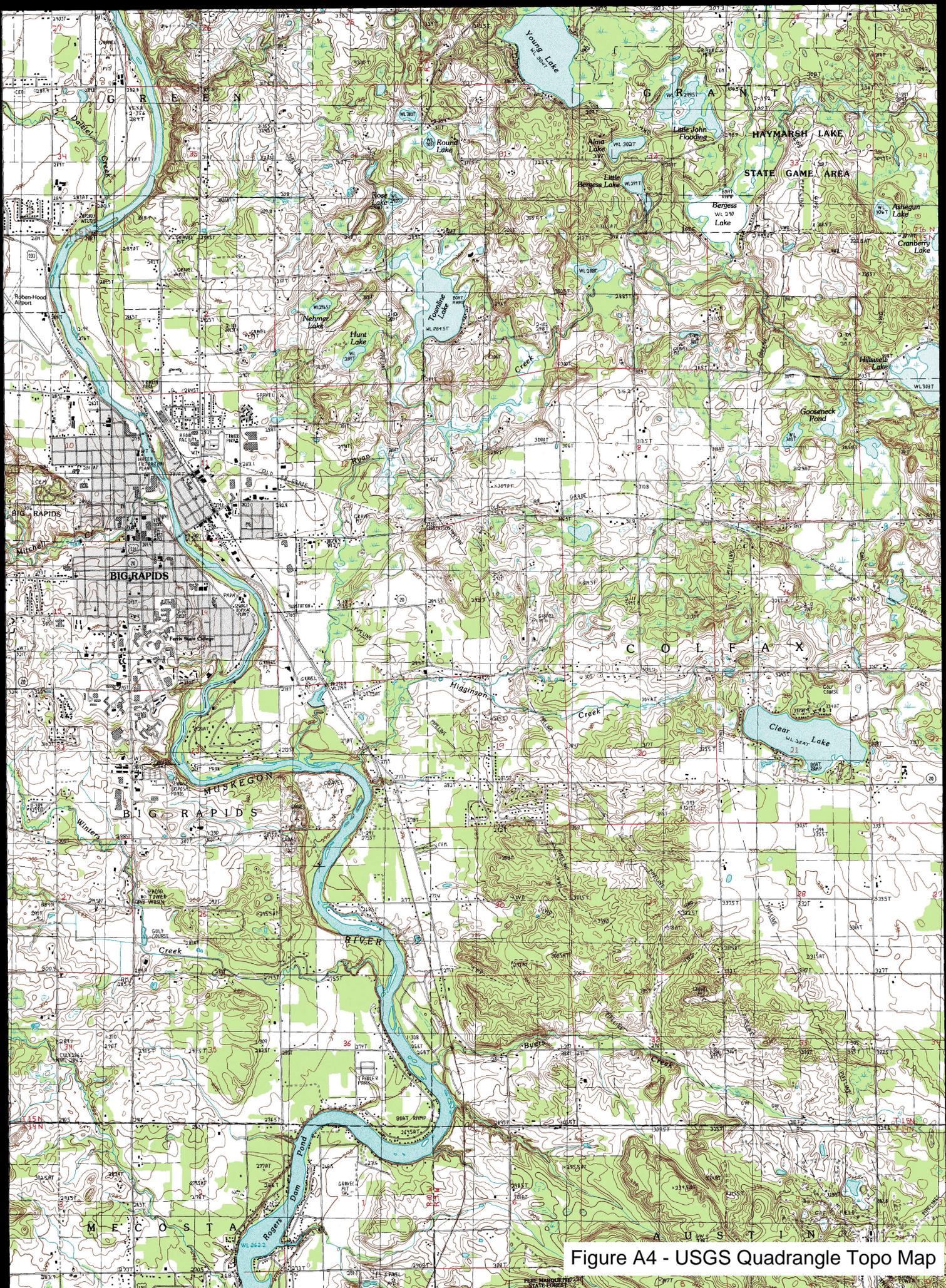
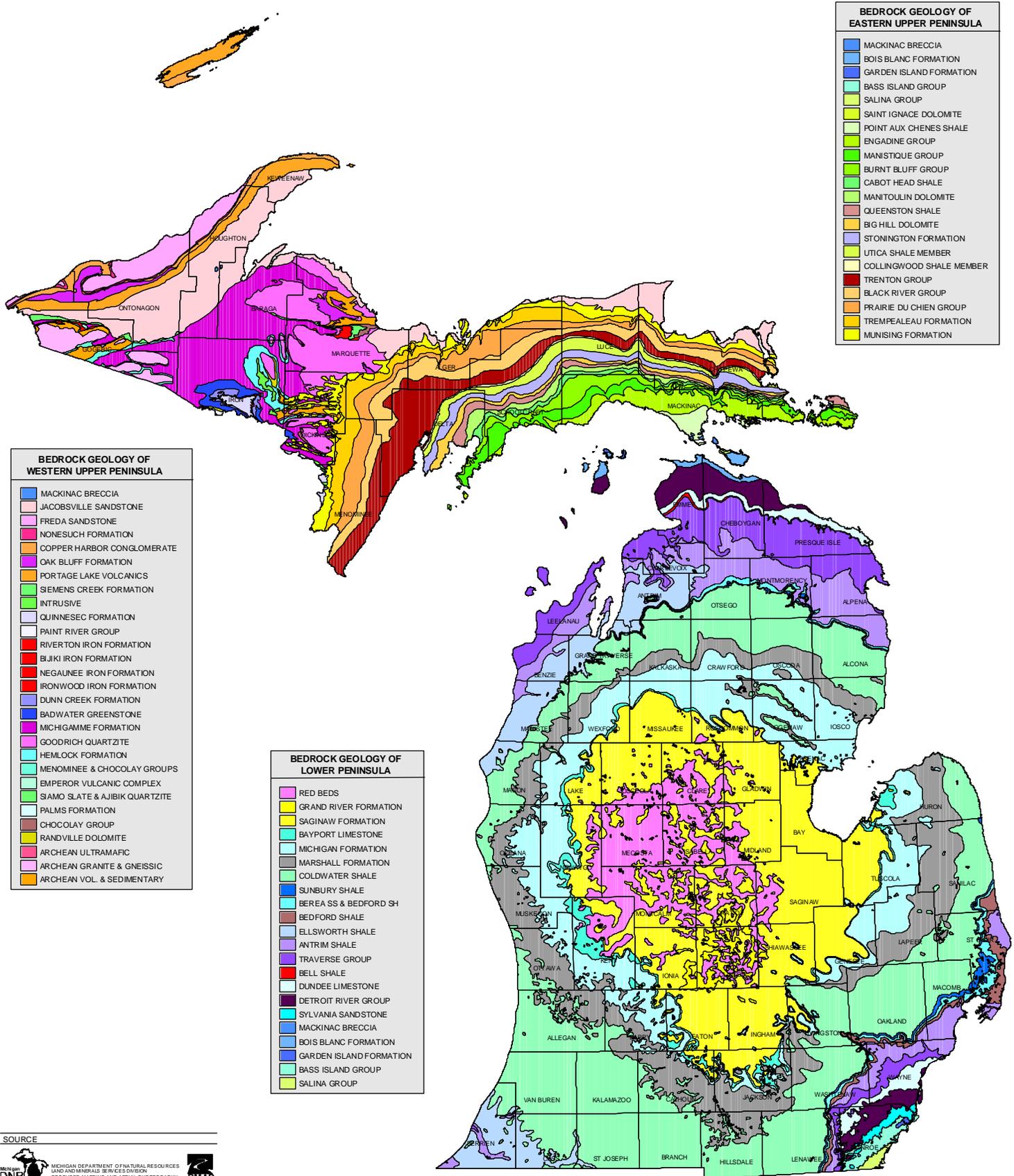


Figure A4 - USGS Quadrangle Topo Map

1987 BEDROCK GEOLOGY OF MICHIGAN



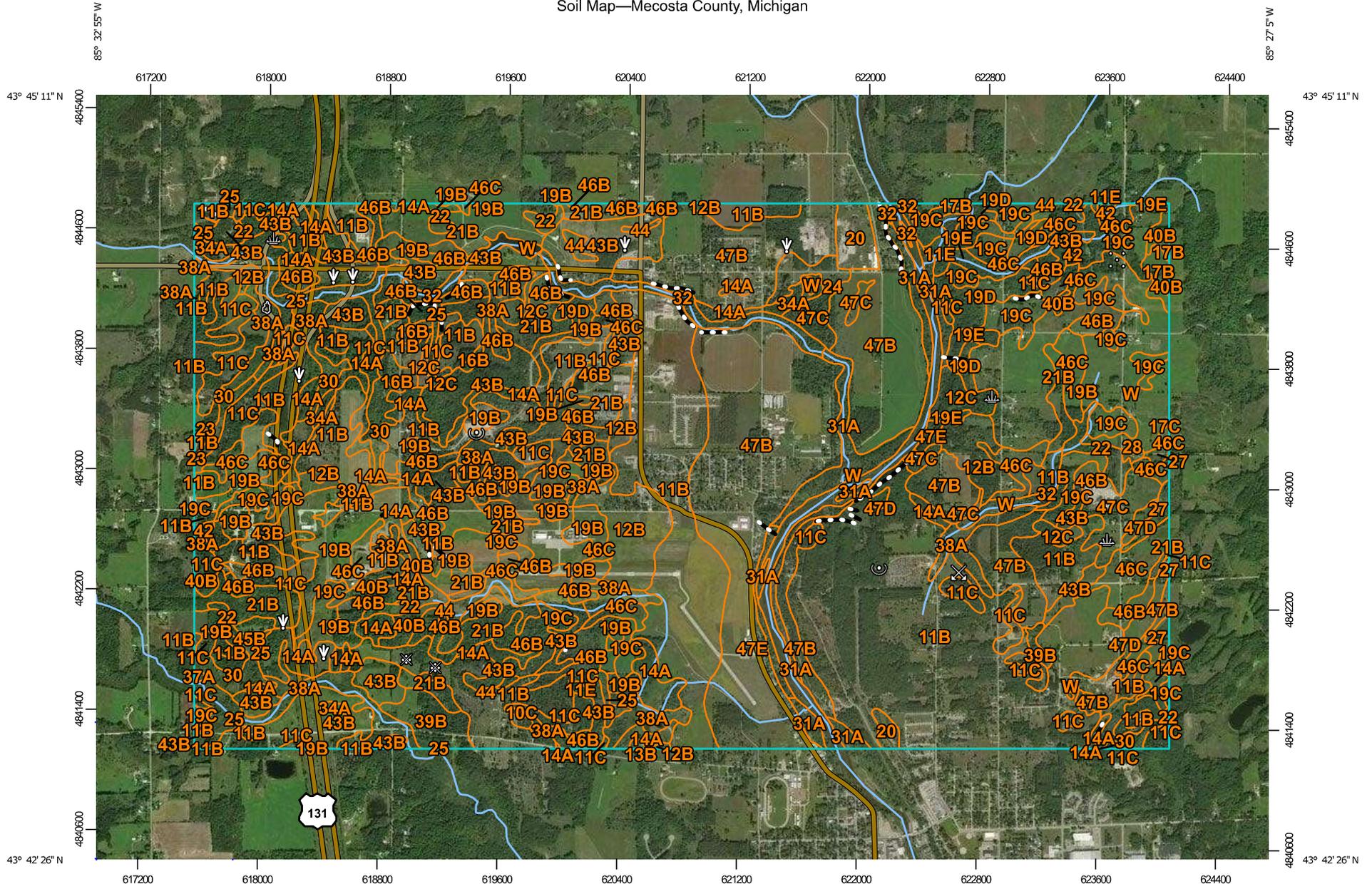
- BEDROCK GEOLOGY OF EASTERN UPPER PENINSULA**
- MACKINAC BRECCIA
 - BOIS BLANC FORMATION
 - GARDEN ISLAND FORMATION
 - BASS ISLAND GROUP
 - SALINA GROUP
 - SAINT IGNACE DOLOMITE
 - POINT AUX CHENES SHALE
 - ENGADINE GROUP
 - MANISTIQUE GROUP
 - BURN'T BLUFF GROUP
 - CABOT HEAD SHALE
 - MANITOULIN DOLOMITE
 - QUEENSTON SHALE
 - BIG HILL DOLOMITE
 - STONINGTON FORMATION
 - UTICA SHALE MEMBER
 - COLLINGWOOD SHALE MEMBER
 - TRENTON GROUP
 - BLACK RIVER GROUP
 - PRAIRIE DU CHIEN GROUP
 - TREMPLEAU FORMATION
 - MUNISING FORMATION

- BEDROCK GEOLOGY OF WESTERN UPPER PENINSULA**
- MACKINAC BRECCIA
 - JACOBSVILLE SANDSTONE
 - FREDA SANDSTONE
 - NONESUCH FORMATION
 - COPPER HARBOR CONGLOMERATE
 - OAK BLUFF FORMATION
 - PORTAGE LAKE VOLCANICS
 - SIEMENS CREEK FORMATION
 - INTRUSIVE
 - QUINNESEC FORMATION
 - PAINT RIVER GROUP
 - RIVERTON IRON FORMATION
 - BIJIKI IRON FORMATION
 - NEGAUNEE IRON FORMATION
 - IRONWOOD IRON FORMATION
 - DUNN CREEK FORMATION
 - BADWATER GREENSTONE
 - MICHIGAMME FORMATION
 - GOODRICH QUARTZITE
 - HEMLOCK FORMATION
 - MENOMINEE & CHOCOLAY GROUPS
 - EMPEROR VULCANIC COMPLEX
 - SIAMO SLATE & AJIBIK QUARTZITE
 - PALMS FORMATION
 - CHOCOLAY GROUP
 - RANDVILLE DOLOMITE
 - ARCHEAN ULTRAMAFIC
 - ARCHEAN GRANITE & GNEISSIC
 - ARCHEAN VOL. & SEDIMENTARY

- BEDROCK GEOLOGY OF LOWER PENINSULA**
- RED BEDS
 - GRAND RIVER FORMATION
 - SAGINAW FORMATION
 - BAYPORT LIMESTONE
 - MICHIGAN FORMATION
 - MARSHALL FORMATION
 - COLDWATER SHALE
 - SUNBURY SHALE
 - BEREA SS & BEDFORD SH
 - BEDFORD SHALE
 - ELLSWORTH SHALE
 - ANTRIM SHALE
 - TRAVERSE GROUP
 - BELL SHALE
 - DUNDEE LIMESTONE
 - DETROIT RIVER GROUP
 - SYLVANIA SANDSTONE
 - MACKINAC BRECCIA
 - BOIS BLANC FORMATION
 - GARDEN ISLAND FORMATION
 - BASS ISLAND GROUP
 - SALINA GROUP

Figure A6 - Bedrock Geology of Michigan Map

Soil Map—Mecosta County, Michigan



Map Scale: 1:35,800 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

Figure A7 - USDA Soils Map

3/11/2022
Page 1 of 4

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features

Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Mecosta County, Michigan
 Survey Area Data: Version 15, Sep 1, 2021

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

Date(s) aerial images were photographed: Oct 4, 2011—Sep 19, 2016

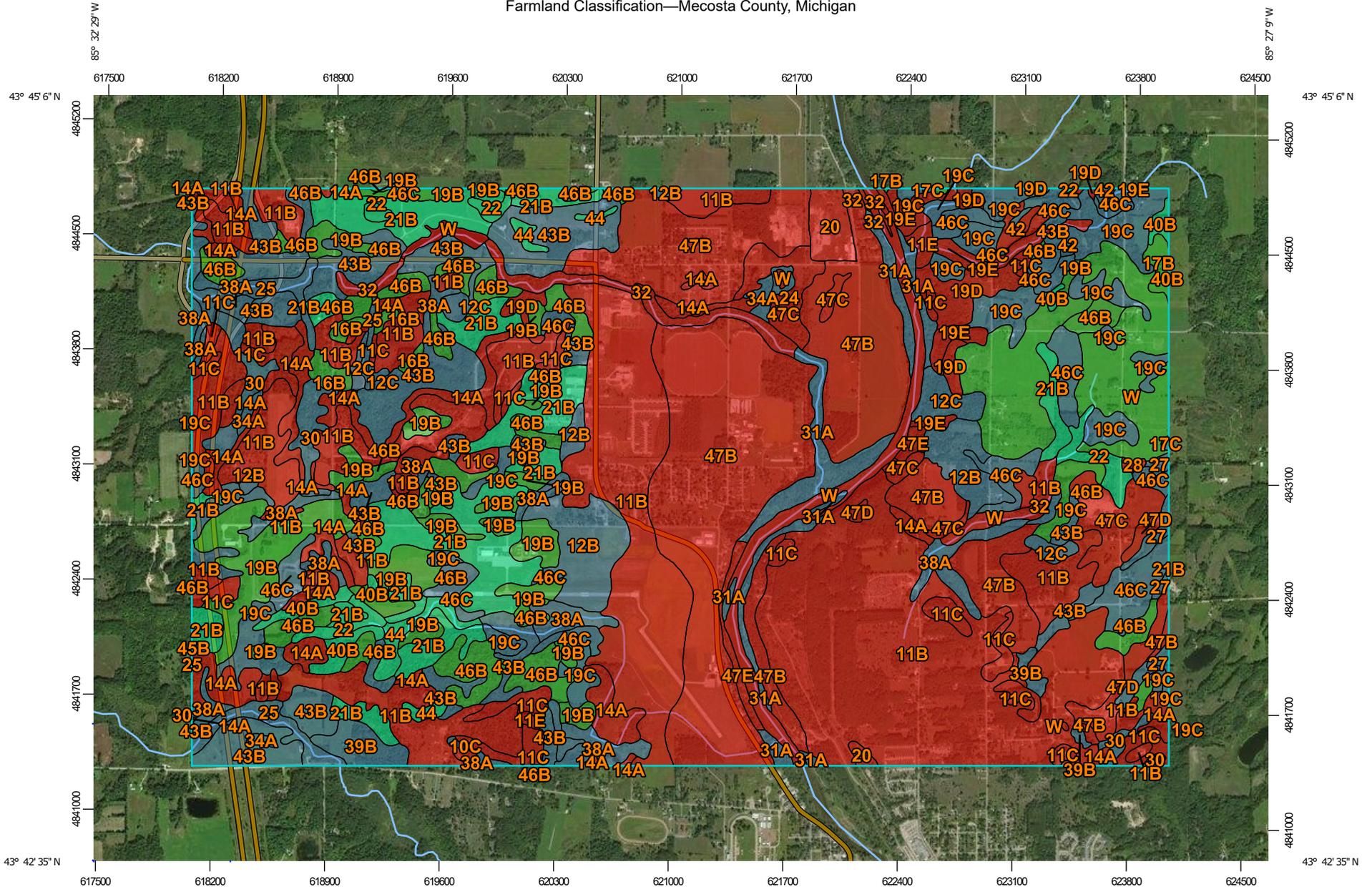
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
10C	Plainfield sand, 6 to 18 percent slopes	2.3	0.0%
11B	Coloma sand, 0 to 6 percent slopes	1,358.9	23.2%
11C	Coloma sand, 6 to 18 percent slopes	230.4	3.9%
11E	Coloma sand, 18 to 35 percent slopes	10.1	0.2%
12B	Spinks loamy sand, 0 to 6 percent slopes	125.0	2.1%
12C	Spinks loamy sand, 6 to 12 percent slopes	42.2	0.7%
13B	Metea loamy sand, 0 to 6 percent slopes	0.5	0.0%
14A	Covert sand, 0 to 3 percent slopes	220.5	3.8%
16B	Remus sandy loam, 0 to 6 percent slopes	20.8	0.4%
17B	Marlette sandy loam, 2 to 6 percent slopes	12.4	0.2%
17C	Filer sandy loam, 6 to 12 percent slopes	1.9	0.0%
19B	Onekama loam, Saginaw Lobe, 2 to 6 percent slopes	476.7	8.1%
19C	Onekama loam, Saginaw Lobe, 6 to 12 percent slopes	244.3	4.2%
19D	Perrinton loam, 12 to 18 percent slopes	59.3	1.0%
19E	Perrinton loam, 18 to 35 percent slopes	44.6	0.8%
20	Pits, sand and gravel	34.5	0.6%
21B	Ithaca loam, 0 to 4 percent slopes	342.7	5.8%
22	Ziegenfuss silty clay loam	44.7	0.8%
23	Roscommon loamy sand	1.2	0.0%
24	Vestaburg sandy loam	3.7	0.1%
25	Edmore sandy loam	123.7	2.1%
27	Houghton muck, 0 to 1 percent slopes	22.4	0.4%
28	Houghton muck, ponded, 0 to 1 percent slopes	2.1	0.0%
30	Adrian muck, 0 to 1 percent slopes	86.0	1.5%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
31A	Alganssee loamy sand, 0 to 3 percent slopes	98.7	1.7%
32	Glendora loamy sand	69.0	1.2%
34A	Pipestone loamy sand, 0 to 3 percent slopes	20.6	0.4%
37A	Locke sandy loam, 0 to 3 percent slopes	1.0	0.0%
38A	Thetford loamy sand, 0 to 3 percent slopes	140.1	2.4%
39B	Riverdale loamy sand, 0 to 4 percent slopes	47.0	0.8%
40B	Aubbeenaubbee fine sandy loam, 0 to 4 percent slopes	33.5	0.6%
42	Palms muck, 0 to 1 percent slopes	6.4	0.1%
43B	Arkona loamy sand, 0 to 4 percent slopes	423.2	7.2%
44	Wauseon sandy loam	31.7	0.5%
45B	Coloma loamy sand, loamy substratum, 0 to 6 percent slopes	11.5	0.2%
46B	Tustin loamy sand, 0 to 6 percent slopes	226.5	3.9%
46C	Tustin loamy sand, 6 to 12 percent slopes	168.4	2.9%
47B	Mecosta sand, 0 to 4 percent slopes	829.3	14.2%
47C	Mecosta sand, 6 to 12 percent slopes	98.4	1.7%
47D	Mecosta sand, 12 to 18 percent slopes	35.4	0.6%
47E	Mecosta sand, 18 to 35 percent slopes	18.1	0.3%
W	Water	88.1	1.5%
Totals for Area of Interest		5,858.9	100.0%

Farmland Classification—Mecosta County, Michigan



Map Scale: 1:32,800 if printed on A landscape (11" x 8.5") sheet.

0 450 900 1800 2700 Meters

0 1500 3000 6000 9000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

-  Not prime farmland
-  All areas are prime farmland
-  Prime farmland if drained
-  Prime farmland if protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated
-  Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated and drained
-  Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

-  Prime farmland if subsoiled, completely removing the root inhibiting soil layer
-  Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
-  Prime farmland if irrigated and reclaimed of excess salts and sodium
-  Farmland of statewide importance
-  Farmland of statewide importance, if drained
-  Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if irrigated

-  Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if irrigated and drained
-  Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
-  Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60

-  Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
-  Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
-  Farmland of statewide importance, if warm enough
-  Farmland of statewide importance, if thawed
-  Farmland of local importance
-  Farmland of local importance, if irrigated

-  Farmland of unique importance
-  Not rated or not available

Soil Rating Lines

-  Not prime farmland
-  All areas are prime farmland
-  Prime farmland if drained
-  Prime farmland if protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated
-  Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
-  Prime farmland if irrigated and drained
-  Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season

Farmland Classification—Mecosta County, Michigan

	Prime farmland if subsoiled, completely removing the root inhibiting soil layer		Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season		Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium		Farmland of unique importance		Prime farmland if subsoiled, completely removing the root inhibiting soil layer
	Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60		Farmland of statewide importance, if irrigated and drained		Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season	Soil Rating Points			Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
	Prime farmland if irrigated and reclaimed of excess salts and sodium		Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season		Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season		Not prime farmland		Prime farmland if irrigated and reclaimed of excess salts and sodium
	Farmland of statewide importance						Prime farmland if drained		Farmland of statewide importance
	Farmland of statewide importance, if drained		Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer				Prime farmland if protected from flooding or not frequently flooded during the growing season		Farmland of statewide importance, if drained
	Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season		Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60		Farmland of statewide importance, if warm enough		Prime farmland if irrigated		Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
	Farmland of statewide importance, if irrigated				Farmland of statewide importance, if thawed		Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season		Farmland of statewide importance, if irrigated
					Farmland of local importance		Prime farmland if irrigated and drained		
					Farmland of local importance, if irrigated		Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season		

Farmland Classification—Mecosta County, Michigan

Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season	Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium	Farmland of unique importance Not rated or not available	<p>The soil surveys that comprise your AOI were mapped at 1:15,800.</p>
Farmland of statewide importance, if irrigated and drained	Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season	<p>Water Features</p> Streams and Canals	<p>Please rely on the bar scale on each map sheet for map measurements.</p>
Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season	Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season	<p>Transportation</p>	<p>Source of Map: Natural Resources Conservation Service Web Soil Survey URL: Coordinate System: Web Mercator (EPSG:3857)</p>
Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer	Farmland of statewide importance, if warm enough	Rails	<p>Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.</p>
Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60	Farmland of statewide importance, if thawed	Interstate Highways	<p>This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.</p>
	Farmland of local importance	US Routes	<p>Soil Survey Area: Mecosta County, Michigan Survey Area Data: Version 15, Sep 1, 2021</p>
	Farmland of local importance, if irrigated	Major Roads	<p>Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.</p>
		Local Roads	<p>Date(s) aerial images were photographed: Oct 4, 2011—Sep 19, 2016</p>
		<p>Background</p>	<p>The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.</p>
		Aerial Photography	

Farmland Classification

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10C	Plainfield sand, 6 to 18 percent slopes	Not prime farmland	2.3	0.0%
11B	Coloma sand, 0 to 6 percent slopes	Not prime farmland	1,223.0	23.5%
11C	Coloma sand, 6 to 18 percent slopes	Not prime farmland	132.2	2.5%
11E	Coloma sand, 18 to 35 percent slopes	Not prime farmland	10.1	0.2%
12B	Spinks loamy sand, 0 to 6 percent slopes	Farmland of local importance	120.2	2.3%
12C	Spinks loamy sand, 6 to 12 percent slopes	Farmland of local importance	41.3	0.8%
14A	Covert sand, 0 to 3 percent slopes	Not prime farmland	201.1	3.9%
16B	Remus sandy loam, 0 to 6 percent slopes	All areas are prime farmland	20.8	0.4%
17B	Marlette sandy loam, 2 to 6 percent slopes	All areas are prime farmland	10.6	0.2%
17C	Filer sandy loam, 6 to 12 percent slopes	Farmland of local importance	1.1	0.0%
19B	Onekama loam, Saginaw Lobe, 2 to 6 percent slopes	All areas are prime farmland	431.5	8.3%
19C	Onekama loam, Saginaw Lobe, 6 to 12 percent slopes	Farmland of local importance	213.4	4.1%
19D	Perrinton loam, 12 to 18 percent slopes	Not prime farmland	59.5	1.1%
19E	Perrinton loam, 18 to 35 percent slopes	Not prime farmland	44.8	0.9%
20	Pits, sand and gravel	Not prime farmland	30.6	0.6%
21B	Ithaca loam, 0 to 4 percent slopes	Prime farmland if drained	315.5	6.1%
22	Ziegenfuss silty clay loam	Prime farmland if drained	39.1	0.8%
24	Vestaburg sandy loam	Farmland of local importance	3.7	0.1%
25	Edmore sandy loam	Farmland of local importance	65.0	1.2%
27	Houghton muck, 0 to 1 percent slopes	Farmland of local importance	15.9	0.3%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
28	Houghton muck, ponded, 0 to 1 percent slopes	Not prime farmland	2.1	0.0%
30	Adrian muck, 0 to 1 percent slopes	Farmland of local importance	51.8	1.0%
31A	Alganssee loamy sand, 0 to 3 percent slopes	Farmland of local importance	92.1	1.8%
32	Glendora loamy sand	Not prime farmland	69.1	1.3%
34A	Pipestone loamy sand, 0 to 3 percent slopes	Farmland of local importance	13.3	0.3%
38A	Thetford loamy sand, 0 to 3 percent slopes	Farmland of local importance	108.7	2.1%
39B	Riverdale loamy sand, 0 to 4 percent slopes	Farmland of local importance	36.5	0.7%
40B	Aubbeenaubbee fine sandy loam, 0 to 4 percent slopes	Prime farmland if drained	29.9	0.6%
42	Palms muck, 0 to 1 percent slopes	Farmland of local importance	4.3	0.1%
43B	Arkona loamy sand, 0 to 4 percent slopes	Farmland of local importance	358.8	6.9%
44	Wauseon sandy loam	Prime farmland if drained	31.7	0.6%
45B	Coloma loamy sand, loamy substratum, 0 to 6 percent slopes	Farmland of local importance	0.4	0.0%
46B	Tustin loamy sand, 0 to 6 percent slopes	All areas are prime farmland	213.7	4.1%
46C	Tustin loamy sand, 6 to 12 percent slopes	Farmland of local importance	162.0	3.1%
47B	Mecosta sand, 0 to 4 percent slopes	Not prime farmland	809.6	15.6%
47C	Mecosta sand, 6 to 12 percent slopes	Not prime farmland	98.4	1.9%
47D	Mecosta sand, 12 to 18 percent slopes	Not prime farmland	33.9	0.7%
47E	Mecosta sand, 18 to 35 percent slopes	Not prime farmland	18.1	0.3%
W	Water	Not prime farmland	84.5	1.6%
Totals for Area of Interest			5,201.6	100.0%

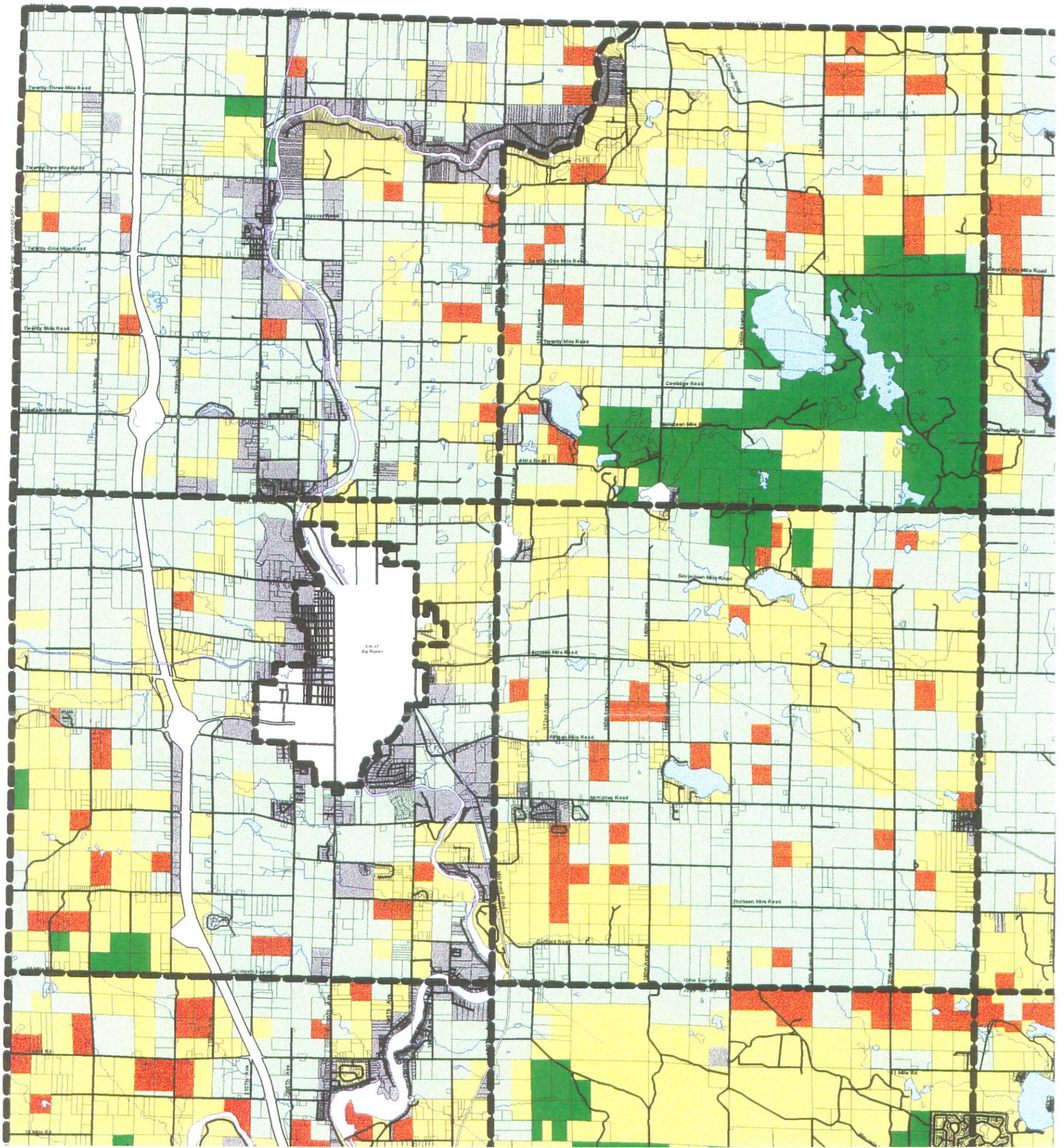
Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

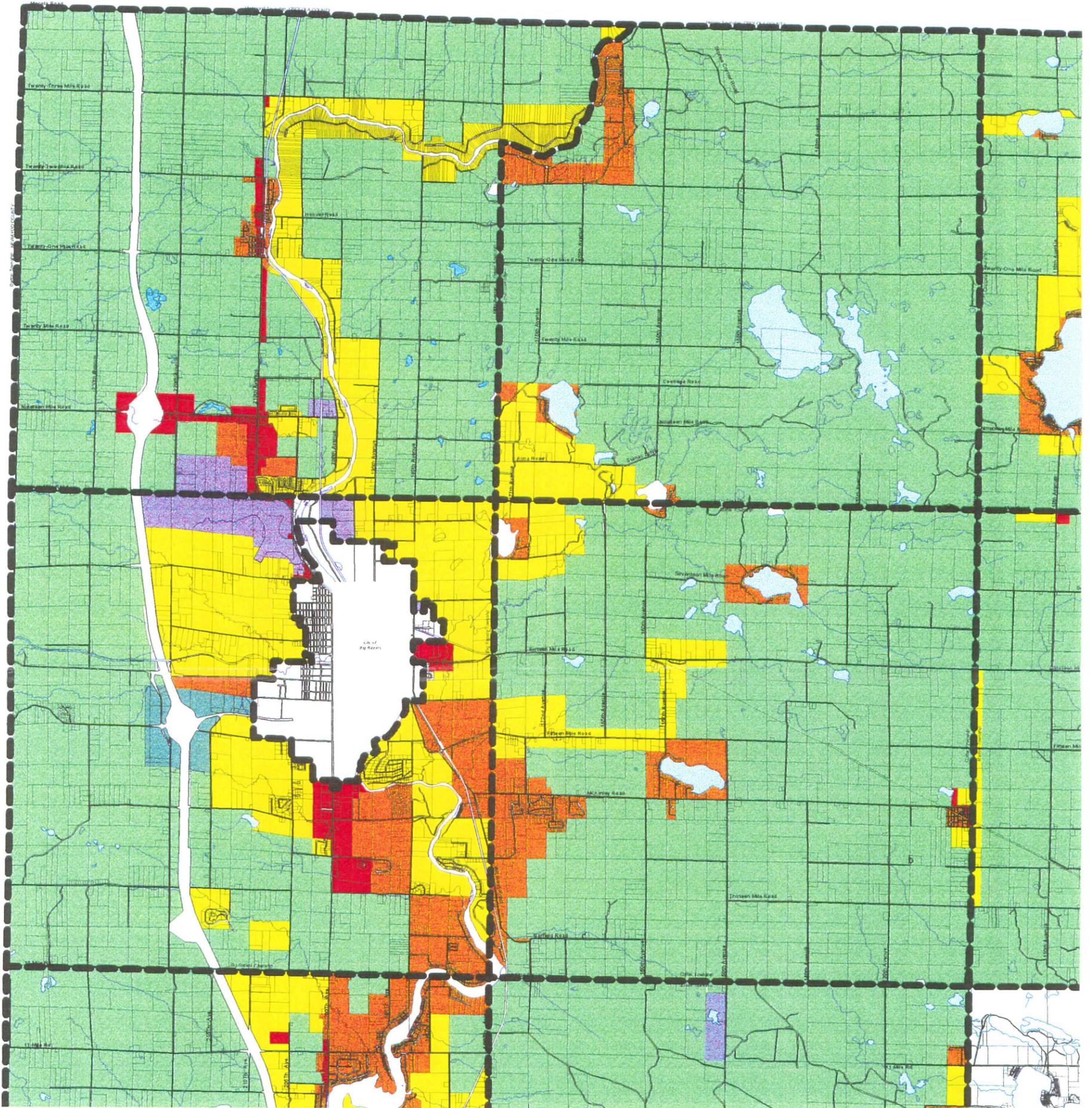
Tie-break Rule: Lower



Map 1 - Existing Land Cover (NW Quarter of County)

Figure A9 - Existing Land Use Map





Future Land Use Categories*

- | | |
|--|---|
|  Agricultural |  Commercial |
|  Low Density Residential |  Highway Interchange |
|  Medium Density Residential |  Industrial |

*Future Land Use categories for Morton Township are designated by the Morton Township Master Plan.

**Map 6 -
Future Land Use (NW Quarter of County)**

Figure A10 - Future Land Use Map



4/23/2001

APPENDIX B COST ESTIMATES

PREPARED FOR:

GREEN CHARTER TOWNSHIP





Summary Table Engineer's Preliminary Opinion of Probable Project Costs

Alternative	Anticipated Project Year	Project Cost	Annual OM&R Cost	Net Present Worth of OM&R Cost (1)	Total Present Worth	Salvage Value	Net Present Worth
Alternatives							
Alternative 3 - Lift Station Replacement	2023	\$799,900	\$9,560	\$201,600	\$1,001,500	\$214,100	\$787,400

Note: This table represents budgetary estimates for planning purposes. Further definition of the scope of the projects through final design will provide details necessary to improve the accuracy of the costs.

(1) Discount rate -0.500%



Project: Green Charter Township Lift Station
 Basis for Estimate: [] Conceptual [X] Basis of Design [] Final
 Work: Lift Station Replacement

Project No. 848060
 Estimator: SFH/LTW
 Date Apr-22

Item	Description	Unit	Qty.	Unit Price	Amount
1	General Conditions, Bonds, Insurance, and Mobilization	LS	1	\$30,000	\$30,000
2	Demolition, Abandon Existing LS	LS	1	\$30,000	\$30,000
3	Bypass Pumping/traffic control	LS	1	\$20,000	\$20,000
4	Dewatering	LS	1	\$20,000	\$20,000
5	Tree Removal	EA	1	\$8,000	\$8,000
6	8" Sanitary Sewer - Correct Sag	LF	105	\$210	\$22,050
7	Intermediate Manhole	LS	2	\$8,000	\$16,000
8	10" Sanitary Sewer - Wet Well Influent	LF	27	\$220	\$5,940
9	Wet Well	LS	1	\$80,000	\$80,000
10	ASVP Station	LS	1	\$122,000	\$122,000
11	4" Bypass Suction Piping	LF	24	\$140	\$3,360
12	6" Pump Discharge Piping	LF	48	\$150	\$7,200
13	8" Flow Meter Piping and Bypass Piping	LF	40	\$180	\$7,200
14	Flow Meter and Metering MH	LS	1	\$15,000	\$15,000
15	8" Gate Valves	EA	3	\$3,500	\$10,500
16	8" Forcemain	LF	105	\$200	\$21,000
17	Electrical & Control Panel	EA	3	\$25,000	\$75,000
18	Electric Utility Allowance	LS	1	\$42,000	\$42,000
19	Gas Utility Allowance	LS	1	\$5,000	\$5,000
20	Pavement Replacement	SYD	200	\$130	\$26,000
21	Restoration	LS	1	\$10,000	\$10,000
22	Site Grading	LS	1	\$10,000	\$10,000
23	24" Storm Pipe	LF	86	\$80	\$6,880
24	Air Release Valve Locating and Replacement	LS	1	\$30,000	\$30,000
25	Subtotal (Construction)				\$624,000
26	Contingency				\$63,000
27	Design Engineering				\$52,900
28	Construction Engineering				\$60,000
	Project Total				Project Budget: \$799,900

Notes:

(1) This estimate represents a budgetary cost estimate in 2022 dollars to be used for planning purposes. Further definition of the scope of the project through final design will provide details necessary to improve the accuracy of conceptual estimates.

APPENDIX C

PUBLIC PARTICIPATION DOCUMENTS

PREPARED FOR:

GREEN CHARTER TOWNSHIP



