



Consulting
Engineers and
Scientists

Project Plan
Clean Water State Revolving Fund
(CWSRF)
Ontonagon, Michigan

Prepared for:

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May 2023
Project 2300109

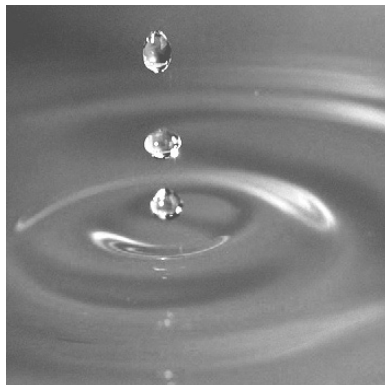


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Executive Summary

The Village of Ontonagon (Village) submits this Project Plan to the Water Infrastructure Financing Section, Finance Division, Michigan Department of Environment, Great Lakes, and Energy (EGLE) to be reviewed and considered for the Project Priority List for obtaining low-interest loans from the State Revolving Fund. Specifically, the Village would like to request a Clean Water State Revolving Fund (CWSRF) loan to help finance improvements to the Sanitary Sewer System within their Village.

GEI Consultants of Michigan, P.C. (GEI) has prepared this document following the EGLE Project Plan guidance. The scope of this project includes the following elements:

- Lift Station Improvements
- Sanitary Sewer Main Rehabilitation
- Manhole Repair and Replacement
- Removing Combined Sewer Overflow (CSO) locations
- Extending Sanitary Sewer Main onto Rose Island

In 2018, the Village received a SAW (Stormwater, Asset Management, and Wastewater) grant to develop an Asset Management Plan (AMP) for their Sanitary Sewer system. A goal of this project is to repair and replace critical items listed in the AMP. Another goal of this project is to extend the sanitary sewer main to Rose Island, which is located within the Village limits.

1. Project Background

The Village is applying for a CWSRF loan through EGLE in order to make improvements to their sanitary sewer system. This Project Plan will outline the project need, evaluate alternative solutions, define the selected alternative, review impacts and mitigations, and reach out to the public for input.

1.1 Study and Service Areas

The Ontonagon Sanitary System Improvements Project encompasses the entire sanitary sewer system. All of the sanitary sewer system is within the Village limits. The Village is the sole contributor/user of the sanitary system.

1.2 Population

Data for Table 1.2.1 was pulled from the US Census Bureau website. There are no population projections provided by the US Census Bureau for the Village; however, there are no major changes expected to occur over the next 20 years.

Date	Population
2020	1,269
2010	1,481
2000	1,769
1990	2,052

1.3 Existing Environmental Evaluation

1.3.1 Cultural and Historic Resources

Historical sites that are within the Village limits are the Ontonagon Lighthouse, Ontonagon Harbor Pier, Old Ontonagon County Courthouse, and the Greenland Road School. The lighthouse is located on the west side of the Ontonagon River, northwest of the bridge that crosses the river. It was in operation from 1867 to 1964. The Ontonagon Harbor Pier is located northwest of the lighthouse and extends into Lake Superior. The Old Ontonagon County Courthouse is centrally located within the village, on corner of Houghton and Trap Street. It was the courthouse from 1884 to 1980. The Greenland Road School is located in the southeast portion of town, off of Greenland Road. It was in continuous use from 1912 to 2010. There are no known archeological sites in the area. The Greenland Road School and Old Ontonagon County Courthouse are located within the project area. However, they will not be disturbed during this project. Historical Site locations are shown on Figure 1 in Appendix A.

1.3.2 Air Quality

Ambient air quality in the project area is good owing to the area's rural location and isolation from major industry. The project area is not designated as a "non-attainment" area in accordance with the Clean Air Act. No adverse air quality effects are anticipated with this project.

1.3.3 Wetlands

Wetlands are identified within the project area, the majority of which are on the Rose Island portion of the project. Soils with wetland characteristics are also identified within the study area. A wetlands map is included in Figure 5 of Appendix A.

1.3.4 Great Lakes Shorelands, Coastal Zones, and Coastal Management Areas

The study area is within the Coastal Zone of Lake Superior. Please see coastal zone map in Figure 6 of Appendix A for more details.

1.3.5 Floodplains

Portions of the project area are in a floodplain. The Rose Island portion of the project area as well as other downtown locations are in a Zone A5 flood plain. The other adjoining portions are in a Zone B floodplain. A floodplain map is included in Figure 7 of Appendix A.

1.3.6 Natural or Wild and Scenic Rivers

No designated natural or wild and scenic rivers exist within the project area.

1.3.7 Major Surface Waters

Lake Superior and the mouth of the Ontonagon River exist within the study area. Public water supply is generated from drawing water from Lake Superior 13 miles to the east of Ontonagon, pumping it to a treatment facility in White Pine, and then pumping it back to Ontonagon. A major surface water map is provided in Figure 8 of Appendix A.

1.3.8 Topography

Relief in the project area is relatively flat. Elevations in the project area range from 200 m/660 ft. to 183 m/600 ft., sloping towards Lake Superior. A Topographic Map is included in Figure 9 of Appendix A.

1.3.9 Geology

The major bedrock types in the project area are Middle Proterozoic and predominantly Freda Sandstone. Freda Sandstone is sandstone with minor shale and conglomerate beds, red, brown, and tan. Mostly fine to medium grained feldspathic and lithic arenite, commonly micaceous. It is well-bedded and commonly cross bedded. Local geological formations will not affect the choice of alternatives.

1.3.10 Soil Types

Adverse soil types are expected to be encountered in the Rose Island portion of the project area. This is expected to occur because the Island is located on soils with wetland characteristics, i.e. not stable. A Soil Survey Report is provided in Appendix B.

1.3.11 Agricultural Resources

Agriculture is a very small part of the local economy. Several factors that contribute to this is the short growing season and the limited local market. Flintsteel loam, a prime farmland soil type is located on the far east end of the project area. A Soil Survey Map of the project area is provided in Appendix B. It is expected that no prime farmlands will be affected by the proposed project.

1.3.12 Fauna and Flora

The Gray Wolf (*Canis Lupus*) and Northern Long-eared Bat (*Myotis Septentrionalis*) are currently the only endangered species in the study area. The Canada Lynx (*Lynx Canadensis*) and the Red Knot (*Calidris Canutus Rufa*) are the only threatened species in the study area. None of the endangered or threatened species are expected to be affected by the proposed project.

1.4 Existing System

1.4.1 General

The original sanitary sewer system for the Village was a combined storm and sanitary system that discharged into the Ontonagon River. It is estimated that it was built around the turn of the 20th Century. In the 1950's, the Village separated the sanitary and storm system and constructed a treatment plant on the west side of the Ontonagon River. The lift stations were all replaced or updated during the 1960's. In 1976, a second treatment facility was constructed adjoining the adjacent papermill. This was constructed in order to properly handle heavy metals. The main treatment plant was abandoned in 1998 when a new lagoon system was constructed off of Giesau Road in the southeast portion of the Village limits. The sanitary force main was extended and a lift station was built in 2006 to service the

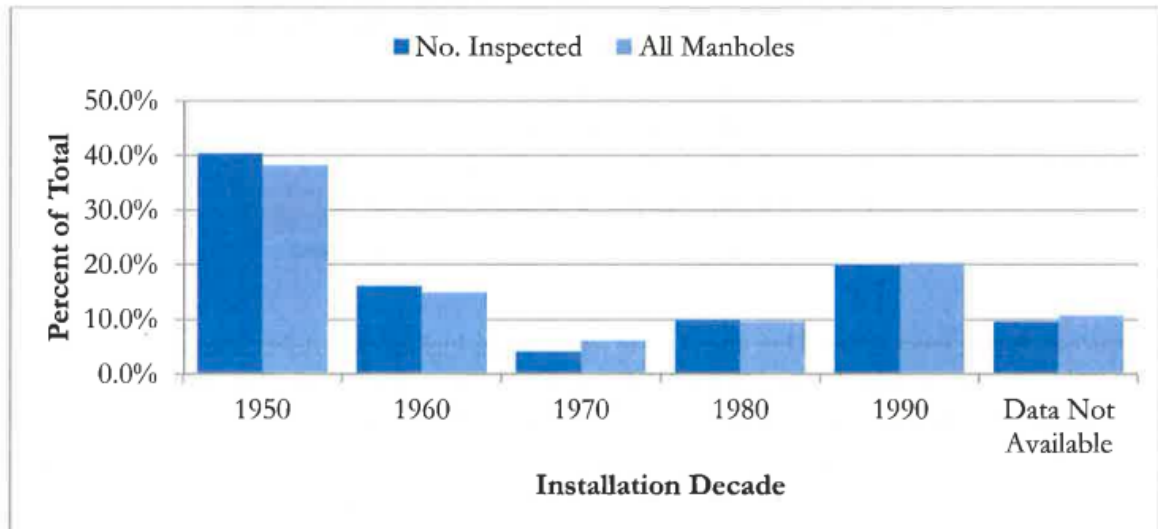
Ontonagon Township Park. Since 2006, no other improvements have occurred. The papermill closed in 2010 and the small, adjoining treatment plant was demolished. In 2018, the village received funding through the SAW program to develop an AMP. Sanitary Sewer Televising of their existing system was included in the AMP. Currently the Village's sanitary system is made up of 23 miles of gravity main, 2.5 miles of force main, 476 gravity main manholes, 3 force main manholes, 4 lift stations, and a lagoon system comprised of 4 cells. Per the AMP, in 2018 the Village had 841 system users and 1,017 REU's.

1.4.2 Collection System

1.4.2.1 Manholes

Majority of manholes (>50%) were installed in the 1950's and 1960's (see graph below). During the assessment, 416 out of the total 476 manholes were inspected. Of the 416 manholes, approximately 90% are in good to moderate condition. The remaining 10% have major structural or O&M issues with them. Out of the 416 manholes inspected, 193 have active inflow and infiltration.

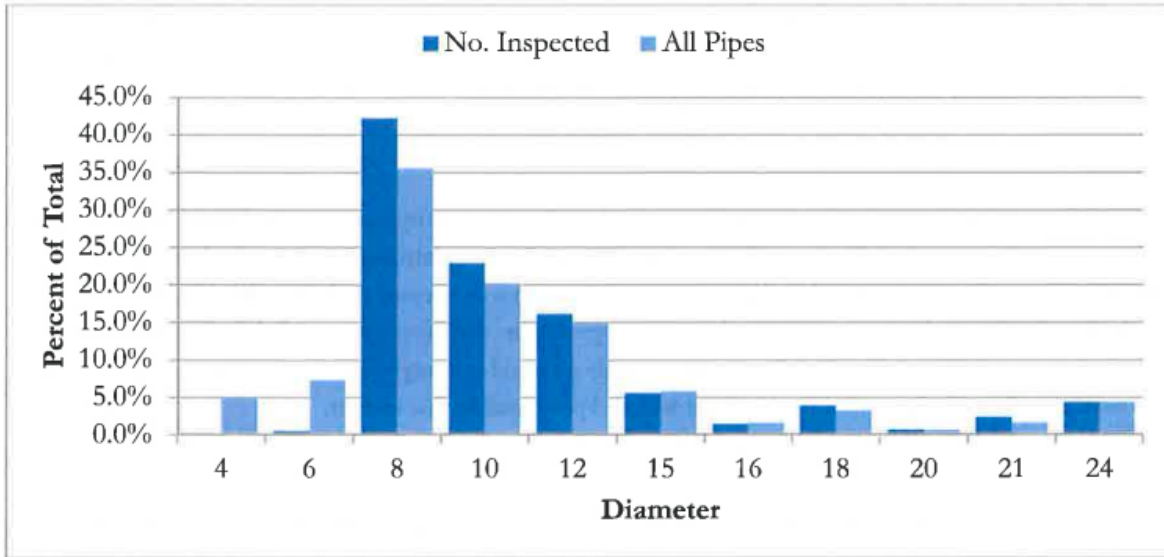
Manhole Installation by Decade



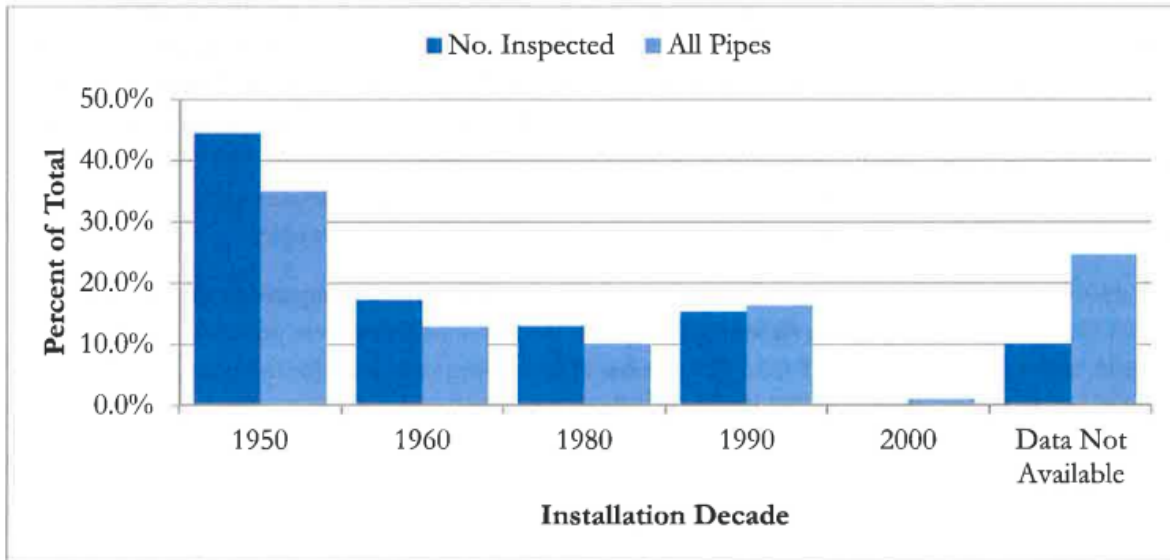
1.4.2.2 Gravity Main

The sanitary sewer gravity main is comprised of vitrified clay pipe (VCP), asbestos cement pipe, reinforced plastic (truss) pipe, and polyvinyl chloride (PVC) pipe. Diameters of gravity main vary between 4" and 24", the most of which being 8" and 10". The majority (>60%) of the gravity main was installed in the 1950's and 1960's. The graphs below breakdown the percentage of pipe by diameter, age, and material. Inflow and infiltration, pipe damage, and other defects were present in 11% of the gravity main televised.

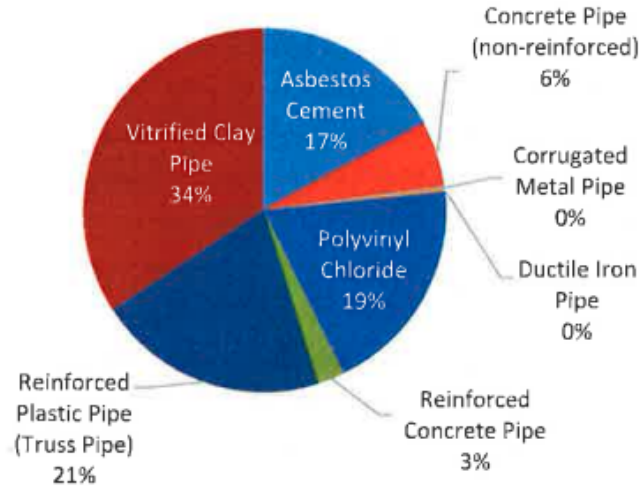
Pipe Installation by Diameter



Pipe Installation by Decade



Pipe Material Breakdown



1.4.2.3 Force Main

Force main is located on the westside of the Ontonagon River, it runs under the river and ties into the main lift station at Tin Street. A section force main was installed in 1968 on Zinc Street, and a section force main was installed in 1987 at the corner of River Street and Lake Street. A 14” force main takes the sewage from the main lift station to the lagoons. No inspections or assessments have taken place on the force main.

1.4.3 Lift Stations

The village currently operates four lift stations. See Figures 1 and 2 in Appendix A for locations of the lift stations. A Lift Station Assessment is available in Table A-3 in Appendix E.

1.4.3.1 #1 – Old WWTP Lift Station

The Old WWTP Lift Station is a submersible lift station that was constructed in 1957. It is located on the westside of the Ontonagon River. It currently pumps the sewage under the Ontonagon River to the Main Lift Station at Tin Street. All of the components in the lift station are original. Pump #1 is non-operational, and Pump # 2 is operational but is obviously beyond its service life. All other components of the lift station are operational but again beyond their service life.

1.4.3.2 #2 – Main Lift Station

The Main Lift Station is a dry-pit submersible lift station that was constructed in 1997. It is centrally located on the corner of Tin Street and Iron Street. This lift station pumps all of the sewage to the wastewater lagoons on the south eastside of the Village. The lift station has two 700 GPM pumps and two 2,200 GPM pumps. The 700 GPM pumps are intended to handle normal dry-weather flows and the larger 2,200 GPM pumps take over during periods of heavy flow. One of the 700 GPM pumps is currently non-operational, and one of the 2,200 GPM is non-operational as well. The Main Lift Station is equipped with a wet well transfer pump. This pump is beyond its useful service life.

1.4.3.3 #3 – River and Lake Lift Station

The River and Lake Lift Station is a submersible lift station that was constructed in 1970. It is located on Trident Maritime Systems property, on the northwest side of the Village. It is currently equipped with one pump, which is operational but beyond its useful life. The check valves, shutoff valves, floats, and control panel are beyond their useful life.

1.4.3.4 #5 – Zinc Street Lift Station

The Zinc Street Lift Station is a submersible lift station that was constructed in 1997. This lift station is located on Zinc Street just south of Granite Street. It is equipped with two pumps that are both operational and in good condition. The only component that is beyond its useful life is the control panel.

1.4.4 Sewage Treatment

Wastewater lagoons are the method of treatment by the Village. They were constructed in 1998 when the treatment plant was abandoned. There are four cells at the lagoons. Sludge removal has not occurred. Between 2001-2017, average annual treatment flow was approximately 114 MGY (Million Gallons per Year). The Village is currently permitted to discharge 137 MGY. No improvements have occurred since it was built in 1998.

1.4.5 Combined Sewer Overflows (CSOs)

The Village has separate storm and sanitary systems. However, the AMP identified three CSO locations and a location of direct discharge into the sanitary system. The direct discharge is located on North Steel Street between Pennsylvania Avenue and Trap Street. A catch basin is tied into the sanitary sewer. Two of the CSO's are located south of River Street near Island Road in the north bank of the slough. The third CSO is located at the intersection of Zinc Street and Mercury Street.

1.5 Need for the Project

Multiple elements of the Village's sanitary sewer system are aged and in need of replacement or upgrading. Portions of the sanitary sewer main are collapsed, allowing for inflow and infiltration. Manholes are deteriorated and in need of replacement and repair. Components of the four lift stations are beyond their useful life or non-operational, which contributes to an inefficient system through more energy being used to operate them. Additionally, three out of the four lift stations do not have operable backup motors or pumps. This is a large reliability issue that needs to be corrected. Currently, the system has four CSO locations. This contributes to unnecessary clear water discharge into the wastewater lagoons. Lastly, there are six residents using septic systems on Rose Island, creating the potential for sewage leaking into the Ontonagon River and into Lake Superior.

If these items are not addressed quickly, the system will continue to age and deteriorate. The chances of a system failure will increase, and the results of a system failure will become greater. The negative impacts to public health would also become greater as time passes.

The Township currently does not have any court orders, federal or state enforcement orders, administrative consent orders, or violation notices. A copy of the National Pollutant Discharge Elimination System (NPDES) Permit is provided in Appendix C.

1.5.1 Water Quality Problems

Rose Island is an island located in the Ontonagon River, near the mouth of the river, on the southwest side of the Village. The island currently has 6 (six) year-round residents on it. Village watermain exists on the island; however, the sanitary sewer main does not. It is anticipated that all 6 (six) residences are connected to septic systems. One of the residences is within 200 feet of a sanitary sewer main and is obviously not connected. This is in violation of Village ordinance. Presently, the users on Rose Island are connected to Village water. No drinking water quality issues have been documented.

1.5.2 Projected Future Needs

Population data as shown in Section 1.2 shows that population in the Village has declined and is expected to continue to decline. It is expected that residential flows seen at the lagoons will not change significantly over the next 20 years. Additionally, there are no major industrial, commercial, or institutional developments that are planned in the service area. Flows from these facilities are also expected to remain similar to current flows.

The AMP has identified several projects that would need to be completed within the next twenty years. These projects focus on replacement and rehabilitation of existing systems, not expanding. A copy of the AMP is available upon request.

2. Analysis of Alternatives

2.1 No-Action

If no-action is taken, the sanitary sewer system will continue to age and deteriorate. The potential for inflow and infiltration will increase and the system will become more inefficient, and the Village will not improve.

2.2 Optimum Performance of Existing Facilities

The sanitary system is running at an optimum level considering the age and condition that the system is in. Lift stations are beyond their useful service life and are still operating. Nothing can be performed in the existing facilities to optimize the performance of the current system. It is currently performing as optimal as possible.

2.3 Regionalization

The Village's Sanitary System does not have regional alternatives available due to the geographic location of the system.

2.4 Principal Alternative

The proposed alternative consists of completely removing, reconstructing, and replacing Lift Station #1 – Old WWTP; replacing four (4) pumps, installing two (2) variable frequency drives (VFD), and a wet well transfer pump in Lift Station #2 – Main Station; completely removing, reconstructing, and replacing Lift Station #3 – River and Lake Street, and upgrading the control panel at Lift Station #5 – Zinc Street. Principal alternative also includes replacing four (4) manholes, replacing 2,800 linear feet of sanitary sewer main, lining and repair of select manholes, lining of sanitary sewer main, and removing the CSO locations from the sanitary system. Additionally included is the expansion of the sanitary sewer system on to Rose Island.

2.5 Monetary Evaluation

Monetary Evaluation was not calculated for the No-Action, Optimum Performance of Existing Facilities, or Regionalization alternatives because implementing these alternatives does not require the Village to increase rates or purchase new materials and equipment. A monetary evaluation was conducted on the selected alternative.

2.5.1 Sunk Costs

Investments have been made to develop this project prior to or during the project planning process. Development of an Intent to Apply (ITA) occurred during the Fall of 2022. Drafting of a Project Plan occurred during the Spring of 2023. The total cost incurred by the Village was \$22,500. This is the only sunk cost associated with the proposed projects.

2.5.2 Present Worth/Salvage Value

A present worth analysis was performed for the principal alternative using existing given real discount rate provided by the US Office of Management and Budget of 0.4%. This is the initial capital cost, added to value of the Operation, Maintenance, and Replacement costs, then subtracted by the salvage value. For the purpose of comparing the present worth analysis, the OM&R values will be considered zero for simplification since the result will be equivalent. The No-Action alternative is not included because if the No-Action alternative is selected, the Village will not incur any additional cost. The watermain system is currently operating at an optimum level, therefore the Village is not acquiring additional cost. Regionalization of the system is not possible and is not incorporated in this evaluation.

The cost analysis is summarized in the tables below. This analysis was done in March 2023 using estimated construction costs for lift station rehabilitation, replacement of sanitary sewer main and manholes, lining of sanitary sewer and manholes, expanding the sanitary sewer system to Rose Island, and restoration of pavement and site.

Table 2.5.2.1	
Clean Water – Monetary Evaluation	
EPA Discount Rate	0.40%
Planning Period (yrs)	20
Lift Stations	
Total Project Cost (Capital Cost) ==>	\$ 1,675,145
Subtotal Present Worth:	\$ 1,675,145
Salvage Value at End of Planning Period:	\$ -
Present Worth of Salvage Value:	\$ -
TOTAL PRESENT WORTH OF ALTERNATIVE ==>	\$ 1,675,145

Table 2.5.2.2	
Clean Water – Monetary Evaluation	
EPA Discount Rate	0.40%
Planning Period (yrs)	20
Manhole Replacement	
Total Project Cost (Capital Cost) ==>	\$ 66,985
Subtotal Present Worth:	\$ 66,985
Salvage Value at End of Planning Period:	\$ 18,684
Present Worth of Salvage Value:	\$ 17,250
TOTAL PRESENT WORTH OF ALTERNATIVE ==>	\$ 49,735

Table 2.5.2.3	
Clean Water – Monetary Evaluation	
EPA Discount Rate	0.40%
Planning Period (yrs)	20
Manhole Repair/Lining	
Total Project Cost (Capital Cost) ==>	\$ 147,000
Subtotal Present Worth:	\$ 147,000
Salvage Value at End of Planning Period:	\$ -
Present Worth of Salvage Value:	\$ -
TOTAL PRESENT WORTH OF ALTERNATIVE ==>	\$ 147,000

Table 2.5.2.4	
Clean Water – Monetary Evaluation	
EPA Discount Rate	0.40%
Planning Period (yrs)	20
Sanitary Sewer Main Replacement	
Total Project Cost (Capital Cost) ==>	\$ 1,154,088
Subtotal Present Worth:	\$ 1,154,088
Salvage Value at End of Planning Period:	\$ 320,069
Present Worth of Salvage Value:	\$ 295,508
TOTAL PRESENT WORTH OF ALTERNATIVE ==>	\$ 858,580

Table 2.5.2.5	
Clean Water – Monetary Evaluation	
EPA Discount Rate	0.40%
Planning Period (yrs)	20
Sanitary Sewer Lining	
Total Project Cost (Capital Cost) ==>	\$ 923,975
Subtotal Present Worth:	\$ 923,975
Salvage Value at End of Planning Period:	\$ -
Present Worth of Salvage Value:	\$ -
TOTAL PRESENT WORTH OF ALTERNATIVE ==>	\$ 923,975

Table 2.5.2.6	
Clean Water – Monetary Evaluation	
EPA Discount Rate	0.40%
Planning Period (yrs)	20
Rose Island Expansion	
Total Project Cost (Capital Cost) ==>	\$ 997,975
Subtotal Present Worth:	\$ 997,975
Salvage Value at End of Planning Period:	\$ 240,314
Present Worth of Salvage Value:	\$ 221,874
TOTAL PRESENT WORTH OF ALTERNATIVE ==>	\$ 776,102

Table 2.5.2.7	
Clean Water – Monetary Evaluation	
EPA Discount Rate	0.40%
Planning Period (yrs)	20
Remove CSO Locations	
Total Project Cost (Capital Cost) ==>	\$ 67,253
Subtotal Present Worth:	\$ 67,253
Salvage Value at End of Planning Period:	\$ -
Present Worth of Salvage Value:	\$ -
TOTAL PRESENT WORTH OF ALTERNATIVE ==>	\$ 67,253

2.5.3 Escalation

Escalation is not anticipated during this project.

2.5.4 Interest During Construction

Interest during construction is not significant enough to be included in the Monetary Evaluation.

2.5.5 User Costs

The tables below show the different loan options available to the Village and what the impacts on the residents would be based on calculating the residential equivalent user (REU) and a loan amount of \$6.4 million. There are currently 1,017 REU's within the Village. The rates used for these tables were carried over from last year and are subject to change based on this year's adjustments. The Village meets the requirements for overburdened status, see Appendix H. The information below is based on a project estimated cost of \$6,366,013 seen in Appendix D.

Table 2.5.5.1: User Cost Increase – 100% Loan

Loan Term	Expected Interest Rate	Monthly Payment	Monthly Cost per REU
20 year	1.875	\$32,053.66	\$31.52
30 year	2.125	\$24,095.89	\$23.69
30 year*	1.875	\$23,281.66	\$22.89

**Overburdened Status required for this loan*

Table 2.5.5.2: User Cost Increase – 50% Loan/50% Grant

Loan Term	Expected Interest Rate	Monthly Payment	Monthly Cost per REU
20 year	1.875	\$16,026.83	\$15.76
30 year	2.125	\$12,047.94	\$11.85
30 year*	1.875	\$11,640.83	\$11.45

**Overburdened Status required for this loan*

Table 2.5.5.3: User Cost Increase – 30% Loan/70% Grant

Loan Term	Expected Interest Rate	Monthly Payment	Monthly Cost per REU
20 year	1.875	\$9,616.40	\$9.46
30 year	2.125	\$7,228.77	\$7.11
30 year*	1.875	\$6,984.50	\$6.87

**Overburdened Status required for this loan*

The current user cost for sanitary sewer includes a \$21.00 long-term debt fee plus \$6.00 per 1,000 gallons of sewage disposed.

2.5.6 Project Delivery Method

This project will be using the traditional Design-Bid-Build delivery method.

2.6 Environmental Evaluation

Environmental effects concerning the lift station improvement portion of the principal alternative are lift stations being offline while work is being performed. This creates the potential for a sewage backup if work takes longer than expected. Construction environmental impacts (i.e. excessive noise and increased traffic) will be localized to the immediate lift station area.

The environmental impacts as a result of the sanitary sewer replacement and repair portion of the principal alternative are that the project area will involve the use of construction equipment/labor. These impacts include increased noise during working hours, removal and replacement of existing road, and dust from truck traffic in the area.

Expanding the sanitary sewer to Rose Island creates several new environmental impacts that were not covered previously. First, is the clearing and grubbing of the area in which the new sanitary main will be laid. Second, is soil displacement where the force main will be directionally bored under the channel between Rose Island and the mainland. Third, a portion of Island Road would need to be removed and replaced as part of the expansion. Lastly, excavation will need to be performed on private property in order to connect the residents to the new sanitary system. No environmental impacts would take place if the other alternatives were selected.

3. Technical Considerations

3.1 Infiltration and Inflow Removal

Infiltration and Inflow (I&I) is an issue within the Village's sanitary sewer system. However, a complete I&I analysis was not completed for this Project Plan because the amount of clear water entering the system and eventually entering the wastewater lagoons does not warrant an off-season discharge. Between 2001 and 2017, average annual treatment flow was approximately 114 MGY. The Village is currently permitted to discharge 137 MGY. With no expected population growth or industry moving into the Village in the next 20 years, the capacity at the lagoons is sufficient to handle the I&I that enters the system. Therefore, it is not cost effective to remove the I&I.

3.2 Sewer System Evaluation Survey

A Sewer System Evaluation Survey is not required because it was deemed not cost effective to remove the I&I from the system.

3.3 Structural Integrity

The Village's sanitary sewer system was evaluated as part of their SAW Grant AMP. The National Association of Sewer Service Companies (NASSCO) rating system was used to evaluate the system. Both the Manhole Assessment Certification Program (MACP) and the Pipeline Assessment Certification Program (PACP) were implemented during the evaluation. A Level 1.5 manhole inspection was conducted by a MACP certified individual. This hybrid inspection provides a large amount of Level 2 data (defect documentation, condition of the asset, corrective action) and includes a full top-down video of the manhole interior. The PACP inspection method for televising pipes was used in evaluating the sanitary sewer main. Tables showing the Grade 4 and 5 structural defects of both sanitary sewer main, and manholes are included in Appendix E. Maps showing the locations of the Grade 4 and 5 defects are included in Appendix A.

3.4 Fiscal Sustainability Plan

As per CWSRF requirements, a Fiscal Sustainability Plan must include an inventory of all critical assets including an evaluation of the assets condition and performance, certification of water and energy conservation efforts, and a plan for operation and maintenance (O&M) and funding. In 2018, the Village was awarded a SAW Grant to fund the development of an AMP. This AMP meets the requirements for a Fiscal Sustainability Plan. A copy of the AMP report is available upon request.

3.4.1 Inventory of Critical Assets

A complete inventory and condition assessment of all components of the Village’s Sanitary System was conducted as part of the SAW AMP to gather information on the assets. These assets are broken down into five categories: manholes, gravity main, force main, lift stations, and lagoons. The inventory and condition assessments were performed through multiple methods. Records research was performed on existing drawings to get a general idea of system layout and asset locations, and where feasible, manual surveys were performed.

Sanitary manholes and gravity main were assessed using the NASSCO condition grading system, which uses a scale of zero to five. Zero indicates the infrastructure is in very good condition, while five indicates the infrastructure is in very poor condition or has already failed. The two primary scoring metrics commonly used to describe the asset conditions are the Structure Rating Index and the Quick Rating. The Structure Rating Index is an average of defect grades within an asset, and the Quick Rating describes the asset’s highest defect grades.

Experienced facility design engineers inspected and documented the condition of the Village’s lift stations as well as treatment facilities. Force mains were not physically inspected, and their remaining useful life was estimated by age of system.

A summary of the sanitary sewer system assets is listed in Table 3.4.1 below.

Table 3.4.1: System Asset Summary		
Gravity Sewer Main	121,440	LFT
Sanitary Force-Main	13,200	LFT
Manholes	476	EACH
Lift Stations	4	EACH
Treatment Lagoons	4	EACH

3.4.2 Condition and Performance of Assets

Table 3.4.2 provides a summary of the condition ratings that were used for sanitary manholes and gravity main. After the asset was evaluated, a condition rating was assigned to each asset. Asset Inventory tables for Sanitary Sewer Manholes, Sanitary Sewer Gravity, and Lift Stations are enclosed with this Project Plan. Tables A-1, A-2, and A-3 located in Appendix E show the condition ratings that were assigned to each asset.

Table 3.4.2: Condition Assessment Ratings	
Condition Rating	Description
5	Marginal functionality with failure imminent
4	Failure likely in the foreseeable future
3	Failure unlikely in the near future
2	Moderate wear but still functional
1	Minimal wear and good working condition
0	New or like new

3.4.3 Water and Energy Conservation

Water and energy conservation efforts will be implemented whenever possible throughout the proposed project. A fiscal sustainability plan form will be submitted with the CWSRF Part III Application.

3.4.4 Plan for Maintaining, Repairing, and Funding

Village rates are separated into a Long-Term Debt Fee and Sewer Disposal Rate. The Long-Term Debt Fee income is generally used to cover operation, maintenance, and repair (OM&R), bonding, and any long-term debt costs.

3.5 Special Assessment District Projects

The proposed project does not create a Special Assessment District (SAD) within the Village.

4. Selected Alternatives

Performing system improvements identified in the AMP is the most feasible alternative. Since the No-Action option does not solve the issues that exist in the project scope area, that alternative was not selected. Optimization of current infrastructure also was not selected since it does not resolve the issues and contributes to the continuing deterioration of the system. Finally, Regionalization was not selected because there is not another system to combine with due to the geographic location of the Village's system. The selected alternative would include the following major elements:

- Lift Station Improvements
- Manhole Replacement
- Manhole Repair/Lining
- Sanitary Sewer Main Replacement
- Sanitary Sewer Lining
- Removing CSO Locations
- Rose Island Sanitary Sewer Expansion

The expected cost of this selected alternative is \$6.4 million with contingencies. Figures 1 and 2 in Appendix A show the layout of the proposed project. The major elements are discussed in further detail within the Design Parameters section.

4.1 Design Parameters

4.1.1 *Lift Station Improvements*

4.1.1.1 Lift Station #1 – Old WWTP Station

Completely remove and reconstruct lift station. Replace and upgrade all components of lift station to Ten States Standards. Components will be replaced in kind.

4.1.1.2 Lift Station #2 – Main Station

Replace two (2) 700 GPM pumps, two (2) 2,200 GPM pumps, and wet well transfer pump with operable, more efficient pumps of the same size. VFD's will be installed on the 2,200 GPM pumps.

4.1.1.3 Lift Station #3 – River and Lake Street Station

Completely remove and reconstruct lift station. Replace and upgrade all components of lift station to Ten States Standards. Components will be replaced in kind.

4.1.1.4 Lift Station #5 – Zinc Street Station

Upgrade control panel to current standards.

4.1.2 Manhole Replacement

Manholes replaced will be precast concrete and replace in kind.

4.1.3 Manhole Repair/Lining

Manhole repair design will be on a per case basis, using the recommendations of the AMP as a guideline. Manhole lining design will be based upon the recommendations of the AMP.

4.1.4 Sanitary Sewer Main Replacement

The sanitary sewer main that will be replaced consists of 13 segments; three segments that are 8" vitrified clay pipe (VCP), three segments that are 8" polyvinyl chloride pipe (PVC), one segment that is 8" Asbestos Cement pipe, one segment that is 8" concrete pipe (non-reinforced), one segment that is 10" VCP, one segment that is 10" Asbestos Cement pipe, one segment that is 10" Truss pipe, two segments that are 12" VCP, and one segment that is 12" PVC. All sanitary sewer main will be replaced with SDR-26 PVC pipe of the same diameter as the existing sewer main. Replacement location and length are below:

- Between River Street and Pennsylvania Avenue – 420 LFT
- Copper Street – 140 LFT
- Tin Street – 70 LFT
- Parker Avenue – 140 LFT
- Michigan Avenue – 140 LFT
- Between Lake Street and Ontonagon Street – 70 LFT
- Amygdaloid Street – 280 LFT
- Houghton Street – 210 LFT
- Michigan Street – 140 LFT
- W. Mercury Street – 140 LFT
- Zinc Street – 350 LFT

- Payne Street – 280 LFT
- S. 4th Street – 420 LFT

4.1.5 Sanitary Sewer Lining:

Design and implementation of sanitary sewer lining will be based upon recommendations from the AMP.

4.1.6 Removing CSO Locations:

CSO removal will be designed on a per case basis.

4.1.7 Rose Island Sanitary Sewer Expansion:

Expansion will be 8” SDR-26 gravity main to a small grinder pump station located on Village property in the middle of the Island. A 4” force main will transport the sewage under the channel and onto the mainland. Once on the mainland, the sanitary sewer will go back to 8” gravity main and will tie into an existing sanitary manhole. A preliminary map is provided on Figure 10 in Appendix A.

4.2 Useful Life

Due to the fact that this project contains multiple components with different useful lives, a weighted useful life calculation was developed to determine the overall useful life of the project. A summary of the useful life calculation is shown below. References to useful life estimates can be provided upon request.

Table 4.2.1: Summary of Useful Life			
Item	Estimated Cost	Useful Life	Weighted Useful Life
Lift Station #1 – Improvements	\$ 315,000	20 Years	1.53 Years
Lift Station #2 – Improvements	\$ 430,500	20 Years	2.10 Years
Lift Station #3 – Improvements	\$ 315,000	20 Years	1.53 Years
Lift Station#5 – Improvements	\$ 73,500	20 Years	0.36 Years
Manhole Replacement	\$ 66,985	50 Years	0.82 Years
Manhole Repair/Lining	\$ 147,000	20 Years	0.72 Years
Sewer Main Replacement	\$ 1,157,845	100 Years	28.19 Years
Sewer Main Lining	\$ 923,975	50 Years	4.50 Years
Rose Island – Lift Station	\$ 150,000	30 Years	1.10 Years
Rose Island – Backup Generator	\$ 70,000	30 Years	0.51 Years
Rose Island - Manholes	\$ 25,000	50 Years	0.30 Years
Rose Island – Sanitary Sewer	\$ 381,524	100 Years	9.29 Years
Remove CSO Locations	\$ 50,715	20 Years	0.25 Years
Weighted Useful Life			51 Years

4.3 Project Maps

The Project area is located within the Village limits. The majority of which is located east of the Ontonagon River and north of M-64. A map indicating the locations of work for the selected alternative is included on Figures 1 and 2 located in Appendix A.

4.4 Water and Energy Efficiency

Removing and replacing the old, outdated lift station pumps with new energy efficient pumps would improve the reliability of the sanitary system and reduce energy consumption and operating cost for the Village.

Reducing infiltration and inflow through sanitary sewer replacement and lining would increase the efficiency of the system because the amount of clear water entering the lagoons would be decreased. Therefore, creating more lagoon capacity and promoting a better treatment process.

4.5 Schedule for Design and Construction

Based on the timeline for the EGLE SRF application process, it is anticipated that the design for the proposed selected alternatives will begin in the fall of 2023. It is expected that the project will occur during Quarter 4 of EGLE’s Fiscal Year 2024 Financing Schedule. Construction will begin in September of 2024 and be completed in November 2025. A detailed project timeline is provided below:

Table 4.5.1: Schedule for Design and Construction	
Activity	Completion Date
Approval of Project Plan and Resolution of Adoption	April 24, 2023
Final Project Plan Submittal	May 1, 2023
Begin Design of Project	October 2023
Complete Design of Project	May, 2024
Begin Construction	September 2024
Complete Construction	November 2025

4.6 Cost Summary

The estimated total project cost is approximately \$6.4 million. An engineering cost estimate is provided in Appendix D.

4.7 Implementability

Implementation of the Principal Alternative will be discussed at the Village Council Meeting on April 24, 2023.

5. Environmental and Public Health Impacts

5.1 Direct Impacts

5.1.1 Construction Impacts

The proposed project is not anticipated to impact any cultural or historical sites. This project will have no adverse impacts on surface water or groundwater quality or quantity. There are wetlands within the project area, in particular at the Rose Island expansion location. The project area is within the coastal zone of Lake Superior. A floodplain exists over portions of the project. Lake Superior and the Ontonagon River are considered “major surface waters.” See wetland, coastal zone, floodplain, and major surface water maps in Appendix A. The project area was reviewed by the United States Fish and Wildlife Service through their IPaC (Information for Planning and Consultation) system which confirmed that this project is “not likely to adversely affect” local threatened species. A copy of this document is in Appendix H. Due to these findings, we believe the need for further review through the Michigan Natural Features Inventory (MNFI) can be waived. There will be no impact on agricultural land.

The first portion of the project consist of lift station improvements. Work surrounding these improvements will be taking place in the immediate vicinity of the lift station. Increased noise and equipment in the area of the lift station is expected.

The second portion of the project consists of replacing, repairing, and relining portions of the existing sanitary system. Construction activities related to sanitary sewer replacement will occur within road right-of-way. Typical construction related impacts will occur during the proposed project which include excessive noise, dust, traffic detours, etc.

The third portion of the project is an expansion of the sanitary sewer system to Rose Island. Construction impacts to the island that have not been mentioned previously include clearing and grubbing the area where sanitary sewer will be laid, directional boring of a new force main under the channel between Rose Island and the Village mainland, and construction activities occurring on private property in order to connect the residents to the new sanitary sewer main. Dewatering is also expected during construction within the limits of project area.

5.1.2 Operational Impacts

The proposed project will improve multiple facets of the wastewater system. First, is improving the efficiency of four (4) lift stations. This would be achieved by upgrading the pumps, piping, valves, electrical and control systems in the lift stations. Second, overall reliability of the collection system would be increased by repairing and replacing damaged portions of sanitary sewer main. Therefore, reducing the probability of a system failure.

5.1.3 Social Impacts

This project will enhance the Village's existing infrastructure, making it more reliable and safer. Therefore, improving the community's outlook on their utilities. No negative impacts are anticipated for community businesses. Rate increases are anticipated, which may result in a temporary negative social impact.

New users on Rose Island will begin to receive a sanitary sewer bill from the Village, which may result in a temporary negative social impact. Though, this potential negative impact may be mitigated because of the reduced maintenance involved with a user's sanitary system when it is part of the Village's sanitary sewer and not a stand-alone septic system.

Due to the construction efforts required to implement the selected alternative, there is potential for a short-term beneficial impact in the employment market since the Contractor may hire local equipment operators, laborers, etc. to complete the system improvements. In addition, the selected alternative will provide short-term beneficial impacts to local suppliers of goods and services related to the construction project.

5.2 Indirect Impacts

The proposed improvements are not intended to promote additional growth within the Village. Therefore, no indirect impacts are anticipated with completion of this project.

- Changes in rate, density, or type of development are expected to occur. The selected alternatives will provide sanitary sewer to six new users. User's impact to the system will be minimal.
- Changes in land use are not planned to occur in the project plan area.
- Changes in air or water quality stemming from development including impacts from increased traffic are not expected to occur because of the selected alternatives.
- Changes to the natural areas and sensitive species or ecosystems due to secondary growth are not expected to occur with the selected alternatives.
- No impacts are anticipated on cultural, human, social, and economic resources.
- Changes to aesthetics aspects of the community will be minimal. These changes will be the result of road removal/reconstruction as a result of sanitary sewer replacement/repair and manhole installation. Clearing and grubbing will be an aesthetic aspect that will be a result of the Rose Island sanitary expansion. But this aspect will be resolved by turf and site restoration that will bring the disturbed area back to its original state.
- Resource consumption over the useful life of the projects is not expected to change.

5.3 Cumulative Impacts

Environmental impacts will not increase in magnitude over time as a result of the proposed project. However, if no action is taken, the environmental impacts will increase over time because of the condition that the sanitary system is in. A system failure will be worse to the community and environment as time goes on.

6. Mitigation

6.1 Short-Term Construction-Related Mitigation

6.1.1 General Construction

Construction mitigation measures for the Clean Water project include employing a water truck to spray periodically throughout the day. Hence, helping to minimize the amount of dust generated from construction activities. A second mitigation measure for general construction is working only select hours during the day to minimize noise in the community. Lastly, establishing traffic detours to mitigate pedestrian/construction interface.

Silt fence and straw bales would be installed around the project area on Rose Island to help mitigate soil erosion. Traffic control would also be implemented to allow residents to access their businesses and homes. Construction mats potentially will be used to prevent construction equipment from sinking into the soil and becoming stuck. This obviously depends on the condition of the soil on the Island. Turf and site restoration will take place where clearing and grubbing have occurred. Hence, bringing the disturbed area back to its original state.

6.2 Mitigation of Long-Term Impacts

6.2.1 Siting Decisions

Existing facilities will remain at current locations. Long-term project impacts are not expected with respect to siting.

6.2.2 Operational Impacts

Long-term operational impacts are not expected.

6.3 Mitigation of Indirect Impacts

6.3.1 Master Plan and Zoning

There are no significant changes in land use associated with the proposed project that will affect master planning or zoning in the Village.

6.3.2 Ordinances

There will be no changes in ordinances as a result of the proposed project.

6.3.3 *Staging of Construction*

The construction contract documents will provide direction to the proposed contractor on requirements for staging or phasing of construction. Construction staging will occur to ensure that when critical equipment is taken offline there are measures taken to reduce or prevent disruptions to the systems.

7. Public Participation

On August 26, 2022, GEI conducted an onsite meeting with the Village Manager and Director of Public Works to discuss the status of their infrastructure and a possible Intent to Apply (ITA) for the State Revolving Fund.

On August 29, 2022, the Village's ITA was submitted to EGLE.

On December 6, 2022, a revision to the Intent to Apply (ITA) was presented to the Village Manager by GEI for approval.

On December 21, 2022, the revised ITA was submitted to EGLE.

On January 9, 2023, the required Project Plan proposal and description were presented to the Village Council by GEI for approval during a public Council Meeting.

The following sections describe how the public was kept informed on the project and how their input was used to select the proposed alternative.

7.1 Public Meeting

A formal public hearing will be held on April 24, 2023, at 5:00 pm Eastern Time at the Ontonagon Village Hall. Attendees from the public will be documented and included in Appendix I. This meeting is open to the public.

7.2 Public Meeting Advertisement

The public was notified about the hearing over fifteen (15) days in advance on April 5, 2023, through the local newspaper (Appendix I).

7.3 Public Meeting Summary

To be Determined

7.4 Adoption of the Project Plan Document

To be Determined

Appendix A

Maps and Figures

Figure 1 – Proposed Project Layout – North of M-64

Figure 2 – Proposed Project Layout – South of M-64

Figure 3 – SRF Eligible Sanitary Manholes

Figure 4 – SRF Eligible Sanitary Gravity Main

Figure 5 – Wetlands Map

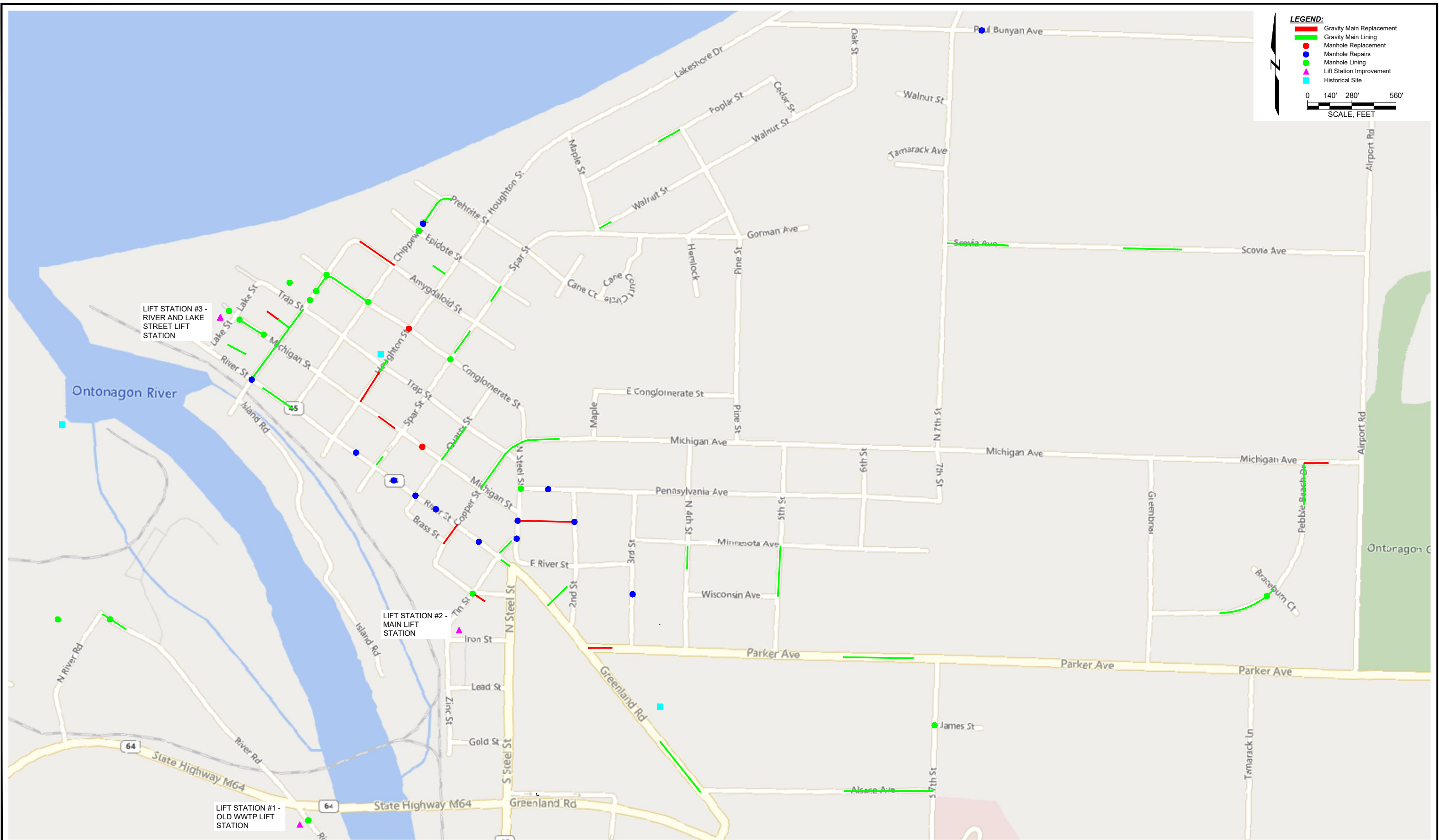
Figure 6 – Coastal Zone Map

Figure 7 – Floodplain Map

Figure 8 – Major Surface Water Map

Figure 9 – Topography Map

Figure 10 – Rose Island Sanitary Sewer Expansion



SOURCE:
1. PLAN BASED ON MAP PREPARED BY J. RECK / R. WARD

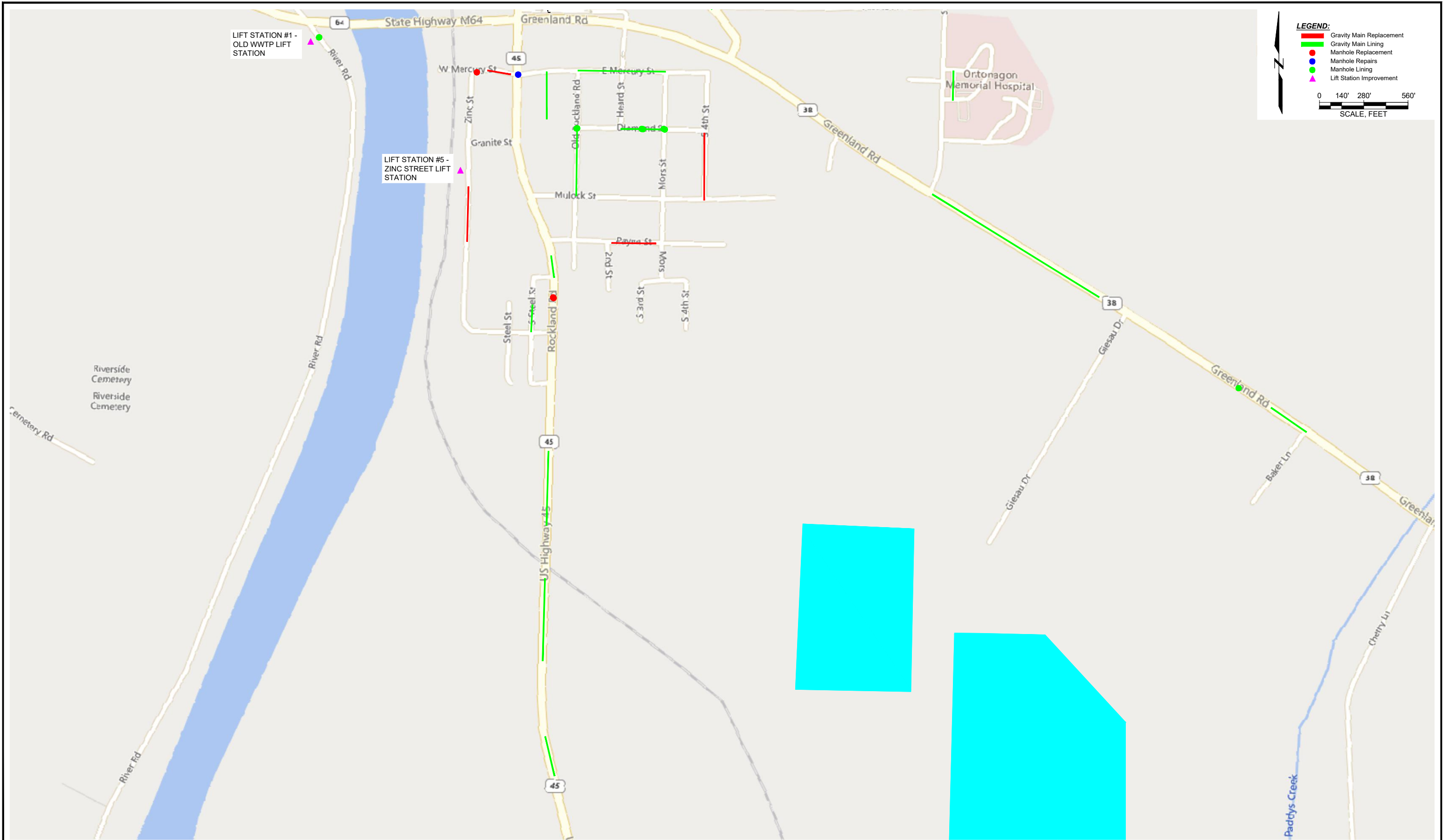
Sanitary Sewer Improvements
Project Plan
Ontonagon, MI

Village of Ontonagon
Ontonagon, MI



PROPOSED PROJECT LAYOUT
NORTH OF M-64

Fig. 1



LEGEND:

- Gravity Main Replacement
- Gravity Main Lining
- Manhole Replacement
- Manhole Repairs
- Manhole Lining
- ▲ Lift Station Improvement

0 140' 280' 560'
SCALE, FEET

SOURCE:
1. PLAN BASED ON MAP PREPARED BY J.RECK / R.WARD

Sanitary System Improvements
Project Plan
Ontonagon, MI

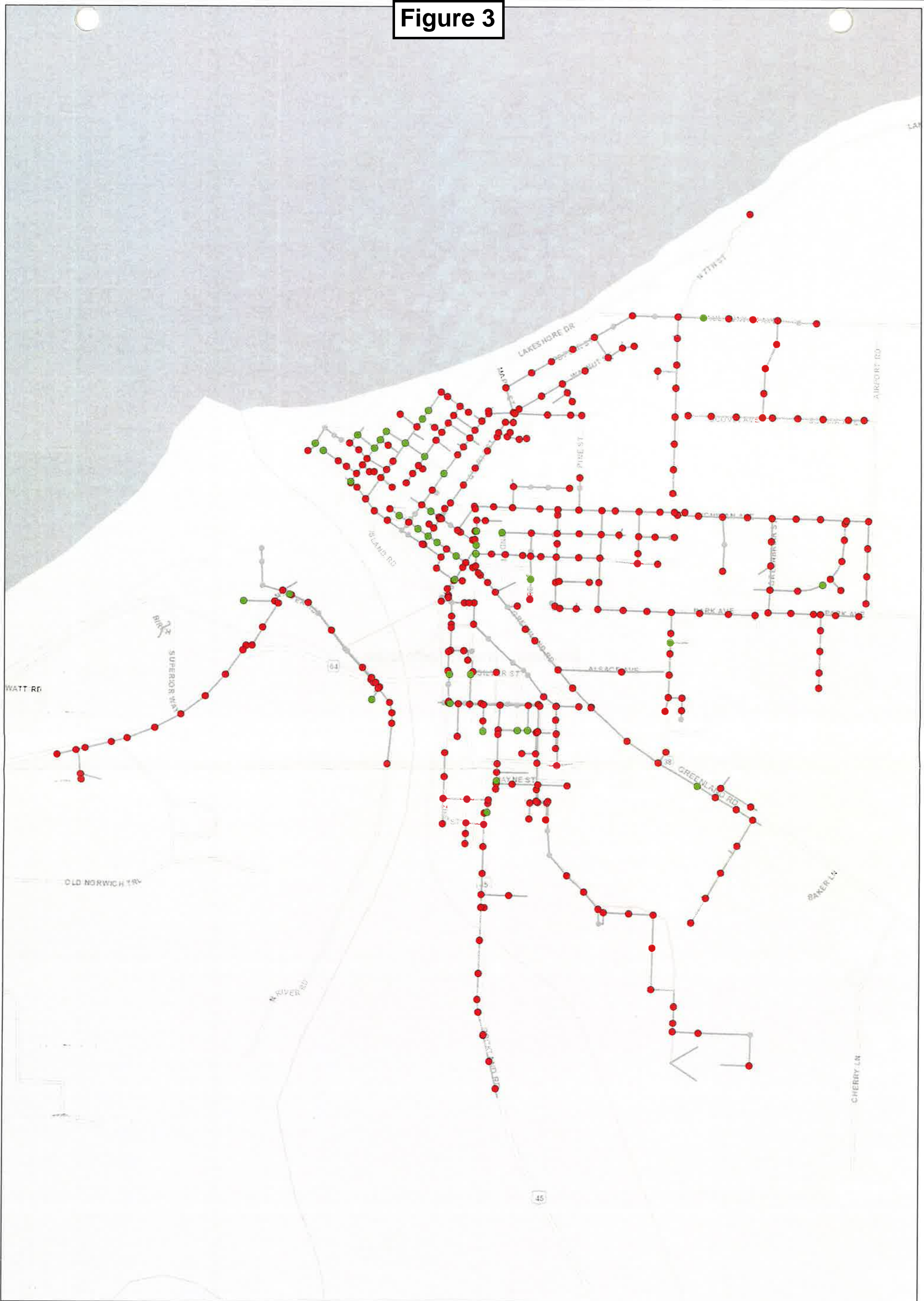
Village of Ontonagon
Ontonagon, MI



PROPOSED PROJECT LAYOUT
-
SOUTH OF M-64

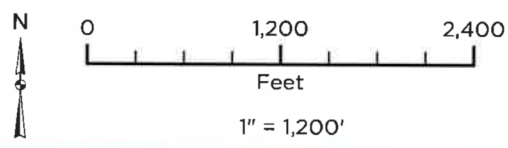
Project 2300109 MAY 2023 Fig. 2

Figure 3



Village of Ontonagon Sanitary Sewer SRF Eligible Sanitary Manholes

- Eligible
- Not Eligible
- Not Rated
- Sanitary Main



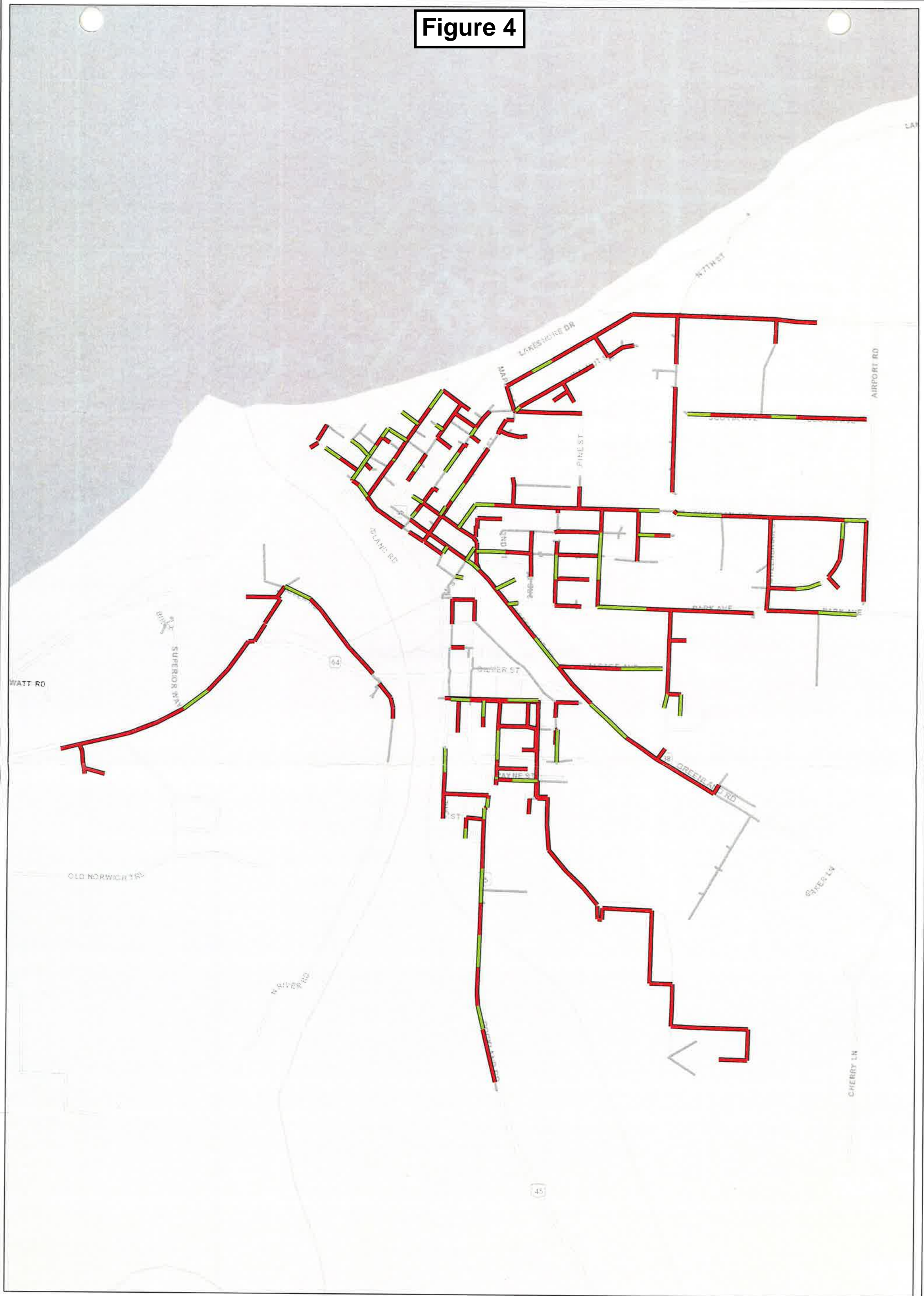
Source: Data provided by Village of Ontonagon and ESRI. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan North FIPS 2111 Feet

Map Published: November 13, 2018

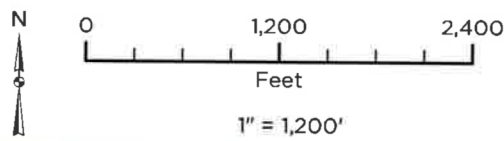


Figure 4



Village of Ontonagon Sanitary Sewer SRF Eligible Sanitary Gravity Main

- Eligible
- Ineligible
- Not Rated
- Pressurized Main

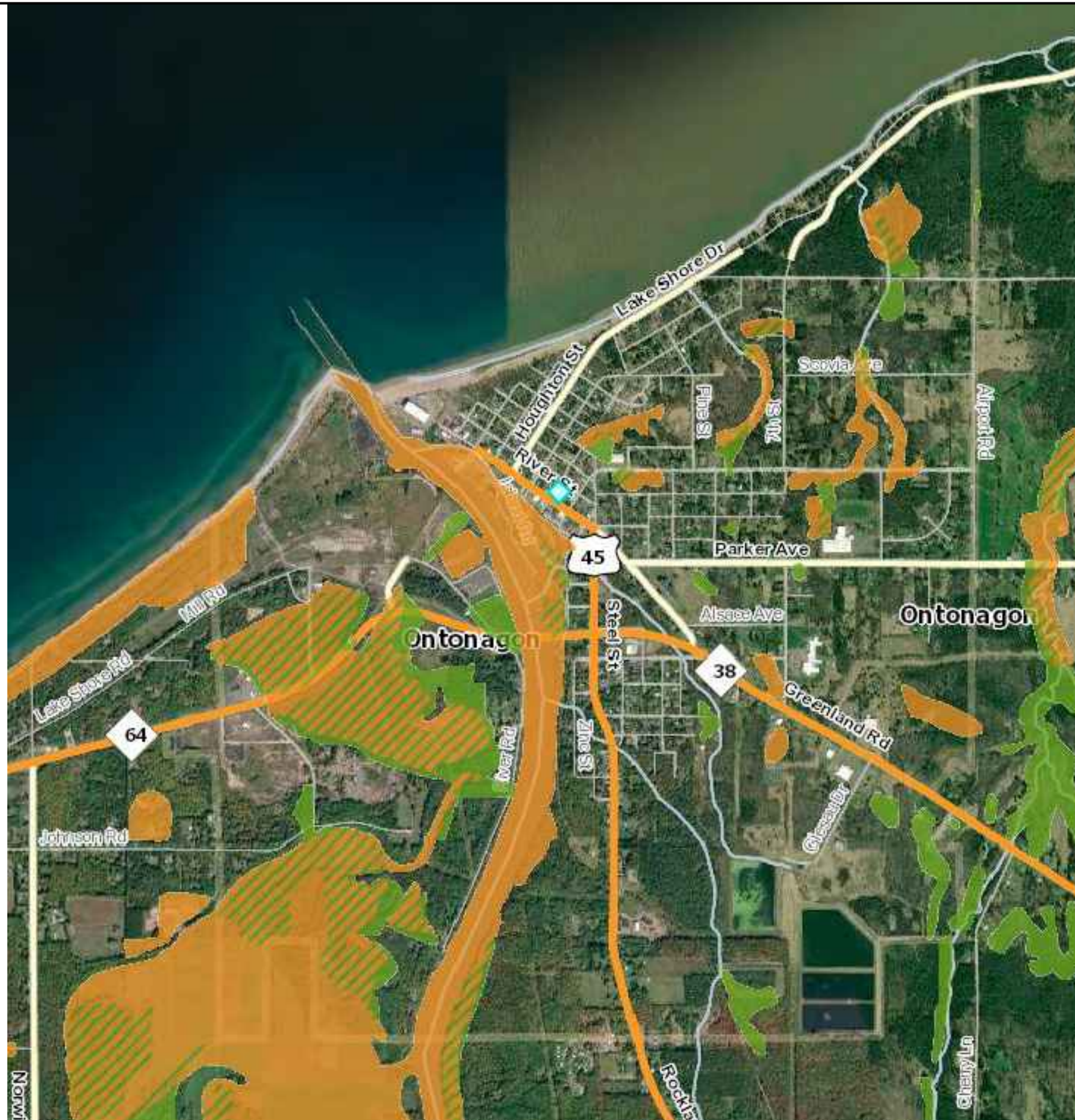


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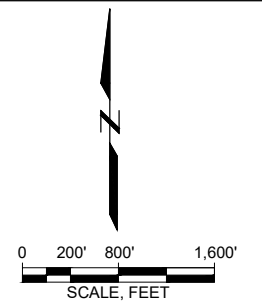
Coordinate System: NAD 1983 StatePlane Michigan North FIPS 2111 Feet

Map Published: November 13, 2018





- LEGEND**
- Part 303 Final Wetlands Inventory
- Wetlands as identified on NWI and MIRIS maps
 - Soil areas which include wetland soils
 - ▨ Wetlands as identified on NWI and MIRIS maps and soil areas which include wetland soils



Sanitary Sewer Improvements
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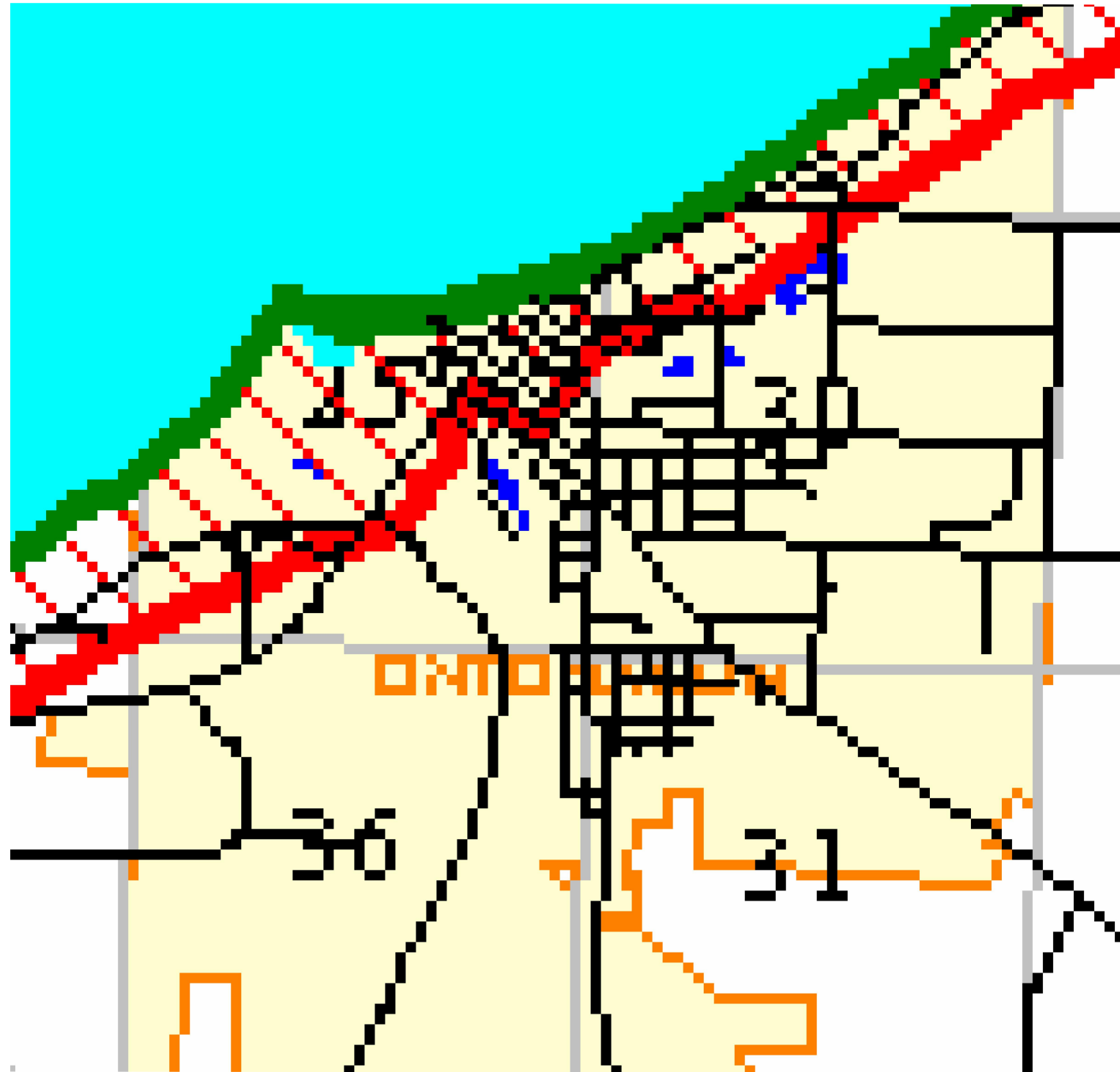
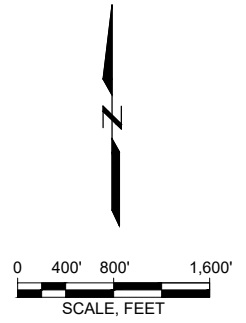
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Ontonagon, MI




**WETLANDS
MAP**

Project 2300109 May 2023

The heavy red line is the **Coastal Zone Management Boundary**
The red hatched area is the **Coastal Zone Management Area**



Sanitary Sewer Improvements Project Plan Ontonagon, MI		COASTAL ZONE MAP
Village of Ontonagon Ontonagon, MI		Project 2300109 May 2023 Fig. 6



KEY TO MAP

500-Year Flood Boundary ———

100-Year Flood Boundary ———

Zone Designations

100-Year Flood Boundary ———

500-Year Flood Boundary ———

Base Flood Elevation Line With Elevation In Feet** ———

Base Flood Elevation In Feet Where Uniform Within Zone** (EL 507)

Elevation Reference Mark ———

Zone D Boundary ———

River Mile ———

**Referenced to the National Geodetic Vertical Datum of 1929

***EXPLANATION OF ZONE DESIGNATIONS**

ZONE	EXPLANATION
A	Area of 100-year flood base flood elevations and flood hazard factors not determined.
A5	Area of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Area of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Area of 100-year flood to be protected by flood protection system (under construction); base flood elevations and flood hazard factors are determined.
B	Area between limits of the 100-year flood and 500-year flood or areas open subject to 100-year flooding with average depth less than one (1) foot or where the overlying drainage area is less than one square mile or area protected by levees from the base flood. (Medium shading)
C	Area of minimal flooding. (No shading)
D	Area of undetermined, but possible, flood hazards.
V	Area of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Area of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all potential features outside special flood hazard areas.

REVISION HISTORY:

INITIAL REVISIONS: MAY 26, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS: DECEMBER 15, 1974

FLOOD INSURANCE RATE MAP EFFECTIVE: NOVEMBER 2, 1983

FLOOD INSURANCE RATE MAP REVISIONS:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to areas in the areas where elevation or depth have been established.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program, at (800) 638-6023.

APPROXIMATE SCALE

500 1000 1500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

VILLAGE OF
ONTONAGON,
MICHIGAN
ONTONAGON COUNTY

(ONLY PANEL PRINTED)

COMMUNITY-PANEL NUMBER
260309 0001 B

EFFECTIVE DATE:
NOVEMBER 2, 1983

Federal Emergency Management Agency

Sanitary Sewer Improvements
Project Plan
Ontonagon, MI

Village of Ontonagon
Ontonagon, MI



FLOODPLAIN MAP

May 2023

Fig. 7



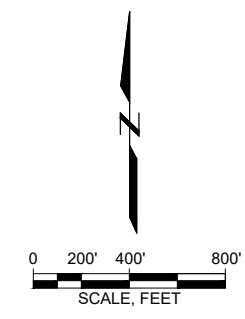
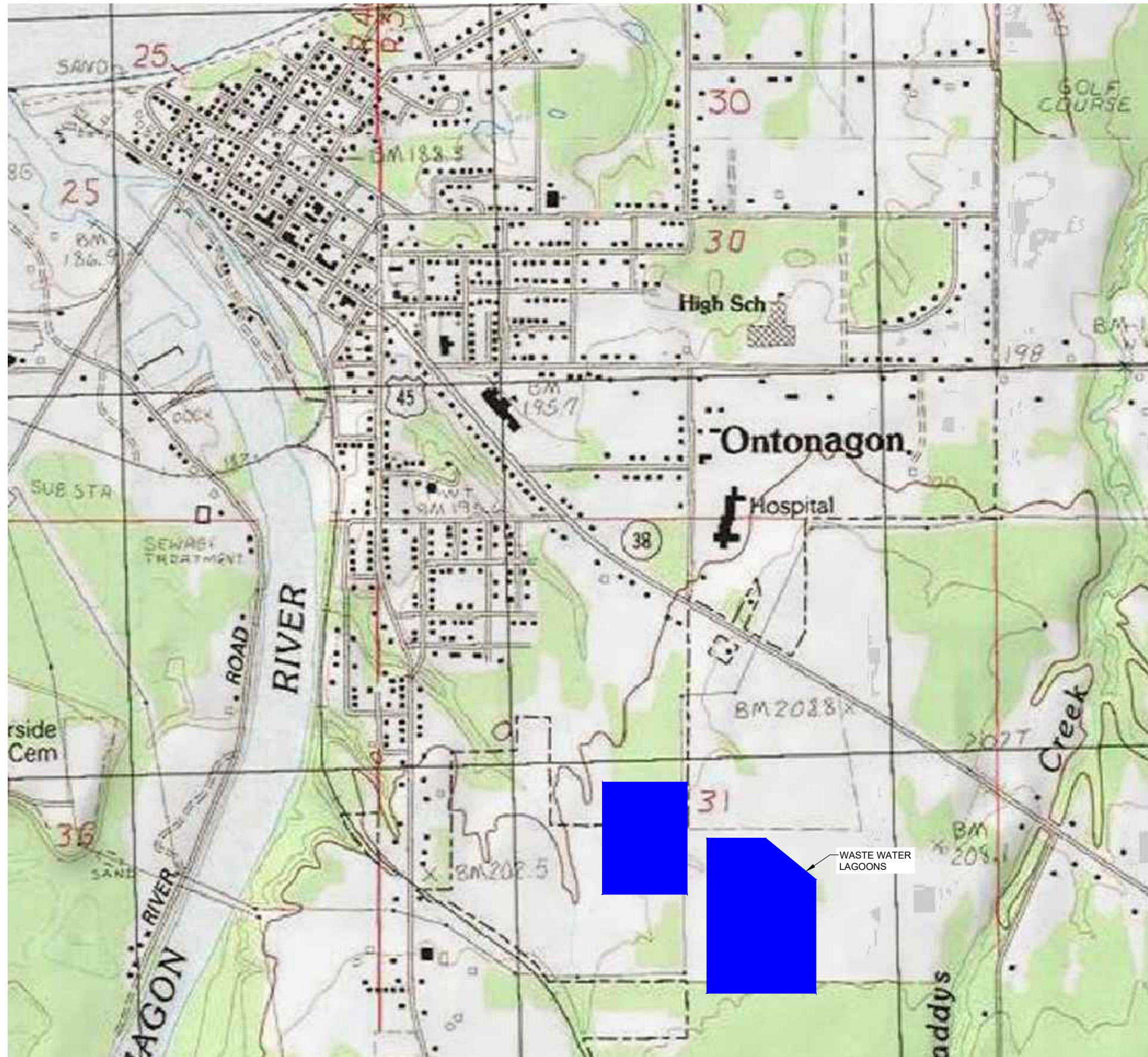
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 Ontonagon, MI


Village of Ontonagon
 Ontonagon, MI



MAJOR SURFACE
 WATER MAP

Project 2300109 May 2023



Sanitary Sewer Improvements Project Plan Ontonagon, MI	 GEI Consultants	TOPOGRAPHY MAP
Village of Ontonagon Ontonagon, MI		



Sanitary Sewer Improvements
 Project Plan
 Ontonagon, MI

Village of Ontonagon
 Ontonagon, MI



ROSE ISLAND
 SANITARY SEWER
 EXPANSION

Project 2300109 May 2023 Fig. 10

Appendix B

Soil Survey Report



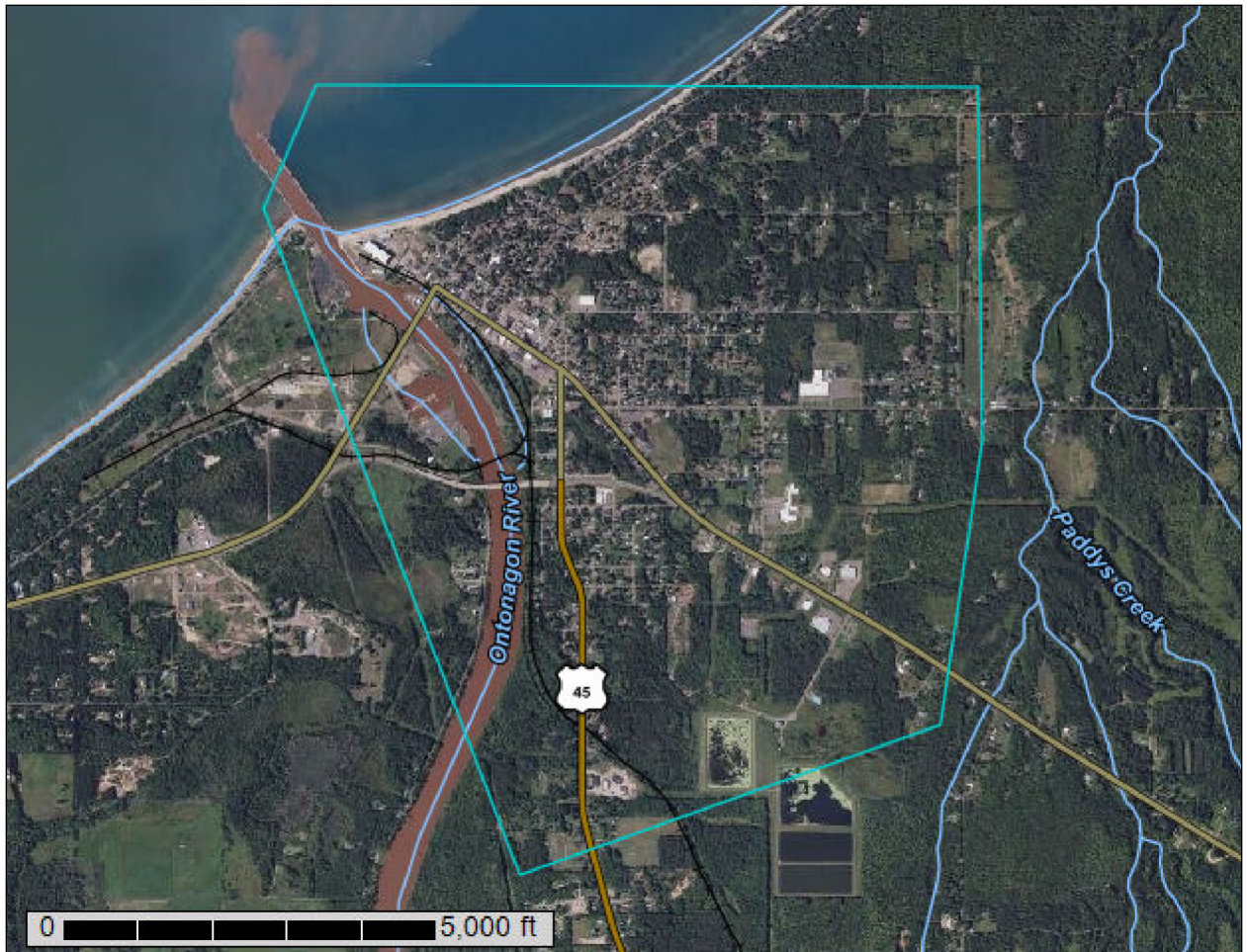
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Ontonagon County, Michigan



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

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scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

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 1:24,000.

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: Ontonagon County, Michigan
 Survey Area Data: Version 13, Aug 29, 2022

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

Date(s) aerial images were photographed: Aug 11, 2020—Sep 18, 2020

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
14B	Annalake loam, 0 to 4 percent slopes	452.5	24.9%
14D	Annalake loam, 4 to 18 percent slopes	9.6	0.5%
16A	Arnheim mucky silt loam, 0 to 1 percent slopes, frequently flooded	35.0	1.9%
20B	Belding fine sandy loam, 0 to 4 percent slopes	8.2	0.5%
29A	Croswell sand, 0 to 3 percent slopes	44.4	2.4%
36A	Ingalls loamy fine sand, 0 to 3 percent slopes	127.5	7.0%
48A	Histosols and Aquents, 0 to 1 percent slopes, ponded	23.6	1.3%
50D	Kalkaska sand, 6 to 15 percent slopes	6.2	0.3%
57B	Liminga fine sand, 1 to 8 percent slopes	3.2	0.2%
57D	Liminga fine sand, 8 to 15 percent slopes	13.1	0.7%
59A	Lupton and Tawas mucks, 0 to 1 percent slopes	3.2	0.2%
63B	Moquah-Arnheim complex, 0 to 3 percent slopes, frequently flooded	4.9	0.3%
67B	Nonesuch loam, 1 to 6 percent slopes, very stony	131.5	7.2%
90A	Deford-Tawas complex, 0 to 1 percent slopes	18.3	1.0%
93B	Loggerhead loam, 1 to 8 percent slopes	25.1	1.4%
94A	Udorthents, loamy, nearly level	205.6	11.3%
100B	Flintsteel loam, 1 to 8 percent slopes	33.3	1.8%
101B	Big Iron silt loam, 0 to 4 percent slopes	127.4	7.0%
102A	Trap Falls clay loam, 0 to 1 percent slopes	8.5	0.5%
108A	Greenstone silt loam, 0 to 3 percent slopes	8.2	0.5%
109	Dumps, sanitary landfill	4.4	0.2%
119A	Moquah loam, 0 to 3 percent slopes, occasionally flooded	45.1	2.5%

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Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
121B	Deer Park sand, 0 to 6 percent slopes	145.7	8.0%
123A	Mishwabic silt loam, 0 to 2 percent slopes	3.6	0.2%
124F	Zandi loamy very fine sand, 35 to 70 percent slopes	21.5	1.2%
129F	Karlin-Sporley complex, 1 to 70 percent slopes	37.5	2.1%
8307	Lupton and Cathro soils, 0 to 1 percent slopes	1.0	0.1%
8309	Cathro muck, drainageway, 0 to 1 percent slopes	5.9	0.3%
MW	Miscellaneous water	26.8	1.5%
W	Water	84.6	4.7%
Totals for Area of Interest		1,817.4	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Ontonagon County, Michigan

14B—Annalake loam, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: 1kwhf
Elevation: 590 to 1,800 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Annalake and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Annalake

Setting

Landform: Outwash terraces, outwash plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Stratified loamy glaciofluvial deposits

Typical profile

Ap - 0 to 9 inches: loam
Bs - 9 to 16 inches: fine sandy loam
E and Bt1 - 16 to 31 inches: stratified loamy very fine sand to silt loam to loamy fine sand
E and Bt2 - 31 to 48 inches: stratified sand to fine sand to loamy fine sand to silt loam
B and Et - 48 to 61 inches: stratified sand to fine sand to loamy fine sand to silt loam
C - 61 to 80 inches: stratified fine sand to loamy fine sand to silt loam to silt

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R092XY014WI - Loamy Uplands

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Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Acer Tsuga
Dryopteris (ATD_1)
Hydric soil rating: No

Minor Components

Manido

Percent of map unit: 5 percent
Landform: Till-floored lake plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R092XY013WI - Sandy Uplands
Other vegetative classification: Tsuga Maianthemum Coptis (TMC_1)
Hydric soil rating: No

Loggerhead

Percent of map unit: 5 percent
Landform: Till plains
Landform position (two-dimensional): Summit, shoulder, backslope, footslope,
toeslope
Landform position (three-dimensional): Interfluve, head slope, nose slope, side
slope, base slope, crest
Down-slope shape: Linear
Across-slope shape: Convex, linear
Ecological site: R092XY014WI - Loamy Uplands
Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Acer Tsuga
Dryopteris (ATD_1)
Hydric soil rating: No

Wainola

Percent of map unit: 5 percent
Landform: Outwash plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R092XY010WI - Moist Sandy Lowlands
Other vegetative classification: Tsuga Maianthemum Coptis - Vaccinium (TMC-
Vac_1)
Hydric soil rating: No

14D—Annalake loam, 4 to 18 percent slopes

Map Unit Setting

National map unit symbol: 1kwhg
Elevation: 590 to 1,800 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

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Map Unit Composition

Annalake and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Annalake

Setting

Landform: Outwash terraces, outwash plains

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope

Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, crest, base slope

Down-slope shape: Convex, linear

Across-slope shape: Concave, convex

Parent material: Stratified loamy glaciofluvial deposits

Typical profile

Ap - 0 to 9 inches: loam

Bs - 9 to 16 inches: fine sandy loam

E and Bt1 - 16 to 31 inches: stratified loamy very fine sand to silt loam to loamy fine sand

E and Bt2 - 31 to 48 inches: stratified sand to fine sand to loamy fine sand to silt loam

B and Et - 48 to 61 inches: stratified sand to fine sand to loamy fine sand to silt loam

C - 61 to 80 inches: stratified fine sand to loamy fine sand to silt loam to silt

Properties and qualities

Slope: 4 to 18 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)

Depth to water table: About 30 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C

Ecological site: R092XY014WI - Loamy Uplands

Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Acer Tsuga Dryopteris (ATD_1)

Hydric soil rating: No

Minor Components

Loggerhead

Percent of map unit: 5 percent

Landform: Till plains

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope

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Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, crest, base slope

Down-slope shape: Linear

Across-slope shape: Convex, linear

Ecological site: R092XY014WI - Loamy Uplands

Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Acer Tsuga Dryopteris (ATD_1)

Hydric soil rating: No

Manido

Percent of map unit: 5 percent

Landform: Till-floored lake plains

Landform position (three-dimensional): Rise

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: R092XY013WI - Sandy Uplands

Other vegetative classification: Tsuga Maianthemum Coptis (TMC_1)

Hydric soil rating: No

Ingalls

Percent of map unit: 5 percent

Landform: Lake plains

Landform position (three-dimensional): Rise

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: R092XY011WI - Moist Loamy Lowlands

Other vegetative classification: Tsuga Maianthemum Coptis - Dryopteris (TMC-D_1)

Hydric soil rating: No

16A—Arnheim mucky silt loam, 0 to 1 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 1kwhl

Elevation: 590 to 1,800 feet

Mean annual precipitation: 25 to 34 inches

Mean annual air temperature: 37 to 43 degrees F

Frost-free period: 100 to 140 days

Farmland classification: Not prime farmland

Map Unit Composition

Arnheim and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arnheim

Setting

Landform: Flood plains

Parent material: Loamy alluvium

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Typical profile

A - 0 to 5 inches: mucky silt loam

Cg - 5 to 10 inches: silt loam

C - 10 to 80 inches: stratified very fine sandy loam to silt loam to loamy fine sand to fine sandy loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)

Depth to water table: About 0 inches

Frequency of flooding: FrequentNoneOccasional

Frequency of ponding: Frequent

Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7w

Hydrologic Soil Group: B/D

Ecological site: R092XY005WI - Wet Floodplains

Other vegetative classification: Fraxinus Impatiens (FI_1), Fraxinus Mentha Carex (FMC_1)

Hydric soil rating: Yes

Minor Components

Moquah

Percent of map unit: 8 percent

Landform: Flood plains

Landform position (three-dimensional): Rise

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: R092XY004WI - Seasonally Dry Floodplains

Other vegetative classification: Acer Osmorhiza Caulophyllum (AOC), Acer-Viola-Osmorhiza (AVO_2)

Hydric soil rating: No

Cathro

Percent of map unit: 5 percent

Landform: Drainageways, depressions, swamps

Ecological site: F090AY002WI - Mucky Swamp

Other vegetative classification: Fraxinus Impatiens (FI_1), Tsuga-Thuja-Mitella (TTM_2)

Hydric soil rating: Yes

Schaat creek

Percent of map unit: 2 percent

Landform: Flood plains

Landform position (three-dimensional): Talf

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: R092XY005WI - Wet Floodplains

Other vegetative classification: Fraxinus Mentha Carex - Caltha (FMC-C)

Hydric soil rating: Yes

20B—Belding fine sandy loam, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: 1kwhp
Elevation: 590 to 1,800 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Belding and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Belding

Setting

Landform: Ground moraines
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy till over fine-loamy till

Typical profile

Oa - 0 to 1 inches: highly decomposed plant material
A1 - 1 to 4 inches: fine sandy loam
A2 - 4 to 9 inches: fine sandy loam
E - 9 to 14 inches: fine sandy loam
Bs1 - 14 to 19 inches: fine sandy loam
Bs2 - 19 to 22 inches: fine sand
2Bt - 22 to 34 inches: silty clay loam
2BCd - 34 to 36 inches: silty clay loam
2Cd - 36 to 80 inches: silty clay loam

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: 30 to 60 inches to densic material
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water supply, 0 to 60 inches: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: R092XY011WI - Moist Loamy Lowlands
Other vegetative classification: Tsuga Maianthemum Coptis - Dryopteris (TMC-D_1), Acer Viola Osmorhiza - Circaea Impatiens (AVO-CI_3)
Hydric soil rating: No

Minor Components

Loggerhead

Percent of map unit: 5 percent
Landform: Till plains
Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, base slope, crest
Down-slope shape: Linear
Across-slope shape: Convex, linear
Ecological site: R092XY014WI - Loamy Uplands
Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Acer Tsuga Dryopteris (ATD_1)
Hydric soil rating: No

Trap falls

Percent of map unit: 5 percent
Landform: Depressions on till plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R092XY007WI - Wet Loamy or Clayey Lowlands
Other vegetative classification: Fraxinus Impatiens (FI_1), Fraxinus Mentha Carex (FMC_1)
Hydric soil rating: Yes

Ubly

Percent of map unit: 5 percent
Landform: Till plains
Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, base slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Concave, convex
Ecological site: R092XY014WI - Loamy Uplands
Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Acer Tsuga Dryopteris (ATD_1)
Hydric soil rating: No

29A—Croswell sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2xtn4
Elevation: 570 to 1,800 feet
Mean annual precipitation: 28 to 37 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 80 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Croswell and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Croswell

Setting

Landform: Flats, terraces, flats
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Convex, linear
Parent material: Sandy glaciofluvial deposits

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
E - 2 to 4 inches: sand
Bs1 - 4 to 8 inches: sand
Bs2 - 8 to 18 inches: sand
BC - 18 to 31 inches: sand
C - 31 to 79 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Ecological site: F093BY007MI - Sandy Uplands
Forage suitability group: Low AWC, adequately drained (G090AY002WI)

Custom Soil Resource Report

Other vegetative classification: Low AWC, adequately drained (G090AY002WI),
Acer rubrum-Quercus/Vaccinium (ArQV), Pinus/Maianthemum-Vaccinium
(PMV)
Hydric soil rating: No

Minor Components

Au gres

Percent of map unit: 8 percent
Landform: Flats, terraces, drainageways, flats
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Ecological site: F093BY005MI - Moist Lowlands
Other vegetative classification: Low AWC, high water table (G090AY001WI),
Tsuga-Maianthemum-Coptis/Tsuga-Maianthemum-Coptis, Vaccinium phase
(TMC/TMC-V)
Hydric soil rating: No

Rubicon

Percent of map unit: 5 percent
Landform: Beach ridges, hillslopes, flats
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, rise
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F093BY011MI - Dry Uplands
Other vegetative classification: Low AWC, adequately drained (G090AY002WI),
Acer-Quercus-Vaccinium/Quercus-Acer-Epigea (AQV/QAE)
Hydric soil rating: No

Kinross

Percent of map unit: 2 percent
Landform: Drainageways, depressions, drainageways, depressions
Down-slope shape: Linear, concave
Across-slope shape: Concave
Ecological site: F093BY004MI - Wet Lowlands
Other vegetative classification: Mod AWC, high water table (G090AY004WI), Not
Assigned (wet mineral soils) (Nmin)
Hydric soil rating: Yes

36A—Ingalls loamy fine sand, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 1kwj5
Elevation: 590 to 1,800 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Ingalls and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ingalls

Setting

Landform: Lake plains

Landform position (three-dimensional): Rise

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Sandy outwash over stratified lacustrine deposits

Typical profile

O_i - 0 to 1 inches: slightly decomposed plant material

O_e - 1 to 3 inches: moderately decomposed plant material

O_a - 3 to 5 inches: highly decomposed plant material

E - 5 to 13 inches: loamy fine sand

B_{s1} - 13 to 17 inches: loamy fine sand

B_{s2} - 17 to 26 inches: fine sand

BC - 26 to 43 inches: fine sand

2C - 43 to 80 inches: stratified very fine sand to loamy very fine sand to silt loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (K_{sat}): Moderately high (0.20 to 0.60 in/hr)

Depth to water table: About 12 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: A/D

Ecological site: R092XY011WI - Moist Loamy Lowlands

Other vegetative classification: Tsuga Maianthemum Coptis - Dryopteris (TMC-D_1)

Hydric soil rating: No

Minor Components

Wainola

Percent of map unit: 10 percent

Landform: Outwash plains

Landform position (three-dimensional): Rise

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: R092XY010WI - Moist Sandy Lowlands

Other vegetative classification: Tsuga Maianthemum Coptis - Vaccinium (TMC-Vac_1)

Custom Soil Resource Report

Hydric soil rating: No

Annalake

Percent of map unit: 3 percent

Landform: Outwash terraces, outwash plains

Landform position (three-dimensional): Rise

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: R092XY014WI - Loamy Uplands

Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Acer Tsuga Dryopteris (ATD_1)

Hydric soil rating: No

Tonkey

Percent of map unit: 1 percent

Landform: Depressions on till plains

Landform position (three-dimensional): Talf

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: R092XY007WI - Wet Loamy or Clayey Lowlands

Other vegetative classification: Fraxinus Impatiens (FI_1)

Hydric soil rating: Yes

Cathro

Percent of map unit: 1 percent

Landform: Drainageways, depressions, swamps

Ecological site: F090AY002WI - Mucky Swamp

Other vegetative classification: Fraxinus Impatiens (FI_1), Tsuga-Thuja-Mitella (TTM_2)

Hydric soil rating: Yes

48A—Histosols and Aquepts, 0 to 1 percent slopes, ponded

Map Unit Setting

National map unit symbol: 1kwjs

Elevation: 600 to 1,800 feet

Mean annual precipitation: 25 to 34 inches

Mean annual air temperature: 37 to 43 degrees F

Frost-free period: 100 to 140 days

Farmland classification: Not prime farmland

Map Unit Composition

Histosols, ponded, and similar soils: 60 percent

Aquepts, ponded, and similar soils: 40 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Histosols, Ponded

Setting

Landform: Marshes

Landform position (two-dimensional): Toeslope

Custom Soil Resource Report

Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear

Typical profile

Oa - 0 to 51 inches: muck
C - 51 to 80 inches: variable

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 6.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Very high (about 20.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: A/D
Ecological site: R092XY002WI - Mucky Swamps
Hydric soil rating: Yes

Description of Aquents, Pondered

Setting

Landform: Marshes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy or loamy alluvium

Typical profile

C - 0 to 80 inches: variable

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Ecological site: R092XY007WI - Wet Loamy or Clayey Lowlands
Hydric soil rating: Yes

50D—Kalkaska sand, 6 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2v8dr
Elevation: 570 to 1,970 feet
Mean annual precipitation: 28 to 37 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 80 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Kalkaska and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kalkaska

Setting

Landform: Beach ridges, hillslopes, hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Outwash

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
E - 1 to 5 inches: sand
Bhs - 5 to 9 inches: sand
Bs - 9 to 16 inches: sand
BC - 16 to 33 inches: sand
C - 33 to 79 inches: sand

Properties and qualities

Slope: 6 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: F093BY007MI - Sandy Uplands

Custom Soil Resource Report

Other vegetative classification: Acer-Tsuga-Dryopteris, Dryopteris phase (ATD-D)
Hydric soil rating: No

Minor Components

Keweenaw

Percent of map unit: 4 percent
Landform: Till plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F094DY012WI - Steep Loamy-Mantled Ridges
Other vegetative classification: Acer-Tsuga-Dryopteris, Dryopteris phase/Tsuga-Maianthemum (ATD-D/TM)
Hydric soil rating: No

Pence

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F094DY011WI - Loamy-Mantled Uplands
Other vegetative classification: Acer-Quercus-Vaccinium/Tsuga-Maianthemum-Vaccinium (AQV/TMV)
Hydric soil rating: No

Wallace

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F093BY007MI - Sandy Uplands
Other vegetative classification: Tsuga-Maianthemum (TM)
Hydric soil rating: No

Kinross

Percent of map unit: 2 percent
Landform: Depressions on lake plains, depressions
Landform position (three-dimensional): Talf
Down-slope shape: Concave, linear
Across-slope shape: Linear
Ecological site: F094DY012WI - Steep Loamy-Mantled Ridges
Other vegetative classification: Tsuga-Thuja-Sphagnum (TTS)
Hydric soil rating: Yes

57B—Liminga fine sand, 1 to 8 percent slopes

Map Unit Setting

National map unit symbol: 1kwkf
Elevation: 600 to 1,800 feet
Mean annual precipitation: 27 to 38 inches
Mean annual air temperature: 36 to 45 degrees F
Frost-free period: 70 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Liminga and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Liminga

Setting

Landform: Outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, base slope, crest
Down-slope shape: Linear
Across-slope shape: Convex, linear
Parent material: Sandy glaciofluvial deposits

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
E - 1 to 8 inches: fine sand
Bhs - 8 to 10 inches: fine sand
Bs - 10 to 18 inches: fine sand
BC - 18 to 26 inches: fine sand
C - 26 to 80 inches: fine sand

Properties and qualities

Slope: 1 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e

Custom Soil Resource Report

Hydrologic Soil Group: A

Ecological site: R092XY013WI - Sandy Uplands

Other vegetative classification: Tsuga/Maianthemum (TM), Tsuga Maianthemum
Vaccinium (TMV_1)

Hydric soil rating: No

Minor Components

Manido

Percent of map unit: 10 percent

Landform: Till-floored lake plains

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Rise

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: F093BY006MI - Alfic Sandy Uplands

Other vegetative classification: Tsuga Maianthemum Coptis (TMC_1)

Hydric soil rating: No

Toivola

Percent of map unit: 10 percent

Landform: Outwash plains

Landform position (two-dimensional): Summit, shoulder, backslope, footslope,
toeslope

Landform position (three-dimensional): Interfluvium, head slope, nose slope, side
slope, base slope, crest

Down-slope shape: Convex, linear

Across-slope shape: Concave, convex

Ecological site: F093BY006MI - Alfic Sandy Uplands

Other vegetative classification: Acer Tsuga Dryopteris - Dryopteris (ATD-D_1),
Tsuga Maianthemum (TM_1)

Hydric soil rating: No

57D—Liminga fine sand, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 1kwkg

Elevation: 600 to 1,800 feet

Mean annual precipitation: 27 to 38 inches

Mean annual air temperature: 36 to 45 degrees F

Frost-free period: 70 to 170 days

Farmland classification: Not prime farmland

Map Unit Composition

Liminga and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Liminga

Setting

Landform: Outwash plains

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope

Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, base slope, crest

Down-slope shape: Convex, linear

Across-slope shape: Concave, convex

Parent material: Sandy glaciofluvial deposits

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material

E - 1 to 8 inches: fine sand

Bhs - 8 to 10 inches: fine sand

Bs - 10 to 18 inches: fine sand

BC - 18 to 26 inches: fine sand

C - 26 to 80 inches: fine sand

Properties and qualities

Slope: 8 to 15 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 4.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: A

Ecological site: R092XY013WI - Sandy Uplands

Other vegetative classification: Tsuga/Maianthemum (TM), Tsuga Maianthemum Vaccinium (TMV_1)

Hydric soil rating: No

Minor Components

Toivola

Percent of map unit: 10 percent

Landform: Outwash plains

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope

Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, base slope, crest

Down-slope shape: Convex, linear

Across-slope shape: Concave, convex

Ecological site: F093BY006MI - Alfic Sandy Uplands

Other vegetative classification: Acer Tsuga Dryopteris - Dryopteris (ATD-D_1), Tsuga Maianthemum (TM_1)

Hydric soil rating: No

Manido

Percent of map unit: 10 percent
Landform: Till-floored lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F093BY006MI - Alfic Sandy Uplands
Other vegetative classification: Tsuga Maianthemum Coptis (TMC_1)
Hydric soil rating: No

59A—Lupton and Tawas mucks, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 1kwkl
Elevation: 590 to 1,800 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Lupton and similar soils: 51 percent
Tawas and similar soils: 49 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lupton

Setting

Landform: Swamps on till plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Highly decomposed organic material

Typical profile

Oa1 - 0 to 20 inches: muck
Oa2 - 20 to 80 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.20 to 6.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Very high (about 23.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: A/D
Ecological site: F093BY002MI - Mucky Swamps
Other vegetative classification: Tsuga Thuja Mitchellia (TTM_1), Tsuga Thuja Sphagnum (TTS_1)
Hydric soil rating: Yes

Description of Tawas

Setting

Landform: Swamps on till plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Highly decomposed organic material over sandy drift

Typical profile

Oa - 0 to 22 inches: muck
C1 - 22 to 42 inches: sand
C2 - 42 to 80 inches: gravelly sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: A/D
Ecological site: F093BY002MI - Mucky Swamps
Other vegetative classification: Tsuga Thuja Mitchellia (TTM_1), Tsuga Thuja Sphagnum (TTS_1)
Hydric soil rating: Yes

63B—Moquah-Arnheim complex, 0 to 3 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 1kwkr
Elevation: 600 to 1,800 feet

Custom Soil Resource Report

Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Moquah, frequently flooded, and similar soils: 55 percent
Arnheim, frequently flooded, and similar soils: 30 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Moquah, Frequently Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope, rise, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy alluvium

Typical profile

A - 0 to 5 inches: loam
C1 - 5 to 19 inches: stratified loamy fine sand to loamy very fine sand to silt loam
C2 - 19 to 48 inches: stratified fine sand to very fine sandy loam to silt loam
C3 - 48 to 55 inches: stratified silt loam
C4 - 55 to 80 inches: stratified sand to fine sand to loamy fine sand to silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.60 to 2.00 in/hr)
Depth to water table: About 42 inches
Frequency of flooding: FrequentRareNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: R092XY004WI - Seasonally Dry Floodplains
Forage suitability group: High AWC, adequately drained (G090AY008WI)
Other vegetative classification: Acer Osmorhiza Caulophyllum (AOC), Acer Viola
Osmorhiza (AVO_1), High AWC, adequately drained (G090AY008WI)
Hydric soil rating: No

Description of Arnheim, Frequently Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear

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Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

A - 0 to 5 inches: mucky silt loam
Cg - 5 to 10 inches: silt loam
C1 - 10 to 15 inches: very fine sandy loam
C2 - 15 to 24 inches: silt loam
C3 - 24 to 80 inches: stratified very fine sandy loam to silt loam to loamy fine sand to fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: FrequentNoneOccasional
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: B/D
Ecological site: R092XY005WI - Wet Floodplains
Forage suitability group: Frequently flooded, organics (G090AY010WI)
Other vegetative classification: Frequently flooded, organics (G090AY010WI), Fraxinus Impatiens (FI_1), Fraxinus Mentha Carex (FMC_1)
Hydric soil rating: Yes

Minor Components

Schaat creek, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains on flood plains
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Talf, dip
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R092XY005WI - Wet Floodplains
Other vegetative classification: Fraxinus Mentha Carex - Caltha (FMC-C)
Hydric soil rating: Yes

Gull point, frequently flooded

Percent of map unit: 5 percent
Landform: Flood plains on till plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, dip, talf
Down-slope shape: Linear
Across-slope shape: Concave, linear
Ecological site: R092XY005WI - Wet Floodplains
Other vegetative classification: Fraxinus Impatiens (FI_1), Fraxinus Mentha Carex (FMC_1)
Hydric soil rating: Yes

Cathro, frequently flooded

Percent of map unit: 5 percent
Landform: Drainageways, depressions, swamps
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip, talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F093BY002MI - Mucky Swamps
Other vegetative classification: Fraxinus Impatiens (FI_1), Tsuga-Thuja-Mitella (TTM_2)
Hydric soil rating: Yes

67B—Nonesuch loam, 1 to 6 percent slopes, very stony

Map Unit Setting

National map unit symbol: 1kwkt
Elevation: 590 to 1,800 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Nonesuch and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nonesuch

Setting

Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy till

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 4 inches: loam
Bs - 4 to 11 inches: channery loam
Bt1 - 11 to 16 inches: very gravelly fine sandy loam
Bt2 - 16 to 23 inches: gravelly sandy loam
B/Ex - 23 to 34 inches: silt loam
Crt - 34 to 50 inches: silt loam
2R - 50 to 80 inches: bedrock

Properties and qualities

Slope: 1 to 6 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent

Custom Soil Resource Report

Depth to restrictive feature: 16 to 30 inches to fragipan; 20 to 40 inches to paralithic bedrock; 20 to 60 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: D
Ecological site: R092XY009WI - Loamy Sandstone Uplands
Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Acer Tsuga Dryopteris (ATD_1)
Hydric soil rating: No

Minor Components

Greenstone

Percent of map unit: 10 percent
Landform: Till plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R092XY009WI - Loamy Sandstone Uplands
Other vegetative classification: Tsuga Maianthemum Coptis - Dryopteris (TMC-D_1), Acer Viola Osmorhiza - Circaea Impatiens (AVO-CI_3)
Hydric soil rating: No

Flintsteel

Percent of map unit: 5 percent
Landform: Till plains
Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, crest, base slope
Down-slope shape: Linear
Across-slope shape: Convex, linear
Ecological site: R092XY014WI - Loamy Uplands
Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Tsuga Acer Mitchella (TAM_1)
Hydric soil rating: No

90A—Deford-Tawas complex, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 1kwlx
Elevation: 600 to 1,800 feet
Mean annual precipitation: 27 to 38 inches
Mean annual air temperature: 36 to 45 degrees F
Frost-free period: 70 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Deford and similar soils: 50 percent
Tawas and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Deford

Setting

Landform: Outwash plains on till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy glaciofluvial deposits

Typical profile

Oa - 0 to 4 inches: muck
E - 4 to 10 inches: sand
Bw - 10 to 36 inches: sand
C1 - 36 to 55 inches: fine sand
2C2 - 55 to 80 inches: gravelly coarse sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.20 to 6.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A/D
Ecological site: R092XY006WI - Wet Sandy Lowlands

Custom Soil Resource Report

Other vegetative classification: Tsuga Thuja Sphagnum (TTS_1), Tsuga-Thuja-Mitella (TTM_2)
Hydric soil rating: Yes

Description of Tawas

Setting

Landform: Swamps on till plains
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Highly decomposed organic material over sandy drift

Typical profile

Oa - 0 to 22 inches: muck
C1 - 22 to 42 inches: sand
C2 - 42 to 80 inches: gravelly sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 6.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: A/D
Ecological site: R092XY002WI - Mucky Swamps
Other vegetative classification: Tsuga Thuja Mitchellia (TTM_1), Tsuga Thuja Sphagnum (TTS_1)
Hydric soil rating: Yes

Minor Components

Kinross

Percent of map unit: 10 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip, tal
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F093BY004MI - Wet Lowlands
Other vegetative classification: Tsuga Thuja Sphagnum (TTS_1), Tsuga Maianthemum Coptis - Sphagnum (TMC-Sphag)
Hydric soil rating: Yes

Au gres

Percent of map unit: 5 percent
Landform: Depressions on till plains

Custom Soil Resource Report

Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Rise, tal
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F093BY005MI - Moist Lowlands
Other vegetative classification: Tsuga Maianthemum Coptis - Vaccinium (TMC-Vac_1), Tsuga Maianthemum Coptis (TMC_1)
Hydric soil rating: No

93B—Loggerhead loam, 1 to 8 percent slopes

Map Unit Setting

National map unit symbol: 1kwm0
Elevation: 600 to 1,800 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Farmland of local importance

Map Unit Composition

Loggerhead and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Loggerhead

Setting

Landform: Till plains
Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, crest, base slope
Down-slope shape: Linear
Across-slope shape: Convex, linear
Parent material: Coarse-loamy till over loamy till

Typical profile

A - 0 to 4 inches: loam
E - 4 to 5 inches: gravelly fine sandy loam
Bs - 5 to 15 inches: gravelly loam
E/B - 15 to 36 inches: gravelly fine sandy loam
2B/E - 36 to 56 inches: gravelly fine sandy loam
2Bt - 56 to 80 inches: loam

Properties and qualities

Slope: 1 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium

Custom Soil Resource Report

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)

Depth to water table: About 12 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C/D

Ecological site: F093BY009MI - Alfic Loamy Uplands

Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Acer Tsuga Dryopteris (ATD_1)

Hydric soil rating: No

Minor Components

Annalake

Percent of map unit: 5 percent

Landform: Till plains, outwash plains, outwash terraces

Landform position (two-dimensional): Summit, backslope, footslope

Landform position (three-dimensional): Base slope, riser, tread, rise

Down-slope shape: Convex, linear

Across-slope shape: Linear

Ecological site: F093BY009MI - Alfic Loamy Uplands

Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Acer Tsuga Dryopteris (ATD_1)

Hydric soil rating: No

Flintsteel

Percent of map unit: 5 percent

Landform: Till plains

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope

Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, crest, base slope

Down-slope shape: Linear

Across-slope shape: Convex, linear

Ecological site: F093BY009MI - Alfic Loamy Uplands

Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Tsuga Acer Mitchella (TAM_1)

Hydric soil rating: No

Belding

Percent of map unit: 5 percent

Landform: Till plains

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Rise, talf

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: F093BY005MI - Moist Lowlands

Other vegetative classification: Tsuga Maianthemum Coptis - Dryopteris (TMC-D_1), Acer Viola Osmorhiza - Circaea Impatiens (AVO-CI_3)

Hydric soil rating: No

94A—Udorthents, loamy, nearly level

Map Unit Setting

National map unit symbol: 1kwm2
Elevation: 590 to 1,800 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy mine spoil or earthy fill

Typical profile

C - 0 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 0 to 10 inches to densic material
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydrologic Soil Group: C/D
Other vegetative classification: Acer Viola Osmorhiza (AVO_1)
Hydric soil rating: No

Minor Components

Flintsteel

Percent of map unit: 5 percent

Custom Soil Resource Report

Landform: Till plains

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope

Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, base slope, crest

Down-slope shape: Linear

Across-slope shape: Convex, linear

Ecological site: R092XY014WI - Loamy Uplands

Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Tsuga Acer Mitchella (TAM_1)

Hydric soil rating: No

Annalake

Percent of map unit: 3 percent

Landform: Outwash terraces, outwash plains

Landform position (three-dimensional): Rise

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: R092XY014WI - Loamy Uplands

Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Acer Tsuga Dryopteris (ATD_1)

Hydric soil rating: No

Loggerhead

Percent of map unit: 2 percent

Landform: Till plains

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope

Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, base slope, crest

Down-slope shape: Linear

Across-slope shape: Convex, linear

Ecological site: R092XY014WI - Loamy Uplands

Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Acer Tsuga Dryopteris (ATD_1)

Hydric soil rating: No

100B—Flintsteel loam, 1 to 8 percent slopes

Map Unit Setting

National map unit symbol: 1kwmd

Elevation: 590 to 1,800 feet

Mean annual precipitation: 25 to 34 inches

Mean annual air temperature: 37 to 43 degrees F

Frost-free period: 100 to 140 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Flintsteel and similar soils: 85 percent

Minor components: 15 percent

Custom Soil Resource Report

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Flintsteel

Setting

Landform: Till plains

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope

Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, base slope, crest

Down-slope shape: Linear

Across-slope shape: Convex, linear

Parent material: Fine-loamy till

Typical profile

O_i - 0 to 1 inches: slightly decomposed plant material

A - 1 to 5 inches: loam

E - 5 to 9 inches: loam

B_w - 9 to 12 inches: fine sandy loam

E/B - 12 to 16 inches: loam

B/E - 16 to 22 inches: loam

B_t - 22 to 36 inches: silt loam

BC_d - 36 to 48 inches: silt loam

C_d - 48 to 80 inches: silt loam

Properties and qualities

Slope: 1 to 8 percent

Depth to restrictive feature: 25 to 40 inches to densic material

Drainage class: Moderately well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (K_{sat}): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: About 12 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 20 percent

Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C/D

Ecological site: R092XY014WI - Loamy Uplands

Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Tsuga Acer Mitchella (TAM_1)

Hydric soil rating: No

Minor Components

Big iron

Percent of map unit: 10 percent

Landform: Till plains

Landform position (three-dimensional): Rise

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: R092XY011WI - Moist Loamy Lowlands

Custom Soil Resource Report

Other vegetative classification: Tsuga Thuja Petasites (TTP_1), Tsuga Acer
Mitchella - Equisetum (TAM-Eq)
Hydric soil rating: No

Loggerhead

Percent of map unit: 3 percent
Landform: Till plains
Landform position (two-dimensional): Summit, shoulder, backslope, footslope,
toeslope
Landform position (three-dimensional): Interfluve, head slope, nose slope, side
slope, base slope, crest
Down-slope shape: Linear
Across-slope shape: Convex, linear
Ecological site: R092XY014WI - Loamy Uplands
Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Acer Tsuga
Dryopteris (ATD_1)
Hydric soil rating: No

Manido

Percent of map unit: 2 percent
Landform: Till-floored lake plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R092XY013WI - Sandy Uplands
Other vegetative classification: Tsuga Maianthemum Coptis (TMC_1)
Hydric soil rating: No

101B—Big Iron silt loam, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: 1kwmg
Elevation: 590 to 1,800 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Farmland of local importance

Map Unit Composition

Big iron and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Big Iron

Setting

Landform: Till plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear

Custom Soil Resource Report

Parent material: Fine-loamy till

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material

A - 1 to 3 inches: silt loam

E - 3 to 4 inches: silt loam

Bw - 4 to 11 inches: loam

E/B - 11 to 17 inches: loam

Bt - 17 to 47 inches: silt loam

BCd1 - 47 to 66 inches: loam

BCd2 - 66 to 80 inches: gravelly silt loam

Properties and qualities

Slope: 0 to 4 percent

Depth to restrictive feature: 40 to 60 inches to densic material

Drainage class: Somewhat poorly drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: About 6 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 20 percent

Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: C/D

Ecological site: R092XY011WI - Moist Loamy Lowlands

Other vegetative classification: Tsuga Thuja Petasites (TTP_1), Tsuga Acer Mitchella - Equisetum (TAM-Eq)

Hydric soil rating: No

Minor Components

Trap falls

Percent of map unit: 10 percent

Landform: Depressions on till plains

Landform position (three-dimensional): Talf

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: R092XY007WI - Wet Loamy or Clayey Lowlands

Other vegetative classification: Fraxinus Impatiens (FI_1), Fraxinus Mentha Carex (FMC_1)

Hydric soil rating: Yes

Belding

Percent of map unit: 10 percent

Landform: Ground moraines

Landform position (three-dimensional): Rise

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: R092XY011WI - Moist Loamy Lowlands

Other vegetative classification: Tsuga Maianthemum Coptis - Dryopteris (TMC-D_1), Acer Viola Osmorhiza - Circaea Impatiens (AVO-CI_3)

Hydric soil rating: No

102A—Trap Falls clay loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 1kwmh
Elevation: 590 to 1,800 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Trap falls and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Trap Falls

Setting

Landform: Depressions on till plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fine-loamy till

Typical profile

Oi - 0 to 1 inches: peat
A - 1 to 10 inches: clay loam
Bt1 - 10 to 18 inches: clay loam
Bt2 - 18 to 31 inches: clay loam
2C - 31 to 55 inches: loam
2Cd - 55 to 80 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 40 to 60 inches to densic material
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: R092XY007WI - Wet Loamy or Clayey Lowlands

Custom Soil Resource Report

Other vegetative classification: Fraxinus Impatiens (FI_1), Fraxinus Mentha Carex (FMC_1)
Hydric soil rating: Yes

Minor Components

Cathro

Percent of map unit: 10 percent
Landform: Drainageways, depressions, swamps
Ecological site: F090AY002WI - Mucky Swamp
Other vegetative classification: Fraxinus Impatiens (FI_1), Tsuga-Thuja-Mitella (TTM_2)
Hydric soil rating: Yes

Big iron

Percent of map unit: 3 percent
Landform: Till plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R092XY011WI - Moist Loamy Lowlands
Other vegetative classification: Tsuga Thuja Petasites (TTP_1), Tsuga Acer Mitchella - Equisetum (TAM-Eq)
Hydric soil rating: No

Gull point

Percent of map unit: 2 percent
Landform: Flood plains on till plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R092XY005WI - Wet Floodplains
Other vegetative classification: Fraxinus Impatiens (FI_1), Fraxinus Mentha Carex (FMC_1)
Hydric soil rating: Yes

108A—Greenstone silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 1kwmp
Elevation: 590 to 1,800 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Greenstone and similar soils: 85 percent
Minor components: 15 percent

Custom Soil Resource Report

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Greenstone

Setting

Landform: Till plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy till

Typical profile

Oa - 0 to 2 inches: highly decomposed plant material
Bw - 2 to 6 inches: silt loam
Bt - 6 to 12 inches: silt loam
Btx - 12 to 18 inches: cobbly silt loam
2Crt - 18 to 21 inches: extremely channery silt loam
2R - 21 to 80 inches: bedrock

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock; 20 to 60 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C/D
Ecological site: R092XY009WI - Loamy Sandstone Uplands
Other vegetative classification: Tsuga Maianthemum Coptis - Dryopteris (TMC-D_1), Acer Viola Osmorhiza - Circaea Impatiens (AVO-CI_3)
Hydric soil rating: No

Minor Components

Nonesuch

Percent of map unit: 6 percent
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R092XY009WI - Loamy Sandstone Uplands
Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Acer Tsuga Dryopteris (ATD_1)
Hydric soil rating: No

Trap falls

Percent of map unit: 6 percent
Landform: Depressions on till plains
Landform position (three-dimensional): Talf

Custom Soil Resource Report

Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R092XY007WI - Wet Loamy or Clayey Lowlands
Other vegetative classification: Fraxinus Impatiens (FI_1), Fraxinus Mentha Carex (FMC_1)
Hydric soil rating: Yes

Big iron

Percent of map unit: 3 percent
Landform: Till plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R092XY011WI - Moist Loamy Lowlands
Other vegetative classification: Tsuga Thuja Petasites (TTP_1), Tsuga Acer Mitchella - Equisetum (TAM-Eq)
Hydric soil rating: No

109—Dumps, sanitary landfill

Map Unit Setting

National map unit symbol: 1kwmq
Elevation: 590 to 1,800 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Dumps, sanitary landfill: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

119A—Moquah loam, 0 to 3 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 1kwn7
Elevation: 600 to 1,800 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Prime farmland if protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Moquah, occasionally flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Moquah, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope, rise, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy alluvium

Typical profile

A - 0 to 5 inches: loam
C1 - 5 to 19 inches: stratified loamy fine sand to loamy very fine sand to silt loam
C2 - 19 to 48 inches: stratified fine sand to very fine sandy loam to silt loam
C3 - 48 to 55 inches: stratified silt loam
C4 - 55 to 80 inches: stratified sand to fine sand to loamy fine sand to silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 42 inches
Frequency of flooding: OccasionalRareNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: R092XY004WI - Seasonally Dry Floodplains
Other vegetative classification: Acer Osmorhiza Caulophyllum (AOC), Acer-Viola-Osmorhiza (AVO_2)
Hydric soil rating: No

Minor Components

Arnheim

Percent of map unit: 10 percent
Landform: Flood plains
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R092XY005WI - Wet Floodplains
Other vegetative classification: Frequently flooded, organics (G090AY010WI), Fraxinus Mentha Carex - Caltha (FMC-C), Fraxinus Mentha Carex (FMC_1)
Hydric soil rating: Yes

Gull point, occasionally flooded

Percent of map unit: 3 percent
Landform: Flood plains on till plains
Landform position (two-dimensional): Toeslope

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Landform position (three-dimensional): Base slope, dip, talf

Down-slope shape: Linear

Across-slope shape: Concave, linear

Ecological site: R092XY005WI - Wet Floodplains

Other vegetative classification: Fraxinus Impatiens (FI_1), Fraxinus Mentha Carex (FMC_1)

Hydric soil rating: Yes

Schaat creek, occasionally flooded

Percent of map unit: 2 percent

Landform: Flood plains on flood plains

Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Talf, dip

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: R092XY005WI - Wet Floodplains

Other vegetative classification: Fraxinus Mentha Carex - Caltha (FMC-C)

Hydric soil rating: Yes

121B—Deer Park sand, 0 to 6 percent slopes

Map Unit Setting

National map unit symbol: 1kwn9

Elevation: 590 to 1,800 feet

Mean annual precipitation: 25 to 34 inches

Mean annual air temperature: 37 to 43 degrees F

Frost-free period: 100 to 140 days

Farmland classification: Not prime farmland

Map Unit Composition

Deer park and similar soils: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Deer Park

Setting

Landform: Dunes, beach ridges

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope

Landform position (three-dimensional): Rise

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Beach sand and/or eolian sands

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material

E - 1 to 11 inches: sand

Bs - 11 to 33 inches: fine sand

BC - 33 to 38 inches: sand

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C - 38 to 80 inches: sand

Properties and qualities

Slope: 0 to 6 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Excessively drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.60 to 6.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: A

Ecological site: R092XY001WI - Sandy Shore Complex

Other vegetative classification: Quercus-Acer-Epigaea (QAE_2), Acer-Quercus-Vaccinium (AQV_2)

Hydric soil rating: No

Minor Components

Croswell

Percent of map unit: 5 percent

Landform: Beach ridges

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope

Landform position (three-dimensional): Interfluvium, head slope, nose slope, side slope, base slope, crest

Down-slope shape: Convex, linear

Across-slope shape: Concave, convex

Ecological site: R092XY013WI - Sandy Uplands

Other vegetative classification: Tsuga Maianthemum Vaccinium (TMV_1)

Hydric soil rating: No

Rubicon

Percent of map unit: 5 percent

Landform: Beach ridges

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope

Landform position (three-dimensional): Interfluvium, head slope, nose slope, side slope, base slope, crest

Down-slope shape: Convex, linear

Across-slope shape: Concave, convex

Ecological site: R092XY013WI - Sandy Uplands

Other vegetative classification: Tsuga Maianthemum Vaccinium (TMV_1), Acer Quercus Vaccinium (AQV_1)

Hydric soil rating: No

123A—Mishwabic silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1kwnd
Elevation: 590 to 1,800 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Mishwabic and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mishwabic

Setting

Landform: Depressions on till plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy till

Typical profile

Oa - 0 to 3 inches: highly decomposed plant material
Bg - 3 to 6 inches: silt loam
C1 - 6 to 13 inches: silt loam
C2 - 13 to 22 inches: paragravelly silt loam
Cr - 22 to 25 inches: weathered bedrock, loam, silt loam
2R - 25 to 80 inches: bedrock

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 50 inches to lithic bedrock; 20 to 30 inches to paralithic bedrock
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Ecological site: R092XY009WI - Loamy Sandstone Uplands

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Other vegetative classification: Fraxinus Impatiens (FI_1), Fraxinus Mentha Carex (FMC_1)
Hydric soil rating: Yes

Minor Components

Trap falls

Percent of map unit: 10 percent
Landform: Depressions on till plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R092XY007WI - Wet Loamy or Clayey Lowlands
Other vegetative classification: Fraxinus Impatiens (FI_1), Fraxinus Mentha Carex (FMC_1)
Hydric soil rating: Yes

Greenstone

Percent of map unit: 5 percent
Landform: Till plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R092XY009WI - Loamy Sandstone Uplands
Other vegetative classification: Tsuga Maianthemum Coptis - Dryopteris (TMC-D_1), Acer Viola Osmorhiza - Circaea Impatiens (AVO-CI_3)
Hydric soil rating: No

124F—Zandi loamy very fine sand, 35 to 70 percent slopes

Map Unit Setting

National map unit symbol: 1kwnj
Elevation: 590 to 1,800 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Zandi and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zandi

Setting

Landform: Till-floored lake plains
Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope

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Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, base slope, crest

Down-slope shape: Convex, linear

Across-slope shape: Concave, convex

Parent material: Coarse-loamy glaciolacustrine deposits

Typical profile

Oe - 0 to 0 inches: moderately decomposed plant material

E - 0 to 4 inches: loamy very fine sand

Bhs - 4 to 6 inches: sandy loam

Bs - 6 to 34 inches: silt loam

E/B - 34 to 42 inches: stratified very fine sand to loamy very fine sand to very fine sandy loam to silt loam

B/E - 42 to 57 inches: stratified loamy very fine sand to very fine sandy loam to silt loam to silt

E and Bt - 57 to 80 inches: stratified very fine sand to loamy very fine sand to very fine sandy loam to silt loam

Properties and qualities

Slope: 35 to 70 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: B

Ecological site: R092XY014WI - Loamy Uplands

Other vegetative classification: Acer Tsuga Dryopteris (ATD_1), Tsuga Maianthemum (TM_1)

Hydric soil rating: No

Minor Components

Toivola

Percent of map unit: 5 percent

Landform: Outwash plains

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope

Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, base slope, crest

Down-slope shape: Convex, linear

Across-slope shape: Concave, convex

Ecological site: R092XY013WI - Sandy Uplands

Other vegetative classification: Acer Tsuga Dryopteris - Dryopteris (ATD-D_1), Tsuga Maianthemum (TM_1)

Hydric soil rating: No

Keweenaw

Percent of map unit: 5 percent

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Landform: Moraines
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R092XY013WI - Sandy Uplands
Other vegetative classification: Acer Tsuga Dryopteris - Dryopteris (ATD-D_1),
Tsuga Maianthemum (TM_1)
Hydric soil rating: No

Karlin

Percent of map unit: 5 percent
Landform: Moraines, stream terraces, outwash plains
Landform position (two-dimensional): Shoulder, backslope
Ecological site: R092XY013WI - Sandy Uplands
Hydric soil rating: No

129F—Karlin-Sporley complex, 1 to 70 percent slopes

Map Unit Setting

National map unit symbol: 1kwnq
Elevation: 590 to 1,800 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 100 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Karlin and similar soils: 60 percent
Sporley and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Karlin

Setting

Landform: Outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, crest, base slope
Down-slope shape: Convex, linear
Across-slope shape: Concave, convex
Parent material: Sandy glaciofluvial deposits

Typical profile

Oa - 0 to 1 inches: highly decomposed plant material
E - 1 to 4 inches: sandy loam
Bs - 4 to 15 inches: sandy loam
2BC - 15 to 29 inches: sand
2C - 29 to 80 inches: sand

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Properties and qualities

Slope: 1 to 70 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: F093BY007MI - Sandy Uplands
Other vegetative classification: Acer Tsuga Dryopteris (ATD_1), Tsuga Maianthemum (TM_1)
Hydric soil rating: No

Description of Sporley

Setting

Landform: Escarpments
Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, crest, base slope
Down-slope shape: Convex, linear
Across-slope shape: Concave, convex
Parent material: Stratified loamy and silty glaciolacustrine deposits

Typical profile

Ap - 0 to 6 inches: silt loam
E - 6 to 7 inches: silt loam
Bs - 7 to 12 inches: silt loam
E' - 12 to 15 inches: silt loam
E/B - 15 to 24 inches: silt loam
B/E - 24 to 30 inches: silt loam, silty clay loam
BC - 30 to 80 inches: stratified very fine sandy loam to silt loam to silt

Properties and qualities

Slope: 6 to 70 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 12.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

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Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: F093BY009MI - Alfic Loamy Uplands
Other vegetative classification: Acer Viola Osmorhiza (AVO_1), Acer Tsuga Dryopteris (ATD_1)
Hydric soil rating: No

Minor Components

Zandi

Percent of map unit: 5 percent
Landform: Till-floored lake plains
Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, crest, base slope
Down-slope shape: Convex, linear
Across-slope shape: Concave, convex
Ecological site: F093BY010MI - Loamy Uplands
Other vegetative classification: Acer Tsuga Dryopteris (ATD_1), Tsuga Maianthemum (TM_1)
Hydric soil rating: No

Liminga

Percent of map unit: 5 percent
Landform: Outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope, footslope, toeslope
Landform position (three-dimensional): Interfluve, head slope, nose slope, side slope, crest, base slope
Down-slope shape: Linear
Across-slope shape: Convex, linear
Ecological site: F093BY007MI - Sandy Uplands
Other vegetative classification: Tsuga/Maianthemum (TM), Tsuga Maianthemum Vaccinium (TMV_1)
Hydric soil rating: No

8307—Lupton and Cathro soils, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2tnxw
Elevation: 1,100 to 1,900 feet
Mean annual precipitation: 27 to 36 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 80 to 150 days
Farmland classification: Not prime farmland

Map Unit Composition

Lupton and similar soils: 45 percent

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Cathro and similar soils: 35 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lupton

Setting

Landform: Depressions on lake plains, depressions on outwash plains, depressions on moraines

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Dip

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Woody organic material and/or herbaceous organic material

Typical profile

Oa1 - 0 to 10 inches: muck

Oa2 - 10 to 25 inches: muck

Oa3 - 25 to 46 inches: muck

Oa4 - 46 to 79 inches: muck

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Very poorly drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 5.95 in/hr)

Depth to water table: About 0 inches

Frequency of flooding: None

Frequency of ponding: Frequent

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: Very high (about 23.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6w

Hydrologic Soil Group: A/D

Ecological site: F090AY002WI - Mucky Swamp

Forage suitability group: Frequently flooded, organics (G090AY010WI)

Other vegetative classification: Frequently flooded, organics (G090AY010WI),
Tsuga-Thuja-Mitella/Tsuga-Thuja-Sphagnum (TTM/TTTS)

Hydric soil rating: Yes

Description of Cathro

Setting

Landform: Depressions on lake plains, depressions on outwash plains, depressions on moraines

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Dip

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Herbaceous organic material over deposits loamy drift

Typical profile

Oa1 - 0 to 15 inches: muck

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Oa2 - 15 to 28 inches: muck
Cg1 - 28 to 49 inches: loam
Cg2 - 49 to 79 inches: sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 25 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 16.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: B/D
Ecological site: F090AY002WI - Mucky Swamp
Forage suitability group: Frequently flooded, organics (G090AY010WI)
Other vegetative classification: Frequently flooded, organics (G090AY010WI),
Tsuga-Thuja-Mitella/Fraxinus-Impatiens (TTM/FI)
Hydric soil rating: Yes

Minor Components

Markey

Percent of map unit: 5 percent
Landform: Depressions on lake plains, depressions on outwash plains, depressions on moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F090AY002WI - Mucky Swamp
Other vegetative classification: Frequently flooded, organics (G090AY010WI), Not Assigned (non-acid organic soils) (Nnor)
Hydric soil rating: Yes

Capitola

Percent of map unit: 5 percent
Landform: Drainageways on moraines, depressions on moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear, concave
Across-slope shape: Concave
Ecological site: F090AY006WI - Wet Loamy Lowland
Other vegetative classification: Mod AWC, high water table (G090AY004WI), Not Assigned (wet mineral soils) (Nmin)
Hydric soil rating: Yes

Beseman

Percent of map unit: 5 percent

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Landform: Depressions on outwash plains, depressions on moraines, depressions on lake plains

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Dip

Down-slope shape: Concave

Across-slope shape: Concave

Ecological site: F090AY001WI - Poor Fen

Other vegetative classification: Frequently flooded, organics (G090AY010WI), Not Assigned (acid organic soils) (Naor)

Hydric soil rating: Yes

Loxley

Percent of map unit: 5 percent

Landform: Depressions on outwash plains, depressions on moraines, depressions on lake plains

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Dip

Down-slope shape: Concave

Across-slope shape: Concave

Ecological site: F090AY001WI - Poor Fen

Other vegetative classification: Frequently flooded, organics (G090AY010WI), Not Assigned (acid organic soils) (Naor)

Hydric soil rating: Yes

8309—Cathro muck, drainageway, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 1t6w6

Elevation: 590 to 1,970 feet

Mean annual precipitation: 27 to 38 inches

Mean annual air temperature: 36 to 45 degrees F

Frost-free period: 70 to 170 days

Farmland classification: Not prime farmland

Map Unit Composition

Cathro and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cathro

Setting

Landform: Drainageways

Down-slope shape: Linear

Across-slope shape: Concave

Parent material: Herbaceous organic material over loamy drift

Typical profile

Oa1 - 0 to 6 inches: muck

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Oa2 - 6 to 31 inches: muck
Cg - 31 to 80 inches: fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.20 to 2.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 30 percent
Available water supply, 0 to 60 inches: Very high (about 16.5 inches)

Interpretive groups

Land capability classification (irrigated): 6w
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: B/D
Ecological site: F093BY002MI - Mucky Swamps
Forage suitability group: Frequently flooded, organics (G090AY010WI)
Other vegetative classification: Frequently flooded, organics (G090AY010WI),
Fraxinus Impatiens (FI_1), Tsuga Thuja Sphagnum (TTS_1)
Hydric soil rating: Yes

Minor Components

Foxpaw

Percent of map unit: 10 percent
Landform: Depressions on till plains, drainageways on till plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F093BY004MI - Wet Lowlands
Other vegetative classification: Fraxinus Impatiens (FI_1), Tsuga Maianthemum
Coptis (TMC_1)
Hydric soil rating: Yes

Lupton

Percent of map unit: 5 percent
Landform: Swamps on till plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F093BY002MI - Mucky Swamps
Other vegetative classification: Tsuga Thuja Mitchella (TTM_1), Tsuga Thuja
Sphagnum (TTS_1)
Hydric soil rating: Yes

MW—Miscellaneous water

Map Unit Composition

Miscellaneous water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

W—Water

Map Unit Setting

National map unit symbol: 1t1r9

Elevation: 590 to 1,800 feet

Mean annual precipitation: 25 to 34 inches

Mean annual air temperature: 37 to 43 degrees F

Frost-free period: 100 to 140 days

Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

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Appendix C

NPDES Permit



MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
WATER RESOURCES DIVISION
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
*Authorized by Part 31, Water Resources Protection, of the
Natural Resources and Environmental Protection Act, 1994 PA 451, as Amended*

CERTIFICATE OF COVERAGE (COC)

**Under General Permit No. MIG580000
Wastewater Stabilization Lagoon General Permit**

COC NO.: MIG580277
DESIGNATED NAME: Ontonagon WWSL
PERMITTEE: Village of Ontonagon
MAILING ADDRESS: 315 Quartz Street
Ontonagon, MI 49953

This COC authorizes the permittee to discharge treated municipal wastewater from the Ontonagon Wastewater Stabilization Lagoon located at Rockland Road, Section 31, Ontonagon Township, Ontonagon, Michigan 49953, in Ontonagon County. Consistent with the criteria and requirements established in General Permit No. MIG580000, the permittee is authorized to discharge the following: 137 MGY of treated municipal wastewater from Monitoring Point 001A through and Outfall 001. Outfall 001 discharges to the Ontonagon River at Latitude 46.86546, Longitude -89.31545.

All sections of the General Permit are applicable to this facility **EXCEPT** the following:

- Part I.A.2. – Additional Final Effluent Limitation for Total Phosphorus
- Part I.A.4. – Groundwater Monitoring for Lagoon Exfiltration/Leakage
- Part I.A.11. – Residuals Management Program for Land Application of Biosolids: APPROVED RMPs
- Part I.A.15. – Industrial Waste (for non-POTWs such as mobile home parks, campgrounds, nursing homes, and marinas)

Prior to any land application of bulk biosolids, the permittee shall have a Residuals Management Program (RMP) approved by the Department of Environment, Great Lakes, and Energy (Department) in accordance with Part I.A.10. of the General Permit.

References in the General Permit to the Department shall be defined as the Marquette District Supervisor of the Water Resources Division. The Marquette District Office is located at 1504 West Washington Street, Marquette, MI, 49855; Telephone: 906-228-4853; Fax: 906-228-4940.

Any person who is aggrieved by this COC may file a sworn petition with the Michigan Administrative Hearing System within the Department of Licensing and Regulatory Affairs, c/o the Michigan Department of Environment, Great Lakes, and Energy, setting forth the conditions of the COC that are being challenged and specifying the grounds for the challenge. The Michigan Administrative Hearing System may reject any petition filed more than 60 days after issuance as being untimely.

The issuance of this COC does not authorize violation of any federal, state, or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other Department of Environment, Great Lakes, and Energy permits, or approvals from other units of government as may be required by law.

This COC is based on a complete application submitted on October 12, 2018. The permittee is subject to the conditions specified in General Permit No. MIG580000, issued January 29, 2019, expiring April 1, 2024. This COC may be modified, terminated, reissued, or revoked as allowed for in General Permit No. MIG580000. On its effective date, this COC shall supersede COC No. MIG580277 (expiring April 1, 2019).

This COC takes effect on October 1, 2020

Issued August 20, 2020.

Original certificate signed by _____
Byron Lane, Supervisor
Municipal Permits Unit
Permits Section
Water Resources Division

PERMIT NO. MIG580000

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
WASTEWATER DISCHARGE GENERAL PERMIT**

WASTEWATER STABILIZATION LAGOON EFFLUENT

In compliance with the provisions of the Federal Clean Water Act, 33 U.S.C., Section 1251 *et seq.*, as amended (CWA); Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA); Part 41, Sewerage Systems, of the NREPA; and Michigan Executive Order 2011-1, wastewater that is associated with stabilization lagoon effluent that is authorized to be discharged from facilities specified in individual "Certificates of Coverage" (COC) in accordance with effluent limitations, monitoring requirements and other conditions set forth in this general National Pollutant Discharge Elimination System (NPDES) permit (the "permit").

The applicability of this permit shall be limited to seasonal (spring/fall) discharges of sanitary or municipal wastewater that: (1) have been adequately treated by a wastewater stabilization lagoon; (2) are not subject to the industrial pretreatment program requirements under the NREPA and R 323.2301 through R 323.2317 of the Michigan Administrative Code (Part 23 Rules); and (3) have been determined by the Michigan Department of Environmental Quality (Department) not to need an individual permit. Aerobic lagoons, both mechanically aerated and non-mechanically aerated, which discharge treated sanitary wastewater, are included. The lagoon system shall: (1) meet accepted design criteria as determined by the Department; and (2) comply with secondary treatment standards for lagoon systems in Part I.A.1. of this permit and other requirements and limitations stated herein as specified in the COC. Discharges that may cause or contribute to a violation of a water quality standard (WQS) are not authorized by this permit.

In order to constitute a valid authorization to discharge, this permit must be accompanied by a COC issued by the Department. The COC will specify which sections of the General Permit apply at the individual facility, including if the Groundwater Monitoring for Lagoon Exfiltration/Leakage, Additional Final Effluent Limitation for Total Phosphorus, and/or Residuals Management Program for Land Application of Biosolids for New or Approved Programs.

Unless specified otherwise, all contact with the Department required by this permit shall be to the position(s) indicated in the COC.

This permit takes effect on April 1, 2019. The provisions of this permit are severable. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term in accordance with applicable laws and rules.

This permit shall expire at midnight on **April 1, 2024**.

Issued: January 29, 2019

Original signed by Christine Alexander
Christine Alexander, Manager
Permits Section
Water Resources Division

PERMIT FEE REQUIREMENTS

In accordance with Section 324.3120 of the NREPA, the permittee shall make payment of an annual permit fee to the Department for each October 1 the permit is in effect regardless of the occurrence of discharge. The permittee shall submit the fee in response to the Department's annual notice. The fee shall be postmarked by **January 15** for notices mailed by December 1. The fee is due no later than 45 days after receiving the notice for notices mailed after December 1.

In accordance with Section 324.3132 of the NREPA, the permittee shall make payment of an annual biosolids land application fee to the Department if the permittee land applies biosolids. In response to the Department's annual notice, the permittee shall submit the fee, which shall be postmarked no later than January 31 of each year.

CONTESTED CASE INFORMATION

The terms and conditions of this permit shall apply to an individual facility on the effective date of a COC for the facility. Any person who is aggrieved by this permit may file a sworn petition with the Michigan Administrative Hearing System within the Michigan Department of Licensing and Regulatory Affairs, c/o the Michigan Department of Environmental Quality, setting forth the conditions of the permit which are being challenged and specifying the grounds for the challenge. The Department of Licensing and Regulatory Affairs may reject any petition filed more than 60 days after issuance as being untimely.

PART I

Section A. Final Effluent Limitations and Monitoring Requirements

1. Final Effluent Limitations

During the period beginning on the effective date of an individual COC under this permit, and lasting until the expiration of this permit or termination of the individual COC, the permittee is authorized to discharge treated sanitary wastewater to the surface waters of the state of Michigan. Effluent shall be discharged during high-flow conditions in the spring and/or fall of each year. There shall be no discharge from June 1 to September 30 and from January 1 to February 28/29 (see b. below). In addition, there shall be no discharge during periods of significant ice cover on the receiving stream unless authorized by the Department. Such discharge shall be limited and monitored by the permittee as specified below.

<u>Parameter</u>	<u>Maximum Limits for Quantity or Loading</u>				<u>Maximum Limits for Quality or Concentration</u>				<u>Monitoring Frequency</u>	<u>Sample Type</u>
	<u>Monthly</u>	<u>7-Day</u>	<u>Daily</u>	<u>Units</u>	<u>Monthly</u>	<u>7-Day</u>	<u>Daily</u>	<u>Units</u>		
Flow	(report)	---	(report)	MGD	---	---	---	---	Daily	Report Total Daily Flow
Biochemical Oxygen Demand (BOD ₅)	---	---	---	---	30	45	(report)	mg/l	see d. below	Composite
Total Suspended Solids (TSS)										
March – May	---	---	---	---	70	100	(report)	mg/l	see d. below	Composite
October – December	---	---	---	---	40	45	(report)	mg/l	see d. below	Composite
Ammonia Nitrogen (as N)	---	---	---	---	(report)	---	(report)	mg/l	see d. below	Composite
Total Phosphorus (as P)	---	---	---	---	(report)	---	(report)	mg/l	see d. below	Composite
Fecal Coliform Bacteria	---	---	---	---	200	400	(report)	cts/ 100 ml	see d. below	Grab
					Minimum Daily					
pH	---	---	---	---	6.5	---	10	S.U.	see d. below	Grab
Dissolved Oxygen	---	---	---	---	5.0	---	---	mg/l	Daily	Grab

- a. **Narrative Standard**
The receiving water shall contain no turbidity, color, oil films, floating solids, foams, settleable solids, or deposits as a result of this discharge in unnatural quantities which are or may become injurious to any designated use.
- b. **Acceptable Discharge Periods**
If the Department determines that discharge periods of shorter duration than March 1 through May 31 and/or October 1 through December 31 are necessary to protect water quality, the reduced discharge periods will be stated in the COC. Upon approval by the Upper Peninsula District Supervisor, the spring discharge period may be extended to April 1 through June 21 for facilities located in the Upper Peninsula.
- c. **Discharges Outside of Acceptable Discharge Periods**
For discharges outside the acceptable discharge periods, the permittee shall notify the Department of the potential noncompliance prior to discharge, as required by Part I.A.7. of this permit.

PART I**Section A. Final Effluent Limitations and Monitoring Requirements**

- d. **Discharge Management**
The discharge is to be managed consistent with all of the following requirements:
- 1) **Cell Isolation** - The permittee shall isolate a cell from cells receiving untreated sanitary wastewater at least two weeks in advance of a proposed discharge. There shall be no discharge to the surface waters from unisolated cells.
 - 2) **Pre-Discharge Sampling** - The permittee shall sample the isolated cell for BOD₅, Total Suspended Solids, Ammonia Nitrogen, Total Phosphorus, Fecal Coliform Bacteria, and pH no more than two weeks in advance of a proposed discharge. Samples shall be drawn from a point approximately five feet from the edge of the cell and one (1) foot beneath the water surface. All samples shall be grab samples. If more than two weeks will pass prior to the beginning of an actual discharge, additional pre-discharge samples shall be obtained, analyzed, and reported to the Department prior to discharge.
 - 3) **Discharge Approval Required** - The permittee shall notify and receive approval from the appropriate District Supervisor or staff authorized to act on his/her behalf prior to discharge of any effluent for each discharge event. The permittee shall supply the results of all pre-discharge effluent samples and the results of a Dissolved Oxygen sample taken no more than 24 hours prior to notification.
 - 4) **Discharge Duration** - Multiple discharge events are authorized in the spring and/or fall of each year in accordance with Part I.A.1.b. of this permit and the following provision. Discharge event duration shall not exceed 10 days within a 14-day period. The discharge may be continuous or intermittent during the event. After the discharge event is ended, the permittee shall wait a minimum of seven calendar days prior to initiating a new discharge event.
 - 5) **Discharge Sampling Frequency** - Flow and Dissolved Oxygen shall be measured daily during discharge. All other parameters shall be measured the first day and every other day during discharge, including the last day of discharge. The Department may approve alternate sampling frequencies that are demonstrated to be representative of the discharge.
 - 6) **Discharge Sample Type and Location** - The sampling for BOD₅, Total Suspended Solids, Total Phosphorus, and Ammonia Nitrogen shall be 3-portion composite samples or 24-hour composite samples of the effluent. The sampling for Dissolved Oxygen, Fecal Coliform Bacteria, and pH shall be grab samples of the effluent.
- e. **Discharge Monitoring Reports**
Monthly Discharge Monitoring Reports (DMRs) shall be submitted for the months of October, November, December, March, April, May, and June whether or not there has been a discharge. Upper Peninsula facilities authorized under Part I.A.1.b. of this permit shall also submit a monthly DMR for any approved discharge event. Daily DMRs shall be submitted only during months a discharge occurred.
- f. **Security Fencing**
The lagoon shall be enclosed by security fencing. The fencing shall include gates wide enough to accommodate mowing machinery. All gates shall be locked to prevent unauthorized access. Metal warning signs shall be posted on the fencing. Lagoon systems that utilize sophisticated mechanical equipment should consider more secure fencing and access control.
- g. **Water Treatment Additives**
This permit does not authorize the discharge of water treatment additives without approval. Approval of water treatment additives is authorized under separate correspondence. Water treatment additives include any material that is added to water used at the facility or to a wastewater generated by the facility to condition or treat the water. In the event a permittee proposes to discharge water treatment additives, including an increased discharge concentration of a previously approved water treatment additive, the permittee shall submit a request for approval in accordance with Part I.A.6. of this permit.
- h. **Construction Approval**
This permit does not authorize the construction or modification of any physical structures of the wastewater treatment facility. The permittee shall receive any required approval of plans and specifications from the appropriate Department before commencing construction of the wastewater treatment facility necessary for compliance with this permit.

PART I

Section A. Final Effluent Limitations and Monitoring Requirements

2. Additional Final Effluent Limitation for Total Phosphorus

If the Department determines it is necessary to control total phosphorus discharges to protect downstream water quality, the discharge shall be limited and monitored by the permittee as specified below. Such determination will be indicated in the COC.

<u>Parameter</u>	<u>Maximum Limits for Quantity or Loading</u>				<u>Maximum Limits for Quality or Concentration</u>				<u>Monitoring Frequency</u>	<u>Sample Type</u>
	<u>Monthly</u>	<u>7-Day</u>	<u>Daily</u>	<u>Units</u>	<u>Monthly</u>	<u>7-Day</u>	<u>Daily</u>	<u>Units</u>		
Total Phosphorus (as P)	---	---	---	---	1.0	---	(report)	mg/l	see Part I.A.d.5 above	Composite

3. Facility Operation and Maintenance

The permittee shall comply with the inspection, operation, and maintenance program requirements specified below. An alternate facility operations program may be approved by the Department.

a. Lagoon Inspection

The permittee shall inspect the lagoon facilities three times weekly year-round unless otherwise authorized by the Department. These inspections shall include all of the following:

- 1) The lagoon dikes for vegetative growth, erosion, slumping, animal burrowing or breakthrough, and condition of the lagoon liner.
- 2) The lagoon for growth of aquatic plants, offensive odors, insect infestations, scum, floating sludge, and septic conditions.
- 3) The depth of the water in each cell and the freeboard.
- 4) The drain pipe to ensure there is no discharge.
- 5) The control structures and pump stations to assure that valves, gates, and alarms are set correctly and properly functioning.
- 6) The lagoon security fence and warning signs.
- 7) Analysis for Dissolved Oxygen in each lagoon cell at least once weekly, except when the lagoons are ice covered. The data shall be kept as retained self-monitoring. See Part II.C.3. of this permit.

The permittee shall initiate steps to correct any condition that is not in accordance with the facility maintenance program outlined in Part I.A.3.b. of this permit. A record of the inspections shall be maintained by the permittee for a period of three (3) years.

PART I**Section A. Final Effluent Limitations and Monitoring Requirements****b. Facility Maintenance**

The permittee shall implement a Facility Maintenance Program that incorporates all of the following management practices unless otherwise authorized by the Department:

- 1) Vegetation shall be maintained at a height not more than six (6) inches above the ground on lagoon dikes and around the fencing.
- 2) At all times, the facility shall be maintained to prevent the negative effects of floating material and/or water perimeter emergent rooted aquatic plants on Dissolved Oxygen concentrations, treatment efficiency, nuisance organisms, offensive odors, or other measurable impacts. However, in no case, even without demonstrated impact, shall the floating material and/or water perimeter emergent rooted aquatic plants exceed forty (40) percent cover.
- 3) Dike damage due to erosion or animal burrowing shall be corrected immediately and steps taken to prevent occurrences in the future.
- 4) The integrity of the lagoon liner shall be protected. Liner damages shall be corrected immediately and steps taken to prevent future occurrences.
- 5) The occurrence of scum, floating sludge, offensive odors, insect infestations, and septic conditions shall be minimized.
- 6) A schedule for the inspection and maintenance of the collection system, lift stations, mechanical and electrical systems, transfer stations, and control structures shall be developed and implemented.

c. Lagoon Drawdown Conditions

The permittee shall observe all of the following conditions when drawing down a cell for transfer or discharge, unless otherwise authorized by the Department:

- 1) Water discharged shall be removed from the surface two feet of the cell at a rate of less than one (1) foot per day.
- 2) The permittee shall maintain a minimum of two (2) feet of freeboard in all cells at all times.
- 3) The permittee shall maintain a minimum of two (2) feet of water in all cells at all times.

4. Groundwater Monitoring for Lagoon Exfiltration/Leakage

This condition is required if specified in the COC. The intent of this requirement is to demonstrate that lagoons have not impacted, and are not likely to impact, surface waters and/or groundwaters of the state in accordance with Part 31 of the NREPA; specifically, Part 4, Water Quality Standards (Part 4 Rules), and R 323.2222 of Part 22, Groundwater Quality Administrative Rules (Part 22 Rules). Information that may be/has been considered by the Department in making this determination includes but is not limited to: the date of lagoon construction; construction design methods and materials including whether liner specifications meet R 323.2237 of the Part 22 Rules or provide equivalency as allowed in R 323.2237; and indications of the presence of a direct vent to surface waters and whether such vent complies with surface water quality standards.

To ensure that leakage from lagoons to surface waters and/or groundwaters of the state is not causing unacceptable impacts, all of the following conditions shall apply unless previously satisfied:

- a. The permittee shall install groundwater monitoring wells around the perimeter of the lagoons to document both groundwater water quality impacts and groundwater flow. A plan for the monitoring wells shall be submitted to the Department for approval within 90 days of notification by the Department. Within 90 days of approval of the plan, unless the Department approves an extended period (not to exceed 180 days), the groundwater monitoring wells shall be installed.

PART I

Section A. Final Effluent Limitations and Monitoring Requirements

- b. The permittee shall submit a groundwater monitoring plan to the Department for approval within 90 days of the effective date of this permit. This groundwater monitoring plan may be submitted as part of the monitoring well work plan. The monitoring plan shall include monitoring of the groundwater elevation and the following parameters: total phosphorus, dissolved phosphorus, total inorganic nitrogen, sodium, chloride, pH, and specific conductance. Monitoring shall be conducted quarterly until the permittee is notified by the Department that the monitoring can end or be reduced.
- c. The permittee shall begin implementation of the monitoring plan within 90 days of approval of the monitoring plan, or upon installation of the monitoring well, whichever occurs last. The result of the monitoring shall be submitted to the Department quarterly.
- d. Upon written notification by the Department that unacceptable leakage is impacting surface waters and/or groundwater, the permittee shall develop a work plan to address the leakage. Within 6 months of such notification, the permittee shall submit an approvable lagoon leakage remediation work plan to the Department. The purpose of the work plan is to control exfiltration from the lagoon treatment system. The study shall include remediation methods, procedures, time schedules, and staff, as appropriate.
- e. The permittee shall begin implementation of the lagoon leakage remediation work plan within 30 days of approval of the work plan.
- f. The permittee shall complete implementation of the lagoon leakage remediation work plan and submit an approvable final report with supporting data to the Department on or before within one year of approval of the work plan. The final report shall include a plan and schedule for continued maintenance and monitoring of the lagoon treatment system.

Based on the results of groundwater monitoring, the Department may require the permittee to obtain an individual permit, as described under Part I.A.13. of this permit, to address compliance with R.323.2222 or surface water quality standards.

5. Quantification Levels and Analytical Methods for Selected Parameters

Quantification levels (QLs) are specified for selected parameters in the table below. These QLs shall be considered the maximum acceptable unless a higher QL is appropriate because of sample matrix interference. Justification for higher QLs shall be submitted to the Department within 30 days of such determination. Where necessary to help ensure that the QLs specified can be achieved, analytical methods may also be specified in the table below. The sampling procedures, preservation and handling, and analytical protocol for all monitoring conducted in compliance with this permit, including monitoring conducted to meet the requirements of the application for permit reissuance, shall be in accordance with the methods specified in the table below, or in accordance with Part II.B.2. of this permit if no method is specified in the table below, unless an alternate method is approved by the Department. With the exception of total mercury, all units are in ug/l. The table is continued on the following page:

Parameter	QL	Units	Analytical Method
1,2-Diphenylhydrazine (as Azobenzene)	3.0	ug/l	
2,4,6-Trichlorophenol	5.0	ug/l	
2,4-Dinitrophenol	19	ug/l	
3,3'-Dichlorobenzidine	1.5	ug/l	EPA Method 605
4-Chloro-3-Methylphenol	7.0	ug/l	
4,4'-DDD	0.05	ug/l	EPA Method 608
4,4'-DDE	0.01	ug/l	EPA Method 608
4,4'-DDT	0.01	ug/l	EPA Method 608
Acrylonitrile	1.0	ug/l	
Aldrin	0.01	ug/l	EPA Method 608
Alpha-Hexachlorocyclohexane	0.01	ug/l	EPA Method 608
Antimony, Total	1	ug/l	

PART I

Section A. Final Effluent Limitations and Monitoring Requirements

Parameter	QL	Units	Analytical Method
Arsenic, Total	1	ug/l	
Barium, Total	5	ug/l	
Benzidine	0.1	ug/l	EPA Method 605
Beryllium, Total	1	ug/l	
Beta-Hexachlorocyclohexane	0.01	ug/l	EPA Method 608
Bis (2-Chloroethyl) Ether	1.0	ug/l	
Bis (2-Ethylhexyl) Phthalate	5.0	ug/l	
Boron, Total	20	ug/l	
Cadmium, Total	0.2	ug/l	
Chlordane	0.01	ug/l	EPA Method 608
Chloride	1.0	mg/l	
Chromium, Hexavalent	5	ug/l	
Chromium, Total	10	ug/l	
Copper, Total	1	ug/l	
Cyanide, Available	2	ug/l	EPA Method OIA 1677
Cyanide, Total	5	ug/l	
Delta-Hexachlorocyclohexane	0.01	ug/l	EPA Method 608
Dieldrin	0.01	ug/l	EPA Method 608
Di-N-Butyl Phthalate	9.0	ug/l	
Endosulfan I	0.01	ug/l	EPA Method 608
Endosulfan II	0.01	ug/l	EPA Method 608
Endosulfan Sulfate	0.01	ug/l	EPA Method 608
Endrin	0.01	ug/l	EPA Method 608
Endrin Aldehyde	0.01	ug/l	EPA Method 608
Fluoranthene	1.0	ug/l	
Heptachlor	0.01	ug/l	EPA Method 608
Heptachlor Epoxide	0.01	ug/l	EPA Method 608
Hexachlorobenzene	0.01	ug/l	EPA Method 612
Hexachlorobutadiene	0.01	ug/l	EPA Method 612
Hexachlorocyclopentadiene	0.01	ug/l	EPA Method 612
Hexachloroethane	5.0	ug/l	
Lead, Total	1	ug/l	
Lindane	0.01	ug/l	EPA Method 608
Lithium, Total	10	ug/l	
Mercury, Total	0.5	ng/l	EPA Method 1631E
Nickel, Total	5	ug/l	
PCB-1016	0.1	ug/l	EPA Method 608
PCB-1221	0.1	ug/l	EPA Method 608
PCB-1232	0.1	ug/l	EPA Method 608
PCB-1242	0.1	ug/l	EPA Method 608
PCB-1248	0.1	ug/l	EPA Method 608
PCB-1254	0.1	ug/l	EPA Method 608
PCB-1260	0.1	ug/l	EPA Method 608
Pentachlorophenol	1.8	ug/l	
Perfluorooctane sulfonate (PFOS)	2.0	ng/l	ASTM D7979 or an isotope dilution method (sometimes referred to as Method 537 modified)
Perfluorooctanoic acid (PFOA)	2.0	ng/l	ASTM D7979 or an isotope dilution method (sometimes referred to as Method 537 modified)

PART I

Section A. Final Effluent Limitations and Monitoring Requirements

Parameter	QL	Units	Analytical Method
Phenanthrene	1.0	ug/l	
Phosphorus (as P), Total	10	ug/l	
Selenium, Total	1.0	ug/l	
Silver, Total	0.5	ug/l	
Strontium, Total	1000	ug/l	
Sulfate	2.0	mg/l	
Sulfides, Dissolved	20	ug/l	
Thallium, Total	1	ug/l	
Toxaphene	0.1	ug/l	EPA Method 608
Vinyl Chloride	0.25	ug/l	
Zinc, Total	10	ug/l	

6. Request for Approval to Use Water Treatment Additives

Prior to use of any water treatment additive, the permittee shall obtain written approval from the Department. Requests for such approval shall be submitted via the Department's MiWaters system. The MiWaters website is located at <https://miwaters.deq.state.mi.us>. Instructions for submitting such a request may be obtained at <http://www.michigan.gov/deqnpdes> (near the bottom of the page, click on one or both of the links located under the Water Treatment Additives banner). Additional monitoring and reporting may be required as a condition for the approval to use the water treatment additive.

A request for approval to use water treatment additives shall include all of the following usage and discharge information for each water treatment additive proposed to be used:

- a. The Safety Data Sheet (SDS).
- b. Ingredient information, including the name of each ingredient, Chemical Abstracts Service (CAS) number for each ingredient, and fractional content by weight for each ingredient.
- c. The proposed water treatment additive discharge concentration with supporting calculations.
- d. The discharge frequency (i.e., number of hours per day and number of days per year).
- e. The outfall(s) and monitoring point(s) from which the water treatment additive is to be discharged.
- f. The type of removal treatment, if any, that the water treatment additive receives prior to discharge.
- g. The water treatment additive's function (i.e., microbiocide, flocculant, etc.).
- h. The SDS shall include a 48-hour LC50 or EC50 for a North American freshwater planktonic crustacean (either *Ceriodaphnia sp.*, *Daphnia sp.*, or *Simocephalus sp.*). The results shall be based on the whole water treatment additive, shall not be results based on a similar product, and shall not be estimated.
- i. The SDS shall include the results of a toxicity test for one (1) other North American freshwater aquatic species (other than a planktonic crustacean) that meets a minimum requirement of R 323.1057(2) of the Water Quality Standards. The results shall be based on the whole water treatment additive, shall not be results based on a similar product, and shall not be estimated. Examples of tests that would meet this requirement include a 96-hour LC50 for rainbow trout, bluegill, or fathead minnow.

PART I**Section A. Final Effluent Limitations and Monitoring Requirements****7. Untreated or Partially Treated Sewage Discharge Reporting and Testing Requirements**

In accordance with Section 324.3112a of the NREPA, if untreated sewage, including sanitary sewer overflows (SSO) and combined sewer overflows (CSO), or partially treated sewage is directly or indirectly discharged from a sewer system onto land or into the waters of the state, the entity responsible for the sewer system shall immediately, but not more than 24 hours after the discharge begins, notify, by telephone, the Department, local health departments, a daily newspaper of general circulation in the county in which the permittee is located, and a daily newspaper of general circulation in the county or counties in which the municipalities whose waters may be affected by the discharge are located that the discharge is occurring.

The permittee shall also annually contact municipalities, including the superintendent of a public drinking water supply with potentially affected intakes, whose waters may be affected by the permittee's discharge of combined sewage, and if those municipalities wish to be notified in the same manner as specified above, the permittee shall provide such notification. Such notification shall also include a daily newspaper in the county of the affected municipality.

At the conclusion of the discharge, written notification shall be submitted in accordance with and on the "Report of Discharge Form" available via the internet at: <https://miwaters.deq.state.mi.us/miwaters/external/home> or, alternatively for combined sewer overflow discharges, in accordance with notification procedures approved by the Department.

In addition, in accordance with Section 324.3112a of the NREPA, each time a discharge of untreated sewage or partially treated sewage occurs, the permittee shall test the affected waters for *Escherichia coli* to assess the risk to the public health as a result of the discharge and shall provide the test results to the affected local county health departments and to the Department. The testing shall be done at locations specified by each affected local county health department but shall not exceed 10 tests for each separate discharge event. The affected local county health department may waive this testing requirement, if it determines that such testing is not needed to assess the risk to the public health as a result of the discharge event. The results of this testing shall be submitted with the written notification required above, or, if the results are not yet available, submit them as soon as they become available. This testing is not required, if the testing has been waived by the local health department, or if the discharge(s) did not affect surface waters.

Permittees accepting sanitary or municipal sewage from other sewage collection systems are encouraged to notify the owners of those systems of the above reporting and testing requirements.

PART I**Section A. Final Effluent Limitations and Monitoring Requirements****8. Facility Contact**

The "Facility Contact" was specified in the application. The permittee may replace the facility contact at any time, and shall notify the Department in writing within ten (10) days after replacement (including the name, address and telephone number of the new facility contact).

- a. The facility contact shall be (or a duly authorized representative of this person):
- For a corporation, a principal executive officer of at least the level of vice president; or a designated representative if the representative is responsible for the overall operation of the facility from which the discharge originates, as described in the permit application or other NPDES form.
 - For a partnership, a general partner.
 - For a sole proprietorship, the proprietor.
 - For a municipal, state, or other public facility, either a principal executive officer, the mayor, village president, city or village manager, or other duly authorized employee.
- b. A person is a duly authorized representative only if both of the following apply:
- The authorization is made in writing to the Department by a person described in paragraph a. of this section.
 - The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the facility (a duly authorized representative may thus be either a named individual or any individual occupying a named position).

Nothing in this section releases the permittee from properly submitting reports and forms as required by law.

9. Monthly Operating Reports

For wastewater treatment facilities that serve the public, Part 41, Sewerage Systems, of the NREPA, specifically Section 324.4106 and associated R 299.2953, requires that the permittee file with the Department, on forms prescribed by the Department, operating reports showing the effectiveness of the treatment facility operation and the quantity and quality of liquid wastes discharged into waters of the state.

FOR ALL NEW DISCHARGERS:

Within 60 days prior to start-up of the treatment facility, the permittee shall submit to the Department a treatment facility monitoring program to meet this requirement. Upon approval by the Department the permittee shall implement the treatment facility monitoring program. Applicable forms and guidance are available on the Department's web site at http://www.michigan.gov/deq/0,1607,7-135-3313_44117---,00.html. The permittee may use alternate forms if they are consistent with the approved treatment facility monitoring program. Unless the Department provides written notification to the permittee that monthly submittal of operating reports is required, operating reports that result from implementation of the approved treatment facility monitoring program shall be maintained on site for a minimum of three (3) years and shall be made available to the Department for review upon request.

FOR ALL EXISTING DISCHARGERS:

Within 30 days of the effective date of the COC, the permittee shall submit to the Department a treatment facility monitoring program to meet this requirement. Upon approval by the Department the permittee shall implement the treatment facility monitoring program. Applicable forms and guidance are available on the Department's web site at http://www.michigan.gov/deq/0,1607,7-135-3313_44117---,00.html. The permittee may use alternate forms if they are consistent with the approved treatment facility monitoring program. Unless the Department provides written notification to the permittee that monthly submittal of operating reports is required, operating reports that result from implementation of the approved treatment facility monitoring program shall be maintained on site for a minimum of three (3) years and shall be made available to the Department for review upon request.

PART I**Section A. Final Effluent Limitations and Monitoring Requirements****10. Residuals Management Program (RMP) for Land Application of Biosolids: First RMP, including new uses (The individual COC indicates if applicable.)**

A permittee seeking authorization to land-apply bulk biosolids or prepare bulk biosolids for land application shall develop and submit an RMP to the Department (see Part I.A.10.e. of this permit) for approval. Effective upon Department approval of the permittee's RMP, the permittee is authorized to land-apply bulk biosolids or prepare bulk biosolids for land application in accordance with the requirements established in R 323.2401 through R 323.2418 of the Michigan Administrative Code (Part 24 Rules) which can be obtained via the internet (<http://www.michigan.gov/deq/> and near the top of the screen click on Water, Wastewater, Surface Water, then click on Biosolids & Industrial Pretreatment, Biosolids, then click on Biosolids Laws and Rules Information which is under the Laws & Rules banner in the center of the screen). The permittee's approved RMP, and any approved modifications thereto, are enforceable requirements of this permit. Incineration, landfilling and other residual disposal activities shall be conducted in accordance with Part II.D.7. of this permit.

a. RMP Approval and Implementation

A permittee seeking approval of an RMP shall submit the RMP to the Department (see Part I.A.10.e. of this permit) at least 180 days prior to the land application of biosolids. The permittee may utilize the RMP Electronic Form which can be obtained via the internet (<http://www.michigan.gov/biosolids> then click on RMP Electronic Form which is under the Downloads banner in the center of the screen) or obtain detailed requirements from the Department. The RMP shall become effective and shall be implemented by the permittee upon written approval by the Department.

b. Annual Report

On or before October 30 of each year, the permittee shall submit an annual report to the Department for the previous fiscal year of October 1 through September 30. The report shall be submitted electronically via the Department's MiWaters system at <https://miwaters.deq.state.mi.us>. At a minimum, the report shall contain:

1) A certification that current residuals management practices are in accordance with the approved RMP, or a proposal for modification to the approved RMP.

2) A completed Biosolids Annual Report Form, available at <https://miwaters.deq.state.mi.us>.

c. Modifications to the Approved RMP

Prior to implementation of modifications to the RMP, the permittee shall submit proposed modifications to the Department (see Part I.A.10.e. of this permit) for approval. The approved modification shall become effective upon the date of approval. Upon written notification, the Department may impose additional requirements and/or limitations to the approved RMP as necessary to protect public health and the environment from any adverse effect of a pollutant in the biosolids.

d. Recordkeeping

Records required by the Part 24 Rules shall be kept for a minimum of five years. However, the records documenting cumulative loading for sites subject to cumulative pollutant loading rates shall be kept as long as the site receives biosolids.

e. Contact Information

RMP-related submittals shall be made to the Department.

PART I**Section A. Final Effluent Limitations and Monitoring Requirements****11. Residuals Management Program for Land Application of Biosolids: APPROVED RMPs (The individual COC indicates if applicable.)**

The permittee is authorized to land-apply bulk biosolids or prepare bulk biosolids for land application in accordance with the permittee's approved RMP approved on the date specified in the COC and approved modifications thereto, in accordance with the requirements established in R 323.2401 through R 323.2418 of the Michigan Administrative Code (Part 24 Rules). The approved RMP, and any approved modifications thereto, are enforceable requirements of this permit. Incineration, landfilling, and other residual disposal activities shall be conducted in accordance with Part II.D.7. of this permit. The Part 24 Rules can be obtained via the internet (<http://www.michigan.gov/deq/> and near the top of the screen click on Water, Wastewater, Surface Water, then click on Biosolids & Industrial Pretreatment, Biosolids, then click on Biosolids Laws and Rules Information which is under the Laws & Rules banner in the center of the screen)

- a. Annual Report
On or before October 30 of each year, the permittee shall submit an annual report to the Department for the previous fiscal year of October 1 through September 30. The report shall be submitted electronically via the Department's MiWaters system at <https://miwaters.deq.state.mi.us>. At a minimum, the report shall contain:
 - 1) A certification that current residuals management practices are in accordance with the approved RMP, or a proposal for modification to the approved RMP.
 - 2) A completed Biosolids Annual Report Form, available at <https://miwaters.deq.state.mi.us>.
- b. Modifications to the Approved RMP
Prior to implementation of modifications to the RMP, the permittee shall submit proposed modifications to the Department (see Part I.A.11.d. for this permit) for approval. The approved modification shall become effective upon the date of approval. Upon written notification, the Department may impose additional requirements and/or limitations to the approved RMP as necessary to protect public health and the environment from any adverse effect of a pollutant in the biosolids.
- c. Record Retention
Records required by the Part 24 Rules shall be kept for a minimum of five years. However, the records documenting cumulative loading for sites subject to cumulative pollutant loading rates shall be kept as long as the site receives biosolids.
- d. Contact Information
RMP-related submittals shall be made to the Department.

12. Expiration and Reissuance

On or before October 1, 2023, a permittee seeking continued authorization to discharge under this permit beyond the permit's expiration date shall submit to the Department a written request containing such information, forms, and fees as required by the Department. Without an adequate request, a permittee's authorization to discharge will expire on **April 1, 2024**. With an adequate request, a permittee shall continue to be subject to the terms and conditions of the expired permit until the Department takes action on the request, unless this permit is terminated or revoked.

If this permit is terminated or revoked, all authorizations to discharge under the permit shall expire on the date of termination or revocation.

If this permit is modified, the Department will notify the permittee of any required action. Without an adequate response, a permittee's authorization to discharge will terminate on the effective date of the modified permit. With an adequate response, a permittee shall be subject to the terms and conditions of the modified permit on the effective date of the modified permit unless the Department notifies the permittee otherwise.

If a discharge is terminated, the permittee shall request termination of discharge authorization.

PART I**Section A. Final Effluent Limitations and Monitoring Requirements****13. Requirement to Obtain Individual Permit**

The Department may require any person who is authorized to discharge, by a COC and this permit, to apply for and obtain an individual NPDES permit if any of the following circumstances apply:

- a. The discharger is a significant contributor to pollution as determined by the Department on a case-by-case basis.
- b. The discharger is not complying or has not complied with the conditions of this permit.
- c. A change has occurred in the availability of demonstrated technology or practices for the control or abatement of waste applicable to the point source discharge.
- d. Effluent standards and limitations are promulgated for point source discharges subject to this permit.
- e. The Department determines that the criteria under which the permit was issued no longer apply.

Any person may request the Department to take action pursuant to the provisions of Rule 2191 (R 323.2191 of the Michigan Administrative Code).

14. Industrial Waste Pretreatment Program

It is understood that the permittee does not receive the discharge of any type or quantity of substance which may cause interference with the operation of the treatment works; and, therefore, the permittee is not required to immediately develop an industrial pretreatment program in accordance with Section 307 of the CWA. The permittee is required to comply with Section 307 of the CWA upon accepting any such discharge for treatment. The permittee is required to notify the Department within thirty (30) days if any user discharges or proposes to discharge such wastes to the permittee for treatment.

Under no circumstances shall the permittee allow introduction of the following wastes into the waste treatment system:

- a. Pollutants which cause pass-through or interference.
- b. Pollutants which create a fire hazard or explosion hazard in the sewerage system, including, but not limited to waste streams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in Title 40 of the Code of Federal Regulations (CFR), Section 261.21.
- c. Pollutants which will cause corrosive structural damage to the sewerage system; but in no case, discharges with pH less than 5.0, unless the works is specifically designed to accommodate such discharges.
- d. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the sewerage system resulting in interference.
- e. Any pollutant, including oxygen demanding pollutants (BOD, etc.) released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the treatment plant.
- f. Heat in amounts which will inhibit biological activity in the treatment plant resulting in interference; but in no case, heat in such quantities that the temperature at the treatment plant exceeds 40 degrees Centigrade (104 degrees Fahrenheit) unless the Department, upon request of the permittee, approves alternate temperature limits.
- g. Pollutants which result in the presence of toxic gases, vapors or fumes within the sewerage system in a quantity that may cause acute worker health and safety problems.

PART I**Section A. Final Effluent Limitations and Monitoring Requirements**

h. Any trucked or hauled pollutants, except at discharge points designated by the permittee. If information is gained by the Department that the permittee receives or is about to receive industrial wastes, then the permittee may be required to obtain an individual permit (see Part I.A.13. of this permit).

15. Industrial Waste (for non-POTWs such as mobile home parks, campgrounds, nursing homes and marinas)

Under no circumstances shall the permittee allow introduction of waste into the sewerage system other than domestic sewage generated by the facility named on the COC.

Part II may include terms and /or conditions not applicable to discharges covered under this permit.

Section A. Definitions

Acute toxic unit (TU_A) means $100/LC_{50}$ where the LC_{50} is determined from a whole effluent toxicity (WET) test which produces a result that is statistically or graphically estimated to be lethal to 50% of the test organisms.

Annual monitoring frequency refers to a calendar year beginning on January 1 and ending on December 31. When required by this permit, an analytical result, reading, value or observation shall be reported for that period if a discharge occurs during that period.

Authorized public agency means a state, local, or county agency that is designated pursuant to the provisions of Section 9110 of Part 91 of the NREPA to implement soil erosion and sedimentation control requirements with regard to construction activities undertaken by that agency.

Best management practices (BMPs) means structural devices or nonstructural practices that are designed to prevent pollutants from entering into storm water, to direct the flow of storm water, or to treat polluted storm water.

Bioaccumulative chemical of concern (BCC) means a chemical which, upon entering the surface waters, by itself or as its toxic transformation product, accumulates in aquatic organisms by a human health bioaccumulation factor of more than 1000 after considering metabolism and other physiochemical properties that might enhance or inhibit bioaccumulation. The human health bioaccumulation factor shall be derived according to R 323.1057(5). Chemicals with half-lives of less than eight (8) weeks in the water column, sediment, and biota are not BCCs. The minimum bioaccumulation concentration factor (BAF) information needed to define an organic chemical as a BCC is either a field-measured BAF or a BAF derived using the biota-sediment accumulation factor (BSAF) methodology. The minimum BAF information needed to define an inorganic chemical as a BCC, including an organometal, is either a field-measured BAF or a laboratory-measured bioconcentration factor (BCF). The BCCs to which these rules apply are identified in Table 5 of R 323.1057 of the Water Quality Standards.

Biosolids are the solid, semisolid, or liquid residues generated during the treatment of sanitary sewage or domestic sewage in a treatment works. This includes, but is not limited to, scum or solids removed in primary, secondary, or advanced wastewater treatment processes and a derivative of the removed scum or solids.

Bulk biosolids means biosolids that are not sold or given away in a bag or other container for application to a lawn or home garden.

Certificate of Coverage (COC) is a document, issued by the Department, which authorizes a discharge under a general permit.

Chronic toxic unit (TU_C) means $100/MATC$ or $100/IC_{25}$, where the maximum acceptable toxicant concentration (MATC) and IC_{25} are expressed as a percent effluent in the test medium.

Class B biosolids refers to material that has met the Class B pathogen reduction requirements or equivalent treatment by a Process to Significantly Reduce Pathogens (PSRP) in accordance with the Part 24 Rules. Processes include aerobic digestion, composting, anaerobic digestion, lime stabilization and air drying.

Combined sewer system is a sewer system in which storm water runoff is combined with sanitary wastes.

PART II**Section A. Definitions**

Daily concentration is the sum of the concentrations of the individual samples of a parameter divided by the number of samples taken during any calendar day. The daily concentration will be used to determine compliance with any maximum and minimum daily concentration limitations (except for pH and dissolved oxygen). When required by the permit, report the maximum calculated daily concentration for the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the Discharge Monitoring Reports (DMRs).

For pH, report the maximum value of any *individual* sample taken during the month in the "MAXIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs and the minimum value of any *individual* sample taken during the month in the "MINIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs. For dissolved oxygen, report the minimum concentration of any *individual* sample in the "MINIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs.

Daily loading is the total discharge by weight of a parameter discharged during any calendar day. This value is calculated by multiplying the daily concentration by the total daily flow and by the appropriate conversion factor. The daily loading will be used to determine compliance with any maximum daily loading limitations. When required by the permit, report the maximum calculated daily loading for the month in the "MAXIMUM" column under "QUANTITY OR LOADING" on the DMRs.

Daily monitoring frequency refers to a 24-hour day. When required by this permit, an analytical result, reading, value, or observation shall be reported for that period if a discharge occurs during that period.

Department means the Michigan Department of Environmental Quality.

Detection level means the lowest concentration or amount of the target analyte that can be determined to be different from zero by a single measurement at a stated level of probability.

Discharge means the addition of any waste, waste effluent, wastewater, pollutant, or any combination thereof to any surface water of the state.

EC₅₀ means a statistically or graphically estimated concentration that is expected to cause one (1) or more specified effects in 50% of a group of organisms under specified conditions.

Fecal coliform bacteria monthly

FOR WASTEWATER STABILIZATION LAGOONS (WWSLs) THAT COLLECT AND STORE WASTEWATER AND ARE AUTHORIZED TO DISCHARGE ONLY IN THE SPRING AND/OR FALL ON AN INTERMITTENT BASIS – Fecal coliform bacteria monthly is the geometric mean of all daily concentrations determined during a discharge event. Days on which no daily concentration is determined shall not be used to determine the calculated monthly value. The calculated monthly value will be used to determine compliance with the maximum monthly fecal coliform bacteria limitations. When required by the permit, report the calculated monthly value in the "AVERAGE" column under "QUALITY OR CONCENTRATION" on the DMR. If the period in which the discharge event occurred was partially in each of two months, the calculated monthly value shall be reported on the DMR of the month in which the last day of discharge occurred.

FOR ALL OTHER DISCHARGES – Fecal coliform bacteria monthly is the geometric mean of all daily concentrations determined during a reporting month. Days on which no daily concentration is determined shall not be used to determine the calculated monthly value. The calculated monthly value will be used to determine compliance with the maximum monthly fecal coliform bacteria limitations. When required by the permit, report the calculated monthly value in the "AVERAGE" column under "QUALITY OR CONCENTRATION" on the DMR.

PART II**Section A. Definitions****Fecal coliform bacteria 7-day**

FOR WWSLs THAT COLLECT AND STORE WASTEWATER AND ARE AUTHORIZED TO DISCHARGE ONLY IN THE SPRING AND/OR FALL ON AN INTERMITTENT BASIS – Fecal coliform bacteria 7-day is the geometric mean of the daily concentrations determined during any 7 consecutive days of discharge during a discharge event. If the number of daily concentrations determined during the discharge event is less than 7 days, the number of actual daily concentrations determined shall be used for the calculation. Days on which no daily concentration is determined shall not be used to determine the value. The calculated 7-day value will be used to determine compliance with the maximum 7-day fecal coliform bacteria limitations. When required by the permit, report the maximum calculated 7-day geometric mean value for the month in the “MAXIMUM” column under “QUALITY OR CONCENTRATION” on the DMRs. If the 7-day period was partially in each of two months, the value shall be reported on the DMR of the month in which the last day of discharge occurred.

FOR ALL OTHER DISCHARGES – Fecal coliform bacteria 7-day is the geometric mean of the daily concentrations determined during any 7 consecutive days in a reporting month. If the number of daily concentrations determined is less than 7, the actual number of daily concentrations determined shall be used for the calculation. Days on which no daily concentration is determined shall not be used to determine the value. The calculated 7-day value will be used to determine compliance with the maximum 7-day fecal coliform bacteria limitations. When required by the permit, report the maximum calculated 7-day geometric mean for the month in the “MAXIMUM” column under “QUALITY OR CONCENTRATION” on the DMRs. The first calculation shall be made on day 7 of the reporting month, and the last calculation shall be made on the last day of the reporting month.

Flow-proportioned sample is a composite sample with the sample volume proportional to the effluent flow.

General permit means a National Pollutant Discharge Elimination System permit issued authorizing a category of similar discharges.

Geometric mean is the average of the logarithmic values of a base 10 data set, converted back to a base 10 number.

Grab sample is a single sample taken at neither a set time nor flow.

IC₂₅ means the toxicant concentration that would cause a 25% reduction in a nonquantal biological measurement for the test population.

Illicit connection means a physical connection to a municipal separate storm sewer system that primarily conveys non-storm water discharges other than uncontaminated groundwater into the storm sewer; or a physical connection not authorized or permitted by the local authority, where a local authority requires authorization or a permit for physical connections.

Illicit discharge means any discharge to, or seepage into, a municipal separate storm sewer system that is not composed entirely of storm water or uncontaminated groundwater. Illicit discharges include non-storm water discharges through pipes or other physical connections; dumping of motor vehicle fluids, household hazardous wastes, domestic animal wastes, or litter; collection and intentional dumping of grass clippings or leaf litter; or unauthorized discharges of sewage, industrial waste, restaurant wastes, or any other non-storm water waste directly into a separate storm sewer.

Individual permit means a site-specific NPDES permit.

PART II**Section A. Definitions**

Inlet means a catch basin, roof drain, conduit, drain tile, retention pond riser pipe, sump pump, or other point where storm water or wastewater enters into a closed conveyance system prior to discharge off site or into waters of the state.

Interference is a discharge which, alone or in conjunction with a discharge or discharges from other sources, both: (1) inhibits or disrupts the publicly owned treatment works (POTW), its treatment processes or operations, or its sludge processes, use, or disposal; and (2) is therefore, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or, of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent state or local regulations): Section 405 of the CWA, the Solid Waste Disposal Act (SWDA) (including Title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including state regulations contained in any state sludge management plan prepared pursuant to Subtitle D of the SWDA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act. [This definition does not apply to sample matrix interference].

Land application means spraying or spreading biosolids or a biosolids derivative onto the land surface, injecting below the land surface, or incorporating into the soil so that the biosolids or biosolids derivative can either condition the soil or fertilize crops or vegetation grown in the soil.

LC₅₀ means a statistically or graphically estimated concentration that is expected to be lethal to 50% of a group of organisms under specified conditions.

Maximum acceptable toxicant concentration (MATC) means the concentration obtained by calculating the geometric mean of the lower and upper chronic limits from a chronic test. A lower chronic limit is the highest tested concentration that did not cause the occurrence of a specific adverse effect. An upper chronic limit is the lowest tested concentration which did cause the occurrence of a specific adverse effect and above which all tested concentrations caused such an occurrence.

MGD means million gallons per day.

Monthly concentration is the sum of the daily concentrations determined during a reporting period event divided by the number of daily concentrations determined. The calculated monthly concentration will be used to determine compliance with any maximum monthly concentration limitations. Days with no discharge shall not be used to determine the value. When required by the permit, report the calculated monthly concentration in the "AVERAGE" column under "QUALITY OR CONCENTRATION" on the DMR.

For minimum percent removal requirements, the monthly influent concentration and the monthly effluent concentration shall be determined. The calculated monthly percent removal, which is equal to 100 times the quantity [1 minus the quantity (monthly effluent concentration divided by the monthly influent concentration)], shall be reported in the "MINIMUM" column under "QUALITY OR CONCENTRATION" on the DMRs.

Monthly loading is the sum of the daily loadings of a parameter divided by the number of daily loadings determined during a reporting period. The calculated monthly loading will be used to determine compliance with any maximum monthly loading limitations. Days with no discharge shall not be used to determine the value. When required by the permit, report the calculated monthly loading in the "AVERAGE" column under "QUANTITY OR LOADING" on the DMR.

Monthly monitoring frequency refers to a calendar month. When required by this permit, an analytical result, reading, value or observation shall be reported for that period if a discharge occurs during that period.

Municipal separate storm sewer means a conveyance or system of conveyances designed or used for collecting or conveying storm water which is not a combined sewer and which is not part of a publicly-owned treatment works as defined in 40 CFR, Section 122.2.

PART II

Section A. Definitions

Municipal separate storm sewer system (MS4) means all separate storm sewers that are owned or operated by the United States, a state, city, village, township, county, district, association, or other public body created by or pursuant to state law, having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under state law, such as a sewer district, flood control district, or drainage district, or similar entity, or a designated or approved management agency under Section 208 of the CWA that discharges to the waters of the state. This term includes systems similar to separate storm sewer systems in municipalities, such as systems at military bases, large hospital or prison complexes, and highways and other thoroughfares. The term does not include separate storm sewers in very discrete areas, such as individual buildings.

National Pretreatment Standards are the regulations promulgated by or to be promulgated by the Federal Environmental Protection Agency pursuant to Section 307(b) and (c) of the CWA. The standards establish nationwide limits for specific industrial categories for discharge to a POTW.

No observed adverse effect level (NOAEL) means the highest tested dose or concentration of a substance which results in no observed adverse effect in exposed test organisms where higher doses or concentrations result in an adverse effect.

Noncontact cooling water is water used for cooling which does not come into direct contact with any raw material, intermediate product, by-product, waste product or finished product.

Nondomestic user is any discharger to a POTW that discharges wastes other than or in addition to water-carried wastes from toilet, kitchen, laundry, bathing or other facilities used for household purposes.

Outfall is the location at which a point source discharge enters the surface waters of the state.

Part 91 agency means an agency that is designated by a county board of commissioners pursuant to the provisions of Section 9105 of Part 91 of the NREPA; an agency that is designated by a city, village, or township in accordance with the provisions of Section 9106 of Part 91 of the NREPA; or the Department for soil erosion and sedimentation activities under Part 615, Supervisor of Wells; Part 631, Reclamation of Mining Lands; or Part 632, Nonferrous Metallic Mineral Mining, of the NREPA pursuant to the provisions of Section 9115 of Part 91 of the NREPA.

Part 91 permit means a soil erosion and sedimentation control permit issued by a Part 91 agency pursuant to the provisions of Part 91 of the NREPA.

Partially treated sewage is any sewage, sewage and storm water, or sewage and wastewater, from domestic or industrial sources that is treated to a level less than that required by the permittee's National Pollutant Discharge Elimination System permit, or that is not treated to national secondary treatment standards for wastewater, including discharges to surface waters from retention treatment facilities.

Point of discharge is the location of a point source discharge where storm water is discharged directly into a separate storm sewer system.

Point source discharge means a discharge from any discernible, confined, discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, or rolling stock. Changing the surface of land or establishing grading patterns on land will result in a point source discharge where the runoff from the site is ultimately discharged to waters of the state.

Polluting material means any material, in solid or liquid form, identified as a polluting material under the Part 5 Rules (R 324.2001 through R 324.2009 of the Michigan Administrative Code).

POTW is a publicly owned treatment works.

PART II**Section A. Definitions**

Pretreatment is reducing the amount of pollutants, eliminating pollutants, or altering the nature of pollutant properties to a less harmful state prior to discharge into a public sewer. The reduction or alteration can be by physical, chemical, or biological processes, process changes, or by other means. Dilution is not considered pretreatment unless expressly authorized by an applicable National Pretreatment Standard for a particular industrial category.

Public (as used in the MS4 individual permit) means all persons who potentially could affect the authorized storm water discharges, including, but not limited to, residents, visitors to the area, public employees, businesses, industries, and construction contractors and developers.

Public body means the United States; the state of Michigan; a city, village, township, county, school district, public college or university, or single-purpose governmental agency; or any other body which is created by federal or state statute or law.

Qualified Personnel means an individual who meets qualifications acceptable to the Department and who is authorized by an Industrial Storm Water Certified Operator to collect the storm water sample.

Qualifying storm event means a storm event causing greater than 0.1-inch of rainfall and occurring at least 72 hours after the previous measurable storm event that also caused greater than 0.1-inch of rainfall. Upon request, the Department may approve an alternate definition meeting the condition of a qualifying storm event.

Quantification level means the measurement of the concentration of a contaminant obtained by using a specified laboratory procedure calculated at a specified concentration above the detection level. It is considered the lowest concentration at which a particular contaminant can be quantitatively measured using a specified laboratory procedure for monitoring of the contaminant.

Quarterly monitoring frequency refers to a three (3)-month period, defined as January through March, April through June, July through September, and October through December. When required by this permit, an analytical result, reading, value, or observation shall be reported for that period if a discharge occurs during that period.

Regional Administrator is the Region 5 Administrator, U.S. EPA, located at R-19J, 77 W. Jackson Blvd., Chicago, Illinois 60604.

Regulated area means the permittee's urbanized area, where urbanized area is defined as a place and its adjacent densely-populated territory that together have a minimum population of 50,000 people as defined by the United States Bureau of the Census and as determined by the latest available decennial census.

Secondary containment structure means a unit, other than the primary container, in which significant materials are packaged or held, which is required by State or Federal law to prevent the escape of significant materials by gravity into sewers, drains, or otherwise directly or indirectly into any sewer system or to the surface or ground waters of this state.

Separate storm sewer system means a system of drainage, including, but not limited to, roads, catch basins, curbs, gutters, parking lots, ditches, conduits, pumping devices, or man-made channels, which is not a combined sewer where storm water mixes with sanitary wastes, and is not part of a POTW.

Significant industrial user is a nondomestic user that: 1) is subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; or 2) discharges an average of 25,000 gallons per day or more of process wastewater to a POTW (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process waste stream which makes up five (5) percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the permittee as defined in 40 CFR 403.12(a) on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's treatment plant operation or violating any pretreatment standard or requirement (in accordance with 40 CFR 403.8(f)(6)).

PART II**Section A. Definitions**

Significant materials Significant Materials means any material which could degrade or impair water quality, including but not limited to: raw materials; fuels; solvents, detergents, and plastic pellets; finished materials such as metallic products; hazardous substances designated under Section 101(14) of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (see 40 CFR 372.65); any chemical the facility is required to report pursuant to Section 313 of Emergency Planning and Community Right-to-Know Act (EPCRA); polluting materials as identified under the Part 5 Rules (R 324.2001 through R 324.2009 of the Michigan Administrative Code); Hazardous Wastes as defined in Part 111 of the NREPA; fertilizers; pesticides; and waste products such as ashes, slag, and sludge that have the potential to be released with storm water discharges.

Significant spills and significant leaks means any release of a polluting material reportable under the Part 5 Rules (R 324.2001 through R 324.2009 of the Michigan Administrative Code).

Special-use area means secondary containment structures required by state or federal law; lands on Michigan's List of Sites of Environmental Contamination pursuant to Part 201, Environmental Remediation, of the NREPA; and/or areas with other activities that may contribute pollutants to the storm water for which the Department determines monitoring is needed.

Stoichiometric means the quantity of a reagent calculated to be necessary and sufficient for a given chemical reaction.

Storm water means storm water runoff, snow melt runoff, surface runoff and drainage, and non-storm water included under the conditions of this permit.

Storm water discharge point is the location where the point source discharge of storm water is directed to surface waters of the state or to a separate storm sewer. It includes the location of all point source discharges where storm water exits the facility, including *outfalls* which discharge directly to surface waters of the state, and *points of discharge* which discharge directly into separate storm sewer systems.

SWPPP means the Storm Water Pollution Prevention Plan prepared in accordance with this permit.

Tier I value means a value for aquatic life, human health or wildlife calculated under R 323.1057 of the Water Quality Standards using a tier I toxicity database.

Tier II value means a value for aquatic life, human health or wildlife calculated under R 323.1057 of the Water Quality Standards using a tier II toxicity database.

Total maximum daily loads (TMDLs) are required by the CWA for waterbodies that do not meet water quality standards. TMDLs represent the maximum daily load of a pollutant that a waterbody can assimilate and meet water quality standards, and an allocation of that load among point sources, nonpoint sources, and a margin of safety.

Toxicity reduction evaluation (TRE) means a site-specific study conducted in a stepwise process designed to identify the causative agents of effluent toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in effluent toxicity.

Water Quality Standards means the Part 4 Water Quality Standards promulgated pursuant to Part 31 of the NREPA, being R 323.1041 through R 323.1117 of the Michigan Administrative Code.

Weekly monitoring frequency refers to a calendar week which begins on Sunday and ends on Saturday. When required by this permit, an analytical result, reading, value or observation shall be reported for that period if a discharge occurs during that period.

PART II

Section A. Definitions

WWSL is a wastewater stabilization lagoon.

WWSL discharge event is a discrete occurrence during which effluent is discharged to the surface water up to 10 days of a consecutive 14-day period.

3-portion composite sample is a sample consisting of three equal-volume grab samples collected at equal intervals over an 8-hour period.

7-day concentration

FOR WWSLs THAT COLLECT AND STORE WASTEWATER AND ARE AUTHORIZED TO DISCHARGE ONLY IN THE SPRING AND/OR FALL ON AN INTERMITTENT BASIS – The 7-day concentration is the sum of the daily concentrations determined during any 7 consecutive days of discharge during a WWSL discharge event divided by the number of daily concentrations determined. If the number of daily concentrations determined during the WWSL discharge event is less than 7 days, the number of actual daily concentrations determined shall be used for the calculation. The calculated 7-day concentration will be used to determine compliance with any maximum 7-day concentration limitations. When required by the permit, report the maximum calculated 7-day concentration for the WWSL discharge event in the “MAXIMUM” column under “QUALITY OR CONCENTRATION” on the DMR. If the WWSL discharge event was partially in each of two months, the value shall be reported on the DMR of the month in which the last day of discharge occurred.

FOR ALL OTHER DISCHARGES – The 7-day concentration is the sum of the daily concentrations determined during any 7 consecutive days in a reporting month divided by the number of daily concentrations determined. If the number of daily concentrations determined is less than 7, the actual number of daily concentrations determined shall be used for the calculation. The calculated 7-day concentration will be used to determine compliance with any maximum 7-day concentration limitations in the reporting month. When required by the permit, report the maximum calculated 7-day concentration for the month in the “MAXIMUM” column under “QUALITY OR CONCENTRATION” on the DMR. The first 7-day calculation shall be made on day 7 of the reporting month, and the last calculation shall be made on the last day of the reporting month.

7-day loading

FOR WWSLs THAT COLLECT AND STORE WASTEWATER AND ARE AUTHORIZED TO DISCHARGE ONLY IN THE SPRING AND/OR FALL ON AN INTERMITTENT BASIS – The 7-day loading is the sum of the daily loadings determined during any 7 consecutive days of discharge during a WWSL discharge event divided by the number of daily loadings determined. If the number of daily loadings determined during the WWSL discharge event is less than 7 days, the number of actual daily loadings determined shall be used for the calculation. The calculated 7-day loading will be used to determine compliance with any maximum 7-day loading limitations. When required by the permit, report the maximum calculated 7-day loading for the WWSL discharge event in the “MAXIMUM” column under “QUANTITY OR LOADING” on the DMR. If the WWSL discharge event was partially in each of two months, the value shall be reported on the DMR of the month in which the last day of discharge occurred.

FOR ALL OTHER DISCHARGES – The 7-day loading is the sum of the daily loadings determined during any 7 consecutive days in a reporting month divided by the number of daily loadings determined. If the number of daily loadings determined is less than 7, the actual number of daily loadings determined shall be used for the calculation. The calculated 7-day loading will be used to determine compliance with any maximum 7-day loading limitations in the reporting month. When required by the permit, report the maximum calculated 7-day loading for the month in the “MAXIMUM” column under “QUANTITY OR LOADING” on the DMR. The first 7-day calculation shall be made on day 7 of the reporting month, and the last calculation shall be made on the last day of the reporting month.

24-hour composite sample is a flow-proportioned composite sample consisting of hourly or more frequent portions that are taken over a 24-hour period. A time-proportioned composite sample may be used upon approval of the Department if the permittee demonstrates it is representative of the discharge.

PART II

Section B. Monitoring Procedures

1. Representative Samples

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. Test Procedures

Test procedures for the analysis of pollutants shall conform to regulations promulgated pursuant to Section 304(h) of the CWA (40 CFR Part 136 – Guidelines Establishing Test Procedures for the Analysis of Pollutants), unless specified otherwise in this permit. **Test procedures used shall be sufficiently sensitive to determine compliance with applicable effluent limitations.** Requests to use test procedures not promulgated under 40 CFR Part 136 for pollutant monitoring required by this permit shall be made in accordance with the Alternate Test Procedures regulations specified in 40 CFR 136.4. These requests shall be submitted to the Manager of the Permits Section, Water Resources Division, Michigan Department of Environmental Quality, P.O. Box 30458, Lansing, Michigan, 48909-7958. The permittee may use such procedures upon approval.

The permittee shall periodically calibrate and perform maintenance procedures on all analytical instrumentation at intervals to ensure accuracy of measurements. The calibration and maintenance shall be performed as part of the permittee's laboratory Quality Control/Quality Assurance program.

3. Instrumentation

The permittee shall periodically calibrate and perform maintenance procedures on all monitoring instrumentation at intervals to ensure accuracy of measurements.

4. Recording Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information: (1) the exact place, date, and time of measurement or sampling; (2) the person(s) who performed the measurement or sample collection; (3) the dates the analyses were performed; (4) the person(s) who performed the analyses; (5) the analytical techniques or methods used; (6) the date of and person responsible for equipment calibration; and (7) the results of all required analyses.

5. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years, or longer if requested by the Regional Administrator or the Department.

PART II**Section C. Reporting Requirements****1. Start-Up Notification for New or Upgraded Facilities**

If the permittee will not discharge during the first 60 days following the effective date of this permit, the permittee shall notify the Department within 14 days following the effective date of this permit, and then 60 days prior to the commencement of the discharge.

2. Submittal Requirements for Self-Monitoring Data

Part 31 of the NREPA (specifically Section 324.3110(7)); and R 323.2155(2) of Part 21, Wastewater Discharge Permits, promulgated under Part 31 of the NREPA, allow the Department to specify the forms to be utilized for reporting the required self-monitoring data. Unless instructed on the effluent limitations page to conduct "Retained Self-Monitoring" the permittee shall submit self-monitoring data via the Department's MiWaters system.

The permittee shall utilize the information provided on the MiWaters website at <https://miwaters.deq.state.mi.us> to access and submit the electronic forms. Both monthly summary and daily data shall be submitted to the Department no later than the 20th day of the month following each month of the authorized discharge period(s). The permittee may be allowed to submit the electronic forms after this date if the Department has granted an extension to the submittal date.

3. Retained Self-Monitoring Requirements

If instructed on the effluent limits page (or otherwise authorized by the Department in accordance with the provisions of this permit) to conduct retained self-monitoring, the permittee shall maintain a year-to-date log of retained self-monitoring results and, upon request, provide such log for inspection to the staff of the Department. Retained self-monitoring results are public information and shall be promptly provided to the public upon request.

The permittee shall certify, in writing, to the Department, on or before January 10th (April 1st for animal feeding operation facilities) of each year, that: 1) all retained self-monitoring requirements have been complied with and a year-to-date log has been maintained; and 2) the application on which this permit is based still accurately describes the discharge. With this annual certification, the permittee shall submit a summary of the previous year's monitoring data. The summary shall include maximum values for samples to be reported as daily maximums and/or monthly maximums and minimum values for any daily minimum samples.

Retained self-monitoring may be denied to a permittee by notification in writing from the Department. In such cases, the permittee shall submit self-monitoring data in accordance with Part II.C.2., above. Such a denial may be rescinded by the Department upon written notification to the permittee. Reissuance or modification of this permit or reissuance or modification of an individual permittee's authorization to discharge shall not affect previous approval or denial for retained self-monitoring unless the Department provides notification in writing to the permittee.

4. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report. Such increased frequency shall also be indicated.

Monitoring required pursuant to Part 41 of the NREPA or Rule 35 of the Mobile Home Park Commission Act (Act 96 of the Public Acts of 1987) for assurance of proper facility operation shall be submitted as required by the Department.

PART II**Section C. Reporting Requirements****5. Compliance Dates Notification**

Within 14 days of every compliance date specified in this permit, the permittee shall submit a *written* notification to the Department indicating whether or not the particular requirement was accomplished. If the requirement was not accomplished, the notification shall include an explanation of the failure to accomplish the requirement, actions taken or planned by the permittee to correct the situation, and an estimate of when the requirement will be accomplished. If a written report is required to be submitted by a specified date and the permittee accomplishes this, a separate written notification is not required.

6. Noncompliance Notification

Compliance with all applicable requirements set forth in the CWA, Parts 31 and 41 of the NREPA, and related regulations and rules is required. All instances of noncompliance shall be reported as follows:

- a. **24-Hour Reporting**
Any noncompliance which may endanger health or the environment (including maximum and/or minimum daily concentration discharge limitation exceedances) shall be reported, verbally, within 24 hours from the time the permittee becomes aware of the noncompliance. A written submission shall also be provided within five (5) days.
- b. **Other Reporting**
The permittee shall report, in writing, all other instances of noncompliance not described in a. above at the time monitoring reports are submitted; or, in the case of retained self-monitoring, within five (5) days from the time the permittee becomes aware of the noncompliance.

Written reporting shall include: (1) a description of the discharge and cause of noncompliance; and (2) the period of noncompliance, including exact dates and times, or, if not yet corrected, the anticipated time the noncompliance is expected to continue, and the steps taken to reduce, eliminate and prevent recurrence of the noncomplying discharge.

7. Spill Notification

The permittee shall immediately report any release of any polluting material which occurs to the surface waters or groundwaters of the state, unless the permittee has determined that the release is not in excess of the threshold reporting quantities specified in the Part 5 Rules (R 324.2001 through R 324.2009 of the Michigan Administrative Code), by calling the Department at the number indicated on the second page of this permit (or, if this is a general permit, on the COC); or, if the notice is provided after regular working hours, call the Department's 24-hour Pollution Emergency Alerting System telephone number, 1-800-292-4706 (calls from **out-of-state** dial 1-517-373-7660).

Within ten (10) days of the release, the permittee shall submit to the Department a full written explanation as to the cause of the release, the discovery of the release, response (clean-up and/or recovery) measures taken, and preventative measures taken or a schedule for completion of measures to be taken to prevent reoccurrence of similar releases.

PART II**Section C. Reporting Requirements****8. Upset Noncompliance Notification**

If a process "upset" (defined as an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee) has occurred, the permittee who wishes to establish the affirmative defense of upset, shall notify the Department by telephone within 24 hours of becoming aware of such conditions; and within five (5) days, provide in writing, all of the following information:

- a. That an upset occurred and that the permittee can identify the specific cause(s) of the upset.
- b. That the permitted wastewater treatment facility was, at the time, being properly operated and maintained (note that an upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation).
- c. That the permittee has specified and taken action on all responsible steps to minimize or correct any adverse impact in the environment resulting from noncompliance with this permit.

No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

In any enforcement proceedings, the permittee, seeking to establish the occurrence of an upset, has the burden of proof.

9. Bypass Prohibition and Notification

- a. **Bypass Prohibition**
Bypass is prohibited, and the Department may take an enforcement action, unless all of the following apply:
 - 1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage.
 - 2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass.
 - 3) The permittee submitted notices as required under 9.b. or 9.c., below.
- b. **Notice of Anticipated Bypass**
If the permittee knows in advance of the need for a bypass, it shall submit prior notice to the Department, if possible at least ten (10) days before the date of the bypass, and provide information about the anticipated bypass as required by the Department. The Department may approve an anticipated bypass, after considering its adverse effects, if it will meet the three (3) conditions listed in 9.a., above.
- c. **Notice of Unanticipated Bypass**
The permittee shall submit notice to the Department of an unanticipated bypass by calling the Department at the number indicated on the second page of this permit (if the notice is provided after regular working hours, use the following number: 1-800-292-4706) as soon as possible, but no later than 24 hours from the time the permittee becomes aware of the circumstances.

PART II**Section C. Reporting Requirements**

- d. **Written Report of Bypass**
A written submission shall be provided within five (5) working days of commencing any bypass to the Department, and at additional times as directed by the Department. The written submission shall contain a description of the bypass and its cause; the period of bypass, including exact dates and times, and if the bypass has not been corrected, the anticipated time it is expected to continue; steps taken or planned to reduce, eliminate, and prevent reoccurrence of the bypass; and other information as required by the Department.
- e. **Bypass Not Exceeding Limitations**
The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to ensure efficient operation. These bypasses are not subject to the provisions of 9.a., 9.b., 9.c., and 9.d., above. This provision does not relieve the permittee of any notification responsibilities under Part II.C.11. of this permit.
- f. **Definitions**
- 1) Bypass means the intentional diversion of waste streams from any portion of a treatment facility.
 - 2) Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

10. Bioaccumulative Chemicals of Concern (BCC)

Consistent with the requirements of R 323.1098 and R 323.1215 of the Michigan Administrative Code, the permittee is prohibited from undertaking any action that would result in a lowering of water quality from an increased loading of a BCC unless an increased use request and antidegradation demonstration have been submitted and approved by the Department.

11. Notification of Changes in Discharge

The permittee shall notify the Department, in writing, as soon as possible but no later than 10 days of knowing, or having reason to believe, that any activity or change has occurred or will occur which would result in the discharge of: (1) detectable levels of chemicals on the current Michigan Critical Materials Register, priority pollutants or hazardous substances set forth in 40 CFR 122.21, Appendix D, or the Pollutants of Initial Focus in the Great Lakes Water Quality Initiative specified in 40 CFR 132.6, Table 6, which were not acknowledged in the application or listed in the application at less than detectable levels; (2) detectable levels of any other chemical not listed in the application or listed at less than detection, for which the application specifically requested information; or (3) any chemical at levels greater than five times the average level reported in the complete application (see the first page of this permit, for the date(s) the complete application was submitted). Any other monitoring results obtained as a requirement of this permit shall be reported in accordance with the compliance schedules.

PART II**Section C. Reporting Requirements****12. Changes in Facility Operations**

Any anticipated action or activity, including but not limited to facility expansion, production increases, or process modification, which will result in new or increased loadings of pollutants to the receiving waters must be reported to the Department by (a) submission of an increased use request (application) and all information required under R 323.1098 (Antidegradation) of the Water Quality Standards or (b) by notice if the following conditions are met: (1) the action or activity will not result in a change in the types of wastewater discharged or result in a greater quantity of wastewater than currently authorized by this permit; (2) the action or activity will not result in violations of the effluent limitations specified in this permit; (3) the action or activity is not prohibited by the requirements of Part II.C.10.; and (4) the action or activity will not require notification pursuant to Part II.C.11. Following such notice, the permit or, if applicable, the facility's COC may be modified according to applicable laws and rules to specify and limit any pollutant not previously limited.

13. Transfer of Ownership or Control

In the event of any change in control or ownership of facilities from which the authorized discharge emanates, the permittee shall submit to the Department 30 days prior to the actual transfer of ownership or control a written agreement between the current permittee and the new permittee containing: (1) the legal name and address of the new owner; (2) a specific date for the effective transfer of permit responsibility, coverage, and liability; and (3) a certification of the continuity of or any changes in operations, wastewater discharge, or wastewater treatment.

If the new permittee is proposing changes in operations, wastewater discharge, or wastewater treatment, the Department may propose modification of this permit in accordance with applicable laws and rules.

14. Operations and Maintenance Manual

For wastewater treatment facilities that serve the public (and are thus subject to Part 41 of the NREPA), Section 4104 of Part 41 and associated Rule 2957 of the Michigan Administrative Code allow the Department to require an Operations and Maintenance (O&M) Manual from the facility. An up-to-date copy of the O&M Manual shall be kept at the facility and shall be provided to the Department upon request. The Department may review the O&M Manual in whole or in part at its discretion and require modifications to it if portions are determined to be inadequate.

At a minimum, the O&M Manual shall include the following information: permit standards; descriptions and operation information for all equipment; staffing information; laboratory requirements; recordkeeping requirements; a maintenance plan for equipment; an emergency operating plan; safety program information; and copies of all pertinent forms, as-built plans, and manufacturer's manuals.

Certification of the existence and accuracy of the O&M Manual shall be submitted to the Department at least sixty days prior to start-up of a new wastewater treatment facility. Recertification shall be submitted sixty days prior to start-up of any substantial improvements or modifications made to an existing wastewater treatment facility.

PART II**Section C. Reporting Requirements****15. Signatory Requirements**

All applications, reports, or information submitted to the Department in accordance with the conditions of this permit and that require a signature shall be signed and certified as described in the CWA and the NREPA.

The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance, shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

The NREPA (Section 3115(2)) provides that a person who at the time of the violation knew or should have known that he or she discharged a substance contrary to this part, or contrary to a permit, COC, or order issued or rule promulgated under this part, or who intentionally makes a false statement, representation, or certification in an application for or form pertaining to a permit or COC or in a notice or report required by the terms and conditions of an issued permit or COC, or who intentionally renders inaccurate a monitoring device or record required to be maintained by the Department, is guilty of a felony and shall be fined not less than \$2,500.00 or more than \$25,000.00 for each violation. The court may impose an additional fine of not more than \$25,000.00 for each day during which the unlawful discharge occurred. If the conviction is for a violation committed after a first conviction of the person under this subsection, the court shall impose a fine of not less than \$25,000.00 per day and not more than \$50,000.00 per day of violation. Upon conviction, in addition to a fine, the court in its discretion may sentence the defendant to imprisonment for not more than 2 years or impose probation upon a person for a violation of this part. With the exception of the issuance of criminal complaints, issuance of warrants, and the holding of an arraignment, the circuit court for the county in which the violation occurred has exclusive jurisdiction. However, the person shall not be subject to the penalties of this subsection if the discharge of the effluent is in conformance with and obedient to a rule, order, permit, or COC of the Department. In addition to a fine, the attorney general may file a civil suit in a court of competent jurisdiction to recover the full value of the injuries done to the natural resources of the state and the costs of surveillance and enforcement by the state resulting from the violation.

16. Electronic Reporting

Upon notice by the Department that electronic reporting tools are available for specific reports or notifications, the permittee shall submit electronically all such reports or notifications as required by this permit.

PART II**Section D. Management Responsibilities****1. Duty to Comply**

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit, more frequently than, or at a level in excess of, that authorized, shall constitute a violation of the permit.

It is the duty of the permittee to comply with all the terms and conditions of this permit. Any noncompliance with the Effluent Limitations, Special Conditions, or terms of this permit constitutes a violation of the NREPA and/or the CWA and constitutes grounds for enforcement action; for permit or Certificate of Coverage (COC) termination, revocation and reissuance, or modification; or denial of an application for permit or COC renewal.

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

2. Operator Certification

The permittee shall have the waste treatment facilities under direct supervision of an operator certified at the appropriate level for the facility certification by the Department, as required by Sections 3110 and 4104 of the NREPA. Permittees authorized to discharge storm water shall have the storm water treatment and/or control measures under direct supervision of a storm water operator certified by the Department, as required by Section 3110 of the NREPA.

3. Facilities Operation

The permittee shall, at all times, properly operate and maintain all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance includes adequate laboratory controls and appropriate quality assurance procedures.

4. Power Failures

In order to maintain compliance with the effluent limitations of this permit and prevent unauthorized discharges, the permittee shall either:

- a. Provide an alternative power source sufficient to operate facilities utilized by the permittee to maintain compliance with the effluent limitations and conditions of this permit.
- b. Upon the reduction, loss, or failure of one or more of the primary sources of power to facilities utilized by the permittee to maintain compliance with the effluent limitations and conditions of this permit, the permittee shall halt, reduce or otherwise control production and/or all discharge in order to maintain compliance with the effluent limitations and conditions of this permit.

5. Adverse Impact

The permittee shall take all reasonable steps to minimize or prevent any adverse impact to the surface waters or groundwaters of the state resulting from noncompliance with any effluent limitation specified in this permit including, but not limited to, such accelerated or additional monitoring as necessary to determine the nature and impact of the discharge in noncompliance.

PART II**Section D. Management Responsibilities****6. Containment Facilities**

The permittee shall provide facilities for containment of any accidental losses of polluting materials in accordance with the requirements of the Part 5 Rules (R 324.2001 through R 324.2009 of the Michigan Administrative Code). For a Publicly Owned Treatment Work (POTW), these facilities shall be approved under Part 41 of the NREPA.

7. Waste Treatment Residues

Residuals (i.e. solids, sludges, biosolids, filter backwash, scrubber water, ash, grit, or other pollutants or wastes) removed from or resulting from treatment or control of wastewaters, including those that are generated during treatment or left over after treatment or control has ceased, shall be disposed of in an environmentally compatible manner and according to applicable laws and rules. These laws may include, but are not limited to, the NREPA, Part 31 for protection of water resources, Part 55 for air pollution control, Part 111 for hazardous waste management, Part 115 for solid waste management, Part 121 for liquid industrial wastes, Part 301 for protection of inland lakes and streams, and Part 303 for wetlands protection. Such disposal shall not result in any unlawful pollution of the air, surface waters or groundwaters of the state.

8. Right of Entry

The permittee shall allow the Department, any agent appointed by the Department, or the Regional Administrator, upon the presentation of credentials and, for animal feeding operation facilities, following appropriate biosecurity protocols:

- a. To enter upon the permittee's premises where an effluent source is located or any place in which records are required to be kept under the terms and conditions of this permit.
- b. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect process facilities, treatment works, monitoring methods, and equipment regulated or required under this permit; and to sample any discharge of pollutants.

9. Availability of Reports

Except for data determined to be confidential under Section 308 of the CWA and Rule 2128 (R 323.2128 of the Michigan Administrative Code), all reports prepared in accordance with the terms of this permit, shall be available for public inspection at the offices of the Department and the Regional Administrator. As required by the CWA, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the CWA and Sections 3112, 3115, 4106 and 4110 of the NREPA.

10. Duty to Provide Information

The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or the facility's COC, or to determine compliance with this permit. The permittee shall also furnish to the Department, upon request, copies of records required to be kept by this permit.

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information.

PART II

Section E. Activities Not Authorized by This Permit

1. Discharge to the Groundwaters

This permit does not authorize any discharge to the groundwaters. Such discharge may be authorized by a groundwater discharge permit issued pursuant to the NREPA.

2. POTW Construction

This permit does not authorize or approve the construction or modification of any physical structures or facilities at a POTW. Approval for the construction or modification of any physical structures or facilities at a POTW shall be by permit issued under Part 41 of the NREPA.

3. Civil and Criminal Liability

Except as provided in permit conditions on "Bypass" (Part II.C.9. pursuant to 40 CFR 122.41(m)), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance, whether or not such noncompliance is due to factors beyond the permittee's control, such as accidents, equipment breakdowns, or labor disputes.

4. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee may be subject under Section 311 of the CWA except as are exempted by federal regulations.

5. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 510 of the CWA.

6. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize violation of any federal, state or local laws or regulations, nor does it obviate the necessity of obtaining such permits, including any other Department permits, or approvals from other units of government as may be required by law.

Appendix D

Detailed Estimate

VILLAGE OF ONTONAGON
 ESTIMATE OF PROJECT COSTS
 GEI PROJECT NO. 2300109

Lift Stations

Lift Station #1 - Old WWTP Lift Station

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 25,000	\$ 25,000
Completely Replace and Reconstruct Lift Station	1	LSUM	\$ 500,000	\$ 500,000

Total Estimated Cost ==> \$ 525,000
 Construction Contingency ==> \$ 78,750
 Total Construction Cost ==> \$ 603,750
 Engineering Construction and Admin ==> \$ 60,375
 Total Estimated Project Cost ==> \$ 664,125

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		

Subtotals==> \$ -

Lift Station #2 - Main Lift Station

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 36,019	\$ 36,019
700 GPM Pump	2	EACH	\$ 83,310	\$ 166,620
2,200 GPM Pump	2	EACH	\$ 266,878	\$ 533,757
Wet Well Transfer Pump	1	EACH	\$ 20,000	\$ 20,000

Total Estimated Cost ==> \$ 756,395
 Construction Contingency ==> \$ 113,459
 Total Construction Cost ==> \$ 869,855
 Engineering Construction and Admin ==> \$ 86,985
 Total Estimated Project Cost ==> \$ 956,840

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		

Subtotals==> \$ -

Lift Station #3 - River and Lake Street Lift Station

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 15,000	\$ 15,000
Completely Replace and Reconstruct Lift Station	1	LSUM	\$ 300,000	\$ 300,000

Total Estimated Cost ==> \$ 315,000
 Construction Contingency ==> \$ 47,250
 Total Construction Cost ==> \$ 362,250
 Engineering Construction and Admin ==> \$ 36,225
 Total Estimated Project Cost ==> \$ 398,475

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		

Subtotals==> \$ -

Lift Station #5 - Zinc Street Lift Station

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 3,750	\$ 3,750
Upgrade Control Panel	1	LSUM	\$ 75,000	\$ 75,000

Total Estimated Cost ==> \$ 78,750
 Construction Contingency ==> \$ 11,813
 Total Construction Cost ==> \$ 90,563
 Engineering Construction and Admin ==> \$ 9,056
 Total Estimated Project Cost ==> \$ 99,619

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		

Subtotals==> \$ -

VILLAGE OF ONTONAGON
 ESTIMATE OF PROJECT COSTS
 GEI PROJECT NO. 2300109

Sanitary Sewer Main Replacement

Between River Street and Pennsylvania Avenue

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 8,384	\$ 8,384
Maintaining Traffic	1	LSUM	\$ 7,985	\$ 7,985
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
12" SDR-26 PVC Sanitary Sewer Main	420	LFT	\$ 210	\$ 88,200
6" SDR-26 PVC Sanitary Sewer Lateral	20	LFT	\$ 140	\$ 2,800
12"x6" Wye	2	EACH	\$ 304	\$ 608
Subbase, MDOT Class II, 12" (CIP)	1000	SYD	\$ 11	\$ 11,000
Aggregate Base Under Bit., MDOT 22A, 6" (CIP)	1000	SYD	\$ 18	\$ 18,000
1-1/2" Bituminous Mixture, MDOT 4EL - Leveling Course	83	TON	\$ 207	\$ 17,078
1-1/2" Bituminous Mixture, MDOT 5EL - Top Course	83	TON	\$ 194	\$ 16,005
Connect to Existing Sanitary Sewer Lateral	2	EACH	\$ 184	\$ 368
Connect to Existing Sanitary Sewer Manhole	4	EACH	\$ 844	\$ 3,376
Post-Construction Sanitary Sewer Televising	420	LFT	\$ 3	\$ 1,260

Total Estimated Cost ==> \$ 176,063
 Construction Contingency ==> \$ 26,409
 Total Construction Cost ==> \$ 202,473
 Engineering Construction and Admin ==> \$ 20,247
 Total Estimated Project Cost ==> \$ 222,720

Copper Street

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 3,346	\$ 3,346
Maintaining Traffic	1	LSUM	\$ 3,187	\$ 3,187
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
8" SDR-26 PVC Sanitary Sewer Main	140	LFT	\$ 140	\$ 19,600
6" SDR-26 PVC Sanitary Sewer Lateral	20	LFT	\$ 140	\$ 2,800
8"x6" Wye	2	EACH	\$ 304	\$ 608
Subbase, MDOT Class II, 12" (CIP)	600	SYD	\$ 11	\$ 6,600
Aggregate Base Under Bit., MDOT 22A, 6" (CIP)	600	SYD	\$ 18	\$ 10,800
1-1/2" Bituminous Mixture, MDOT 4EL - Leveling Course	50	TON	\$ 207	\$ 10,247
1-1/2" Bituminous Mixture, MDOT 5EL - Top Course	50	TON	\$ 194	\$ 9,603
Connect to Existing Sanitary Sewer Lateral	2	EACH	\$ 184	\$ 368
Connect to Existing Sanitary Sewer Manhole	1	EACH	\$ 844	\$ 844
Connect to Existing Sanitary Sewer Main	1	EACH	\$ 844	\$ 844
Post-Construction Sanitary Sewer Televising	140	LFT	\$ 3	\$ 420

Total Estimated Cost ==> \$ 70,266
 Construction Contingency ==> \$ 10,540
 Total Construction Cost ==> \$ 80,806
 Engineering Construction and Admin ==> \$ 8,081
 Total Estimated Project Cost ==> \$ 88,887

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
50	\$ 52,920.00		
50	\$ 1,680.00		
50	\$ 364.80		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
Subtotals==>	\$ 54,964.80		

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
50	\$ 11,760.00		
50	\$ 1,680.00		
50	\$ 364.80		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
Subtotals==>	\$ 13,804.80		

VILLAGE OF ONTONAGON
ESTIMATE OF PROJECT COSTS
GEI PROJECT NO. 2300109

Sanitary Sewer Main Replacement Continued

Tin Street

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 1,942	\$ 1,942
Maintaining Traffic	1	LSUM	\$ 1,849	\$ 1,849
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
8" SDR-26 PVC Sanitary Sewer Main	70	LFT	\$ 140	\$ 9,800
6" SDR-26 PVC Sanitary Sewer Lateral	30	LFT	\$ 140	\$ 4,200
8"x6" Wye	3	EACH	\$ 304	\$ 912
Subbase, MDOT Class II, 12" (CIP)	300	SYD	\$ 11	\$ 3,300
Aggregate Base Under Bit., MDOT 22A, 6" (CIP)	300	SYD	\$ 18	\$ 5,400
1-1/2" Bituminous Mixture, MDOT 4EL - Leveling Course	25	TON	\$ 207	\$ 5,123
1-1/2" Bituminous Mixture, MDOT 5EL - Top Course	25	TON	\$ 194	\$ 4,802
Connect to Existing Sanitary Sewer Lateral	3	EACH	\$ 184	\$ 552
Connect to Existing Sanitary Sewer Manhole	2	EACH	\$ 844	\$ 1,688
Post-Construction Sanitary Sewer Televising	70	LFT	\$ 3	\$ 210
Total Estimated Cost ==>				\$ 40,778
Construction Contingency ==>				\$ 6,117
Total Construction Cost ==>				\$ 46,895
Engineering Construction and Admin ==>				\$ 4,689
Total Estimated Project Cost ==>				\$ 51,584

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
50	\$ 5,880.00		
50	\$ 2,520.00		
50	\$ 547.20		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
Subtotals==>		\$ 8,947.20	

Parker Avenue

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 2,515	\$ 2,515
Maintaining Traffic	1	LSUM	\$ 2,395	\$ 2,395
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
8" SDR-26 PVC Sanitary Sewer Main	140	LFT	\$ 140	\$ 19,600
Subbase, MDOT Class II, 12" (CIP)	400	SYD	\$ 11	\$ 4,400
Aggregate Base Under Bit., MDOT 22A, 6" (CIP)	400	SYD	\$ 18	\$ 7,200
1-1/2" Bituminous Mixture, MDOT 4EL - Leveling Course	33	TON	\$ 207	\$ 6,831
1-1/2" Bituminous Mixture, MDOT 5EL - Top Course	33	TON	\$ 194	\$ 6,402
Connect to Existing Sanitary Sewer Lateral	2	EACH	\$ 184	\$ 368
Connect to Existing Sanitary Sewer Manhole	2	EACH	\$ 844	\$ 1,688
Post-Construction Sanitary Sewer Televising	140	LFT	\$ 3	\$ 420
Total Estimated Cost ==>				\$ 52,820
Construction Contingency ==>				\$ 7,923
Total Construction Cost ==>				\$ 60,743
Engineering Construction and Admin ==>				\$ 6,074
Total Estimated Project Cost ==>				\$ 66,817

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
50	\$ 11,760.00		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
Subtotals==>		\$ 11,760.00	

VILLAGE OF ONTONAGON
ESTIMATE OF PROJECT COSTS
GEI PROJECT NO. 2300109

Sanitary Sewer Main Replacement Continued

Michigan Avenue

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 2,694	\$ 2,694
Maintaining Traffic	1	LSUM	\$ 2,566	\$ 2,566
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
8" SDR-26 PVC Sanitary Sewer Main	140	LFT	\$ 140	\$ 19,600
6" SDR-26 PVC Sanitary Sewer Lateral	20	LFT	\$ 140	\$ 2,800
8"x6" Wye	2	EACH	\$ 304	\$ 608
Subbase, MDOT Class II, 12" (CIP)	400	SYD	\$ 11	\$ 4,400
Aggregate Base Under Bit., MDOT 22A, 6" (CIP)	400	SYD	\$ 18	\$ 7,200
1-1/2" Bituminous Mixture, MDOT 4EL - Leveling Course	33	TON	\$ 207	\$ 6,831
1-1/2" Bituminous Mixture, MDOT 5EL - Top Course	33	TON	\$ 194	\$ 6,402
Connect to Existing Sanitary Sewer Lateral	2	EACH	\$ 184	\$ 368
Connect to Existing Sanitary Sewer Manhole	2	EACH	\$ 844	\$ 1,688
Post-Construction Sanitary Sewer Televising	140	LFT	\$ 3	\$ 420
Total Estimated Cost ==>			\$	56,577
Construction Contingency ==>			\$	8,487
Total Construction Cost ==>			\$	65,064
Engineering Construction and Admin ==>			\$	6,506
Total Estimated Project Cost ==>			\$	71,570

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
50	\$ 11,760.00		
50	\$ 1,680.00		
50	\$ 364.80		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
Subtotals==>		\$	13,804.80

Between Lake Street and Ontonagon Street

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 1,055	\$ 1,055
Maintaining Traffic	1	LSUM	\$ 1,004	\$ 1,004
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
8" SDR-26 PVC Sanitary Sewer Main	70	LFT	\$ 140	\$ 9,800
6" SDR-26 PVC Sanitary Sewer Lateral	30	LFT	\$ 140	\$ 4,200
8"x6" Wye	3	EACH	\$ 304	\$ 912
3" Topsoil, Seed, Fertilizer, and Mulch	230	SYD	\$ 8	\$ 1,725
Connect to Existing Sanitary Sewer Lateral	3	EACH	\$ 184	\$ 552
Connect to Existing Sanitary Sewer Manhole	2	EACH	\$ 844	\$ 1,688
Post-Construction Sanitary Sewer Televising	70	LFT	\$ 3	\$ 210
Total Estimated Cost ==>			\$	22,146
Construction Contingency ==>			\$	3,322
Total Construction Cost ==>			\$	25,468
Engineering Construction and Admin ==>			\$	2,547
Total Estimated Project Cost ==>			\$	28,015

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
50	\$ 5,880.00		
50	\$ 2,520.00		
50	\$ 547.20		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
Subtotals==>		\$	8,947.20

VILLAGE OF ONTONAGON
 ESTIMATE OF PROJECT COSTS
 GEI PROJECT NO. 2300109

Sanitary Sewer Main Replacement Continued

Amygdaloid Street

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 5,119	\$ 5,119
Maintaining Traffic	1	LSUM	\$ 4,876	\$ 4,876
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
8" SDR-26 PVC Sanitary Sewer Main	280	LFT	\$ 140	\$ 39,200
6" SDR-26 PVC Sanitary Sewer Lateral	60	LFT	\$ 140	\$ 8,400
8"x6" Wye	6	EACH	\$ 304	\$ 1,824
Subbase, MDOT Class II, 12" (CIP)	700	SYD	\$ 11	\$ 7,700
Aggregate Base Under Bit., MDOT 22A, 6" (CIP)	700	SYD	\$ 18	\$ 12,600
1-1/2" Bituminous Mixture, MDOT 4EL - Leveling Course	58	TON	\$ 207	\$ 11,954
1-1/2" Bituminous Mixture, MDOT 5EL - Top Course	58	TON	\$ 194	\$ 11,204
Connect to Existing Sanitary Sewer Lateral	6	EACH	\$ 184	\$ 1,104
Connect to Existing Sanitary Sewer Manhole	2	EACH	\$ 844	\$ 1,688
Post-Construction Sanitary Sewer Televising	280	LFT	\$ 3	\$ 840

Total Estimated Cost ==> \$ 107,509
 Construction Contingency ==> \$ 16,126
 Total Construction Cost ==> \$ 123,635
 Engineering Construction and Admin ==> \$ 12,364
 Total Estimated Project Cost ==> \$ 135,999

Houghton Street

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 4,456	\$ 4,456
Maintaining Traffic	1	LSUM	\$ 4,243	\$ 4,243
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
10" SDR-26 PVC Sanitary Sewer Main	210	LFT	\$ 175	\$ 36,750
6" SDR-26 PVC Sanitary Sewer Lateral	40	LFT	\$ 140	\$ 5,600
10"x6" Wye	4	EACH	\$ 304	\$ 1,216
Subbase, MDOT Class II, 12" (CIP)	600	SYD	\$ 11	\$ 6,600
Aggregate Base Under Bit., MDOT 22A, 6" (CIP)	600	SYD	\$ 18	\$ 10,800
1-1/2" Bituminous Mixture, MDOT 4EL - Leveling Course	50	TON	\$ 207	\$ 10,247
1-1/2" Bituminous Mixture, MDOT 5EL - Top Course	50	TON	\$ 194	\$ 9,603
Connect to Existing Sanitary Sewer Lateral	4	EACH	\$ 184	\$ 736
Connect to Existing Sanitary Sewer Manhole	2	EACH	\$ 844	\$ 1,688
Post-Construction Sanitary Sewer Televising	210	LFT	\$ 3	\$ 630

Total Estimated Cost ==> \$ 93,569
 Construction Contingency ==> \$ 14,035
 Total Construction Cost ==> \$ 107,604
 Engineering Construction and Admin ==> \$ 10,760
 Total Estimated Project Cost ==> \$ 118,364

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
50	\$ 23,520.00		
50	\$ 5,040.00		
50	\$ 1,094.40		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
Subtotals==>	\$ 29,654.40		

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
50	\$ 22,050.00		
50	\$ 3,360.00		
50	\$ 729.60		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
Subtotals==>	\$ 26,139.60		

VILLAGE OF ONTONAGON
ESTIMATE OF PROJECT COSTS
GEI PROJECT NO. 2300109

Sanitary Sewer Main Replacement Continued

Michigan Street

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 3,407	\$ 3,407
Maintaining Traffic	1	LSUM	\$ 3,245	\$ 3,245
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
12" SDR-26 PVC Sanitary Sewer Main	140	LFT	\$ 210	\$ 29,400
6" SDR-26 PVC Sanitary Sewer Lateral	40	LFT	\$ 140	\$ 5,600
12"x6" Wye	4	EACH	\$ 304	\$ 1,216
Subbase, MDOT Class II, 12" (CIP)	400	SYD	\$ 11	\$ 4,400
Aggregate Base Under Bit., MDOT 22A, 6" (CIP)	400	SYD	\$ 18	\$ 7,200
1-1/2" Bituminous Mixture, MDOT 4EL - Leveling Course	33	TON	\$ 207	\$ 6,831
1-1/2" Bituminous Mixture, MDOT 5EL - Top Course	33	TON	\$ 194	\$ 6,402
Connect to Existing Sanitary Sewer Lateral	4	EACH	\$ 184	\$ 736
Connect to Existing Sanitary Sewer Manhole	1	EACH	\$ 844	\$ 844
Connect to Existing Sanitary Sewer Main	1	EACH	\$ 844	\$ 844
Post-Construction Sanitary Sewer Televising	140	LFT	\$ 3	\$ 420

Total Estimated Cost ==> \$ 71,545
Construction Contingency ==> \$ 10,732

Total Construction Cost ==> \$ 82,276
Engineering Construction and Admin ==> \$ 8,228

Total Estimated Project Cost ==> \$ 90,504

W Mercury St.

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 3,407	\$ 3,407
Maintaining Traffic	1	LSUM	\$ 3,245	\$ 3,245
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
12" SDR-26 PVC Sanitary Sewer Main	140	LFT	\$ 210	\$ 29,400
6" SDR-26 PVC Sanitary Sewer Lateral	40	LFT	\$ 140	\$ 5,600
12"x6" Wye	4	EACH	\$ 304	\$ 1,216
Subbase, MDOT Class II, 12" (CIP)	400	SYD	\$ 11	\$ 4,400
Aggregate Base Under Bit., MDOT 22A, 6" (CIP)	400	SYD	\$ 18	\$ 7,200
1-1/2" Bituminous Mixture, MDOT 4EL - Leveling Course	33	TON	\$ 207	\$ 6,831
1-1/2" Bituminous Mixture, MDOT 5EL - Top Course	33	TON	\$ 194	\$ 6,402
Connect to Existing Sanitary Sewer Lateral	4	EACH	\$ 184	\$ 736
Connect to Existing Sanitary Sewer Manhole	2	EACH	\$ 844	\$ 1,688
Post-Construction Sanitary Sewer Televising	140	LFT	\$ 3	\$ 420

Total Estimated Cost ==> \$ 71,545
Construction Contingency ==> \$ 10,732

Total Construction Cost ==> \$ 82,276
Engineering Construction and Admin ==> \$ 8,228

Total Estimated Project Cost ==> \$ 90,504

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
50	\$ 17,640.00		
50	\$ 3,360.00		
50	\$ 729.60		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
Subtotals==>	\$ 21,729.60		

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
50	\$ 17,640.00		
50	\$ 3,360.00		
50	\$ 729.60		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
Subtotals==>	\$ 21,729.60		

VILLAGE OF ONTONAGON
 ESTIMATE OF PROJECT COSTS
 GEI PROJECT NO. 2300109

Sanitary Sewer Main Replacement Continued

Zinc Street

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 6,444	\$ 6,444
Maintaining Traffic	1	LSUM	\$ 6,138	\$ 6,138
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
10" SDR-26 PVC Sanitary Sewer Main	350	LFT	\$ 175	\$ 61,250
6" SDR-26 PVC Sanitary Sewer Lateral	10	LFT	\$ 140	\$ 1,400
10"x6" Wye	1	EACH	\$ 304	\$ 304
Subbase, MDOT Class II, 12" (CIP)	900	SYD	\$ 11	\$ 9,900
Aggregate Base Under Bit., MDOT 22A, 6" (CIP)	900	SYD	\$ 18	\$ 16,200
1-1/2" Bituminous Mixture, MDOT 4EL - Leveling Course	74	TON	\$ 207	\$ 15,370
1-1/2" Bituminous Mixture, MDOT 5EL - Top Course	74	TON	\$ 194	\$ 14,405
Connect to Existing Sanitary Sewer Lateral	1	EACH	\$ 184	\$ 184
Connect to Existing Sanitary Sewer Manhole	2	EACH	\$ 844	\$ 1,688
Post-Construction Sanitary Sewer Televising	350	LFT	\$ 3	\$ 1,050

Total Estimated Cost ==> \$ 135,332
 Construction Contingency ==> \$ 20,300
 Total Construction Cost ==> \$ 155,632
 Engineering Construction and Admin ==> \$ 15,563
 Total Estimated Project Cost ==> \$ 171,195

Payne Street

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 5,337	\$ 5,337
Maintaining Traffic	1	LSUM	\$ 5,082	\$ 5,082
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
10" SDR-26 PVC Sanitary Sewer Main	280	LFT	\$ 175	\$ 49,000
6" SDR-26 PVC Sanitary Sewer Lateral	30	LFT	\$ 140	\$ 4,200
10"x6" Wye	3	EACH	\$ 304	\$ 912
Subbase, MDOT Class II, 12" (CIP)	700	SYD	\$ 11	\$ 7,700
Aggregate Base Under Bit., MDOT 22A, 6" (CIP)	700	SYD	\$ 18	\$ 12,600
1-1/2" Bituminous Mixture, MDOT 4EL - Leveling Course	58	TON	\$ 207	\$ 11,954
1-1/2" Bituminous Mixture, MDOT 5EL - Top Course	58	TON	\$ 194	\$ 11,204
Connect to Existing Sanitary Sewer Lateral	3	EACH	\$ 184	\$ 552
Connect to Existing Sanitary Sewer Manhole	2	EACH	\$ 844	\$ 1,688
Post-Construction Sanitary Sewer Televising	280	LFT	\$ 3	\$ 840

Total Estimated Cost ==> \$ 112,069
 Construction Contingency ==> \$ 16,810
 Total Construction Cost ==> \$ 128,879
 Engineering Construction and Admin ==> \$ 12,888
 Total Estimated Project Cost ==> \$ 141,767

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
50	\$ 36,750.00		
50	\$ 840.00		
50	\$ 182.40		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
Subtotals==>	\$ 37,772.40		

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
50	\$ 29,400.00		
50	\$ 2,520.00		
50	\$ 547.20		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
Subtotals==>	\$ 32,467.20		

VILLAGE OF ONTONAGON
ESTIMATE OF PROJECT COSTS
GEI PROJECT NO. 2300109

Sanitary Sewer Main Replacement Continued

S 4th Street

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 6,851	\$ 6,851
Maintaining Traffic	1	LSUM	\$ 6,525	\$ 6,525
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
8" SDR-26 PVC Sanitary Sewer Main	420	LFT	\$ 140	\$ 58,800
6" SDR-26 PVC Sanitary Sewer Lateral	30	LFT	\$ 140	\$ 4,200
8"x6" Wye	3	EACH	\$ 304	\$ 912
Subbase, MDOT Class II, 12" (CIP)	1000	SYD	\$ 11	\$ 11,000
Aggregate Base Under Bit., MDOT 22A, 6" (CIP)	1000	SYD	\$ 18	\$ 18,000
1-1/2" Bituminous Mixture, MDOT 4EL - Leveling Course	83	TON	\$ 207	\$ 17,078
1-1/2" Bituminous Mixture, MDOT 5EL - Top Course	83	TON	\$ 194	\$ 16,005
Connect to Existing Sanitary Sewer Lateral	3	EACH	\$ 184	\$ 552
Connect to Existing Sanitary Sewer Manhole	2	EACH	\$ 844	\$ 1,688
Post-Construction Sanitary Sewer Televising	420	LFT	\$ 3	\$ 1,260

Total Estimated Cost ==> \$ 143,870
 Construction Contingency ==> \$ 21,581
 Total Construction Cost ==> \$ 165,451
 Engineering Construction and Admin ==> \$ 16,545
 Total Estimated Project Cost ==> \$ 181,996

Manhole Replacement

Houghton Street

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 948	\$ 948
Maintaining Traffic	1	LSUM	\$ 903	\$ 903
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
10" SDR-26 PVC Sanitary Sewer Main	6	LFT	\$ 175	\$ 1,050
12" SDR-26 PVC Sanitary Sewer Main	6	LFT	\$ 210	\$ 1,260
15" SDR-26 PVC Sanitary Sewer Main	6	LFT	\$ 245	\$ 1,470
4' Dia. Precast Concrete Sanitary Manhole	1	EACH	\$ 3,450	\$ 3,450
Drainage Structure Cover	1	EACH	\$ 1,080	\$ 1,080
Subbase, MDOT Class II, 12" (CIP)	100	SYD	\$ 11	\$ 1,100
Aggregate Base Under Bit., MDOT 22A, 6" (CIP)	100	SYD	\$ 18	\$ 1,800
1-1/2" Bituminous Mixture, MDOT 4EL - Leveling Course	8	TON	\$ 207	\$ 1,708
1-1/2" Bituminous Mixture, MDOT 5EL - Top Course	8	TON	\$ 194	\$ 1,601
Connect to Existing Sanitary Sewer Main	3	EACH	\$ 844	\$ 2,532

Total Estimated Cost ==> \$ 17,368
 Construction Contingency ==> \$ 2,605
 Total Construction Cost ==> \$ 19,974
 Engineering Construction and Admin ==> \$ 1,997
 Total Estimated Project Cost ==> \$ 21,971

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
50	\$ 35,280.00		
50	\$ 2,520.00		
50	\$ 547.20		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
Subtotals==>	\$ 38,347.20		

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
50	\$ 630.00		
50	\$ 756.00		
50	\$ 882.00		
50	\$ 2,070.00		
50	\$ 648.00		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
Subtotals==>	\$ 4,986.00		

VILLAGE OF ONTONAGON
ESTIMATE OF PROJECT COSTS
GEI PROJECT NO. 2300109

Manhole Replacement Continued

Michigan Street

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 881	\$ 881
Maintaining Traffic	1	LSUM	\$ 839	\$ 839
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
18" SDR-26 PVC Sanitary Sewer Main	12	LFT	\$ 280	\$ 3,360
4' Dia. Precast Concrete Sanitary Manhole	1	EACH	\$ 3,450	\$ 3,450
Drainage Structure Cover	1	EACH	\$ 1,080	\$ 1,080
Subbase, MDOT Class II, 12" (CIP)	100	SYD	\$ 11	\$ 1,100
Aggregate Base Under Bit., MDOT 22A, 6" (CIP)	100	SYD	\$ 18	\$ 1,800
1-1/2" Bituminous Mixture, MDOT 4EL - Leveling Course	8	TON	\$ 207	\$ 1,708
1-1/2" Bituminous Mixture, MDOT 5EL - Top Course	8	TON	\$ 194	\$ 1,601
Connect to Existing Sanitary Sewer Main	2	EACH	\$ 844	\$ 1,688

Total Estimated Cost ==> \$ **16,819**
 Construction Contingency ==> \$ **2,523**
 Total Construction Cost ==> \$ **19,342**
 Engineering Construction and Admin ==> \$ **1,934**
 Total Estimated Project Cost ==> \$ **21,276**

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
50	\$ 2,016.00		
50	\$ 2,070.00		
50	\$ 648.00		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		

Subtotals==> \$ 4,734.00

W. Mercury Street

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 948	\$ 948
Maintaining Traffic	1	LSUM	\$ 903	\$ 903
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
10" SDR-26 PVC Sanitary Sewer Main	6	LFT	\$ 175	\$ 1,050
12" SDR-26 PVC Sanitary Sewer Main	6	LFT	\$ 210	\$ 1,260
15" SDR-26 PVC Sanitary Sewer Main	6	LFT	\$ 245	\$ 1,470
4' Dia. Precast Concrete Sanitary Manhole	1	EACH	\$ 3,450	\$ 3,450
Drainage Structure Cover	1	EACH	\$ 1,080	\$ 1,080
Subbase, MDOT Class II, 12" (CIP)	100	SYD	\$ 11	\$ 1,100
Aggregate Base Under Bit., MDOT 22A, 6" (CIP)	100	SYD	\$ 18	\$ 1,800
1-1/2" Bituminous Mixture, MDOT 4EL - Leveling Course	8	TON	\$ 207	\$ 1,708
1-1/2" Bituminous Mixture, MDOT 5EL - Top Course	8	TON	\$ 194	\$ 1,601
Connect to Existing Sanitary Sewer Main	3	EACH	\$ 844	\$ 2,532

Total Estimated Cost ==> \$ **17,368**
 Construction Contingency ==> \$ **2,605**
 Total Construction Cost ==> \$ **19,974**
 Engineering Construction and Admin ==> \$ **1,997**
 Total Estimated Project Cost ==> \$ **21,971**

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
50	\$ 630.00		
50	\$ 756.00		
50	\$ 882.00		
50	\$ 2,070.00		
50	\$ 648.00		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		

Subtotals==> \$ 4,986.00

VILLAGE OF ONTONAGON
 ESTIMATE OF PROJECT COSTS
 GEI PROJECT NO. 2300109

Manhole Replacement Continued

US-45

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 815	\$ 815
Maintaining Traffic	1	LSUM	\$ 776	\$ 776
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
10" SDR-26 PVC Sanitary Sewer Main	12	LFT	\$ 175	\$ 2,100
4' Dia. Precast Concrete Sanitary Manhole	1	EACH	\$ 3,450	\$ 3,450
Drainage Structure Cover	1	EACH	\$ 1,080	\$ 1,080
Subbase, MDOT Class II, 12" (CIP)	100	SYD	\$ 11	\$ 1,100
Aggregate Base Under Bit., MDOT 22A, 6" (CIP)	100	SYD	\$ 18	\$ 1,800
1-1/2" Bituminous Mixture, MDOT 4EL - Leveling Course	8	TON	\$ 207	\$ 1,708
1-1/2" Bituminous Mixture, MDOT 5EL - Top Course	8	TON	\$ 194	\$ 1,601
Connect to Existing Sanitary Sewer Main	2	EACH	\$ 844	\$ 1,688

Total Estimated Cost ==> \$ 15,430
 Construction Contingency ==> \$ 2,314
 Total Construction Cost ==> \$ 17,744
 Engineering Construction and Admin ==> \$ 1,774
 Total Estimated Project Cost ==> \$ 19,519

Manhole Repair/Lining

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 34,398	\$ 34,398
Maintaining Traffic	1	LSUM	\$ 7,000	\$ 7,000
Manhole Major Repair/Lining	35	EACH	\$ 4,000	\$ 140,000

Total Estimated Cost ==> \$ 147,000
 Construction Contingency ==> \$ 22,050
 Total Construction Cost ==> \$ 169,050
 Engineering Construction and Admin ==> \$ 16,905
 Total Estimated Project Cost ==> \$ 185,955

Sanitary Sewer Lining

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Maintaining Traffic	1	LSUM	\$ 43,999	\$ 44,000
Sewer Line Full Lining - 8"	3680	LFT	\$ 80	\$ 294,400
Sewer Line Full Lining - 10"	2760	LFT	\$ 80	\$ 220,800
Sewer Line Full Lining - 12"	1685	LFT	\$ 90	\$ 151,650
Sewer Line Full Lining - 15"	1075	LFT	\$ 125	\$ 134,375
Sewer Line Full Lining - 18"	150	LFT	\$ 125	\$ 18,750
Sewer Line Full Lining - 24"	150	LFT	\$ 400	\$ 60,000

Total Estimated Cost ==> \$ 923,975
 Construction Contingency ==> \$ 138,596
 Total Construction Cost ==> \$ 1,062,571
 Engineering Construction and Admin ==> \$ 106,257
 Total Estimated Project Cost ==> \$ 1,168,828

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
50	\$ 1,260.00		
50	\$ 2,070.00		
50	\$ 648.00		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		

Subtotals==> \$ 3,978.00

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		

Subtotals==> \$ -

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		

Subtotals==> \$ -

VILLAGE OF ONTONAGON
ESTIMATE OF PROJECT COSTS
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Remove CSO Locations

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 3,203	\$ 3,203
Maintaining Traffic	1	LSUM	\$ 3,050	\$ 3,050
Soil Erosion and Sedimentation Control	1	LSUM	\$ 1,000	\$ 1,000
Cap CSO Locations	4	EACH	\$ 15,000	\$ 60,000

Total Estimated Cost ==> \$ 67,253
 Construction Contingency ==> \$ 10,088
 Total Construction Cost ==> \$ 77,340
 Engineering Construction and Admin ==> \$ 7,734
 Total Estimated Project Cost ==> \$ 85,074

Rose Island Expansion

Item Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Extension
Mobilization	1	LSUM	\$ 47,523	\$ 47,523
Maintaining Traffic	1	LSUM	\$ 45,260	\$ 45,260
Soil Erosion and Sedimentation Control	1	LSUM	\$ 10,000	\$ 10,000
Dewatering	1	LSUM	\$ 20,000.00	\$ 20,000.00
Clearing and Grubbing	0.5	ACRE	\$ 7,000.00	\$ 3,500.00
Grinder Lift Station	1	LSUM	\$ 150,000.00	\$ 150,000.00
Backup Generator	1	EACH	\$ 70,000.00	\$ 70,000.00
Tie into SCADA System	1	LSUM	\$ 30,000.00	\$ 30,000.00
4' Dia. Precast Concrete Standard Sanitary Manhole (0'-8')	5	EA	\$ 4,000.00	\$ 20,000.00
Sanitary Structure Cover	5	EA	\$ 1,000.00	\$ 5,000.00
6" SDR-26 PVC Sanitary Sewer Lateral	620	LFT	\$ 140.00	\$ 86,800.00
8" SDR-26 PVC Sanitary Sewer Main	1085	LFT	\$ 140.00	\$ 151,900.00
8" x 6" Wye	6	EA	\$ 304.00	\$ 1,824.00
Directional Bore 4" SDR 17	300	LFT	\$ 450.00	\$ 135,000.00
Directional Bore Mobilization/Demobilization	1	LSUM	\$ 6,000.00	\$ 6,000.00
Imported Fill Material	2000	CYD	\$ 25.00	\$ 50,000.00
Pipe Bedding Material 6" MDOT Class IIIA	500	SYD	\$ 15.00	\$ 7,500.00
Subbase, MDOT Class II, 12" (CIP)	2540	SY	\$ 11.00	\$ 27,936.33
Aggregate Base Under Bit., MDOT 22A, 6" (CIP)	2540	SY	\$ 18.00	\$ 45,714.00
1-1/2" Bituminous Mixture, MDOT 4EL - Leveling Course	210	TON	\$ 207.00	\$ 43,371.16
1-1/2" Bituminous Mixture, MDOT 5EL - Top Course	210	TON	\$ 194.00	\$ 40,647.37
Connect to Existing Sewer Main	1	EA	\$ 1,000.00	\$ 1,000.00
Connect User to New System	6	EA	\$ 500.00	\$ 3,000.00

Total Estimated Cost ==> \$ 997,975
 Construction Contingency ==> \$ 149,696
 Total Construction Cost ==> \$ 1,147,671
 Engineering Construction and Admin ==> \$ 114,767
 Total Estimated Project Cost ==> \$ 1,262,439

Total Estimated Cost All Projects ==> \$ 5,032,421
 Construction Contingency ==> \$ 754,863
 Total Construction Cost ==> \$ 5,787,284
 Engineering Construction and Admin ==> \$ 578,728
 Total CSWRF Project Cost ==> \$ 6,366,013

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		

Subtotals==> \$ -

Service Life	Salvage Value at 2043	OM&R	Description
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
30	\$ 50,000.00		
30	\$ 23,333.33		
20	\$ -		
50	\$ 12,000.00		
50	\$ 3,000.00		
50	\$ 52,080.00		
50	\$ 91,140.00		
50	\$ 1,094.40		
50	\$ 81,000.00		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		
20	\$ -		

Subtotals==> \$ 240,314.40

Appendix E

Manhole/Gravity Main/Lift Station Assessment Tables

Table A-1 – Manhole Assessment

Table A-2 – Gravity Main Assessment

Table A-3 – Lift Station Assessment

Table A-1: Manhole Assessment

Grade 5 defect; Structure needs immediate attention
Grade 4 defect
Structure is SRF eligible (based on Structural Quick Rating)

Structure ID	Structural										O & M						OVERALL													
	Pipe Grade Scores					Structure Grade Score	Structure Rating	Highest Rated Defect	Quick Rating	Structure Ratings Index	Pipe Grade Scores					Structure Grade Score	Structure Rating	Highest Rated Defect	Quick Rating	Structure Ratings Index										
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5						Grade 1	Grade 2	Grade 3	Grade 4	Grade 5						Grade 1	Grade 2	Grade 3	Grade 4	Grade 5					
10F	0	1	1	0	2	4	15	5	5231	3.750	0	2	1	0	0	3	7	3	3122	2.333	0	3	2	0	2	7	22	5	5232	3.143
105D	0	0	2	1	1	4	15	5	5141	3.750	0	1	0	0	0	1	2	2	2100	2.000	0	1	2	1	1	5	17	5	5141	3.400
3F	0	2	0	1	1	4	13	5	5141	3.250	0	2	0	0	0	2	4	2	2200	2.000	0	4	0	1	1	6	17	5	5141	2.833
7E	0	2	1	1	1	5	16	5	5141	3.200	0	2	3	0	0	5	13	3	3322	2.600	0	4	4	1	1	10	29	5	5141	2.900
110	0	1	1	0	1	3	10	5	5131	3.333	0	1	1	0	0	2	5	3	3121	2.500	0	2	2	0	1	5	15	5	5132	3.000
31G	1	3	0	0	1	5	12	5	5123	2.400	0	0	1	0	0	1	3	3	3100	3.000	1	3	1	0	1	6	15	5	5131	2.500
31M	0	1	0	0	1	2	7	5	5121	3.500	0	0	0	0	0	0	0	0	0000	0.000	0	1	0	0	1	2	7	5	5121	3.500
61D	0	0	0	0	1	1	5	5	5100	5.000	0	1	0	0	0	1	2	2	2100	2.000	0	1	0	0	1	2	7	5	5121	3.500
46H	0	0	3	2	0	5	17	4	4233	3.400	0	0	0	0	0	0	0	0	0000	0.000	0	0	3	2	0	5	17	4	4233	3.400
5A	0	2	1	2	0	5	15	4	4231	3.000	0	1	0	0	0	1	2	2	2100	2.000	0	3	1	2	0	6	17	4	4231	2.833
16H	0	4	1	2	0	7	19	4	4231	2.714	0	1	0	0	0	1	2	2	2100	2.000	0	5	1	2	0	8	21	4	4231	2.625
1M	0	0	0	2	0	2	8	4	4200	4.000	0	4	0	0	0	4	8	2	2400	2.000	0	4	0	2	0	6	16	4	4224	2.667
14A	0	1	9	1	0	11	33	4	4139	3.000	1	0	0	0	0	1	1	1	1100	1.000	1	1	9	1	0	12	34	4	4139	2.833
24H	0	4	3	1	0	8	21	4	4133	2.625	0	0	0	0	0	0	0	0	0000	0.000	0	4	3	1	0	8	21	4	4133	2.625
12A	0	7	3	1	0	11	27	4	4133	2.455	0	3	0	0	0	3	6	2	2300	2.000	0	10	3	1	0	14	33	4	4133	2.357
15A	0	7	3	1	0	11	27	4	4133	2.455	1	1	0	0	0	2	3	2	2111	1.500	1	8	3	1	0	13	30	4	4133	2.308
22D	0	0	2	1	0	3	10	4	4132	3.333	0	1	0	0	0	1	2	2	2100	2.000	0	1	2	1	0	4	12	4	4132	3.000
6F	0	0	2	1	0	3	10	4	4132	3.333	0	4	1	0	0	5	11	3	3124	2.200	0	4	3	1	0	8	21	4	4133	2.625
15H	0	3	2	1	0	6	16	4	4132	2.667	0	5	0	0	0	5	10	2	2500	2.000	0	8	2	1	0	11	26	4	4132	2.364
10D	0	7	2	1	0	10	24	4	4132	2.400	3	1	0	0	0	4	5	2	2113	1.250	3	8	2	1	0	14	29	4	4132	2.071
55A	0	8	2	1	0	11	26	4	4132	2.364	0	0	0	0	0	0	0	0	0000	0.000	0	8	2	1	0	11	26	4	4132	2.364
4H	0	10	2	1	0	13	30	4	4132	2.308	0	1	0	0	0	1	2	2	2100	2.000	0	11	2	1	0	14	32	4	4132	2.286
32K	0	0	1	1	0	2	7	4	4131	3.500	0	3	1	0	0	4	9	3	3123	2.250	0	3	2	1	0	6	16	4	4132	2.667
29D	0	1	1	1	0	3	9	4	4131	3.000	0	3	0	0	0	3	6	2	2300	2.000	0	4	1	1	0	6	15	4	4131	2.500
22J	0	1	1	1	0	3	9	4	4131	3.000	0	4	0	0	0	4	8	2	2400	2.000	0	5	1	1	0	7	17	4	4131	2.429
21A	0	2	1	1	0	4	11	4	4131	2.750	1	2	4	0	0	7	17	3	3422	2.429	1	4	5	1	0	11	28	4	4135	2.545
5F	0	2	1	1	0	4	11	4	4131	2.750	0	0	0	0	0	0	0	0	0000	0.000	0	2	1	1	0	4	11	4	4131	2.750
7F	0	3	1	1	0	5	13	4	4131	2.600	0	4	0	0	0	4	8	2	2400	2.000	0	7	1	1	0	9	21	4	4131	2.333
20A	0	4	1	1	0	6	15	4	4131	2.500	0	1	0	0	0	1	2	2	2100	2.000	0	5	1	1	0	7	17	4	4131	2.429
16D	0	5	1	1	0	7	17	4	4131	2.429	0	3	0	0	0	3	6	2	2300	2.000	0	8	1	1	0	10	23	4	4131	2.300
12H	0	8	0	1	0	9	20	4	4128	2.222	0	2	0	0	1	3	9	5	5122	3.000	0	10	0	1	1	12	29	5	5141	2.417
57A	0	8	0	1	0	9	20	4	4128	2.222	0	2	1	0	0	3	7	3	3122	2.333	0	10	1	1	0	12	27	4	4131	2.250
23A	0	5	0	1	0	6	14	4	4125	2.333	0	1	0	3	0	4	14	4	4321	3.500	0	6	0	4	0	10	28	4	4426	2.800
12M	0	4	0	1	0	5	12	4	4124	2.400	0	3	0	0	1	4	11	5	5123	2.750	0	7	0	1	1	9	23	5	5141	2.556
31F	0	1	0	1	0	2	6	4	4121	3.000	0	0	0	0	0	0	0	0	0000	0.000	0	1	0	1	0	2	6	4	4121	3.000
23D	0	0	0	1	0	1	4	4	4100	4.000	0	0	0	0	0	0	0	0	0000	0.000	0	0	0	1	0	1	4	4	4100	4.000
21H	0	0	0	1	0	1	4	4	4100	4.000	0	4	0	1	0	5	12	4	4124	2.400	0	4	0	2	0	6	16	4	4224	2.667

Table A-1: Manhole Assessment

Grade 5 defect; Structure needs immediate attention
Grade 4 defect
Structure is SRF eligible (based on Structural Quick Rating)

Structure ID	Structural										O & M										OVERALL									
	Pipe Grade Scores					Structure Grade Score	Structure Rating	Highest Rated Defect	Quick Rating	Structure Ratings Index	Pipe Grade Scores					Structure Grade Score	Structure Rating	Highest Rated Defect	Quick Rating	Structure Ratings Index	Pipe Grade Scores					Structure Grade Score	Structure Rating	Highest Rated Defect	Quick Rating	Structure Ratings Index
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5						Grade 1	Grade 2	Grade 3	Grade 4	Grade 5						Grade 1	Grade 2	Grade 3	Grade 4	Grade 5					
3B	0	0	0	1	0	1	4	4	4100	4.000	1	3	0	0	0	4	7	2	2311	1.750	1	3	0	1	0	5	11	4	4123	2.200
10A	0	0	0	1	0	1	4	4	4100	4.000	0	2	0	0	0	2	4	2	2200	2.000	0	2	0	1	0	3	8	4	4122	2.667
9E	0	2	8	0	0	10	28	3	3822	2.800	0	6	0	0	0	6	12	2	2600	2.000	0	8	8	0	0	16	40	3	3828	2.500
11D	0	0	7	0	0	7	21	3	3700	3.000	0	0	0	0	0	0	0	0	0000	0.000	0	0	7	0	0	7	21	3	3700	3.000
52H	0	0	7	0	0	7	21	3	3700	3.000	0	0	0	0	0	0	0	0	0000	0.000	0	0	7	0	0	7	21	3	3700	3.000
32A	0	6	5	0	0	11	27	3	3526	2.455	3	2	0	1	0	6	11	4	4122	1.833	3	8	5	1	0	17	38	4	4135	2.235
3A	0	0	5	0	0	5	15	3	3500	3.000	0	0	0	0	0	0	0	0	0000	0.000	0	0	5	0	0	5	15	3	3500	3.000
14E	0	6	4	0	0	10	24	3	3426	2.400	0	1	0	1	0	2	6	4	4121	3.000	0	7	4	1	0	12	30	4	4134	2.500
17E	1	1	4	0	0	6	15	3	3421	2.500	0	0	0	0	0	0	0	0	0000	0.000	1	1	4	0	0	6	15	3	3421	2.500
12E	0	0	4	0	0	4	12	3	3400	3.000	0	5	2	0	1	8	21	5	5132	2.625	0	5	6	0	1	12	33	5	5136	2.750
13H	0	0	4	0	0	4	12	3	3400	3.000	0	0	0	0	1	1	5	5	5100	5.000	0	0	4	0	1	5	17	5	5134	3.400
27A	0	5	3	0	0	8	19	3	3325	2.375	0	0	0	0	0	0	0	0	0000	0.000	0	5	3	0	0	8	19	3	3325	2.375
27D	0	3	3	0	0	6	15	3	3323	2.500	0	1	1	0	0	2	5	3	3121	2.500	0	4	4	0	0	8	20	3	3424	2.500
50D	0	1	3	0	0	4	11	3	3321	2.750	0	2	1	0	0	3	7	3	3122	2.333	0	3	4	0	0	7	18	3	3423	2.571
15D	0	0	3	0	0	3	9	3	3300	3.000	1	3	0	0	0	4	7	2	2311	1.750	1	3	3	0	0	7	16	3	3323	2.286
2G	0	0	3	0	0	3	9	3	3300	3.000	1	0	0	0	0	1	1	1	1100	1.000	1	0	3	0	0	4	10	3	3311	2.500
17A	0	6	2	0	0	8	18	3	3226	2.250	0	2	0	0	0	2	4	2	2200	2.000	0	8	2	0	0	10	22	3	3228	2.200
51D	0	5	2	0	0	7	16	3	3225	2.286	0	3	0	0	0	3	6	2	2300	2.000	0	8	2	0	0	10	22	3	3228	2.200
26J	0	5	2	0	0	7	16	3	3225	2.286	0	2	3	0	0	5	13	3	3322	2.600	0	7	5	0	0	12	29	3	3527	2.417
34A	0	5	2	0	0	7	16	3	3225	2.286	1	1	0	0	0	2	3	2	2111	1.500	1	6	2	0	0	9	19	3	3226	2.111
49G	0	5	2	0	0	7	16	3	3225	2.286	0	3	0	0	0	3	6	2	2300	2.000	0	8	2	0	0	10	22	3	3228	2.200
56A	0	4	2	0	0	6	14	3	3224	2.333	0	1	0	1	0	2	6	4	4121	3.000	0	5	2	1	0	8	20	4	4132	2.500
2H	0	3	2	0	0	5	12	3	3223	2.400	0	0	0	0	0	0	0	0	0000	0.000	0	3	2	0	0	5	12	3	3223	2.400
13M	0	2	2	0	0	4	10	3	3222	2.500	0	2	0	0	0	2	4	2	2200	2.000	0	4	2	0	0	6	14	3	3224	2.333
52D	0	2	2	0	0	4	10	3	3222	2.500	0	0	0	0	1	1	5	5	5100	5.000	0	2	2	0	1	5	15	5	5132	3.000
3C	0	2	2	0	0	4	10	3	3222	2.500	0	2	1	0	0	3	7	3	3122	2.333	0	4	3	0	0	7	17	3	3324	2.429
17G	0	1	2	0	0	3	8	3	3221	2.667	0	1	0	0	0	1	2	2	2100	2.000	0	2	2	0	0	4	10	3	3222	2.500
33A	0	1	2	0	0	3	8	3	3221	2.667	0	4	1	0	0	5	11	3	3124	2.200	0	5	3	0	0	8	19	3	3325	2.375
53H	0	1	2	0	0	3	8	3	3221	2.667	0	1	0	0	0	1	2	2	2100	2.000	0	2	2	0	0	4	10	3	3222	2.500
18	0	1	2	0	0	3	8	3	3221	2.667	0	1	0	0	0	1	2	2	2100	2.000	0	2	2	0	0	4	10	3	3222	2.500
2F	0	1	2	0	0	3	8	3	3221	2.667	0	0	0	0	0	0	0	0	0000	0.000	0	1	2	0	0	3	8	3	3221	2.667
8E	1	0	2	0	0	3	7	3	3211	2.333	0	2	1	0	0	3	7	3	3122	2.333	1	2	3	0	0	6	14	3	3322	2.333
24F	1	0	2	0	0	3	7	3	3211	2.333	0	0	0	0	0	0	0	0	0000	0.000	1	0	2	0	0	3	7	3	3211	2.333
13D	0	0	2	0	0	2	6	3	3200	3.000	0	1	0	0	0	1	2	2	2100	2.000	0	1	2	0	0	3	8	3	3221	2.667
18E	0	0	2	0	0	2	6	3	3200	3.000	0	0	0	0	0	0	0	0	0000	0.000	0	0	2	0	0	2	6	3	3200	3.000
2D	0	0	2	0	0	2	6	3	3200	3.000	0	0	0	0	0	0	0	0	0000	0.000	0	0	2	0	0	2	6	3	3200	3.000
4G	0	0	2	0	0	2	6	3	3200	3.000	0	2	0	0	0	2	4	2	2200	2.000	0	2	2	0	0	4	10	3	3222	2.500

Table A-2: Gravity Main Assessment

Immediate Attention Needed

Pipe ID	Structural Quick Rating	Preliminary Rehab Recommendations		Associated Restoration (if necessary)		TOTAL Estimated Cost
		Rehab Method(s)	Estimated Cost	Pipe Location	Estimated Cost	
SNG-G049	4100	Spot Liner(s), Lateral Cutting	\$3,000.00	Data Not Available	\$0.00	\$3,000.00
SNG-G047	4100	Spot Liner(s)	\$2,500.00	Data Not Available	\$0.00	\$2,500.00
SNG-G020	5100	Spot Liner(s)	\$4,000.00	Data Not Available	\$0.00	\$4,000.00
SNG-J038	5231	Full Liner	\$6,898.28	Data Not Available	\$0.00	\$6,898.28
SNG-J039	5134	Full Liner	\$4,898.98	Data Not Available	\$0.00	\$4,898.98
SNG-J036	4200	Monitor Closely	\$0.00	Data Not Available	\$0.00	\$0.00
SNG-K010	4200	Monitor Closely, Grouting	\$5,626.31	Data Not Available	\$0.00	\$5,626.31
SNG-J002	4100	Monitor Closely	\$0.00	Data Not Available	\$0.00	\$0.00
SNG-J001	5100	Monitor Closely, Spot Liner(s)	\$8,000.00	Data Not Available	\$0.00	\$8,000.00
SNG-F029	513A	Monitor Closely, Full Liner, Lateral Cutting	\$30,494.38	Data Not Available	\$0.00	\$30,494.38
SNG-H031	511B	Remove and Replace	\$21,133.12	1	\$6,339.93	\$27,473.05
SNG-H030	4125	Remove and Replace	\$23,388.29	2	\$8,185.90	\$31,574.19
SNG-M004	5111	Spot Liner(s)	\$8,000.00	Data Not Available	\$0.00	\$8,000.00
SNG-E003	4A00	Remove and Replace	\$29,742.26	2	\$10,409.79	\$40,152.05
SNG-E009	5143	Full Liner	\$5,366.95	Data Not Available	\$0.00	\$5,366.95
SNG-D032	4325	Remove and Replace	\$30,904.23	1	\$9,271.27	\$40,175.49
SNG-D035	5132	Monitor Closely, Full Liner	\$1,804.51	Data Not Available	\$0.00	\$1,804.51
SNG-D055	5141	Monitor Closely, Spot Liner(s), Lateral Cutting	\$9,500.00	Data Not Available	\$0.00	\$9,500.00
SNG-D057	5100	Full Liner, Heavy Cleaning	\$10,393.65	Data Not Available	\$0.00	\$10,393.65
SNG-D064	5321	No Rehab Necessary	\$0.00	Data Not Available	\$0.00	\$0.00
SNG-D066	5141	Monitor Closely, Cutting and Grouting, Lateral Cutting	\$3,522.93	Data Not Available	\$0.00	\$3,522.93
SNG-A028	4124	Full Liner	\$12,017.50	Data Not Available	\$0.00	\$12,017.50
SNG-G007	5131	Spot Liner(s)	\$5,000.00	Data Not Available	\$0.00	\$5,000.00
SNG-A013	5543	Remove and Replace	\$13,815.74	2	\$4,835.51	\$18,651.25
SNG-F007	5100	Remove and Replace	\$9,388.73	5	\$4,694.36	\$14,083.09
SNG-F012	5A32	Full Liner, Heavy Cleaning	\$6,407.41	Data Not Available	\$0.00	\$6,407.41
SNG-F013	5148	Full Liner	\$5,270.22	Data Not Available	\$0.00	\$5,270.22
SNG-A007	4121	Full Liner	\$9,821.36	Data Not Available	\$0.00	\$9,821.36
SNG-A011	5242	Monitor Closely, Full Liner	\$7,798.66	Data Not Available	\$0.00	\$7,798.66
SNG-A008	4A29	Monitor Closely, Full Liner	\$10,722.50	Data Not Available	\$0.00	\$10,722.50
SNG-A004	4926	Full Liner	\$10,157.17	Data Not Available	\$0.00	\$10,157.17
SNG-H003A	4200	Spot Liner(s)	\$6,000.00	Data Not Available	\$0.00	\$6,000.00
SNG-H004	4200	Remove and Replace	\$19,377.19	2	\$6,782.02	\$26,159.21
SNG-A025	5141	Remove and Replace	\$25,244.19	2	\$8,835.46	\$34,079.65
SNG-D019	5341	Remove and Replace	\$39,632.04	2	\$13,871.21	\$53,503.26
SNG-H013	5100	Remove and Replace	\$12,494.26	2	\$4,372.99	\$16,867.25
SNG-F019	5231	Remove and Replace	\$11,700.29	4	\$5,265.13	\$16,965.42
SNG-I014	5141	Remove and Replace	\$9,270.68	2	\$3,244.74	\$12,515.42
SNG-F017	5100	Monitor Closely, Cutting and Grouting	\$6,486.17	Data Not Available	\$0.00	\$6,486.17

Table A-2: Gravity Main Assessment

Immediate Attention Needed		Preliminary Rehab Recommendations		Associated Restoration (if necessary)		TOTAL Estimated Cost
- Pipe ID	Structural Quick Rating	Rehab Method(s)	Estimated Cost	Pipe Location	Estimated Cost	
SNG-I003	412A	Monitor Closely, Spot Liner(s)	\$8,000.00	Data Not Available	\$0.00	\$8,000.00
SNG-F045	5131	Full Liner	\$9,106.64	Data Not Available	\$0.00	\$9,106.64
SNG-K025	4123	Full Liner	\$8,825.92	Data Not Available	\$0.00	\$8,825.92
SNG-K029	4131	Remove and Replace	\$26,890.57	2	\$9,411.70	\$36,302.28
SNG-D085	5100	Spot Liner(s)	\$8,000.00	Data Not Available	\$0.00	\$8,000.00
SNG-K038	5131	Full Liner	\$14,156.47	Data Not Available	\$0.00	\$14,156.47
SNG-K044	4200	Monitor Closely, Grouting, Lateral Cutting	\$6,044.06	Data Not Available	\$0.00	\$6,044.06
SNG-K015	4100	Monitor Closely	\$0.00	Data Not Available	\$0.00	\$0.00
SNG-J025	5142	Monitor Closely, Full Liner	\$12,879.54	Data Not Available	\$0.00	\$12,879.54
SNG-J024	4431	Monitor Closely	\$0.00	Data Not Available	\$0.00	\$0.00
SNG-K004	4C00	Monitor Closely	\$0.00	Data Not Available	\$0.00	\$0.00
SNG-J022	4721	Monitor Closely, Spot Liner(s)	\$3,000.00	Data Not Available	\$0.00	\$3,000.00
SNG-H042	5141	Monitor Closely, Full Liner, Lateral Cutting, Letter to Customer(s)	\$15,989.33	Data Not Available	\$0.00	\$15,989.33
SNG-F025	5121	Monitor Closely, Grouting, Spot Liner(s), Lateral Cutting	\$14,814.98	Data Not Available	\$0.00	\$14,814.98
SNG-N007	4500	Monitor Closely	\$0.00	Data Not Available	\$0.00	\$0.00
SNG-F023	5100	Spot Liner(s)	\$4,000.00	Data Not Available	\$0.00	\$4,000.00
SNG-E019	5200	Spot Liner(s)	\$5,000.00	Data Not Available	\$0.00	\$5,000.00
SNG-E017	4900	Monitor Closely	\$0.00	Data Not Available	\$0.00	\$0.00
SNG-A057	5100	Monitor Closely, Spot Liner(s)	\$3,000.00	Data Not Available	\$0.00	\$3,000.00
SNG-A036	5100	Spot Liner(s), Cutting and Grouting	\$4,770.89	Data Not Available	\$0.00	\$4,770.89
SNG-A046	5132	Full Liner	\$4,969.92	Data Not Available	\$0.00	\$4,969.92
SNG-H007	5141	Full Liner, Letter to Customer(s)	\$14,238.60	Data Not Available	\$0.00	\$14,238.60
SNG-A042	4131	Spot Liner(s)	\$6,000.00	Data Not Available	\$0.00	\$6,000.00
SNG-A020	4123	Full Liner, Heavy Cleaning	\$11,540.25	Data Not Available	\$0.00	\$11,540.25
SNG-A017	5123	Full Liner	\$13,146.55	Data Not Available	\$0.00	\$13,146.55
SNG-A012	5200	Full Liner, Heavy Cleaning	\$7,468.84	Data Not Available	\$0.00	\$7,468.84
SNG-E014	5231	Spot Liner(s), Cutting and Grouting	\$9,047.96	Data Not Available	\$0.00	\$9,047.96
SNG-E026	4133	Full Liner	\$12,721.76	Data Not Available	\$0.00	\$12,721.76
SNG-C005A	4100	Spot Liner(s)	\$2,500.00	Data Not Available	\$0.00	\$2,500.00
SNG-A021	4121	Full Liner	\$22,612.14	2	\$0.00	\$22,612.14
SNG-K043	4111	Monitor Closely, Spot Liner(s), Cutting and Grouting	\$6,460.72	Data Not Available	\$0.00	\$6,460.72
SNG-K014	4B36	Monitor Closely	\$0.00	Data Not Available	\$0.00	\$0.00
SNG-J020	4400	Monitor Closely, Heavy Cleaning	\$1,921.79	Data Not Available	\$0.00	\$1,921.79
SNG-E023	5241	Full Liner	\$17,678.09	Data Not Available	\$0.00	\$17,678.09
SNG-E011	5141	Monitor Closely, Spot Liner(s)	\$3,000.00	Data Not Available	\$0.00	\$3,000.00
Labor Material Subtotal						\$803,083.07
Engineering, Administration, and Contingency						\$321,233.23
Preliminary SRF Eligible Total Rehabilitation						\$1,124,316.30

Table A-3: Lift Station Assessment

Asset Inventory Table 1 Evaluation Year: 2018

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	
Pump Station Assets	Capacity	Material	Location	Latitude	Longitude	Manufacturer	Tag Number	Original Cost	Replacement Cost	Depreciation Value	Year Installed	Remaining Useful Life In Years	Condition	Probability of Failure	Criticality of Asset	Business Risk	Expected Asset Life	Redundancy	Replacement Year	Annual OM&R Cost	Funding Source	
Pump #1	20-30hp pump -250gpm	Pumping Equipment	Pump Station 1 - Old WWTP	46.8662113	-89.318897		105		\$15,000	\$1,000	1957	2	4	5.0	4	20	30	0%	2019		\$0 CIP	
Pump #2	20-30hp pump -250gpm	Pumping Equipment	Pump Station 1 - Old WWTP	46.8662113	-89.318897		106		\$15,000	\$1,000	1957	2	4	5.0	4	20	30	0%	2019		\$0 CIP	
Motor #1		Pumping Equipment	Pump Station 1 - Old WWTP	46.8662113	-89.318897		107		\$13,000	\$0	1957	0	5	5.0	4	20	30	0%	2019		\$0 CIP	
Motor #2		Pumping Equipment	Pump Station 1 - Old WWTP	46.8662113	-89.318897		108		\$13,000	\$867	1957	2	4	5.0	4	20	30	0%	2019		\$0 CIP	
Shutoff Valve #1	4"	Valves	Pump Station 1 - Old WWTP	46.8662113	-89.318897		109		\$1,900	\$271	1957	5	3	4.9	2	10	35	50%	2019		\$0 CIP	
Shutoff Valve #2	4"	Valves	Pump Station 1 - Old WWTP	46.8662113	-89.318897		110		\$1,900	\$271	1957	5	3	4.9	2	10	35	50%	2019		\$0 CIP	
Shutoff Valve #3	4"	Valves	Pump Station 1 - Old WWTP	46.8662113	-89.318897		111		\$1,900	\$271	1957	5	3	4.9	2	10	35	50%	2019		\$0 CIP	
Shutoff Valve #4	4"	Valves	Pump Station 1 - Old WWTP	46.8662113	-89.318897		112		\$1,900	\$271	1957	5	3	4.9	2	10	35	50%	2019		\$0 CIP	
Check Valve #1		Valves	Pump Station 1 - Old WWTP	46.8662113	-89.318897		113		\$1,200	\$171	1957	5	3	4.9	2	10	35	50%	2019		\$0 CIP	
Check Valve #2		Valves	Pump Station 1 - Old WWTP	46.8662113	-89.318897		114		\$1,200	\$171	1957	5	3	4.9	2	10	35	50%	2019		\$0 CIP	
Floats		Pumping Equipment	Pump Station 1 - Old WWTP	46.8662113	-89.318897		115		\$1,500	\$300	2006	2	3	4.1	4	17	10	0%	2019	\$150	OM&R	
Control panels	100A	Motor Controls / Drives	Pump Station 1 - Old WWTP	46.8661611	-89.3188462	Square D, Cutler Hammer	100		\$10,000	\$1,000	2000	2	3	4.6	3	14	20	0%	2019	\$500	OM&R	
Electrical Switchgear		Transformers/Switchgear	Pump Station 1 - Old WWTP	46.8662113	-89.318897		101		\$5,000	\$2,125	1996	17	3	1.9	3	6	40	0%	2019		\$0 CIP	
Pump station building		Pumping Equipment	Pump Station 1 - Old WWTP	46.8662113	-89.318897		102		\$70,000	\$10,267	1957	11	4	4.0	4	16	75	0%	2019		\$0 CIP	
Wet well	6' diameter	Concrete & Metal Storage Tanks	Pump Station 1 - Old WWTP	46.8662113	-89.318897		103		\$20,000	\$3,467	1957	13	3	3.5	4	14	75	0%	2019		\$0 CIP	
Pump #1	700 gpm	Pumping Equipment	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		237		\$25,000	\$0	1997	0	5	5.0	3	15	30	100%	2019		\$0 CIP	
Pump #2	700 gpm; 135' head	Pumping Equipment	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		238		\$25,000	\$22,500	2015	27	2	1.0	4	4	30	100%	2019		\$0 CIP	
Pump #3	2200 gpm	Pumping Equipment	Pump Station 2 - Main pump Station	46.8697261	-89.3150219	Aurora-663A SF	239		\$40,000	\$0	1997	0	5	5.0	3	15	30	100%	2019		\$0 CIP	
Pump #4	2200 gpm	Pumping Equipment	Pump Station 2 - Main pump Station	46.8697261	-89.3150219	Aurora	240		\$40,000	\$12,000	1997	9	2	2.7	2	5	30	100%	2019		\$0 CIP	
Motor #1	50 HP	Pumping Equipment	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		204		\$15,000	\$0	1997	0	5	5.0	4	20	30	100%	2019		\$0 CIP	
Motor #2	50 HP	Pumping Equipment	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		207		\$15,000	\$4,500	1997	9	2	2.7	4	11	30	100%	2019		\$0 CIP	
Motor #3	150 HP	Pumping Equipment	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		210		\$20,000	\$0	1997	0	5	5.0	3	15	30	100%	2019		\$0 CIP	
Motor #4	150 HP	Pumping Equipment	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		214		\$20,000	\$6,000	1997	9	2	2.7	2	5	30	100%	2019		\$0 CIP	
Shutoff Valve #1	6"	Valves	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		205		\$3,000	\$1,114	1997	13	3	2.2	3	7	35	50%	2019		\$0 CIP	
Shutoff Valve #2	6"	Valves	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		206		\$3,000	\$1,114	1997	13	3	2.2	2	4	35	50%	2019		\$0 CIP	
Shutoff Valve #3	6"	Valves	Pump Station 2 - Main pump Station	46.8697261	-89.3150219	1-670-1773	209		\$3,000	\$1,114	1997	13	3	2.2	2	4	35	50%	2019		\$0 CIP	
Shutoff Valve #4	6"	Valves	Pump Station 2 - Main pump Station	46.8697261	-89.3150219	1.5K-E	219		\$3,000	\$1,114	1997	13	3	2.2	2	4	35	50%	2019		\$0 CIP	
Shutoff Valve #5	8"	Valves	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		211		\$4,400	\$1,634	1997	13	3	2.2	2	4	35	50%	2019		\$0 CIP	
Shutoff Valve #6	8"	Valves	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		213		\$4,400	\$1,634	1997	13	3	2.2	2	4	35	50%	2019		\$0 CIP	
Shutoff valve #7	8"	Valves	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		215		\$4,400	\$1,634	1997	13	3	2.2	2	4	35	50%	2019		\$0 CIP	
Shutoff valve #8	8"	Valves	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		217		\$4,400	\$1,634	1997	13	3	2.2	2	4	35	50%	2019		\$0 CIP	
Shutoff valve #9	8"	Valves	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		234		\$4,400	\$1,634	1997	14	2	2.1	2	4	35	50%	2019		\$0 CIP	
Shutoff valve #10	8"	Valves	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		235		\$4,400	\$1,634	1997	13	3	2.2	2	4	35	50%	2019		\$0 CIP	
Check Valve #1	6"	Valves	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		203		\$2,000	\$743	1997	13	3	2.2	2	4	35	50%	2019		\$0 CIP	
Check Valve #2	6"	Valves	Pump Station 2 - Main pump Station	46.8697261	-89.3150219	250AP00	208		\$3,500	\$0	1997	0	5	5.0	2	10	35	0%	2019		\$0 CIP	
Check Valve #3	8"	Valves	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		212		\$2,000	\$743	1997	13	3	2.2	2	4	35	50%	2019		\$0 CIP	
Check Valve #4	8"	Valves	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		216		\$3,500	\$3,000	2013	30	2	1.0	2	2	35	0%	2019		\$0 CIP	
Check Valve #5	8"	Valves	Pump Station 2 - Main pump Station	46.8697261	-89.3150219	Apco	227		\$3,500	\$1,300	1997	13	3	2.2	2	4	35	0%	2019		\$0 CIP	
Dry Well Dehumidifier		HVAC	Pump Station 2 - Main pump Station	46.8697261	-89.3150219	Desert Aire	200		\$1,000	\$233	1997	7	4	3.1	3	9	30	0%	2023		\$0 CIP	
Electrical Switchgear		Transformers / Switchgears / Wiring	Pump Station 2 - Main pump Station	46.8696733	-89.31504		223		\$8,000	\$4,400	2000	22	2	1.4	3	4	40	0%	2019		\$0 CIP	
Motor Starters	150 hp	Motor Controls / Drives	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		231		\$32,000	\$3,200	2000	2	2	4.6	4	19	20	0%	2019	\$1,600	OM&R	
VFD'S	50 hp	Motor Controls / Drives	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		233		\$16,000	\$1,600	2000	2	2	4.6	4	19	20	0%	2019	\$800	OM&R	
Control Panels		Motor Controls / Drives	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		236		\$10,000	\$1,000	2000	2	2	4.6	4	19	20	0%	2019	\$500	OM&R	
Generator	200KW	Generators	Pump Station 2 - Main pump Station	46.8698381	-89.3151418	Kohler-200R0ZD71	202		\$80,000	\$32,000	2000	12	2	2.1	4	8	30	0%	2028		\$0 CIP	
Holst	2 ton	Tools & Shop Equipment	Pump Station 2 - Main pump Station	46.8697261	-89.3150219	Chester-AM h2359	218		\$4,000	\$1,200	1997	9	2	2.7	1	3	30	0%	2025		\$0 CIP	
Building		Buildings	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		220		\$100,000	\$58,000	1997	29	2	1.3	2	3	50	0%	2045		\$0 CIP	
Drywell vent		Buildings	Pump Station 2 - Main pump Station	46.8698914	-89.3152323		221		\$1,500	\$0	1997	0	5	5.0	2	10	50	0%	2019		\$0 CIP	
Meter		Meters	Pump Station 2 - Main pump Station	46.8696492	-89.3151089		222		\$10,000	\$2,500	1997	5	3	3.6	2	7	20	0%	2019	\$500	OM&R	
Generator Room Heater		HVAC	Pump Station 2 - Main pump Station	46.8698146	-89.3151919		224		\$2,000	\$600	1997	9	2	2.7	3	8	30	0%	2025		\$0 CIP	
Generator Room Dampener		Generators	Pump Station 2 - Main pump Station	46.8697997	-89.3150888		225		\$1,000	\$300	1997	9	2	2.7	4	11	30	0%	2025		\$0 CIP	
Control Room Heater		HVAC	Pump Station 2 - Main pump Station	46.8699785	-89.3151627	Reznor	226		\$2,000	\$600	1997	9	2	2.7	2	5	30	0%	2025		\$0 CIP	
Wet well		Buildings	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		228		\$25,000	\$13,667	1997	41	4	1.2	2	2	75	0%	2025		\$0 CIP	
Sump Pump		Bldg Plumbing	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		229		\$1,500	\$500	1997	5	3	3.6	2	7	15	0%	2021	\$100	OM&R	
Piping	-30 feet, 6-10"	Transmission Mains	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		230		\$9,450	\$6,615	1997	49	2	0.9	4	4	70	0%	2019		\$0 CIP	
Wet well transfer pump		Bldg Plumbing	Pump Station 2 - Main pump Station	46.8697261	-89.3150219		232		\$5,000	\$0	1997	0	5	5.0	2	10	20	0%	2019		\$250	OM&R
Pump #1		Pumping Equipment	Pump Station 3 - River and Lake	46.8752024	-89.3224131		304		\$15,000	\$3,750	1970	5	3	4.7	4	19	20	0%	2021		\$750	OM&R
Check Valve #1		Valves	Pump Station 3 - River and Lake	46.8752519	-89.3224147		305		\$1,200	\$69	1970	2										

Appendix F

IPaC Documentation



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Michigan Ecological Services Field Office
2651 Coolidge Road Suite 101
East Lansing, MI 48823-6360
Phone: (517) 351-2555 Fax: (517) 351-1443

In Reply Refer To:
Project code: 2023-0053255
Project Name: Ontonagon SRF Application
IPaC Record Locator: 212-123341490

March 08, 2023

Subject: Consistency letter for 'Ontonagon SRF Application' for specified threatened and endangered species that may occur in your proposed project location consistent with the Michigan Endangered Species Determination Key (Michigan DKey)

Dear John Reck:

The U.S. Fish and Wildlife Service (Service) received on **March 08, 2023** your effect determination(s) for the 'Ontonagon SRF Application' (the Action) using the Michigan DKey within the Information for Planning and Consultation (IPaC) system. The Service developed this system in accordance with the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.).

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

Species	Listing Status	Determination
Canada Lynx (<i>Lynx canadensis</i>)	Threatened	NLAA
Gray Wolf (<i>Canis lupus</i>)	Endangered	NLAA
Monarch Butterfly (<i>Danaus plexippus</i>)	Candidate	No effect
Northern Long-eared Bat (<i>Myotis septentrionalis</i>)	Threatened	NLAA
Red Knot (<i>Calidris canutus rufa</i>)	Threatened	NLAA
Tricolored Bat (<i>Perimyotis subflavus</i>)	Proposed Endangered	No effect

Coordination with the Michigan Ecological Services Office is complete. Thank you for considering federally listed species during your project planning.

Please provide sufficient project details on your project homepage in IPaC (Define Project, Project Description) to support your conclusions. Failure to disclose important aspects of your project that would influence the outcome of your effects determinations may negate your determinations and invalidate this letter. If you have site-specific information that leads you to

believe a different determination is more appropriate for your project than what the Dkey concludes, you can and should proceed based on the best available information.

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

Gray Wolf:

Gray wolf may be present in the Action area. However, given the large amount of suitable wolf habitat available throughout the Upper Peninsula of Michigan, any wolves active on the landscape would be able to avoid project activities without incurring adverse impacts. Since you determined that the Action will not harm wolves directly (e.g., mammal trapping, poison bait) or indirectly (e.g., increasing vehicle use that may result in vehicle strikes, exposure to potential human persecution), any potential effects would be insignificant.

Bats of Conservation Concern:

Implementing protective measures for bats, including both federally listed and non-listed species, indirectly helps to protect Michigan's agriculture and forests. Bats are significant predators of nocturnal insects, including many crop and forest pests. For example, Whitaker (1995) estimated that a single colony of 150 big brown bats (*Eptesicus fuscus*) would eat nearly 1.3 million pest insects each year. Boyles et al. (2011) noted the "loss of bats in North America could lead to agricultural losses estimated at more than \$3.7 billion/year, and Maine and Boyles (2015) estimated that the suppression of herbivory by insectivorous bats is worth >1 billion USD globally on corn alone. In captive trials, northern long-eared bats were found to significantly reduce the egg-laying activity of mosquitoes, suggesting bats may also play an important role in controlling insect-borne disease (Reiskind and Wund 2009). Mosquitoes have also been found to be a consistent component of the diet of Indiana bats and are eaten most heavily during pregnancy (6.6%; Kurta and Whitaker 1998). Taking proactive steps to help protect bats may be very valuable to agricultural and forest product yields and pest management costs in and around a project area. Such conservation measures include limiting tree clearing during the bat active season (April through October varies by location) and/or the non-volant period (June through July), when young bats are unable to fly, and minimizing the extent of impacts to forests, wetlands, and riparian habitats.

Bald and Golden Eagles:

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

interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”

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

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

Monarch butterfly and other pollinators

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

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

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

Monarch and Pollinator BMP Recommendations

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

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

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

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

Resources:

<https://www.fws.gov/initiative/monarchs>

<https://www.fws.gov/library/collections/pollinators>

Wetland impacts:

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

Bat References

Boyles, J.G., P.M. Cryan, G.F. McCracken, T.H. Kunz. 2011. Economic Importance of Bats in Agriculture. *Science* 332(1):41-42.

Kurta, A. and J.O. Whitaker. 1998. Diet of the Endangered Indiana Bat (*Myotis sodalis*) on the Northern Edge of Its Range. *The American Midland Naturalist* 140(2):280-286.

Reiskind, M.H. and M.A. Wund. 2009. Experimental assessment of the impacts of northern long-eared bats on ovipositing *Culex* (Diptera: Culicidae) mosquitoes. *Journal of Medical Entomology* 46(5):1037-1044.

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

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

Rufa red knot

Avoid permanent modification of beaches, dunes, mudflats, peat banks, sandbars, shoals, or other red knot habitats during the red knot migration windows (May 15 through June 15 in the spring OR July 1 through September 30 in the fall). In addition, the project will not result in an increase in human disturbance or predation during the red knot migration windows within suitable habitat during the migration window.

Northern long-eared bat

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

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

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

Action Description

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

1. Name

Ontonagon SRF Application

2. Description

The following description was provided for the project 'Ontonagon SRF Application':

Sanitary Sewer Repair and Expansion. Lift Station Upgrades. Wastewater Lagoon Improvements

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@46.86503155,-89.31332928498821,14z>



QUALIFICATION INTERVIEW

1. Are there any possible effects to any listed species or to designated critical habitat from your project or effects from any other actions or projects subsequently made possible by your project?

Select "Yes" even if the expected effects to the species or critical habitat are expected to be 1) extremely unlikely (discountable), 2) can't meaningfully be measured, detected, or evaluated (insignificant), or 3) wholly beneficial.

Select "No" to confirm that the project details and supporting information allow you to conclude that listed species and their habitats will not be exposed to any effects (including discountable, insignificant, or beneficial effects) and therefore, you have made a "no effect" determination for all species. If you are unsure, select YES to answer additional questions about your project.

Yes

2. This determination key is intended to assist the user in the evaluating the effects of their actions on Federally listed species in Michigan. It does not cover other prohibited activities under the Endangered Species Act (e.g., for wildlife: import/export, Interstate or foreign commerce, possession of illegally taken wildlife, purposeful take for scientific purposes or to enhance the survival of a species, etc.; for plants: import/export, reduce to possession, malicious destruction on Federal lands, commercial sale, etc.) or other statutes. Click yes to acknowledge that you must consider other prohibitions of the ESA or other statutes outside of this determination key.

Yes

3. Is the action the approval of a long-term (i.e., in effect greater than 10 years) permit, plan, or other action? (e.g., a new or re-issued hydropower license, a land management plan, or other kinds of documents that provide direction for projects or actions that may be conducted over a long term (>10 years) without the need for additional section 7 consultation).

No

4. Is the action being funded, authorized, or carried out by a Federal agency?

No

5. Does the action involve the installation or operation of wind turbines?

No

6. Are there at least 30 days prior to your action occurring? Endangered species consultation must be completed before taking any action that may have effects to listed species. The Service also needs 30 days to review projects before we can verify conclusions in some dkey output letters. For example, if you have already started some components of the project on the ground (e.g., removed vegetation) before completing this key, answer “no” to this question. The only exception is if you have a Michigan Field Office pre-approved emergence survey (i.e., if you have conducted pre-approved emergence surveys for listed bats before tree removal, you can still answer yes to this question).

Yes

7. Does the action involve constructing a new communication tower or modifying an existing communications tower?

No

8. Does the activity involve aerial or other large-scale application of any chemical (including insecticide, herbicide, etc.)?

No

9. Does your project include water withdrawal (ground or surface water) greater than 10,000 gallons/day?

No

10. Will your action permanently affect hydrology?

No

11. Will your action temporarily affect hydrology?

No

12. Will your project have any direct impacts to a stream or river (e.g., Horizontal Directional Drilling (HDD), hydrostatic testing, stream/road crossings, new storm-water outfall discharge, dams, other in-stream work, etc.)?

No

13. Does your project have the potential to indirectly impact the stream/river or the riparian zone (e.g., cut and fill, horizontal directional drilling, hydrostatic testing, construction, vegetation removal, discharge, etc.)?

Yes

14. Are you applying for one of the following Michigan EGLE/Army Corps of Engineers joint permit application Minor Permit (MP) Categories:
MP 3 - Boat Hoist; MP 5 - Boal Wells; MP 7 - Completed Enforcement Actions; MP 12 - Dock;
MP 21 - Fish and Wildlife Habitat Structures;
MP 22 - Ford Stream Crossings for Commercial Forestry Operations;
MP 28 - Maintenance and Repair of Serviceable Structures;
MP 45 - Temporary Recreational Structures;
MP 48 - Wetland Habitat Restoration and Enhancement?

Verify the MP category number and associated description matches your project/application (https://www.michigan.gov/documents/egle/WRD-Minor-Project-Categories_733320_7.pdf). If you don't know what category applies for your project, answer no to this question.

No

15. Are you applying for one of the following Michigan EGLE/Army Corps of Engineers joint permit application General Permit (GP) Categories:
GP A - Aids to Navigation;
GP C - Clear Span Bridge;
GP E - Culverts - Small;
GP J - Dry Fire Hydrant;
GP O - Minor Permit Revisions and Transfers;
GP Q - Mooring Buoy;
GP W - Scientific Measuring Devices;
GP X - Snow Road Stream Crossings for Forestry Operations;
GP Z - Spring Piles and Piling Clusters;
GP DD - Wetland Habitat Restoration and Enhancement?

Verify the GP category number and associated description matches your project/application (https://www.michigan.gov/documents/deq/wrd-general-permit-categories_555828_7.pdf). If you don't know what category applies for your project, answer no to this question.

No

16. Will your action disturb the ground or existing vegetation? This includes any off road vehicle access, soil compaction, digging, seismic survey, directional drilling, heavy equipment, grading, trenching, placement of fill, pesticide application, vegetation management (including removal or maintenance using equipment or chemicals), cultivation, development, etc.

Yes

17. Is the action a utility-scale solar development project?

No

18. [Hidden semantic] Does the action intersect the MOBU AOI?

Automatically answered

Yes

19. Under the ESA, monarchs remain warranted but precluded by listing actions of higher priority. The monarch is a candidate for listing at this time. The Endangered Species Act does not establish protections or consultation requirements for candidate species. Some Federal and State agencies may have policy requirements to consider candidate species in planning. We encourage implementing measures that will remove or reduce threats to these species and possibly make listing unnecessary. If your project will have no effect on monarch butterflies (for example, if your project won't affect their habitat or individuals), then you can make a "no effect" determination for this project. Are you making a "no effect" determination for monarch?

Yes

20. [Hidden Semantic] Does the action area intersect the rufa red knot area of influence?

Automatically answered

Yes

21. Will the action occur during the red knot migration windows (May 15-June 15 or July 1-September 30?)

Yes

22. Will the action modify beaches, dunes, mudflats, peat banks, sandbars, shoals, or other red knot habitats? For example, the following actions may modify red knot habitat: groins, jetties, sea walls, revetments, bulkheads, rip-rap, beach nourishment, nearshore dredging, dredge spoil disposal, sand mining/borrowing, beach bulldozing, sandbagging, sand fencing, vegetation planting/alteration/removal, deliberate or possible introduction of non-native vegetation, beach raking/mechanized grooming, boardwalks, aquaculture development.

No

23. Will the action result in increased human disturbance or predation? For example, is the action likely to indirectly increase access or use of red knot habitats by humans and/or predators at times of year that the birds are typically present (e.g., commercial/residential development, beach access structures, boardwalks, pavilions, bridges/roads/ferries/trails, marinas, posts or other avian predator perches, structures or habitat features likely to encourage predator nesting/denning, trash cans or other predator attractants, feral cat colonies, policy changes likely to increase human use).

No

24. [Hidden Semantic] Does the action area intersect the gray wolf area of influence?

Automatically answered

Yes

25. Does the action area intersect with a known gray wolf denning or rendezvous area?

No

26. Is there any potential for the action to harm wolves directly (e.g., mammal trapping, poison bait), or indirectly (e.g., increasing vehicle use that may result in vehicle strikes, exposure to potential human persecution)?

No

27. [Hidden Semantic] Does the action area intersect the lynx area of influence?

Automatically answered

Yes

28. Is there any potential for this action to harm Canada lynx directly (e.g., mammal trapping, poison bait)?

No

29. [Hidden Semantic] Does this project intersect the NLEB AOI?

Automatically answered

Yes

30. The project has the potential to affect federally listed bats. Does the action area contain any known or potential bat hibernacula (natural caves, abandoned mines, or underground quarries)?

No

31. Has a presence/absence bat survey or field-based habitat assessment following the Service's Range-wide [Indiana Bat and Northern Long-eared Bat Summer Survey Guidelines](#) been conducted within the action area?

No

32. Does the action involve removal/modification of a human structure (barn, house or other building) known to contain roosting bats?

No

33. Does the action include removal/modification of an existing bridge or culvert?

No

34. Does the action include herbicide application?

No

35. Does the action include tree cutting/trimming, prescribed fire, and/or pesticide (e.g., insecticide, rodenticide) application?

Yes

36. Will the action clear >10 acres of contiguous forest (i.e., connected by 1,000 feet or less) or fragment a riparian or other connective forested corridor (e.g., tree line) between 2 or more forest patches of at least 5 acres? For more information, see [Appendix II](#).

No

37. Does the action area contain potential NLEB bat roost trees (trees ≥ 3 inches in diameter [at breast height] with cracks, crevices, cavities and/or exfoliating bark)? For more information, see [Appendix IV](#).

Yes

38. Does the action include emergency cutting/trimming of hazard trees in order to prevent imminent loss of human life and/or property?

No

39. [Semantic] Is any portion of the action area within 5 miles of a known Indiana or northern long-eared bat hibernaculum?

Automatically answered

No

40. [Hidden Semantic] Does this project intersect the northern long-eared bat area of influence?

Automatically answered

Yes

41. Is the project action area located within 0.25 miles of a known northern long-eared bat hibernaculum?

Automatically answered

No

42. Will the action involve Tree Removal as defined in the 4(d) rule for northern long-eared bat?

Yes

43. Is the project action area located within 150 feet of a known occupied northern long-eared bat maternity roost tree?

Automatically answered

No

44. Will all tree cutting/trimming, prescribed fire, and/or pesticide/herbicide application be conducted outside the northern long-eared bat summer roosting period of May 15 through August 31 (that is, limited to September 1 through May 14)?

Yes

45. [Hidden semantic] Does the action intersect the Tricolored bat AOI/SLA/range?

Automatically answered

Yes

46. The tricolored bat was proposed for listing as endangered on September 13, 2022. In Michigan, the tricolored bat was rare pre-white nose syndrome (WNS) and is exceedingly rare post-WNS. The species has been observed in 12 Michigan counties to date, largely during the fall or winter. With very few exceptions, the species has not been observed in Michigan in the summer months, and no maternity colonies have been found. During winter, tricolored bats hibernate in caves, abandoned mines, and abandoned tunnels ranging from small to large in size. During spring, summer and fall months, they roost primarily among leaf clusters of live or recently dead deciduous/hardwood trees.

Are you making a no effect determination on this project for the tricolored bat?

Yes

IPAC USER CONTACT INFORMATION

Agency: GEI Consultants

Name: John Reck

Address: 990 Lalley Rd.

City: Iron River

State: MI

Zip: 49935

Email: jreck@geiconsultants.com

Phone: 9062144156

Appendix G

Rose Island Documentation

Appendix H

Overburdened Community Status

Appendix I

Public Participation

Appendix J

Project Plan Resolution