

City of St. Ignace

Phase I – Wastewater Improvements

Michigan Clean Water State Revolving Fund Project Plan
Volume 1 – Report Body

21-0085

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1211 Ludington Street
Escanaba, MI 49829

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LIST OF ABBREVIATIONS

Abbreviation	Description	Abbreviation	Description
AC	Acre	O&M	Operation and Maintenance
AMP	Asset Management Plan	OMB	US Office Of Management And Budget
ASCE	American Society of Civil Engineers	PAC	Powdered Activated Carbon
AWWA	American Waterworks Association	PACL	Polyaluminum hydroxychloride
BOD	Biological Oxygen Demand	PFAS	Per- and polyfluoroalkyl substances
BRF	Business Risk Factor	POF	Probability of Failure
CAS or CI	Cast Iron Pipe	POSA	Plan of Study Area
CFM	Cubic Feet per Minute	POTW	Publically Owned Treatment Works
CFS	Cubic Feet Per Second	PPB	Parts per Billion
Cl	Chlorine	PPD	Pounds Per Day
CIP	Capital Improvement Plan	PPM	Parts Per Million
CT	Contact Time	PRV	Pressure Reducing Valve
CUPPAD	Central U.P. Planning and Devel. Reg. Commission	PS	Pump Station
DBP	Disinfection Byproduct	PSI	Pounds Per Square Inch
DI or DIP	Ductile Iron Pipe	PVC	Polyvinyl Chloride (Pipe)
DO	Dissolved Oxygen	RRI	Repair, Replacement, and Improvements (Fund)
DWAM	Drinking Water Asset Management	RUS	Rural Utility Service (USDA RD)
DWSRF	Michigan Drinking Water State Revolving Fund	SAN	Sanitary Sewer
EDU	Equivalent Dwelling Unit	SAW	Michigan Stormwater, Asset Management, And Wastewater funding
EGLE	Mich. Dept. of Environment, Great Lakes, & Energy	SCADA	Supervisory Control And Data Acquisition
ENR	Engineering News-Record	SCFM	Standard Cubic Feet per Minute
EPA	US Environmental Protection Agency	SF	Square Foot
EPDM	Ethylene Propylene Diene Terpolymer	TSS	Total Suspended Solids
EUPPDR	Eastern U.P. Planning and Devel. Reg. Commission	STO	Storm Sewer
FPS	Feet per Second	SRF	Michigan State Revolving Loan Fund
FSP	Fiscal Sustainability Plan	SWD	Side Wall Depth
GAC	Granular Activated Carbon	TDH	Total Dynamic Head
GPCD	Gallons Per Capita Per Day	TRS	Trihalomethane Removal System
GPD	Gallons Per Day	TTHM	Total Trihalomethane
GPD/IN-MI	Gallons Per Day Per Inch Diameter Mile	TWST	Treated Water Storage Tanks
GPM	Gallons Per Minute	USACE	US Army Corps Of Engineers
HP	Horsepower	USDA RD	US Dept. Of Agriculture - Rural Development
HVAC	Heating, Ventilation, and Air Conditioning (System)	UV	Ultra Violet
ITA	Intent to Apply	VFD	Variable Frequency Drive
MDNR	Michigan Department of Natural Resources	WERF	Water Environment Research Foundation

Abbreviation	Description	Abbreviation	Description
MG	Million Gallons	WM	Watermain
MGD	Million Gallons Per Day	WPA	Works Progress Administration (early public works construction program)
MG/L	Milligrams Per Liter	WRC	Michigan Water Resources Commission
MH	Access Manhole	WS	Water Service
ML	Milliliter	WTP	Water Treatment Plant
MPN	Most Probable Number	WUPPDR	Western U.P. Planning and Devel. Reg. Commission
NEMA	National Electrical Manufacturers Association	WV	Water Valve
NEPA	National Environmental Policy Act	WWTF	Wastewater Treatment Facility
NH ₃ -N	Ammonia Nitrogen	WWTP	Wastewater Treatment Plant
NPDES	National Pollutant Discharge Elimination System		
NPV	Net Present Value		
NRWA	National Rural Water Association		

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SUMMARY

Project Background

This study (Project Plan) was authorized by the City of St. Ignace via execution of a letter proposal. The purpose of the Project Plan is to evaluate needs and recommend alternatives for improvements to the City’s wastewater system.

Summary of Project Need

The ultimate goal of wastewater treatment is to protect the quality of the waters of State and protect the health of the public. Reliable operation of the wastewater collection system within the City’s utility systems directly impacts the health and safety of the City’s citizens and visitors. Deficient sewers can contaminate ground and surface waters and contribute to the wastewater treatment facility’s ability to adequately treat wastewater.

Analysis of Alternatives

The principal alternatives are being considered as noted below:

Alternative 1: No Action

No implementation of a corrective measures project at this time while attempting to correct deficiencies in the system over time as maintenance budgets will allow. No Action will result in continued sewer main backups/SSOs in the system.

Alternative 2: Collection System Improvements

Replacement and upgrading where required of sanitary sewers over 70 years old prioritized as to condition via SAW findings, City records, and personnel knowledge. This alternative includes emphasis on lines which coincide with aging or deficient water or sewer lines to allow combining projects and maximizing use of project funding for construction while minimizing environmental effects and disruption to the area citizens. Sanitary sewers to be replaced vary in size from 8 to 20-inch. This alternative includes 7,950 ft of pipe with the most severe quick ratings. Project will address sewer main backups/SSOs in project location.

Selected Alternative

The Alternative 2 to replace sewers is the selected alternative because it provides the most cost effect option to provide improvements to structural deficiencies within the system.

Environmental Evaluation

The anticipated environmental impacts resulting from implementation of the selected alternative are relatively minor. There is no increase in the extent of the wastewater system, and no major changes in terms of residuals or other material effects. Full detail may be found under the section labeled “Environmental Evaluation”.

Mitigation Measures

Where adverse impacts due to installation of the recommended improvements cannot be avoided, mitigation measures will be implemented. Costs for mitigation measures were considered and included where applicable in project opinions of probable cost and included in construction contract documents. A full discussion of mitigation measures can be found in detail in section “Mitigation Measures”.

Public Participation

A public hearing for this CWSRF Project Plan took place on **May 16, 2022**. Copies of public hearing advertising and minutes are included in Appendix E of the adopted final version of this Project Plan.

PROJECT BACKGROUND

This study (Project Plan) was authorized by the City of St. Ignace via execution of a letter proposal. The purpose of the Project Plan is to evaluate needs and recommend alternatives for improvements on the City's wastewater system.

Delineation of Study Area

The City of St. Ignace is located on the eastern end of Michigan's Upper Peninsula, on the north shore of the Straits of Mackinac between Lake Huron and Lake Michigan. It sits on the north end of the Mackinac Bridge. The City serves as the county seat of Mackinac County. The City itself takes up approximately 1,700 acres located in Township 40N and Range 4W.

The economic base of the study area is primarily tourism relying on water related recreational opportunities and historic/archaeological sites. The City is an important archaeological area both for original Native American inhabitants and later development as a fur trading site in the late 1600s.

The City of St. Ignace is a Home Rule City, while Moran and St. Ignace Townships are General Law Townships. They therefore have the authority to finance, construct, and operate a public wastewater utility. Moran Township currently operates a small wastewater collection and lagoon treatment system. The City of St. Ignace currently provides water and wastewater service to the eastern side of Moran Township, primarily for commercial interests along Highway US-2. The City also provides services to southern St. Ignace Township in the Evergreen Shores area, and the Kewadin Casino north of the City.

The area of study is within the legal boundaries of the City of St. Ignace (see Figure 1 and Figure 2 on the next pages). Areas proposed for CWSRF consideration are within these boundaries.

Figure 1. Project Location



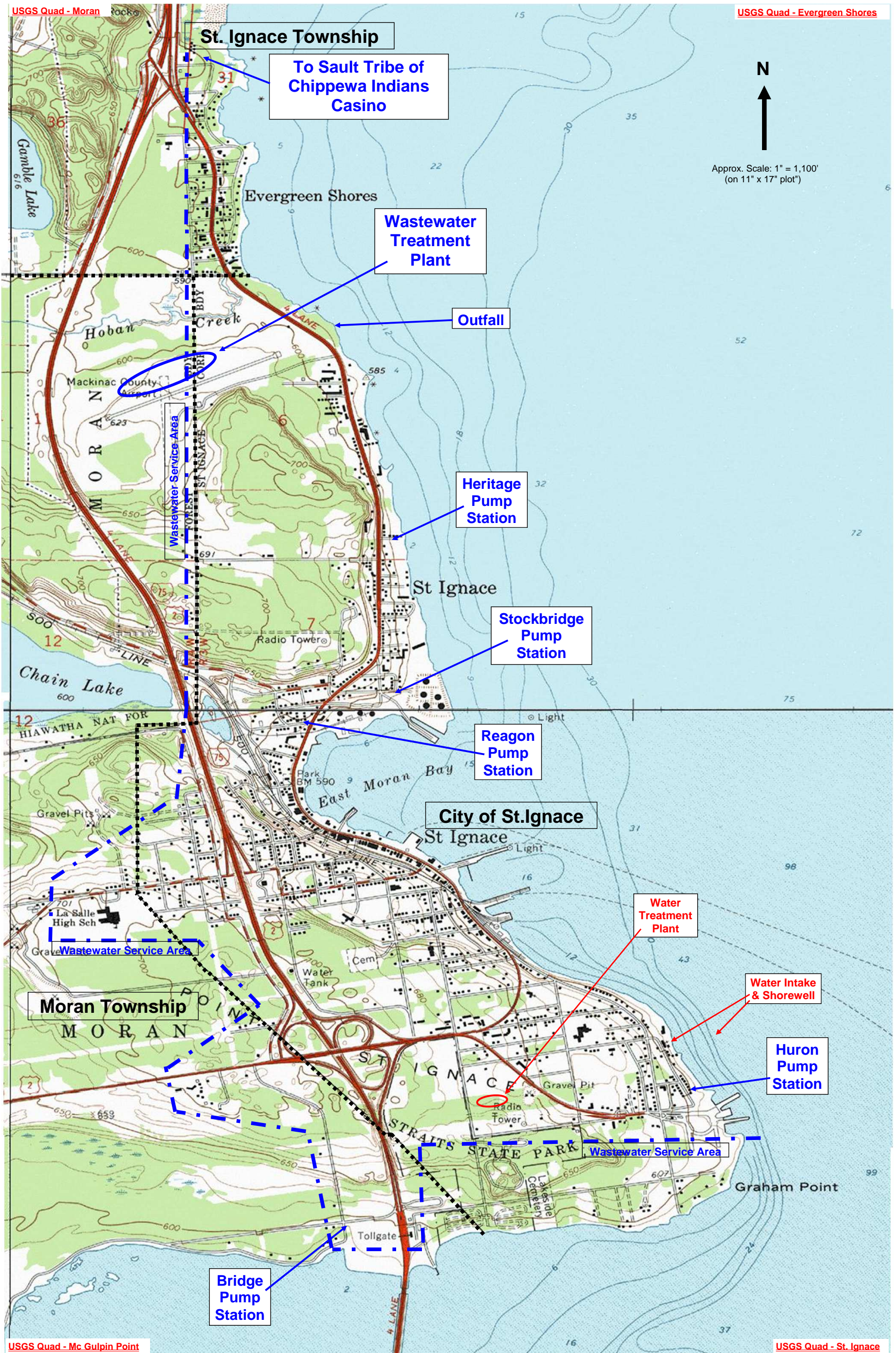


Figure 2: Project Area Topographic Map

Environmental Setting

Supplemental information on the environmental setting is contained in Appendix C.

Cultural Resources

Significant historical and archaeological sites are common in St. Ignace, one of the oldest continuously inhabited sites in North America. The St. Ignace area has a long standing commitment to historic preservation, which is a major part of the area's tourism driven economy. The proposed construction will be within existing facilities and previously disturbed areas. It is expected that there will be no long term impact.

The Natural Environment

Air Quality

Project area air quality can only be described as good to excellent. The area is virtually free of large industrial or power producing facilities which can adversely affect air quality. Limited population also means limited transportation system initiated air quality impacts.

Wetlands

There are scattered pockets of wetlands within the City.

Coastal Zones

The study area is surrounded on the east and south by the Straits of Mackinac and East Moran Bay on Lake Huron. The downtown waterfront is on East Moran Bay. A small shallow lake also encroaches on the northwestern City limits. No work is anticipated near existing surface waters.

Floodplains

Floodplains or high water marks exist along the shoreline of the Straits of Mackinac.

Natural or Wild and Scenic Rivers

There are no designated natural or wild and scenic rivers in the study area.

Major Surface Waters

St. Ignace lies on the northern shore of the Straits of Mackinac between lakes Huron and Michigan. The area's weather, economy and history are dominated by the Straits. Tourism, recreational boating and fishing thrive in the Straits area. The City's downtown area sits on the shore of East Moran Bay which is home to the City's marina and ferry docks for Mackinac Island's service ferry boats.

Groundwater in the area is found in a shallow, perched, near surface water table and in deep (700'+) bedrock formations. Intermediate fractured limestone aquifers are susceptible to surface water influence and are in general very hard. St. Ignace draws its water from Lake Huron on the southern fringe of the City. This surface water quality is considered very good.

Recreational Facilities

The major economic characteristic that could affect population change in St. Ignace is overall Midwest economy and its effect on tourism and recreational living. The area employment is dependent on tourism. Recreational development (summer homes, commercial rentals, etc.) in outlying township areas is in part dependent on the availability of drinking water and wastewater disposal.

Topography

A topographic map of the service area has been included as Figure 2. Ground elevations are generally flat especially in the proposed project areas.

Geology

The following is excerpted from the City's 1990 Water Study by Granger and Associates:

“The bedrock underlying the Lake Huron/Michigan Drainage Basin originated over 500 million years ago when the Michigan Basin, a large depression in the ancient continental base, began filling with sand, silt and mud. Salt water seas entered the Michigan Basin at six different times with each sea smaller than its predecessor. The sediment from these areas varied depending upon the environmental conditions at the time. Precipitates of salt and gypsum were left by evaporation of sea waters. Lime deposits were left by lime oriented animals, while organic deposits resulted from vast reaches of swampy lands on which grew such plants as giant bushes, tree ferns and ground pines.”

This accumulation of sediments was accompanied by a slow sinking of the underlying rock formations and a slow uplift of the lands to the south. This caused water from the ancient seas to become trapped in the rocks it helped form. Some of this salt water is still present at certain depths. Later, glaciers eroded and deposited additional materials on top of the base laid down by sedimentation of the ancient seas. During the last glacial action, a rather large lake was formed by meltwater from the retreating glacier. The previous materials deposited were then subjected to water action, and additional sedimentary buildup.”

Soils

USDA Natural Resource Conservation Service (NRCS) has published their Soil Survey of County. Soils and geology maps and type descriptions can be found in Appendix C. The following is also excerpted from the City’s 1990 Water Study by Granger and Associates:

“Soil associations describe both soil types and landforms of areas. The soil associations of the Study Area are mainly surficial deposits of limestone, dolomite and shales. The surficial deposits are primarily fine sands and silts, with swampy areas composed of mucks and peat. Occasionally, areas are bedrock formations that are exposed, or near the surface. Intermixed with these areas are layers of sand and gravel, and impermeable clays. Like most glaciated areas, the resultant soils are well scrambled with many small areas inconsistent with the overall soils.

The soils throughout the Study Area are unpredictable with scattered patches of everything. The soils vary from zero to thirty feet thick over the limestone bedrock. Many of the soils have a perched ground water table that is near the surface due to the bedrock preventing percolation of the rain water downward. In other areas, fracturing in the bedrock leads to direct piping of surface water into the groundwater aquifers. For these reasons, the soil pattern is extremely complicated within the Study Area.”

Agricultural Resources

There is no designated prime agricultural land in the service/planning area which includes the City and developed land along major transportation arteries.

Fauna and Flora

The project area is commercial in nature with private (hotel) lawn areas and parking lots or driveways.

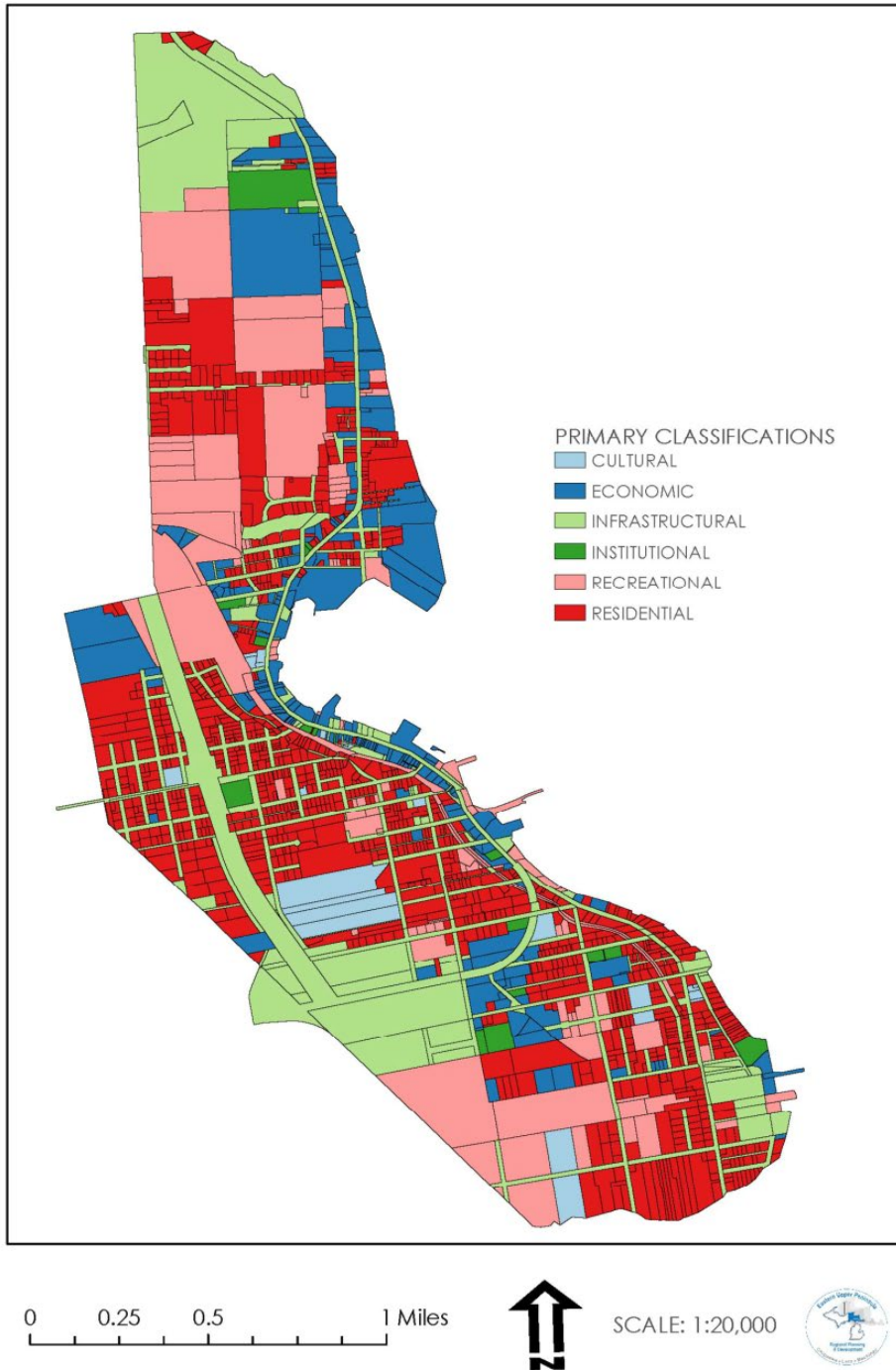
Land Use

Land within the City of St. Ignace is primarily residential and commercial, driven by tourism. Figure 3, from the City's Master Plan, shows the land use in the City.

Within Mackinac County the principal land use is forestry with approximately 90 percent of the land area forested. The majority of the forest land is owned and administered by the U.S. Forest Service or Michigan Department of Natural Resources. Developed land is predominantly residential and light commercial with less than one percent devoted to industrial use.

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Figure 3. Land Use



Population

Population in the study area is expected to stabilize assuming the national and regional economies can recover and also stabilize. Population projections noted in Table 1, which follows, reflect the optimism that the regional economy will recover or at least halt its decline as the nationwide recession ends. Little influx of new growth is expected in the study area other than redistribution of commercial and residential patterns. The area depends heavily on tourism and it is anticipated that as the national economy recovers, tourism, jobs, and population will stabilize.

Table 1. Population Projections

Year	City of St. Ignace	St. Ignace Township	Moran Township	Mackinac County
1960	3,334	686	877	10,853
1970	2,892	551	779	9,660
1980	2,632	706	823	10,178
1990	2,568	932	838	10,674
2000	2,678	1,024	1,080	11,943
2010	2,452	939	994	11,113
2020 (a)	2,500	900	1,000	11,100
2030 (a)	2,500	900	1,000	11,100
2040 (a)	2,500	900	1,000	11,100

(a) 1960 to 2010 based on published US Census figures
2020 to 2040 assumes population stabilizing as economy stabilizes after nationwide recession

Economic Characteristics

Within Mackinac County the principal land use is forestry with approximately 90% of the land area forested. The majority of the forest land is owned and administered by the U.S. Forest Service or Michigan Department of Natural Resources. Developed land is predominantly residential and light commercial with less than one percent devoted to industrial use. Commercial interests in both the City and County are driven by service to either the small local communities or the influx of summer tourists.

St. Ignace lies on the northern shore of the Straits of Mackinac between lakes Huron and Michigan. The area's weather, economy and history are dominated by the Straits. Tourism, recreational boating and fishing thrive in the Straits area. The City's downtown area sits on the shore of East Moran Bay which is home to the City's marina and ferry docks for Mackinac Island's service ferry boats.

In Table 2, below, summarizes the economic characteristics of the project area.

Table 2. Major Employers of Project Area

Employer Sector	Employees (a)
Managerial & Professional	233
Technical and Administrative Support	152
Sales	106
Service	254
Farming, Forestry, and Fishing	25
Precision Production, Crafts, and Laborers	130
Operators, Fabricators, & Laborers	106
Total	1,006

(a) Excerpted from City's Master plan

Existing Facilities








St. Ignace currently serves customers in Moran and St. Ignace Townships as well as the City of St. Ignace; currently there are no high strength users. The existing system consists of approximately 20 miles of 6 to 27-inch sewers. System maps are presented in the following pages:

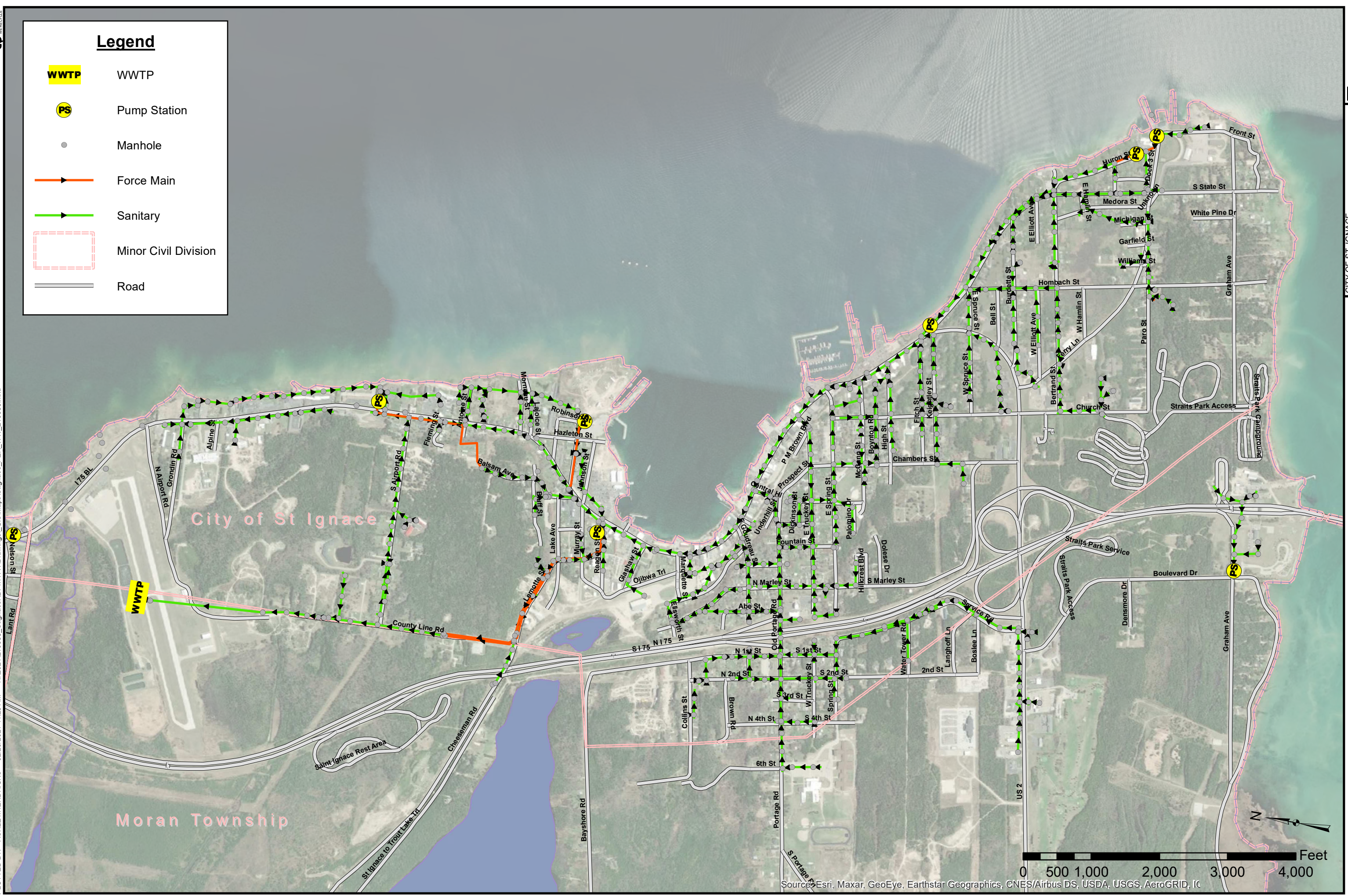
- Figure 4. Existing Wastewater
- Figure 5. Wastewater Pipe Size
- Figure 6. Wastewater Pipe Installation Year

Note that the Sault Tribe of Chippewa Indians is a private customer north of the City, discharging its force main directly to the WWTP and is not shown on the City's system maps). The City's WWTP is located directly north of the airport. The system is gravity with eight lift stations.

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Legend

-  WWTP
-  Pump Station
-  Manhole
-  Force Main
-  Sanitary
-  Minor Civil Division
-  Road









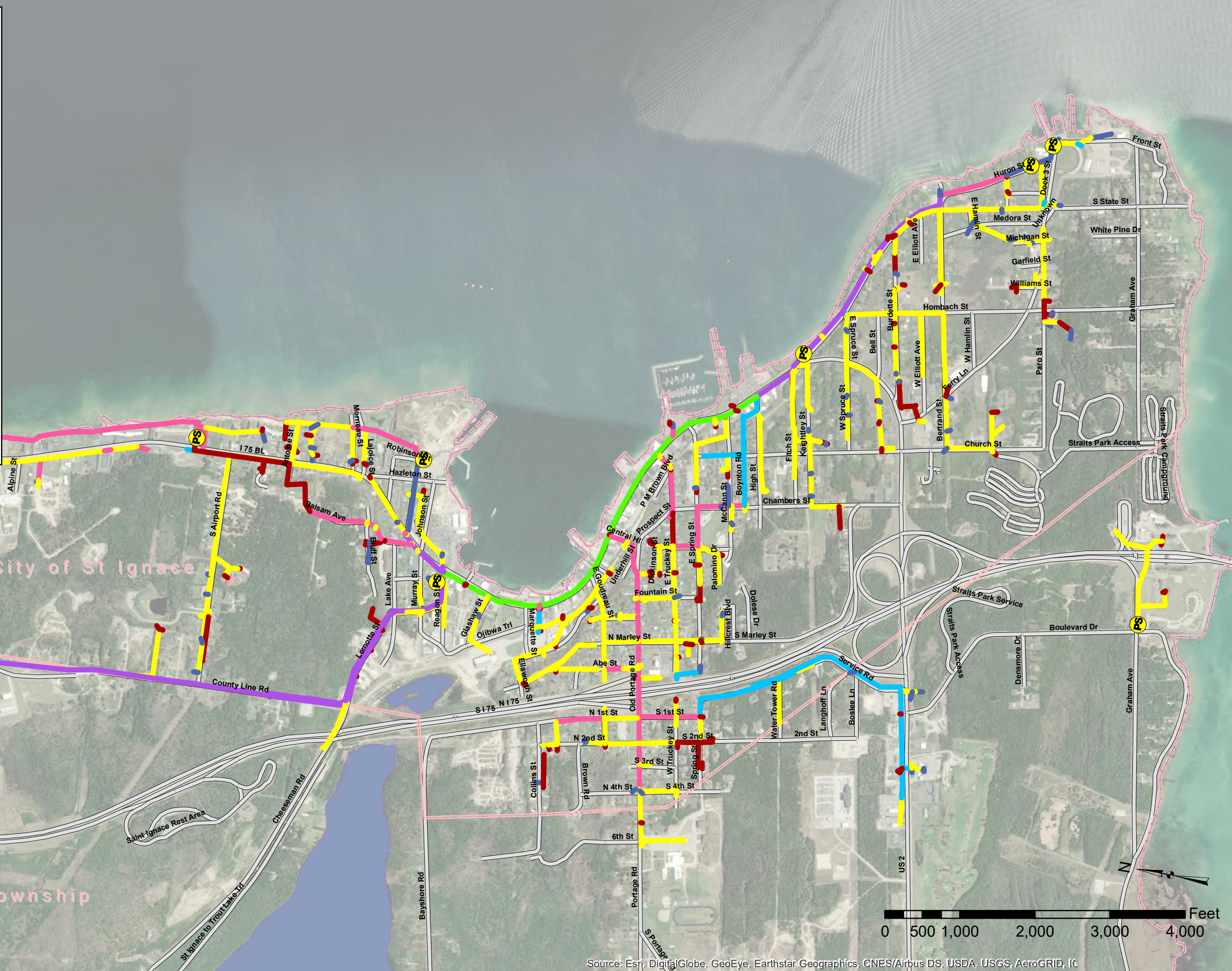
Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IC

FIGURE 4: EXISTING WASTEWATER FACILITIES

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Legend

-  Pump Station
- Pipe Size**
-  ≤ 4'
-  6"
-  8"
-  10"
-  12"
-  15 - 18"
-  24 - 27"
-  Minor Civil Division
-  Road



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IC



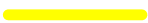






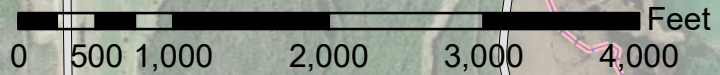
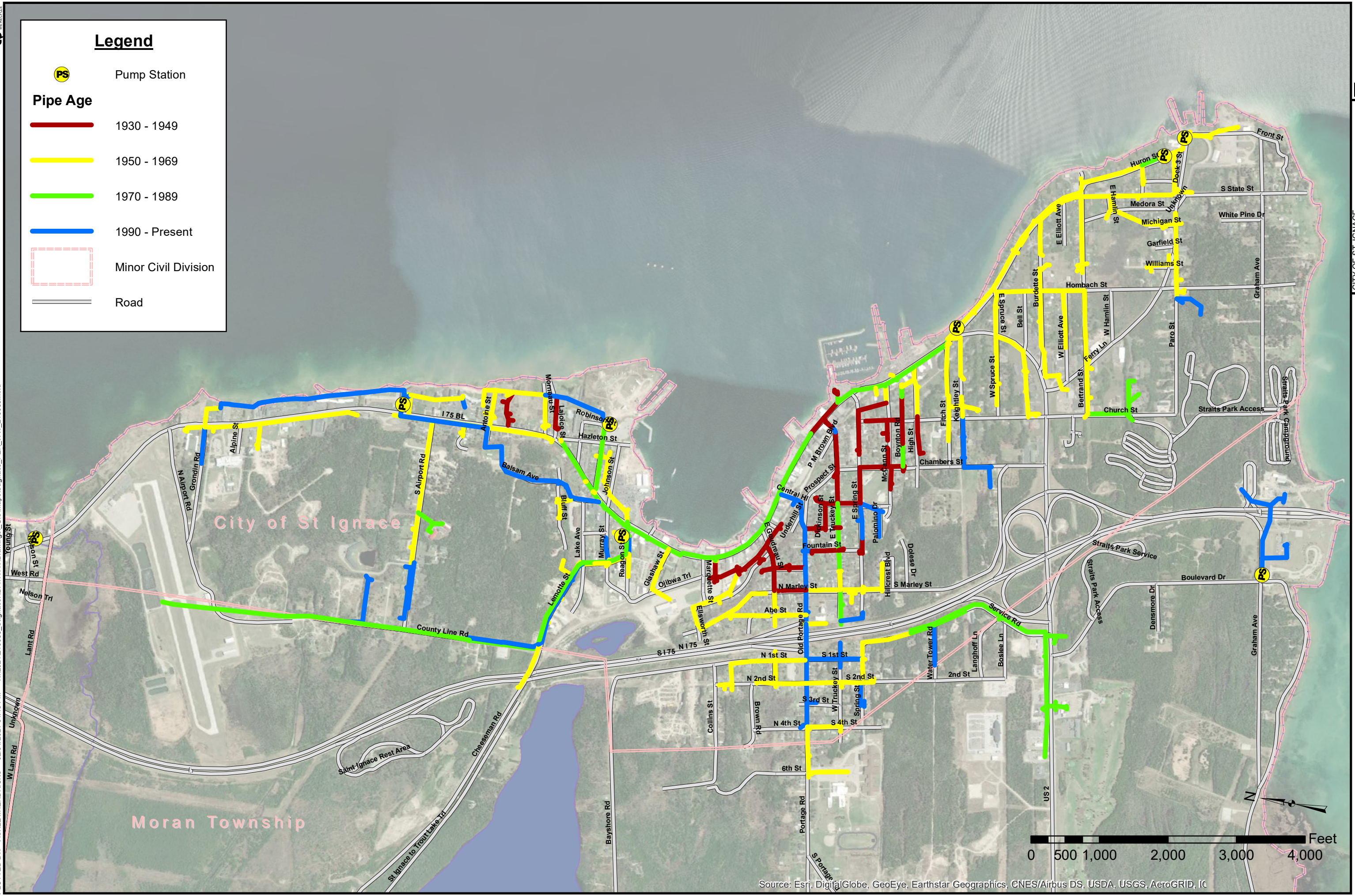
CITY OF ST. IGNACE
USDA RD WASTEWATER
PROJECT: 18-0085
MACKINAC COUNTY, MICHIGAN

FIGURE 5: WASTEWATER PIPE SIZE

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Legend

-  Pump Station
- Pipe Age**
-  1930 - 1949
-  1950 - 1969
-  1970 - 1989
-  1990 - Present
-  Minor Civil Division
-  Road



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IC



CITY OF ST. IGNACE
 USDA RD WASTEWATER
 PROJECT: 18-0085
 MACKINAC COUNTY, MICHIGAN

FIGURE 6: WASTEWATER PIPE INSTALLATION YEAR

The bulk of the City’s water and sewer lines are at least 70 years old. Pipe and joint materials are not up to modern standards. Leaking joints, structural problems, and capacity issues require increasing operation, maintenance, and repair expenditures. Newer expansions of the wastewater system utilized modern polyvinyl pipes, the older areas still have vitrified clay pipe in service. Older portions of the wastewater system also have smaller pipe sizes. A summary of the existing wastewater utilities is provided in Table 3.

Table 3. Summary of the Existing Wastewater System

Mainline Gravity Sewer				Force Main			
Size	Length		Size	Length		Size	Length
6"	2,665'		15"	3,665'		4"	400'
8"	70,585'		18"	3,370'		6"	2,300'
10"	7,825'		24"	5,665'		8"	1,100'
12"	11,635'		27"	210'		18"	4,400'
			TOTAL	105,620'		TOTAL	8,200'
4" to 6" laterals for 1,331 users @ 50' each = 66,550'							
Pump Stations							
Name (a)	Pumps	Pump Capacity (Each)	Installed	Last Upgrade	Condition	Comments	
Reagon	3 ea	2,200 gpm	1988	2012	Good		
Heritage	2 ea		1989	2010	Good		
Stockbridge	2 ea	600 gpm	1988	1994	Average		
Huron	2 ea	200 gpm	1988	1995	Average		
Bridge	2 ea				Good	Moran Twp	
3 Grinder Stations	2 ea	20 gpm			Average		
Wastewater Treatment Facility							
Design Flows (after 2010 to 2012 project)							
Avg. Day = 1.64 MGD		Max. Day = 4.21 MGD			Peak Rate = 5.10 MGD		
Lagoon Cell 1-A: 2.4 mg			Polishing Cell 4-A: 0.43 mg				
Lagoon Cell 1-B: 2.4 mg			Lagoon Cell 4-B: 0.43 mg				
Lagoon Cell 1-C: 4.0 mg			Aeration				
Flocculation Cell 2			Disinfection: Ultraviolet				
Lagoon cell 3: Abandoned							

The City of St. Ignace partook in Michigan’s Storm, Asset Management, Wastewater (SAW) grant program; see summary in Appendix D. This data has been used in conjunction with the water asset management plan to develop a proposed project area which will effectively replace both aging infrastructures within a single project. The following are a sampling of items found during construction and sewer televising:

1. Manholes with open covers and excessive infiltration and inflow not previously identified

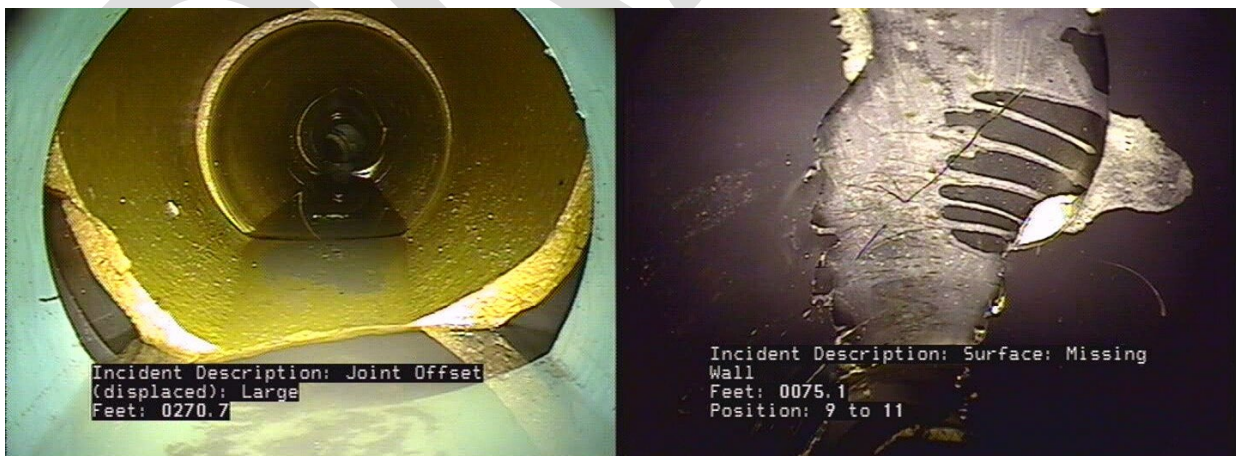
2. Sewer services leads improperly abandoned or no apparent use
3. Multiple customers serviced from a single lateral
4. Laterals directly connected to manholes
5. Lines exist where no homes have been shown
6. Intruding lateral connections Poor access for maintenance, or non-existent maintenance structures
7. Mainline sewer with holes and offset joints
8. Watermains penetrating sanitary manholes

Some of the SAW program identified issues are illustrated as follows:

1. Limited confined space
2. Manhole degradation prohibiting lining or repair (refer to photographs below)



The SAW televising also identified areas where pipe has almost degraded to the point of the pipe collapsing, or in some cases, already collapsed. The following photographs illustrate these points.



It also identified many areas where alignment both vertically and horizontally have created a problem with low spots collecting water and debris. This ponding creates maintenance issues as seen in the example photo above. One of the

major reasons for the mis-alignments is settlement after installation and existing lines were laid on top of solid rock. The photographs illustrate several of the major problems and limits of lining:

1. Pipe degeneration too significant to facilitate lining
2. Dissimilar pipe materials and/or pipe diameters
3. Alignment issues that cannot be resolved by lining and will create continuing maintenance issues

Televising also shows protruding service leads into mainline piping which is of a type that will resist the attempt to remove these service intrusions, and will likely lead to further mainline pipe damage and be a source of infiltration to the system. See following photo for the televised main with an intruding tap.



Fiscal Sustainability Plan

Through historic established practices and programming developed via the State SAW funded asset management planning, the City has addressed asset inventory, asset evaluation, water/energy conservation, and asset maintenance/funding.

Need for the Project

Orders or Enforcement Actions

The City does not currently have any court or enforcement order against it.

Water Quality Problems

The ultimate goal of wastewater treatment is to protect the quality of the waters of State and protect the health of the public. Reliable operation of the wastewater collection system within the City's utility systems directly impacts the health

and safety of the City's citizens and visitors. Deficient sewers can contaminate ground and surface waters and contribute to the wastewater treatment facility's ability to adequately treat wastewater. Currently the system is exhibiting sewer main backups/SSOs that pose health risks (refer to Appendix D for list of SSOs in project location).

Projected Needs for the Next 20 Years

The Capital Improvement Plan for the City (developed as part of the SAW Project) currently includes wastewater projects allocated over ten year periods. Service area population has been stable for some time. Increased treatment capacity is not a goal of this Project Plan and any subsequent project. Projected needs concentrates more on the systems reliability and replacement/enhancement of existing treatment systems to protect what is there now. Further information can be found in Appendix D.

Future Environment without the Proposed Project

With population and growth within the service area stabilizing, existing WWTP capacity to treat future generated wastewater is adequate. Factors that adversely affect existing capacity or contribute to wet weather capacity problems are the areas that must be controlled.

ANALYSIS OF ALTERNATIVES

The City of St. Ignace has invested in regular maintenance, asset management, and capital improvements planning for their WWTP and collection system. This Project Plan examines several alternatives for development in the next five to twenty years.

Potential Alternatives

No Action

The No Action alternative, although saving a large initial capital investment, would result in several and continuing adverse impacts on the St. Ignace wastewater system and its customers. Those impacts include, but may not necessarily be limited to, the following:

- Continued risk of system failure
- Continued decrease in the reliability of waste treatment and increased risk to water quality in the Great Lakes
- Continued and accelerated degradation of facilities along with increased maintenance costs.
- Continued use of excess energy
- Continued sewer main backups/SSOs (refer to Appendix D for summary of backups in project location)

Optimum Performance of Existing Facilities

The City has been working toward optimizing its collection system since storm and sanitary separation in the 1980s. St. Ignace has achieved what it can with the current infrastructure.

Water and Energy Efficiency

This project plan focuses on collection system improvements and will not address water and energy efficiencies.

Regional Alternatives

The City of St. Ignace currently operates as the centralized facility for City of St. Ignace, St. Ignace Township, and Moran Township. The plant is maintained and operating well, and therefore, regionalization will not be analyzed as a proposed alternative.

Lining/Rehabilitation of Sewer

Lining of the sewer pipe is not considered a potential alternative as it is not feasible to line the pipe (refer to pictures shown under Existing Facilities). Vertical alignment issues, collapsed pipe, and intruding taps would require potential spot repairs prior to lining, making replacement more cost effective and increased longevity.

Principal Alternatives

Alternative 1: No Action

Not implementing a corrective measures project at this time while attempting to correct deficiencies in the system utilizing existing maintenance budgets. No Action will result in continued sewer main backups/SSOs (refer to Appendix D for summary of backups in project location).

Alternative 2: Collection System Improvements

Replacement and upgrading where required of sanitary sewers over 70 years old prioritized as to condition via SAW findings, City records, and personnel knowledge. This alternative includes emphasis on lines which coincide with aging or deficient water or sewer lines to allow combining projects and maximizing use of project funding for construction while minimizing environmental effects and disruption to the area citizens. Sanitary sewers to be replaced vary in size from 8 to 20-inch. This alternative includes approximately 7,950 ft of pipe with the most severe quick ratings outlined in SAW (refer to Appendix D). Routes where both water main and sanitary sewer replacements are proposed (plus maintaining service to customers) will require full road width reconstruction with curb and sidewalk replacement driven by the number of services (both water and sewer) to be replaced and reconnected. This alternative will aim to eliminate SSOs/sewer main backups within the system.

ANALYSIS PRINCIPAL ALTERNATIVES

The Monetary Evaluation

A construction estimate is provided in Table 4. The construction costs used in this analysis are based on previous work done in St. Ignace and neighboring communities. Costs have been adjusted based on ENR index and typical engineering and administrative fee rates. Detailed costs, sewer lengths/sizes, and number of manholes can be found in Appendix A.

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Table 4. Construction Cost Estimate

Priority 1 - Construction Costs Only		
A1 Boundary Rd from S Airport Rd to 300 ft S Water - \$34,900	A2 PRV on S Airport Rd Water - \$14,100	A3 E Goudreau St from I75 to I75 BL and Mary St from Goudreau St North Sewer - 1,470'; Water - 1,210' Sewer - \$526,400; Water - \$405,400
A4 N Marley St from E Goudrea St to Old Portage Rd Sewer - 470'; Water - 480' Sewer - \$172,100; Water - \$152,600	A5 Mary St from Goudrea to Old Portage Rd Sewer - 460'; Water - 480' Sewer - \$166,100; Water - \$147,900	A6 N 2nd St from Collins St to Spring St) Sewer - 660'; Water - 2,150' Sewer - \$260,200; Water - \$592,400
A7 Fountain St from E Truckey St to E Spring St Water - 330' Water - \$91,500	A8 Fountain St. from Old Portage Rd to E Truckey St. Sewer - 400'; Water - 490' Sewer - \$139,100; Water - \$127,500	A9 Joseph St from Old Portage St to E Truckey St Sewer - 310'; Water - 490' Sewer - \$120,800; Water - \$127,000
A10 Dickinson St from Joseph St to E Truckey St Sewer - 540'; Water - 500' Sewer - \$147,100; Water - \$123,700	A11 Dickinson St from E Truckey St to E Spring St Water - 330' Water - \$91,500	A12 E Truckey St from Dickinson St to Chambers St Sewer - 420'; Water - 520' Sewer - \$168,800; Water - \$166,500
A13 McCann St from Chambers St to West of Dickinson St Water - 710' Water - \$193,500	A14 S Marley Street from Spring St to Tank Water - 250' Water - \$125,000	A15 Dock 3 St from Graham Ave to Ferry Ln; From Ferry and Dock 3 St to Huron St Water - 1,720' Water - \$678,300
Allowance for Lead Impact Water Service Replacements throughout Project Area (5 @ \$6,000 each) Water -\$30,000		Priority 1 Total Sewer - 4,730'; Water - 9,660' Sewer - \$1,701,000; Water - \$3,102,000

Priority 2 - Construction Costs Only		
<p>B1 Alley South of Collins St from N 2nd to 1st St Sewer - 300'; Water - 300' Sewer - \$63,900; Water - \$58,900</p>	<p>B2 N 1st St from Collins St to North of Old Portage Rd Sewer - 870'; Water - ' Sewer - \$309,900</p>	<p>B3 Goudreau St from N 2nd to 1st St Sewer - 340'; Water - 340' Sewer - \$98,000; Water - \$92,400</p>
<p>B4 Spring St from S 2nd St to S 1st St(175) Sewer - 530'; Water - 590' Sewer - \$168,500; Water - \$145,300</p>	<p>B5 Truckey St & Spring St from Marley to NI75 including sewer between streets Sewer - 1,180'; Water - 870' Sewer - \$358,200; Water - \$234,300</p>	<p>B6 E Truckey St from Marley St to Fountain St Water - 590' Water - \$156,600</p>
<p>B7 E Truckey St from Fountain St to Dickinson St Water - 660' Water - \$210,400</p>	<p>B8 S State St from Ferry Ln to Graham Ave Water - 1,260' Water - \$420,500</p>	<p>Priority 2 Total Sewer - 3,220'; Water - 4,610' Sewer - \$999,000; Water - \$1,319,000</p>

A 30-year present worth analysis is also included in Table 5 below. Because St. Ignace is a disadvantaged community, they are eligible for a 30-year loan/bond term. The bond schedule, operating expense, and salvage values can be found in Appendix A. O&M impacts were assumed to effect plant operations only for this analysis. The anticipated savings in operating expenses is represented in Appendix A as negative “O&M impacts.” Likewise, the “no action” alternative indicates escalating expenses as utility rates increase and energy efficiency decreases.

Table 5. Present Worth Analysis

Item	Description	Alternative 1: No Action	Alternative 2: Collection System Improvements
1	Construction Costs	\$0	\$2,700,000
2	Engineering, Legal, Administration, Planning, and Contingencies	\$0	\$800,000
3	Total Capital Cost	\$0	\$3,500,000
4	Change in Annual O&M Costs	\$0	\$5,000
5	Present Worth of O&M Costs	\$0	\$156,000
6	Salvage Value	\$0	\$700,000
7	Present Worth of Salvage Value	\$0	\$1,510,000
8	Total Present Worth	\$0	\$2,146,000

Table row description for Table 5:

1. Construction costs developed by AMP and detailed in Appendix A.
2. Project support fees based on a percentage of construction costs; typical rate 30%. Table 7 further breaks this total cost down for Alternative 2.
3. Capital costs are sum of 1 and 2.
4. O&M costs are based on the full budget, adding or subtracting impacts throughout the system.
5. Present value of O&M costs for 30 years at -0.25% (per 2022 USDA/CWSRF guidance).
6. Land considered permanent, 50-year life for piping and valves, 50-year life for structures, 20-year life for repairs, and 20-year life for equipment.
7. Present worth of line 6 at -0.25% interest for 30 years.
8. Total of items 3 and 5 minus 7.

Partitioning of the Project

The long-term needs of the collection system are discussed in this report and in SAW. The City intends to partition the total collection system needs into numerous construction phases over the next several decades to enable improvements to within the limited financing capability of the service district. The 20-year improvement plan is outlined in Appendix D.

The Environmental Evaluation

The City of St. Ignace has considered the impact of these recommended improvements. The areas most affected have already been impacted by the original construction of the facilities. The necessary disruption caused by construction must be performed with conservation in mind. A cursory environmental review has been performed and the findings are included within Appendix C. Based on the CWSRF Intent to Apply (ITA) Meeting for this project, the project has been classified as a non-equivalency project, therefore no further review is needed as part of the project plan.

Cultural resources

Significant historical and archaeological sites are common in St. Ignace, one of the oldest continuously inhabited sites in North America. The St. Ignace area has a long standing commitment to historic preservation, which is a major part of the area's tourism driven economy. The proposed construction will be within existing facilities and previously disturbed areas. It is expected that there will be no long term impact.

The Natural Environment

- Climate: St. Ignace has an average annual rainfall of 27 inches and an average snowfall of 60 inches. January average low temperature is 12° F, while July average high temperature is 75° F. The area is sometimes described

as having short cool summers and long cold winters. The long winters typically drive frost depths to 4 ft or beyond which must be considered in any proposed underground construction. Winter season construction is often difficult and sometimes impossible depending on the activity. In general, exterior construction comes to a halt by November 15. Lake Huron and the Straits of Mackinac, whose shorelines are adjacent the project areas, generally has a tempering effect on the weather, but can sometimes contribute to weather extremes.

- Air quality: Other than temporary impacts from running construction equipment and fugitive dust, air quality will not be affected by the project. Construction related dust will be minimized through contract enforcement of mitigation measures such as watering.
- Wetlands: Although there are scattered pockets and areas of wetlands in the project area (City), none are expected to be impacted by the project.
- Coastal Zone: Activities within the Coastal Zone Management Area would be permitted during the design process as needed.
- Floodplains: Floodplains or high water marks exist along the shoreline of the Straits of Mackinac. It is anticipated that the proposed project will not impact any floodplains.
- Natural or Wild and Scenic Rivers: There are no designated natural or wild and scenic rivers in the study area.
- Surface Waters: The study area is surrounded on the east and south by the Straits of Mackinac and East Moran Bay on Lake Huron. The downtown waterfront is on East Moran Bay. A small shallow lake also encroaches on the northwestern City limits. No work is anticipated near existing surface waters.
- Agricultural Resources: There is no designated prime agricultural land in the service/planning area.
- Sensitive Species and Habitat: There is no sensitive habitat in the project area nor are there any threatened or endangered species in the project area.

Mitigation

Planned improvements are not likely to incur any negative environmental impacts. No mitigation will be required beyond typical soil erosion and sediment control measures.

Implementability and Public Participation

The City of St. Ignace has completed large construction projects over the past several decades. All are openly discussed at public Commission meetings, including with cost impacts. The Project Plan was advertised and displayed for citizen review

for one month prior to a formal Public Hearing. The City contracted with an engineering design consultant (C2AE) for assistance in the planning process and will utilize quality based selection for their design consultant as required by the CWSRF. They will also contract a bond counsel for assistance in arranging project funding.

Technical Considerations

Infiltration and Inflow (I/I) Removal

There will be no I/I removal issues resolved in this project.

Structural Integrity

After reviewing sanitary sewer televising done as part of the City's SAW project, it has been concluded that there are sections of sewer that require replacement. Appendix D provides data collected under the SAW Program.

Sludge and Residuals

The proposed improvements will not affect quality of sludge or residuals.

Industrial Pretreatment

It is not expected that the improvements recommended under the alternatives will have a positive or negative impact on industrial pretreatment issues.

Growth Capacity

It is not anticipated that there will be a need for growth capacity in the 20-year future planning period.

Areas Currently Without Sewers

Developed areas within the community service districts are all currently served.

Alternative Sites and Routings

All improvements under the principal alternatives are contained on the existing site. Considerations for alternate siting and routing are minimal due to the extensive infrastructure already in place.

Combined Sewer Overflows (CSO)

There are no known combined sewer overflows associated with the City of St. Ignace.

Contamination at the Project Site

There are no known contamination sites at the area of the proposed project.

Green Project Reserve

The proposed project does not include green infrastructure, water, nor energy improvements.

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SELECTED ALTERNATIVE

The Alternative 2 to replace sewers is the selected alternative because it provides the most cost effective option to provide improvements to structural deficiencies within the system.

Relevant Design Parameters

Sewer replacement or rehabilitation would conform to current EGLE and American Water Works Association (AWWA) standards. Environmental issues that arise during design would be addressed via EGLE and local and county permitting processes. Wastewater collection deficiencies to be corrected are prioritized based on results of the SAW program and City personnel knowledge of problem areas, existing pipe age and material, and ability to combine work with water system deficiencies to cost effectively deal with both.

Project Maps

Below is a list of the maps presented in this report:

- Figure 4. Existing Wastewater
- Figure 5. Wastewater Pipe Size
- Figure 6. Wastewater Pipe Installation Year
- Figure 7. Proposed Project Priorities
- Figure 8. Proposed

Controlling Factors

Planning and design will be in accordance with applicable industry standards including:

- EGLE and USACE Permitting Requirements
- OSHA and MiOSHA Requirements
- SHPO and THPO Requirements
- EGLE and Ten State Standards
- Regional Utility Standards

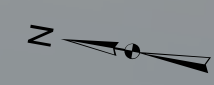
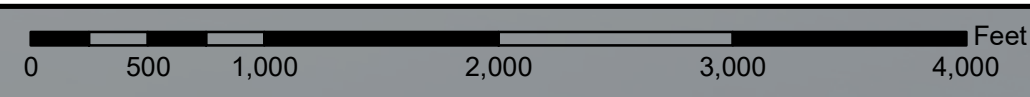
Special Assessment District Projects

A special assessment district is not planned nor applicable to this project.

Sensitive Features

Work will take place on previously disturbed areas within right-of-ways and on existing treatment facility grounds. Both areas will be isolated from any potential sensitive environmental locations. It will be necessary to protect the waters of the Great Lakes during construction.

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Legend

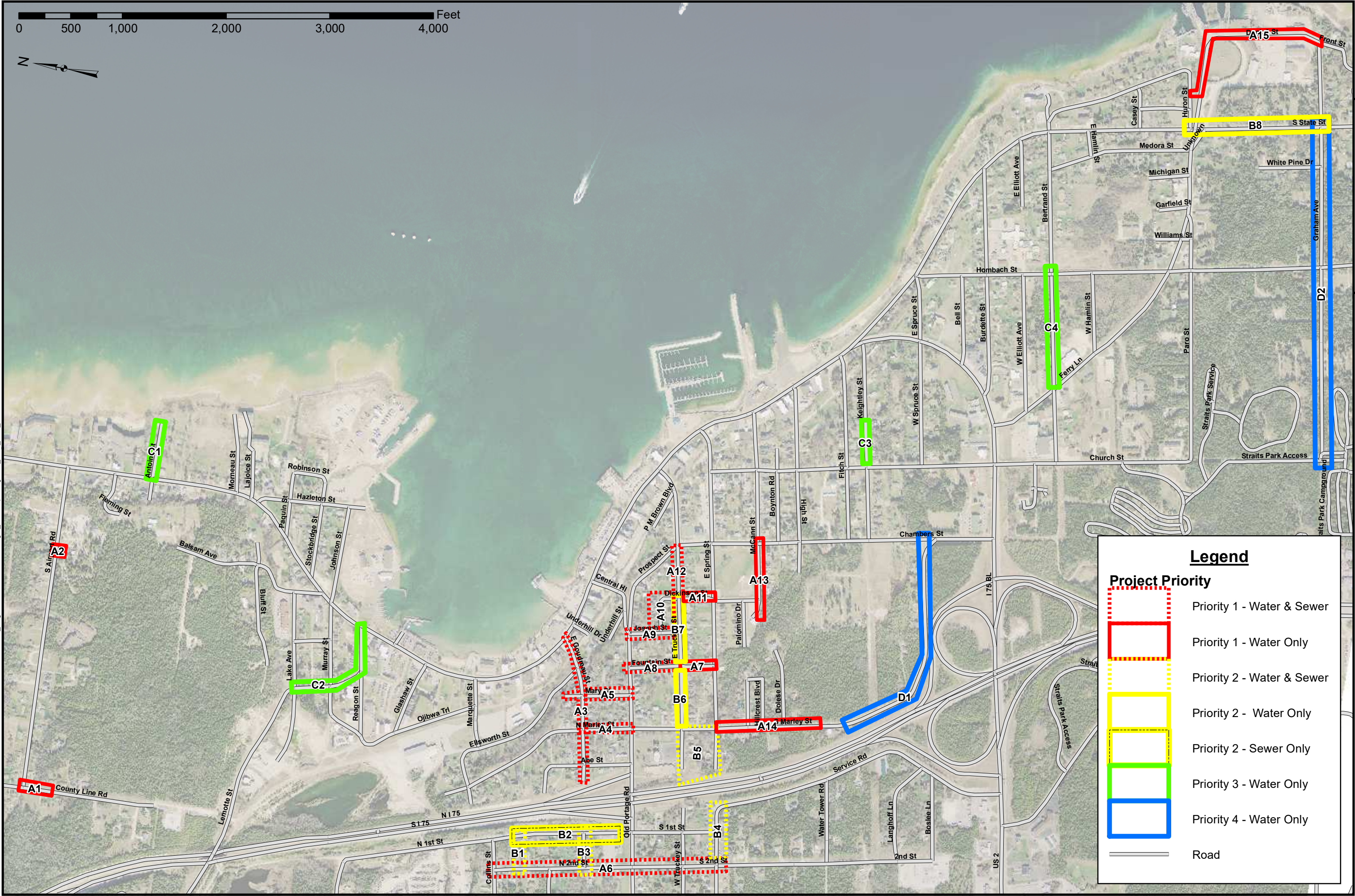
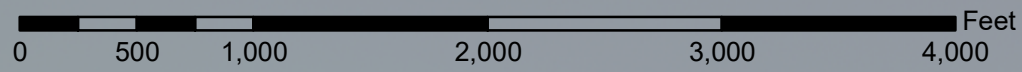
- Pump Station
- Manhole
- All Sanitary Pipes
- Priority 1
- Priority 2
- Road

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IC








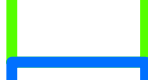

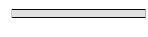
CITY OF ST. IGNACE
SRF PROJECT PLAN
PROJECT: 18-0084 & 85
MACKINAC COUNTY, MICHIGAN

**FIGURE 7: PROPOSED PROJECT PRIORITIES
WASTEWATER IMPROVEMENTS**



Legend

Project Priority

-  Priority 1 - Water & Sewer
-  Priority 1 - Water Only
-  Priority 2 - Water & Sewer
-  Priority 2 - Water Only
-  Priority 2 - Sewer Only
-  Priority 3 - Water Only
-  Priority 4 - Water Only
-  Road

**FIGURE 8: PROPOSED PROJECT PRIORITIES
 COMBINED UTILITIES**

Schedule for Design and Construction

The schedule for design and construction is present in Table 6 below.

Table 6. Project Schedule

Item	Target
CWSRF Application Submittal	Summer 2022
CWSRF Acceptance	Summer 2022
Funding Commitment	Summer 2022
Start Design	Winter 2022
Land & Easements Acquisition	Not Applicable
Permits	Spring 2023
Advertise for Bids	Spring 2023
Funding Closing	Spring 2023
Contract Award	Spring 2023
Construction	Summer 2023
Substantial Completion	Fall 2024
Final Completion & Initiate Operation	Fall 2024

Cost Summary

A brief summary of planning, design, and construction costs is included below in Table 7.

Table 7. Project Cost Summary

Item	Est. Total
Construction	\$2,700,000
Administration, Legal, Bonding, Permits, & Miscellaneous	\$30,000
Planning	\$19,000
Design	\$243,000
Bidding	\$9,000
General Engineering During Construction	\$81,000
Post Construction Services	\$7,000
Resident Project Representative	\$115,000
Additional Services – Design Related	\$34,000
Additional Services – Construction Related	\$63,000
Engineering Total	\$571,000
Contingencies	\$199,000
Total Project Cost	\$3,500,000

Authority to Implement the Selected Alternative

The City of St. Ignace is incorporated as a Home Rule City in the State of Michigan. The City has successfully implemented wastewater system improvements projects over the past 50 years. The City has shown it has the legal, institutional, technical, financial, and managerial resources to accomplish implementation of the recommended alternatives.

User Costs

Table 8 demonstrates the impact on user rates that may be possible with a project of this size. This breakdown assumes a 30-year debt service on the bond at an interest rate of 2.125% (2022 interest rate). O&M is expected to decrease, but will be maintained at existing rate for conservative budgeting. Expected user rate impact is noted in Table 8 below:

Table 8. User Costs

Description	Value
CWSRF Loan Amount	\$3,500,000
Anticipated Interest Rate	2.125%
Term	30 Years
Annual Debt Service	\$158,973
Monthly Debt Service	\$13,248
Estimated System EDUs	3,194
User Rate Impact / EDU /month	\$4.15

Disadvantaged Community

A “Disadvantaged Community Status Determination Worksheet” is included with the final project plan submittal (see Appendix B). According to guidelines, the City of St. Ignace does qualify as a disadvantaged community considering their current and projected debt service, median household income, and user rates.

Useful Life

Remaining Useful Life of all wastewater assets is available in the SAW Asset Management Plan (see Appendix D). For new capital improvements including those under the proposed SRF project the total useful lives are as listed below based on methodology for salvage value computation.

- Building: 40 years
- Underground facilities including piping and foundations: 50 years (100 years expected based on performance of existing systems).
- Short-lived equipment: 20 years (30 to 40 years expected based on performance of existing equipment).

ENVIRONMENTAL EVALUATION

A cursory environmental review has been performed and the findings are included within Appendix C. Based on the ITA Meeting for this project, the Project has been classified as an equivalency project, therefore no further review is needed as part of the project plan.

Historical/Archaeological/Tribal Resources

Construction of wastewater system improvements is not anticipated to have any adverse effect on historical, archaeological, geological, or recreational areas. Excavation in previously unexcavated areas is very limited. As is standard with City utility projects, construction contracts will contain archaeological discovery procedures to be followed in the event of unanticipated discoveries.

Water Quality

Neither surface water nor groundwater quality is expected to be adversely affected by the project. Mitigation measures to control construction run-off will be required by the contract documents. No water withdrawal or dewatering is necessary except for temporary dewatering during construction. Any required construction excavation dewatering will be monitored and on a level with typical construction activities in the area. Discharge water will be stilling if necessary as part of contract and permit required sedimentation control measures.

When individual projects are designed, contaminated areas will be avoided via utility routing where possible. When construction may infringe on impacted areas, a FOIA request for these sites will be made, EGLE permitting will be pursued if appropriate, and mitigation and safety measures will be required by contractor via construction documents.

Land/Water Interface

No significant impact is expected on floodplain, wetlands, shorelands, or streams. No crossings of creeks or rivers are planned under the recommended project.

Endangered Species

The project should have no impact on endangered species. If needed, mitigation measures will be coordinated with EGLE during the design process and permits pursued where needed.

Agricultural Land

This project is unlikely to negatively impact or remove agricultural land or open space.

Social/Economic Impact

The project will create short-term economic benefits in areas of construction employment and materials supply. No relocation of residents or businesses is expected to result from the project. Long-term human, social and economic impacts will be positive through increased efficiency, reliability, and capacity in area utility infrastructure.

Construction/Operational Impact

Construction activity impacts will be short term and are not expected to be unusual for utility facility construction. Construction related dust will be minimized through contract enforcement of mitigation measures such as watering. Where applicable, contract documents will require construction methods and disturbed areas to be minimized regarding their impact to the site and neighboring areas. Details will be developed during the design and permitting process. Implementing the improvements will reduce overall system operation and maintenance efforts.

Indirect Impacts

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

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

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MITIGATION MEASURES

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

Short-Term Construction Related Mitigation

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

devices and protective equipment. Minimum requirements are defined by the U.S. Department of Labor and the Michigan Occupational Safety and Health Act.

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

Mitigation of Long-Term Impacts

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

Mitigation of Indirect Impacts

- **Master Planning and Zoning:** Long range planning by the City identified the project segments evaluated in this report and all impacts take place within the developed City streets and would have no effect on planning and zoning in the community. The work will not impact historical features, agricultural land, or sensitive features.
- **Ordinances:** Local ordinances are in place regarding minimum construction and operation standards and site erosion control. Wetlands, floodplains, and other sensitive habitats are protected by State laws and permitting

procedures.

- Land Requirements: None needed for the recommended alternatives.
- Socio-economic and Environmental Justice Issues: Costs and less tangible impacts such as construction traffic would have no disproportionate impact on any area group. Impacts are spread evenly amongst community collection system users.
- Noise: Construction dust and noise will be kept to a minimum via construction contract requirements.

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PUBLIC PARTICIPATION

Public Meeting

The City of St. Ignace wastewater system needs and generic potential fixes have been openly noted at several City Council meetings over the past decade. The Council has held several open council meetings over the past years where there were discussions and approved studies both at the WWTP and regarding the collection system. User rate increases due in part to planned action outlined in this project plan were discussed at a City Council meeting on **May 16, 2022**.

Public Hearing

An initial public hearing on the information presented in this report was held during a regular City Council meeting on **May 16, 2022**. A written transcript is included in Appendix E.

Public Hearing Advertisement

An advertisement was placed in the St. Ignace News 30 days prior to the Public Hearing on **April 15, 2022**. Simultaneously to the advertisement publication, copies of the project plan were made available to the public at City Hall and on the City's website. Appendix E has the advertisement copies.

Public Hearing Transcript

A full transcript of the public hearing is available in Appendix E.

Public Hearing Comments

Comments are summarized in Appendix E with a full transcript.

Comments Received and Answered

No written comments were received prior to the Public Hearing.

Adoption of the Project Plan

Agency and/or Owner preliminary review comments were incorporated into the final version of this Project Plan. The plan was adopted by the City of St. Ignace commission on **May 16, 2022**.