HOUSE of REPRESENTATIVES
STATE OF MICHIGAN

Appropriations Requests for Legislatively Directed Spending Items

1. The sponsoring representative's first name:
   Greg

2. The sponsoring representative's last name:
   Alexander

3. The cosponsoring representatives' names. All cosponsors must be listed. If none, please type 'n/a.' A signed letter from the sponsor approving the co-sponsorship and a signed letter from the member wishing to co-sponsor are required. Attach letters at question #9 below.
   n/a

4. Name of the entity that the spending item is intended for:
   Village of Carsonville

5. Physical address of the entity that the spending item is intended for:
   4140 E. Chandler, Carsonville, Michigan 48419

6. If there is not a specific recipient, the intended location of the project or activity:
   The Village of Carsonville

7. Name of the representative and the district number where the legislatively directed spending item is located:
   Greg Alexander | District 98

8. Purpose of the legislatively directed spending item. Please include how it provides a public benefit and why it is an appropriate use of taxpayer funding. Please also demonstrate that the item does not violate Article IV, S 30 of the Michigan Constitution.
   Water System Improvements
   The proposed improvements to the Village's water system include:

   Construction of two new wells on Village-owned property.
   Installation of a raw water main to connect the new wells to the existing Water Treatment Plant.
   Abandonment of Wells A and B.
   Upgrades to the existing Water Treatment Plant, including enhancements to the chemical feed system, SCADA system, and electrical and control systems.

Justification for Replacement
Details are provided in the DWSRF Project Plan (attached), and summarized below:

The Village's most recent Water System Sanitary Survey identified deficiencies in the source components of the system.
Well A, although fully functional and connected to the system, has high levels of arsenic. If operated, a Village-wide "Do Not Drink" advisory would be necessary until the system is fully flushed of the contaminated water.
The existing wells do not meet the firm capacity requirements of the system.
Furthermore, Wells B and C are located close to each other within the same aquifer, limiting the ability to conduct necessary maintenance.
Constitutional Compliance
These improvements do not violate Article IV, Section 30 of the Michigan Constitution.

No Extra Compensation Is Provided Post-Contract:

All contracts for water system improvements are awarded through a public bidding process.
Compensation is predetermined and disbursed according to the contract terms.
Contractors are not paid retroactively or in excess of the agreed amount after completing their work.
Payments Are for Public Infrastructure, Not Individuals:

Funds are used solely for materials, labor, and infrastructure improvements.
No public officer or contractor receives personal enrichment beyond the contract terms.
All improvements serve a public purpose, such as providing safe drinking water and replacing aging infrastructure, and are therefore lawful.

9. Attach documents here if needed:
   Attachments added to the end of this file.

10. The amount of state funding requested for the legislatively directed spending item.
    1170000

11. Has the legislatively directed spending item previously received any of the following types of funding? Check all that apply.
    ["None"]

12. Please select one of the following groups that describes the entity requesting the legislatively directed spending item:
    Local unit government

13. For a non-profit organization, has the organization been operating within Michigan for the preceding 36 months?
    Not applicable

14. For a non-profit organization, has the entity had a physical office within Michigan for the preceding 12 months?
    Not applicable

15. For a non-profit organization, does the organization have a board of directors?
    Not applicable

16. For a non-profit organization, list all the active members on the organization's board of directors and any other officers. If this question is not applicable, please type 'n/a.'
    n/a

17. "I certify that neither the sponsoring representative nor the sponsoring representative's staff or immediate family has a direct or indirect pecuniary interest in the legislatively directed spending item."
    Yes, this is correct

18. Anticipated start and end dates for the legislatively directed spending item:
    Late Fall 2025 and be completed in the fall of 2026

19. "I hereby certify that all information provided in this request is true and accurate."
    Yes

Village of Carsonville

Sanilac County, Michigan

Drinking Water
State Revolving Fund (DWSRF)
Project Plan

July 2022
837230

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

Table of Contents

Appendices

I. Executive Summary

This Project Plan was prepared for the Village of Carsonville by Fleis & VandenBrink Engineering to evaluate and address the needs and deficiencies of the waterworks system.

This Drinking Water State Revolving Fund (DWSRF) Project Plan will fulfill the project planning requirements under Michigan's Safe Drinking Water Act 399 and provide the basis for ranking of the Village's proposed waterworks improvements on the annual Project Priority List for obtaining a low-interest loan, grants, and principal forgiveness from the Drinking Water State Revolving Fund (DWSRF).

The format of the report follows the project planning guidelines for DWSRF Projects revised in May of 2016, issued by the Michigan Department of Environment, Great Lakes, & Energy (EGLE). Major elements of the Project Plan include a summary of the project study area and characteristics, projection of the population served within the next 20 years, a summary of the existing water works system, identification of the project needs, identifying and evaluating alternatives, and to evaluate the environmental impacts of the selected alternative.

There are several concerns and needs of the system, including the age, reliability, and capacity. To continue to provide high quality, reliable, and safe drinking water to its customers, the Village needs to continue maintaining and improving the system by making improvements to increase system reliability, integrity, and quality. The costs of the needed water system improvements can be offset through financial assistance from the DWSRF.

The Village's 2019 Water System Sanitary Survey identified a number of deficiencies throughout the system, including contaminant levels and well capacities. Additional improvements were also identified in a 2014 elevated storage tank inspection.

Based on the feasibility and evaluations presented in this Project Plan, the selected alternatives include the following supply and metering improvements to the waterworks system that have been determined to be critical at this time. Implementing the following recommended improvements of this Project Plan will effectively address the water system reliability, quality, and safety concerns.

- Two new wells, a well house, and chemical feed system
- New raw water line from the new wells to the water treatment plant
- Water treatment plant improvements
- Abandon ex wells A and B
- Demolish existing water tower
- Construct a new 100,000 gallon elevated storage tank
- Install residential water meters and meter reading system
- Fire hydrant replacement

The Project Plan also discusses projected user costs for financing the selected alternative and a review of the public participation and public comments solicited by the Village on the selected alternative.

II. Introduction and History of Public Water Supply

The Village of Carsonville is located in Sanilac County in Michigan's thumb region. The current Type 1 public water supply and distribution system is comprised of three production wells, one active elevated storage tank, one iron and arsenic removal plant and approximately 30,000 feet of distribution piping. The water from two of the three wells is treated at the WTP and the third well is treated at the wellhouse in order to disinfect the water.

Well A was constructed in 1969. Well B was constructed in 1970. Well C was constructed in 1971. The wells turn on and off according to the elevated tank level and are rotated in use, with well A only running during emergencies.

The Village has one above ground storage tank. The 100,000 gallon storage tank was built in 1972. The exterior of the tank was last painted in 1994 and the remaining coating contains lead and chromium. The paint on the wet interior was last done in 1993. The tank was last inspected in 2014.

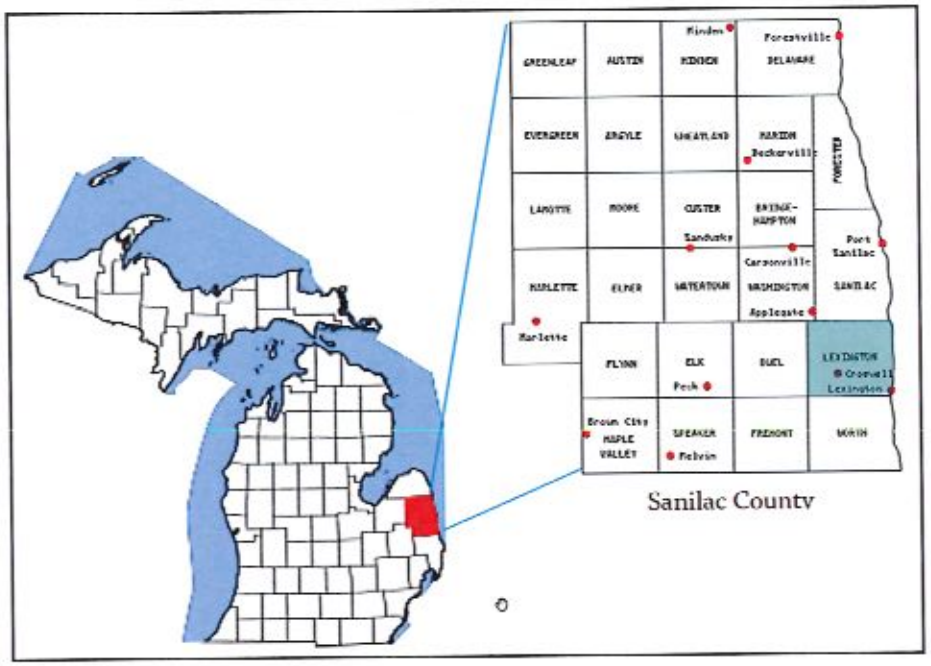
The water main in the Village is composed of PVC and HDPE. It was constructed in the 1970's with improvements occurring in 2004-2005. Sizes of water main range from 6 to 10 inches.

III. Project Background

The Village of Carsonville is located in the center of Sanilac County on the border between Bridgehampton and Washington Township. The Village is approximately 1.13 square miles. It is located on M-46 and approximately 7 miles west of Lake Huron.

Delineation of Study Area

The study area for this project plan is defined by the service area for the Village of Carsonville. The service area is defined by the Village limits. The project study area and general layout of the Village's existing water system is shown in Figure A1 in Appendix A.



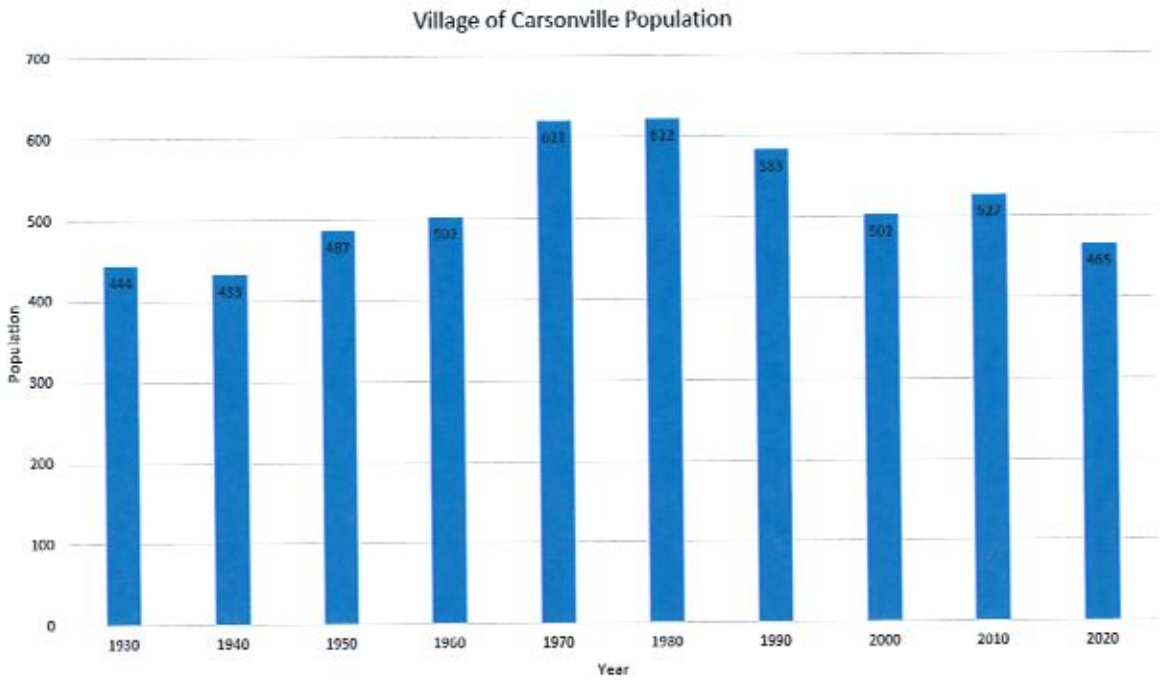
Land Use

A majority of the Village's land use is residential. There is a commercial area located along M-46 (Sanilac Rd) which includes businesses such as restaurants, banks, gas stations, and retail.

The Village is located less than 10 miles from Lake Huron but is mostly an agricultural area. Many of the businesses may get additional business because the Village is located on a main thoroughfare to Lake Huron and Port Sanilac from Sandusky. It is located less than a two-hour drive from Flint, Bay City, Detroit, and Saginaw and less than three hours from Lansing.

Population Projections

The Village of Carsonville population grew through 1980 with a decline in population starting in the mid-1980's. This trend has continued to the present day, with a slight increase in population in 2010. The graph below shows the overall change in population in the village since 1930.



Source: U.S. Census Bureau

From year 2010 to 2020 the population decreased by 11% from 527 to 465 as shown on the bar chart above. In addition, the table below shows how Village of Carsonville population trends compares to the regional area.

Table 1: Population Data and Projections

Year	1960	1970	1980	1990	2000	2010	2020	2040 (est)	2045 (est)
Village of Carsonville	502	621	622	583	502	527	465	452	439
Annual % Change	-	2.37%	0.02%	-0.63%	-1.39%	0.5%	-1.18%	-0.14%	-0.55%
Sanilac County	32,314	34,889	40,789	39,928	44,547	43,114	40,611	39,436	38,352
Annual % Change	-	0.8%	1.69%	-0.21%	1.16%	-0.32%	-0.58%	-0.14%	-0.55%

Source: US Census Bureau, EMCOG Sanilac County Population Forecast Through 2045

Based on the historical population trends, it is expected that population in the area will decrease. It is not anticipated that there will be a significant impact on water demand.

Water Demand

Based upon available Water Treatment Plant Monthly Operating Reports (MORs), the Village has a daily average water usage of 44,200 gallons per day and a max day demand of 140,000 gallons per day. Hourly flow data was not available. As such, the peak hour demand needed to be estimated to be 280,000 gallons per day which is two times greater than the maximum daily flow. Water supply data from 2019 and 2021 is summarized below. A monthly water use summary is included in Appendix D.

Table 2: Village Water Supply Data			
	Average Month (Million Gallons)	Max Month (Million Gallons)	Max Day (Gallons)
2019	1.34	1.64	140,000
2021	1.45	1.92	-
Average (2019 & 2021)	**1.39**	**1.78**	-
Maximum (2019 & 2021)	**1.45**	**1.92**	**140,000**

**Only monthly totals were received for 2021, no daily or hourly data was included*

Existing Facilities

The Village of Carsonville owns and operates a Type 1 public water supply and distribution system with three production wells, one elevated storage tank, and approximately 30,000 feet of distribution main. The water from two of the wells is treated at an iron/arsenic removal plant. The third well is only used during emergencies. The following sections provides an overview of the existing waterworks system, including the size, capacity, and condition on the various components.

Supply

The village water supply comes from three groundwater wells. All three wells were installed around 1970. Additional well information can be found in the table below.

Table 3: Water Supply Well Summary					
Well Number	Year Installed	Type	Casing	Depth	Capacity (gpm)
A	1969	Drift	8"	150'	80
B	1970	Drift	6"	145'	190
C	1971	Drift	8"	155'	195

Wells B and C are treated by an arsenic removal plant before being sent to the distribution system. Well A is located near the existing water tower and does not utilize any treatment other than chlorination. If Well A is operated, a Village wide "Do Not Drink" advisory needs to be issued due to high levels of arsenic in the water.

The Village wells do not produce enough water to meet the firm capacity requirements of the system. Additionally, Wells B and C are close to each other and within the same aquifer. This limits the ability to perform maintenance on the wells.

Wells B and C are located near the Village Salt Storage building and are located near the center of the Village, downgradient of gas stations and other pollution sources. The existing well sites do not meet current EGLE requirements for isolation distances from potential sources of contamination as outlined in Part 127, Act 368, P.A. 1978 and Act 399, P.A. 1976.

Treatment

An iron and arsenic removal plant for Wells B and C was installed in 2005. The water treatment plant for wells B and C consists of a horizontal pressure filter for iron and arsenic removal and chlorine for disinfection. The design treatment capacity is 250 gpm.

Water Storage

A 100,000-gallon, multi-leg elevated water storage tank was built in 1972. Recommendations for improvements and maintenance from the 2014 elevated storage tank inspection have not been completed. The recommended repairs are outlined in the summary of project need section below.

The exterior of the tank was last painted in 1994 and the remaining coating contains lead and chromium. The paint on the wet interior was last done in 1993. It has spot failure and is past its useful life. Many of these improvements are needed to increase the safety of employees doing tank maintenance as well as retrofitting the existing tank to meet current OSHA standards.

Water Distribution

The Village owns and operates a potable water distribution system. During the 2004-2005 water system improvements, 9,946 feet of 6-inch PVC water main, 2,485 feet of 8-inch PVC water main, and 1,077 feet of 10-inch HDPE water main were installed, and the associated water services were replaced. The remaining water main in the distribution system is original to the early 1970 system construction. A map of the existing system can be seen in Appendix A.

Table 4: Water System Pipe Summary

Pipe Diameter (in)	Length of Pipe (ft)
6	19,462
8	3,817
10	6,318
Total Length	29,597

Methods of Residuals Handling and Disposal

Residuals from the existing arsenic removal plant are disposed of at the Village's wastewater treatment facility.

Water Meters

The Village of Carsonville does not currently have meters for the water system customers. There are approximately 250 customers.

Operation and Maintenance

Well pump maintenance and well cleaning are completed as needed.

Design Capacity of the Waterworks System

The design capacity of the wells can be seen in Table 3 above. As stated above, well A is only used during emergencies as it requires a "Do not drink" water advisory to be issued. The total rated well capacity of the two usable existing wells is 385 gpm, 465 gpm if well A is included. The Village's existing firm well capacity, excluding well A, with the largest well out of service (Well C) is equal to 190 gpm.

The firm capacity of any water supply system should meet or exceed the maximum day demands placed on the wells in the system. In the 2019 sanitary survey, it was identified that the Village wells do not produce enough water to meet the firm capacity requirements and it was recommended that investigation and installation of additional capacity occur. A copy of the 2019 sanitary survey is included in Appendix B.

Waterworks System Climate Resiliency

At this time, the Village does not anticipate that the system will need to withstand and respond to changes resulting from climatic factors, such as increased flooding risks, increased intensity, or frequency of storm events. Furthermore, all of the wells are located out of floodplain areas and have not been prone to flooding in the past.

Summary of Project Need

The Village's last Water System Sanitary Survey was completed on February 7, 2019. The Sanitary Survey identified several deficiencies in source and finished water storage elements of water system. The deficiencies identified are summarized below:

- Well A is connected to the system and is fully functional. However, Well A contains a high level of arsenic. If Well A is operated, a Village wide "Do Not Drink" advisory would need to be issued until all water containing high levels of arsenic is flushed from the system.
- The Village wells do not produce enough water to meet the firm capacity requirements of the system. Additionally, Wells B and C are close to each other and within the same aquifer. This limits the ability to perform maintenance on the wells.
- Recommendations for improvements and maintenance from the 2014 elevated storage tank inspection have not been completed.

The Sanitary Survey also recommended that the Village install water meters in order to monitor the distribution system and create a volume-based fee schedule. A copy of the Survey is included in Appendix B.

The 2020 Water Quality Report for the Village water system indicated that susceptibility of the source water is moderate to moderately high. A copy of the water quality report can be found in Appendix C.

In addition to the items identified in the Sanitary Survey, Wells B and C are located near the Village Salt Storage building and are located near the center of the Village, downgradient of gas stations and other pollution sources. The existing well sites do not meet current EGLE requirements for isolation distances from potential sources of contamination as outlined in Part 127, Act 368, P.A. 1978 and Act 399, P.A. 1976.

As noted in the Sanitary Survey, the elevated water storage tank also requires repairs. Per the 2014 inspection report, the following repairs are needed:

- Exterior painting with containment,
- Wet interior repainting,
- Roof seam sealer,
- Install cathodic clips and pressure fitting,
- Weld cathodic covers,
- Install roof handrail and painter's rail,
- Install overflow flap gate,
- Install 30-inch riser manway,
- Install 30-inch roof hatch,
- Install frost free roof vent,
- Install wet interior ladder,
- Install roof platform,
- Install riser grate.

There have recently been breaks in the riser pipe on the storage tank.

The exterior of the tank was last painted in 1994 and the remaining coating contains lead and chromium. The paint on the wet interior was last done in 1993. It has spot failure and is past its useful life. Many of these improvements are needed to increase the safety of employees doing tank maintenance as well as retrofitting the existing tank to meet current OSHA standards.

Exploratory Well Investigations/Well Site Selection/Test Well Drilling Procedures

The proposed well site is identified in Appendix A on Figure A1. This site is owned by the Village and is located away from most area homes. The site is large enough that the required isolation distances can be met. Additional investigations and test wells will be conducted during the design phase of the project.

IV. Analysis of Alternatives

Identification of Potential Alternatives

Alternatives to accomplish improvements to the Village's water system were developed and evaluated based on their ability to meet the scope of the project while remaining within financial, regulatory, and technical constraints.

Project objectives include:

- Address deficiencies noted in the most recent Sanitary Survey to provide reliable water service to the customers.
- Provide rate stabilization for existing and future customers.
- Reduce long-term treatment and operating costs.
- Improve billing accuracy with the addition of water meters.

Four alternatives were developed for the Village's water system improvement project:

1. No Action
2. Improvements to existing system
3. Improvements to the existing system including new wells
4. Regional Alternative

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

No-Action Alternative

The "No Action" alternative would maintain current system operations with no improvements. The Village of Carsonville would continue to utilize the existing wells and water treatment plant (WTP) and operate the treatment technology to failure.

The "No Action" alternative does not meet the Village's objectives of:

- Address deficiencies noted in the most recent Sanitary Survey to provide reliable water service to the customers.
- Provide rate stabilization for existing and future customers.
- Reduce long-term treatment and operating costs.
- Improve billing accuracy with the addition of water meters.

Improvements to the Existing System

Alternative 2 includes drilling a new well on the site of well A and installing a new raw watermain to the arsenic removal plant. This would allow the water from well A to be treated along with wells B and C to increase the water quality in the system.

Wells B and C would get upgraded electrical and controls along with a new SCADA system. Well A would get the new SCADA system as well to increase the ease of control of the system.

This alternative includes building improvements to the existing treatment plant. These improvements would include electrical and controls upgrades as well as the addition of a chlorine room. The chlorine room would include upgraded chemical feed equipment as well.

The existing water tower would have the necessary improvements made to increase its useful life.

The alternative is not feasible as the existing well site does not meet current EGLE requirements for isolation distances from potential sources of contamination as outlined in Part 127, Act 368, P.A. 1978 and Act 399, P.A. 1976 for Type I wells.

Additionally, Well A has a lower capacity than the other wells in the system. The hydrogeological report for Well A is not available and it is not known if the aquifer in this area can support a higher capacity well as required to meet the firm capacity requirements for the system.

Improvements to the Existing System Including New Wells

Alternative 3 has two different sub-alternatives. These include:

- 3A: Two New Wells and Water Tower Rehabilitation
- 3B: Two New Wells and a New Water Tower

Alternative 3A

The proposed improvements to the water system include the following:

- Construction of two wells and wellhouse on Village owned property at 4140 E Chandler Street.
- Construction of a raw water main to connect the wells to the existing Water Treatment Plant.
- Abandoning Well A and B.
- Improvements to the existing water treatment plant including chemical feed system, SCADA system and electrical and controls improvements.
- Rehabilitation of the existing elevated storage tank.
- Water meters for all users.

Alternative 3B

Alternative 3B includes the same items as alternative 3A with the exception of the water tower improvements. This alternative includes the replacement of the existing water tower. The existing water tower has a significant number of recommended repairs and a new 100,000 gallon tower would have a longer useful life.

Alternative 3A and 3B both meet the objectives of:

- Address deficiencies noted in the most recent Sanitary Survey to provide reliable water service to the customers.
- Provide rate stabilization for existing and future customers.
- Reduce long-term treatment and operating costs.
- Improve billing accuracy with the addition of water meters.

Regional Alternative

Alternative 4 includes abandoning the existing wells and treatment system and instead, buying water from a nearby community. This alternative would be contingent on the other community having the capacity to provide additional water as well as being willing to sell the water and would involve building the conveyance system. This alternative assumes that Port Sanilac or Sandusky would be willing to sell water to the Village.

Using water from Sandusky, the water would have to be conveyed 8 miles to Carsonville's distribution system. Water from Port Sanilac would have to travel 5 miles.

This is the highest cost alternative and does not meet the Village's goal of reducing long-term operating costs. This alternative was not evaluated further.

V. Principal Alternatives

The principal alternatives to be evaluated address the improvement needs of the system through the construction of new assets or the replacement of existing assets. As presented above, the no action and optimization alternatives are not considered reasonable as they do not fully address the needs of the system and objectives of the project. The regional alternative is similarly not feasible. To address the critical needs of the water system, principal alternatives for replacement and new construction will need to be evaluated.

Monetary Evaluation

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

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

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

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

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

A detailed breakdown of all identified project costs is included in Appendix E. Table 5 shows the costs for breakdown for the principal Alternative. The net present worth of Alternative No. 3B is estimated at $4,233,000.

Table 5: Present Worth Analysis Summary		
	Alternative 3A Two New Wells and Water Tower Rehabilitation	Alternative 3B Two New Wells and New Water Tower
Capital Cost	$3,000,000	$3,900,000
Annual OM&R Cost	$85,000	$70,000
Net Present Value of 20-year OM&R Costs	$1,793,000	$1,476,000
Present Worth of 20-Year Salvage Value	$468,000	$1,143,000
Net Present Worth	$4,325,000	$4,233,000

Environmental Setting

Cultural Resources

None of the alternatives discussed are expected to have any impact upon historical or archeological sites.

The Natural Environment

Climate

Climatological data for the area is based on information from the U.S. Climate Data for Sandusky MI. The average January climatic conditions include average minimum temperatures of 15 degrees F and average maximum temperatures of 28 degrees F. The average July climatic conditions include average minimum temperatures of 60 degrees F and average maximum temperatures of 80 degrees F. The average annual precipitation is 31.91 in.

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

Air Quality

The Clean Air Act requires an analysis of whether air pollutant emissions will result from the construction or operation of a federally assisted project.

Air quality within the service area complies with Federal Clean Air Act Standards for attainment for all air quality standards.

The impacts in air quality from dust and emissions in the area due to typical construction operations would be temporary and similar for all principal alternatives.

Wetlands

A review of the mapping available from the US Fish and Wildlife indicated that the project does not impact any state or federally identified wetlands. This map is shown in Appendix A.

Floodplains

The Village is not included in FEMA floodplain mapping, but there are no significant waterways in the Village limits. The Village is not located within a 100- or 500-year floodplain.

The Flood Insurance Rate Maps (FIRM) are shown in Appendix A.

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

The Wild and Scenic Rivers Act as amended by the Michigan Scenic Rivers Act of 1991, prohibits federal assistance to a project which will have a direct and adverse effect on the values for which a river segment listed in the National Wild and Scenic Rivers System or designated for study on the National Rivers Inventory was established.
There are no waterways listed on the National Wild and Scenic Rivers System website, administered by the National Park System, or on the Michigan Natural Rivers System found on EGLE's website in the area. Based on this, the selected alternative will have no impact on natural, wild, or scenic rivers.

Major Surface Waters

There is no major water system found in the service area. Therefore, the selected alternative will have no impact on a major water system.

Topography and Geology

Appendix A shows the existing topography from the USGS quadrangle map. The elevations in the village range from 770 to 820.

The regional geology for the area is based on a review of the Quaternary Geology of Michigan Map (W.R. Farrand, 1982), and the Bedrock Geology of Michigan Map (MDNR Geological Survey Division, 1987), are shown in Appendix A.

The general geology of the village area is characterized by lacustrine sand and gravel and end moraines of fine-textured fill.

Soils

Appendix A shows the general soil map from the Soil Survey of Bay County, Michigan prepared by the U.S. Department of Agriculture, Soil Conservation Service. The soils around the village are mainly sandy.

Agricultural Resources

The project will utilize land that is classified as areas of prime farmland. Appendix A includes a map of the area farmland. However, this land is not currently used as farmland and is within the village limits.

Flora, Fauna, and Unique Natural Features

It is not anticipated that any federally listed endangered or threatened species or unique natural features will be encountered. The village will review the project scope with EGLE and complete the necessary investigations based on the project requirements prior to implementation.

Project Delivery Method

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

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

Design-Bid-Build (DBB)

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

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

The following advantages are offered by the DBB method:

- Well understood and accepted
- Independent oversight of builder
- Open to owner involvement during design

The following disadvantages are offered by the DBB method:

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

Construction Management At-Risk (CMAR)

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

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

The following advantages are offered by the CMAR method:

- Open to owner involvement during design
- Early integration of builder
- Provides early and continuous constructability review
- Provides early certainty of costs
- Pricing and design may be conducted in parallel
- Reduced likelihood of claims compared to the DBB alternative

The following disadvantages are offered by the CMAR method:

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

Fixed Price Design Build (FPDB)

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

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

Progressive Design Build (PDB)

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

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

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

The following advantages are offered by the PBD delivery method:

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

Project Delivery Selection

The Village and the engineering firm that developed the Project Plan will have discussions regarding the available project delivery methods and advantages and disadvantages offered by each method to develop the preferred method for the Village.

As mentioned, financial feasibility is only one of the factors that need to be evaluated. Additional considerations for the principal alternatives are presented in the following sections.

Mitigation

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

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

Mitigation of Short-Term Impacts

Traffic and Safety Hazard Control

Road work is proposed as part of the selected alternative, so traffic control during construction will be necessary. Work can be limited to two streets at a time to limit the impact of construction to residents and traffic.

Equipment operations safety is the responsibility of the Contractor, and they will be required to have trained persons performing all phases of the work. The Contractor will be required, by the project specifications, to hold regular safety meetings for their employees. Back up alarms on all equipment will be required. Contractor's employees must also be trained in hazard control and must have access to any permanent materials safety data sheets (MSDS) for any material they may use or may come in contact with.

Dust Control

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

Noise Control

Noise levels will increase during construction due to the excavation equipment used to complete the proposed water system improvements. Construction activities will only be allowed during the Village's approved hours to limit the adverse effect of noise to the residents/businesses near the construction area. Construction

workers may be required to wear earplugs to minimize the effects of long-term noise during the construction operations.

Soil Erosion/Sedimentation Control
The Contractor will be required to obtain a soil erosion and sedimentation control permit from the local agency prior to the start of the work. It is anticipated that mitigation measures that may be utilized will include silt fence, straw bales, rip rap, geotextile fabric, etc. as appropriate. Mitigation and abatement measures will be detailed in both the plans and specifications for this site work and will be reviewed and approved by EGLE prior to construction if necessary.

Restoration of Roads/Disturbed Areas
Roads and lawn areas will be restored following the construction of the watermain to match or improve the existing conditions. Road restoration will be limited if it is possible to construct the new watermain outside of the pavement limits.

Mitigation of Long-Term Impacts
There are no expected long-term impacts that will require mitigation for this project.

Mitigation of Indirect Impacts
There are no expected indirect impacts that will require mitigation for this project.

Implementation and Public Participation
The proposed improvements will enhance the reliability and resiliency of the Village's water works system. These improvements are common supply, storage, and distribution infrastructure projects with no foreseeable problems. Most of the activities will take place within public road rights-of-way, easements, or property already under the control of the Village. The Village is familiar with the technical, financial, legal, and administrative aspects of this type of project and is applying for DWSRF assistance to minimize the additional financial burden resulting from these needed improvements. The Village sets rates and fees for capital improvement projects and the operation and maintenance of their water supply system. The implementation of this project as presented is dependent on the receipt of financial assistance, including DWSRF funding. Should funds not be made available through a DWSRF loan, the Village will likely need to subdivide the project into much smaller parts and implement these necessary improvements over a much longer schedule.

The draft Project Plan will be placed on display 30 days prior to the scheduled public hearing, which is anticipated to be held on June 28, 2022 at 6:00 pm. The public hearing will discuss the project alternatives in terms of effectiveness, ability to implement, projects costs, anticipated user rates, and potential environmental impacts. Opportunity for public participation and comment will be provided. The public notice will be published in the local newspaper. Public input presented at the public hearing or written comments received will be considered during review of the principal alternatives. An audio recording of the public hearing will be included.

Technical Considerations
The principal alternatives that are being evaluated will comply with Act 399 regulations and be designed to meet the guidelines established in the latest edition of the *"Recommended Standards for Water Works" (10 State Standards),* as published by the Great Lakes - Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (GLUMRB) and relevant American Water Works Association (AWWA) standards.

The implementation of two new water supply wells will increase the firm capacity of the system as well as the reliability of the system. The replacement of the water tower will increase the useful life as compared to rehabilitating the existing tower.

Residuals
No additional water treatment residuals will be generated as part of any principal alternatives or the proposed project.

Contamination

A search for contaminated sites was conducted on the Michigan Department of Environment, Great Lakes, and Energy's (EGLE) website. The contaminated sites are those that are regulated under Part 201, Environmental Remediation, and under Part 213, Leaking Underground Storage Tanks, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451). Results of the search are included in Appendix A. The search shows 7 locations, which will not impact construction activities.

New/Increased Water Withdrawals

There will be new and increased water withdrawals associated with this project. The anticipated impact of these wells is discussed in the hydrogeological analysis section below.

VI. Selected Alternative

Principal alternatives to accomplish improvements to the Village's water system were evaluated based on their ability to meet the scope of the project while remaining within financial, regulatory, and technical constraints. The objectives of the water system improvement project included:

- Address deficiencies noted in the most recent Sanitary Survey to provide reliable water service to the customers.
- Provide rate stabilization for existing and future customers.
- Reduce long-term treatment and operating costs.
- Improve billing accuracy with the addition of water meters.

Principal alternatives were developed from an analysis of alternatives including:

1. No Action
2. Improvements to existing system
3. Improvements to the existing system including new wells
4. Regional Alternative

Alternative 3B has been selected as the recommended project and includes the following

- Construction of two wells and wellhouse on Village owned property at 4140 E Chandler Street.
- Construction of a raw water main to connect the wells to the existing Water Treatment Plant.
- Abandoning Well A and B.
- Improvements to the existing water treatment plant including chemical feed system, SCADA system and electrical and controls improvements.
- A new 100,000 gallon elevated water storage tank.
- Water meters for all users.

Design Parameters

The design criteria for this alternative was intended to match the existing system and will comply with the "Recommended Standards for Water Works" published by the Upper Mississippi River Board of State and Provincial Public health and Environmental Managers (10 State Standards), and Public Act 399 of 1976 "Safe Drinking Water Act." Permits will be acquired per the EGLE regulations for the improvements.

Additionally, the proposed improvements must be sequenced in a manner that allows for continued operation of the water supply and treatment system. This will require close coordination during the design and construction phase to maintain service while implementing the proposed improvements.

Land Requirements

The proposed site of the new wells is identified as Village owned land on the existing system map found in Appendix A. exploratory investigation, observation wells, test production wells, and aquifer testing will occur during the design phase of the project.

Hydrogeological Analysis

A hydrogeological analysis of the proposed wells site will be completed as part of the design phase of the project.

One well site is being considered for the development of two new production wells. The proposed well site is Village-owned property located north of Chandler Street and east of Main Street in the Village of Carsonville. The proposed new production wells are intended to replace the Village's existing Well A and Well B, which are planned to be taken offline. The proposed well site is located in the same watershed as all of the Village's existing wells. As such, the Village would transfer existing water capacity from Well A (80 gpm) and Well B (190 gpm) to the new production wells. If aquifer testing supports that the site can provide greater capacity than provided by the existing wells, the Village would like to consider a capacity increase to match the design treatment rate of 250 gpm for the existing arsenic treatment plant

We conducted a preliminary analysis of a limited net capacity increase of 250 gpm using the State's Water Withdrawal Assessment Tool (WWAT) at various locations within the proposed well site. The WWAT input

parameters are listed in the table below. Using these assumptions, the WWAT projected the impact of the withdrawal as Zone A, suggesting there is not likely to be an Adverse Resource Impact associated with the capacity increase of 250 gpm above the 270 gpm transfer capacity that could be obtained at the proposed well site.

WWAT Input Parameters	
Withdrawal Source	Groundwater
Pumping Capacity	250 gpm
Well Casing Depth	150 feet
Aquifer Type	Glacial
Pumping Schedule	Continuous Pumping

Permit Requirements

The permits required for this project include a Soil Erosion and Sedimentation Control Permit and an EGLE Act 399 permit.

Maps

The proposed improvement locations are spread throughout the Village and are identified in Appendix A.

Schedule for Design and Construction

The anticipated schedule for implementation of the proposed water system improvements is presented below, which is based on an anticipated Fiscal Year 2023 Quarter 4.5 MFA Closing.

Anticipated Date	Activity
July 2022	Submit Final SRF Project Plan to EGLE
June 2023	Finalize Design and Submit Permit Applications
July 2023	EGLE Approval of Plans & Specs
September 2023	SRF Loan Closing
November 2023	Begin Construction
November 2025	Complete Construction
December 2025	O&M Manual, Startup Assistance, and Record Drawings

Cost Estimate

Appendix E shows an estimate of the overall capital costs for the selected alternative. The total estimated project cost for the selected alternative is $3,900,000. The project costs include a 10% construction contingency on the estimated construction costs. The estimated construction cost will be further defined once a preliminary engineering design is complete.

Table 1: Summary of Present Worth Cost Analysis

	Alternative 3
Capital Cost	$3,900,000
Annual OM&R	$70,000
Net Present Value of OM&R Cost	$1,476,000
Total Present Worth	$5,376,000
Salvage Value	$1,143,000
Net Present Worth	$4,233,000

User Costs

The Village funds water operations entirely through user fees. Revenue is generated based on a flat monthly fee.

The water bill increases assume a total SRF 20-year loan of $3,900,000 at 1.875% interest. The balance will be paid through user fees over the 20-year loan period. The user charge for a typical residential customer is expected to increase $75-80 based on a $3,900,000 20-year loan at 1.875% interest. This is based on a consistent increase in cost across all water customers. The increase stated in this Project Plan is an estimate and does not consider grant eligibility or other items which may impact the rate structure.

Disadvantaged Community

Part 54, of the NREPA, provides for several benefits to municipalities who meet the state's criteria for disadvantaged community status. Those benefits include additional priority points, extended loan terms, and the possibility of loan forgiveness for qualified planning costs. A Disadvantaged Community Status Determination Worksheet was provided with the Intent to Apply form and EGLE has determined that Village of Carsonville qualifies for Disadvantaged Community Status.

Ability to Implement the Selected Alternative

The Village of Carsonville has established legal, institutional, technical, financial and managerial resources to improve, maintain, and operate its water works system.

The ability for the Village of Carsonville to implement the selected alternatives depends on the success of the Village's application to EGLE for DWSRF financial assistance. The Village intends to utilize consultants to assist with project coordination, design, financing, and construction administration.

VII. Environmental Evaluation

The potential environmental impacts the selected alternative may cause, both direct and indirect, beneficial and detrimental, are evaluated in the sections below. As these improvements have been determined to be a non-equivalency project, the Federal Cross-Cutting Authorities have not been contacted. A desktop review of historical resources and potential environmental impacts of the project are summarized in the sections below.

Historical / Archaeological / Tribal Resources

The National Historic Preservation Act, as amended, mandates the protection of historic sites, buildings, structures, districts, and objects of national, state, regional, or local significance listed in the National Register of Historic Places and requires that the effect of a federally assisted project upon properties included in or eligible for inclusion in the National Register must be taken into account during project planning.

There are no sites within the village that are listed on the National Register of Historic Places.

Water Quality

The selected alternatives will have no adverse impacts on groundwater or surface water quality or quantity. Disinfection and testing of new mains will occur before connection to the existing water distribution system in accordance with AWWA and EGLE requirements.

The proposed improvements are anticipated to improve drinking water quality through the abandonment of contaminated wells and improvements to the existing treatment plant.

Land/Water Interface

The selected alternative will have no anticipated adverse impacts on wetlands, floodplains, rivers/streams, or coastal zones.

Endangered Species

A review of the endangered species in the area was completed using the USFWS IPaC online screening tool generated a Section 7 listing of TES that may occur within the project study area.

Suitable habitat may be present for both the Indiana Bat and Northern Long-eared Bat in the Village of Carsonville. Removal of potential roost trees that could potentially impact these species would occur under the proper regulations to minimize the potential impact on the species.

Other listed threatened or endangered species are the Piping Plover, Red Know, Eastern Massasauga Rattlesnake, Northern Riffleshell, and Monarch Butterfly.

Agricultural Land

This project will not impact agricultural land or resources.

Social/Economic Impact

The proposed improvements will result in the Village of Carsonville experiencing direct and beneficial human, social, and economic benefits by continuing to provide reliable, safe, secure, and high-quality drinking water to its customers and visitors. Improvements to public health, safety, and welfare will be realized by energy and water conservation and system reliability, redundancy, and integrity.

Construction/Operational Impact

Direct impacts of the selected alternatives include dust, noise, vehicle emissions, and minor disruption of road or driveway access during construction. Impacts on traffic are anticipated to be minimal since most work is being completed along low volume residential streets. Minor, temporary disturbances to paved and vegetated surfaces will be required during construction and these surfaces will be restored to their preconstruction condition or better. Sedimentation control measures will be used to ensure that the surrounding areas and storm water inlets are protected from soil erosion and sediment.

Once the improvements are completed, both the Village and their water customers will realize operational benefits by the reduction of water main breaks and service interruptions.

Indirect Impacts

Indirect impacts are those caused by the proposed project but removed in time and/or distance. Indirect impacts are often secondary in nature and are generally caused by residential and/or commercial development made possible by the project. The selected alternatives are not intended to promote growth, spur development, change land use, or increase traffic, but to help assure a safe and resilient water supply system.

Neither the drilling of new wells or replacement of the water tower is anticipated to result in new or anticipated development.

VIII. Mitigation

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

The structural measures involve the specific design and construction of the improvements while the non-structural measures involve regulatory, institutional, governmental, or private plans, policies, or regulations of the Village. Mitigation of short-term, long-term, and indirect impacts were considered and are discussed below.

Mitigation of Short-Term Environmental Impacts

Traffic and Safety Hazard Control

Road work is proposed as part of the selected alternative, so traffic control during construction will be necessary. Work can be limited to two streets at a time to limit the impact of construction to residents and traffic.

Traffic control and maintaining access to homes and businesses will be the responsibility of the Contractor. Access to all homes and businesses will be maintained and emergency vehicle access will be ensured throughout construction. Residents will be notified when construction work is scheduled in their area. Contractors will be required to have trained persons performing all phases of the work. Traffic control regulators, warning signs, barricades, drums, and cones will be used for traffic control.

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

Dust Control

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

Noise Control

Noise levels will increase during construction due to the excavation equipment used to complete the proposed water system improvements. Construction activities will only be allowed during the Village's approved hours to limit the adverse effect of noise to the residents/businesses near the construction area. Construction workers may be required to wear earplugs to minimize the effects of long-term noise during the construction operations.

Soil Erosion/Sedimentation Control

The Contractor will be required to obtain a soil erosion and sedimentation control permit or waiver from the local agency prior to the start of the work for the water main looping and replacement. It is anticipated that mitigation measures to be utilized will include silt fence, geotextile filter fabric, and permanent seeding and mulch. Mitigation and abatement measures will be detailed in both the plans and specifications and will be reviewed and approved by the local permitting agency prior to construction. The other improvements proposed in this project are located within existing facilities and erosion control will not be needed.

Restoration of Roads and Vegetation Areas

Roads and lawn areas will be restored following the construction of the watermain to match or improve the existing conditions. Road restoration will be limited if it is possible to construct the new watermain outside of the pavement limits.

Mitigation of Long-Term Environmental Impacts

There are no expected long-term impacts that will require mitigation for this project.

Mitigation of Indirect Environmental Impacts

There are no expected indirect impacts that will require mitigation for this project.

IX. Public Participation

Public participation is an integral component of the final Project Plan for the proposed water system improvements. A summary of public participation is provided in the following sections.

Formal Public Hearing and/or Recording

A formal public hearing on project alternatives was held on Tuesday, June 28, 2022, at 6:00 PM at the Village Hall. Attendees from the public were documented and a listing is included within Appendix F of the final Project Plan.

Public Hearing Advertisement

The public hearing was advertised in the Port Huron Times Herald at least 30 days prior to the hearing. A copy of the public hearing notice is included in Appendix F of the final Project Plan.

A copy of the draft Project Plan was made available to the public for a 30-day period at the Village Hall.

Public Hearing Transcript or Recording

An audio recording of the public hearing is attached as a separate file.

Public Hearing Contents

The required content presented in the Project Plan Preparation Guidance was used to develop a slide presentation for the public hearing.

Comments Received and Answered

No written comments from the public were received before, during, or subsequent to the Public Hearing. Questions and comments received during the Public Hearing were addressed as a part of the Question-and-Answer portion of the presentation.

Adoption of the Project Plan

The Village council voted unanimously to adopt the Project Plan and implement the selected alternatives. A copy of resolution is included in Appendix F of the final Project Plan.

APPENDIX A
MAPS AND FIGURES

PREPARED FOR:

VILLAGE OF CARSONVILLE

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

Project No.: 837230


NORTH
0
600
1200
SCALE IN FEET
Linzi Dr
Cheryl Dr
Main St
Approximate Location of Village Owned Property
Baird St
Water Treatment Plant Wells B and C
Chandler St
Marsh St
Arthur St
High St
Howard St
Maynard St
Existing Water Tower
Well A
Sheldon St
Orchard St
State St
Park St
Main St
6" Watermain
8" Watermain
10" Watermain
VILLAGE OF CARSONVILLE
SANILAC COUNTY, MICHIGAN
EXISTING WATER SYSTEM
FIGURE 1
F&V

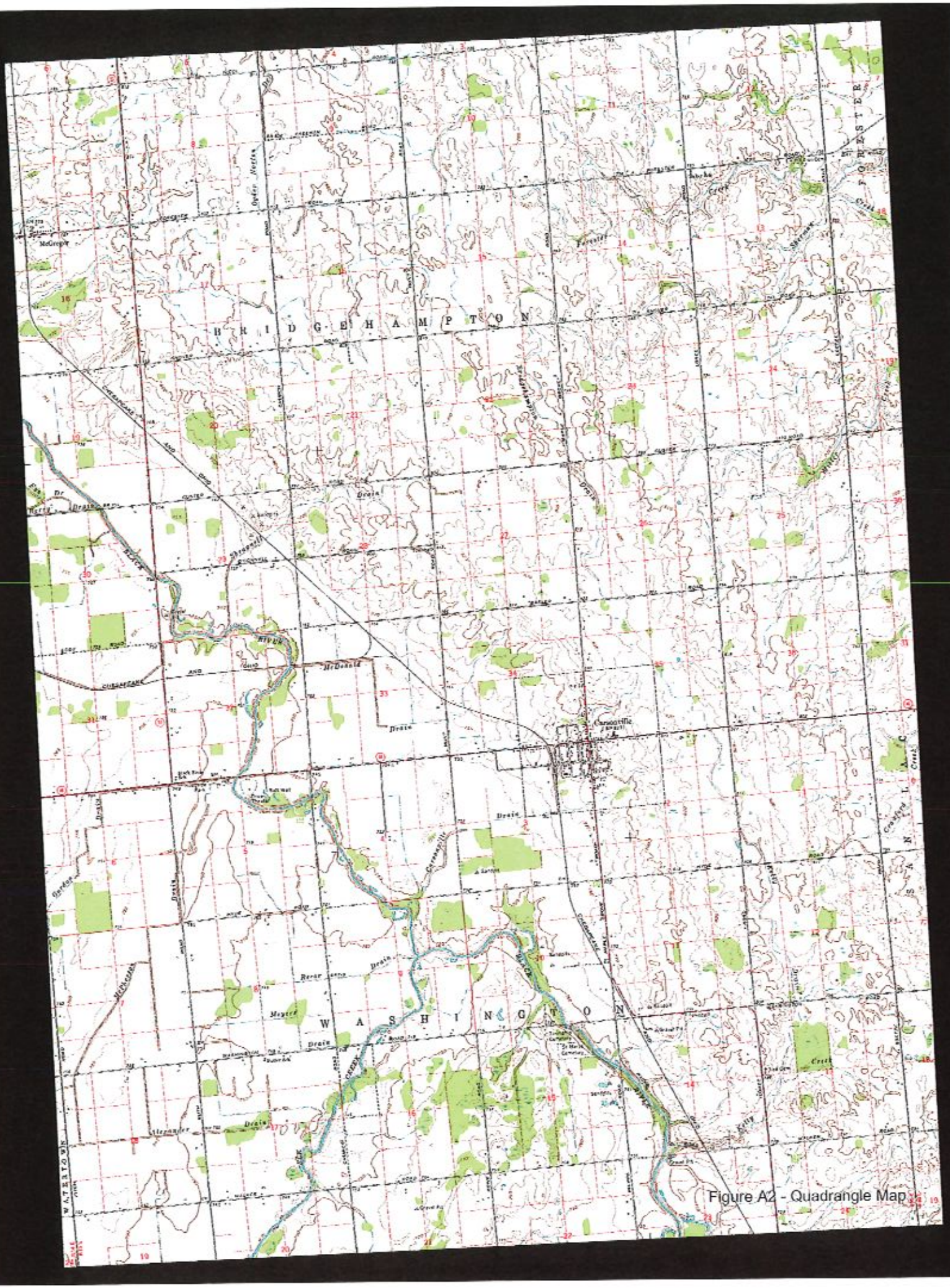


Figure A2 - Quadrangle Map

Figure A3 - Environmental Mapper

May 10, 2022

- Michigan Department of Transportation - Point
- Notice of Approved Env. Remediation - Point
- Ordinance - Point
- Notice of Corrective Action - Point
- Restrictive Covenant - Point
- Other Institutional Control
- Michigan Department of Transportation - Polygon
- Notice of Environmental Remediation

1:20,916

0 0.17 0.35 0.7 mi

0 0.28 0.55 1.1 km

U.S. Fish and Wildlife Service

National Wetlands Inventory

Figure A4 - Wetlands Map

May 10, 2022

Wetlands

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

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

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

National Flood Hazard Layer FIRMette

FEMA

Legend

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

- SPECIAL FLOOD HAZARD AREAS
  - Without Base Flood Elevation (BFE) Zone A, V, A99
  - With BFE or Depth Zone AE, AO, AH, VE, AR
  - Regulatory Floodway
- OTHER AREAS OF FLOOD HAZARD
  - 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
  - Future Conditions 1% Annual Chance Flood Hazard Zone X
  - Area with Reduced Flood Risk due to Levee. See Notes. Zone X
  - Area with Flood Risk due to Levee Zone D
- OTHER AREAS
  - NO SCREEN Area of Minimal Flood Hazard Zone X
  - Effective LOMRs
  - Area of Undetermined Flood Hazard Zone D
- GENERAL STRUCTURES
  - Channel, Culvert, or Storm Sewer
  - Levee, Dike, or Floodwall
- OTHER FEATURES
  - 20.2 Cross Sections with 1% Annual Chance
  - 17.5 Water Surface Elevation
  - Coastal Transect
  - Base Flood Elevation Line (BFE)
  - Limit of Study
  - Jurisdiction Boundary
  - Coastal Transect Baseline
  - Profile Baseline
  - Hydrographic Feature
- MAP PANELS
  - Digital Data Available
  - No Digital Data Available
  - Unmapped

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/10/2022 at 2:46 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

Figure A5 - Floodplain Map

1982 QUATERNARY GEOLOGY OF MICHIGAN

Figure A7

1987 BEDROCK GEOLOGY OF MICHIGAN

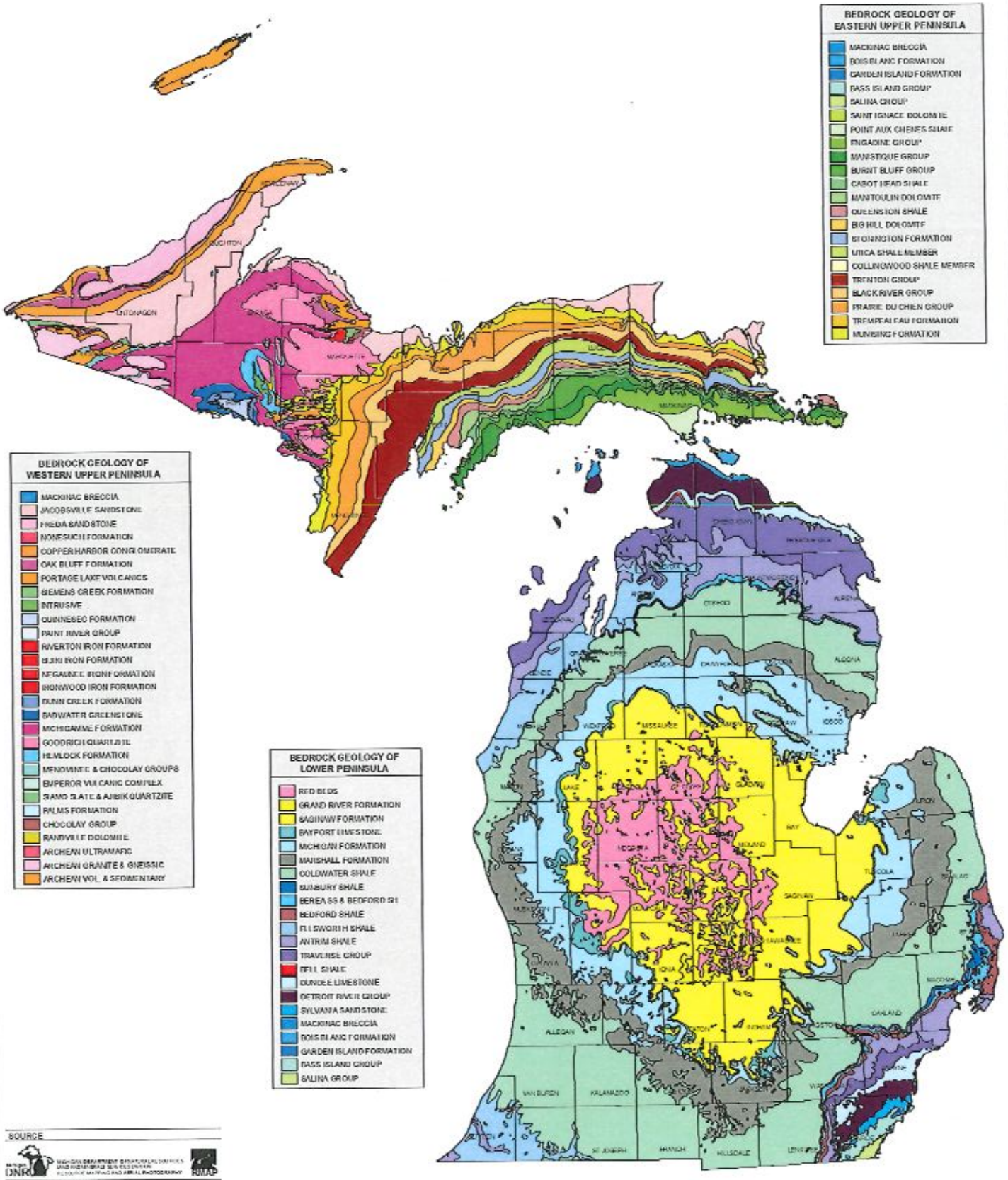
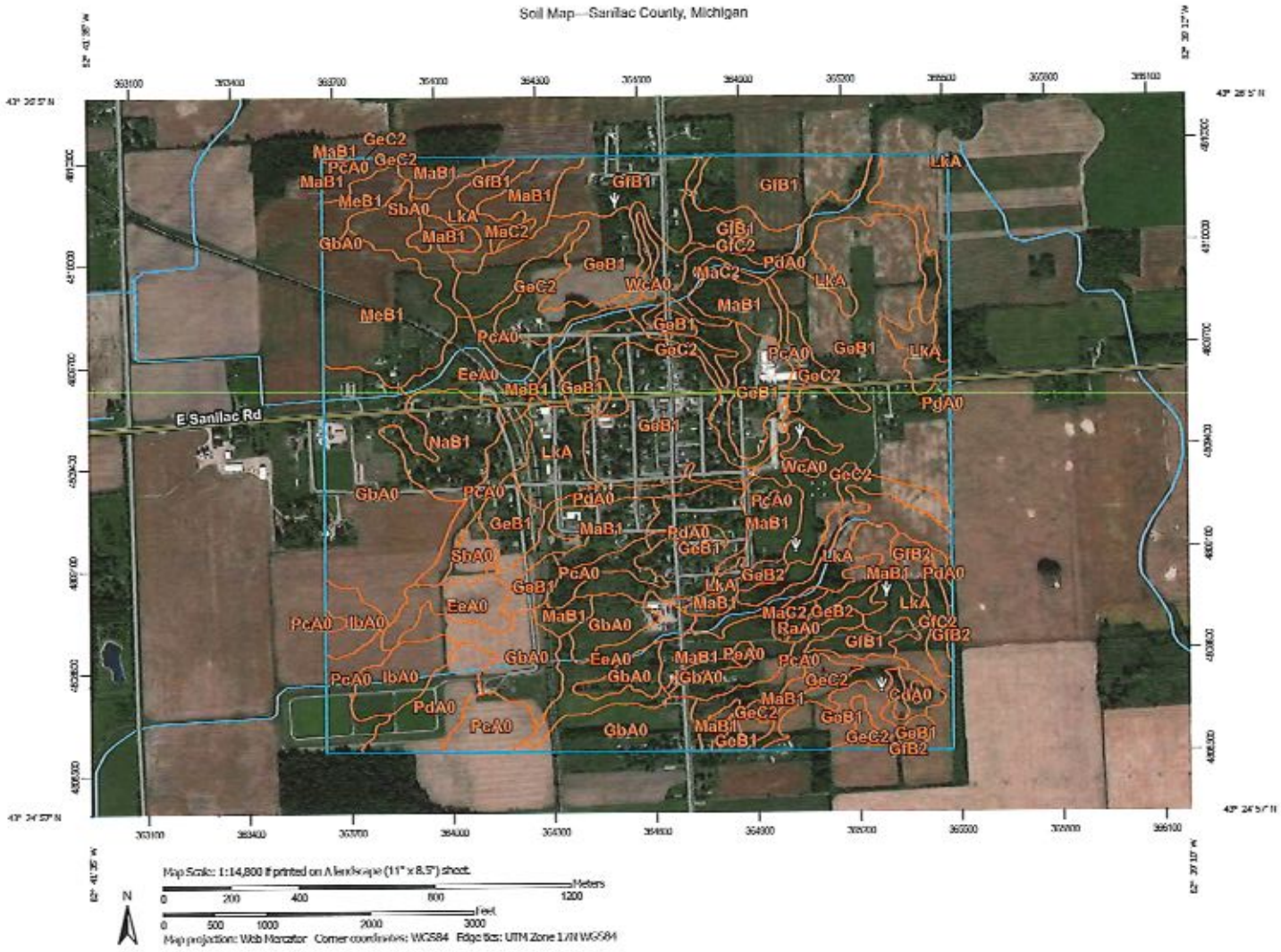


Figure A8 - Soil Survey



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

Soil Survey Area: Sanilac County, Michigan
Survey Area Data: Version 18, Sep 1, 2021

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

Date(s) aerial images were photographed: Dec 31, 2009—Mar 4, 2017

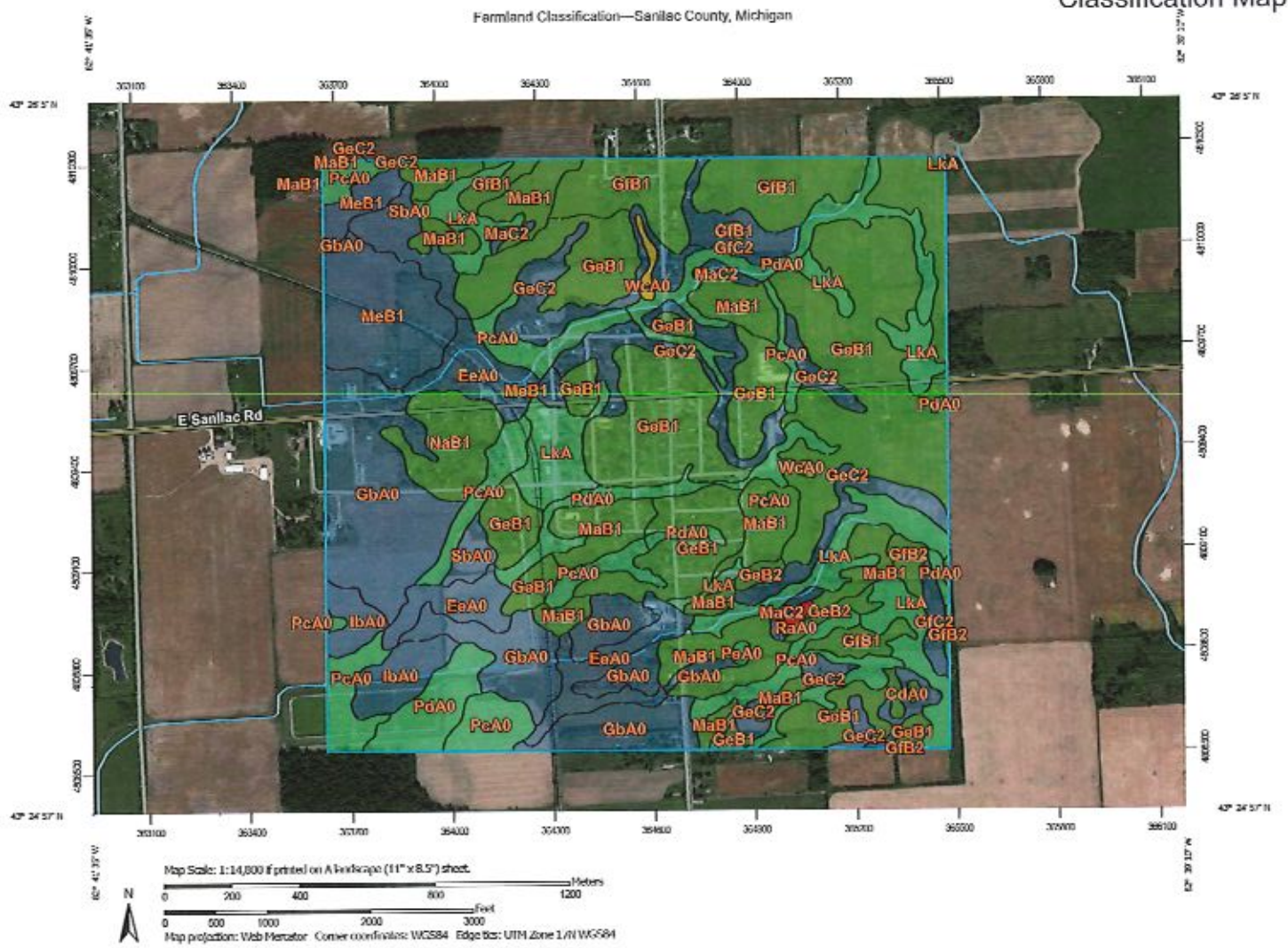
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

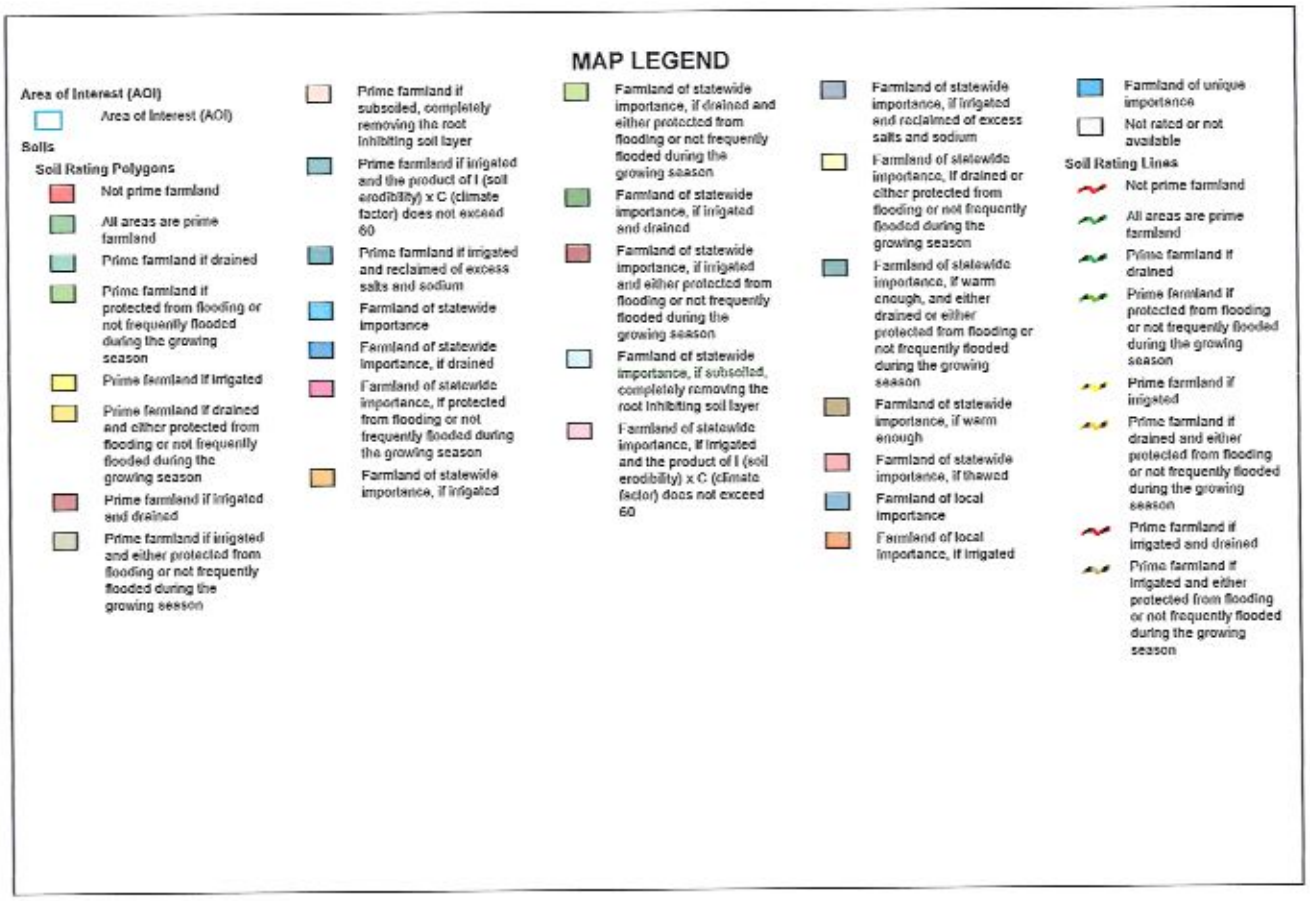
Map Unit Legend

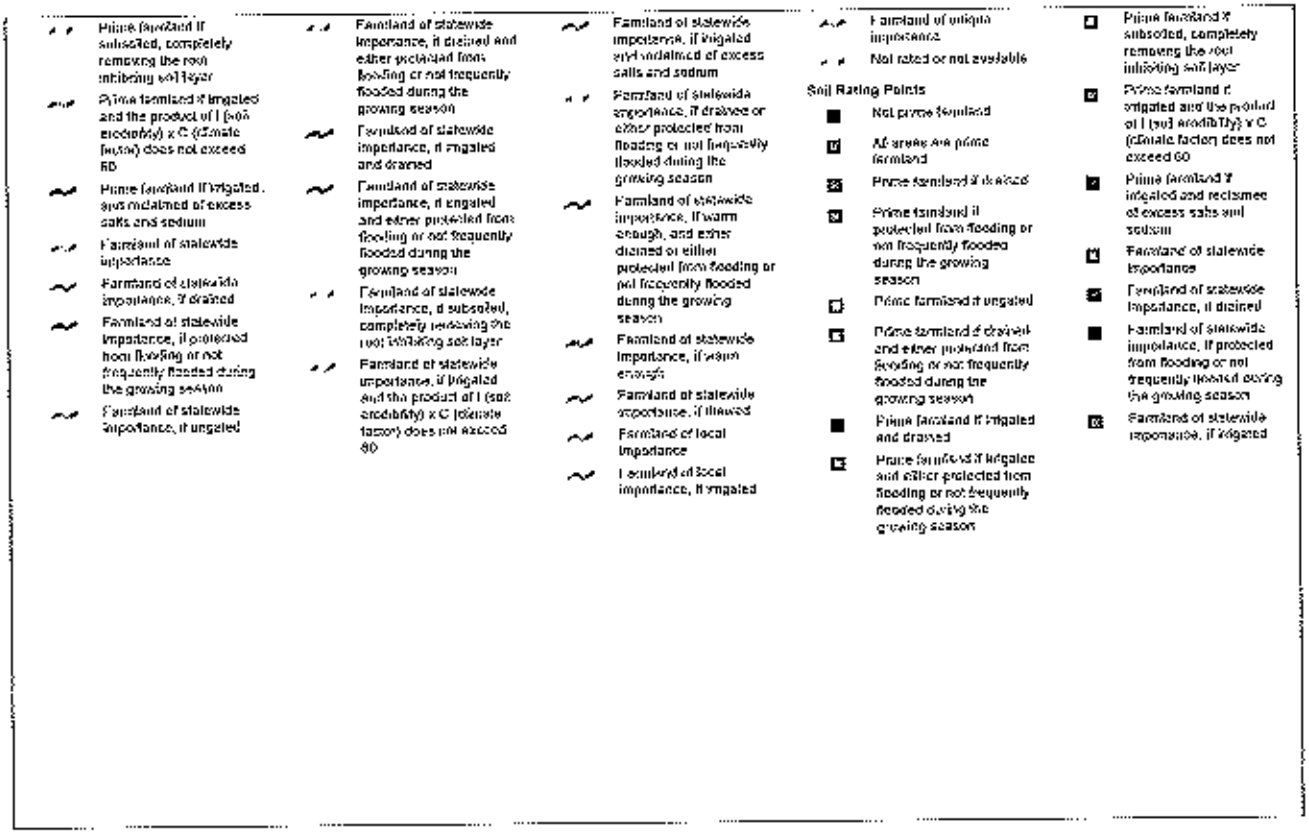
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CdA0	Cardisle and Linwood mucks, 0 to 2 percent slopes	3.7	0.5%
EeA0	Epoufette and Ronald sandy loams, 0 to 2 percent slopes	36.4	4.5%
GbA0	Gladwin and Palo sandy loams, 0 to 2 percent slopes	94.4	11.8%
GeB1	Guelph loam, 2 to 6 percent slopes, slightly eroded	204.2	25.4%
GeB2	Guelph loam, 2 to 6 percent slopes, moderately eroded	4.7	0.6%
GeC2	Guelph loam, 6 to 12 percent slopes, moderately eroded	54.8	6.8%
GfB1	Guelph loam and silt loam, 2 to 6 percent slopes, slightly eroded	47.6	5.9%
GfB2	Guelph loam and silt loam, 2 to 6 percent slopes, moderately eroded	4.5	0.6%
GfC2	Guelph loam and silt loam, 6 to 12 percent slopes, moderately eroded	13.6	1.7%
IbA0	Iosco and Winegars sandy loams, 0 to 2 percent slopes	16.7	2.1%
LkA	Londo loam, 0 to 3 percent slopes	57.8	7.2%
MaB1	McBride fine sandy loam, 2 to 6 percent slopes, slightly eroded	72.8	9.1%
MaC2	McBride fine sandy loam, 6 to 12 percent slopes, moderately eroded	4.9	0.6%
MeB1	Marcellona loamy sand, 3 to 8 percent slopes, slightly eroded	38.9	4.8%
MfB1	Marlette loam, 2 to 6 percent slopes, slightly eroded	0.6	0.1%
NaB1	Newaygo sandy loam, 2 to 6 percent slopes, slightly eroded	17.8	2.2%
PcA0	Parkhill loam, 0 to 1 percent slopes	62.4	7.8%
PdA0	Parkhill loam and clay loam, 0 to 2 percent slopes	48.4	6.0%
PeA0	Parkhill loam and mucky loam, 0 to 2 percent slopes	0.8	0.1%

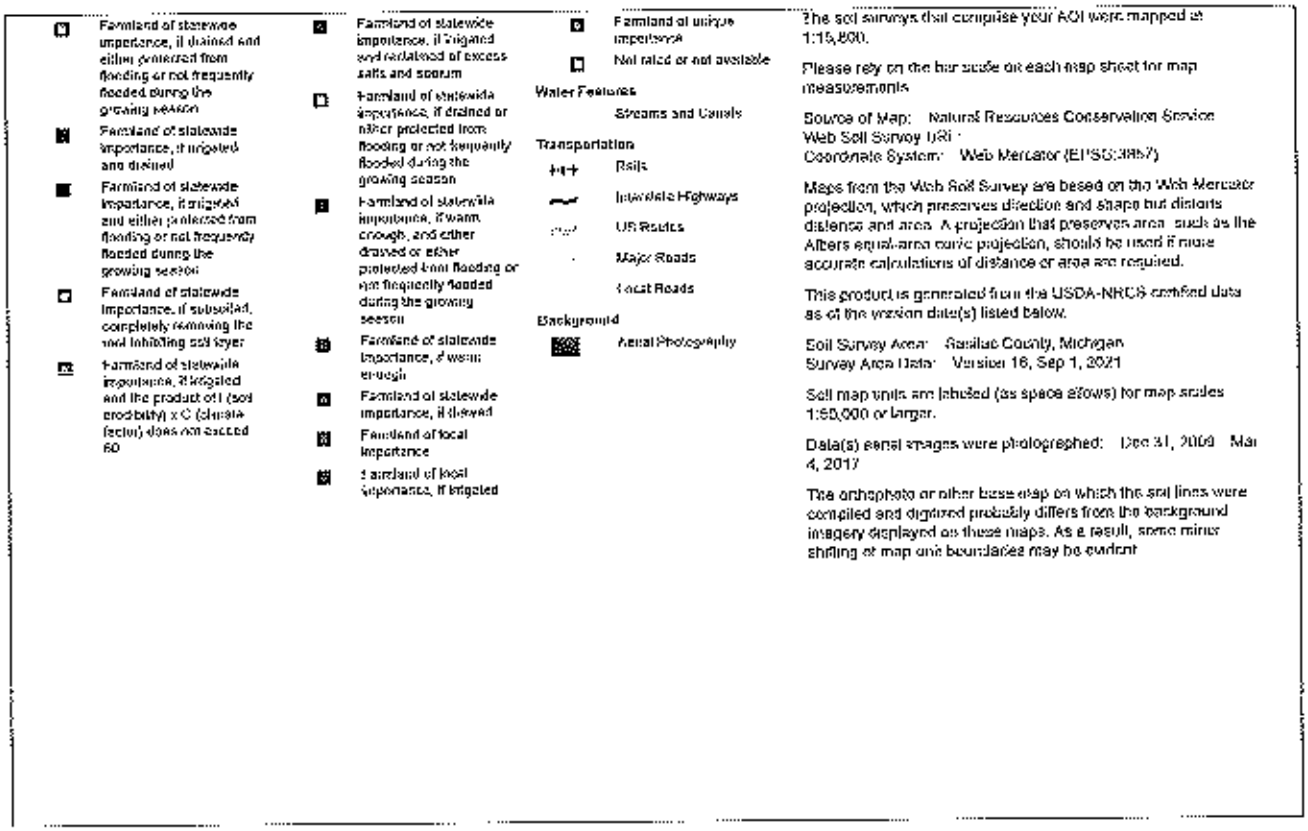
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
RaA0	Richter and Tonkey bouldery sandy loam and loam, 0 to 2 percent slopes	1.2	0.2%
SbA0	Saverine and Iosco fine sandy loams, 0 to 2 percent slopes	14.7	1.8%
WcA0	Washtenaw loam and silt loam, 0 to 2 percent slopes	2.5	0.3%
Totals for Area of Interest		803.4	100.0%

Figure A9 - Farmland Classification Map




MAP LEGEND
Area of Interest (AOI)
Area of Interest (AOI)
Soils
Soil Rating Polygons
Not prime farmland
All areas are prime farmland
Prime farmland if drained
Prime farmland if protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated and drained
Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of statewide importance, if drained
Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated
Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated and drained
Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough
Farmland of statewide importance, if thawed
Farmland of local importance
Farmland of local importance, if irrigated
Farmland of unique importance
Not rated or not available
Soil Rating Lines
Not prime farmland
All areas are prime farmland
Prime farmland if drained
Prime farmland if protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated and drained
Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season


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


Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated and drained
Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Farmland of statewide importance, if irrigated and drained or excess salts and sodium
Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough
Farmland of statewide importance, if drained
Farmland of local importance
Farmland of local importance, if irrigated
Farmland of unique importance
Not rated or not available
Water Features
Streams and Canals
Transportation
Rails
Interstate Highways
US Routes
Major Roads
Local Roads
Background
Aerial Photography
The soil surveys that comprise your AOI were mapped at 1:15,800.
Please rely on the bar scale on each map sheet for map measurements.
Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)
Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.
This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.
Soil Survey Area: Sanilac County, Michigan
Survey Area Data: Version 16, Sep 1, 2021
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.
Date(s) aerial images were photographed: Dec 31, 2009—Mar 4, 2017
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.

Farmland Classification

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CdA0	Carlisle and Linwood mucks, 0 to 2 percent slopes	Farmland of local importance	3.7	0.5%
EoA0	Epoufette and Ronald sandy loams, 0 to 2 percent slopes	Farmland of local importance	36.4	4.5%
GbA0	Gladwin and Palo sandy loams, 0 to 2 percent slopes	Farmland of local importance	94.4	11.8%
GeB1	Guelph loam, 2 to 6 percent slopes, slightly eroded	All areas are prime farmland	204.2	25.4%
GeB2	Guelph loam, 2 to 6 percent slopes, moderately eroded	All areas are prime farmland	4.7	0.6%
GeC2	Guelph loam, 6 to 12 percent slopes, moderately eroded	Farmland of local importance	54.8	6.8%
GfB1	Guelph loam and silt loam, 2 to 6 percent slopes, slightly eroded	All areas are prime farmland	47.6	5.9%
GfB2	Guelph loam and silt loam, 2 to 6 percent slopes, moderately eroded	All areas are prime farmland	4.5	0.6%
GfC2	Guelph loam and silt loam, 6 to 12 percent slopes, moderately eroded	Farmland of local importance	13.6	1.7%
IbA0	Iosco and Winegars sandy loams, 0 to 2 percent slopes	Farmland of local importance	16.7	2.1%
LkA	Londo loam, 0 to 3 percent slopes	Prime farmland if drained	57.8	7.2%
MaB1	McBride fine sandy loam, 2 to 6 percent slopes, slightly eroded	All areas are prime farmland	72.8	9.1%
MaC2	McBride fine sandy loam, 6 to 12 percent slopes, moderately eroded	Farmland of local importance	4.9	0.6%
MeB1	Mancelona loamy sand, 3 to 8 percent slopes, slightly eroded	Farmland of local importance	38.9	4.8%
MfB1	Marlette loam, 2 to 6 percent slopes, slightly eroded	All areas are prime farmland	0.6	0.1%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
NaB1	Newaygo sandy loam, 2 to 6 percent slopes, slightly eroded	All areas are prime farmland	17.8	2.2%
PcA0	Parkhill loam, 0 to 1 percent slopes	Prime farmland if drained	62.4	7.8%
PdA0	Parkhill loam and clay loam, 0 to 2 percent slopes	Prime farmland if drained	48.4	6.0%
PeA0	Parkhill loam and mucky loam, 0 to 2 percent slopes	Prime farmland if drained	0.8	0.1%
RaA0	Richter and Tonkey bouldery sandy loam and loam, 0 to 2 percent slopes	Not prime farmland	1.2	0.2%
SbA0	Saverine and Iosco fine sandy loams, 0 to 2 percent slopes	Farmland of local importance	14.7	1.8%
WcA0	Washtenaw loam and silt loam, 0 to 2 percent slopes	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	2.5	0.3%
Totals for Area of Interest			803.4	100.0%

Description

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

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

APPENDIX B
WATER SYSTEM SANITARY SURVEY

PREPARED FOR:

VILLAGE OF CARSONVILLE

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

Project No.: 837230

GRETCHEN WHITMER
GOVERNOR

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
SAGINAW BAY DISTRICT OFFICE

DEQ

LIESL EICHLER CLARK
DIRECTOR

February 7, 2019

Mr. Don Pangburn
Village of Carsonville
4140 Chandler Road
Carsonville, Michigan 48419

WSSN: 01180
County: Sanilac

Dear Mr. Pangburn:

SUBJECT: Water System Sanitary Survey (Survey)

This letter confirms the Department of Environmental Quality's (DEQ's) staff visit on December 20, 2018, with Mr. Dan Kelly, Mrs. Christine Kelly and Mr. Bob Kruss to conduct a Survey of the public water supply serving the Village of Carsonville (Village) and to present the final findings, discuss areas for improvement, and identify timelines for corrective action where appropriate. The purpose of a Survey is to evaluate the water supply system with respect to the requirements of the Michigan Safe Drinking Water Act, 1976 PA 399, as amended (Act 399). It is also an opportunity to update the DEQ's records, provide technical assistance, and identify potential risks that may adversely affect drinking water quality. Enclosed, is a copy of the Sanitary Survey Report (Report) for your reference.

Since the last Survey, the DEQ acknowledges that the Village has completed the following water facility improvements and operations:

1. Updated the Sampling Site Plan for monthly bacteriological monitoring of its drinking water.
2. The Village has implemented a valve turning program.
3. Cross connections and the testing of backflow prevention devices is starting to be tracked and accurately recorded.

The following table summarizes the DEQ's final findings from the Survey of the water system:

Survey Element	Findings
Source	**Deficiencies Identified**
Treatment	No Deficiencies/recommendations
Distribution System	Recommendations Made
Finished Water Storage	**Deficiencies Identified**
Pumps	No Deficiencies/recommendations
Monitoring & Reporting	No Deficiencies/recommendations

Management & Operations	Recommendations Made
Operator Compliance	No Deficiencies/recommendations
Security	Recommendations Made
Financial	No deficiencies/recommendations
Other	No deficiencies/recommendations

Deficiencies:

Deficiencies indicate non-compliance with one or more Act 399 requirements, which include defects in a water system's infrastructure, design, operation, maintenance, or management that cause, or may cause, interruptions to the "multiple barrier" protection system and adversely affect the system's ability to produce safe and reliable drinking water in adequate quantities.

During the Survey four (4) deficiencies were identified and are listed below:

1. R 325.10504 General requirements of type I public water supplies: Rule 504. A type I public water supply shall meet the following general requirements and other specific requirements as prescribed by the act and these rules: (b) Monitor for contaminants at prescribed frequencies as required by part 7 of these rules.

   The Village currently does not perform any monitoring on Well A located southeast of the elevated water storage tank. The well is still connected to the system and is fully functional. If the Village would like to continue having Well A as a standby well it will need to have annual testing completed as well as monthly bacti sampling. Also due to the high arsenic content of the water pumped from Well A if it is used at any time a Village wide "Do Not Drink" advisory needs to be issued until water can be supplied from the arsenic removal plant again and all the high arsenic water is flushed from the system. If the Village does not plan to keep Well A as a standby well it needs to be physically disconnected from the system.

2. R 325.11204 Required capacity of waterworks systems; applicability: Rule 1204 states, "A type I public water supply shall provide sufficient capacity in the waterworks system to meet the approved finished water supply requirements. That capacity may be 1 or any combination of the following: (b) Firm capacity from an approved groundwater supply where firm capacity equals the flow with the largest producing well out of service."

   The Village wells do not produce enough water to meet the firm capacity requirements. Firm capacity is the amount of water that the system can produce with the highest producing well out of service. The Village's firm capacity is currently 194 gallons per minute or 0.280 million gallons per day. The DEQ recommends the investigation and installation of additional capacity when the

maximum day demand is 90% or less of the firm capacity. In the Village's case, the maximum day demand exceeds the firm capacity which is only 87% of the maximum day.

To further compound concerns with capacity, the two wells (Well B and Well C) that are capable of being treated by the arsenic treatment plant are very close in proximity and within the same aquifer. This limits the ability to perform maintenance on the wells, such as acidizing the well screens, which would help keep the up the production of these wells. Well A, which has arsenic levels above the Maximum Contaminant Level (MCL) and is not connected to the arsenic treatment plant, cannot consistently produce water near the design capacity of the well.

The Village should begin investigating options for adding capacity to meet the firm capacity requirements. It's likely that there will be substantial costs associated with all the options and the Village should be planning financially for the potential costs associated.

3. R 325.11105 Capacity of distribution system; fire hydrants; inadequately sized watermains. Rule 1105. (1) Distribution systems shall have sufficient capacity to meet peak demands, including fire flow demands where fire protection is provided, while continuously maintaining a minimum of 35 psi throughout the distribution system under normal operating conditions and 20 psi throughout the distribution system during emergencies such as firefighting.

   There were several recommendations for both improvements and maintenance that resulted from the last elevated storage tank inspection, performed on July 22, 2014. The recommended time frame for most of the maintenance, including repainting the interior and exterior, and improvements were three to five years. Because of the failures of the coating on the interior and exterior it could lead to a failure of the tank itself through corrosion. Without the elevated storage tank in service the Village will not be able to maintain flow or pressure in the distribution system

   Because of the amount of time that has passed since the last inspection, and the increase in construction costs, the estimated expenditure for these recommendations was substantial (approximately $302,000) and that number is probably lower than the current actual cost. The Village should be planning financially for these repairs.

4. MCL 325.1004 Waterworks system; filing plans and specifications; general plan; evaluation of proposed system; use of assessment tool; determination of zone C withdrawal; certification of measures taken; capacity assessment; return or rejection of plans and specifications; public notice; plans and specifications for improvements; permit for construction; violation; conditions for denial of permit; verbal approval of minor modifications; confirmation; report; definitions. Section 2 states "...The department shall also conduct a capacity assessment for a proposed community

supply or nontransient noncommunity water supply and determine if the system has the technical, financial, and managerial capacity to meet all requirements of this act and the rules promulgated under this act."

Currently the Village lacks the financial capacity to perform the necessary capital improvements required for increasing the amount of available source water and the maintenance required on the distribution system including the repairs to the elevated storage tank. The last water rate increase for the Village was in 2015. The Village needs to have a rate study performed and implemented to help determine a more accurate rate structure to allow the Village to get the financial capacity required to cover maintenance and improvement costs.

Recommendations:

Recommendations are suggestions the public water supply should consider, to enhance its operations and services, and to avoid future deficiencies.

During the Survey, the following recommendations were identified: Security and Financial.

1. Security:

   The Village has an ERP in place that was approved by the DEQ on October 20, 2016. This ERP should be reviewed yearly and updated as appropriate to reflect any changes in procedure, staffing, and contact information.

2. Financial:

   The Village should install meters. With the installation of meters, the Village will be better able to monitor the distribution system and account for the amount of lost water in the system to determine if or when repairs are needed. At this time if there is a leak in the distribution system, unless it surfaces, it could go unnoticed for years. Adding meters to the system would also allow the Village to create a volume based fee schedule which also tends to decrease the amount of water usage per service connection.

3. Distribution System:

   The Village is working on updating and implementing a new cross connection control program. This should be implemented by December 31, 2019. If the Village needs any assistance in updating the cross connection control program guidance and basic program outlines are available on the DEQ website.

4. Finished Water Storage:

   The screen on the overflow for the EST is currently damaged, this could allow insects to build a nest in the overflow piping causing it to become ineffective when needed. The overflow should be screened with a 24-mesch screen attached to the overflow flap.

   The overflow discharge pipe on the EST currently discharges directly into a storm drain inlet, this is not acceptable. The storm drain inlet should be terminated 12 to 24 inches below the overflow discharge outlet.

If you have any questions, please feel free to contact me at the phone number listed below, or by email at reinkej1@michigan.gov.

Sincerely,

Joe Reinke, District Engineer
Field Operations Section
Drinking Water and Municipal Assistance Division
989-326-7709

Enclosure:
cc/enc: Mr. Dan Kelly, Certified Operator in Charge, BWMS Training
Mr. Bob Kress, Operator, Village of Carsonville
Mr. Gary Bartow, F&V Engineering

APPENDIX C
2020 WATER QUALITY REPORT

PREPARED FOR:

VILLAGE OF CARSONVILLE

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

Project No.: 837230

Village of Carsonville, Michigan
Annual Drinking Water Quality Report for2020
7/1/21

We're pleased to present to you this year's Annual Quality Water Report. This report is designed to inform you about the quality water and services we deliver to you every day. Our constant goal is to provide you with a safe and dependable supply of drinking water. We want you to understand the efforts we make to continually improve the water treatment process and protect our water resources. We are committed to ensuring the quality of your water. Our water source is three screened drift wells located within the village limits. Our wells draw from an aquifer located above the Marshall Sandstone Aquifer. I am pleased to report that the Village of Carsonville's drinking water is safe and meets or exceeds federal and state requirements.

The State of Michigan has produced a Source Water Assessment for the Village's wells. This Assessment reports the susceptibility of our water supply sources to contamination. The susceptibility score is broken down into 7 categories. Very Low, Low, Moderately Low, Moderate, Moderately High and Very High. The score, given by the State, for Well #A located at 49 Maynard Street is Moderate, Well # B located at 3972 Chandler Street is Moderately High, Well #C located at Chandler Street is Moderately High. The complete Source Water Assessment is available by contacting the Department of Public Works.

If you have any questions about this report or concerning your water utility, please contact Bob Kress **at 810-657-9400**. We want our valued customers to be informed about their water utility. If you want to learn more, please attend any of our regularly scheduled meetings. They are held on **the third Wednesday of each month at Village Hall.**

The Village of Carsonville routinely monitors for contaminants in your drinking water according to Federal and State laws. The following tables show the results of our monitoring for the period of January 1st to December 31st, **2020.** The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the land or underground, it dissolves naturally-occurring minerals and in some cases, radioactive material and can pick up substances resulting from the presence of animals or from human activity or contaminants such as microbes, inorganic and organic chemicals, and radioactive substances. All drinking water, including bottled drinking water, may be reasonably expected to contain at least small amounts of some contaminants. It's important to remember that the presence of these contaminants does not necessarily pose a health risk. More information about contaminants and potential health effects can be obtained by calling the United States Environmental Protection Agency's (EPA) Safe Drinking Water Hotline at 1-800-426-4791.

TERMS AND ABBREVIATIONS USED IN THE TABLES BELOW

Not-Detected (ND) - laboratory analysis indicates that the constituent is not present.
Parts per million (ppm) or Milligrams per liter (mg/l) - one part per million corresponds to one minute in two years or a single penny in $10,000.
Parts per billion (ppb) or Micrograms per liter - one part per billion corresponds to one minute in 2,000 years, or a single penny in $10,000,000.
Picocuries per liter (pCi/L) - picocuries per liter is a measure of the radioactivity in water.
Action Level - the concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

Maximum Contaminant Level - The "Maximum Allowed" (MCL) is the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Maximum Contaminant Level Goal - The "Goal" (MCLG) is the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety. ***Maximum Residual disinfection Level-(MRDL)*** is the highest level of free chlorine allowed in the distribution system.

The State allows us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. All of the data is representative of the water quality, but some are more than one year old. The table below represents the most current testing information available.

Inorganic Contaminants Detected in Water at Entry point to Distribution System

Contaminant	Year of Test	Viola -tion Y/N	Highest Level Detected	Unit of Measure	Range Detected	MCLG	MCL	Likely Source of Contamination
Fluoride	2020	N	.41	ppm		4	4	Erosion of natural deposits, water additive which promotes strong teeth.
Nitrate (as nitrogen)	2020	N	ND	ppm		10	10	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits.
Nitrite as (as nitrogen)	2020	N	ND	ppm		1	1	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits.
Arsenic	2020	N	5	ppb	0-14	0	10*	Erosion of natural deposits; Runoff from glass and electronics production wastes

* On January 23, 2006 the MCL for arsenic was decreased to 10ppb. The Village has constructed a building and has provided equipment to treat wells B and C. The water from these wells is being treated for the removal of Arsenic and is meeting the standard. Well A is not being used; it is for emergency only.

While your drinking water meets the U.S. EPA standard for arsenic, it does contain low levels of arsenic. The U.S EPA standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. The U.S. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

Radioactive Contaminants Detected in Water at Entry point to Distribution System

Contaminant	Year of Test	Violation Y/N	Highest Level Detected	Unit of Measure	Range Detected	MCLG	MCL	Likely Source of Contamination
Radium (combined 226/228)	2018	N	2.08	(pCi/L)	NA	0	5	Erosion of natural deposits
Gross Alpha	2020	N	2.10	(pCi/L)	NA	0	15	Erosion of natural deposits

Chlorine Residuals from Distribution System Monitoring

Contaminant	Year Tested	Highest level detected	Range detected	Violation Yes/No	MRDL	Optimum Level of Chlorination	Likely Source of Contamination
Free Chlorine Residuals	2020 Monthly	.50 ppm	.30ppm to .70ppm	No	4 ppm	.5ppm to 1.5 ppm	Water additive used to control microbes

Organic Contaminates from Distribution System Monitoring

Contaminant	Year of Test	Violation Y/N	Highest Level Detected	Unit of Mensure	MCLG	MCL	Likely Source of Contamination
Bromochloroacetic acid	2020	N	4	ppb	NA	NA	By-product of drinking water chlorination
Dibromoacetic acid	2020	N	4	ppb	NA	NA	By-product of drinking water chlorination
Dichloroacetic acid	2020	N	2	ppb	NA	NA	By-product of drinking water chlorination
Total Haloacetic Acid	2020	N	8	ppb	NA	60	By-product of drinking water chlorination
Trichloroacetic acid	2020	N	2	ppb	NA	NA	By-product of drinking water chlorination
Bromodichloromethane	2020	N	8.50	ppb	NA	80	By-product of drinking water chlorination
Bromoform	2020	N	5.20	ppb	NA	80	By-product of drinking water chlorination
Chlorodibromomethane	2020	N	12	ppb	NA	80	By-product of drinking water chlorination
Chloroform	2020	N	4.5	ppb	NA	80	By-product of drinking water chlorination
Total Trihalomethanes	2020	N	30.5	ppb	NA	80	By-product of drinking water chlorination

Lead & Copper Distribution System Monitoring Results

Contaminant	Date Tested	Number of Sites Tested	90th Percentile	Range detected	# of Sites over Action Level	Action level/ units of Measurement	Likely Source of Contamination
Lead	2018	10	4 ppb	1ppb to 15ppb	0	15 ppb	Lead service lines, corrosion of household plumbing including fittings and fixtures; Erosion of natural deposits
Copper	2018	10	450 ppb	60 to 520 ppb	0	1300 ppb	Corrosion of household plumbing systems; Erosion of natural deposits

Lead. If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The Village of Carsonville is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your

tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

Estimated Number of Service Connections by Service Line Material

A Service line includes any section of pipe from the water main to the building plumbing at the first shut-off valve inside the building, or 18 inches inside the building, whichever is shorter.

Any Portion Contains Lead	Contains Galvanized Previously Connected to Lead	Unknown			Contains neither Led nor Galvanized Previously Connected to Lead	Total
		Likely Contains Lead	Likely Does Not Contain Lead	Material(s) Unknown		
			198		45	243

Unregulated contaminants are those for which EPA has not established drinking water standards. Monitoring helps EPA to determine where these contaminants occur and whether it needs to regulate those contaminants.

Unregulated Contaminants Detected in Water at Entry point to Distribution System

Contaminant	Year of Test	Unit of Measure	Highest level detected	Lifetime Health Advisory (LHA)	Likely Source of Contamination
Sodium	2020	ppm	32	NA	Erosion of natural deposits

All sources of drinking water are subject to potential contamination by substances that are naturally occurring or man made. These substances can be:

Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
Pesticides and herbicides, which may come from a variety of sources such as agriculture and residential uses.
Radioactive contaminants, which are naturally occurring or be the result of oil and gas production and mining activities.
Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, an can also come from gas stations, urban storm water runoff, and septic systems
Total Coliform: The Total Coliform Rule requires water systems to meet strict limits for coliform bacteria. Coliform bacteria are usually harmless, but their presence in water can be an indication of disease-causing bacteria. When coliform bacteria are found, special follow-up tests are done to determine if harmful bacteria are present in the water supply. If this limit is exceeded, the water supplier must notify the public by newspaper, television or radio.

All drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a

health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline at 1-800-426-4791.

MCL's are set at very stringent levels. To understand the possible health effects described for many regulated constituents, a person would have to drink 2 liters of water every day at the MCL level for a lifetime to have a one-in-a-million chance of having the described health effect.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbiological contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

We ask that all our customers help us protect our water sources, which are the heart of our community, our way of life and our children's future.
Please call our office if you have questions.
Carsonville Village Hall (810) 657-9400

Copies of this report will not be mailed.
Copies of this report are available at Village of Carsonville, Village Hall at 4140 E. Chandler St. or visit us online at www.villageofcarsonville.org

APPENDIX D
WATER USE SUMMARY

PREPARED FOR:

VILLAGE OF CARSONVILLE

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

Project No.: 837230

Monthly Village Water Supply Data			
	Monthly Total (Million Gallons)	Max Day (Gallons)	Projected Peak Hour (MGD)
Feb-19	1.26	52,000	0.10
Mar-19	1.36	53,000	0.11
April-19	1.15	59,000	0.14
May-19	1.18	51,000	0.12
June-19	1.10	69,000	0.17
Jul-19	1.43	140,000	0.27
Aug-19	1.62	103,000	0.18
Sep-19	1.64	127,000	0.21
Oct-19	1.28	61,000	0.13
Nov-19	1.36	65,000	0.13
Dec-19	1.37	58,000	0.12
Jan-21	1.43		
Feb-21	1.27		
Mar-21	1.39		
Apr-21	1.33		
May-21	1.53		
Jun-21	1.92		
Jul-21	1.64		
Aug-21	1.64		
Sep-21	1.33		
Oct-21	1.23		
Nov-21	1.20		
Average (2019 & 2021)	**1.39**	**76,000**	**0.15**
Maximum (2019 & 2021)	**1.92**	**140,000**	**0.27**

APPENDIX E
ENGINEERS OPINION OF PROBABLE COST

PREPARED FOR:

VILLAGE OF CARSONVILLE

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

Project No.: 837230

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

Summary Table Engineer's Preliminary Opinion of Probable Project Costs

Alternative	Anticipated Project Year	Project Cost	Annual OM&R Cost	Net Present Worth of OM&R Cost (1)	Total Present Worth	Salvage Value	Net Present Worth
Alternatives							
Alternative 3B - Two New Wells	**2026**	**$1,170,000**	$70,000	$1,476,000	$2,646,000	$318,000	**$2,328,000**

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

(1) Discount rate -0.500%

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

Engineer's Opinion of Probable Project Cost [1]

Project:	Carsonville Water System Improvements	*Project No.*	837230
Basis for Estimate:	[X] Conceptual [ ] Basis of Design [ ] Final	*Estimator:*	MHW
Work:	**Improvements to the Existing System**	*Date:*	4/24/2025
	Alternative 3B - Two New Wells	*Current ENR-CCI:*	

Item	Description	Unit	Qty.	Unit Price	Amount
Drilling New Wells					
1	New Wells	EA	2	$40,000	$80,000
2	Aquifer Testing	LS	1	$10,000	$10,000
3	Observation Wells	EA	2	$10,000	$20,000
4	New Well Pump and pitless adapter	EA	2	$60,000	$120,000
5	New Wellhouse	SFT	384	$250	$96,000
6	Wellhouse Mechanical and HVAC	LS	1	$20,000	$20,000
7	Electrical and Controls (Well D & E)	LS	1	$0	$0
8	Standby Generator and ATS	LS	1	$40,000	$40,000
9	Wellhouse Piping	LS	1	$15,000	$15,000
10	Painting	LS	1	$15,000	$15,000
11	Gas and Electric Service	LS	1	$25,000	$25,000
12	6" RAW Watermain from Wells to WTP	LF	2,700	$100	$270,000
13	WTP Building Improvements	LS	1	$30,000	$30,000
14	Electrical and Controls (Well C)	LS	1	$5,000	$5,000
15	Flow Meter	EA	2	$6,000	$12,000
16	Well C Chemical Feed Equipment Upgrades	LS	1	$40,000	$40,000
17	Well Abandonment (A and B)	EA	2	$10,000	$20,000
18	SCADA System	LS	1	$40,000	$40,000
				Construction Total:	**$900,000**
1	Construction Contingency		10%		$90,000
2	Engineering		18%		$162,000
3	Legal, Administration, & Financial		2%		$18,000
				Total Project Cost:	**$1,170,000**

Notes:

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

APPENDIX F
PUBLIC PARTICIPATION DOCUMENTS

PROOF OF PUBLICATION
PUBLIC HEARING NOTICE
PUBLIC ATTENDING THE HEARING
PROJECT PLAN SUBMITTAL
RESOLUTION OF PLAN ADOPTION
PUBLIC HEARING AUDIO RECORDING
(UNDER SEPARATE ENCLOSURE)

PREPARED FOR:

VILLAGE OF CARSONVILLE

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

Project No.: 837230

AFFIDAVIT OF PUBLICATION
TIMES HERALD MEDIA
911 Military, Port Huron 48060

State of Michigan, County of Macomb } *ss*

IN THE MATTER OF:

VILLAGE OF CARSONVILLE
4140 E. CHANDLER ST.
CARSONVILLE, MI 48419

Notice Of Project Plan Public Hearing

The Village of Carsonville will hold a public hearing on the proposed project plan for the purpose of receiving comments from interested persons.

The hearing will be held at 6:00 p.m. on June 20,2022, at the Village of Carsonville 4140 E. Chandler Street, Carsonville, Michigan 48419.

The purpose of the proposed project is to construct a new elevated water storage tower, install new water meters, new raw water wells, and water treatment plant upgrades.

Project construction will involve constructing a new water tower, new raw water wells, new water meters and water treatment plant upgrades.

Impacts of the proposed project will improve water quality, system reliability within the community. Short term construction related impacts include increased noise and dust during construction of the improvements.

The estimated project cost for the project has been estimated at $3.9 Million Dollars. The project will be financed with low interest loans, grants, and principal forgiveness.

Copies of the plan detailing the proposed project are available for inspection at the Village of Carsonville 4140 E Chandler Street, Carsonville, Michigan 48419.

Written comments received before the public hearing will be entered into the public hearing record and should be sent to the Village of Carsonville 4140 E Chandler Street, Carsonville, Michigan 48419.

Susan Heberling
Village of Carsonville - Clerk

PTH-5276825 05/27/2022

Being duly sworn, says that he/she is authorized by the publisher of The Times-Herald, to swear that a certain notice, a copy of which is annexed here to, was published in the following publication:

1. Published in the English language for the dissemination of general and/or legal news, and
2. Has a bonfide list of paying customers or has been published at least once a week in the same community without interruption for at least 2 years, and
3. Has been established, published and circulated at least once a week without interruption for at least one (1) year in the community where the publication is to occur.

The Times-Herald, 05/27/22

Tyra Smith

SUBSCRIBED AND SWORN TO BEFORE ME THIS 27th DAY OF May; 2022

GINA ANNE HUFF
Notary Public State of Michigan
County of Livingston
My commission expires March 9, 2023

Acting in the County of Macomb

0005276825, 8106579400VILL

LSJ-PTH-The Times-Herald

NOTICE OF PROJECT PLAN PUBLIC HEARING

The Village of Carsonville will hold a public hearing on the proposed project plan for the purpose of receiving comments from interested persons.

The hearing will be held at 6:00 p.m. on Tuesday June 28th, 2022, at the Village of Carsonville 4140 E. Chandler St., Carsonville, Michigan 48419

The purpose of the proposed project is to construct a new elevated water storage tower, install new water meters, new raw water wells, and water treatment plant upgrades.

Project construction will involve constructing a new water tower, new raw water wells, new water meters and water treatment plant upgrades.

Impacts of the proposed project will improve water quality, system reliability within the community. Short term construction related impacts include increased noise and dust during construction of the improvements.

The estimated project cost for the project has been estimated at $3.9 Million Dollars. The project will be financed with low interest loans, grants, and principal forgiveness.

Copies of the plan detailing the proposed project are available for inspection at the Village of Carsonville 4140 E. Chandler St., Carsonville, Michigan 48419.

Written comments received before the public hearing will be entered into the Public Hearing record and should be sent to the Village of Carsonville 4140 E. Chandler St., Carsonville, Michigan 48419.

Village of Carsonville

DWSRF Project Plan Public Hearing
June 28, 2022

Names and addresses of public who attended:
See Attachment

Written Comments received:
None

Name & Address 6-28-2022

Mary Goss
53 S Arthur St
Carsonville Mi 48419

Rosemary Turk
3686 Lakeshore Rd
Lexington, mi 48450

- 125 S. Main St
Carsonville, mi 48419

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
FINANCE DIVISION

EGLE

DRINKING WATER STATE REVOLVING FUND
PROJECT PLAN SUBMITTAL

Part 54, Safe Drinking Water Assistance, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended

Name of the Project

Water Wells,Treatment and Storage Improvements

Applicant's Federal Employer Identification Number (EIN)

38-6030925

Legal Name of Applicant (The legal name of the applicant may be different than the name of the project. For example, a county may be the applicant for bonding purposes, while the project may be named for the particular village or township it serves.)

Village of Carsonville

Areas Served by this Project

Counties

Sanilac

Congressional Districts

10th

State Senate Districts

25

State House Districts

83

Address of Applicant

Street Address

4140 E. Chandler St.

PO Box

City	State	Zip
Carsonville	Michigan	48419

Population Served by the Water Supplier

510

Water Supply Serial Number (WSSN)

01180

Brief Description of the Project

New wells,well house, new raw water line, abandon 2 wells, demo ex. water tower, new elevated water tower, new water meters, new hydrants

Estimated Total Cost of the Project

$3,900,000

Construction Start Target Date

11/09/2023

Name and Title of Applicant's Authorized Representative

Name

Bob Kress

Title

DPW Director

Telephone

(810) 657-9400

E-mail Address

(810) 657-9400

carsonville_dpw@yahoo.com

Address of Authorized Representative - if same as address above, check here ☑

Street Address

PO Box

City State Zip

Signature of Authorized Representative	**Date**
Robert Kuhr	6/28/22

State approval of the water supplier's Surface Water Intake Protection Program is attached (if applicable) check here ☐

State approval of the water supplier's Wellhead Protection Program is attached (if applicable) check here ☐

Joint Resolution of Project Plan Adoption/Authorized Representative Designation is attached check here ☑

A final project plan, prepared and adopted in accordance with the Department's *Drinking Water State Revolving Fund Program Project Plan Preparation Guidance*, must be submitted by July 1st in order for a proposed project to be considered for placement on Michigan's Project Priority List for the next fiscal year.

Please send your final project plan with this form to your EGLE Water Infrastructure Financing Section Project Manager. Electronic submittal to Project Manager is acceptable.

WATER INFRASTRUCTURE FINANCING SECTION
FINANCE DIVISION
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
P O BOX 30457
LANSING MI 48909-7957

A RESOLUTION ADOPTING A FINAL PROJECT PLAN FOR WATER SYSTEM IMPROVEMENTS AND DESIGNATING AN AUTHORIZED PROJECT REPRESENTATIVE

WHEREAS, the Village of Carsonville *(legal name of applicant)* recognizes the need to make improvements to its existing water distribution system; and

WHEREAS, the Village of Carsonville *(legal name of applicant)* authorized Fleis & VandenBrink Engineering *(name of consulting engineering firm)* to prepare a Project Plan, which recommends the construction of New wells,well house, new raw water line, abandon 2 wells, demo ex. water tower, new elevated water tower, new water meters, new hydrants;

WHEREAS, said Project Plan was presented at a Public Hearing held on 06/28/2022 and all public comments have been considered and addressed;

NOW THEREFORE BE IT RESOLVED, that the Village of Carsonville *(legal name of applicant)* formally adopts said Project Plan and agrees to implement the selected alternative (Alternative) Alternative 3B.

BE IT FURTHER RESOLVED, that the DPW Director *(title of the designee's position)*, a position currently held by Bob Kress *(name of the designee)*, is designated as the authorized representative for all activities associated with the project referenced above, including the submittal of said Project Plan as the first step in applying to the State of Michigan for a Drinking Water State Revolving Fund Loan to assist in the implementation of the selected alternative.

Yeas (names of Members voting Yes): 5

Nays (names of Members voting No): 0

I certify that the above Resolution was adopted by Village of Casonville (the *governing body of the applicant)* on 6/28/2022.

BY: Susan Hebeding — Village Clerk

Name (please print or type) — Title

Susan Hebeding — 6/28/2022

Signature — Date