Project Planning Document

Water System Improvements

Prepared for

Village of Schoolcraft

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22200322

Prein&Newhof

Contents

1 EXECUTIVE SUMMARY

The Village of Schoolcraft (Village) owns and operates a public water supply consisting of two treated groundwater wells, one elevated storage tank, and a distribution system that serves approximately 1.0 square miles and an estimated population of 1,454 (2020 census). The water system has operated reliably without any health-based violations in the last five years. By completing a Water System Reliability Study (WSRS, Appendix A), Asset Management Program and Capital Improvement Plan (AMP/CIP, Appendix B), and updates to the Capital Improvement Plan (Appendix C), the Village has prioritized the following water system improvements for completion in the next five years:

a. Lead Service Line Replacements
b. Under Sized Water Main Replacements
c. New Well Siting

The purpose of the Project Planning Document (PPD) is to demonstrate the needs for the 20-year period, conduct alternatives analysis, estimate project costs, conduct environmental evaluations, and include the public in the planning process. This PPD is prepared on behalf of the Village of Schoolcraft, Kalamazoo County, Michigan, for the purpose of obtaining a Drinking Water State Revolving Fund (DWSRF) loan from the State of Michigan Department of Environment, Great Lakes, and Energy (EGLE) for the construction of improvements to the Village of Schoolcraft water system.

A summary of recommended projects to fill the project need is shown on Figure 1 and summarized in Table 3.

2 INTRODUCTION

The Village is located in Kalamazoo County. The Village consists of a mix of residential, commercial, and industrial properties. The Village water system is supplied by two existing wells located in Schoolcraft Township, with a firm capacity of 0.72 million gallons per day (mgd).

The existing water distribution system contains approximately 14 miles of water main with variety of age, size, and material.

The presence of lead service lines is likely, particularly for customers connected to older water main. The Village has made concerted efforts in recent years to identify aging water main and lead service lines for replacement and wishes to continue this work utilizing DWSRF funds.

Specifically, the Village has prioritized areas of undersized cast iron water mains that are beyond their design life. The selection of projects was determined by the 2023 WSRS, 2017 AMP and CIP, and the 2023 updates to the CIP.

2.1 Study Area Characteristics

2.1.1 Delineation of Study Area

The service area of the Village of Schoolcraft water system is confined within the extent of the Village incorporated boundary and is shown in Figure 1. No new areas of service are anticipated in the next 20-years; however, growth within the area of service is expected.

2.1.2 Land Use

The current Zoning Map is included in Appendix D. The area affected has mixed land use, with both residential and urban areas as well as industrial zoning. According to the Master Plan the Village does not expect zoning changes for the project area.

2.1.3 Population Data

The historical and projected population for the Village of Schoolcraft is shown in Table 1. Population projections were based on data from the U.S. Census Bureau. The population of Village of Schoolcraft is projected to increase by about 0.36% percent annually from 2020 to 2042. The U.S. Census population for 2020 for the Village is 1,454 persons.

2.2 Water Demand

A comprehensive review of the Village of Schoolcraft water system is contained in the 2023 Village of Schoolcraft Water Reliability Study. That study concluded that the system has adequate supply for both current and future demands. Replacement of undersized water main is intended to provide service to existing customers and does not impact the existing or projected water demands of the system.

2.3 Existing Facilities

A map of the existing water system is included in Figure 2.

2.3.1 Water Supply

The Village of Schoolcraft supplies its customers with water pumped from two municipal wells with a total pumping capacity of 1.44 mgd and a firm capacity of 0.72 mgd. Wells #3 and #4 are located on the western side of the Village on Cass Street, next to the railroad tracks and behind the DPW building. Fluoride, chlorine, and polyphosphate are added to Wells #3 and #4.

Currently Well #4 is operating at a capacity of 387 gpm, which is lower than its rated capacity of 500 gpm. Well #4 currently pumps at 370 gpm, which is lower than its rated capacity of 500 gpm.

When maximum day demand reaches 80-percent of the firm production capacity, the Michigan Department of Environment, Great Lakes, and Energy (EGLE) typically recommends planning for supply expansion. Currently, the firm production capacity is 0.72 mgd and the projected maximum day usage for the year 2042 is 0.341 mgd, far less than 80-percent of the system's firm capacity.

2.3.2 Water Treatment

The water supplied by the Village of Schoolcraft's distribution system meets all regulations established in the State of Michigan Safe Drinking Water Standards.

2.3.3 Water Distribution Mains

The existing wells are connected to customers via the distribution system consisting of some large diameter transmission (10-inch, 12-inch) pipes as well as some undersized pipes (4-inch, 6-inch). Most of the distribution system consists of 4-inch, 6-inch and 8-inch diameter pipes. The distribution system contains a fair amount of older cast iron and asbestos cement water main installed from the 1950s – 1970s and is past its design life. A full characterization of the distribution system is included in the 2023 WSRS, attached in Appendix A.

2.3.4 Storage Facilities

Schoolcraft owns and maintains one elevated storage tank with a 250,000-gallon storage capacity. The tank was constructed in 1991 and is located at the corner of Lee Avenue and East Eliza Street. A full characterization of the distribution system is included in the 2023 WSRS, attached in Appendix A.

2.3.5 Service Lines

The Village has identified the presence of lead services lines in the distribution system. Amendments to Michigan's Lead and Copper Rule were enacted by the State of Michigan in 2018 including requirements pertaining to lead service lines. To comply with the new regulations, the Village completed a Preliminary Distribution System Materials Inventory (PDSMI) and is in the process of completing a verified inventory by January 1, 2025. It is estimated that approximately 365 water services are classified as lead service lines.

The Village is actively conducting projects and planning future work to comply with the replacement requirements of 5% per year on average. The Village intends to complete 18 lead service line replacements in 2023. The Village currently has a DWAM grant and is in the process of conducting field verifications of service line materials by potholing and in-home verification in order to submit a complete DSMI to EGLE by January 1, 2025. Other service line materials known to be in the system include copper.

2.3.6 Meters

The Village changes out meters every 15-20 years, with the most recent change occurring between 2006 and 2010.

2.3.7 Operations and Maintenance

Hydrant flushing is performed in the spring and the fall, and every hydrant is operated. Village personnel inspects all hydrants and identifies necessary repairs during hydrant flushing. The Village keeps records of hydrant activities. Hydrant flushing allows stagnant water to be discharged from the system, improving reliability of water quality.

The Village does not currently follow a formal valve exercising program. The Village maintains a schedule/checklist to track the progress of the routine maintenance.

2.3.8 Design Capacity

The water system design capacities are outlined in the 2023 WSRS in Appendix A. Supply capacity with the existing wells is adequate, with 2022 maximum day demands estimated at 47% of the firm capacity of 0.72 mgd.

2.4 Summary of Project Needs

The replacement of lead service lines and aging/undersized water main have been prioritized for increased public health protection and water system reliability. Lead service line replacements are needed to maintain compliance with the Michigan Safe Drinking Water Act (SDWA). For efficiency, projects were prioritized from previous studies that accomplished multiple goals, such as replacing aging and undersized water main while also replacing adjacent lead service lines.

The following criteria were considered during development of this PPD:

2.4.1 Standards Compliance and Reliability

The Village's water system has not incurred any violations of acute or non-acute water quality standards. Aging infrastructure remains the highest priority as outlined in the 2019 AMP, 2023 WSRS, and 2022 CIP.

Compliance with the SDWA requires replacement of known or suspected lead service lines at an average rate of 5% per year. Schoolcraft estimates there remain over 365 lead services as defined by the SDWA.

2.4.2 Orders of Enforcement Action

No orders of enforcement exist with EGLE for the Village's water system.

2.4.3 Water Quality

Aging water mains lose reliability and increase the risk of pipe failure. Loss of pressure from pipe failure can impact water quality through entry of contaminants into the failed pipe, or via backflow in customer connections. In addition, the presence of lead service lines increases the risk of lead entering the drinking water. The proposed projects would help address these water quality issues for the Village of Schoolcraft residents in the project area.

2.4.4 Projected Needs for the Next 20 Years

The Village has continued to refine and utilize the 2023 CIP, using the asset management principles of probability and consequence of failure. Appendix C contains excerpts of the latest 2023 CIP and provides a detailed list of long-term projects.

3 ANALYSIS OF ALTERNATIVES

The following is an evaluation of alternatives to fulfill the project need as identified above. The analyses are grouped by project type for efficiency.

3.1 Lead Service Line Replacements

The Village has prioritized the need for replacement of existing lead service lines as required in the SDWA. Below is an evaluation of alternatives to fulfill this project need.

3.1.1 No-Action – Lead Service Line Replacements

Existing lead service lines must be replaced to continue to remove potentially harmful lead materials from the water system. Furthermore, the Michigan SDWA and Administrative Rules require that all lead service lines must be replaced by 2041 at an average of 5% per year. Therefore, the no action alternative was not considered further.

3.1.2 Optimum Performance of Existing Facilities – Lead Service Line Replacements

Existing lead/galvanized water service lines are not considered eligible for optimum performance by the SDWA and must be replaced in full. Lining of service lines is not acceptable to EGLE for purposes of compliance. Therefore, this alternative was not considered further.

3.1.3 Regional Alternatives – Lead Service Line Replacements

Existing customers served by lead/galvanized water service lines cannot be otherwise served through a regional alternative. Therefore, this alternative was not considered further.

3.1.4 Routing Options – Lead Service Line Replacements

Service line installation and routing options will be considered during the design phase. Routing options are restricted by the location of the water main and the existing connection to the water customer plumbing.

3.1.5 Construction Methods – Lead Service Line Replacements

A variety of methods for service line installation have been considered including but not limited to:

3.1.5.1 Open Cut – Lead Service Line Replacements

Open cut/trenching of service lines is an available option. Trenching is often desirable for shorter service line installations where no obstructions exist, and directional drilling is not needed. Open trench installation is cost competitive in these conditions, even when considering the additional cost of restoring disturbed areas. For short service line installations without obstructions, this is the preferred method.

3.1.5.2 Directional Drill – Lead Service Line Replacements

This trenchless construction method offers benefits for service line installation, by minimizing disturbances to the ground surface and therefore restoration. It enables service line installation underneath obstructions such as roads, sidewalks, etc. It is also highly accurate by utilizing methods for steering the drilling machine. This is a preferred method for service line replacements in many cases.

3.1.5.3 Pipe Bursting – Lead Service Line Replacements

This trenchless construction method has been utilized in some service line installation projects in the past. However, it results in abandonment of existing materials below grade leaving toxic lead in the soil. This is not a preferred method.

3.1.5.4 Pipe Lining – Lead Service Line Replacements

There are existing technologies available to line service lines to reduce risk of lead exposure. However, these have been determined to be unacceptable by EGLE for compliance with the lead service line replacement requirements of the Michigan SDWA. This is not a preferred method.

3.2 Water Main Replacement Projects

Many of the project priorities in the 20-year capital improvement plan consist of replacing water distribution mains that are beyond their design life. These projects pair well with lead service line projects, and result in a more reliable water system and improved water quality. Following is an analysis of alternatives for this group of projects:

3.2.1 No-Action – Water Main Replacement Projects

The no-action alternative is unacceptable as the project need has determined the water mains are beyond their useful design life. An increased risk of breaks and leaks would lead to decreased reliability, and the potential for water system contamination.

3.2.2 Optimum Performance of Existing Facilities – Water Main Replacement Projects

For water distribution mains beyond their useful design life, optimization of existing facilities is not an acceptable alternative for mitigating the risk of breaks and leaks.

3.2.3 Regional Alternatives – Water Main Replacement Projects

The projects in this category are intended to provide direct service to water customers in the project area. Regional alternatives are not available for this intended purpose.

3.2.4 Routing Options – Water Main Replacement Projects

The projects in this category are intended to provide direct service to water customers in the project area. Routing options will be considered during project design but are limited to existing road rights-of-way for service to existing customers. The most efficient and reliable alignment will be selected for the proposed water main and will be submitted to EGLE for approval with a permit application under the SDWA.

3.2.5 Construction Methods – Water Main Replacement Projects

A variety of methods for construction have been considered including but not limited to:

3.2.5.1 Open Cut

Traditional open cut methods of excavation are used extensively in the West Michigan area for installation of most underground public utilities. Although the Village is a more urban setting, the traffic volumes on many of the roads are not excessive enough to warrant the generally more expensive trenchless technologies currently used today. Open cut is the preferred method of water main replacement construction and is also necessary for targeted excavations during water main abandonment.

3.2.5.2 Directional Drill

Directional drilling is the process of using a small, steer-able steel pipe that is guided under the soil to create a pilot hole. The pipe is guided by above-grade monitoring equipment that tracks the depth and location. Once the guided head reaches its location, the host pipe is attached and pulled back through the pilot hole.

Horizontal Directional Drilling (HDD) is more cost effective when trying to avoid surface disruptions and there are few services requiring digging up and tapping. In the case of the proposed projects in this PPD, water services are located very close together requiring numerous access pits to be dug. Another problem in the tight urban environment is the location of numerous other utilities within the right-of-way. To avoid them with directional drilling, the main would be installed deeper than the standard 5 to 6 feet resulting in a less accessible and maintainable water main for the Village. This option will not be pursued for water main replacement; however, it will be considered and used extensively during water service replacements.

3.2.5.3 Pipe Bursting

Pipe bursting is another trenchless method of pipe replacement where a new pipe of the same or larger diameter is pulled through the existing host pipe while "bursting" the deteriorating pipe. Access is needed on both ends of the pipe. A hydraulic machine would then pull the new pipe back toward the receiving pit behind the bursting head, which breaks up the brittle host pipe to make space for the new one. Pipe bursting is often used to replace water services from the property line to inside the house with minimal disturbance to the private property. It is less commonly used for replacement of larger diameter pipes such as water mains.

Pipe bursting of water main is cost effective when the water main will not be in the roadway. With pipe bursting, every service tap, valve, tee or other fitting requires digging up to install. Due to the number of excavations required to replace water services in the dense urban setting, pipe bursting will not offer a significant advantage. Pipe bursting will not be considered in this application.

3.2.6 Pipe Material – All Water Main Projects

Polyvinyl chloride (PVC), Polyethylene (PE), and ductile iron are the three most common water main materials for the pipe in the 6-inch to 16-inch diameter range.

3.2.6.1 Polyvinyl Chloride (PVC) Pipe / Polyethylene (PE) Pipe Water Main

PVC and Polyethylene pipe is manufactured from petroleum derivatives, chlorine gas, and vinyl chloride. PVC/Polyethylene is known to have a probable negative impact on the environment by their production. Not only is PVC/Polyethylene an environmental concern, but these pipe materials are also sensitive to other natural environmental impacts like ultraviolet light exposure, temperature, etc. According to UNIBELL, the nationally recognized authority on PVC/Polyethylene, the impact resistance of PVC/Polyethylene pipe is reduced by approximately 20 percent when exposed to ultraviolet light for extended periods of time.

The installation of PVC/Polyethylene is sensitive to the type of materials used for bedding the pipe in the trench. The strength of PVC/Polyethylene comes from supporting the pipes from the centerline of the pipe and below. This requires close attention to proper compaction of the necessary granular pipe backfill. PVC/Polyethylene pipe has been known to deflect under static loads of the soil column to the point of bursting. Since PVC/Polyethylene is sensitive to installation compared to ductile iron, the cost associated with the installation of the material is generally more than ductile iron. However, polyethylene piping is generally regarded as cost effective.

Another drawback to PVC/Polyethylene is its ability to allow hydrocarbons from contaminated soils or chemical spills to permeate the PVC/Polyethylene and possibly contaminate the drinking water.

PVC/Polyethylene materials are more difficult to locate because current locating technologies rely on the magnetic properties of the pipe material. Locating PVC/Polyethylene pipe materials may require the installation of a magnetic tracing wire that can be avoided in other construction activities. The tracer wire can also corrode over time making locating the pipe more difficult. This can have a negative impact on local residents, since locating the water main would require a greater amount of excavation.

Due to the above concerns, PVC and Polyethylene pipe materials will not be further considered for the proposed projects for use as a water main.

3.2.6.2 Ductile Iron Water Main

Ductile iron pipe has been used in the construction of new water main since the late 1970's. According to the Ductile Iron Pipe Research Association, ductile iron pipe is thirteen times more impact resistant than similar pipe constructed of PVC/Polyethylene.

Ductile iron pipe is ferrous and more easily located by current locating technologies. Ductile iron pipe allows more protection from hydrocarbon contamination and chemical spills. The cost of installing ductile iron pipe may be slightly less than PVC since ductile iron pipe is less dependent on the surrounding soils for its strength. The materials for manufacturing ductile iron pipe are more environmentally friendly than PVC pipe and Polyethylene pipe since it is made from recycled steel.

There are numerous advantages of using ductile iron pipe over PVC/Polyethylene for water main; therefore, ductile iron pipe will be utilized in the construction of the proposed selected water main projects.

3.3 New Well Siting

The Village has prioritized the need for an additional well site to provide an alternative water source to the Village. Below is an evaluation of alternatives to fulfill this project need.

3.3.1 No-Action – New Well Siting

The existing Wells #3 and #4 are within 50 feet of each other and within 50 feet of an existing railroad. In the event of ground water contamination or damage to the well house and associated infrastructure, both Wells#3 and #4 would be affected. Therefore, the no action alternative was not considered further.

3.3.2 Optimum Performance of Existing Facilities – New Well Siting

The intent of the new well site is to provide an alternative ground water source for the Village, optimization of existing facilities is not an acceptable alternative for mitigating the risk of contamination or damage to the existing wells.

3.3.3 Regional Alternatives – New Well Siting

The nearest regional provider of drinking water is the City of Portage. Connection to this system would include three miles of transmission main and pressure booster stations to provide the Village with adequate water. This alternative would cost double the amount of drilling a new well within or near the Village and would require the City of Portage to agree to operate and maintain the system. Therefore, this alternative was not considered further.

3.3.4 Routing Options – New Well Siting

The Village has pursued a number of different properties within the Village of Schoolcraft and Schoolcraft Township for a new well site. All routing options to connect the new well site and the existing system will be limited to the public rights-of-way. A route will be established once the Village has found a suitable site for the new well.

3.3.5 Construction Methods – New Well Siting

The new well site will include the drilling of test and production wells, sampling of the ground water, open cutting installation of water main to connect the wells to the existing system, construction of a new well house and associated site work, paving of a service drive and general restoration.

3.4 Additional Projects over the 20-year period

3.4.1 New Main Loop Projects

As identified in the 2023 CIP and 2023 Water Reliability study, there is a need to construct new water main to connect multiple dead-end mains throughout the Village. Over the next 20 years, the Village is considering the construction of approximately 2,900 feet of new water main to improve water quality and increase fire protection by closing dead ends throughout the system. This work would include transmission mains ranging from 8-inch to 12-inch.

4 IDENTIFICATION OF PRINCIPAL ALTERNATIVES

4.1 Monetary Evaluation

Detailed cost estimates for the principal alternatives are included in Appendix E. A present worth analysis comparing alternatives was not completed because project alternatives do not meet the project need. For water main replacement projects, the do-nothing alternative and optimizing performance of existing do not resolve the project need of addressing aging infrastructure that is unreliable. This also applies to lead service line replacement projects.

4.2 The Environmental Evaluation

Pursuant to EGLE guidelines, several cultural and environmental organizations were contacted during preparation of the PPD. A cursory review was completed for impacts to environmental and cultural resources, and correspondence with these entities is included as noted below. The following is a discussion on the potential cultural or natural environment impact because of the proposed construction activities. Additional analysis of the potential for environmental impacts is included in Section 6.

4.2.1 Cultural Resources

The areas that are served by the Village's water system are located in southern Kalamazoo County. The proposed projects are within previously developed areas. No historic or archaeological impacts are anticipated due to the construction of the proposed projects. According to the National Register of Historic Places, there are no structures that are designated for historic preservation within the Village.

Contact was made with the State Historic Preservation Office (SHPO). A field evaluation was completed by Orbis, which found no significant concerns. The submitted Section 106 application is included in Appendix F, and formal consultation with SHPO is underway.

Correspondence with the Tribal Historic Preservation Officers (THPO) has been made. A list of the consulted tribes is included in Appendix F.

4.2.2 Environment

Air Quality

National Ambient Air Quality Standards are health-based standards set by the United States Environmental Protection Agency (US EPA). The entire state of Michigan is in attainment for carbon dioxide, nitrogen dioxide, particulate matter, and lead. According to the "Air Now" forecast courtesy of EGLE, the primary pollutant in the Village of Schoolcraft is particulate pollution, but it is in attainment.

It is not anticipated that the proposed projects would facilitate the growth of residential or commercial development, since the projects are focused on rehabilitating existing water infrastructure. Therefore, these projects would not negatively impact the air quality in the affected areas.

Wetlands

No wetlands exist within the study area.

Coastal Zones

None of the proposed projects would take place in Great Lakes shorelands, coastal zones, or Coastal Management Areas.

Floodplains

None of the proposed projects would take place within FEMA Flood Zones.

Inland Lakes and Streams

None of the proposed projects would take place near inland lakes and streams. No bodies of water would be modified during the proposed projects.

Natural or Wild and Scenic Rivers

No designated wild, scenic, or natural rivers exist within the study area. The proposed projects would be located within the St. Joseph watershed.

Agricultural Resources

No prime farmland exists within the project area.

Fauna and Flora

Impacts to federally threatened and endangered species near and within the project area from the US Fish and Wildlife Service (USFWS) Information were studied through the Planning and Conservation System (IPaC). The Official Species List Letter from USFWS is provided in Appendix H and summarized below. The Verification Letter from USFWS is also provided in Appendix H and summarized below.

Species	*Category*	*Notes*
Indiana Bat	**Endangered**	**May affect, not likely to adversely effect**
Northern Long-eared Bat	**Endangered**	**May affect, not likely to adversely effect**
Tricolored Bat	**Prop. Endangered**	**No Effect**
Copperbelly Water Snake	**Threatened**	**No Effect**
Eastern Massasauga	**Threatened**	**May affect, not likely to adversely effect**
Mitchell's Satyr Butterfly	**Endangered**	**No Effect**
Monarch Butterfly	**Candidate**	**No Effect**

The USFWS Verification Letter clarifies the approval is contingent upon removal of trees in the project area inside the inactive season for Indiana bat, between October 1 and April 14. This will prevent adverse effects to the protected bat species. This restriction will be incorporated into the contract documents for construction during detailed design.

In addition, the Michigan Natural Features Inventory provided County-level data on State designated species for Kalamazoo County. This list is included in Appendix H. The proposed projects are not likely to have an adverse impact to the species listed based on a review of the project area.

Soils

No undisturbed soil would be affected by the proposed projects. The natural soils in the study area are dominated by loamy soils underlain by sand in the Schoolcraft Loam Association, as depicted by the Soil Association Map produced by Michigan State

University and the U.S. Department of Agriculture Soil Conservation Service in 1981. An NRCS Soil Survey is included in Appendix J.

4.3 Mitigation

Environmental adverse impacts for water main replacement and lead service line replacement are not anticipated and mitigation is not proposed at this time. Short-term mitigation measures such as soil erosion control or de-chlorination of water used for disinfection are considered incidental to the work and will minimize impacts during construction.

4.4 Implementability and Public Participation

The Village of Schoolcraft is the sole owner and operator of the public water system and maintains the legal authority and managerial capability to conduct the proposed projects. The principal alternatives identified herein will be presented to the public for input and discussion. Items of particular importance for the public to consider are financial burdens on the municipality, any competing uses of proposed sites, and impacts to the operations and maintenance of the water system.

4.5 Technical Considerations

The design and construction of water distribution mains will be conducted in accordance with applicable standards in the SDWA, as well as the Recommended Standards for Water Works by the Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers ("Ten States").

Replacement of lead service lines will also follow best practices including available guidance from EGLE regarding customer notification and education on flushing after replacement.

4.6 Areas of Contamination

There are several known contamination sites within the service area of the Village.

In order to maintain the quality of the below-grade environment and groundwater in the proposed project area, a review of Michigan's Environmental Mapper program by the Michigan Department of Environment, Great Lakes, and Energy's (EGLE) was reviewed. The sites in the area were plotted as shown in Appendix I. The environmental sites mapped include Baseline Environmental

Assessments (BEAs), Brownfield sites, Michigan Part 201 sites, active and closed underground storage tanks (UST), and leaking underground storage tank (LUST) sites. As shown in Appendix I, no sites of contamination are located within the proposed project areas where excavation is anticipated to complete the project.

5 SELECTED ALTERNATIVE

Based on a review of the existing facilities, identification of project needs, and analysis of alternatives, this section will present a detailed and comprehensive description of the selected alternatives. Figure 1 presents locations of the selected alternatives, which are described in general below.

5.1 Project No.'s 1-10: 4-inch Water Main Replacement – FY2024

See Table 3 for a complete summary of the selected alternatives, and Appendix E for detailed cost estimates. These projects were selected due to the existing water main size and age. These projects collectively include approximately 9,490 feet of 8-inch water main. They are replacing 4-inch main installed in the 1950s. The water main is undersized for peak demands and beyond its design life. These projects will provide increased capacity for flow and pressure and increased reliability of service to water customers. In addition, these water main replacement projects will include the replacement of 143 lead service lines (the remaining 222 of the estimated 365 lines will be addressed as a separate project below).

The estimated cost for these projects is $3,382,621 in 2022 dollars and $4,112,100 in 2026 dollars based on a 5% inflation rate.

5.2 Project No. 11: New Well Siting – FY2024

This PDD includes the installation of a new well site for an alternate source of ground water for the Village of Schoolcraft. This work will include the purchase of property, drilling of the test and production wells, construction of a well house and associated site work, installation of water main to connect to the existing system and construction of a service drive. The new well would provide a second source of drinking water for the Village.

The estimated cost for this projects is $1,603,125 in 2022 dollars and $1,948,700 in 2026 dollars based on a 5% inflation rate.

5.3 Project No. 12: Lead Service Line Replacement – FY2024

This PPD includes the replacement of 222 lead service lines spread throughout the Village of Schoolcraft. These are the remaining service lines that will not be addressed during water main replacement projects. These service lines have been identified as likely containing lead through the Village's PDSMI program. The replacement will include potholing of services to verify the material type, replacement of the service line from the water main to the house connection, restoration of the yard and sidewalk as necessary, and other miscellaneous items necessary to complete construction. These replacements will allow the Village of Schoolcraft to meet the requirements of the Lead and Copper Rule.

The estimated cost for the service line replacements is $2,470,125 in 2022 dollars and $3,002,500 in 2026 dollars based on a 5% inflation rate.

5.4 Project Schedule

The table below is a schedule for proposed Projects; the proposed water system improvements that are intended to be included as part of the Village's FY 2024 DWSRF Project. They would be funded under the fourth quarter of fiscal year 2024.

DWSRF Project (4th Quarter 2024)
Proposed Project Schedule

Milestone	Date
Hold Public Hearing	April 10, 2023
Submit Final PPD to EGLE	June 1, 2023
Receive Approval of PPD	September 2023
User Charge System Approved	October 2023
Plans and Specifications Approved	May 2024
Receive Construction Bids	August 2024
DWSRF Loan Closing	September 2024
Begin Construction	April 2025
Construction Completed	November 2026

5.5 Cost Estimates

Appendix E contains cost estimates for the selected alternatives for water system improvements. The project cost estimates include construction costs plus 35% for construction contingencies, legal, administrative, and project engineering costs.

5.6 User Costs

The Village anticipates funding the FY2024 projects with an estimated $9,063,300 DWSRF loan. Assuming a 1.875% interest rate for a 40-year period, the expected annual debt service for the loan, will be approximately $324,121 per year. The Village has 718 residential equivalent units. This translates to an annual cost of $451.42 per REU, or $37.62 per REU per month in the Village. User costs are outlined in Appendix E.

The Village has been working on financial plans to address needed capital improvement projects over the last several years. A more detailed rate analysis will be conducted if these projects are funded through the DWSRF. Payments on DWSRF loans are expected to be covered through rate adjustments. Consideration will also be given to ensuring rates are as affordable as possible for the community.

5.7 Overburdened Community

The Village of Schoolcraft does not qualify as an overburdened community under the DWSRF program.

5.8 Authority to Implement the Selected Alternatives

Implementation of the proposed project is based on the assumption that the project will be financed by a low-interest loan from the DWSRF program. The Village of Schoolcraft has the necessary legal, institutional, financial, and managerial resources available to ensure the construction, operation and maintenance of the proposed facilities. Water system construction will occur in either existing road right-of-way or obtained utility easements on private property. For water service replacements, the Village is under obligation to fund replacements on private property by the Michigan SDWA. In these instances, property access agreements are required to be secured for each property owner/resident.

5.8.1 Financials

The Village has been working on financial plans over the last several years to help address its capital improvement projects. A more detailed rate analysis will be conducted if these projects are funded through the DWSRF. Payments on DWSRF loans are expected to be covered through planned rate adjustments. Further details on rate increases are described in Section 5.5.

5.8.2 Design/Permits

FY2024 projects will be under design later in 2023 and into 2024 and will be submitted for necessary permits prior to the required deadline.

6 EVALUATION OF ENVIRONMENTAL IMPACTS

6.1 General

An evaluation for important resources in the project area was conducted, including Historical/Archaeological/Tribal resources, as well as natural resources such as wetlands, floodplains, streams, and habitat for threatened and/or endangered species. The anticipated environmental impacts resulting from the construction of the selected projects may include beneficial and adverse impacts, short and long-term impacts, and irreversible and irretrievable impacts. There may also be social or economic impacts from proposed projects that should be identified. The following is a discussion of the anticipated impacts of the selected projects on environmental resources identified.

6.1.1 Beneficial Impacts

- Construction and equipment manufacturing related jobs would be generated.
- Local contractors would have an equal opportunity to bid on the construction contracts.
- Reduced risk of lead exposure to residents with lead water services.
- Improvement of drinking water quality and reliability.
- Lower consumption of energy and natural resources due to decreased potential of water loss due to replaced water services.
- More reliable drinking water distribution system.

6.1.2 Adverse Impacts

- Some vegetation removal is likely.
- Noise and dust would be generated during construction of the project.
- Potential for increased exposure to lead in water during construction activities.
- Disruption of routine for residents when replacing water service on private property and inside houses.
- Increased traffic during construction.
- Use of energy and natural resources during construction.
- Potential for impacts to downtown historical district

6.1.3 Short and Long-Term Impacts

The short-term adverse impacts associated with construction activities would be minimal, and mitigable, in comparison to the resulting long-term beneficial impacts.

6.1.3.1 Short Term Adverse Impacts

- Traffic disruption.
- Dust and noise.
- Use of energy and natural resources.
- Increased risk of lead exposure during water service replacements.
- Construction safety hazards – the projects will be designed with the overall health and safety of construction workers and operators in mind, although construction site safety is the Contractor's responsibility.

6.1.3.2 Short Term Beneficial Impacts

- Construction and equipment manufacturing related jobs would be generated.
- Local contractors would have an equal opportunity to bid on the construction contracts.

6.1.3.3 Long Term Adverse Impacts

- None identified.

6.1.3.4 Long Term Beneficial Impacts

- A more reliable water distribution system.

- A water system with adequate flow and pressure for peak demands.
- Reduced risk of lead exposure for residents with lead water services.
- Lower operation and maintenance costs due to reduced risk of water main and water service breaks.
- Reduced water loss.

6.2 Analysis of Impacts

6.2.1 Direct Impacts

Impact to these resources will be avoided were possible. If impact is unavoidable, it will be minimized and mitigated, and necessary permits will be obtained.

6.2.1.1 Land-Water Interfaces

The EGLE Wetlands Map Viewer was utilized to look for potential wetlands that may be impacted by the proposed projects. A copy is provided in Appendix G, which indicates presence of wetland soils and some wetlands from NWI/MIRIS maps within the Village limits. However, all proposed work will be limited to existing road right of ways and in upland soils in urban areas. Based on this information, impacts to wetlands are not anticipated with the proposed projects.

The National Flood Hazard Layer FIRMette was obtained for the Village of Schoolcraft (effective 2/17/2010), and is included in Appendix G. The entire Village is mapped as a "Zone X", an area with minimal flood hazard, and no base flood elevation is given. The proposed work is located in upland areas within existing street right-of way and will not impact floodplain areas. In addition, a permanent change of grade is not being proposed. Based on this information, impacts to the floodplain are not anticipated with the proposed projects.

6.2.1.2 Construction Impacts

The construction of the proposed project is not anticipated to affect historic, archaeological, geographic, cultural or recreational areas, as most construction activities would be within road rights-of-way or previously disturbed soil. Previously referenced figures show the proposed construction locations for each project. Where service line replacement enters existing buildings, the existing foundation penetration will be utilized to ensure minimal impacts to the existing structures.

The projects will not detrimentally affect the water quality or air quality in the area, since water quality can be protected during construction using erosion control best management practices.

The proposed projects are not intended to extend or construct new road to previously undeveloped lands within the work areas. The proposed work is to replace or improve an existing water distribution system to better serve its existing customers.

Groundwater depths in the project area are expected to be a few feet below typical water main installation depth. If needed, dewatering will be performed to ensure excavations are controlled, safe, and sanitary. If extensive, additional investigation may be warranted for potential impacts to natural resources or adjacent private wells. Additional information on groundwater depths will be collected during detailed design.

6.2.1.3 Operational Impacts

The construction will be planned so that service disruptions to customers will be minimized. Communications with customers will be crucial to completing the lead service line replacement work on private property, which helps ensure customers are aware of the impacts of the work to their service.

6.2.1.4 Social Impacts

If DWSRF funding is provided for the proposed projects, user rates will require a burdensome change as they are already considered overburden. See Cost Analysis in Appendix E for further details on user costs.

As practicable, construction will be staged and scheduled so that residents have access to their home and business.

The DWSRF program requires competitive bidding for projects exceeding $50,000. This will allow a larger number of contractors to bid on the projects compared to projects that would be solicited to a short list of contractors. Construction related jobs may be created due to the amount of work anticipated to be completed in the next few years.

The water main will typically be installed outside the road surface, and may impact sidewalks and intersections of roadways to cross the road during construction. In most cases, portions of existing sidewalks and road crossings effected by water main construction will be replaced to their existing extents. The reconstruction of sidewalks and intersections will meet current ADA standards of compliance and improve safety.

6.2.2 Indirect Impacts

The proposed water facilities are sized to provide service for 20 years of future growth in the study area, based on current trends. Future growth in the study area will not greatly alter the character of the area. Future growth would be subject to conformance with the land use and zoning plans of the Village.

6.2.3 Cumulative Impacts

Providing a more reliable water distribution and well system with new updated equipment, pipes, and structures to the customers of the system is the primary cumulative impact anticipated from the construction of the project. Minimal short- and long-term environmental impacts are not anticipated to be cumulatively significant.

7 MITIGATION

7.1 Short Term Construction Related Mitigation

Standard procedures used in the construction industry will be included in the construction contract documents to mitigate construction activities.

7.1.1 Traffic Disruption

Water main replacement projects are located in the road rights-of-way where streets, parking areas and pedestrian facilities may be impacted. The components of each project will be coordinated carefully with residences and businesses in the area, and construction methods will be selected to minimize disruptions. Standard traffic and safety control devices such as barricades and lighted barrels will be in place to warn and protect residents during construction activities.

7.1.2 Dust and Noise

Dust control methods such as water and/or brine will be used to keep dust to a minimum. Haul roads and public roadways will be swept daily and maintained to assure residents access to the area. Construction equipment will be maintained in good condition to decrease noise.

7.1.3 Soil Erosion

Soil erosion and sedimentation control measures such as silt sacs and silt fence, will be part of the construction activities to prevent soil release and protect streams and wetlands.

7.1.4 Water Service Disruption

During construction of the water distribution system improvement projects, residents and businesses existing water services must be transferred to the water mains. In order to limit the negative impacts, communication with the public will be important. Notification will be provided 24 hours prior to any service interruptions to provide time to prepare for a short-term interruption. Coordination will be required to schedule times with the property owners to enter buildings and replace the water services.

The requirements outlined by EGLE for notification to residents will be strictly followed. Residents will be contacted by letter informing them of the upcoming project. Information will be provided to them about what to expect, what the service replacement will consist of, how to schedule an appointment and the risks of lead exposure during and after construction. Directions on how to flush the plumbing and clean aerators will be provided to the residents.

7.1.5 Potential Loss of Wildlife / Habitat

The water main replacement and lead service line replacement construction activities will occur in previously developed areas and existing roadway. Therefore, it is unlikely that these projects would impact habitats of the endangered and threatened species within the study area.

The one exception to the above statement is removal of mature trees greater than 5-inches diameter, which may represent potential habitat for threatened and/or endangered bat species identified by the USFWS. Reference Section 4.2.2 for more information on species identified, and the below section for plans to mitigate this potential loss of habitat.

7.2 Mitigation of Potential Long-Term Impacts

General construction activities in the water system improvements will prohibit the disposal of soils in wetlands, floodplains, or other sensitive areas. Catch basins will be protected on the distribution system where earth changing activities will take place to reduce sedimentation.

7.2.1 Habitat Loss

Mitigation of potential direct impacts of the project due to tree removal is planned to be through a seasonal restriction on tree removal. By restricting mature tree removal to the period between October 1 through April 14, impacts are mitigated as this is the hibernation season for the protected species.

7.2.2 Permits

Act 399 water supply system construction permits will be obtained. While it is not anticipated, permit applications can be submitted and permits obtained from the EGLE for wetlands (Part 303), floodplains (Part 31), and inland lakes and streams (Part 301) should they be determined necessary during detailed design of the projects.

7.2.3 Use of Natural Resources

As a result of the water main and water service construction, natural resources such as gravel, sands, oil, and fuels will be utilized and/or consumed. The long-term benefits for most of the proposed projects will result in reduced use of natural resources.

Recycled materials like scrap iron will be used to make the ductile iron water main pipe. This will require less use of iron ore that is mined from the ground. The use of erosion control measures will be composed of recycled or natural products that do not use (or use less) synthetic materials.

7.2.4 Energy Use

The use of energy is inevitable in operating well pumps, maintaining water distribution infrastructure, and producing materials used for construction. Using recycled or natural eco-friendly products as part of the construction process will use less energy compared to using nonrenewable resources. The use of the recycled and/or eco-friendly products will not completely mitigate the use of all energy, but it will offset a small percentage.

Energy use from pumping water through the system may be reduced slightly, through installation of new and appropriately sized water mains and service lines as well as abandonment of old (parallel) water mains.

7.3 Mitigation of Indirect Impacts

There are no major projected changes in the land use of the study area that would significantly impact water demands beyond the average daily demand projections and maximum daily demand projections. A copy of the zoning map for the Village is included in Appendix D. All projects are proposed in order to replace or improve existing water main and water service piping and well infrastructure. None of the proposed projects are located in areas where significant growth or land use changes are projected to occur.

The community's ordinances can be found on their website. General rules reflect EGLE permit requirements, such as storm water containment, and soil erosion and sedimentation control.

8 PUBLIC PARTICIPATION

8.1 Public Meeting

8.2

Tables

Table 1 - Historical and Projected Population

Year	Village of Schoolcraft
Historical Population[1]	
1940	823
1950	1,078
1960	1,205
1970	1,277
1980	1,359
1990	1,517
2000	1,587
2010	1,525
2020	1,466
Projected Population[2]	
2022	1,477
2027	1,503
2032	1,531
2037	1,558
2042	1,587

Notes:

[1] Historical population data from 1940 to 2020 is from the U.S. Census Bureau.

[2] Population projections through 2042 are based on projections in Table 2 from the 2018 Village of Schoolcraft Master Plan. Long term increases of 0.36% per annum were assumed.

Table 2 - Historical Water Use Data

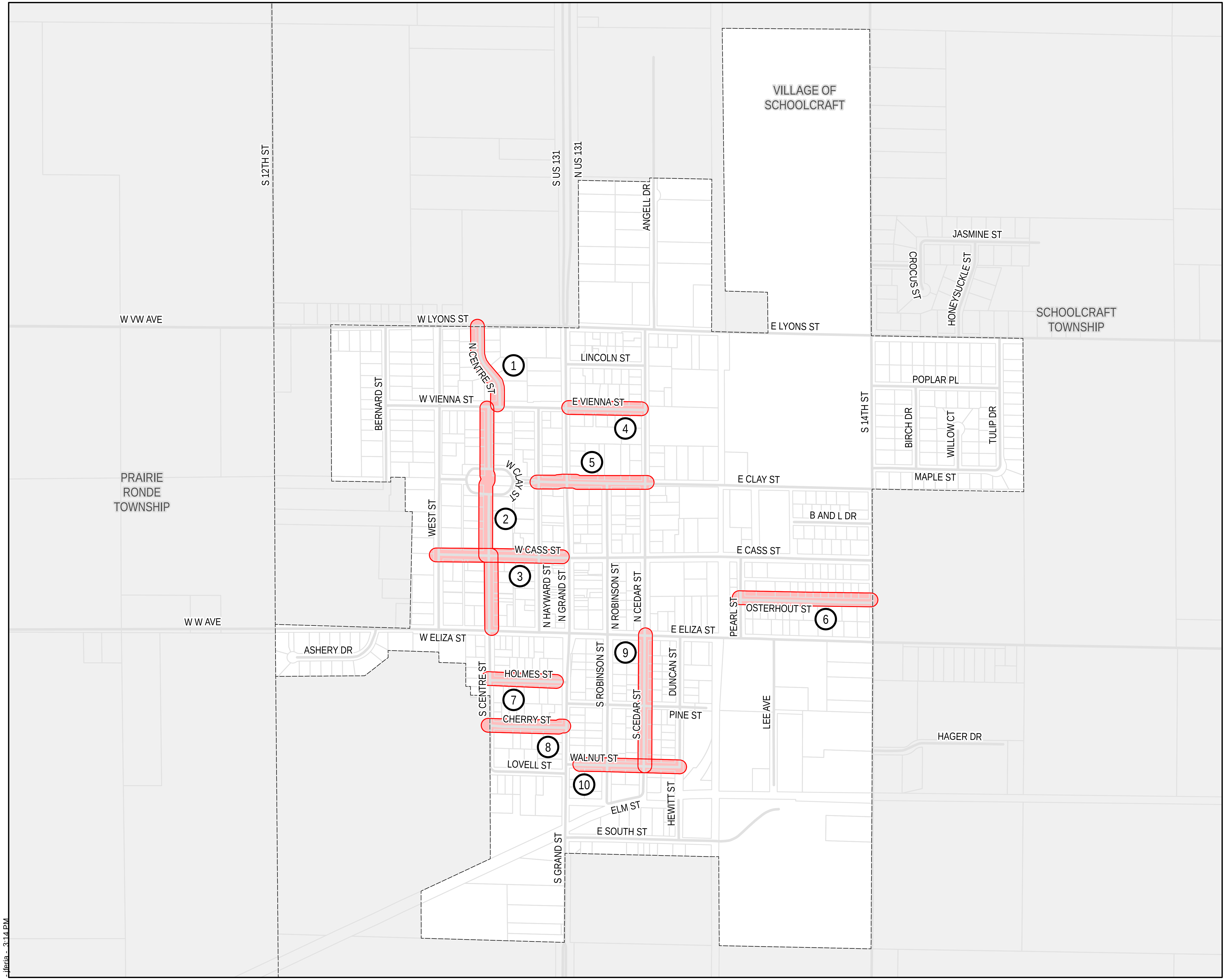
Year	Average Day Pumpage (mgd)	Maximum Day Pumpage (mgd)	Max/Avg Ratio
1997	0.253	0.492	1.94
1998	0.166	0.464	2.80
1999	0.202	0.518	2.56
2000	0.174	0.403	2.32
2001	0.179	0.504	2.82
2002	0.187	0.504	2.70
2003	0.179	0.520	2.91
2004	0.175	0.326	1.86
2005	0.179	0.418	2.34
2006	N/A	N/A	N/A
2007	N/A	N/A	N/A
2008	N/A	N/A	N/A
2009	N/A	N/A	N/A
2010	0.142	0.272	1.92
2011	0.143	0.227	1.58
2012	0.153	0.279	1.83
2013	0.140	0.246	1.76
2014	0.127	0.198	1.56
2015	0.125	0.225	1.80
2016	0.134	0.231	1.72
2017	0.135	0.317	2.35
2018	0.134	0.259	1.93
2019	0.120	0.285	2.38
2020	0.107	0.228	2.14
2021	0.102	0.217	2.12
5-yr Average	0.120	0.261	2.18
5-yr Max	0.135	0.317	2.38

Note: N/A indicates data not available

Table 3
Summary of DWSRF Projects

Project ID Code & Description	Existing Diameter (in)	Proposed Diamter (in)	Length of Project (Ft)	Year Installed	Cost	Future Costs - 2026
PROJECT #01: N Centre St (W Lyon to W Vienna) - Replacement	4	8	740	1957	$272,754	$331,600
PROJECT #02: N Centre St (W Vienna to W Eliza) - Replacement	4	8	1,920	1950	$639,623	$777,500
PROJECT #03: W Cass St (West to US-131) - Replacement	4	8	1,100	1930	$303,885	$369,400
PROJECT #04: E Vienna St (US-131 to N Cedar) - Replacement	4	8	585	1950	$227,489	$276,600
PROJECT #05: Clay St (N Hayward to N Cedar) - Replacement	4	8	735	1950	$299,039	$363,500
PROJECT #06: Osterhout St (Pearl to 14th) - Replacement / Loop	4	8	1,140	1930	$419,864	$510,400
PROJECT #07: W Holmes St (S Centre to US-131) - Replacement	4	8	600	1950	$220,590	$268,200
PROJECT #08: Cherry St (Centre to US-131) - Replacement	4	8	660	1950	$234,846	$285,500
PROJECT #09: S Cedar St (E Eliza to E Elm) - Replacement	4	8	1,140	1950	$448,038	$544,600
PROJECT #10: Walnut St (US-131 to Duncan) - Replacement	4	8	870	1950	$316,494	$384,800
PROJECT #11: New Well Siting	-	-	-	-	$1,603,125	$1,948,700
PROJECT #12: Lead Service Replacement - City wide	-	-	-	-	$2,470,125	$3,002,500
TOTAL					**$ 7,455,871**	**$ 9,063,300**

Figures



VILLAGE OF SCHOOLCRAFT

KALAMAZOO COUNTY, MICHIGAN

DRINKING WATER REVOLVING FUND

FIGURE 1: SELECTED WATER SYSTEM IMPROVEMENTS MAP

MAY 2023

Prein&Newhof

2220322

LEGEND

Project Area

Project Label

SCALE: 1 " = 800 '

VILLAGE OF SCHOOLCRAFT

KALAMAZOO COUNTY, MICHIGAN

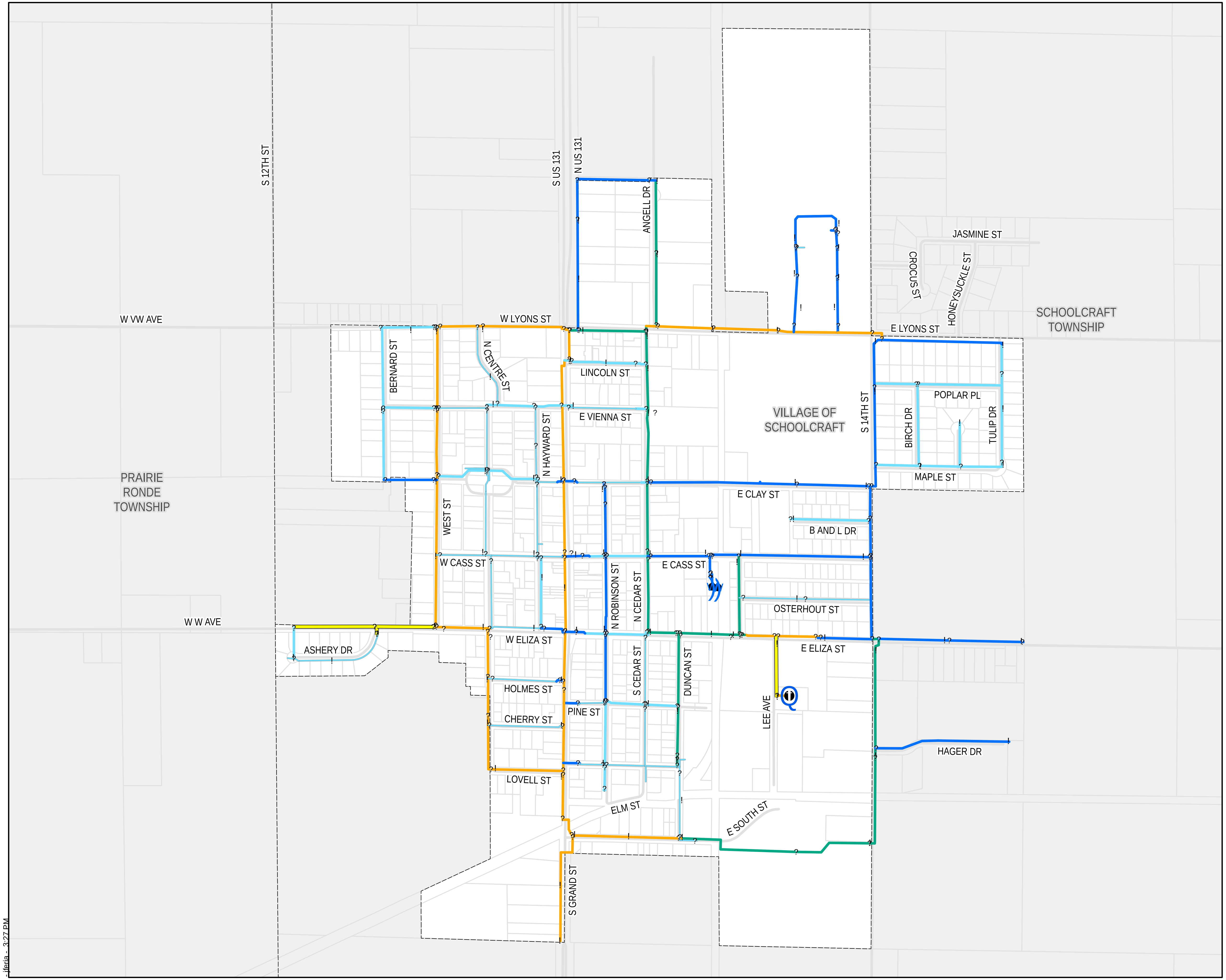
DRINKING WATER REVOLVING FUND

FIGURE 2: EXISTING WATER SYSTEM MAP

MAY 2023

Prein&Newhof

2220322



LEGEND

Water Main Diameter

- 4" and Smaller
- 6"
- 8"
- 10"
- 12"
- 16"
- Valve
- Hydrant
- Water Tank
- Well

SCALE: 1 " = 800 '

Appendix A

Water System Reliability Study

WSSN #0005970

Prepared for

Village of Schoolcraft

Kalamazoo County, Michigan

APPROVED

February 2023

2220665

Prein&Newhof

CONTENTS

Tables

Figures

Appendices

EXECUTIVE SUMMARY

This report represents the update to the full 2006 Water Reliability Study for the Village of Schoolcraft and the brief 2015 study. Improvements have been made to the system since that time. After reviewing the primary components of the water distribution system – water supply, distribution, and storage – the following conclusion could be made:

- The Village provides adequate water supply to customers for normal (non-emergency) system conditions.
- Existing maximum day demands have reached 60% of the firm supply capacity of the system (based on current well production). Under current demand projections, the 20-year maximum day demand will reach approximately 64% of the firm supply capacity. The current well capacity is sufficient to supply water to customers now and in the next 20 years.
- The Village provides fire protection to residential customers of 1,000 gpm for 2 hours and to non-residential customers of 2,000 gpm for 2 hours. Specific distribution and transmission system improvements have been recommended for improved fire protection in some areas of the system to meet these goals. Some areas of the system are aging, and continued distribution main replacement is recommended to maintain suggested fire flows and a high level of service.
- The system transmission is adequate, although additional redundancy of the primary transmission main is proposed for improved reliability.
- Existing storage is sufficient to supply equalization and fire storage (2,000 gpm for 2 hours) for existing, five-year, and twenty-year projected demands.
- The Village provides high quality water and has met the regulations for all known contaminants.
- The Village has completed a service line inventory in accordance with the lead and copper rule requirements. In the past they have completed inside inspections themselves but intend to contract it out in the future.
- Estimated water loss in the system has averaged 5% over the past two years which is a significant decrease from previous years, likely attributed to the well meter replacement in 2019. This estimated water loss is considered reasonable for this system. The Village should continue with the water accountability program to ensure that non-revenue water is minimized.

1 INTRODUCTION

The Village of Schoolcraft (Schoolcraft) is in Kalamazoo County in southwest Michigan. The village is located in Schoolcraft Township, approximately 13 miles south of Kalamazoo. Schoolcraft has a population of 1,454 (2020 Census) and covers about one squared mile. The Village operates and maintains the water supply. The existing system is shown in Figure 1.

The purpose of this report is to provide a reliability study for the Schoolcraft water system, which in turn is intended to fulfill specific requirements of Part 12 and Part 16 promulgated under Michigan's Safe Drinking Water Act, 1976, P.A. 399, as amended. The Act calls for a 20-year projection of water demands and an evaluation of each of the system components on a five-year interval.

Population projections and historical population data from the United States Department of Commerce, Bureau of Census (through the 2020 census), are included in this report. The water distribution system analysis identifies current and projected water demands and includes a computer assisted network analysis of the water distribution system.

Based on the analysis, recommendations for improvements to the water supply system are made and cost estimates are presented for the improvements.

Since completion of the last reliability study update in 2015, the Village has made the major improvement of redundancy at the well houses. Two new mains were installed from Cass Street. to the wells, with interconnections and valves, in order to provide continued service in the event of a water main or well failure.

2 WATER DEMANDS

Land use within the Village is mixed with a significant number of residential neighborhoods as well as some commercial and industrial areas. The main commercial area is located along the US 131 in the western part of the Village. As of 2022, the Village has 641 service connections and a customer population of approximately 1,466 people. Breakdowns of service connections by customer type are provided in the table below.

Service Connections by Customer Type

Customer Type	Meter Size							Total
	5/8"	3/4"	1"	1.5"	2"	3"	4"	
Residential	38	469	41	2	2	1	0	553
Commercial	4	31	21	6	3	3	1	69
Government	0	1	2	0	3	1	0	7
Other	2	7	2	1	0	0	0	12
Total	44	508	66	9	8	5	1	641

Source: Village of Schoolcraft

2.1 Population Projections

Population projections for Schoolcraft are shown in Table 1 and are graphically illustrated in Figure 2. Historical population data from 1970 to 2020 was taken from the U.S. Census Bureau. Population projections for the Village of Schoolcraft through 2042 were used to estimate future population growth. The projected annual rate of population increase for the Village of Schoolcraft was 0.36% when the projections were developed in 2020. Historical population growth has averaged 0.8% over the past ten years. The 0.36% annual growth rate was used for this study to project both population and system demands.

Historical water demand data for the service area is provided in Appendix A and summarized in Table 2. From this data and population projections, the following was projected into the future: average day demand, which is the average daily water use for the year; maximum day demand, which is the highest daily use for the year; and peak hour demand, which is the estimated maximum hour of water use during the year.

2.2 Average Day Demands

Historic water demand data for the service area was provided by Schoolcraft in the form of Monthly Pumpage Summary Reports for 2011-2021, as shown in Table 2. From this data, the average day demand was estimated.

Based on the historical high maximum day demand and an estimated maximum day demand multiplier of 2.4, the 2022 average day demand is estimated to be approximately 0.132 million gallons per day (mgd). By using the population growth projection of 0.36% annual growth for future water demands over the next twenty years, the 2042 average day demand is projected to be 0.142 mgd. Existing and projected average day water demands for the Schoolcraft water system are provided in Table 3.

2.3 Maximum Day Demands

The historic maximum day demands for the Schoolcraft water distribution system are shown in Table 2, while projected maximum day demands are presented in Table 3. The maximum day factor is a ratio comparing the average day demands to the maximum day demands. A maximum day demand factor of 2.4 was assumed to determine projected maximum day demands for the next twenty years. This demand factor represents the average maximum day demand factor experienced by the system over the past five years. The 2022 maximum day demand was determined to be approximately 0.317 mgd. The projected maximum day demand for 2042 is 0.341 mgd. Figure 3 graphically depicts the projected demands.

2.4 Peak Hour Demands

Peak hourly water demands are typically not recorded but can be estimated from instantaneous high service pump flows and storage tank elevations. Often residential water use has a relatively high peaking factor while industrial customers reduce the overall peaking factor since water use is often steadier during a typical day. A peak hour factor of 4 times the average day demand was used to estimate peak hour demands, based on similar communities. This peaking factor results in a 2022 peak hour demand of 0.528 mgd and a projected 2042 peak hour demand of 0.568 mgd. The peak hour projection has been included in Figure 3.

2.5 Billing Data

Billing data for the past five years was provided for the various classes of customers in the Village. Table 4 shows the residential class accounts for 75% of use. Commercial use is also significant with 21% of total water use. Data was also provided for the largest individual users which is contained in Table 5. While those high water users account for 8.9% of total water use, the overall demand remains predominantly residential.

3 WATER SYSTEM INFRASTRUCTURE

3.1 Water Supply Source

The Village of Schoolcraft supplies its customers with water pumped from two municipal wells. Wells #3 and #4 are located just east of the railroad tracks, south of Cass Street.

Details about the individual wells are contained in Table 6. Currently Well #3 has a rated capacity of 500 gpm but is only noted to pump at 387 gpm. Well #4 currently pumps at 370 gpm, which is less than its permit capacity of 500 gpm. The total capacity for the Village of Schoolcraft water system is 1.44 mgd however since the wells do not operate concurrently, the firm capacity is 0.72 mgd. Calculation of the firm and total capacities are provided in Table 7.

When maximum day demand reaches 80 percent of the firm production capacity, the Michigan Department of Environment, Great Lakes, and Energy (EGLE) typically recommends planning for supply expansion. Currently, the firm production capacity of the Village is 0.72 mgd and the projected maximum day usage for the year 2042 is 0.341 mgd, far less than 80% of the system's firm capacity. However, the Village should continue to monitor water usage.

The Sourcewater Protection Area data for the wells is also available in Appendix G.

3.2 Water Treatment

The water supplied by the Village of Schoolcraft distribution system meets all regulations established in the State of Michigan Safe Drinking Water Standards. Prior to entering the distribution network, the raw well water is treated with fluoride, chlorine for disinfection, and polyphosphate.

3.3 Water Mains

The Schoolcraft water system has a complex network of water mains providing transmission and distribution to its customers. The service area covers approximately 1.0 square miles and is supplied through a water distribution network consisting of approximately 14 miles of water mains ranging from 4 to 16 inches. An approximate breakdown of the water mains by size is presented in the table below.

Water Main Summary by Diameter

Water Main Diameter (inches)	*Approximate Length of Water Main (miles)*	*Percentage of Total (%)*
4 or less	2.7	19.1%
6	2.6	18.0%
8	3.6	25.2%
10	2.1	14.6%
12	2.9	20.6%
16	0.3	2.5%
Total	14.2	100.0%

Source: GIS Database.

A summary of water main age is provided in the following table and in Figure 4. About half of the system is more than 40 years old. The existing main is primarily ductile iron. An approximate breakdown of water main material is included below and in Figure 5.

Water Main Summary by Age

Year Installed	*Approximate Length of Water Main (miles)*	*Percentage of Total (%)*
1910s	0.1	0.7%
1950s	2.6	18.5%
1960s	0.9	6.2%
1970s	1.5	10.3%
1980s	2.1	14.7%
1990s	5.2	36.4%
2000s	1.9	13.2%
2010s	0.1	0.9%
2020s	0.0	0.0%
Total	14.2	100%

Source: GIS Database.

Water Main Summary by Material

Material	*Approximate Length of Water Main (miles)*	*Percentage of Total (%)*
Asbestos Cement	3.5	24.4%
Cast Iron	3.0	20.9%
Ductile Iron	7.6	53.7%
Iron	0.1	1.0%
Total	14.2	100.0%

Source: GIS Database.

Several areas which could be improved with addition or completion of transmission looping are indicated on Figure 6 and outlined in the General Plan, which is Figure 7.

3.4 Storage Facilities

Schoolcraft owns and maintains one elevated storage tank with a 250,000-gallon storage capacity. The tank was constructed in 1991 and is located near Lee Ave and East Eliza Street. Summaries of the storage facility and its operational setpoints are provided in Tables 8 and 9.

All vents, hatches, and screens are checked annually or biannually, and the water tower settings are the same for summer and winter. The Village keeps maintenance records for the storage tank. Inspection and interior and exterior painting dates are included in Table 8. The generators providing standby power to the pumps supplying the tank are detailed in Table 10.

4 WATER SYSTEM ANALYSIS

4.1 Water Storage Analysis

Ten State Standards states in Section 7.0.1: "Storage facilities should have sufficient capacity, as determined from engineering studies, to meet domestic demands and where fire protection is provided, fire flow demands."

With the Village's desire to provide fire protection to customers, a common practice is to determine the storage needs based on maximum daily demands, maximum hourly demands, and fire demands. An analysis was performed for these demands with consideration for the firm capacity of the water supply.

Table 11 show the results of the storage analysis. Under Year 2022 demands, the existing system can provide 2,000 gpm of fire demand for a two-hour duration.

The system-wide storage was also analyzed for Year 2042 demand projections to determine if additional storage will be required in the next twenty years to adequately supply the future system growth. The storage analyses presented in Table 11 show that the firm capacity of the existing supply and existing storage are sufficient to provide normal demand (equalization) storage plus 2,000 gpm of fire demand volume for two hours through the Year 2042.

While no requirements exist for fire protection, the Insurance Services Office (ISO) typically rates residential customers with a fire flow of 1,000 to 1,500 gpm and industrial customers with a fire flow of 3,500 gpm, depending on the industry and building, for full insurance credit. Since the Village has no major industrial customers, no additional storage is necessary at present to meet these limits.

4.2 Distribution System Analysis

The water supply network was analyzed using WaterCAD, a water distribution management and modeling software application integrated with AutoCAD. This software combines the ability to perform complex hydraulic computations and the ability to present results in a graphical format through its interface with AutoCAD. Model input data consisted of the following: lengths, diameters, and roughness factors (Hazen-Williams coefficients) for pipes, ground elevations and demands for nodes, and storage tank elevations and volumes.

4.2.1 Model Development

The existing WaterCAD model was updated to include recent water system improvements. Demands were entered into the model using the projections based on population growth and water use data.

To calibrate the model, hydrant testing results were used. A hydrant flow test measures the distribution capabilities of a system by measuring and comparing the static pressure at a given location under typical conditions and the residual pressure at that same location for a given hydrant flow. The test data provides information for model calibration; that is, model parameters can be adjusted so that predicted results compare favorably to measured results. In addition, the test data can provide information to determine locations at which a valve might be partially closed, or locations at which an unknown connection could exist.

The Village performed 6 fire hydrant flow tests with Prein&Newhof personnel on August 3, 2022. The results of these tests are shown in Table 12. The tests were performed using American Water Works Association (AWWA) test procedures at a variety of locations dispersed throughout the system. The tests provide data to adjust modeled roughness coefficients and demands to simulate results.

Using the hydrant test data, the model was calibrated as follows:

- Simulate system conditions using initial assumptions for parameters

- Adjust water main roughness coefficients and system demand distribution
- Perform a sensitivity analysis on adjusted results
- Fine tune results based on previous steps

Table 13 compares the calibrated model results at the nearest model node to the field test results at the test hydrant sites. Tank levels and pump flows were also recorded during the hydrant tests.

The model reasonably simulates the hydrant test results. Static and residual pressures are within 2 psi at all hydrant test locations. In general, the calibration results are relatively accurate. Given that hydrant model simulations cannot account for fluctuations in demands, the calibration results are considered reliable.

4.2.2 Existing System

Using the calibrated model, simulations were performed for various demand conditions. Resulting pressures were reviewed to determine the adequacy of the system under high demand. Pressures during non-emergency conditions should not fall below 35 psi, nor should pressures in the system exceed approximately 90 psi.

The available fire flow is generally the standard by which a system is measured since that is typically the highest demand experienced. The available fire flow represents the flow available at a given location without creating a low-pressure problem anywhere in the system. The minimum system pressure which should be maintained at all times is 20 psi. While recommended fire flows vary based on many factors, the generally suggested fire flows are 1,000 to 1,500 gpm for residential customers, 2,500 gpm for commercial customers, and 3,500 gpm for industrial customers.

Table 14 provides results of simulations for existing conditions. This table shows the results for average day and maximum day pressures and the available fire flow. The locations shown represent a cross-section of areas across the Schoolcraft water system as well as critical areas and noted areas of concern.

Results indicate that pressures are generally adequate throughout the system. The model results show that the system transmission capacity is adequate; however, in some areas, the available fire flows are less than suggested due to undersized distribution main or dead end mains.

Pressures are greater than the desired 35 psi in all locations. As stated above, some areas served by older 4-inch or 6-inch diameter mains cannot achieve the recommended suggested fire flow of 1,000 gpm for residential areas.

Appendix B includes output of the model results.

4.2.3 Future Conditions

Using the model, simulations were performed for Year 2042 conditions to determine where improvements to the existing infrastructure may be needed. All water main Hazen-Williams coefficients were reduced by 10 percent to simulate aging. Resulting pressures and available fire flows were reviewed to determine the adequacy of the existing system under future demands.

Table 15 provides a summary of model results with Year 2042 demands and the existing infrastructure. The results indicate that pressures would still be adequate into the future, but the available fire flows will be further reduced from existing fire flow capabilities because of the additional demands on the system from the projected growth of the service area over the twenty-year period. As a result, potential improvements were analyzed to improve the fire protection in some locations. Figure 7, the General Plan Map, shows the areas within the system modeled as having less than recommended available fire flow under maximum day demands.

4.2.4 Distribution System Improvements

Based on the results of the existing system analysis with future demand projections, improvement alternatives were considered. Several alternatives were considered and then selected and prioritized based on the most cost-effective alternatives to enhance fire protection and overall service.

Each of the following improvements would provide improved reliability of flow to the system.

Hewitt Street and Walnut Street Improvements

The available fire flow in Walnut Street ranges from 500 to 1,500 gpm. To boost the available fire flow, we recommend replacement of the 4-inch main with a 12-inch main on Hewitt Street from Walnut to East South Street. This would also serve to close the transmission loop (between the 10-inch mains). In addition, we recommend an 8-inch main on Walnut from Duncan Street west to the 8-inch stub near South Grand Street. These sections of watermain increase the available fire flow to 3,500 gpm (Projects 7 and 11).

Cass Street Replacement

Fire flows at the intersection of West Cass Street and North Centre Street are less than 600 gpm in some locations. To increase the available fire flow and replace an aging main, we recommend a project to remove the 4-inch main on West Cass Street from West Street to North Grand Street and construct 1,050 feet of 8-inch main (Project 1). One alternative considered was to replace the 4-inch main on North Centre Street from West Clay Street to West Eliza Street with new 8-inch main.

B and L Drive Improvements

The available fire flow at the end of B and L Drive is 950 gpm. To boost the available fire flow, loop the dead end main by constructing 280 feet of 8-inch ductile iron main from the dead end to the north (Project 14). One alternative that retains the dead end main configuration is to replace the 6-inch main with an 8-inch main. Regardless, this is a lower priority project since the available fire flow is near 1,000 gpm.

Ashery Drive Improvement

Available fire flow at the second hydrant on Ashery Drive is 350 gpm. To boost the available fire flow and remove an old 4-inch main, replace 900 feet of 4-inch main from WW Avenue to the cul-de-sac (Project 12).

4.2.4.1 Old and Deteriorating Mains

Schoolcraft has many 4-inch and 6-inch mains installed prior to 1970 which may be deteriorating and restricting flow in some locations. Any mains found to be deteriorating or breaking should be replaced, when possible, in conjunction with road improvement projects. Specific mains that are planned for replacement along with lead service replacement are as follows:

- West Cass Street, West Street to US 131
- Hayward Street, from West Cass Street to West Clay Street
- West Clay Street, from Hayward Street to U S131
- East Vienna Street, from US 131 to Cedar Street
- Cherry Street, from US 131 to South Centre Street
- Holmes Street, from US 131 to South Centre Street
- West Vienna St., from North Centre St. to West St.
- North Centre Street, from West Vienna Street to West Clay Street
- Osterhout Street, from Pearl to North 14th Street
- Walnut Street, from Duncan Street to US 131
- Clay Street, from US 131 to North Cedar Street
- South Cedar Street, from East Eliza Street to Elm Street
- East Cass Street, from the Well House to Pearl Street

These sections of old 4-inch main are planned for replacement in the short-term. They are represented by Projects 1 through 10.

Model simulations were performed with potential improvements included. Simulation results with all the recommended improvements for Year 2042 demands are summarized in Table 16. The General Plan in Figure 7 shows areas with less than recommended fire flow as well as recommended improvements through 2042.

Results show that the available fire flows throughout the system with the improvements meet the general suggestions for fire protection. All model input and output are included in Appendix B, which also includes a map showing node numbering in the model. Appendix F provides pressure contours in the system both under maximum day demands and 1,000 gpm of fire flow.

5 RELIABILITY ISSUES

5.1 Redundancy

Redundancy in the water distribution system ensures the Village can maintain a desired level of service even in the event of an emergency, water main break, or planned system maintenance. Key aspects of system redundancy include a looped water transmission system and backups for critical distribution system components such as pumps and storage.

5.1.1 Water Supply

Two wells are available to supply water to the distribution system, so only one well can be out of service without losing water supply. Since the wells are in close proximity and both draw from the same field, they are vulnerable to the same potential contamination.

As recommended in the 2006 Reliability Study and in the priorities of the 2017 Water Asset Management Plan, the investigation of the placement of a new well field should continue.

5.1.2 Water Transmission

It is important that the transmission system has redundancy via looping from the wells to the storage tank in case of an emergency such as a water main break. Currently, only a single 8-inch transmission main conveys water from the wells to the distribution network. The operation and maintenance of the main from the wells is critical because the main transmission line is not adequately looped. Water would not have a sufficient means to reach the remaining distribution network if the transmission main failed.

The Village currently owns and operates approximately 5.3 miles of transmission main. As shown on Figure 6, there are some gaps in the transmission network that could be closed to improve system reliability.

5.1.3 Storage

Schoolcraft's water system currently has 0.25 million gallons of storage in one storage tank. The system does not have redundancy if the tank is out of service.

5.1.4 Emergency Interconnections

The Village has no emergency interconnections that can be used to supply water to the Village in the event of an emergency.

5.1.5 Backup Power

Both wells are served by a permanent 60 kW natural gas generator. Standby power capacity for each well is provided in Table 10.

5.2 Water Quality

The Village performs bacteriological, chemical, lead and copper, and radiological monitoring of the finished water and has had no maximum contaminant level (MCL) exceedances. The Annual Water Quality Report is included in Appendix C and additional Water Quality Data is included in Appendix D.

5.2.1 Per- and Polyfluoroalkyl Substances (PFAS)

Per- and Polyfluoroalkyl Substances (PFAS) have been a recent focus in drinking water as well as other environmental sectors as a group of man-made chemicals that are not easily destroyed in the environment and are not easily removed in treatment. Many of the chemicals in the PFAS group have been identified as having increased health risks at relatively low levels in drinking water..

It is anticipated the EPA will be considering federally established MCLs in the coming years. Due to the lack of federally established maximum contaminant levels (MCLs), the regulatory landscape varies across state lines and is frequently shifting. Effective August 2020, Michigan established regulatory MCLs for six PFAS chemicals through amendment to the Michigan Safe Drinking Water Act. Community water supplies are now required to sample finished water for PFAS.

The Village of Schoolcraft water supply was tested, and the sample results show that the total tested PFAS (PFOA plus PFOS) sample were non-detect in each case.

5.2.2 Lead and Copper Rule

The U.S. Environmental Protection Agency (EPA) requires that systems monitor the water at customer taps for the presence of lead and copper. If lead or copper exceed an action level of

15 parts per billion (ppb) and 1.3 parts per million (ppm), respectively, the system may be required to replace lead service lines or take other steps to protect the public health.

Based on the service line inventory there are estimated to be a total of 630 service lines in the Village. Of those lines 271 of them do not or likely do not contain lead. There are 39 which are of an unknown material whereas 320, or about 50%, have portions which contain lead or are galvanized pipes that were previously connected to lead.

5.3 Deteriorating Mains

Pipe suppliers indicate that water main is expected to last more than 100 years. However, depending on the material, design parameters, soils, proper construction, water chemistry, and associated breaks that occur, etc., a pipe may need to be replaced sooner. Thus, the condition of water main should be observed and tracked. The Village has old asbestos cement and cast iron pipes which they continue to monitor. When necessary, water main should be replaced for improved system reliability. There has only been one main break in the recent past, approximately 14 years ago near West Vienna Street and North Centre Street.

Approximately 40-percent of the water system was constructed prior to 1970. Operators should continue to document signs of main deterioration when possible and deteriorating water mains should be replaced in conjunction with other street or utility projects. The Village has already identified several sections of 4-inch watermain for replacement. These are listed in Section 5.2.4.1 and as projects in Section 7.1.

5.4 General Maintenance

The water distribution system and its assets are maintained by Schoolcraft. General maintenance of equipment and facilities enhances overall system reliability.

5.4.1 Flushing Program

Hydrant flushing is performed twice a year - once in the spring and once the fall. Village personnel inspects all hydrants and identifies necessary repairs during hydrant flushing. The Village keeps records of hydrant activities. Hydrant flushing allows stagnant water to be discharged from the system, improving reliability of water quality.

5.4.2 Valve Exercising Program

The Village does not currently have a formal valve exercising program. Valve exercising programs enhance the reliability of the system and improve public protection. The recommendation is to maintain a schedule/checklist to track the progress of the routine maintenance. The Village should update its valve records to include specific information for individual valves. This valve information should include the following: ID, location (with witness points), type, size, normal operating status (open or closed), condition, direction of turn, number of turns, and date of last inspection.

5.4.3 Meter Testing Program

The Village changes out meters every 15 to 20 years with the most recent change-out occurring between 2006 and 2010. This program helps to maintain accurate customer billing with the potential to increase system revenue and accountability.

5.4.4 Cross Connection Program

The Village contracts with Hydrocorp for its cross-connection program for commercial and industrial customers. The program is in accordance with the EGLE rules and regulations, including following report requirements. The program includes installation of backflow prevention devices, site protection through containment and isolation, testing of backflow prevention devices, and facility inspections.

5.4.5 Well Inspections Program

The Village has a well maintenance program with an inspection completed annually by Peerless Midwest Inc.

5.4.6 Water Shortage Response Plan

The Village currently has a Water Shortage Response Plan which is included in Appendix E.

5.4.7 Water Accountability Plan

The Village has a program to track billed and unbilled water usage. Unbilled sources of water use should continue to be estimated, including water used during hydrant flushing, fires, main leakage, and street sweeping, as well as others. In the past five years, the Village has averaged 16% of water pumped from the wells that is unaccounted for and unbilled, as shown in Figure 8 and in the table below. However, the most recent two years are significantly lower with only 5% unaccounted and unbilled. This is most likely due to the change out of the well meters completed in 2019.

Water Accountability

Year	Total Pumped (MG)	Billed (MG)	Known Unbilled[1] (MG)	Unaccounted (%)
2017	49.13	35.88	0.8	25.3%[2]
2018	49.03	35.70	0.8	25.6%[2]
2019	43.76	33.68	0.8	21.2%[2]
2020	38.90	36.32	0.8	4.6%
2021	37.31	34.51	0.8	5.4%
Average	43.625	35.217	0.8	16.4%

Note:
1. The Village tracks and estimates unbilled water use for the following: firefighting, hydrant flushing, other City use, and other miscellaneous use, with approximately 0.7 MG for hydrant flushing and 0.1 MG of use by the fire department each year.
2. The drop in water unaccounted for after 2019 likely attributed to change in well meters.

Water loss within the range of 10-percent is considered to be average for comparable water distribution systems. Since 2017, the Village has averaged 16% water loss, however the most recent two years are much improved from that average.

6 RECOMMENDATIONS FOR IMPROVEMENTS

The following categories of improvements to the Schoolcraft Water System were used to prioritize the recommended system improvements.

<u>Improvements to Address Problems with Existing Infrastructure</u>

- Comply with Federal and State Regulations
- Improve general level of service
- Improve redundancy of transmission

<u>Improvements Required to Expand Service for Projected Growth</u>

- Improvements to existing infrastructure to serve new areas

- Improvements which would enhance the level of service

Recommendations have been separated into projects and general improvements based on the above criteria and demand projections. Recommendations developed herein are intended to improve the overall supply and increase available fire flows to customers. These projects should be completed in conjunction with road projects, when possible.

6.1 Recommended Projects

Project 1: Replace 2,050 feet of old 4-inch main on West Cass Street, West Street to US 131; Hayward Street, from West Cass Street to West Clay Street; and West Clay Street, from Hayward Street to US 131 (2023)

Project 2: Replace 600 feet of old 4-inch main on East Vienna Street, from US 131 to Cedar Street (2024)

Project 3: Replace 670 feet of old 4-inch main on Cherry Street, from US 131 to South Centre Street (2025)

Project 4: Replace 670 feet of old 4-inch main on Holmes Street, from US 131 to South Centre Street (2026)

Project 5: Replace 1,000 feet of old 4-inch main on West Vienna Street, from North Centre Street to West Street; and North Centre Street, from West Vienna Street to West Clay Street (2027)

Project 6: Replace 1,150 feet of old 4-inch main on Osterhout Street, from Pearl Street to North 14^{th} Street (2028)

Project 7: Replace 1,000 feet of old 4-inch main on Walnut Street, from Duncan Street to US 131 (2029)

Project 8: Replace 730 feet of old 4-inch main on Clay Street, from US 131 to North Cedar Street (2030)

Project 9: Replace 1,160 feet of old 4-inch main on Cedar Street, from East Eliza Street to Elm Street (2031)

Project 10: Replace 240 feet of old 4-inch main on East Cass Street, from the Well House to Pearl Street (2032)

Project 11: Construct 650 feet of 12-inch main on Hewitt Street from East South Street to Walnut Street (2034)

Project 12: Construct 850 feet of 8-inch main on Ashery Drive from West W Avenue to the cul-de-sac (2038)

Project 13: Construct 1,100 feet of 8-inch main on Maple Street from North 14th Street to Tulip Drive (2040)

Project 14: Construct 300 feet of 8-inch main in alley from B and L Drive to East Clay Street (2042)

6.2 General Recommendations

6.2.1 Dead End Mains

Whenever possible, dead end mains should be looped. Water tends to become stagnant in dead end mains, often affecting the quality of water provided to nearby customers. Thus, whenever feasible, dead end mains should be removed by closing loops, thereby improving the circulation of water and adding reliability. Additionally, removing dead ends will also improve fire protection by providing a second supply route for distribution to the area.

6.2.2 Reliability Study

Update the Water System Reliability Study within five years. Given the uncertainty of growth, demand projections should be reviewed periodically.

6.2.3 Water Quality

The Village should continue to monitor water quality and proceed with lead service line replacement regulations.

6.2.4 Flushing Program

The Village should continue to implement the spring and fall flushing program and make modifications based on its effectiveness to ensure all hydrants are operable and in good condition.

6.2.5 Valve Exercising Program

The Village should develop a valve exercising program.

6.2.6 Water Accountability Plan

The Village should continue with its water accountability plan to account for unbilled water usage. Continuous tracking and development of the program is recommended as results may signal whether a source of lost revenue exists and may ultimately help identify the source.

6.2.7 Meter Testing Program

The Village should continue to implement its meter testing and change-out program to help maintain accurate customer billing and to maximize system revenue. While every system can be different, the typical recommended testing/calibration/change-out period for commercial meters is every 3 years, and 10 years for residential meters.

6.2.8 Cross Connection Program

The Village should continue with its cross-connection program and upgrade efforts to continue meeting the cross-connection control standards as outlined by EGLE.

6.2.9 Replace Older Mains

As operators observe water mains to be deteriorating, such as experiencing significant main breaks or tuberculation, they should be considered for replacement in conjunction with other street and utility projects. Projects 1 through 10 outlined in Section 6.1 are such replacements.

6.2.10 Water Shortage Response Plan

The Village has a Water Shortage Response Plan for use in the event of a water shortage emergency. The Village should continue to update the plan as needed to maintain preparedness in case of emergency.

6.2.11 Water Supply Capacity/Redundancy

As water system demands approach 80% of the firm supply capacity, the Village should investigate additional water supply alternatives. Another well would also provide redundancy of water supply since all the water comes from the same well field and is vulnerable to contamination.

7 COST OPINIONS

An Opinion of Project Costs has been prepared for each project. Costs for projects of similar size and scope that have been constructed in southwest Michigan were reviewed for relevant information.

The Cost Opinions have been prepared including an allowance of approximately 35% above the estimated construction cost. This allowance is intended to include the cost of construction contingencies (issues which are presently unknown), legal fees, engineering design and construction services (including preliminary and final design, soil borings, topographic survey, bidding assistance, construction staking, compaction testing, construction inspection and project administration during the entire project) and administrative expenses related to the project.

It has been assumed that land is available for construction of the described improvements. No provision has been made in the cost estimate for cost of land or right-of-way purchase or easements.

Cost Opinions for recommended projects are included in Table 17.

Appendix B

2019 Asset Management and Capital Improvement Plan (excerpts)

WATER ASSET MANAGEMENT PLAN

Village of Schoolcraft, MI

June 2017

Where we're going: System Goals

INTRODUCTION

About this Document

This document is our Water Asset Management Plan. It defines the goals and guiding principles for our asset management activities. With input from our community, the Asset Management Plan will be maintained through a joint effort of our staff, administration, and elected officials. We will update our Plan on a 5 year schedule to ensure its relevancy and effectiveness.

A companion document, our Water Asset Management Program, shows how we will apply the principals of asset management to achieve the goals outlined in this Asset Management Plan.

Our Commitment

Our community water system is a complex set of components that we operate and maintain in a way that provides us with clean and reliable drinking water. That system includes assets such as wells which supply our water, a water treatment plant which filters and purifies the water, tanks which provide storage, and a pipe network which distributes our water. As members of our community, each one of us helps pay for the operation, maintenance, and replacement of those system assets through our utility rates. In effect, we are all owners of the water system. As the system owners, we commit to proactively manage our system assets and make decisions based on long term lifecycle cost.

Asset Management Principals

All infrastructure deteriorates with age and requires proactive management to operate, maintain, repair, and eventually replace each physical component, or asset. This progression over time from routine operation and maintenance through repairs and eventual replacement is the asset's life cycle. Waiting to perform maintenance or make repairs can save money in the short term but may decrease the life cycle of an asset. On the other hand, replacing an asset before it fails may not take full advantage of the asset's value. It is this balance which puts the decisions for operations, maintenance, repair, and replacement actions at the heart of asset management.

Asset management is an evaluation of needed actions after considering the condition of an asset, the consequences of an asset failure, and the action alternatives available. The solution that provides lowest life cycle cost at the desired level of service is implemented.

Contents

Prepared by

ENGINEER:
Prein&Newhof
[2160224]

FINANCIAL ADVISOR:
UMBAUGH

PART 1: DEFINING OUR GOALS – WHAT IS OUR DESIRED LEVEL OF SERVICE?

Our mission is to provide clean potable water for our community by proactively managing our water source, treatment, storage, and distribution assets to meet our desired level of service goals.

Our community, as the system owners, must determine the level of service we want from our system. Many factors play into this determination including: compliance with regulations, public health, aesthetics, service reliability, stable rates, etc. To this end, we have established the following primary goals:

Goal 1: Meet Regulatory Requirements

Our water system provides high-quality drinking water which meets or exceeds all regulations established in the Michigan Safe Drinking Water Act. Our system operators routinely test for contaminants in the drinking water according to Federal and State laws. We strive to achieve continued compliance with environmental regulations and provide the cleanest, safest water achievable with the treatment facilities we have.

Goal 2: Minimize Service Interruptions

Service interruptions from water main breaks, repair operations, and asset replacements are an inevitable part of operating a water system. However, by proactively managing and investing in our system, we can minimize how often these interruptions occur.

Goal 3: Minimize Public Hazards

Water main breaks can cause significant damage, not only to the streets above the mains but also to adjacent utilities and property. Additionally, water main breaks may result in boil-water requirements and/or other use restrictions. The American Water Works Association offers a goal guideline of 15 water main breaks per 100 miles of distribution water main. Our system contains 14.25 miles of water main and our goal is to have less than 3 breaks per calendar year.

To limit the potential damage from main breaks, we will maintain staffing levels to provide emergency response services 24 hours per day, 7 days a week.

Goal 4: Provide Enhanced-Fire Protection in the Distribution System

In accordance with the American Water Works Association Standards Manual of Water Supply Practices M31, we must decide if we want to size our drinking water system to provide water for firefighting. Firefighting can be accomplished using water brought to each site by the fire department and we can provide enhanced fire protection by oversizing our water system to allow the use of drinking water as a supplementary firefighting supply. Our system, at a minimum, must be designed to provide for the maximum expected demand for non-firefighting uses (domestic use, commercial uses, manufacturing, etc.). There is no legal requirement that we oversize portions or all of our water mains or water storage to allow the use of drinking water for firefighting.

Oversizing can increase the amount of time water sits within the system (when we are not using it for firefighting) which can create water quality issues in the system.

We will evaluate the desired levels of enhanced fire protection in each area of our community. Based on lifecycle costs, water quality considerations, the risks in various areas of our community, and the capabilities of our fire department, we will determine what level of enhanced fire protection is desired in various areas.

Goal 5: Minimize Water Loss

Water loss is often a significant source of lost revenue. We monitor the volume of pumped water and billed water which allows an accounting of potential leaked water. Causes of known, unbilled water loss include fire-fighting, hydrant flushing, and main breaks. Other water loss may occur through inaccurate water meters and leakage in the system. The American Water Works Association notes that the average water system can expect up to 10 percent water loss on an annual basis through the various causes of water loss. We will operate and maintain our system to meet the goal of 10 percent or less of annual water loss.

Goal 6: Identify and Replace Lead/Galvanized Water Services

In the early part of the 20th Century, many water systems utilized lead and galvanized metal for water service connections. Later in time, copper services became the norm for use on the public systems. However, lead and galvanized metal may still have been used within homes beyond the point of the public service connection. Under certain conditions, lead and galvanized water services may corrode and adversely affect water quality. We will locate lead and galvanized water services and implement a program to replace them.

Goal 7: Minimize Life Cycle Costs

The best financial decisions are those which achieve the lowest life cycle costs. This means we consider the full life cycle of each investment each time we evaluate improvements to our system. It is recognized that short term fixes, while they may have lowest immediate costs, may not be the best long term financial decision Likewise, not spending money on maintenance and repairs can provide short term cost savings but result in asset failure, ultimately increasing lifecycle costs. We intend to manage our system to always pursue the lowest life cycle cost possible for each system asset.

PART 2: INVENTORY - WHAT DO WE OWN?

Our System

Our water system includes assets such as wells which supply our water, a water treatment plant which filters and purifies the water, tanks which provide storage, and a pipe network which distributes our water.

Our Plan

We intend to keep our system inventory current by maintaining records of water system construction/maintenance utilizing a Geographic Information System for mapping and a comprehensive data base for asset information. This system will include mapping of all water distribution system assets, inventory of non-pipe assets (equipment, buildings, etc.), and asset data pertinent to Operations, Maintenance, Repair, and Replacement.

PART 3: RISK OF FAILURE – WHAT ARE THE CONDITIONS OF OUR ASSETS?

Our System

To understand how long each of our assets may last, we must maintain an understanding of their condition and evaluate the potential risk for failure. We will consider functional failure of an asset to be the primary consideration for Risk of Failure. However, physical failure of an asset must also be evaluated. Water pipes, valves, hydrants, and water services can be evaluated based on break history, evidence of corrosion, and age to determine their condition. Non-pipe assets such as, buildings, wells, and storage tanks can be inspected to determine their physical condition.

Our Plan

We will keep our condition assessments current by making recurring inspections of the assets at intervals frequent enough to document reasonably expected condition changes. These intervals will vary by asset type and expected asset life cycle. Once evaluation are completed, assets will be ranked based on the likelihood / risk of failure. All Risk of Failure ratings will be on a scale of 1-5 with 5 being the highest Risk of Failure.

PART 4: CONSEQUENCE OF FAILURE – WHAT HAPPENS WITH A FAILURE?

Our System

It is important that we understand the severity of consequences that may occur if any asset in our system fails. Functional failure consequences can occur when pumps stop working, valves cannot be opened/closed, and when water mains become corroded (pipe capacity is lost). Physical failure consequences can occur when we have water main breaks or catastrophic equipment failures.

Our Plan

We will evaluate the Consequences of Failure of each asset, from both a functional and physical failure perspective. We will maintain redundancy on assets with a high Consequence of Failure. All Consequence of Failure ratings will be on a scale of 1-5 with 5 being the highest Consequence of Failure.

PART 5: CRITICALITY – HOW DO WE PRIORITIZE OUR ACTIONS?

Our System

We must prioritize the actions we need to take for our system to meet our Level of Service goals while managing our work loads, utility rates, and minimizing life cycle costs. Criticality is the product of as asset's Risk of Failure and Consequence of Failure. The Criticality of an asset should not be confused with its Consequence of Failure. Criticality, being the product of Risk and Consequence, is simply a measure of priority.

Our Plan

Criticality Ratings will be used to guide the priority of needed improvements and development of the Capital Improvement Plan. Criticality of assets within our system will be determined by multiplying each asset's Risk of Failure rating (1-5) by an asset's Consequence of Failure rating (1-5) to establish the Criticality Rating (1-25).

PART 6: CAPACITY – DO WE HAVE ENOUGH, NOW AND FOR THE FUTURE?

Our System

Our system must meet water demands both now and into the future for both typical uses and, if we chose, fire protection. Over time, the flow demands will change with changes in property use and population. System analysis indicates we are currently meeting typical peak demands and that we need to make some improvement to meet our enhanced-fire protection goals.

Our Plan

Our General Plan outlining the capacity improvements which are needed to keep up with future flow projections, peak demands, and desired fire flow supply is maintained as part of our requirements under the Safe Drinking Water Act. Additional system analysis is found in our Water System Reliability Study report.

PART 7: OPERATIONS AND MAINTENANCE – KEEPING UP WITH ROUTINE WORK

Our System

Certain portions of our system need routine/on-going service to continue functioning. Our system Operations and Maintenance (O&M) demands are relatively stable and we will manage the system to maintain that stability. We will utilize Computerized Operations Maintenance and Management tools to maintain asset inventories and schedule regular O&M activities.

Our Plan

We have established the following O&M goals:

1. Maintain staffing and equipment levels such that routine O&M activities can be accomplished by in-house staff with a maximum overtime goal of 15%.

2. Utilize in-house staff to verify proper function of all system assets such as equipment, valves, and hydrants.

3. Outside consultants/contractors will be utilized when specialized technical or equipment capabilities are required.

PART 8: CAPITAL IMPROVEMENTS – CONTINUING SYSTEM RENEWAL

Our System

A Capital Improvement Plan (CIP) for our water system is found in our most recent Water Reliability Study (WRS). That study identifies the priorities of proposed water system improvements such as water main replacements, equipment replacements, and major O&M activities.

Our Plan

We will incorporate the recommendations of the WRS into a comprehensive CIP which will document the major projects we plan to complete within the next 10 years. The order and timing of projects will be guided by the Criticality Ratings developed during the asset evaluation process.

Project timing may also be driven by availability of outside funding sources such as loans and grants. We will maintain and update our comprehensive Capital Improvement Plan on an annual basis.

PART 9: FINANCIAL STRATEGY – RATE PLANNING AND STABILITY

Our System

All system costs are funded through our water system billings. Our billings are broken into two primary categories: Readiness to Serve (RTS) charges and Commodity Charges. The RTS charges pay for the investment into the physical assets of the system such as treatment works, storage tanks, and distribution piping. Those assets must be in-place before any actual water can be used and must be maintained regardless of the amount of water used. The Commodity charge is based on the cost to supply, treat, and pump the actual water. It is the smaller of the two primary cost categories and is based on both the user category (residential, commercial, industrial, etc.) and the actual amount of water used.

The billings also support O&M activities and payments on utility bonds (borrowed money) used to fund major system improvements.

Our Plan

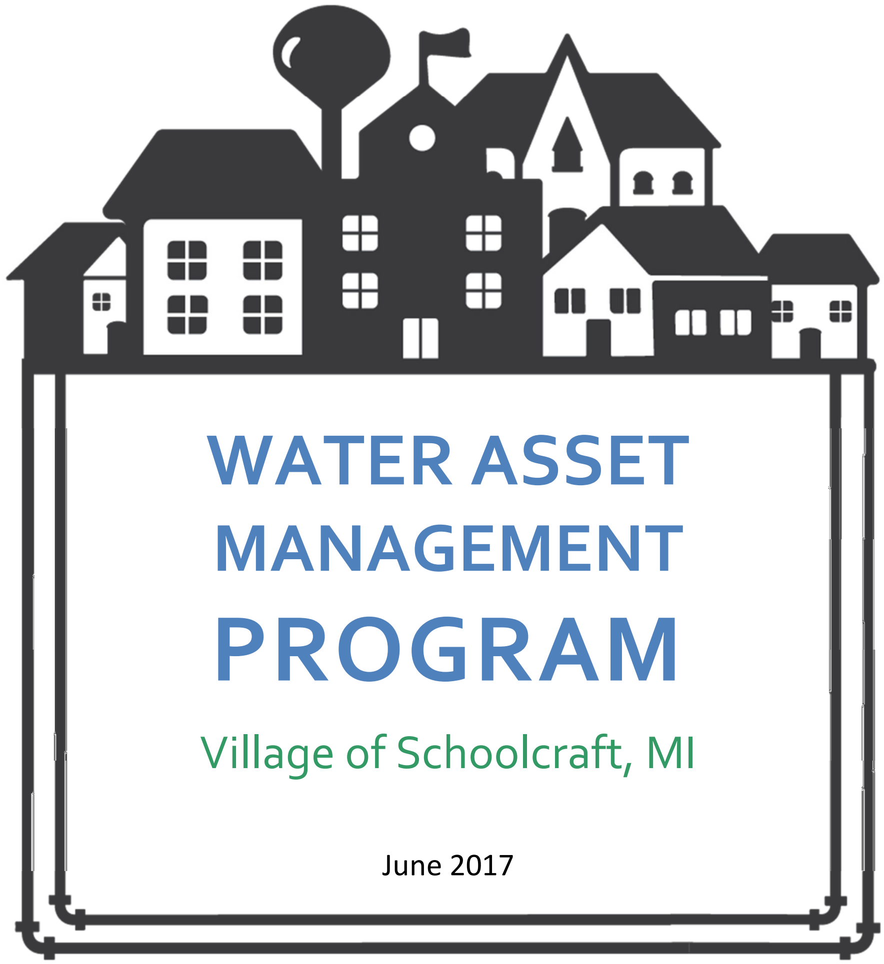
We intend to maintain a life cycle forecast of anticipated costs, income from rates, and cash balances. We will use this forecast to establish sustainable and stable utility rates. This in turn helps our residential, business, and industrial owners in their individual, long-term financial planning.

We intend to fund system O&M on a cash basis through the rate structure and intend to maintain minimum cash balance equal to 12 months of standard O&M. This will also allow us to cash fund emergency repairs and minor unanticipated asset repairs/replacements.

We intend to also cash fund planned system repairs and replacements if that can be accomplished with a stable rate structure and appropriate cash balances. Significant expenditures may be bond financed to stabilize rate impacts and maintain reasonable cash balances.

SUMMARY

Our Asset Management Plan is a compilation of goals to guide us in maintaining a reliable water system. By achieving these goals, our utility system will be proactively managed to provide the Desired Level of Service for the lowest possible long term cost.

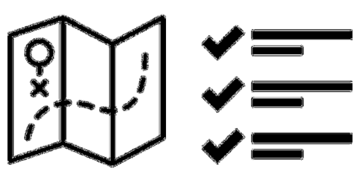


WATER ASSET MANAGEMENT PROGRAM

Village of Schoolcraft, MI

June 2017

How we'll get there: The Action Plan



INTRODUCTION

About this Document

This document is our Water Asset Management Program. It is an internal document which defines how we will apply the principals of asset management to achieve the goals outlined in our Asset Management Plan.

The Asset Management Program will be maintained through a joint effort of our staff and administration. We will update our program on an annual basis to ensure its relevancy and effectiveness.

Our Commitment

Our community water system is a complex set of components that we operate and maintain in a way that provides us with clean and reliable drinking water. That system includes assets such as wells which supply our water, a water treatment plant which filters and purifies the water, tanks which provide storage, and a pipe network which distributes our water. As members of our community, each one of us helps pay for the operation, maintenance, and replacement of those system assets through our utility rates. In effect, we are all owners of the water system. As the system owners, we commit to proactively manage our system assets and make decisions based on long term lifecycle cost.

Asset Management Principals

All infrastructure deteriorates with age and requires proactive management to operate, maintain, repair, and eventually replace each physical component, or asset. This progression over time from routine operation and maintenance through repairs and eventual replacement is the asset’s life cycle. Waiting to perform maintenance or make repairs can save money in the short term but may decrease the life cycle of an asset. On the other hand, replacing an asset before it fails may not take full advantage of the asset’s value. It is this balance which puts the decisions for operations, maintenance, repair, and replacement actions at the heart of asset management.

Asset management is an evaluation of needed actions after considering the condition of an asset, the consequences of an asset failure, and the action alternatives available. The solution that provides lowest life cycle cost at the desired level of service is implemented.

CONTENTS

Prepared by

ENGINEER:
Prein&Newhof
[2160224]

FINANCIAL ADVISOR:
UMBAUGH

PART 1: DEFINING OUR GOALS – WHAT IS OUR DESIRED LEVEL OF SERVICE?

Our mission is to provide clean potable water for our community by proactively managing our water source, treatment, storage, and distribution assets to meet our desired level of service goals.

Our community, as the system owners, must determine the level of service we want from our system. Many factors play into this determination including: compliance with regulations, public health, aesthetics, service reliability, stable rates, etc. To this end, we have established primary system goals in a separate document titled as our Asset Management Plan. This document, our Asset Management Program, identifies how we plan to meet our goals:

Goal 1: Meet Regulatory Requirements

We will have a minimum of 2 certified water system operators to provide staff coverage, quality control cross checking, and broadened institutional knowledge.

We will perform the required testing in-house by maintaining a laboratory testing space and through a third-party certified laboratory when needed to supplement in-house capabilities.

We will establish a cross-connection elimination program.

Goal 2: Minimize Service Interruptions

We will monitor and maintain all of our water supply, treatment, and distribution system assets such that there are no interruptions in system operation that are reasonably preventable.

We will maintain service crew levels to ensure continued operations and maintenance activities such that no more than 10 emergency responses per year are required.

Goal 3: Minimize Public Safety Hazards

Water system assets that are significantly affected by environmental conditions (freezing, heating, corrosion) will be improved / replaced so as to minimize their failure vulnerability.

Our 24 hour emergency response services will be equipped and staffed to provide maximum 30 minute response times to main breaks and major equipment failures. We will strive to limit the duration of individual service interruptions to less than 6 hours whenever possible. Staff will be provided cell phones, pagers, and /or other contact mechanism to be notified when a response is required.

Goal 4: Provide Enhanced-Fire Protection in the Distribution System

Enhanced fire protection in accordance with American Water Work Association, AWWA, standards Manual M31 will be provided as noted for the following areas:

- Low and Medium Density Residential : No enhanced protection
- High Density Residential: Up to 1,500 gallon per minute for 2 hours
- All commercial/industrial: Up to 2,500 gallons per minute for 2 hours

Goal 5: Minimize Water Loss

We will implement a water efficiency program to track the actual lost water. Once water loss causes are identified and quantified, we will implement corrective measures such as main replacement and meter replacement to meet our water loss goal.

We will develop a water meter testing and replacement program. Maintaining meter records and developing a systematic plan to change out meters will help maintain accurate water billing and can provide a significant increase in system revenue. As part of this effort, we will evaluate meter technologies that relate to accuracy, labor efficiency and cost effectiveness. Meter replacement will be made with either new or refurbished meters with the goal of providing more accurate billings to our system owners and to help minimize revenue loss. The replacement schedule goals are within 3-years for business/commercial and industrial facilities and within 10-years for residential meters.

Goal 6: Identify and Replace Lead/Galvanized Water Services

We will maintain our water chemistry to minimize the corrosion potential in the various water service materials.

We will implement a program to identify and locate the types of service lines in our system and prepare a logistical plan, timeline, and budget for replacing the lead and galvanized metal services within the public portions of system. Services will be replaced when road replacement projects or work on other assets impact the immediate area where lead/galvanized services are known to exist. Such projects are identified in our Capital Improvement Plan.

Through a public education program, we will encourage all members of our community to replace those types of water lines on the private property portions of those services and within their homes/businesses.

Goal 7: Minimize Life Cycle Costs

We will implement asset condition tracking and criticality assessments to determine the optimum time for asset maintenance and/or replacement. Decisions will be made which strike a balance between maximizing the lifecycle use of all assets, the risk of failure of the assets, and the consequence of failure of the assets.

PART 2: INVENTORY - WHAT DO WE OWN?

Our System

Our water system includes assets such as wells which supply our water, a water treatment plant which filters and purifies the water, tanks which provide storage, and a pipe network which distributes our water. Cast iron pipe was the dominant choice for water construction in North America for many decades. Cast iron pipes are subject to internal corrosion (rusting) and can be prone to cracking. In more recent decades, ductile iron and plastic water pipes have become the standards in new water main construction. Water mains made from these newer materials are expected to outlast their cast iron predecessors and as time continues, there is more data being gathered regarding the potential failure modes of those materials.

The majority of our water mains which were installed from the 1940's through 1970's are made of cast iron pipe material. Pipes installed after 1980 are made of ductile.

A detailed summary of our water system assets is found in our Water Reliability Study as well as in a detailed asset inventory maintained by our Department of Public Works in a General Plan as required by the Safe Drinking Water Act.

A history on non-pipe assets is maintained by the Department of Public Works, and generally includes date of purchase, purchase costs, inspection reports, repair history, maintenance schedule, and specifications.

Our Plan

We will keep our system inventory current by keeping records of water system construction with the use of our Geographic Information System (GIS). This system will include mapping of all water distribution system assets, inventory of non-pipe assets, and asset data pertinent to Operations, Maintenance, and Replacement.

Our Program

When the water system is altered, either by construction of new assets or rehabilitation/replacement of existing assets, we will maintain records of each water project in our GIS system.

Distribution System

We will maintain data on pipe materials, installation dates, sizes, and any other pertinent information which will assist with our asset management program. Pipe locations will be determined based on record drawing information.

Hydrants and valves locations will initially be identified using base aerial photography and field observations. As time and budget permit, we will utilize either handheld GPS or survey GPS to collect and refine locational data.

Assets within our pumping stations will be tracked using Computerized Operations Maintenance and Management tools to maintain asset inventories, schedule regular O&M activities, and create financial projections for future replacement. We will utilize the Proteus CMMS software as well as customized spreadsheets.

We will also collect locational data on water services for tap and curb box locations. Other data such as size, material, and installation date will also be documented in our GIS system.

Water Supply

We will maintain GIS locational data on each well in our system. Other well data such as depth, diameter, capacity, and installation dates will also be maintained.

Our surface water intake locations(s) will be identified in our GIS system.

Water Treatment and Water Storage

Our treatment/storage facility locations will be identified in our GIS system. Assets within our treatment system will be tracked using Computerized Operations Maintenance and Management tools to maintain asset inventories, schedule regular O&M activities, and create financial projections for future replacement. We will utilize the Proteus CMMS software as well as customized spreadsheets.

Other Assets

We will maintain active inventories of assets such as trucks, loaders, generators, backhoes, or any other functionally or financially significant assets. Informational data such as manufacture date, purchase price, maintenance budget, and warranty information will be tracked.

In this way, the GIS database will be kept up to date and serve as a complete record of the current water system inventory. We will use this inventory and database to operate and manage our system.

PART 3: RISKS OF FAILURE – IN WHAT CONDITION ARE OUR ASSETS?

Our System

To understand how long each of our assets may last, we must maintain an understanding of their condition and evaluate the potential risk for failure. We will consider functional failure of an asset to be the primary consideration for Risk of Failure. However, physical failure of an asset must also be evaluated. Water pipes, valves, hydrants, and water services can be evaluated based on break history, evidence of corrosion, and age to determine their condition. Non-pipe assets such as, buildings, wells, and storage tanks will be inspected to determine their physical condition.

Our Plan

We will keep our condition assessments current by making recurring inspections of the assets at intervals frequent enough to document reasonably expected condition changes. These intervals will vary by asset type and expected asset life cycle. Once evaluation are completed, assets will be ranked based on the likelihood / risk of failure. All Risk of Failure ratings will be on a scale of 1-5 with 5 being the highest Risk of Failure.

Our Program

We will assess water pipe conditions on a regular basis based on break/repair records, break history, material, and age. All system data for the distribution network, including Risk of Failure ratings, will be maintained within a GIS database.

We will exercise hydrants and valves yearly to insure they are properly working. All data for these assets will be maintained within a GIS database.

Production wells, storage tanks, buildings, and water meters condition information will be kept up to date as part of routine operations.

Higher consequence of failure items may be inspected or assessed more frequently.

PART 4: CONSEQUENCE OF FAILURE –WHAT HAPPENS WITH A FAILURE?

Our System

It is important that we understand the severity of consequences that may occur if any asset in our system fails. Functional failure consequences can occur when pumps stop working, valves cannot be opened/closed, and when water mains become corroded (pipe capacity is lost). Physical failure consequences can occur when we have water main breaks or catastrophic equipment failures.

Our Plan

We will evaluate the Consequences of Failure of each asset, from both a functional and physical failure perspective. We will maintain redundancy on assets with a high Consequence of Failure. All Consequence of Failure ratings will be on a scale of 1-5 with 5 being the highest Consequence of Failure.

Our Program

It is important that we understand the severity of consequences that may occur if any asset in our system fails. Functional failure considerations include potential health risks, service interruption, and damage to connected assets. Physical failure considerations include damage to adjacent infrastructure, environmental damage, and property damage. Each of these factor will be considers separately and then compiled into a single Consequence of Failure (CoF) rating for each asset.

For the distribution system water mains, all data for the CoF factors will be maintained in the GIS database. For all other assets, CoF factors will be maintained in either the Proteus CMMS software or in customized asset spreadsheets.

Consequence of Failure

5	Unacceptable Impacts
4	Critical Impacts
3	Significant Impacts
2	Minor Impacts
1	Redundant System or No Impacts

PART 5: CRITICALITY – HOW DO WE PRIORITIZE?

Our System

We must prioritize the actions we need to take for our system to meet our Level of Service goals while managing our work loads, utility rates, and minimizing life cycle costs. Criticality is the product of as asset's Risk of Failure and Consequence of Failure. The Criticality of an asset should not be confused with its Consequence of Failure. Criticality, being the product of Risk and Consequence, is simply a measure of priority.

Our Plan

Criticality Ratings will be used to guide the priority of needed improvements and development of the Capital Improvement Plan. Criticality of assets within our system will be determined by multiplying each asset's Risk of Failure rating (1-5) by an asset's Consequence of Failure rating (1-5) to establish the Criticality Rating (1-25).

Our Program

The condition of the asset, and therefore its Risk of Failure, will change over time. Additionally, the Consequences related to failure may also change. We will review the criticality of each asset on an annual basis and make adjustments to account for these changes. As with all the components of the Asset Management program, the criticality analysis is an on-going process. We will keep our criticality assessments current after performing repairs, improvements, or inspections. When evaluating the criticality of an asset, we also consider redundancy as this can significantly reduce the Consequence of Failure of an individual asset. We will use our criticality assessments when establishing priorities regarding maintenance, repairs, and capital improvements.

PART 6: CAPACITY – DO WE HAVE ENOUGH, NOW AND FOR THE FUTURE?

Our System

Our system must meet water demands both now and into the future for both typical uses and, if we chose, fire protection. Over time, the flow demands will change with changes in property use and population. System analysis indicates we are currently meeting typical peak demands and that we need to make some improvement to meet our enhanced-fire protection goals. A detailed analysis of our system capacity is found in our Water System Reliability Study report.

Our Plan

Our General Plan outlining the capacity improvements which are needed to keep up with future flow projections, peak demands, and desired fire flow supply is maintained as part of our requirements under the Safe Drinking Water Act. Additional system analysis is found in our Water System Reliability Study report.

Our Program

We will update our General Plan and Water System Reliability Study report in accordance with current regulations. The evaluations will include review of the distribution system, source and treatment system and storage requirements under maximum day demands and desired fire flow.

We will monitor water use for consistency with the water system's General Plan. As water uses change and connections are added or changed, the system demands will be monitored. If significant changes in system flow occur, the General Plan and Reliability Study will be updated to account for these changes.

System improvement needs identified in the Water Reliability Study will be integrated into the comprehensive Capital Improvement Plan.

PART 7: OPERATIONS AND MAINTENANCE – KEEPING UP WITH ROUTINE WORK

Our System

Certain portions of our system need routine/on-going service to continue functioning. Our system Operations and Maintenance (O&M) demands are relatively stable and we will manage the system to maintain that stability. We will utilize Computerized Operations Maintenance and Management tools to maintain asset inventories and schedule regular O&M activities.

Our Plan

We have established the following O&M goals:

1. Maintain staffing and equipment levels such that routine O&M activities can be accomplished by in-house staff with a maximum overtime goal of 15%.

2. Utilize in-house staff to verify proper function of all system assets such as equipment, valves, and hydrants.

3. Outside consultants/contractors will be utilized when specialized technical or equipment capabilities are required.

Our Program

Staffing and Equipment

We will monitor crew workloads and production rates to establish general workload goals for our crews. This will include periodic review of crew size, methods, and equipment in an effort to maximize staff efficiency and effectiveness. Equipment ownership vs rental will be evaluated based on an annual cost of service basis. Staffing levels will be adjusted based on normalized workload projections and workload goals to meet utilization goals.

Water System Flushing

We will perform system flushing on all hydrants on a twice-annual basis, once in the spring and once in the fall. A detailed flushing plan will be maintained by the Department of Public Works.

We will exercise each system valve on a once-annual basis.

Valves or hydrants requiring repairs will be identified and scheduled for repair within three months of being identified or as soon as seasonal weather allows.

Data relative to hydrant flushing and valve exercising will be maintained in the GIS database.

Production Wells, Storage Tanks and Treatment Facilities

We will continue operating these facilities and perform maintenance in accordance with site specific operations and maintenance plans for each of these assets. This includes having the wells inspected every 2 years and storage tanks every 5 years by a trained expert. Operations and maintenance manuals will be kept on file to document all maintenance performed and list of recommended scheduled maintenance.

Supporting Assets

We plan to renew our maintenance equipment and other supporting assets on a scheduled replacement cycle. This will allow us to keep reliable equipment in service for operating and maintaining the system to achieve our level of service goals.

Water System Management

We will monitor the break history of the water mains and record the date and locations of such breaks using the GIS system. We will track maintenance activities to identify assets requiring higher than expected maintenance levels.

We will perform O&M activities to extend the useful life of these assets until complete rehabilitation or replacement of the asset is more cost effective. We will use our software systems to manage this data and keep our planned activities up to date. We will maintain regularly scheduled O&M activities, plan/schedule appropriate replacements, and coordinate activities with work on other assets that share common space (i.e. within the same road right-of-way)

PART 8: CAPITAL IMPROVEMENTS – CONTINUING SYSTEM RENEWAL

Our System

A Capital Improvement Plan (CIP) for our water system is found in our most recent Water Reliability Study (WRS). That study identifies the priorities of proposed water system improvements such as water main replacements, equipment replacements, and major O&M activities.

Our Plan

We will incorporate the recommendations of the WRS into a comprehensive CIP which will document the major projects we plan to complete within the next 10 years. The order and timing of projects will be guided by the Criticality Ratings developed during the asset evaluation process. Project timing may also be driven by availability of outside funding sources such as loans and grants. We will maintain and update our comprehensive Capital Improvement Plan on an annual basis.

Our Program

Planning for capital improvements is a continual management process. The Capital Improvement Plan shows our foreseeable project priorities based on the information we have available now. Capital Improvement Plans will be adjusted annually and will consider the following influences:

- Outside funding sources (grants and loans) may become available for certain types of projects from time to time. When this happens, we will reprioritize to make best use of available funds.
- Adjustment of asset condition assessments.
- Changes in economic conditions such as costs of materials, labor, and financing.
- Coordination with road work and other utility work may require adjustments in timing of water system improvements. Roadway conditions can dramatically change with severe weather seasons. Where utility projects require excavation below streets, coordinating utility and road projects is essential to achieve the lowest life cycle cost. As roadway conditions change and paving plans are revised, the water system plans will be adjusted.

We will keep the Capital Improvement Plan up to date by taking the following steps annually:

- Adjust the cost estimates for capital projects based on current market pricing
- Reconsider capital improvements priorities based on any updated criticality assessments
- Reconsider implementation years for upcoming capital projects to coordinate with changing conditions of roads and other utilities
- Adjust our financial forecast based on number of users, current rates, and cash balances

- Adjust the utility rates according to these changed conditions, to stay consistent with established long term financial strategy.
- We will make miscellaneous system repairs which are small enough to be accomplished without engineered project plans or project specific budgeting on an as-needed basis. We will continue budgeting for such repairs based on prior year expenses and known system repair needs. When making decisions on system repairs, we will consider the criticality assessments as well as planned rehabilitation and replacement projects. We will perform proactive repairs with in-house staff and equipment as to the ability of staff and the available resources. Proactive repairs outside the available staff resources or abilities will be contracted out.
- We will fully rehabilitate or replace pipes, hydrants, production wells, and elevated storage tanks when doing so would provide the lowest life cycle cost. Such projects are identified in our Capital Improvement Plan.

PART 9: FINANCIAL STRATEGY – RATE PLANNING AND STABILITY

Our System

All system costs are funded through our water system billings.

Our Plan

We intend to maintain a life cycle forecast of anticipated costs, income from rates, and cash balances. We will use this forecast to establish sustainable and stable utility rates. This in turn helps our residential, business, and industrial owners in their individual, long-term financial planning.

We intend to fund system O&M on a cash basis through the rate structure and intend to maintain minimum cash balance equal to 12 months of standard O&M. This will also allow us to cash fund emergency repairs and minor unanticipated asset replacements.

We intend to also cash fund planned system repairs and replacements if that can be accomplished with a stable rate structure and appropriate cash balances. Significant expenditures may be bond financed to stabilize rate impacts and maintain reasonable cash balances.

Our Program

We will maintain a life cycle forecast of anticipated costs, income from rates, and cash balances. The early years of the forecast are tabulated from our Capital Improvement Plan cost estimates while the later years of the forecast are projected from the system inventory and life cycle data. We will use this forecast to establish sustainable and stable utility rates.

We will fund system operations and maintenance on a cash basis through the rate structure and will maintain a minimum cash balance as set by the system goals.

We will also cash fund planned system repairs and replacements if that can be accomplished with a stable rate structure and cash balances not exceeding our base cash balance by a factor of 2.5. Significant expenditures may be bond financed to stabilize rate impacts and maintain reasonable cash balances. We will maintain and update our CIP plan annually, and review it with our financial adviser to confirm rates and cash balances are acceptable.

We will also implement standard, annual rate changes that, at a minimum, parallel inflation so as to foster a stable rate structure.

To keep the financial strategy on track with changing conditions, we plan to make the following updates each year:

- Update all spending and income projections
- Adjust or reaffirm the long term financial strategy
- Implement updated user rates.

SUMMARY

Our Asset Management Program outlines how we will achieve our Asset Management Plan goals. It may be adjusted from time to time based as new/improved tools, software, and evaluation techniques are developed. Regardless of those changes, we will incorporate Asset Management into our everyday activities, including implementation of system improvements and our system master planning. Refer to the Water Reliability Study for current status of goals. By proactively managing our water system, we will be able to achieve our Desired Level of Service for the lowest possible long term cost.

The following table notes tentative start dates for each of the noted major activities:

Activity	**Estimated Start**
Inventory	May 2018
Condition Assessment	July 2018
Criticality Determination	August 2018
Capacity Analysis	October 2018
Fire Protection Review	October 2018
Capital Improvement Plan	January 2018

Special Programs	**Estimated Start**
Utility Partner Board	July 2018
Water Efficiency	August 2018
Meter Testing/Replacement	August 2018
Lead/Galvanized Services	September 2018

CAPITAL IMPROVEMENT PLAN (WATER)

Village of Schoolcraft, MI

June 2017

CONTENTS

Prepared by

ENGINEER: Ryan Russell
Prein&Newhof
[2160224]

FINANCIAL ADVISOR:
UMBAUGH

INTRODUCTION

The Village of Schoolcraft public infrastructure includes drinking water supply and delivery systems, storm drainage systems, and public streets. These systems are aging and certain parts need to be repaired or replaced to keep up with deterioration over time. This capital improvement plan focuses on the water supply and delivery system only.

Waiting until something breaks to make emergency repairs is expensive. A more proactive approach can minimize life cycle costs using the following steps:

- Evaluate the condition and capacity of assets to determine the needs.
- Implement a maintenance program for the small needs.
- Implement a Capital Improvement Plan for the big needs.
- Develop financial strategies to fund all planned work before needs become emergencies.

The Village of Schoolcraft is actively managing the needs of these systems. The needs have been evaluated and financial strategies have been considered. All non-pipe assets above $2000 were inspected and recorded for financial analysis. Assumptions were made using the best available information to estimate unknown pipe and non-pipe asset data. This Capital Improvement Plan presents the Village of Schoolcraft’s infrastructure priorities that have been established within a 20-year planning period, a timeline for accomplishing the needed improvements, and a financial strategy to implement the plan.

Table 1: Capital Improvement Priorities

Capital Improvement Priorities

Location	Description	Today's Cost	Estimated Year*	Future Cost**
Well Site to East Cass St.	New Watermain Loop	116,000	2017	118,000
Well House	Roof	4,000	2018	4,000
New Well Site	Well 5 Construction	600,000	2020	649,000
Water Tower	Interior and Exterior Painting	140,000	2024	164,000
East Cass St.	Watermain Replacement	127,000	2025	152,000
Existing Well Site	Well 3 and 4 Replacement Well	260,000	2025	311,000
West Cass St.	Watermain Replacement	230,000	2027	286,000
North Centre St.	Watermain Replacement	102,000	2029	132,000
Ashery Dr.	Watermain Replacement	194,000	2029	251,000
West Lyon St.	Watermain Replacement	82,000	2029	106,000
Well House	Chemical Feed systems	6,500	2030	9,000
Well House	Generator, Controls, Electrical	50,000	2035	73,000
Water Tower	Water Tower Replacement	2,000,000	2039	3,154,000
B&L Drive	Watermain Replacement and Looping	147,000	2041	241,000
W. Vienna St. & Bernard St.	Watermain Replacement	253,000	2041	415,000
Willow Ct.	Watermain Replacement and Looping	77,000	2066	207,000

*Actual year subject to change pending available funding and coordination with other infrastructure

** Future costs include annual 2 percent inflation

Table 2: Non-Pipe Assets

Asset Category	Asset Item	Install Year	Purchase Price	Life Cycle	Notes	Condition Inspection Year
Well House	Building (20'x60' block)	1973	18,000	50		2016
Well House	Roof		4,000	20		
Well House	Piping	1948	10,000	50		
Well House	Standby Generator	2008	32,000	25		2016
Well House	Controls	1991	5,000	10		2016
Well House	Electrical	1973	2,000	10		
Well House	Chemical Feed Systems	2010	6,500	5		2016
Well #3	Casing and Screen	1948		50	to be retired	2016
Well #3	Pump	1948		15	to be retired	
Well #4	Casing and Screen	1966		50	to be retired	2016
Well #4	Pump	1966		15	to be retired	
Well #3 & #4	Replacement Well	2025	240,000	30	FUTURE ASSET	
Water Tower	Tank Structure	1991	1,200,000	60		
Water Tower	Interior Coating	2008	59,000	15		
Water Tower	Exterior Coating	2008	59,000	15		2016
Well #5	New Well Site	2020	650,000	50	FUTURE ASSET	

Table 3: Recurring Cost Schedule

Recurring Cost Schedule

Item Description	Recurrence Interval	Next Occurrence	Today's Cost
Tower Inspection	every 5 years	2018	2,700
Tower Cleaning	every 6 years	2020	3,700
Well 4 Overhaul	every 5 years	2016	23,000
Well 4 Cleaning	every 3 years	2016	17,000
Well 3 Overhaul	every 5 years	2017	23,000
Well 3 Cleaning	every 4 years	2016	17,000
Reliability Study	every 5 years	2017	16,000
Hand Held Meter Reader	every 10 years	2021	8,500
Water Meter Replacements	annual	2016	10,000

Table 4: Future Costs

Future Costs
(not including annual operations and maintenance)

Suggested Year	Recurring Costs	NON-Pipe Assets Capital Improvements	Watermain Capital Improvements	Description of Major Items	Projected Year
2016	57,000	-	-		
2017	49,000	-	118,468	Watermain from Well House to Cass St.	2,018
2018	13,000	4,162	-		
2019	29,000	-	-		
2020	33,000	650,000	-	New Well Site	2,028
2021	45,000	-	-		
2022	74,000	-	-		
2023	14,000	-	-		
2024	32,000	161,989	-	Water Tower Painting	
2025	32,000	310,095	151,261	Well 3&4 Replacement Well and	2,028
2026	45,000	-	-	East Cass Street Watermain	2,018
2027	61,000	-	286,489	West Cass Street Watermain	2,018
2028	60,000	-	-		
2029	13,000	-	488,932	Watermains on W. Lyon St.,	2,038
2030	13,000	9,659	-	N. Centre St. and Ashery Dr.	
2031	78,000	-	-		
2032	96,000	-	-		
2033	18,000	-	-		
2034	38,000	-	-		
2035	15,000	73,398	-		
2036	74,000	-	-		
2037	100,000	-	-		
2038	25,000	6,184	-		
2039	16,000	3,322,500	-	New Water Tower	2,048
2040	70,000	-	-		
2041	68,000	-	668,287	Watermains on B&L Dr, W. Vienna St	2,048
2042	82,000	-	-	and Bernard St.	
2043	51,000	-	-		
2044	53,000	-	-		
2045	18,000	-	-		

FINANACIAL FORECAST

UMBAUGH

H. J. Umbaugh & Associates
Certified Public Accountants, LLP
2150 Association Drive
Suite 100
Okemos, MI 48864
Phone: 517-321-0110
Fax: 517-321-8866
www.umbaugh.com

January 23, 2017

Village of Schoolcraft
442 N. Grand Street
Schoolcraft, MI 49087

Re: Village of Schoolcraft (Michigan) Water Asset Management Program – Abbreviated Rate Study

Dear Village of Schoolcraft:

The attached schedules (listed below) present unaudited and limited information for the purpose of discussion and consideration in the preliminary planning stage of an abbreviated rate study by the appropriate officers, officials and advisors of the Village of Schoolcraft. The use of these schedules should be restricted to this purpose, for internal use only, as the information is subject to future revision.

We would appreciate your questions or comments on this information and would provide additional information upon request.

Sincerely,

UMBAUGH

Thomas Traciak

VILLAGE OF SCHOOLCRAFT (MICHIGAN) WATER FUND

COMPARATIVE STATEMENT OF NET POSITION

	As of:			
	2/28/2013	**2/28/2014**	**2/28/2015**	**2/29/2016**
	(------------------------Per Audit------------------------)			
Assets				
Current assets:				
Cash and investments	$11,355	$9,589	$53,103	$78,523
Accounts receivable	51,552	44,324	52,809	45,929
Total current assets	62,907	53,913	105,912	124,452
Noncurrent assets:				
Capital assets, net of accumulated depreciation	1,556,693	1,491,663	1,418,030	1,352,045
Total Assets	$1,619,600	$1,545,576	$1,523,942	$1,476,497
Liabilities				
Current liabilities:				
Accounts payable	-	-	$2,319	-
Due to other funds	$14,808	$4,903	25,084	$15,527
Compensated absences payable	-	4,661	5,466	6,157
Current portion of long-term debt	58,012	60,586	15,562	
Total current liabilities	72,820	70,150	48,431	21,684
Noncurrent liabilities:				
Bonds payable	76,148	15,562	-	-
Deferred compensation payable	4,451	-	-	-
Advance from other funds	76,333	60,623	42,442	-
Total noncurrent liabilities	156,932	76,185	42,442	-
Total Liabilities	229,752	146,335	90,873	21,684
Net Position				
Net invested in capital assets	1,422,533	1,415,516	1,402,468	1,352,045
Unrestricted	(32,685)	(16,275)	30,601	102,768
Total Net Position	1,389,848	1,399,241	1,433,069	1,454,813
Total Liabilities and Net Position	$1,619,600	$1,545,576	$1,523,942	$1,476,497

VILLAGE OF SCHOOLCRAFT (MICHIGAN) WATER FUND

COMPARATIVE STATEMENT OF REVENUES, EXPENSES AND CHANGES IN NET POSITION

	Fiscal Year Ended			
	2/28/2013	**2/28/2014**	**2/28/2015**	**2/29/2016**
	(-------------------------Per Audit-------------------------)			
Operating Revenues				
Charges for services	$226,350	$204,633	$215,152	$213,343
Fees	3,385	3,295	3,210	3,520
Total operating revenues	229,735	207,928	218,362	216,863
Operating Expenses				
Salaries and fringe benefits	42,644	46,389	46,190	55,338
Payroll taxes	3,190	3,520	3,420	4,120
Employee insurance	14,418	10,279	12,057	12,767
Retirement	1,873	1,928	1,864	2,195
Supplies	10,851	7,801	8,178	9,944
Contractual services	8,930	6,672	6,849	12,505
Insurance	1,430	592	615	644
Printing	1,036	936	926	936
Utilities	10,188	11,339	11,615	9,971
Repairs	7,396	12,522	7,768	11,075
Rent	8,000	8,000	6,808	7,511
Education	240	375	250	385
Dues and fees	195	569	485	505
Other	77	6	-	-
Capital outlay	3,827	-	-	-
Subtotal	114,295	110,928	107,025	127,896
Depreciation expense	81,177	80,710	73,633	65,985
Total operating expenses	195,472	191,638	180,658	193,881
Net operating income (loss)	34,263	16,290	37,704	22,982
Non-Operating Revenue (Expenses)				
Interest earned on investments	140	82	57	148
Interest expense	(9,843)	(6,979)	(3,933)	(1,386)
Total non-operating revenues (expenses)	(9,703)	(6,897)	(3,876)	(1,238)
Income (loss) before contributions	24,560	9,393	33,828	21,744
Capital contributions	3,499	-	-	-
Change in net position	28,059	9,393	33,828	21,744
Net position, beginning of year	1,361,789	1,389,848	1,399,241	1,433,069
Net position, End of Year	$1,389,848	$1,399,241	$1,433,069	$1,454,813

VILLAGE OF SCHOOLCRAFT (MICHIGAN) WATER FUND

COMPARATIVE DETAIL OF OPERATING EXPENSES

		Fiscal Year Ended			
		2/28/2015	**2/29/2016**	**2/28/2017**	
Operating Expenses					
Dept. 441 - Department of Public Works					
591-441-702.000	Salaries	$29,009	$32,010	$29,980	
591-441-705.000	Employee Pension Expense	1,365	1,507	2,650	
591-441-710.000	Payroll Tax Expense	2,132	2,343	2,300	
591-441-714.300	Insurance - Health	144	152	250	
591-441-727.100	Supplies - Office	-	54	-	
591-441-727.200	Supplies - Postage	986	1,078	1,080	
591-441-727.400	Supplies - Operating	-	29	50	
591-441-760.000	Training	250	95	100	
591-441-801.000	Professional Services	1,350	1,380	1,440	
591-441-801.200	Professional Services - Engineering	-	1,553	500	
591-441-802.000	Association Memberships	485	505	500	
591-441-818.000	Contracted Services	451	453	500	
591-441-900.000	Printing And Publishing	926	936	1,000	
591-441-930.200	Maintenance - Computers and Software	1,775	2,188	1,700	
591-441-950.000	Interest Expense	1,819	1,273	-	
591-441-956.000	Miscellaneous Expenses	-	-	-	
	Total Department of Public Works Expenses	40,692	45,556	42,050	
Dept. 556 - Operations					
591-556-702.000	Salaries	17,180	23,328	27,960	
591-556-705.000	Employee Pension Expense	499	688	830	
591-556-710.000	Payroll Tax Expense	1,288	1,777	2,140	
591-556-714.100	Insurance - Worker's Compensation	428	314	320	
591-556-714.200	Insurance - Liability and Property	615	644	650	
591-556-714.300	Insurance - Health	10,337	11,145	12,480	
591-556-714.301	Short Term Disability	492	496	500	
591-556-714.302	Life Insurance	336	336	340	
591-556-714.304	Long Term Insurance	320	324	330	
591-556-727.400	Supplies - Operating	107	1,286	150	
591-556-727.425	Supplies - Gasoline	120	370	400	
591-556-727.600	Supplies - Water Meters	-	-	3,000	
591-556-728.100	Uniforms - Cleaning and Repair	501	471	470	
591-556-741.000	Chemicals and Lab Equipment	6,464	6,657	6,500	
591-556-760.000	Training	-	290	290	
591-556-801.200	Professional Services - Engineering	55	4,365	60	
591-556-818.000	Contracted Services	4,992	4,755	7,640	
591-556-853.000	Telephone Service	3,107	3,592	3,440	
591-556-855.300	Electricity - Wells	4,184	4,084	4,600	
591-556-855.400	Electricity - Water Tower	532	558	630	
591-556-856.000	Natural Gas	962	223	380	
591-556-856.100	Natural Gas - Generator	2,831	1,514	2,800	
591-556-935.100	Maintenance - Water Mains	-	-	4,600	
591-556-935.200	Maintenance - Service Lines	374	1,403	1,300	
591-556-935.300	Maintenance - Water Meters	1,955	1,407	3,000	
591-556-935.400	Maintenance - Hydrants	23	825	500	
591-556-935.500	Maintenance - Wells and Pumps	2,570	970	2,000	
591-556-935.600	Maintenance - Pump House	1,071	185	1,000	
591-556-935.700	Maintenance - Water Tower	-	4,097	-	
591-556-943.000	Equipment Rental	6,808	7,511	8,180	
591-556-950.000	Interest Expense	2,114	113	-	
591-556-956.000	Miscellaneous Expenses	-	-	-	
591-556-968.000	Depreciation Expense	-	-	-	[1]
591-556-970.000	Capital Outlay	-	-	-	[2]
591-556-975.000	Capital Outlay Set Aside	-	-	-	[2]
	Total Operations Expenses	70,267	83,727	96,490	
	Total Operating Expenses - Water	$110,959	$129,284	$138,540	

[1] Depreciation expense is removed from this report as it is performed on the cash basis.
[2] Capital Outlay is removed from this section of the report. These items are discussed later in the report.

VILLAGE OF SCHOOLCRAFT (MICHIGAN) WATER FUND

WATER CASH FLOW ANALYSIS

	Increase	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Rate revenue increase assumption over previous year			13.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
Rate revenues		$216,000	$244,080	$251,402	$258,944	$266,713	$274,714	$282,956	$291,444	$300,188	$309,193
Other revenues		3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800
Total revenues		219,800	247,880	255,202	262,744	270,513	278,514	286,756	295,244	303,988	312,993
Total expenditures	2.00%	138,540	141,311	144,137	147,020	149,960	152,959	156,019	159,139	162,322	165,568
Net operating revenue		81,260	106,569	111,065	115,725	120,553	125,555	130,737	136,105	141,666	147,425
Less: Estimated cash-funded recurring costs		57,000	49,000	13,000	29,000	33,000	45,000	74,000	14,000	32,000	32,000
Estimated cash-funded watermain capital improvements											
Estimated cash-funded non-pipe asset capital improvements				4,162						161,989	
Estimated debt service #1 - 2018 Bonds [1]				7,000	63,250	63,250	63,250	63,250	63,250	63,250	63,250
Estimated debt service #2 - 2028 Bonds [2]											
Estimated debt service #3 - 2038 Bonds [3]											
Estimated debt service #4 - 2039 Bonds [4]											
Net cash flow		$24,260	$57,569	$86,903	$23,475	$24,303	$17,305	($6,513)	$58,855	($115,573)	$52,175
Cash & investments	*$78,523*	*$102,783*	*$160,352*	*$247,256*	*$270,730*	*$295,033*	*$312,338*	*$305,825*	*$364,680*	*$249,107*	*$301,282*

[1] Estimated debt service payments based on a watermain $556,218 bond issue for 10 years at current market rates.
[2] Estimated debt service payments based on a non-pipe asset $960,095 bond issue for 10 years at current market rates.
[3] Estimated debt service payments based on a watermain $488,932 bond issue for 10 years at current market rates.
[4] Estimated debt service payments based on a non-pipe asset $3,322,500 bond issue for 30 years at current market rates.

VILLAGE OF SCHOOLCRAFT (MICHIGAN) WATER FUND

WATER CASH FLOW ANALYSIS

	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33	2033/34	2034/35	2035/36	2036/37	2037/38	2038/39	2039/40	2040/41
	3.00%	3.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
	$318,469	$328,023	$334,584	$341,275	$348,101	$355,063	$362,164	$369,407	$376,795	$384,331	$392,018	$399,858	$407,856	$416,013	$424,333
	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800
	322,269	331,823	338,384	345,075	351,901	358,863	365,964	373,207	380,595	388,131	395,818	403,658	411,656	419,813	428,133
	168,879	172,257	175,702	179,216	182,801	186,457	190,186	193,989	197,869	201,827	205,863	209,980	214,180	218,464	222,833
	153,390	159,566	162,681	165,859	169,100	172,406	175,778	179,218	182,726	186,305	189,955	193,678	197,475	201,349	205,300
	45,000	61,000	60,000	13,000	13,000	78,000	96,000	18,000	38,000	15,000	74,000	100,000	25,000	16,000	70,000
		286,489													
					9,659					73,398			6,184		
	63,250	63,250	63,250												
			12,000	109,000	109,000	109,000	109,000	109,000	109,000	109,000	109,000	109,000	109,000		
													6,125	55,375	55,375
														75,000	203,000
	$45,140	($251,173)	$27,431	$43,859	$37,441	($14,594)	($29,222)	$52,218	$35,726	($11,093)	$6,955	($15,322)	$51,166	$54,974	($123,075)
	$346,422	*$95,249*	*$122,680*	*$166,539*	*$203,980*	*$189,387*	*$160,165*	*$212,383*	*$248,109*	*$237,016*	*$243,970*	*$228,648*	*$279,815*	*$334,789*	*$211,714*

Appendix C

2022 Updates to Capital Improvement Plan (excerpts)

Table 17 – Cost Opinions for Recommended Projects

Project	*Project Description*	*Opinion of Cost*	*Approx. Year*
Short-Term Improvements (Years 0 – 5)			
1	Replace 2,050' of 4" with 8" main on West Cass St., West St. to US 131; Hayward St., from West Cass St. to West Clay St.; and West Clay St., from Hayward St. to US 131	$ 360,000	2023
2	Replace 600 ft of 4" main on E. Vienna St., from US 131 to Cedar St.	$ 105,000	2024
3	Replace 670 ft of 4" main on Cherry St., from US 131 to S. Centre St.	$ 115,000	2025
4	Replace 670 ft of old 4" main on Holmes St., from US 131 to S. Centre St.	$ 115,000	2026
5	Replace 1,000 ft of 4" main on W. Vienna St., from N. Centre St. to West St.; & N. Centre St., from W. Vienna to W. Clay St.	$ 175,000	2027
6	Replace 1,150 ft of old 4" main on Osterhout St., from Pearl St. to N. 14th St.	$ 205,000	2028
7	Replace 1,000 ft of 4" main on Walnut St., from Duncan St. to US 131	$ 175,000	2029
8	Replace 730 ft of 4" main on Clay St., from US 131 to N. Cedar St.	$ 130,000	2030
9	Replace 1,160 ft of 4" main on Cedar St., from E. Eliza St. to Elm St.	$ 205,000	2032
10	Replace 240 ft of 4" main on E. Cass St., from Well House to Pearl St.	$ 45,000	2034
	Short-Term Total Cost	**$1,630,000**	
Long-Term Improvements (Years 6-20)			
11	Construct 650 ft of 12" main on Hewitt St., E. South St. to Walnut St.	$ 170,000	2036
12	Construct 850 ft of 8" main on Ashery Dr. from West W Ave. to the cul-de-sac	$ 150,000	2038
13	Construct 1100 ft of 8" main on Maple St. from North 14th St. to Tulip Dr.	$ 195,000	2040
14	Construct 300 ft of 8" main in alley from B and L Drive to E. Clay St.	$ 55,000	2042
	Long-Term Total Cost	**$ 570,000**	
	Short-Term and Long-Term Total Cost	**$ 2,185,000**	

Notes:
1. Opinion of Cost includes 35 percent allowance for legal and administrative costs, engineering, and contingencies.
2. The Opinion of Cost is based on current dollars.
3. Does not include water service replacements or extensive restoration.

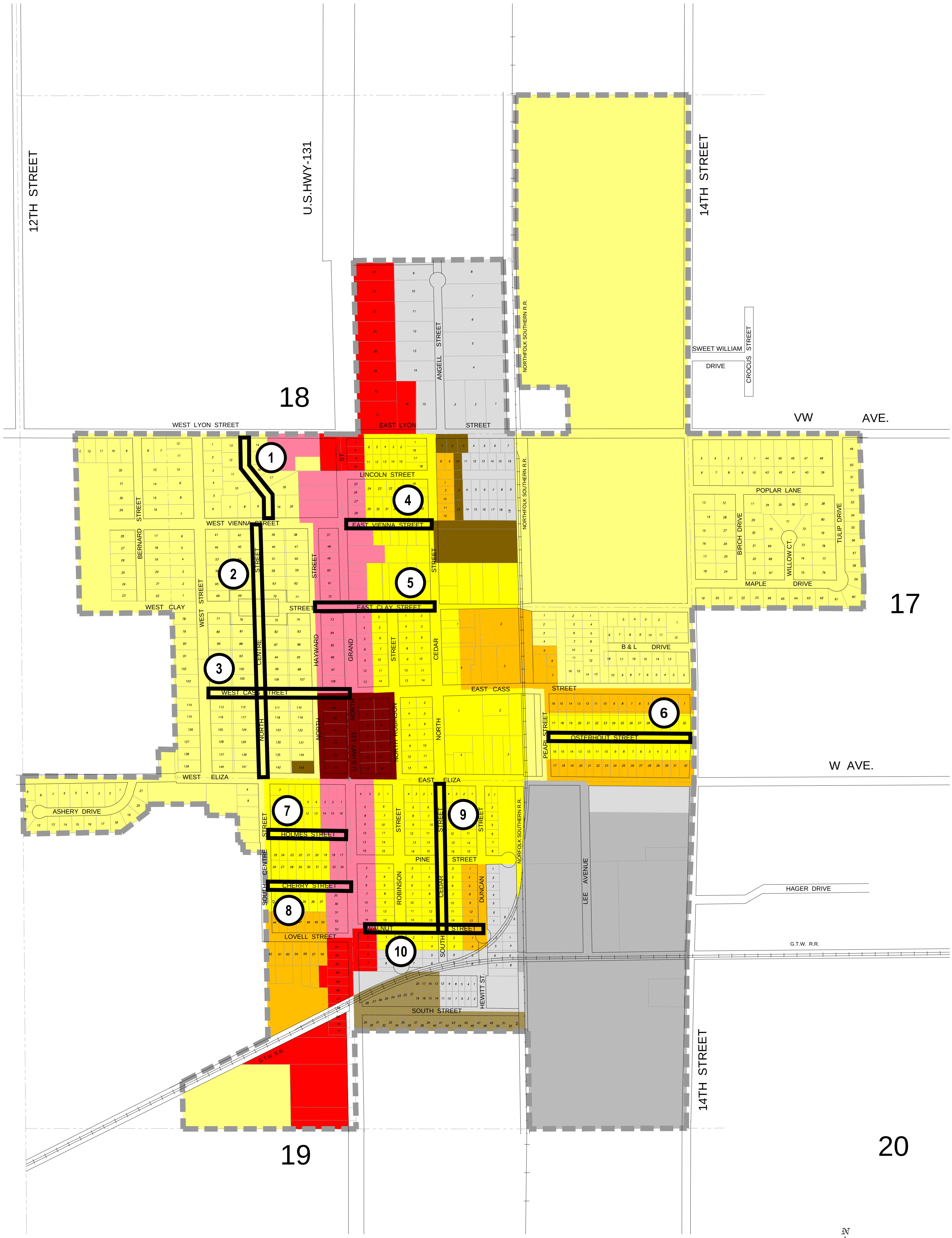
Appendix D

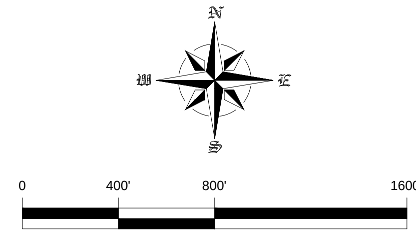
Zoning Map

ZONING MAP
VILLAGE OF SCHOOLCRAFT

KALAMAZOO COUNTY, MICHIGAN

LAST REVISION PER ORDINANCE # 228
EFFECTIVE: JUNE 6, 2014





LEGEND

- RA - SINGLE FAMILY RESIDENTIAL DISTRICT
- R1 - SINGLE FAMILY RESIDENTIAL DISTRICT
- R2 - SINGLE AND TWO FAMILY RESIDENTIAL DISTRICT
- R3 - SINGLE FAMILY AND MANUFACTURED HOUSING DISTRICT
- RM - MULTIPLE FAMILY RESIDENTIAL DISTRICT
- RMH - RESIDENTAIL MOBILE HOME DISTRICT
- B1 - LOCAL BUSINESS DISTRICT
- B2 - GENERAL BUSINESS DISTRICT
- CBD - CENTRAL BUSINESS DISTRICT
- P - PARKING DISTRICT
- I1 - LIGHT INDUSTRIAL DISTRICT
- I2 - GENERAL INDUSTRIAL DISTRICT

Prein&Newhof
Engineers•Surveyors•Planners•Environmental•Laboratory
7123 STADIUM DRIVE
KALAMAZOO, MICHIGAN 49009
PHONE: (269) 372-1158
JUNE 2014

Appendix E

Project Cost Estimates and User Cost Estimates

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Estimate of Probable Cost

Owner:
Village of Schoolcraft

Project Title:
PROJECT #01: N Centre St (W Lyon to W Vienna) - Replacement

Date: March 2023

Project #: 2220322

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	General Conditions / Mobilization (10%)	1	LS	$18,400.00	$18,400.00
2	Abandon watermain	740	LF	$1.00	$740.00
3	8" Watermain	740	LF	$75.00	$55,500.00
4	12" Watermain	0	LF	$100.00	$0.00
5	Bore & Jack	0	LF	$400.00	$0.00
6	Connect to existing WM	2	EA	$3,000.00	$6,000.00
7	Watermain Valve	2	EA	$2,200.00	$4,400.00
8	Remove pavement	100	SY	$5.00	$500.00
9	Remove and replace driveways	4	EA	$1,500.00	$6,000.00
10	Remove and Replace Concrete Sidewalk	3,700	SF	$8.00	$29,600.00
11	Remove and Replace Curb	0	LF	$30.00	$0.00
12	Hydrant Complete	1	EA	$6,000.00	$6,000.00
13	Water Services	10	EA	$5,500.00	$55,000.00
14	HMA road patch - Complete	100	SY	$60.00	$6,000.00
15	Restoration	1	LS	$7,400.00	$7,400.00
16	Traffic Control	1	LS	$5,000.00	$5,000.00
17	Soil Erosion Control	1	LS	$1,500.00	$1,500.00
	Subtotal				$202,040.00
	Contingencies (10%)				$20,204.00
	Engineering, Administration & Legal (25%)				$50,510.00
	Project Total				$272,754.00

All work quantities and costs are estimated for preliminary planning purposes only.
Costs estimated in 2022 Dollars

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Estimate of Probable Cost

Owner:
Village of Schoolcraft

Project Title:
PROJECT #02: N Centre St (W Vienna to W Eliza) - Replacement

Date: March 2023

Project #: 2220322

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	General Conditions / Mobilization (10%)	1	LS	$43,100.00	$43,100.00
2	Abandon watermain	1,920	LF	$1.00	$1,920.00
3	8" Watermain	1,920	LF	$75.00	$144,000.00
4	12" Watermain	0	LF	$100.00	$0.00
5	Connect to existing WM	7	EA	$3,000.00	$21,000.00
6	Watermain Valve	6	EA	$2,200.00	$13,200.00
7	Remove pavement	275	SY	$5.00	$1,375.00
8	Remove and replace driveways	11	EA	$1,500.00	$16,500.00
9	Remove and Replace Concrete Sidewalk	0	SF	$8.00	$0.00
10	Remove and Replace Curb	0	LF	$30.00	$0.00
11	Hydrant Complete	8	EA	$6,000.00	$48,000.00
12	Water Services	26	EA	$5,500.00	$143,000.00
13	HMA road patch - Complete	275	SY	$60.00	$16,500.00
14	Restoration	1	LS	$19,200.00	$19,200.00
15	Traffic Control	1	LS	$5,000.00	$5,000.00
16	Soil Erosion Control	1	LS	$1,000.00	$1,000.00
	Subtotal				$473,795.00
	Contingencies (10%)				$47,379.50
	Engineering, Administration & Legal (25%)				$118,448.75
	Project Total				$639,623.25

All work quantities and costs are estimated for preliminary planning purposes only.
Costs estimated in 2022 Dollars

Prein&Newhof
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Estimate of Probable Cost

Owner:
Village of Schoolcraft

Project Title:
PROJECT #03: W Cass St (West to US-131) - Replacement

Date:
March 2023

Project #:
2220322

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	General Conditions / Mobilization (10%)	1	LS	$20,500.00	$20,500.00
2	Abandon watermain	1,100	LF	$1.00	$1,100.00
3	8" Watermain	1,100	LF	$75.00	$82,500.00
4	12" Watermain	0	LF	$100.00	$0.00
5	Bore & Jack	0	LF	$400.00	$0.00
6	Connect to existing WM	6	EA	$3,000.00	$18,000.00
7	Watermain Valve	4	EA	$2,200.00	$8,800.00
8	Remove pavement	180	SY	$5.00	$900.00
9	Remove and replace driveways	2	EA	$1,500.00	$3,000.00
10	Remove and Replace Concrete Sidewalk	0	SF	$8.00	$0.00
11	Remove and Replace Curb	0	LF	$30.00	$0.00
12	Hydrant Complete	3	EA	$6,000.00	$18,000.00
13	Water Services	8	EA	$5,500.00	$44,000.00
14	HMA road patch - Complete	180	SY	$60.00	$10,800.00
15	Restoration	1	LS	$11,000.00	$11,000.00
16	Traffic Control	1	LS	$5,000.00	$5,000.00
17	Soil Erosion Control	1	LS	$1,500.00	$1,500.00
	Subtotal				$225,100.00
	Contingencies (10%)				$22,510.00
	Engineering, Administration & Legal (25%)				$56,275.00
	Project Total				$303,885.00

All work quantities and costs are estimated for preliminary planning purposes only.
Costs estimated in 2022 Dollars

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Estimate of Probable Cost

Owner:
Village of Schoolcraft

Project Title:
PROJECT #04: E Vienna St (US-131 to N Cedar) - Replacement

Date: March 2023

Project #: 2220322

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	General Conditions / Mobilization (10%)	1	LS	$15,300.00	$15,300.00
2	Abandon watermain	585	LF	$1.00	$585.00
3	8" Watermain	585	LF	$75.00	$43,875.00
4	12" Watermain	0	LF	$100.00	$0.00
5	Connect to existing WM	2	EA	$3,000.00	$6,000.00
6	Watermain Valve	2	EA	$2,200.00	$4,400.00
7	Remove pavement	100	SY	$5.00	$500.00
8	Remove and replace driveways	7	EA	$1,500.00	$10,500.00
9	Remove and Replace Concrete Sidewalk	0	SF	$8.00	$0.00
10	Remove and Replace Curb	0	LF	$30.00	$0.00
11	Hydrant Complete	1	EA	$6,000.00	$6,000.00
12	Water Services	12	EA	$5,500.00	$66,000.00
13	HMA road patch - Complete	100	SY	$60.00	$6,000.00
14	Restoration	1	LS	$5,850.00	$5,850.00
15	Traffic Control	1	LS	$2,500.00	$2,500.00
16	Soil Erosion Control	1	LS	$1,000.00	$1,000.00
	Subtotal				$168,510.00
	Contingencies (10%)				$16,851.00
	Engineering, Administration & Legal (25%)				$42,127.50
	Project Total				$227,488.50

All work quantities and costs are estimated for preliminary planning purposes only.
Costs estimated in 2022 Dollars

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Estimate of Probable Cost

Owner:
Village of Schoolcraft

Project Title:
PROJECT #05: Clay St (N Hayward to N Cedar) - Replacement

Date: March 2023

Project #: 2220322

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	General Conditions / Mobilization (10%)	1	LS	$20,100.00	$20,100.00
2	Abandon watermain	735	LF	$1.00	$735.00
3	8" Watermain	735	LF	$75.00	$55,125.00
4	12" Watermain	0	LF	$100.00	$0.00
5	Connect to existing WM	4	EA	$3,000.00	$12,000.00
6	Watermain Valve	4	EA	$2,200.00	$8,800.00
7	Remove pavement	500	SY	$5.00	$2,500.00
8	Remove and replace driveways	4	EA	$1,500.00	$6,000.00
9	Remove and Replace Concrete Sidewalk	2,800	SF	$8.00	$22,400.00
10	Remove and Replace Curb	0	LF	$30.00	$0.00
11	Hydrant Complete	2	EA	$6,000.00	$12,000.00
12	Water Services	7	EA	$5,500.00	$38,500.00
13	HMA road patch - Complete	500	SY	$60.00	$30,000.00
14	Restoration	1	LS	$7,350.00	$7,350.00
15	Traffic Control	1	LS	$5,000.00	$5,000.00
16	Soil Erosion Control	1	LS	$1,000.00	$1,000.00
	Subtotal				$221,510.00
	Contingencies (10%)				$22,151.00
	Engineering, Administration & Legal (25%)				$55,377.50
	Project Total				$299,038.50

All work quantities and costs are estimated for preliminary planning purposes only.
Costs estimated in 2022 Dollars

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Estimate of Probable Cost

Owner:
Village of Schoolcraft

Project Title:
PROJECT #06: Osterhout St (Pearl to 14th) - Replacement / Loop

Date:
March 2023

Project #:
2220322

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	General Conditions / Mobilization (10%)	1	LS	$28,300.00	$28,300.00
2	Abandon watermain	1,140	LF	$1.00	$1,140.00
3	8" Watermain	1,140	LF	$75.00	$85,500.00
4	12" Watermain	0	LF	$100.00	$0.00
5	Connect to existing WM	2	EA	$3,000.00	$6,000.00
6	Watermain Valve	3	EA	$2,200.00	$6,600.00
7	Remove pavement	100	SY	$5.00	$500.00
8	Remove and replace driveways	11	EA	$1,500.00	$16,500.00
9	Remove and Replace Concrete Sidewalk	250	SF	$8.00	$2,000.00
10	Remove and Replace Curb	0	LF	$30.00	$0.00
11	Hydrant Complete	2	EA	$6,000.00	$12,000.00
12	Water Services	24	EA	$5,500.00	$132,000.00
13	HMA road patch - Complete	100	SY	$60.00	$6,000.00
14	Restoration	1	LS	$11,400.00	$11,400.00
15	Traffic Control	1	LS	$2,500.00	$2,500.00
16	Soil Erosion Control	1	LS	$570.00	$570.00
	Subtotal				$311,010.00
	Contingencies (10%)				$31,101.00
	Engineering, Administration & Legal (25%)				$77,752.50
	Project Total				$419,863.50

All work quantities and costs are estimated for preliminary planning purposes only.
Costs estimated in 2021 Dollars

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Estimate of Probable Cost

Owner:
Village of Schoolcraft

Project Title:
PROJECT #07: W Holmes St (S Centre to US-131) - Replacement

Date: March 2023

Project #: 2220322

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	General Conditions / Mobilization (10%)	1	LS	$14,900.00	$14,900.00
2	Abandon watermain	600	LF	$1.00	$600.00
3	8" Watermain	600	LF	$75.00	$45,000.00
4	12" Watermain	0	LF	$100.00	$0.00
5	Connect to existing WM	2	EA	$3,000.00	$6,000.00
6	Watermain Valve	2	EA	$2,200.00	$4,400.00
7	Remove pavement	100	SY	$5.00	$500.00
8	Remove and replace driveways	3	EA	$1,500.00	$4,500.00
9	Remove and Replace Concrete Sidewalk	0	SF	$8.00	$0.00
10	Remove and Replace Curb	0	LF	$30.00	$0.00
11	Hydrant Complete	1	EA	$6,000.00	$6,000.00
12	Water Services	12	EA	$5,500.00	$66,000.00
13	HMA road patch - Complete	100	SY	$60.00	$6,000.00
14	Restoration	1	LS	$6,000.00	$6,000.00
15	Traffic Control	1	LS	$2,500.00	$2,500.00
16	Soil Erosion Control	1	LS	$1,000.00	$1,000.00
	Subtotal				$163,400.00
	Contingencies (10%)				$16,340.00
	Engineering, Administration & Legal (25%)				$40,850.00
	Project Total				$220,590.00

All work quantities and costs are estimated for preliminary planning purposes only.
Costs estimated in 2022 Dollars

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Estimate of Probable Cost

Owner:
Village of Schoolcraft

Project Title:
PROJECT #08: Cherry St (Centre to US-131) - Replacement

Date:
March 2023

Project #:
2220322

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	General Conditions / Mobilization (10%)	1	LS	$15,800.00	$15,800.00
2	Abandon watermain	660	LF	$1.00	$660.00
3	8" Watermain	660	LF	$75.00	$49,500.00
4	12" Watermain	0	LF	$100.00	$0.00
5	Connect to existing WM	2	EA	$3,000.00	$6,000.00
6	Watermain Valve	2	EA	$2,200.00	$4,400.00
7	Remove pavement	100	SY	$5.00	$500.00
8	Remove and replace driveways	6	EA	$1,500.00	$9,000.00
9	Remove and Replace Concrete Sidewalk	0	SF	$8.00	$0.00
10	Remove and Replace Curb	0	LF	$30.00	$0.00
11	Hydrant Complete	1	EA	$6,000.00	$6,000.00
12	Water Services	12	EA	$5,500.00	$66,000.00
13	HMA road patch - Complete	100	SY	$60.00	$6,000.00
14	Restoration	1	LS	$6,600.00	$6,600.00
15	Traffic Control	1	LS	$2,500.00	$2,500.00
16	Soil Erosion Control	1	LS	$1,000.00	$1,000.00
	Subtotal				$173,960.00
	Contingencies (10%)				$17,396.00
	Engineering, Administration & Legal (25%)				$43,490.00
	Project Total				$234,846.00

All work quantities and costs are estimated for preliminary planning purposes only.
Costs estimated in 2022 Dollars

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Estimate of Probable Cost

Owner:
Village of Schoolcraft

Project Title:
PROJECT #09: S Cedar St (E Eliza to E Elm) - Replacement

Date:
March 2023

Project #:
2220322

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	General Conditions / Mobilization (10%)	1	LS	$30,200.00	$30,200.00
2	Abandon watermain	1,140	LF	$7.00	$7,980.00
3	8" Watermain	1,140	LF	$75.00	$85,500.00
4	12" Watermain	0	LF	$100.00	$0.00
5	Connect to existing WM	4	EA	$3,000.00	$12,000.00
6	Watermain Valve	4	EA	$2,200.00	$8,800.00
7	Remove pavement	200	SY	$5.00	$1,000.00
8	Remove and replace driveways	8	EA	$1,500.00	$12,000.00
9	Remove and Replace Concrete Sidewalk	0	SF	$8.00	$0.00
10	Remove and Replace Curb	0	LF	$30.00	$0.00
11	Hydrant Complete	4	EA	$6,000.00	$24,000.00
12	Water Services	22	EA	$5,500.00	$121,000.00
13	HMA road patch - Complete	200	SY	$60.00	$12,000.00
14	Restoration	1	LS	$11,400.00	$11,400.00
15	Traffic Control	1	LS	$5,000.00	$5,000.00
16	Soil Erosion Control	1	LS	$1,000.00	$1,000.00
	Subtotal				$331,880.00
	Contingencies (10%)				$33,188.00
	Engineering, Administration & Legal (25%)				$82,970.00
	Project Total				$448,038.00

All work quantities and costs are estimated for preliminary planning purposes only.
Costs estimated in 2022 Dollars

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Estimate of Probable Cost

Owner:
Village of Schoolcraft

Project Title:
PROJECT #10: Walnut St (US-131 to Duncan) - Replacement

Date: March 2023

Project #: 2220322

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	General Conditions / Mobilization (10%)	1	LS	$21,300.00	$21,300.00
2	Abandon watermain	870	LF	$7.00	$6,090.00
3	8" Watermain	870	LF	$75.00	$65,250.00
4	12" Watermain	0	LF	$100.00	$0.00
5	Connect to existing WM	4	EA	$3,000.00	$12,000.00
6	Watermain Valve	4	EA	$2,200.00	$8,800.00
7	Remove pavement	200	SY	$5.00	$1,000.00
8	Remove and replace driveways	4	EA	$1,500.00	$6,000.00
9	Remove and Replace Concrete Sidewalk	2,100	SF	$8.00	$16,800.00
10	Remove and Replace Curb	0	LF	$30.00	$0.00
11	Hydrant Complete	3	EA	$6,000.00	$18,000.00
12	Water Services	10	EA	$5,500.00	$55,000.00
13	HMA road patch - Complete	200	SY	$60.00	$12,000.00
14	Restoration	1	LS	$8,700.00	$8,700.00
15	Traffic Control	1	LS	$2,500.00	$2,500.00
16	Soil Erosion Control	1	LS	$1,000.00	$1,000.00
	Subtotal				$234,440.00
	Contingencies (10%)				$23,444.00
	Engineering, Administration & Legal (25%)				$58,610.00
	Project Total				$316,494.00

All work quantities and costs are estimated for preliminary planning purposes only.
Costs estimated in 2022 Dollars

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Estimate of Probable Cost

Owner:
Village of Schoolcraft

Project Title:
PROJECT #11: New Well Siting

Date:
March 2023

Project #:
2220322

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	Property Acquisition, 4 acres	1	Lsum	$0.00	$0.00
2	Observation Wells	1	Lsum	$100,000.00	$100,000.00
3	Test & Production Wells	1	Lsum	$130,000.00	$130,000.00
4	Well House & Site Work	1	Lsum	$650,000.00	$650,000.00
5	Water Main	1,800	Ft	$110.00	$198,000.00
6	Service Drive	900	Ft	$105.00	$94,500.00
7	Restoration	1	Lsum	$15,000.00	$15,000.00
	Subtotal				$1,187,500.00
	Contingencies (10%)				$118,750.00
	Engineering, Administration & Legal (25%)				$296,875.00
	Project Total				$1,603,125.00

All work quantities and costs are estimated for preliminary planning purposes only.
Costs estimated in 2022 Dollars

Prein&Newhof

Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

Estimate of Probable Cost

Owner:

Village of Schoolcraft

Project Title:

PROJECT #12: Lead Service Replacement - City wide

Date: March 2023

Project #: 2220322

Item No.	Description	Quantity	Unit	Unit Price	Total Amount
1	Mobilization	1	LS	$19,500.00	$19,500.00
2	Water Service Potholing	222	EA	$600.00	$133,200.00
3	Water Service - Long Side, 1 inch	111	EA	$2,400.00	$266,400.00
4	Water Service - Short Side, 1 inch	111	EA	$2,000.00	$222,000.00
5	Water Service - Yard (Private), 1 inch	222	EA	$4,000.00	$888,000.00
9	House Connection w/Plummer	222	EA	$400.00	$88,800.00
11	Sidewalk Remove and Replace	16,650	SF	$8.00	$133,200.00
13	Road Remove and Replace	2,500	SY	$60.00	$150,000.00
16	Traffic Control	1	LS	$75,000.00	$75,000.00
	Subtotal				$1,976,100.00
	Contingencies (10%)				$197,610.00
	Engineering, Administration & Legal (15%)				$296,415.00
	Project Total				$2,470,125.00

All work quantities and costs are estimated for preliminary planning purposes only.

Costs estimated in 2022 Dollars

Project and User Cost Estimate

Project Description	Number	Total Cost	Notes
Water Main Replacements	1-10	$ 4,112,100	FY24
Well Siting	11	$ 1,948,700	FY24
Lead Service Line Replacements	12	$ 3,002,500	FY24
		$ 9,064,000	

Loan Term	40
Loan Interest Rate	1.875%
Annual Debt Payment	$ 324,121
Annual Cost per REU	$ 451.42
Monthly Cost per REU	$ 37.62

Current Population:	1477		
Residential Services (REU):	572	2021 Annual Water Use:	27.5 MG
Com/Ind Services (REU):	146	2021 Annual Water Use:	7 MG
Total REU's:	718.0		

City uses AWWA meter Equivalents to determine REUs

Water usage comes from City billings

Appendix F

State Historic Preservation Office, Tribal Historic Preservation Officers

Appendix G

Wetland & Floodplain Maps

VILLAGE OF SCHOOLCRAFT

KALAMAZOO COUNTY, MICHIGAN

DRINKING WATER REVOLVING FUND

APPENDIX G: WETLAND AND FLOODPLAIN MAPS

MAY 2023

Prein&Newhof

2220322

LEGEND

- Project Area
- Project Label

National Wetlands Inventory

- Aquatic Bed
- Emergent
- Scrub-Shrub
- Unconsolidated Bottom

FEMA FLOODPLAINS
THE ENTIRE MAPPED AREA IS ZONE X
(AREA OF MINIMAL FLOOD HAZARD)
Source: FEMA's National Flood Hazard Layer (NFHL)

SCALE: 1 " = 800 '

Appendix H

Protected Species Review

Appendix I

Sites of Contamination

VILLAGE OF SCHOOLCRAFT

KALAMAZOO COUNTY, MICHIGAN

DRINKING WATER REVOLVING FUND

APPENDIX G: WETLAND AND FLOODPLAIN MAPS

MAY 2023

Prein&Newhof

2220322

LEGEND

- Project Area
- 1 Project Label
- Part 201 Site of Environmental Contamination
- Part 213 LUST - Open
- Part 213 LUST - Closed
- Part 211 Underground Storage Tank - Active
- Part 211 Underground Storage Tank - Closed
- Toxic Release Site
- Hazardous Waste Site

Source: MI EGLE Environmental Mapper and EPA Enviromapper

SCALE: 1 " = 800 '

J:\GIS_Client\Kal-GD\SCVill-GD\Vlg_Proj\2220322_DWRFLeadServices\2220322_DWRFLeadServices.aprx - jferia - 5/1/2023 4:33 PM

Appendix J

Soils Survey Map

United States Department of Agriculture

NRCS

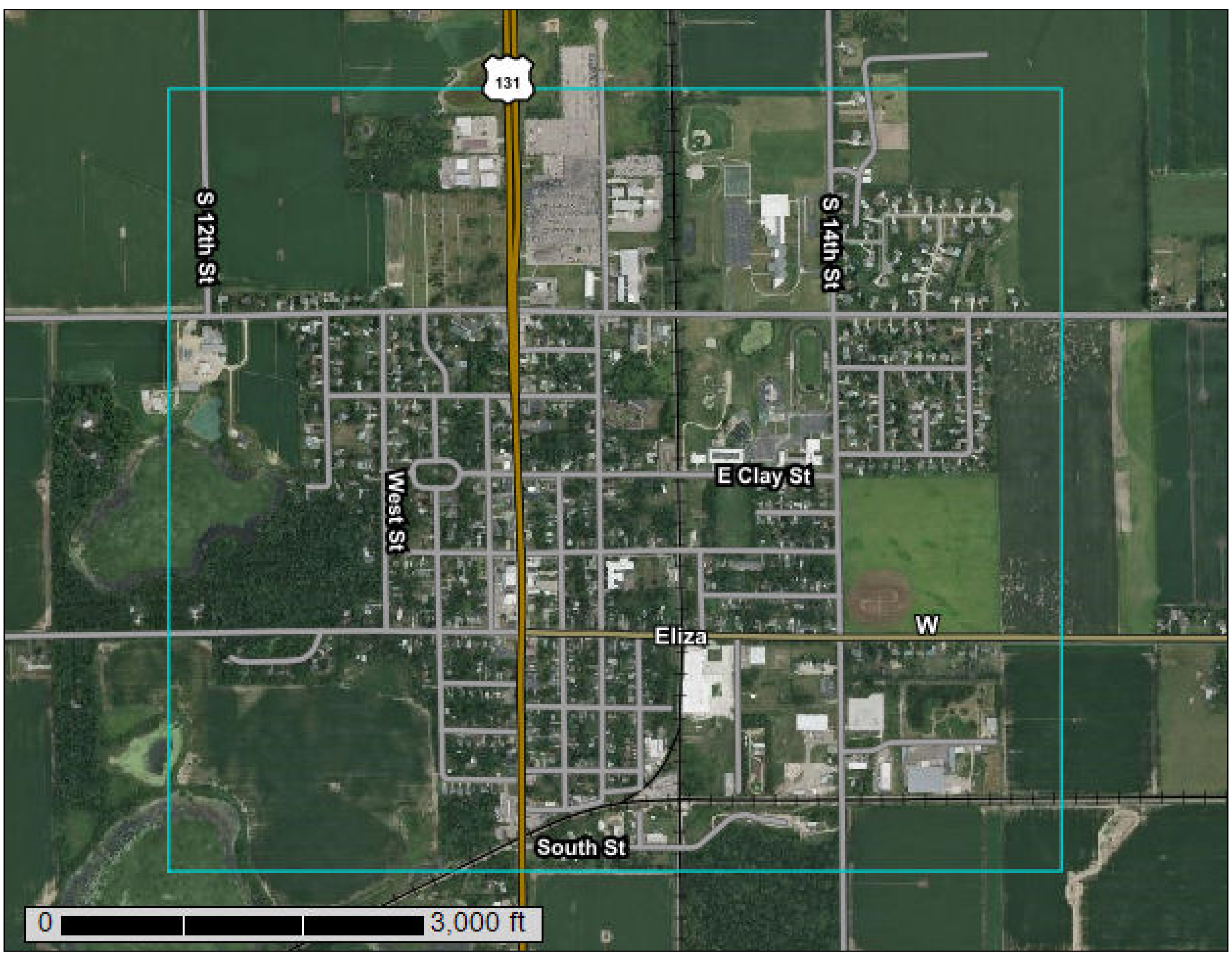
Natural Resources Conservation Service

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

Custom Soil Resource Report for

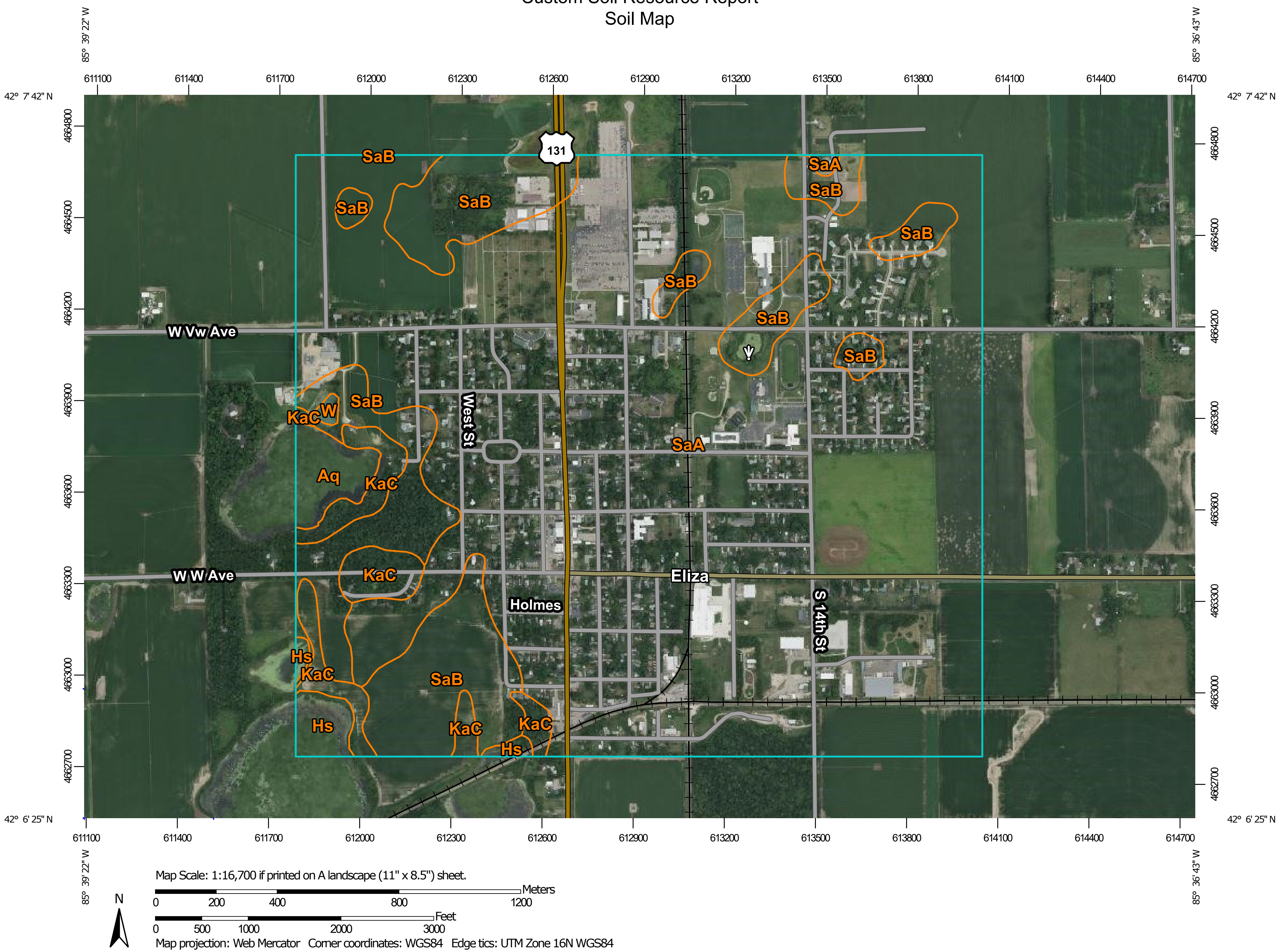
Kalamazoo County, Michigan

Village of Schoolcraft - DWRF



May 1, 2023

Soil Map



Map Scale: 1:16,700 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 200, 400, 800, 1200

Feet: 0, 500, 1000, 2000, 3000

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

Appendix K

Public Participation Documentation

Appendix L

Resolution Adopting the Project Plan

Appendix M

Overburdened Community Determination Worksheet