Water System Improvements
Drinking Water State Revolving Fund
Project Planning Document

Village of Baldwin

Project No.: 221928
March 16, 2023

REVIEW DRAFT

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Prepared For:
Village of Baldwin
Baldwin, Michigan

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Review Draft

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List of Abbreviations/Acronyms

ADD	average day demand
AMP	asset management plan
CIP	capital improvements plan
CSI	contaminant source inventory
DCLSLR	Disadvantaged Community Lead Service Line Replacement
DSMI	Distribution System Materials Inventory
DWAM	Drinking Water Asset Management
DWI	Drinking Water Infrastructure
DWSRF	Drinking Water State Revolving Fund
EGLE	Michigan Department of Environment, Great Lakes, and Energy
gpm	gallons per minute
ITA	Intent to Apply
LSLR	lead service line replacement
MDD	maximum day demand
mgd	million gallons per day
MNFI	Michigan Natural Features Inventory
PFAS	perfluoroalkyl and polyfluoroalkyl substances
PRV	pressure reducing valve
REU	residential equivalent units
SESC	Soil Erosion and Sedimentation Control
Village	Village of Baldwin
WHPA	wellhead protection area
WHPP	Wellhead Protection Plan
WSRS	Water System Reliability Study

1.0 Introduction

In November 2022, the Village of Baldwin (Village) retained Fishbeck to complete a Drinking Water State Revolving Fund (DWSRF) Project Planning Document for improvements to the Village's water system. The purpose of this document is to meet the project planning requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE). The project plan presented herein addresses replacement of lead service lines within the water distribution system to comply with the Safe Drinking Water Act, as well as distribution system improvements to improve water quality, system reliability, and system pressure in various parts of the system. These distribution improvements include water main replacements, elevated storage tank improvements, water supply improvements, and water system pressure reducing valve improvements.

The Village owns and operates a water supply and distribution system that meets the local water demands. This system does not provide water to any non-Village customers and has no connections to any surrounding water systems. The Village serves approximately 900 customers. The water distribution system is divided into two pressure districts, with the high-pressure district located north of Eighth Street, and the low-pressure district located south of Eighth Street. The water service area is presented in Figure 1.

The Village's water distribution system is supplied by four groundwater supply wells. The combined groundwater pumping capacity of the four active wells is 1,850 gallons per minute (gpm). The groundwater is conveyed to either of two elevated storage tanks. The Norway Tower is the newer of the two tanks and serves the high-pressure district. This tower has a storage volume of 300,000 gallons and was installed in 2005. The School Tower is the second elevated storage tank and serves the low-pressure district. This tower has a storage volume of 100,000 gallons and was installed in 1981. The current water distribution system is shown in Figure 2.

As part of the *Water System Reliability Study* (WSRS) (Fishbeck, May 2019), an inventory of the system water main diameter, material, and installation year was completed. This inventory revealed several areas of aging water main where lead service lines were likely installed. Although an actual count of these services has yet to be completed, the services will need to be replaced over the next 20 years, according to the provisions of the 2018 Revisions to the Lead and Copper Rule. The recommended projects included within this DWSRF Project Planning Document, will focus on improvements to older areas of the distribution system through replacement of both water main and lead service lines.

In addition to the water main and lead service lines, the Village's *Water Asset Management Plan* (WAMP) (Fishbeck, 2022) identified several aging infrastructure assets in the system. Critical infrastructure assets identified in the WAMP include the elevated storage tanks, the water supply wells, and pressure reducing control valves located in the distribution system. These assets will need to be replaced to ensure the reliability and functionality of the Village's water supply system is maintained.

2.0 Project Background

2.1 Delineation of Study Area

The Village is located in southcentral Lake County, in the northwestern portion of Michigan's lower peninsula. Baldwin is only one of two villages in Lake County and is surrounded by forest, lakes, and outdoor recreation areas. The Village owns and operates the water supply and distribution system serving the surrounding community. The system does not employ any form of treatment and water is supplied by four groundwater wells. The current water distribution system, with the study area and a map of the major surface waters, are depicted in Figure 2 and Map 2, respectively.

2.2 Land Use

The existing land use in the study area includes residential, commercial, industrial, and public/institutional, as indicated on Map 3. The Village spans approximately 720 acres, including all streets, railroads, and surface water bodies. The actual land area is 672 acres, with nearly 33% of this being residential. An additional 33% of the Village is public/institutional lands, including churches, parks, schools, government buildings, and utilities. There is currently only one active industrial/manufacturing parcel in the Village. Approximately 20% of the Village area is vacant land. The commercial portion of the Village is mainly limited to the central business district along M-37. Existing land use is represented using the current zoning map layers published by the Esri ArcOnline map services.

The *Baldwin Village Master Plan* (Village of Baldwin Planning Commission, 2021) was consulted to create Map 4, which presents the planned land use within the Village, over the 20-year planning period. There are no major differences between the existing and planned land use. Small sections of commercial and public/institutional land scattered amongst the medium and high-density residential areas in Map 3 are not shown in Map 4, suggesting the Village plans on centralizing all commercial land use along the central business district, if possible. Map 4 also presents the Village wellhead protection area (WHPA). The only industrial parcel in the Village is located within one of the WHPAs.

2.3 Population Projections

Table 2-1 presents the official population estimates for the Village, completed by the US Census Bureau through the year 2020. An estimated 2021 population from the American Community Survey (ACS) is also included.

Table 2-1 – Population Data

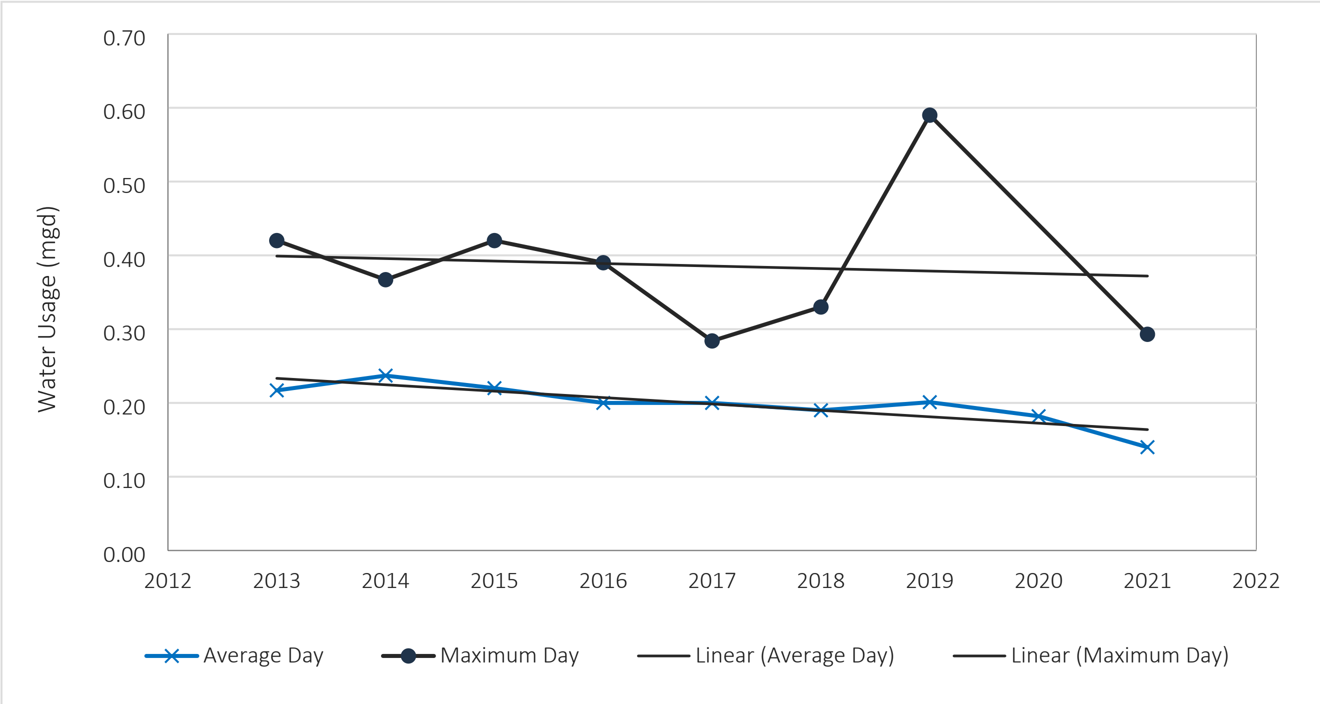
Year	Population	Annualized % Change
1960	835	
1970	612	-26.7%
1980	674	10.1%
1990	800	18.7%
2000	1,108	38.5%
2010	1,208	9.0%
2020	902	-25.3%

Table 2-1 indicates that the Village population peaked in 2010, and Census population estimates since then have shown a stark decrease. Census estimates for 2020 indicate an approximate 25% decrease in the population of the Village from 2010 to 2020. A conservative approach for projecting water demands is to assume that no future growth or decline in the Village population will occur. This approach will allow the Village to plan to serve the current number of customers, while providing surplus water system capacity, if declining populations continue.

2.4 Water Demand

A summary of the historical and projected water demands for the Village is included in this section. Historical data for the Average Day Demands (ADD) and Maximum Day Demands (MDD) from the last 10-years was provided by the Village and is summarized in Graph 1.

Graph 1 – Historical ADD and MDD



Graph 1 indicates that the ADD and MDD trended downward from 2013 through 2022. During this period, the ADD was 0.20 million gallons per day (mgd) and the average MDD was 0.39 mgd. The MDD for the year 2020 was not evaluated due to an extreme outlier caused by filter to waste pumping at Well 4. It is assumed that the decreasing trends are representative and correspond with decreasing population.

Future water usage projections are typically developed by multiplying the projected future population by historical average per capita demand. However, since the population is not projected to increase, the current system demands were conservatively deemed as representative of the future water demands. To account for some safety factor in planning for future demands, the future MDD was calculated using a conservative MDD:ADD peaking factor estimate. A conservative value above the average peaking factor was used. The estimated peaking factor was found by multiplying the average of the data set plus 1.65 standard deviations. Statistically, assuming a normal distribution of the data, this value will be greater than 95% of the future peaking factors based on the observed data. The estimated peaking factor was 2.70, resulting in a projected MDD of 0.536 mgd based on the ADD of 0.20 mgd. This estimation method resulted in an MDD that was slightly lower than the historical MDD value of 0.59 mgd from 2019. The historical value of 2019 is considered to be an outlier; the projected value of 0.54 mgd will be utilized. Table 2-2 presents the future ADD and MDD projections.

Table 2-2 – Future Water Demand Projections

Year	ADD	MDD
2023	0.20	.54
2028	0.20	.54
2043	0.20	.54

The projected 2021 and 2041 ADD is 0.20 mgd and the MDD is 0.54 mgd. As mentioned, since the population is not projected to increase, the 2021 and 2041 demand values are the same. As indicated previously, this approach is conservative, as water demands have likely decreased since 2017.

2.5 Existing Facilities

The Village owns its water system and subcontracts Infrastructure Alternatives Inc. to operate and maintain it. The system consists of water main, groundwater wells, and elevated storage tanks. Each of these components will be discussed in this section.

2.5.1 Water Main

The Village has over 16 miles of water main in the system. Water main sizes range from 6-inch to 12-inch main. Approximately 50% of the system is 8-inch-diameter main. Approximately 65% of the water main installed is ductile iron pipe. Other materials used include cast iron, PVC, and Transite. The water main installation year varies in the Village by location, material, and diameter. Roughly 20% of the system is over 40 years old, while nearly 50% of the system was installed after 2000.

The Village previously experienced problems with lost water in the distribution system. In 2017 and 2018, a significant percentage of the water pumped from the groundwater wells was not billed to customers. Although the exact cause for this discrepancy is unknown, operators suspect water main breaks are partially responsible. Replacing aging areas of the water distribution system will help reduce lost water.

2.5.2 Groundwater Wells

There are four active groundwater wells in the Village that supply the distribution system with water. The locations of each well are presented in Figure 2. Each well is flow tested annually to verify the pumping capacity, with EGLE. Well 2 has a capacity of 800 gpm and was installed in 1981 near the high school. Well 3 has a capacity of 200 gpm and was installed in 1965 by the park tennis courts, west of the courthouse. Well 4 has a capacity of 500 gpm and was installed in 1996 in the same park near the baseball field. Well 5 has a capacity of 350 gpm and was installed in 2004 southwest of the Village on 56th Street. Well 1 was abandoned and is no longer in use. None of the four wells utilize any form of water treatment.

2.5.3 Water Storage

The Village has two elevated water storage tanks. The older School Tower has a volume of 100,000 gallons and was installed in 1981, near the high school. It has an overflow elevation of 956.6 feet. The newer Norway Tower has a volume of 300,000 gallons and was installed in 2005, near the intersection of Norway Street and 10th Street. It has an overflow elevation of 980.0 feet. Under normal operation, Well 2 is used to fill the School Tower; Wells 3, 4 and 5 are used to fill the Norway Tower. Well 5 can be diverted to fill the School Tower if needed, using a valve vault at Astor Road. The vault is described in more detail below. During an emergency, any well can be used to fill any tower.

2.5.4 Pressure Zones

The distribution system is divided into two pressure zones as indicated in Figure 2. The high-pressure zone is located north of Eighth Street and is serviced by the Norway Tower and Wells 3 and 4. The low-pressure zone is located south of Eighth Street and is serviced by the School Tower and Wells 2 and 5. The two pressure districts are connected by pressure reducing valve (PRV) vaults north of Eighth Street on Maple Street and Norway Street. Together, the PRVs regulate pressure between the two districts to ensure each can operate independently but remain interconnected to provide water if pressure in either district drops significantly. Installed in the PRV vaults are an 8-inch PRV, a check valve, and a pressure gauge to measure pressure in each zone. The Norway vault also includes an additional 2-inch PRV. A third valve vault houses a check valve and pressure gauges and is located northwest of the school tower between Astor Road and Fourth Street.

2.6 Summary of Project Need

2.6.1 System Needs

2.6.1.1 <u>Lead Service Replacement</u>

Lead water services are a known potential public health hazard. It is expected that lead services still exist within older portions of the distribution system. These lead services must be eliminated within the next 20 years to meet the requirements of the Safe Drinking Water Act. The 2018 Revisions to the Lead and Copper Rule require municipalities to replace a minimum of 5% of lead service lines annually starting in 2021, including those service lines traditionally owned by the customer. In 2022, the Village received a Lead Service Line Replacement grant (Booker Funds), for which approximately 110 services are currently under construction.

Based on the preliminary DSMI and the Drinking Water Asset Management (DWAM) grant lead service line material investigations, 110 remaining lead services have been included for replacement within this Project Planning Document.

2.6.1.2 <u>Water Main Replacement</u>

The existing water distribution system includes aged water mains and dead ends, resulting in areas of low distribution system pressure and water quality issues. As mentioned previously, roughly 50% of the distribution system is 30 years or older. Areas of aged water main are more prone to failure and water main breaks, which decreases system reliability and increases operation and maintenance efforts along with the costs associated with such unplanned replacements or repairs. Aged water mains may include lead service lines, and it is best practice and most cost-effective to replace both the water main and lead services concurrently. Dead-end lines result in low system pressure on the outer edges of the distribution system and accumulate deposited material due to the relatively infrequent flow through these pipes. Flushing of the dead-end lines temporarily helps clean out deposited solids but does not remove the potential for sedimentation and water quality complaints. Dead-end lines should gradually be removed from the system or looped to eliminate the associated maintenance and operation efforts and water safety concerns.

2.6.1.3 <u>Elevated Storage Tank Improvements</u>

The School Tower and Norway Tower elevated storage tanks are critical components of the distribution system, providing equalization and emergency storage for the distribution system. The 2022 Water Asset Management Plan completed by Fishbeck, identified several aging infrastructure and operations components for both elevated tanks. These components are beyond, or are approaching, the end of their useful lives and will require replacement in the coming years to maintain the functionality of the elevated storage system. At the School Tower, these aging components include an altitude valve and associated piping and valving, overflow and drain piping, and the exterior and interior coatings. For the Norway Tower, the aging components include the exterior and interior tank coatings, as well as electrical control components such as level sensors, control panels and panel boards.

In addition to the aging infrastructure components identified in the WAMP report, an additional need for mixing has been identified in the School Tower. Currently, there is no existing mixing system inside the tank. During periods of low demand, the rate of turnover in the School tank decreases, resulting in issues with thermal stratification, which can lead to microbial growth and allow the potential for icing during cold weather. The installation of a mixer system in the School tank can mitigate thermal stratification and icing potential.

2.6.1.4 <u>Water Supply Improvements</u>

The 2022 Water Asset Management plan completed by Fishbeck also identified several critical aging infrastructure components that are part of the Village’s water supply system. These components include process equipment and piping, as well as various electrical, mechanical, and building components. Many of these pieces of equipment and building components are also beyond, or are approaching, the end of their useful lives. Each of the four active wells contain equipment that is due for replacement, including:

- Well pump, process piping and valves, electrical and mechanical equipment, and building components at Well 2.
- Well pump, process piping, valves, and instrumentation, electrical and mechanical equipment, and building components at Well 3.
- Process valves, electrical and mechanical equipment at Well 4.
- Process piping, valves, and instrumentation, and electrical and mechanical equipment at Well 5.

In particular, the process and electrical equipment at each of the Wells is critical for the continued operation of the water supply assets. Continued use of aging assets risks the equipment breaking down during operation and additional staff time for maintenance. Additionally, due to the age of the equipment, spare and replacement parts are becoming more difficult to obtain.

2.6.1.5 <u>Water System Pressure Reducing Valve Improvements</u>

The Maple and Norway PRV vaults, respectively, were identified for replacement in the 2022 Water Asset Management plan. The PRVs and check valves located in the vaults are aging and are critical components for the Village's distribution system. Failure-in-operation of the either of the valves in either of the valve vaults could result in uncontrolled flow from the high-pressure district to the low-pressure district and the overflow of the School tank.

2.6.2 Compliance with Drinking Water Standards

In 2018, the State of Michigan adopted Michigan Administrative Code Rule 604f, i.e., R325.10604f, entitled "Treatment techniques for lead and copper" pursuant to the Safe Drinking Water Act, Act 399 of Public Acts of Michigan of 1976, as amended ("Act 399"). Rule 604f requires a reduction in the threshold of allowable lead in water to 12 parts per billion by 2025. Water supplies with lead service lines, regardless of lead action level values, must replace all lead service lines at an average rate of five percent per year, not to exceed 20 years, or in accordance with an alternate schedule incorporated into an asset management plan (AMP) and approved by EGLE.

EGLE performed a Sanitary Survey of the Village water system in 2017. The document recommended the Village update their General Plan and Water System Reliability Study and to complete a Wellhead Protection Plan (WHPP). Since then, the Village has fulfilled all three of these items. The Village has also prepared an AMP that was approved by the EGLE Cadillac District Office in 2020.

2.6.3 Orders of Enforcement Actions

No court or enforcement orders, nor written enforcement actions have been issued to the Village, regarding the water system.

2.6.4 Drinking Water Quality Problems

The most recently published Water Quality Report (2020) indicates that water quality in the Village is good. Samples of water from the four active wells tested below the enforceable limit for all regulated contaminants. Unregulated contaminants, such as Sodium, Chloride, Hardness, Iron, and Sulfate, do not have enforceable limits, but are still monitored. Unregulated contaminant levels in the Village were typical for a community of this size supplied by well water. Twice a year, the system is flushed to reduce the potential for material to settle out near dead ends.

Recently, EGLE has required that all communities sample their water system for perfluoroalkyl and polyfluoroalkyl substances (PFAS). The four wells in the Village were sampled for PFAS on September 18, 2018, by EGLE. Initial sampling results indicated that Well 3 tested positive for PFAS. The Village was surprised by this result considering that Well 4, which is located roughly 350 feet from Well 3, tested nondetective for PFAS. Discussions with Village staff identified potential sources of PFAS contamination, including fire foam used by the fire department during a Village festival and the contamination zone from the Lake County courthouse nearby. The Village had the Well retested on November 13, 2018, and results came back nondetective for PFAS.

2.6.5 Projected Needs for the Next 20 Years

The WSRS completed in 2019 and WAMP completed in 2022, each included a capital improvements plan (CIP) for both 5-year and 20-year distribution system improvements. The water main improvements were prioritized by location in the system and focused on improving system pressure and reliability by eliminating dead ends, replacing old main, and looping the system in new locations. The elevated storage tank improvements, water supply improvements, and pressure reducing valve improvements were all prioritized based on the criticality assessment conducted in the WAMP, which notes the assets probability and consequences of failure. The proposed improvements focused on replacing infrastructure components that would improve system reliability and maintain current functionality. Both the 2019 WSRS and 2022 WAMP are available for review upon request.

In addition to the distribution system improvements needed, LSLR is also needed. As mentioned, removal of lead services over the next 20 years is required to meet the lead and copper rule of the Safe Drinking Water Act. The proposed lead service and distribution system improvements will have no impact on system demands or performance.

3.0 Analysis of Alternatives

3.1 Lead Service Line Replacement

3.1.1 No Action

If no action is taken, existing lead services in the water distribution system will remain in place. The lead services need to be replaced within 20 years to comply with the Safe Drinking Water Act.

3.1.2 Optimum Performance of Existing Facilities

Optimization is not a realistic alternative to lead service line replacement. Lead service lines are not acceptable materials any longer; there is no way to improve their performance. Therefore, performance optimization is not a viable alternative and will not be considered further.

3.1.3 Construction Alternative – New Service Lines

The Village has identified approximately 110 remaining lead services that need replacement. It is expected that the existing service line materials will be replaced with copper pipe from the resident’s meter to the corporation stop at the water main.

3.1.4 Regional Alternative

A regional alternative is not applicable for lead service line replacement since the service line replacements are required to comply with the Safe Drinking Water Act.

3.2 Water Main Replacement

3.2.1 No Action

If the proposed water main replacement projects are not completed, the risk of main breaks, lost water, and water quality problems associated with aging water main will remain. Therefore, the no-action alternative will not be considered further.

3.2.2 *Optimum Performance of Existing Facilities*

Optimization is not a realistic alternative to the proposed water main replacement projects. Optimization alternatives such as exercising valves, adjusting flows, or other operational measures are not viable alternatives to replacement of aging mains that may have tuberculation, dead ends, leaks, or pressure problems. Therefore, performance optimization is not a viable alternative and will not be considered further.

3.2.3 *Construction Alternatives*

This alternative evaluates improvements to the water mains via construction.

3.2.3.1 Water Main Repair and Rehabilitation

Water main repairs are reactionary and not considered a long-term approach to problems of pressure and aging pipe. Rehabilitation measures such as pipe lining are not considered cost effective or practical since mains are accessible and are not in areas of concentrated utilities. Therefore, water main repair and rehabilitation is not a viable alternative and will not be considered further.

3.2.3.2 Water Main Replacement

The proposed water main replacement projects are summarized in this section.

3.2.3.2.1 Eighth Street Dead End

A 6-inch dead-end pipe extends south from Eighth Street, west of Cherry Street, into what was formerly a railroad property. This section of main is no longer used and should be abandoned to eliminate any water quality concerns associated with the dead end.

3.2.3.2.2 Eighth Street Loop

Approximately 800 feet of 6-inch ductile iron water main installed in 1940 exist along Eighth Street from Oak Street to the railroad tracks west of the Village. To eliminate the water quality concerns associated with this 80-year-old pipe, a new section of 8-inch water main should be installed along Eighth Street from Oak Street to Astor Road. This will loop the system in this area in what was formerly a dead end, improving system pressure. This project will involve a railroad crossing.

3.2.3.2.3 Carrs Road

Approximately 400 feet of 6-inch ductile iron water main installed in 1960 exist along Carrs Road, west of Cherry Street. To increase system redundancy and pressure availability in this area of the system, this section of water main should be replaced with approximately 700 feet of 8-inch ductile iron main. Looping the system at Carrs Road will also remove any water quality problems associated with this aging dead-end pipe. This project will involve a railroad crossing.

3.2.3.2.4 First Street

Approximately 600 feet of 6-inch PVC water main installed in 1980 exist along First Street, west of Maple Street. Replacement of this main with an 8-inch ductile iron main will help improve available pressure in this part of the system.

3.2.3.2.5 Norway Street

Approximately 1,500 feet of 6-inch ductile iron water main installed in 1960 exist along Norway Street from Eighth Street to Fifth Street. In the latest AMP, the Village identified this section of main as a priority for replacement. Replacing it with 8-inch main will improve system pressure and reliability in this area.

3.2.3.2.6 Lake Street

Approximately 1,900 feet of 6-inch ductile iron water main installed in 1960 exist along Lake Street from Cherry Street to Michigan Avenue. In the latest AMP, the Village identified this section of main as a priority for replacement. Replacing it with 8-inch main will improve system pressure and reliability in this area.

3.2.3.2.7 Oak Street

Approximately 950 feet of 6-inch ductile iron water main installed in 1960 exists along Oak Street from Fourth Street to Sixth Street. In the latest AMP, the Village identified this section of main as a priority for replacement. Replacing it with 8-inch main will improve system pressure and reliability in this area.

3.2.3.2.8 Fifth Street

No water main currently exists on Fifth Street between Cherry Street and Oak Street. Installing an 8-inch ductile iron main in this area will loop Cherry Street and Oak Street, improving system pressure and reliability in this area.

3.2.4 Regional Alternative

A regional alternative is not applicable for the selected water mains. Regardless of system supply, these water mains have reached the end of their useful life and will need to be replaced to remain operational, reduce frequency of main breaks, and improve system looping. Therefore, no further consideration is given to this alternative.

3.3 Elevated Storage Tank Improvements

3.3.1 No Action

If no action is taken, aging equipment will continue to be operated beyond its useful life, increasing the chance for failures and potential service disruptions. Broken equipment would need to be repaired or replaced anyway. This option would not increase the reliability of the system and is not evaluated further.

3.3.2 Optimum Performance of Existing Facilities

This alternative evaluates the optimization of the elevated storage tank systems by making improvements to the following.

3.3.2.1 School Tank Altitude Valve System

In this alternative, the existing altitude valve and associated control and isolation valves located in the School Tower valve vault would be replaced in kind as the existing components are beyond their useful lives. These valves include: the altitude valve, the back-pressure control valve, the swing check valve, and the three isolation gate valves. These valves ensure that the School Tower does not overflow.

3.3.2.2 School Tank Mixer System Installation

In this alternative, a mixing system would be installed in the School Tank to continuously mix the contents of the tank. The Village has indicated a preference for an active jet mixer system and has successfully utilized this technology in the Norway Tank. The active jet mixer creates a vortex and induces a flow pattern to circulate the full volume of the tank. These small mixers could be easily lowered from the roof hatch and installed on the riser tube or on a floor stand. Jet mixers have reliable performance and longevity based on past experiences with similar style mixers. The jet mixer installation system is evaluated further as the principal alternative for the mixer system improvements.

3.3.2.3 School Tank Improvements

This alternative would see the overflow piping and drain piping within the tank replaced. These components of the tank are aging and should be replaced in kind, to ensure the functionality of the tank is maintained.

3.3.2.4 Norway Tank Controls and Instrumentation

This alternative would see aging electrical equipment and instrumentation inside the Norway elevated tank replaced, including the control panel, panel board and level sensor. Replacing this equipment would maintain the existing functionality of the elevated storage tank and would ensure that aging equipment is not being operated.

In addition, corrosion control equipment would be replaced, including the cathodic protection system control panel. This system helps to prevent corrosion inside the elevated storage tank, which improves both the life of the elevated tank and helps to maintain water quality.

3.3.3 Construction Alternative

In this alternative, new elevated storage tanks, including control valves and mixers, would have to be constructed and outfitted to replace the existing tanks. This would not be cost-effective; therefore, no further consideration is given to this alternative.

3.3.4 Regional Alternative

A regional alternative is not applicable for the elevated tanks given the scope of the improvements needed. Therefore, no further consideration is given to this alternative.

3.4 Water Supply Improvements

3.4.1 No Action

If no action is taken, critical water supply equipment will continue to be operated beyond its useful life. Equipment failure, especially process and electrical equipment, may result in water supply shortages for the Village. Therefore, no further consideration is given to this alternative.

3.4.2 Optimum Performance of Existing Facilities

This alternative evaluates the optimization of the elevated storage tank systems by making improvements to the following.

3.4.2.1 Well 2

In this alternative, the existing critical water supply equipment would be replaced in kind to maintain the existing functionality of the well. This equipment includes:

- Process equipment replacements including vertical turbine pump, discharge piping, check valve, isolation valves, air/vacuum valve and magnetic flow meter.
- Electrical equipment improvements including control panel, panel board, motor starter, manual transfer switch, and disconnect.
- Mechanical equipment replacements including exhaust fans and louvers.
- Building roof.

3.4.2.2 Well 3

In this alternative, the existing critical water supply equipment would be replaced in kind, to maintain the existing functionality of the well. This equipment includes:

- Discharge piping, check valve, isolation valves, air/vacuum valve and magnetic flow meter.
- Control panel, panel board, motor starter, manual transfer switch, and disconnect.
- Unit heater.
- Building improvements.

3.4.2.3 Well 4

In this alternative, the existing critical water supply equipment would be replaced in kind, to maintain the existing functionality of the well. This equipment includes:

- Check valve, isolation valves, air/vacuum valve, and magnetic flow meter.
- Control panel, motor starter, manual transfer switch, disconnect, and load center,
- Exhaust fans and unit heater.

3.4.3 Construction Alternative

In this alternative, new wells would have to be drilled and outfitted to replace the existing wells. The existing wells are sufficient for the needs of the system and optimization of the current wells is the more cost-effective alternative. Therefore, no further consideration is given to this alternative.

3.4.4 Regional Alternative

A regional alternative is not applicable for the water supply improvements listed above. The Village has the largest water supply and distribution system in the area and is geographically isolated from nearby, smaller systems. The closest system is Webber Township, to the north, which is not sized to supply the Village water demand, in addition to Webber's demands.

3.5 Water System Pressure Reducing Valve Improvements

3.5.1 No Action

If no action is taken, critical water distribution system equipment located at the Maple and Norway PRV vaults will continue to be operated beyond its useful life. Equipment failure may result in severe operational challenges and overflowing of elevated tanks. Therefore, no further consideration is given to this alternative.

3.5.2 Optimum Performance of Existing Facilities

In this alternative, the existing critical distribution system equipment at the Maple and PRV vaults would be replaced in kind, to maintain the existing functionality of the vaults. This equipment includes the PRVs and check valves at each vault. Replacement of these components would prevent the continued use of the aging equipment, reducing the risk of failure-in-operation.

3.5.3 Construction Alternative

A construction alternative would be cost prohibitive, requiring building of new facilities. It is more cost efficient to optimize existing facilities, therefore, this alternative is not evaluated further.

3.5.4 Regional Alternative

A regional alternative is not applicable for the pressure reducing valve improvements. The Village has the largest water supply and distribution system in the area and is geographically isolated from nearby, smaller systems. The closest system is Webber Township, to the north, which is not sized to supply the Village water demand, in addition to Webber's demands.

4.0 Principal Alternatives

4.1 Monetary Evaluation

A cost-effective analysis was completed for the LSLRs and distribution system improvements.

4.1.1 *Lead Service Line Replacement*

The lead service line project budget cost is presented in Table 4-1. Table 4-1 indicates the total estimated project budget cost for the LSLRs is $1,660,000.

Table 4-1 – Estimated Project Cost Summary for Lead Service Line Replacement

Project	Item	Initial Capital Cost	Design Life (years)	Salvage Value
Lead Service Replacement	New Copper Services	$1,502,000	50	$902,000
Subtotal: Estimated Construction Cost		$1,502,000		
Administration and Engineering		$151,000		
Total: Estimated Project Budget		$1,660,000		

4.1.2 *Water Main Replacement*

The water main replacement project budget cost is presented in Table 4-2. These costs are preliminary estimates and will be further refined during the project design phase. Table 4-2 indicates that the total estimated project cost for the eight water main improvement projects listed is $6,290,000.

Table 4-2 – Estimated Project Cost Summary for Water Main Replacement

Project	Initial Capital Cost	Salvage Value
Eighth Street Loop	$741,000	$445,000
Carrs Road Loop	$529,000	$318,000
First Street	$390,000	$234,000
Norway Street	$975,000	$585,000
Lake Street	$1,235,000	$741,000
Oak Street	$618,000	$371,000
Fifth Street	$195,000	$117,000
Abandon Eighth Street Dead	$10,000	$0
Subtotal: Estimated Construction Cost	$4,693,000	
Administration, Engineering, Contingency	$1,588,000	
Total: Estimated Project Budget	$6,290,000	

4.1.3 *Elevated Storage Tank Improvements*

The elevated storage tank improvements project budget cost is presented in Table 4-3. These costs are preliminary estimates and will be further refined during the project design phase. Table 4-3 indicates that the total estimated project cost for the four elevated storage tank improvement projects listed is $580,000.

Table 4-3 – Estimated Project Cost Summary for Elevated Storage Tank Improvements

Project	Initial Capital Cost	Salvage Value
School Tank Improvements	$93,000	$56,000
School Tank Altitude Valve Improvements	$91,000	$31,000
School Tank Mixers	$54,000	$0
Norway Tank Improvements	$133,000	$27,000
Subtotal: Estimated Construction Cost	$371,000	
Administration, Engineering, Contingency	$205,000	
Total: Estimated Project Budget	$580,000	

4.1.4 Water Supply Improvements

The water supply improvements project budget cost is presented in Table 4-4. These costs are preliminary estimates and will be further refined during the project design phase. Table 4-4 indicates that the total estimated project cost for the three water supply improvement projects listed is $1,100,000.

Table 4-4 – Estimated Project Cost Summary for Water Supply Improvements

Project	Initial Capital Cost	Salvage Value
Well 2 Improvements	$123,000	$80,000
Well 3 Improvements	$358,000	$198,000
Well 4 Improvements	$115,000	$22,000
Subtotal: Estimated Construction Cost	$703,000	
Administration, Engineering, Contingency	$388,000	
Total: Estimated Project Budget	$1,100,000	

4.1.5 Water System Pressure Reducing Valve Improvements

The water system pressure reducing valves improvements project budget cost is presented in Table 4-5. These costs are preliminary estimates and will be further refined during the project design phase. Table 4-5 indicates that the total estimated project cost for the pressure reducing valves improvements project listed is $90,000.

Table 4-5 – Estimated Project Cost Summary for Water System Pressure Reducing Valve Improvements

Project	Initial Capital Cost	Salvage Value
PRV Vault Improvements	$53,000	$18,000
Subtotal: Estimated Construction Cost	$53,000	
Administration, Engineering, Contingency	$30,000	
Total: Estimated Project Budget	$90,000	

4.1.6 Present Worth Analysis

A present worth analysis was completed for the construction alternatives as summarized in Table 4-6 and detailed in Appendix 1. The No-Action alternative has no associated capital costs. Sunk costs are not included in the analysis.

Table 4-6 – Present Worth Analysis (1 of 2)

	Lead Service Line Replacement		Water Main Replacements	
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$1,660,000	$1,660,000	$6,290,000	$6,290,000
Salvage Value	902,000	$833,000	$2,820,000	$2,600,000
Total Worth		$830,000		$3,690,000

Table 4-6 – Present Worth Analysis (2 of 2)

	Elevated Storage Tank Improvements		Water Supply Improvements		Water System Pressure Reducing Valve Improvements	
	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth	Cost/Value	20-Year Present Worth
Capital Cost	$580,000	$580,000	$1,100,000	$1,100,000	$90,000	$90,000
Salvage Value	$114,000	$110,000	$300,000	$280,000	$18,000	$7,000
Total Worth		$490,000		$840,000		$77,000

4.2 Environmental Evaluation

4.2.1 Cultural Resources

The proposed distribution system and LSLR projects will have no direct historical or archeological impacts. The Village has one historical marker at the Lake County Courthouse that commemorates the settling of Lake County. There are no proposed water main replacements in this area. It is unclear where the service line is for the Lake County Courthouse. If the service line is identified for replacement and located in the vicinity of the marker, the historical marker will be temporarily removed and reinstalled to protect it from damage during construction. It is unlikely that this will be required.

4.2.2 The Natural Environment

There are no potential long-term impacts on the natural environment because of the proposed projects. A temporary decrease in air quality may occur due to the construction. Additionally, the yards of homeowners receiving lead service replacements will be temporarily excavated and restored to the original condition upon completion of the work. The Baldwin River, and its associated wetlands, located southeast of the Village and presented in Map 2, are not in the area of the proposed projects.

4.3 Mitigation

The impact on air quality will be controlled to the greatest extent possible by limiting construction to the regular construction season, during normal working hours. Soil erosion and sedimentation measures will be installed to ensure no debris associated with the excavation work enters the river or wetlands.

4.4 Implementability and Public Participation

The water main replacements will all occur within the existing Village public right-of-way or on land owned by the Village. The LSLRs will occur largely on private property. No expense to the homeowner is anticipated for the LSLRs.

The Village will coordinate with its customers 30 days prior to the start of any water main or LSL construction so that the community is aware of the upcoming work and will plan accordingly. Additionally, the Village will provide door hangers and post information on the Village website to increase public awareness of the upcoming projects. The Village will also present the plan to the public during a regularly scheduled Village Council meeting, to provide the community with an opportunity to voice concerns associated with the proposed projects.

4.5 Technical Considerations

4.5.1 No-Action

Dead-end line operation, maintenance, and water main age concerns are not addressed. Within 20 years, the lead services would need to be replaced to meet compliance requirements of the Safe Drinking Water Act. In addition, aging infrastructure components would continue to be operated, increasing the likelihood of failures and diminished system reliability.

4.5.2 New Services and Distribution System Improvements

Removal of lead services will satisfy the requirements of the SDWA and result in a safer water system for Village customers. Replacement of aging water mains and dead ends will help reduce maintenance costs associated with main breaks, lost water, and flushing, while improving system reliability and water quality. Improvements to the elevated storage tanks, water supply system, and pressure reducing valves will ensure current system functionality is maintained and will increase system reliability.

4.6 Residuals

No treatment processes generating residuals will be used nor will the water main construction means and methods produce residuals needing disposal.

4.7 Industrial/Commercial/Institutional

There are no industrial properties in the area of the proposed improvements. The commercial and institutional properties that are served are not significant water users. For this reason, industrial, commercial, and institutional usage does not require consideration.

4.8 Growth Capacity

The purpose of the proposed projects is to serve existing customers within the Village. The water main and services are not being installed for future growth of the distribution system.

4.9 Contamination

Map 1 shows the sites of known environmental contamination within the Village. Areas of potential groundwater contamination were identified as part of the WHPP submitted in 2019. As part of that plan, a contaminant source inventory (CSI) was performed to identify existing and potential threats to the groundwater wells in the Village. The CSI searched through relevant data bases, including EGLE oil and gas contamination sites, groundwater discharge permits, and the EGLE environmental mapper site. Identified sites of existing or potential were grouped into three categories:

- Category 1 sites are sites of known contamination. These sites represent the greatest contamination risk to the project areas mentioned above. Sites where a documented cleanup has occurred and where the former MDEQ has issued some notices of closure, are excluded from this category.
- Category 2 sites are locations where significant use of hazardous substances is known or suspected. These include commercial or industrial establishments.
- Category 3 sites are where the significant use of hazardous materials is not expected.

The Lake County Courthouse and Sheriff's Office and the Lake County Road Commission were the three sources identified as Category 1 sites due to previous contamination from leaking underground storage tanks that resulted in future land use restrictions at these locations. Although the contamination has since been remediated, any LSLRs in the areas of these buildings may confirm whether contaminated soils are present. This will be revisited when the location of the lead service lines for replacement is determined. Lead service lines identified for removal will be disposed of in a hazardous waste landfill to ensure no potential contamination from the lead piping will occur.

5.0 Selected Alternative

5.1 Lead Service Line Replacement

The selected alternative will include both the replacement of the 250 lead service lines with new copper services and distribution system improvement projects outlined previously. This alternative will address compliance with the Safe Drinking Water Act.

5.1.1 Design Parameters

As previously indicated, the Preliminary DSMI identified a total of 250 lead services that may need replacing. The Village is pursuing a DWAM grant to further study the number and location of lead service lines and to produce a final DSMI. GIS location of curb stops and hydroexcavations will provide exact service locations and a better understanding of the service material types. With this data in hand, a better summation of the services needing replacement can be made.

5.1.2 Project Map

The selected areas within the Village for LSLR are presented in Figure 3.

5.1.3 Schedule for Design and Construction

The project schedule, consistent with the quarterly DWSRF funding deadlines, is presented in Table 5-1 for the lead services replacement.

Table 5-1 – Lead Service Line Replacement Schedule

Task	Estimated Milestone	
	LSLR – 60	LSLR – 50
EGLE Fiscal Year and Quarter Planned for Project	FY 2024, Quarter 4	FY 2026, Quarter 4
Final Design	April 2024	April 2026
Construction Permit	May 2024	May 2026
Bidding	June 2024	June 2026
DWSRF Funding Award	August 2024	August 2026

5.1.4 Cost Estimate

Table 5-2 presents the estimated project costs for LSLRs. The proposed costs are in 2023 dollars.

Table 5-2 – Lead Service Line Replacement Cost Estimates

Project	Total Estimated Project Cost
LSLR – 60	$906,000
LSLR – 50	$755,000
Total	$1,660,000

5.2 Water Main Replacement

The water main replacement projects will involve replacing existing 6-inch or 8-inch water main with new 8-inch main, including replacing associated lead service lines. This alternative addresses issues associated with undersized and aging water mains such as risk of main breaks, lost water, excessive head loss, decreased system pressure, and water quality problems.

5.2.1 Design Parameters

The length of water main to be replaced ranges from 300 feet to 2,100 feet. The water system modeling performed under the WSRS showed that currently, dead ends and older mains produce pressures between 48-52 psi, under peak hour demand conditions. After completion of the proposed projects, water system modeling showed that system pressure should increase to greater than 55 psi in all parts of the system.

5.2.2 Project Map

The proposed water main replacement projects are shown in Figure 4.

5.2.3 Schedule for Design and Construction

The water main replacement schedule is provided in Table 5-3.

Table 5-3 – Water Main Replacement Schedule

	Estimated Milestone		
Task	Norway Street, First Street	Lake Street, Oak Street, Fifth Street	Eighth Street Abandonment, Eighth Street, Carrs Street
EGLE Fiscal Year and Quarter Planned for Project	FY 2024, Quarter 4	FY 2026, Quarter 4	FY 2028, Quarter 4
Final Design	April 2024	April 2026	April 2028
Construction Permit	May 2024	May 2026	May 2028
Bidding	June 2024	June 2026	June 2028
DWSRF Funding Award	August 2024	August 2026	August 2028
Loan Closing	September 2024	September 2026	September 2028
Notice to Proceed	October 2024	October 2026	October 2028
Construction Phase	November 2024	November 2026	November 2028

The water main improvements are initially grouped into three phases and separate loans. The date ranges shown begin with bidding the project, and end with final completion of construction. The phasing of projects and project durations shown in Table 5-3 are current estimates only.

5.2.4 Cost Estimate

Table 5-4 presents the estimated project cost for the water main replacement projects described previously. The proposed costs are in 2023 dollars.

Table 5-4 – Water Main Replacement Cost Estimates

No.	Project	Total Estimated Project Cost
1	Norway Street	$1,307,000
2	First Street	$523,000
3	Lake Street	$1,656,000
4	Oak Street	$829,000
5	Fifth Street	$262,000
6	Eighth Street Abandonment	$10,000
7	Eighth Street	$994,000
8	Carrs Street	$710,000
	Total	**$6,290,000**

5.3 Elevated Storage Tank Improvements

The selected alternative for the elevated storage tank improvements is the optimization of the existing facilities. This alternative includes replacing aging infrastructure components at both of the Village's existing elevated storage tanks, the Norway Tower, and the School Tower. Improvements to the School Tower include replacing overflow piping, drain piping, and altitude valve piping and equipment. In addition, a mixer is proposed to be installed in the School Tower to address concerns with ice formation and thermal stratification. Improvements to the Norway tower include replacement of existing electrical and control equipment, as well as corrosion control system equipment.

5.3.1 Design Parameters

Improvements at both the School Tower and Norway Tower will see the aging equipment and infrastructure components replaced in kind, to maintain the existing functionality of the system. Additionally, a mixer will be installed in the School Tower that can mix the entire contents of the tank. The mixer will be water lubricated. System operators will be able to control and monitor the mixer operation through the Village's SCADA system.

5.3.2 Project Map

The elevated storage tank locations are shown in Figure 4.

5.3.3 Schedule for Design and Construction

The elevated storage tank improvements schedule is provided in Table 5-5.

Table 5-5 – Elevated Storage Tank Improvements Schedule

	Estimated Milestone			
Task	School Tank Improvements	School Tank Altitude Valve Improvements	School Tank Mixers	Norway Tank Improvements
EGLE Fiscal Year and Quarter Planned for Project	FY 2028, Quarter 4	FY 2026, Quarter 4	FY 2024, Quarter 4	FY 2028, Quarter 4
Final Design	April 2028	April 2026	April 2024	April 2028
Construction Permit	May 2028	May 2026	May 2024	May 2028
Bidding	June 2028	June 2026	June 2024	June 2028
DWSRF Funding Award	August 2028	August 2026	August 2024	August 2028
Loan Closing	September 2028	September 2026	September 2024	September 2028
Notice to Proceed	October 2028	October 2026	October 2024	October 2028
Construction Phase	November 2028	November 2026	November 2024	November 2028

5.3.4 Cost Estimate

Table 5-6 presents the proposed project start date and estimated project cost for the elevated storage tank improvement projects described previously. The proposed costs are in 2023 dollars.

Table 5-6 – Elevated Storage Tank Improvement Cost Estimates

Project	Total Estimated Project Cost
School Tank Improvements	$146,000
School Tank Altitude Valve Improvements	$142,000
School Tank Mixers	$86,000
Norway Tank Improvements	$207,000
Total	**$580,000**

5.4 Water Supply Improvements

The selected alternative for the water supply improvements is the optimization of the existing facilities. This alternative includes the replacement of aging equipment and infrastructure components at each of the Village's well houses. Replacing these items will improve the reliability of the water system and will limit the risk of critical supply equipment breaking down while in operation.

5.4.1 Design Parameters

Improvements to the well houses will see the aging components replaced in kind to maintain the existing functionality of the supply system.

5.4.2 Project Map

The well house locations are shown in Figure 4.

5.4.3 Schedule for Design and Construction

The water supply improvements schedule is provided in Table 5-7.

Table 5-7 – Water Supply Improvements Schedule

	Estimated Milestone		
Task	Well 2 Improvements	Well 3 Improvements	Well 4 Improvements
EGLE Fiscal Year and Quarter Planned for Project	FY 2026, Quarter 4	FY 2024, Quarter 4	FY 2024, Quarter 4
Final Design	April 2026	April 2024	April 2024
Construction Permit	May 2026	May 2024	May 2024
Bidding	June 2026	June 2024	June 2024
DWSRF Funding Award	August 2026	August 2024	August 2024
Loan Closing	September 2026	September 2024	September 2024
Notice to Proceed	October 2026	October 2024	October 2024
Construction Phase	November 2026	November 2024	November 2024

5.4.4 Cost Estimate

Table 5-8 presents the estimated project cost for the water supply improvement projects described previously. The costs shown are in 2023 dollars.

Table 5-8 – Water Supply Improvement Cost Estimates

Project	Total Estimated Project Cost
Well 2 Improvements	$358,000
Well 3 Improvements	$556,000
Well 4 Improvements	$180,000
Total	**$1,100,000**

5.5 Water System Pressure Reducing Valves Improvements

The selected alternative for the water system pressure reducing valves improvements is the optimization of the existing facilities. This alternative will see the PRVs and associated piping and equipment at the Maple Street and Norway Street PRV vaults replaced in kind. Maintaining the functionality of these infrastructure components is necessary to ensure reliable operation of the two pressure zones in the distribution system, and to prevent scenarios where elevated tank overflows could occur.

5.5.1 Design Parameters

Improvements to the PRV vaults will see the aging components replaced in kind to maintain the existing functionality of the distribution system.

5.5.2 Project Map

The location of the Norway Street and Maple Street PRV vaults is shown on Figure 4.

5.5.3 Schedule for Design and Construction

The water system pressure reducing valves improvements schedule is provided in Table 5-9.

Table 5-9 – Water System Pressure Reducing Valves Improvements Schedule

Task	Estimated Milestone
EGLE Fiscal Year and Quarter Planned for Project	FY 2028, Quarter 4
Final Design	April 2028
Construction Permit	May 2028
Bidding	June 2028
DWSRF Funding Award	August 2028
Loan Closing	September 2028
Notice to Proceed	October 2028
Construction Phase	November 2028

5.5.4 Cost Estimate

Table 5-10 presents the proposed project start date and estimated project cost for the water system pressure reducing valve improvements project described previously. The costs shown are in 2023 dollars.

Table 5-10 – Pressure Reducing Valves Improvement Cost Estimate

Project	Total Estimated Project Cost
PRV Vault Improvements	$90,000

5.6 Summary of Project Schedule and Estimated Costs

A summary of the DWSRF projects grouped by fiscal year is provided below.

- Year 1: 60 lead service line replacements, Norway Street water main, First Street water main, School Tank Mixers, Well 3 Improvements, Well 4 Improvements.
- Year 3: 50 lead service line replacements, Lake Street water main, Oak Street water main, Fifth Street waterman, School Tank Altitude Valve Improvements, and Well 2 Improvements.
- Year 5: Eighth Street Dead End abandonment, Eighth Street water main, Carrs Street water main, School Tank Improvements, Norway Tank Improvements, and PRV Vault Improvements.

The total estimated costs of the grouped projects for each fiscal year are provided in Table 5-11.

Table 5-11 – Summary of DWSRF Projects and Total Estimated Costs by Fiscal Year

Year	EGLE Fiscal Year and Quarter	Total Estimated Project Costs
Year 1	FY 2024, Quarter 4	$3,560,000
Year 2	FY 2025, Quarter 4	$0
Year 3	FY 2026, Quarter 4	$4,000,000
Year 4	FY 2027, Quarter 4	$0
Year 5	FY 2028, Quarter 4	$2,160,000
	Total	**$9,720,000**

5.7 User Costs

The Village does not intend to increase customer water use rates to pay for the construction of the proposed distribution system projects. However, it is likely that some portion of the construction costs for the distribution system projects under the DWI loan/grant, may be funded by the water system users via increased user rates. The proposed project schedule and costs will be discussed with the Village to determine what adjustments can be made, if any, to current customer water rates. The EGLE guidance requires that eligible loan amounts be presented as an equivalent water system rate increase. Table 5-12 presents the annual average increase for debt retirement at an interest rate of 1.875% over 20 years for the proposed projects in fiscal years 2024-2028.

Table 5-12 – Estimated User Rate Increase

Year	Eligible Amount	Yearly Loan Payment	Average Monthly User Rate Increase
2024	$3,560,000	$215,100	$35.85
2025	$0	$0	$0.00
2026	$3,998,000	$242,290	$40.38
2027	$0	$0	$0.00
2028	$2,167,000	$130,510	$21.75
Total	**$9,720,000**	**$587,901**	**$97.98**

Fiscal responsibility is of the utmost importance to the Village, and cost saving measures will be explored throughout the design process. The proposed improvements are necessary to continue to provide reliable water service to customers.

5.8 Overburdened Community

The Overburdened Community qualification is determined for each loan that is applied for by the community. An Overburdened Community Status Determination Worksheet was submitted to EGLE. Preliminary evaluation indicates that the Village meets the Significantly Overburdened Community qualifications.

5.9 Ability to Implement the Selected Alternatives

The Village owns and operates the water supply and distribution system and has direct authority to implement the improvements mentioned in this Project Planning Document. The proposed projects for lead service lines and water main replacement will occur within the Village limits and require no consent from adjacent municipalities; they are not connected to the Village's water system.

6.0 Environmental Evaluation

6.1 Historical/Archeological/Tribal Resources

Review of the Village Master Plan and the National Register of Historic Places did not identify any historic sites within the Village. The Village has one historical marker at the Lake County Courthouse that commemorates the settling of Lake County. There are no proposed water main replacements in this area. It is unclear where the service line is for the Lake County Courthouse. If the service line is identified for replacement and located in the vicinity of the marker, the historical marker will be temporarily removed and reinstalled to protect it from damage during construction. It is unlikely that this will be required.

6.2 Water Quality

The project alternative selected will not have any negative impacts on surface water or groundwater quality in the Village. As discussed, LSLR will satisfy the compliance requirements of the Safe Drinking Water Act for the Village's water system and may also improve the aesthetic water quality of the resident depending on the condition of the piping materials replaced. Replacement of various water mains and abandonment of unused dead-end mains may also result in better aesthetic water quality.

6.3 Land/Water Interface

Map 2 depicts the location of wetlands and surface water in the immediate area of the Village. The proposed projects will have no negative impacts on these bodies of water, as no construction work is anticipated within the water boundaries. Soil erosion and sedimentation control measures will be instituted in accordance with Lake County requirements. The soils map is included in Map 5.

6.4 Endangered Species

The U.S. Fish and Wildlife Services list of federally recognized endangered and threatened species for Lake County were reviewed and are summarized in Table 6-1. Endangered or threatened species are defined as those species that are or could become endangered or threatened, and therefore are protected under the Endangered Species Act. The objective of the act is to preserve and restore species threatened with extinction. The Michigan Natural Features Inventory (MNFI) was also reviewed by county and has additional listings of flora and fauna with a state status of endangered, threatened, or special concern and is included in Appendix 3. If the projects are deemed equivalency by EGLE, then governmental agencies like the MNFI, State Historic Preservation Office, and Tribal Historic Preservation Office will be contacted.

Table 6-1 – Lake County Federal Endangered/Threatened Species List

Name	Status
Northern Long-Eared Bat	Threatened
Eastern Massasauga Rattlesnake	Threatened
Karner Blue Butterfly	Endangered

The proposed projects will occur in urban areas where no significant wildlife habitat is present. No tree removal is anticipated that could have potential impacts on the species listed in Table 6-1.

6.5 Agricultural Land

There is no agricultural land present within the Village. The proposed projects will have no impact on nearby agricultural land.

6.6 Social/Economic Impact

The replacement of lead services within the distribution system will result in direct cultural and social benefits. Public health and safety will benefit from the proposed project by meeting the compliance set forth by the Safe Drinking Water Act.

6.7 Construction/Operational Impact

There are two types of proposed projects, each with different construction impacts. The water main replacements will likely involve demolition of roadways and rerouting traffic to allow for the work to be completed. The LSLRs will involve work behind the curb or R.O.W. lines. Though streets and properties have trees present, no tree removal is anticipated. All grass parkways will be restored in kind. No adverse impacts on major street traffic patterns are anticipated.

Construction for projects of this type is generally limited to the hours 7 a.m. to 7 p.m., Monday through Friday, and 7 a.m. to 1 p.m. on Saturday. Vehicular and pedestrian access to all properties will be maintained throughout construction.

6.8 Indirect Impacts

6.8.1 Changes in Development

The proposed distribution system improvement projects will not facilitate any new areas of development within the Village, because they involve replacing existing pipes and infrastructure components and do not result in water service to new areas.

The proposed lead service line replacement project will not facilitate any new areas of development.

6.8.2 Changes in Land Use

The proposed projects will not have an impact on existing or future land use.

6.8.3 Changes in Air or Water Quality

The proposed projects will not impact air or water quality.

6.8.4 Changes to Natural Setting or Sensitive Ecosystems

The proposed projects will not have an impact on the natural setting or the sensitive ecosystems.

6.8.5 Changes to Aesthetic Aspects of the Community

The proposed projects will have an indirect effect of providing a more reliable and safe water system in compliance with the Safe Drinking Water Act.

6.8.6 Resource Consumption

Resource consumption in the form of building materials, new water main, and service line materials will occur for the proposed project.

7.0 Mitigation Measures

7.1 Mitigation Measures for Short Term Impact

Measures that will be taken to avoid, eliminate, or mitigate potential short-term environmental impacts include the following:

- Traffic: use of designated traffic routes for construction traffic, as well as flagmen, warning signs, barricades, and cones.
- Air emissions: use of calcium chloride or water for dust control and proper maintenance on heavy equipment to reduce exhaust emissions.
- Noise control: use designated daytime work hours, use mufflers on all equipment, and minimize work on weekends and/or holidays.
- Soil erosion and sedimentation control (SESC): Appropriate measures such as use of riprap, hay bales, erosion control fence, silt fence, etc.
- Restoration: use topsoil, seed, sod, mulch, gravel, and pavement. Vegetation that is removed as a part of the construction will be replaced. All areas will be restored to their existing grade.

7.2 Mitigation Measures for Long Term Impact

Every effort will be made to prevent long-term or irreversible impacts because of the project. The selected alternative has been evaluated to determine any potential of long-term impacts. Where short-term impacts are unavoidable, mitigation measures will be considered to ensure that sensitive features do not suffer permanent or irreversible adverse impacts.

Measures that will be taken to avoid, eliminate, or mitigate potential long-term environmental impacts include the preparation and implementation of a SESC Plan. The SESC Plan for the construction of the selected alternative will be filed with the local SESC Agency. The plan will also be reviewed by the EGLE Land and Water Management Division. The plan will summarize the quantity of soils that will be excavated, locations where soil will be stored, the destination of soils (onsite or offsite), and measures that will be taken (silt fence, sod, etc.) to minimize erosion.

8.0 Public Participation

8.1 Public Meeting Advertisement

The formal public meeting regarding the DWSRF Project Planning Document will be advertised on the City’s website (https://villageofbaldwin.org/) and on the Village’s social media pages on April 26, 2023. The advertisement will list the public meeting date, include a link to the Project Planning Document for viewing, and briefly describe the proposed projects, impacts, and estimated costs.

The EGLE project manager will be provided with a link to the notice. A screenshot of the public meeting advertisement will be included in the final Project Planning Document. Written comments are requested to be received no later than May 8, 2023, the date of the public meeting.

8.2 Formal Public Meeting

A public meeting will be held at the regularly scheduled Village Council meeting on May 8, 2023. Representatives from Fishbeck will be in attendance to explain the projects to the Council members and the public.

The following information will be provided during the public meeting:

- A description of the project needs and problems to be addressed by the proposed projects and the principal alternatives that were considered.
- A description of the selected alternatives, including capital costs.
- A description of project financing and anticipated costs to users, including the proposed method of project financing and the proposed annual charge to the typical residential customer.
- A description of the anticipated social and environmental impacts associated with the selected alternatives and the measures that will be taken to mitigate adverse impacts.

The public meeting minutes and a PDF of the presentation will be included in the final Project Planning Document.

8.3 Comments Received and Answered

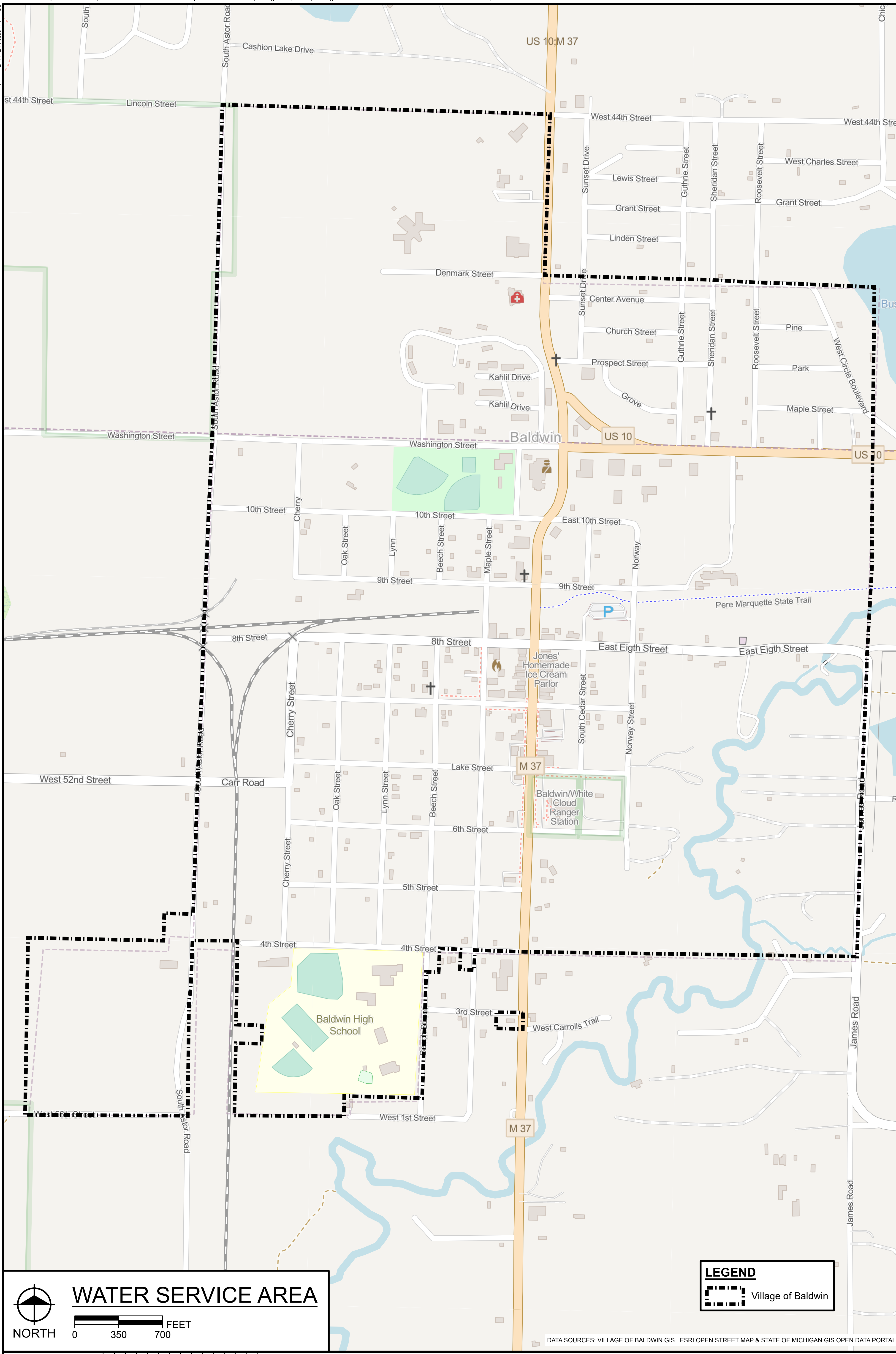
Comments received during the public comment period and responses provided will be included in the final Project Planning Document.

8.4 Adoption of the Planning Document

A resolution to formally adopt the plan and implement the selected alternatives will be submitted to EGLE with the final Project Planning Document.

Figures

PLOT INFO: \\corp.ftch.com\AllProjects\2022\221928\CAD\GIS\ProProj\Baldwin_DWSRF Report Figures.aprx Layout: Fig01_Water Service Area Date: 1/19/2023 11:10 AM User: prbaskins



WATER SERVICE AREA

DATA SOURCES: VILLAGE OF BALDWIN GIS. ESRI OPEN STREET MAP & STATE OF MICHIGAN GIS OPEN DATA PORTAL.

FIGURE NO. 1

PROJECT NO. 221928

Village of Baldwin
Lake County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

Hard copy is intended to be 11"x17" when plotted. Scale(s) indicated and graphic quality may not be accurate for any other size.

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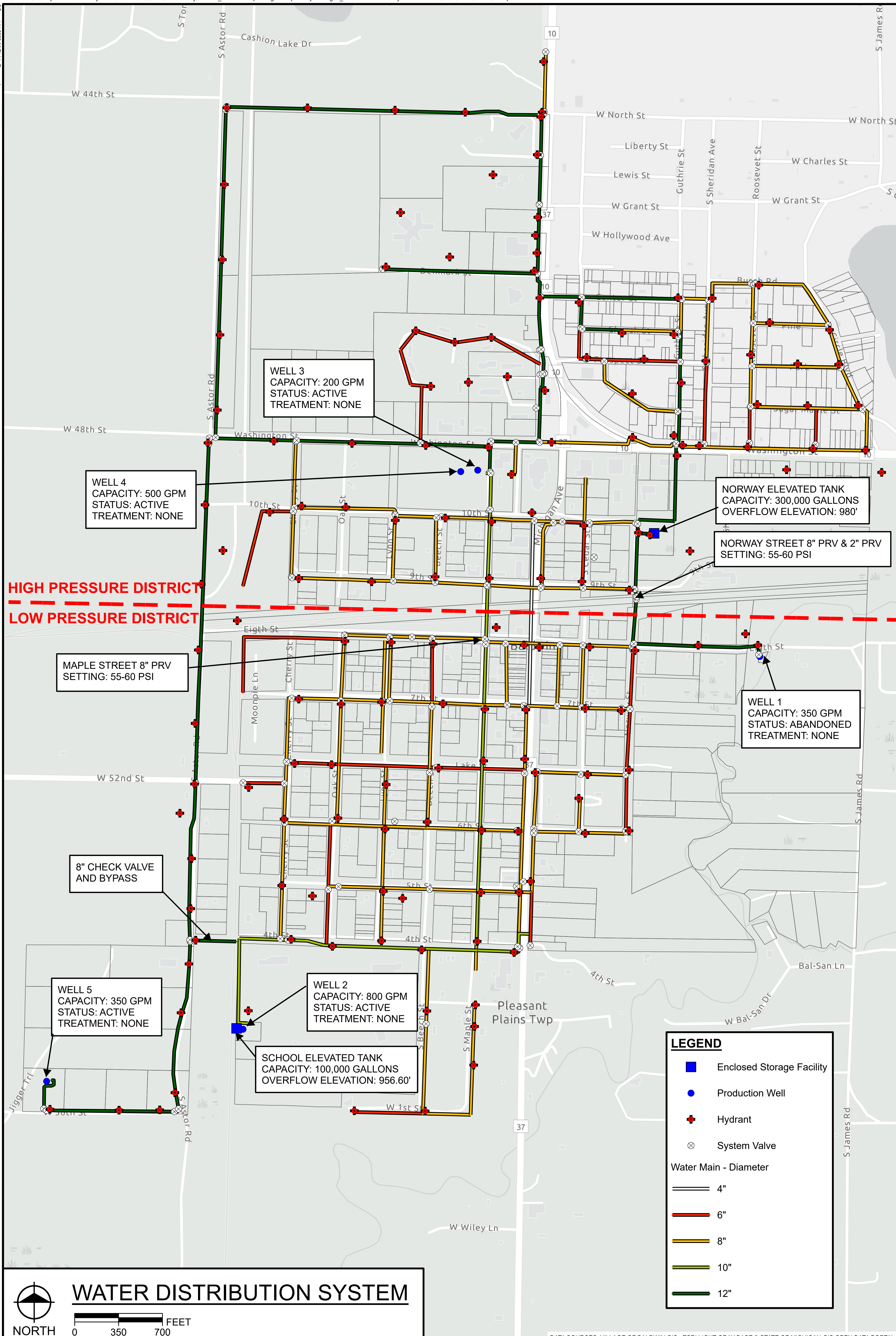

WATER DISTRIBUTION SYSTEM

NORTH

0 350 700 FEET

FIGURE NO. 2

PROJECT NO. 221928

Village of Baldwin

Lake County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

Hard copy is intended to be 11"x17" when plotted. Scale(s) indicated and graphic quality may not be accurate for any other size.

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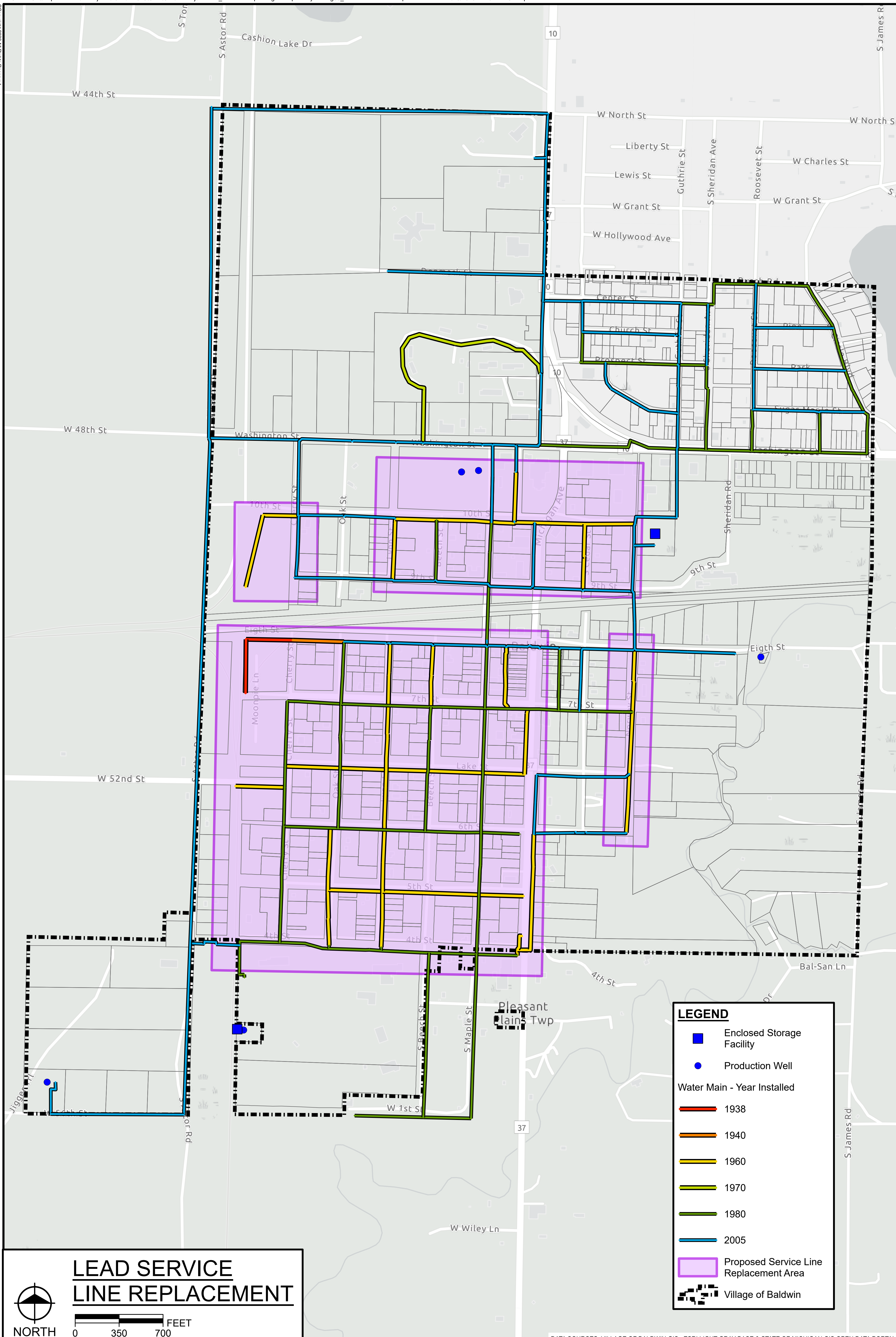

DATA SOURCES: VILLAGE OF BALDWIN GIS. ESRI LIGHT GRAY BASE & STATE OF MICHIGAN GIS OPEN DATA PORTAL.

LEAD SERVICE LINE REPLACEMENT

NORTH

0 350 700 FEET

FIGURE NO. 3

PROJECT NO. 221928

Village of Baldwin

Lake County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

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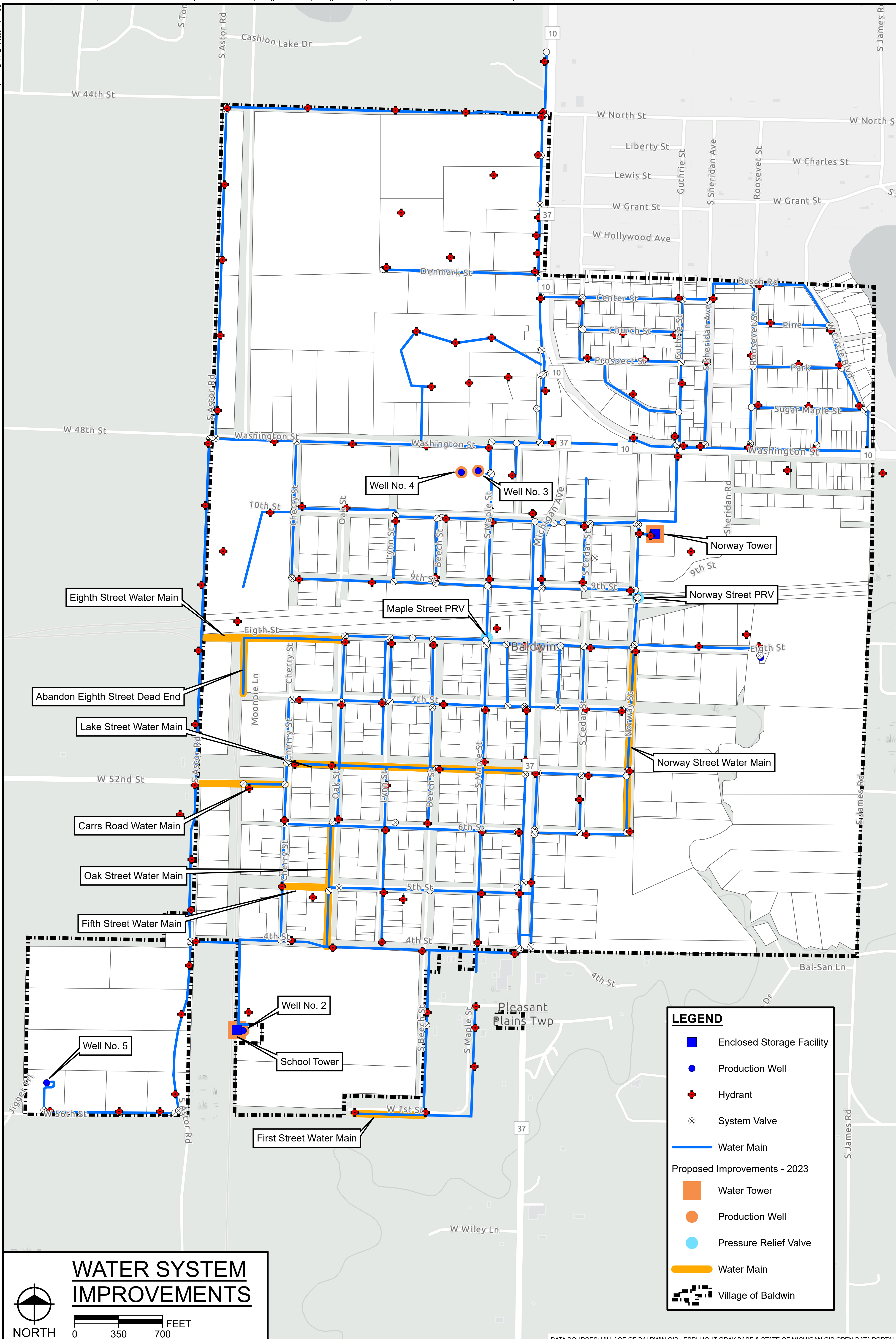
PLOT INFO: \\corp.ftch.com\AllProjects\2022\221928\CAD\GIS\ProProj\Baldwin_DWSRF Report Figures.aprx Layout: Fig04_Water System Improvements Date: 1/19/2023 3:55 PM User: prbaskins



WATER SYSTEM IMPROVEMENTS

NORTH

0 350 700 FEET

DATA SOURCES: VILLAGE OF BALDWIN GIS. ESRI LIGHT GRAY BASE & STATE OF MICHIGAN GIS OPEN DATA PORTAL.

FIGURE NO. 4

PROJECT NO. 221928

Village of Baldwin

Lake County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

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Maps

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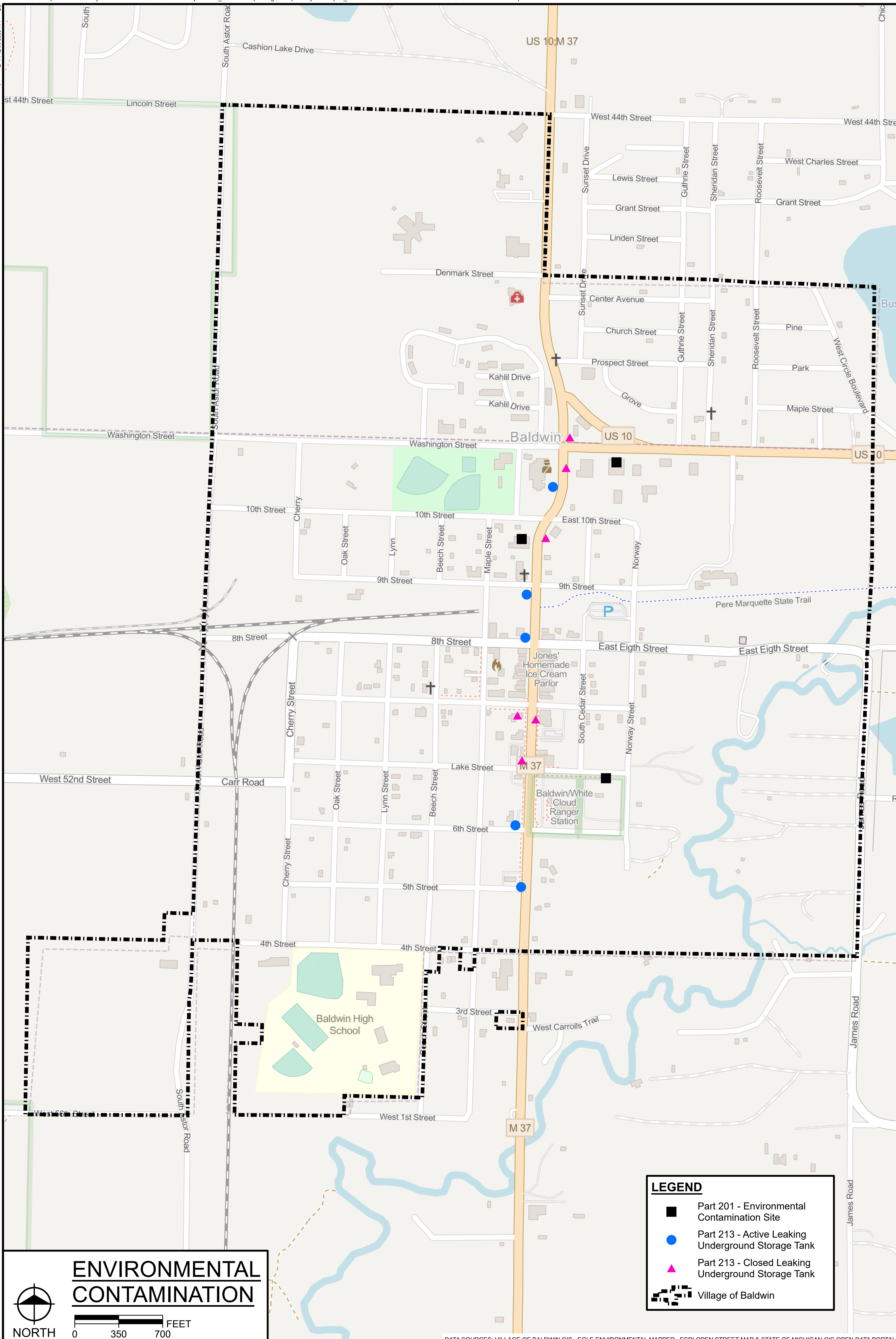

MAP NO. 1

PROJECT NO. 221928

Village of Baldwin

Lake County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

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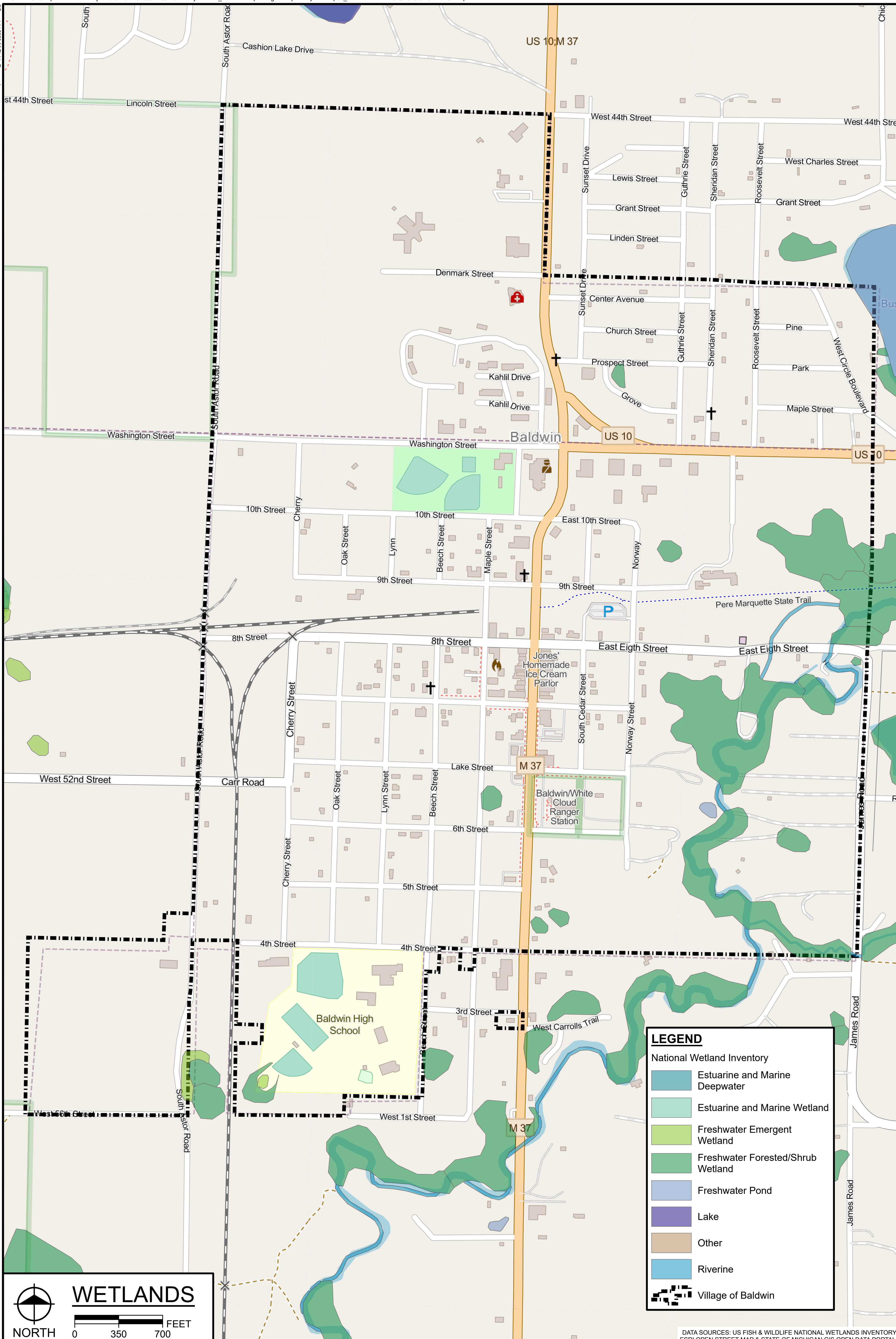
PLOT INFO: \\corp.ftch.com\AllProjects\2022\221928\CAD\GIS\ProProj\Baldwin_DWSRF Report Figures.aprx Layout: Map02_Wetlands Date: 1/19/2023 3:13 PM User: prbaskins



MAP NO. 2

PROJECT NO. 221928

Village of Baldwin

Lake County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

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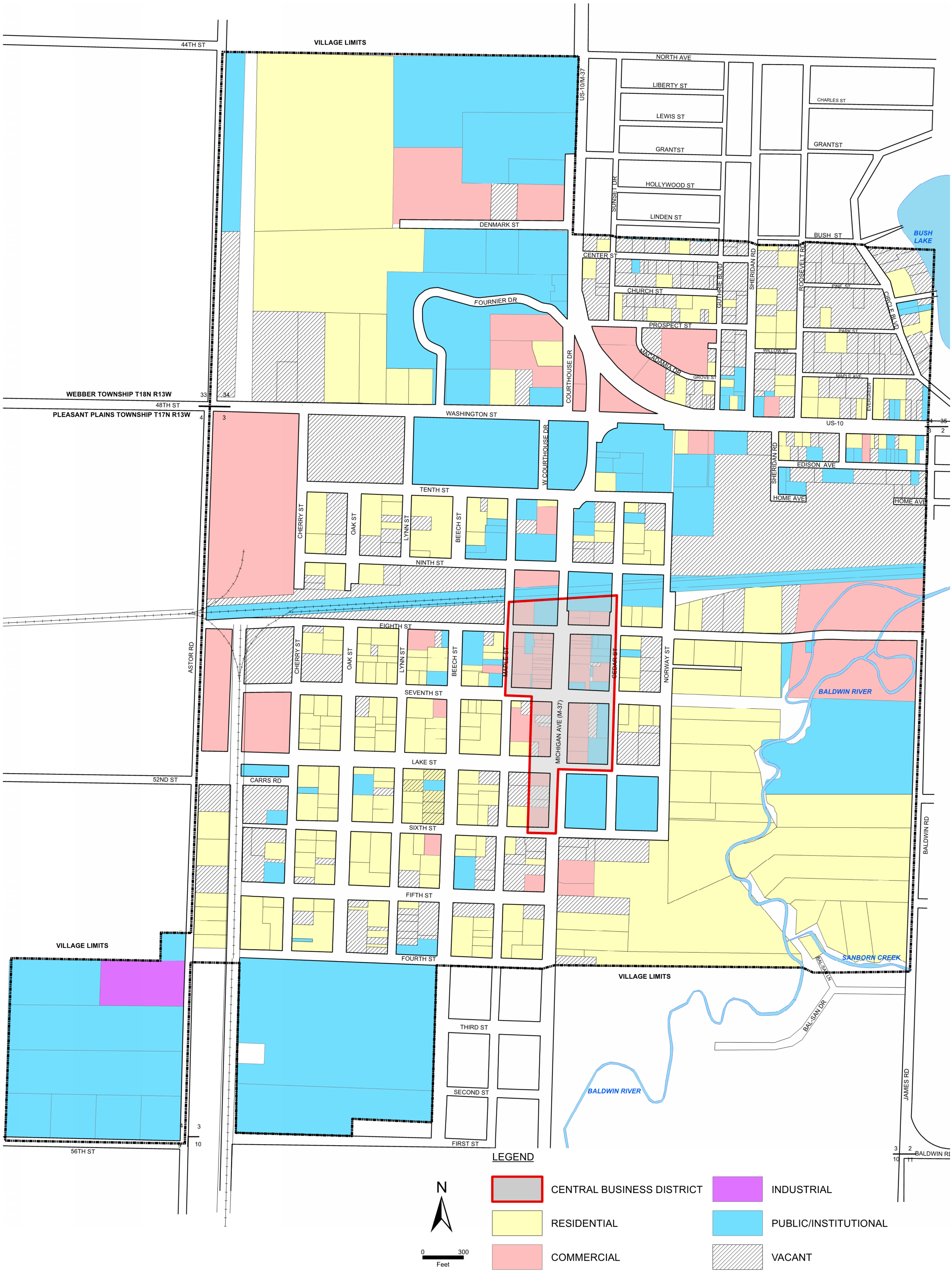
PLOT INFO: \\corp.ftch.com\AllProjects\2022\221928\CAD\GIS\ProProj\Baldwin_DWSRF Report Figures.aprx Layout: Map03_Existing Land Use Date: 1/19/2023 3:13 PM User: prbaskins



DATA SOURCES: VILLAGE OF BALDWIN GIS, SPCS NAD 83, INT'L. FEET.
PARCELS PER LAKE COUNTY EQUALIZATION TAX ROLL, 2005.

EXISTING LAND USE

DATA SOURCES: VILLAGE OF BALDWIN GIS. VILLAGE MASTER PLAN 2020.

MAP NO. 3

PROJECT NO. 221928

Village of Baldwin
Lake County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

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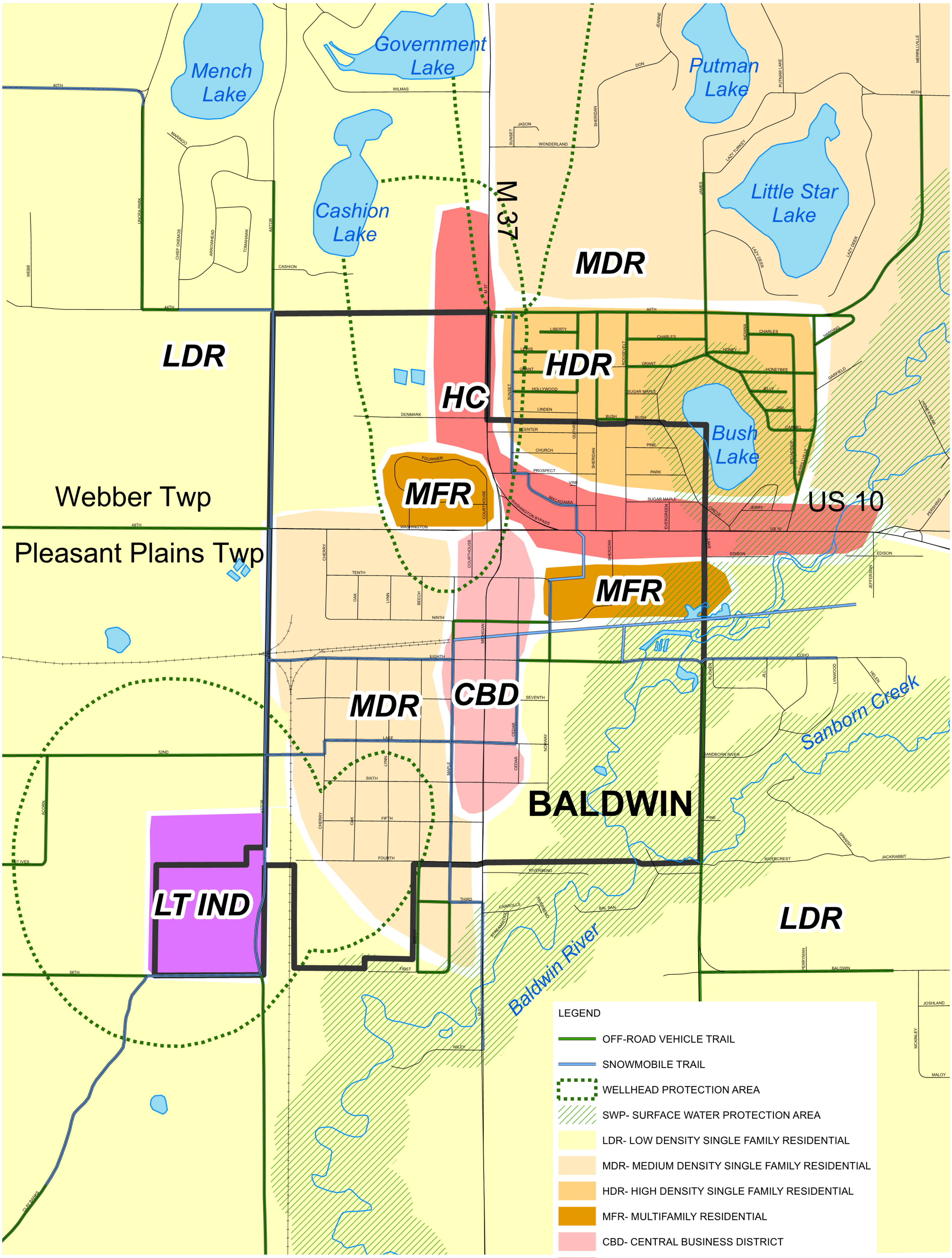
PLOT INFO: \\corp.ftch.com\AllProjects\2022\221928\CAD\GIS\ProProj\Baldwin_DWSRF Report Figures.aprx Layout: Map04_Future Land Use Date: 1/19/2023 3:13 PM User: prbaskins



DATA SOURCES: BASE MAP, MICHIGAN CENTER FOR GEOGRAPHIC INFORMATION, FRAMEWORK.
VILLAGE LIMITS, VILLAGE OF BALDWIN GIS.
WELLHEAD PROTECTION AREA, MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY.

N

0 200 Meters

FUTURE LAND USE

DATA SOURCES: VILLAGE OF BALDWIN GIS. VILLAGE MASTER PLAN 2020.

MAP NO. 4

PROJECT NO. 221928

Village of Baldwin
Lake County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

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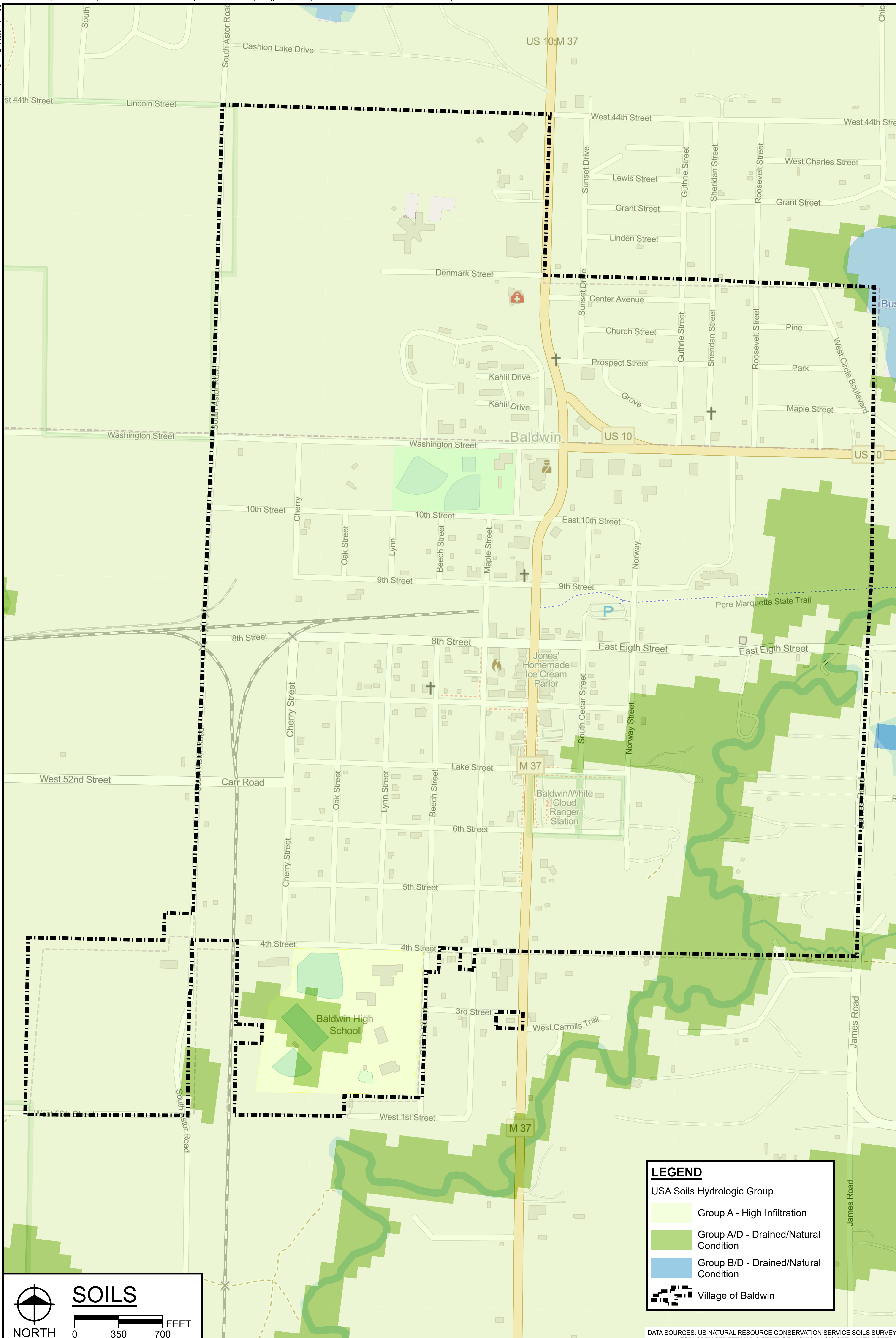
PLOT INFO: \\corp.ftch.com\AllProjects\2022\221928\CAD\GIS\ProProj\Baldwin_DWSRF Report Figures.aprx Layout: Map05_Soils Date: 1/19/2023 3:13 PM User: prbaskins



MAP NO. 5

PROJECT NO. 221928

Village of Baldwin

Lake County, Michigan

Drinking Water State Revolving Fund (DWSRF) Planning Document

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Appendix 1

Baldwin DWSRF Monetary Evaluation
Lead Service Line Replacement
Project No. 221928

Cost Item	Units	Qty	Unit Cost	Initial Estimated Capital Cost
Replace Lead Services	LS	1	$1,501,500	$1,502,000
Village Street Reconstruction	LS	1		$0
Subtotal - Estimated Construction Cost				$1,502,000
Contingency (0%)				0
Engineering/Administration/Legal (10%)				$151,000
Subtotal - Estimated Project Budget				$1,660,000

	Estimated Capital Cost	Design Life (yrs)		Replace. Cost	Salvage Value
Replace Lead Services	$1,502,000	50		$0	$902,000
Village Street Reconstruction	$0	10		by others	$0
Subtotal - Estimated Construction Cost	$1,502,000				$902,000
Contingency (0%)	$0		$0		
Engineering/Administration/Legal (10%)	$151,000				
Subtotal - Estimated Project Budget	$1,660,000				

20 Year Present Worth	New Watermain Actual Cost	20 yr Present Worth
Initial Capital Cost	$ 1,660,000	$ 1,660,000
Annual O & M Cost	$0	$0
Salvage Value	$ 902,000	($833,000)
TOTAL ESTIMATE OF PRESENT WORTH		$ 830,000

Notes:
Present Worth estimated using discount rate of 0.4% *from 2022 OMB Circular No. A-94*

Baldwin DWSRF Monetary Evaluation
Water Main Replacement
Eighth Street
Project No. 221928

Cost Item	Units	Qty	Unit Cost	Initial Estimated Capital Cost
8" Water Main and Street Reconstruction	LS	1	$741,000	$741,000
Subtotal - Estimated Construction Cost				$741,000
Contingency (12%)				$89,000
Engineering/Administration/Legal (22%)				$164,000
Subtotal - Estimated Project Budget				$994,000

	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
8" Water Main and Street Reconstruction	$741,000	50	$0	$445,000
Subtotal - Estimated Construction Cost	$741,000			$445,000
Contingency (12%)	$89,000			
Engineering/Administration/Legal (22%)	$164,000			
Subtotal - Estimated Project Budget	$994,000			

20 Year Present Worth	New Watermain Actual Cost	20 yr Present Worth
Initial Capital Cost	$ 994,000	$ 994,000
Annual O & M Cost	$0	$0
Salvage Value	$ 445,000	($411,000)
TOTAL ESTIMATE OF PRESENT WORTH		$ 583,000

Notes:
Present Worth estimated using discount rate of 0.4% *from 2022 OMB Circular No. A-94*

Baldwin DWSRF Monetary Evaluation
Water Main Replacement
Carrs Street
Project No. 221928

Cost Item	Units	Qty	Unit Cost	Initial Estimated Capital Cost
8" Water Main and Street Reconstruction	LS	1	$529,000	$529,000
Subtotal - Estimated Construction Cost				$529,000
Contingency (12%)				$64,000
Engineering/Administration/Legal (22%)				$117,000
Subtotal - Estimated Project Budget				$710,000

	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
8" Water Main and Street Reconstruction	$529,000	50	$0	$318,000
Subtotal - Estimated Construction Cost	$529,000			$318,000
Contingency (12%)	$64,000			
Engineering/Administration/Legal (22%)	$117,000			
Subtotal - Estimated Project Budget	$710,000			

20 Year Present Worth	New Watermain Actual Cost	New Watermain 20 yr Present Worth
Initial Capital Cost	$ 710,000	$ 710,000
Annual O & M Cost	$0	$0
Salvage Value	$ 318,000	($294,000)
TOTAL ESTIMATE OF PRESENT WORTH		$ 416,000

Notes:
Present Worth estimated using discount rate of 0.4% *from 2022 OMB Circular No. A-94*

Baldwin DWSRF Monetary Evaluation
Water Main Replacement
First Street
Project No. 221928

Cost Item	Units	Qty	Unit Cost	Initial Estimated Capital Cost
8" Water Main and Street Reconstruction	LS	1	$390,000	$390,000
Subtotal - Estimated Construction Cost				$390,000
Contingency (12%)				$47,000
Engineering/Administration/Legal (22%)				$86,000
Subtotal - Estimated Project Budget				$523,000

	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
8" Water Main and Street Reconstruction	$390,000	50	$0	$234,000
Subtotal - Estimated Construction Cost	$390,000			$234,000
Contingency (12%)	$47,000			
Engineering/Administration/Legal (22%)	$86,000			
Subtotal - Estimated Project Budget	$523,000			

20 Year Present Worth	New Watermain Actual Cost	New Watermain 20 yr Present Worth
Initial Capital Cost	$ 523,000	$ 523,000
Annual O & M Cost	$0	$0
Salvage Value	$ 234,000	($217,000)
TOTAL ESTIMATE OF PRESENT WORTH		$ 306,000

Notes:
Present Worth estimated using discount rate of 0.4% *from 2022 OMB Circular No. A-94*

Baldwin DWSRF Monetary Evaluation
Water Main Replacement
Norway Street
Project No. 221928

Cost Item	Units	Qty	Unit Cost	Initial Estimated Capital Cost
8" Water Main and Street Reconstruction	LS	1	$975,000	$975,000
Subtotal - Estimated Construction Cost				$975,000
Contingency (12%)				$117,000
Engineering/Administration/Legal (22%)				$215,000
Subtotal - Estimated Project Budget				$1,307,000

	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
8" Water Main and Street Reconstruction	$975,000	50	$0	$585,000
Subtotal - Estimated Construction Cost	$975,000			$585,000
Contingency (12%)	$117,000			
Engineering/Administration/Legal (22%)	$215,000			
Subtotal - Estimated Project Budget	$1,307,000			

20 Year Present Worth	New Watermain Actual Cost	New Watermain 20 yr Present Worth
Initial Capital Cost	$ 1,307,000	$ 1,307,000
Annual O & M Cost	$0	$0
Salvage Value	$ 585,000	($541,000)
TOTAL ESTIMATE OF PRESENT WORTH		$ 766,000

Notes:
Present Worth estimated using discount rate of 0.4% *from 2022 OMB Circular No. A-94*

Baldwin DWSRF Monetary Evaluation
Water Main Replacement
Lake Street
Project No. 221928

Cost Item	Units	Qty	Unit Cost	Initial Estimated Capital Cost
8" Water Main and Street Reconstruction	LS	1	$1,235,000	$1,235,000
Subtotal - Estimated Construction Cost				$1,235,000
Contingency (12%)				$149,000
Engineering/Administration/Legal (22%)				$272,000
Subtotal - Estimated Project Budget				$1,656,000

	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
8" Water Main and Street Reconstruction	$1,235,000	50	$0	$741,000
Subtotal - Estimated Construction Cost	$1,235,000			$741,000
Contingency (12%)	$149,000			
Engineering/Administration/Legal (22%)	$272,000			
Subtotal - Estimated Project Budget	$1,656,000			

20 Year Present Worth	New Watermain Actual Cost	20 yr Present Worth
Initial Capital Cost	$ 1,656,000	$ 1,656,000
Annual O & M Cost	$0	$0
Salvage Value	$ 741,000	($685,000)
TOTAL ESTIMATE OF PRESENT WORTH		$ 971,000

Notes:
Present Worth estimated using discount rate of 0.4% *from 2022 OMB Circular No. A-94*

Baldwin DWSRF Monetary Evaluation
Water Main Replacement
Oak Street
Project No. 221928

Cost Item	Units	Qty	Unit Cost	Initial Estimated Capital Cost
8" Water Main and Street Reconstruction	LS	1	$618,000	$618,000
Subtotal - Estimated Construction Cost				$618,000
Contingency (12%)				$75,000
Engineering/Administration/Legal (22%)				$136,000
Subtotal - Estimated Project Budget				$829,000

	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
8" Water Main and Street Reconstruction	$618,000	50	$0	$371,000
Subtotal - Estimated Construction Cost	$618,000			$371,000
Contingency (12%)	$75,000			
Engineering/Administration/Legal (22%)	$136,000			
Subtotal - Estimated Project Budget	$829,000			

	New Watermain	
20 Year Present Worth	Actual Cost	20 yr Present Worth
Initial Capital Cost	$ 829,000	$ 829,000
Annual O & M Cost	$0	$0
Salvage Value	$ 371,000	($343,000)
TOTAL ESTIMATE OF PRESENT WORTH		$ 486,000

Notes:
Present Worth estimated using discount rate of 0.4% *from 2022 OMB Circular No. A-94*

Baldwin DWSRF Monetary Evaluation
Water Main Replacement
Fifth Street
Project No. 221928

Cost Item	Units	Qty	Unit Cost	Initial Estimated Capital Cost
8" Water Main and Street Reconstruction	LS	1	$195,000	$195,000
Subtotal - Estimated Construction Cost				$195,000
Contingency (12%)				$24,000
Engineering/Administration/Legal (22%)				$43,000
Subtotal - Estimated Project Budget				$262,000

	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
8" Water Main and Street Reconstruction	$195,000	50	$0	$117,000
Subtotal - Estimated Construction Cost	$195,000			$117,000
Contingency (12%)	$24,000			
Engineering/Administration/Legal (22%)	$43,000			
Subtotal - Estimated Project Budget	$262,000			

20 Year Present Worth	New Watermain Actual Cost	New Watermain 20 yr Present Worth
Initial Capital Cost	$ 262,000	$ 262,000
Annual O & M Cost	$0	$0
Salvage Value	$ 117,000	($109,000)
TOTAL ESTIMATE OF PRESENT WORTH		$ 153,000

Notes:
Present Worth estimated using discount rate of 0.4% *from 2022 OMB Circular No. A-94*

Baldwin DWSRF Monetary Evaluation
Elevated Storage Tank Improvements
Project No. 221928

Cost Item	Units	Qty	Unit Cost	Estimated Capital Cost
School Tank Improvements	LS	1	$60,000	$93,000
School Tank Altitude Valve Improvements	LS	1	$59,000	$91,000
Norway Tank Improvements	LS	1	$86,000	$133,000
School Tank Mixers	EA	1	$35,000	$54,000
Subtotal				$371,000
General Conditions and Ovehead (15%)				$56,000
Contingency (12%)				$45,000
Engineering/Administration/Legal (22%)				$104,000
Total Estimated Project Cost				**$580,000**

Cost Item	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
School Tank Improvements	$93,000	50	$0	$56,000
School Tank Altitude Valve Improvements	$91,000	30	$0	$31,000
Norway Tank Improvements	$133,000	25	$0	$27,000
School Tank Mixers	$54,000	20	$0	$0
Subtotal	$371,000			$114,000
General Conditions and Ovehead (15%)	$56,000			
Contingency (12%)	$45,000			
Engineering/Administration/Legal (22%)	$104,000			
Total Estimated Project Cost	**$580,000**			

20-Year Present Worth	Actual Cost	20-Year Present Worth
Capital Cost	$580,000	$580,000
Annual O&M Cost	$1,000	$19,000
Salvage Value	$114,000	($110,000)
Total Estimate of Present Worth		**$490,000**

Notes:
Present Worth estimated using discount rate of 0.4% *from 2022 OMB Circular No. A-94*

Baldwin DWSRF Monetary Evaluation
Water Supply Improvements
Project No. 221928

Cost Item	Units	Qty	Unit Cost	Estimated Capital Cost
Well 2 Improvements				
Process Improvements	LS	1	$79,500	$123,000
Electrical Improvements	LS	1	$43,000	$67,000
Mechanical Improvements	LS	1	$5,500	$9,000
Building Improvements	LS	1	$20,000	$31,000
Well 3 Improvements				
Process Improvements	LS	1	$37,500	$58,000
Electrical Improvements	LS	1	$16,500	$26,000
Mechanical Improvements	LS	1	$2,000	$4,000
Building Improvements	LS	1	$25,000	$39,000
Generator	EA	1	$150,000	$231,000
Well 4 Improvements				
Process Improvements	LS	1	$27,500	$43,000
Electrical Improvements	LS	1	$41,500	$64,000
Mechanical Improvements	LS	1	$5,000	$8,000
Subtotal				$703,000
General Conditions and Ovehead (15%)				$106,000
Contingency (12%)				$85,000
Engineering/Administration/Legal (22%)				$197,000
Total Estimated Project Cost				**$1,100,000**

Cost Item	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
Well 2 Improvements				
Process Improvements	$123,000	30	$0	$41,000
Electrical Improvements	$67,000	25	$0	$14,000
Mechanical Improvements	$9,000	20	$0	$0
Building Improvements	$31,000	100	$0	$25,000
Well 3 Improvements				$0
Process Improvements	$58,000	30	$0	$20,000
Electrical Improvements	$26,000	25	$0	$6,000
Mechanical Improvements	$4,000	25	$0	$1,000
Building Improvements	$39,000	100	$0	$32,000
Generator	$231,000	50	$0	$139,000
Well 4 Improvements				$0
Process Improvements	$43,000	25	$0	$9,000
Electrical Improvements	$64,000	25	$0	$13,000
Mechanical Improvements	$8,000	20	$0	$0
Subtotal	$703,000			$300,000
General Conditions and Ovehead (15%)	$106,000			
Contingency (12%)	$85,000			
Engineering/Administration/Legal (22%)	$197,000			
Total Estimated Project Cost	**$1,100,000**			

Baldwin DWSRF Monetary Evaluation
Water Supply Improvements
Project No. 221928

20-Year Present Worth	Actual Cost	20-Year Present Worth
Capital Cost	$1,100,000	$1,100,000
Annual O&M Cost	$1,250	$24,000
Salvage Value	$300,000	($280,000)
Total Estimate of Present Worth		$840,000

Notes:
Present Worth estimated using discount rate of 0.4% *from 2022 OMB Circular No. A-94*

Baldwin DWSRF Monetary Evaluation
Water System Pressure Reducing Valves Improvements
Project No. 221928

Cost Item	Units	Qty	Unit Cost	Estimated Capital Cost
PRV Vault Improvements	LS	1	$34,000	$53,000
Subtotal				$53,000
General Conditions and Ovehead (15%)				$8,000
Contingency (12%)				$7,000
Engineering/Administration/Legal (22%)				$15,000
Total Estimated Project Cost				**$90,000**

Cost Item	Estimated Capital Cost	Design Life (yrs)	Replace. Cost	Salvage Value
PRV Vault Improvements	$53,000	30	$0	$17,667
Subtotal	$53,000			$18,000
General Conditions and Ovehead (15%)	$8,000			
Contingency (12%)	$7,000			
Engineering/Administration/Legal (22%)	$15,000			
Total Estimated Project Cost	**$90,000**			

20-Year Present Worth	Actual Cost	20-Year Present Worth
Capital Cost	$90,000	$90,000
Annual O&M Cost	$350	$7,000
Salvage Value	$18,000	($20,000)
Total Estimate of Present Worth		**$77,000**

Notes:
Present Worth estimated using discount rate of 0.4% *from 2022 OMB Circular No. A-94*

Appendix 2

Michigan Natural Features Inventory
MSU Extension

County Element Data

The lists include all elements (species and natural communities) for which locations have been recorded in MNFI's database for each county. Information from the database cannot provide a definitive statement on the presence, absence, or condition of the natural features in any given locality, since much of the state has not been specifically or thoroughly surveyed for their occurrence and the conditions at previously surveyed sites are constantly changing. The County Elements Lists should be used as a reference of which natural features currently or historically were recorded in the county and should be considered when developing land use plans. Included in the list is scientific name, common name, element type, federal status, and state status for each element.

Choose a county Jackson

Jackson County

Code Definitions

Scientific Name	Common Name	Federal Status	State Status	Global Rank	State Rank	Occurrences in County	Last Observed in County
Acris blanchardi	Blanchard's cricket frog		T	G5	S2S3	5	1957
Alasmidonta marginata	Elktoe		SC	G4	S3?	4	2012
Alasmidonta viridis	Slippershell		T	G4G5	S2S3	11	2017
Ammodramus henslowii	Henslow's sparrow		E	G4	S3	5	2016
Ammodramus savannarum	Grasshopper sparrow		SC	G5	S4	4	2016
Angelica venenosa	Hairy angelica		SC	G5	S3	3	1978
Asclepias hirtella	Tall green milkweed		T	G5	S2	2	1981
Asclepias purpurascens	Purple milkweed		T	G5?	S2	6	2006
Baptisia lactea	White or prairie false indigo		SC	G4Q	S3	5	2014
Besseya bullii	Kitten-tails		E	G3	S1	5	2010
Betula populifolia	Gray birch		SC	G5	S3	1	1999
Bombus affinis	Rusty-patched bumble bee	LE	SC	G2	SH	2	1959
Bombus auricomus	Black and gold bumble bee		SC	G5	S2	4	2020
Bombus borealis	Northern amber bumble bee		SC	G4G5	S3	1	1955
Bombus pensylvanicus	American bumble bee		SC	G3G4	S1	3	1980
Bombus terricola	Yellow banded bumble bee		SC	G3G4	S2S3	1	1924
Botaurus lentiginosus	American bittern		SC	G5	S3	5	1996
Bouteloua curtipendula	Side-oats grama grass		E	G5	S1	1	2008
Brickellia eupatorioides	False boneset		SC	G5	S2	1	1966
Calephelis mutica	Swamp metalmark		SC	G3	S1	3	2008
Carex amphibola	Narrow-leaved Sedge		SC	G5	SNR	1	2008

Scientific Name	Common Name	Federal Status	State Status	Global Rank	State Rank	Occurrences in County	Last Observed in County
Carex typhina	Cattail sedge		T	G5	S1	1	2013
Chlidonias niger	Black tern		SC	G4G5	S2	1	1985
Cirsium hillii	Hill's thistle		SC	G3	S3	1	1896
Cistothorus palustris	Marsh wren		SC	G5	S3	1	2002
Clemmys guttata	Spotted turtle		T	G5	S2	6	2007
Coregonus artedi	Lake herring or Cisco		T	GNR	S3	2	2009
Cryptotis parva	Least shrew		T	G5	S1S2	1	1922
Cyclonaias tuberculata	Purple wartyback		T	G5	S2	3	2010
Cypripedium candidum	White lady slipper		T	G4	S2	9	2010
Dennstaedtia punctilobula	Hay-scented fern		T	G5	S1	1	2010
Dichanthelium leibergii	Leiberg's panic grass		T	G4	S2	5	2017
Dorydiella kansana	Leafhopper		SC	GNR	S3	1	2007
Eleocharis engelmannii	Engelmann's spike rush		SC	G4G5	S2S3	1	1893
Eleocharis equisetoides	Horsetail spike rush		SC	G4	S3	4	2010
Eleocharis geniculata	Spike-rush		X	G5	SX	1	1937
Emydoidea blandingii	Blanding's turtle		SC	G4	S2S3	11	2020
Erimyzon claviformis	Creek chubsucker		E	G5	S1	1	1982
Eupatorium sessilifolium	Upland boneset		T	G5	S1	2	1964
Euphyes dukesi	Dukes' skipper		T	G3G4	S2	1	2007
Falco peregrinus	Peregrine falcon		E	G4	S3	1	2018
Gallinula galeata	Common gallinule		T	G5	S3	1	1995
Geum virginianum	Pale avens		SC	G5	S1S2	2	2008
Haliaeetus leucocephalus	Bald eagle		SC	G5	S4	3	2017
Helianthus mollis	Downy sunflower		T	G4G5	S2	1	1980
Hydrastis canadensis	Goldenseal		T	G3G4	S2	5	2015
Ixobrychus exilis	Least bittern		T	G4G5	S3	3	1995
Lampsilis fasciola	Wavyrayed lampmussel		T	G5	S2	5	2010
Lasmigona compressa	Creek heelsplitter		SC	G5	S3	7	2017
Lasmigona costata	Flutedshell		SC	G5	SNR	7	2018
Lepisosteus oculatus	Spotted gar		SC	G5	S2S3	8	2018
Lepyronia angulifera	Angular spittlebug		SC	G3	S3	1	2009
Ligumia recta	Black sandshell		E	G4G5	S1?	1	2010
Lithobates palustris	Pickerel frog		SC	G5	S3S4	9	2018
Mesomphix cupreus	Copper button		SC	G5	S1	3	1947

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Muhlenbergia richardsonis	Mat muhly		T	G5	S2	2	2019
Myotis lucifugus	Little brown bat		SC	G3	S1	2	1980
Myotis septentrionalis	Northern long-eared bat	LT	SC	G1G2	S1	2	1998
Myotis sodalis	Indiana bat	LE	E	G2	S1	4	2005
Myrica pensylvanica	Northern bayberry		T	G5	S2	1	2015
Necturus maculosus	Mudpuppy		SC	G5	S3S4	1	1958
Neonympha mitchellii mitchellii	Mitchell's satyr	LE	E	G2T2	S1	4	2020
Notropis texanus	Weed shiner		X	G5	S1	2	1941
Noturus miurus	Brindled madtom		SC	G5	S2	2	1984
Oarisma poweshiek	Poweshiek skipperling	LE	T	G1	S1	2	2012
Oecanthus laricis	Tamarack tree cricket		SC	G3?	S3	9	2017
Panax quinquefolius	Ginseng		T	G3G4	S2S3	3	1979
Pandion haliaetus	Osprey		SC	G5	S4	2	2016
Pantherophis spiloides	Gray ratsnake		SC	G4G5	S2S3	1	1985
Papaipema beeriana	Blazing star borer		SC	G2G3	S2	5	2017
Papaipema maritima	Maritime sunflower borer		SC	G3	S2	1	1988
Papaipema sciata	Culvers root borer		SC	G3	S3	2	1996
Papaipema silphii	Silphium borer moth		T	G3G4	S1	3	1989
Papaipema speciosissima	Regal fern borer		SC	G4	S2S3	1	1988
Platanthera ciliaris	Orange- or yellow-fringed orchid		E	G5	S1S2	1	1893
Pleurobema sintoxia	Round pigtoe		SC	G4G5	S3	10	2018
Poa paludigena	Bog bluegrass		T	G3G4	S2	3	2006
Polygala cruciata	Cross-leaved milkwort		SC	G5	S3	1	1893
Rallus elegans	King rail		E	G4	S2	3	1992
Scleria triglomerata	Tall nut rush		SC	G5	S3	1	1951
Setophaga cerulea	Cerulean warbler		T	G4	S3	3	2018
Setophaga citrina	Hooded warbler		SC	G5	S3	2	2018
Silene stellata	Starry campion		T	G5	S2	1	1860
Sistrurus catenatus	Eastern massasauga	LT	SC	G3	S3	22	2018
Sisyrinchium albidum	Common blue-eyed grass		X	G5?	SX	1	2014
Sisyrinchium strictum	Blue-eyed-grass		SC	G3	S2	1	1969
Speyeria idalia	Regal fritillary		E	G3?	SH	2	1958
Sphaerium fabale	River fingernail clam		SC	G5	SNR	3	1954
Spiza americana	Dickcissel		SC	G5	S3	4	2016

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Sporobolus heterolepis	Prairie dropseed		SC	G5	S3	5	2014
Stylurus amnicola	Riverine snaketail		SC	G4	S2S3	1	2000
Stylurus laurae	Laura's snaketail		SC	G4	S3	2	1997
Terrapene carolina carolina	Eastern box turtle		SC	G5T5	S2S3	8	2008
Thaspium chapmanii	Meadow-parsnip		SC	GNR	SNR	2	1948
Trichophorum clintonii	Clinton's bulrush		SC	G4	S3	1	1951
Truncilla truncata	Deertoe		SC	G5	S2S3	1	2010
Utterbackia imbecillis	Paper pondshell		SC	G5	S2S3	2	
Valeriana edulis var. ciliata	Edible valerian		T	G5T3	S2	1	1954
Vallonia parvula	Trumpet vallonia		SC	G4	SNR	1	
Ventridens suppressus	Flat dome		SC	G5	SNR	6	1939
Venustaconcha ellipsiformis	Ellipse		SC	G4	S3	12	2018
Villosa iris	Rainbow		SC	G5	S3	20	2018
Zizania aquatica	Wild rice		T	G5	S2S3	2	2010