City of Grand Ledge
Drinking Water State Revolving Fund
Project Plan Amendment

Project No. 221916
February 16, 2023

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Prepared For:
City of Grand Ledge, Michigan

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List of Abbreviations/Acronyms

ARP	American Rescue Plan
City	City of Grand Ledge
DWSRF	Drinking Water State Revolving Fund
EGLE	Michigan Department of Environment, Great Lakes, and Energy
gpm	gallons per minute
HDPE	High-Density Polyethylene

LBWL	Lansing Board of Water and Light
mgd	million gallon(s) per day
O&M	operation and maintenance
REU	Residential Equivalent Unit
SHPO	State Historic Preservation Office
VFD	Variable Frequency Drive
WTP	Water Treatment Plant

1.0 Introduction

In March 2021, the City of Grand Ledge (City) retained Fishbeck to complete a Drinking Water State Revolving Fund (DWSRF) Project Plan for improvements to the City's water system. The Project Plan was prepared to meet the project planning requirements of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) and was submitted on June 29, 2022. The original Project Plan is being amended to change DWSRF Project Number 7735-01 to include the following scope of work:

- The installation of a raw water main to connect Well 2 to the new Water Treatment Plant (WTP).
- The installation of a Variable Frequency Drive (VFD) for the Well 2 pump.

Well 2 is located in Jaycee Park. It is currently a standby well for the City water system that can supply water directly to the water distribution system. Chlorine and phosphate are fed at the well for disinfection and corrosion control, respectively.

A map of the water service area for the City's water system is included in Figure 1. A map of the City's water distribution system, including the well locations, storage tanks, water mains, and the existing WTP is provided in Figure 2.

The installation of a raw water main from Well 2 to the WTP will provide additional raw water to the WTP. This project has an estimated project cost of $4,320,000.

2.0 Project Background

2.1 Existing Facilities

2.1.1 Existing Facilities Description

The total capacity of the existing raw water system is 3.46 million gallons per day (mgd). The firm capacity of the raw water supply system is 1.88 mgd, with Well 6 (the largest well) out-of-service. However, Well 2, with a capacity of 0.58 mgd, pumps directly to the distribution system, but it does not provide raw water directly to the existing WTP. Thus, the total raw water capacity supplied to the existing WTP is 2.88 mgd and the firm raw water capacity supplied to the existing WTP is 1.30 mgd. This raw water capacity will need to be expanded to meet firm capacity of the new WTP. One way to expand this capacity is to connect Well 2 to the new WTP with a raw water main, which will increase the raw water capacity available to the WTP without the need to drill a new well or to obtain EGLE approval to outfit and activate Wells 9 and 10.

2.1.2 Condition of Existing Facilities

2.1.2.1 Groundwater Supply Wells

The supply wells are generally in good condition and are well maintained by City staff, but the raw water supply capacity is limited in relation to the existing treatment plant and system demand. Wells are periodically serviced through contracts with well contractors in the local area.

Well 2, installed in 1941, is the oldest well in the system. This well is considered a standby or emergency source that can be pumped directly into the distribution system as needed. Chlorine is fed at the wellhouse for disinfection of raw water.

2.2 Summary of Project Needs

2.2.1 Expansion of the Raw Water Supply System

The total peak capacity of the existing raw water system is 2,400 gallons per minute (gpm). The firm capacity of the raw water supply system is 1,300 gpm, with Well 6 (the largest well) out-of-service. However, Well 2, with a capacity of 400 gpm, pumps directly to the distribution system but does not currently provide raw water directly to the WTP. Thus, the total raw water capacity supplied to the WTP is 2.88 mgd and the firm raw water capacity supplied to the WTP is 1.30 mgd. This raw water capacity will need to be expanded to meet the design firm capacity needs of the WTP, a value of 2.85 mgd. To help provide additional raw water capacity to the WTP, a raw water main can be installed from Well 2 to the WTP, improving the firm raw water capacity to 1.88 mgd.

2.2.2 Orders of Enforcement Actions

No court or enforcement orders, or written enforcement actions have been issued to the City regarding its water system.

2.2.3 Drinking Water Quality Problems

The aesthetic quality of the water produced by the City's existing WTP is generally good; there are no known drinking water problems in the distribution system.

2.2.4 Projected Needs for the Next 20 Years

The expansion of the existing raw water supply system is needed to help the City meet future projected water demands. Installation of a raw water main from Well 2 to the WTP would improve the capacity of the raw water supply system that is available for treatment.

3.0 Analysis of Alternatives

3.1 Expansion of Raw Water Supply Capacity

3.1.1 No Action

The no-action alternative would delay in the City's raw water capacity being able to meet projected demands. This capacity will be needed to continue to supply water to the City's customers. This is one component of an overall strategy of the City to increase raw water capacity, which is very time consuming considering the scarcity of the resource in the City service area and difficulties in getting approval for other raw water sources. The no-action alternative was not considered feasible.

3.1.2 Optimum Performance of Existing Facilities

The City is planning to add permanent standby power along with the new WTP, which would also power Wells 6 and 7 in case of an emergency. Well 8 has a connection for a portable generator that the City can use to operate it in the event of an emergency. While these measures help provide reliability to the raw water system, it does not resolve the capacity issues. This alternative was not considered feasible.

3.1.3 Construction Alternatives

One additional construction alternative was evaluated for the expansion of the raw water supply system for the City as part of the Project Plan Amendment. The estimated costs, project considerations, feasibility, etc. are described later in the report. This alternative supplements the strategies to increase raw water supply described in the construction alternatives presented previously. Difficulty in getting approval from EGLE for the outfitting and activating of Wells 9 and 10 and difficulty in locating suitable sites for additional wells has led the City to proceed with the Well 2 raw water main.

3.1.3.1 Alternative – Installation of Raw Water Main for Well 2

A raw water main would be installed connecting Well 2 to the WTP. It should be noted that another option for raw water exists in Well 9, which has already been drilled but is not approved to be outfitted and connected to the water system by EGLE. The approximate length of the water main is about 6,000 feet and the expected route is as follows:

- From Well 2 south out of the Jaycee Park to River Street.
- Southeast along River Street to Franklin Street.
- Southwest along Franklin Street to the intersection of Degroff Street.
- South along Degroff Street to Saginaw Highway (M-43).
- West along Saginaw Highway to the WTP driveway.
- South along the WTP driveway to a connection point within the WTP property likely to a connection point between Well 7 and the plant.

The raw water main would be 8-inches in diameter. Generally, the main will be run in the Right of Way (ROW) of the roads down which it travels. It will be tied into the transmission main from Well 7 on the existing WTP site. In addition, some yard piping will be completed on the Water Plant and Well 2 site to connect Well 2 to the Water Plant.

A new VFD will be installed on the Well 2 pump to allow it to pump to the WTP, which has a reduced pressure condition as compared to the distribution system. The VFD will allow the pump to decrease in speed to supply the WTP but still have the ability to ramp up and supply the distribution system directly in an emergency. There will be some corresponding electrical and controls improvements needed at the wellhouse to allow for the operation of a VFD at Well 2.

3.1.4 Regional Alternative

Three regional supply alternatives connecting the City to the Lansing Board of Water and Light (LBWL) was considered as part of a separate study. These alternatives were considered but were ultimately not selected by the City. The Present Worth Analysis showed the WTP as the least cost option of the alternatives considered. For further information, this study has been provided as a supplement to this report.

4.0 Principal Alternative

For the Expansion of Raw Water Capacity, the construction alternative of the installation of a raw water main from Well 2 to the WTP was chosen.

4.1 Expansion of Raw Water Supply System

The installation of a raw water main from Well 2 to the WTP was chosen as the principal alternative.

4.1.1 Installation of Raw Water Main for Well 2

The installation of a raw water main connection to Well 2 to the WTP would increase the raw water capacity of the system that can be treated. As the City water system grows in demand, additional raw water is required to meet the system needs. Well 2 currently only pumps directly to the distribution system and therefore does not count toward the firm capacity of the WTP.

4.1.1.1 Monetary Evaluation

A monetary analysis was completed for the construction alternative. The project cost summary for the construction alternative is presented in Table 4-1. The cost estimates include 6,000 feet of 8-inch raw water transmission main from Well 2 to the WTP. In addition, a VFD will be added at Well 2 to control the speed of the

pump. This is needed due to the reduced pressures needed to supply the WTP as compared to the distribution system.

Table 4-1 – Well 2 Raw Water Main Estimated Costs

Component	Estimated Cost
8-inch Raw Water Transmission Main	$2,506,000
Addition of VFD at Well 2	$50,000
Associated Electrical and Controls Improvements	$30,000
Yard Piping	$40,000
Subtotal	$2,626,000
Design, Estimating & Escalation Contingency (7%)	$184,000
Building Permits Allowance (1%)	$27,000
General Contractor/Construction Manager Fee (5%)	$132,000
General Contractor Overhead & General Conditions (8%)	$211,000
Well Upgrades Subtotal	$3,180,000
Construction Contingency (10%)	$318,000
Construction Cost Opinion	$3,498,000

A present worth analysis was completed for the construction alternative, as summarized in Table 4-2. The present worth analysis for the installation of a raw water main connection to Well 2 and the WTP is included in Appendix 1. Sunk costs are not included in the analysis.

Table 4-2 – 20-Year Present Worth Analysis

	Expansion of Raw Water System	
Cost Category	Cost/Value	20-Year Present Worth
Capital Cost	$3,498,000	$3,498,000
O&M Cost/Year	$0	$0
Replacement Cost	$0	$0
Salvage Value	$1,749,000	($1,615,000)
Total Present Worth		$1,883,000

The capital costs are for the Well 2 raw water main and VFD installation. The operation and maintenance (O&M) costs for the raw water main and VFD were calculated based on regular operation and maintenance costs; these were offset by the removal of chemical costs from Well 2 to make the increase to O&M costs negligible. The salvage value was calculated assuming the raw water main and yard piping had a useful life of 70 years and the VFD had a typical useful life of 20 years.

4.1.1.2 Environmental Evaluation

4.1.1.2.1 Cultural Resources

The proposed project is not expected to have direct expected historical or archeological impacts. The route of the raw water main does pass a few historic homes along Franklin Street, but the main will be installed on the opposite side of these homes, minimizing the impact to them.

4.1.1.2.2 Natural Environment

No long-term impacts to the natural environment are anticipated due to the proposed improvement projects. Where applicable, construction will occur during the typical construction season for underground work.

4.1.1.3 Mitigation

The impact on air quality will be controlled to the greatest extent possible by limiting construction to regular working hours during the week and ensuring proper maintenance on heavy equipment to reduce exhaust emissions. Dust will be controlled by appropriate measures such as the use of calcium chloride or water.

Noise from construction will be mitigated by only working during daylight hours and mitigating the noise of construction where possible.

4.1.1.4 Implementability and Public Participation

The public will be provided with opportunities to comment on the project at the Public Hearing. Public concerns will be considered whenever possible throughout design and construction.

The City owns and operates its water distribution system, and the projects do not require intermunicipal agreements.

4.1.1.5 Technical Considerations

4.1.1.5.1 Installation of Raw Water Main for Well 2

The route of installation for the raw water main for Well 2 is challenging in that it is largely developed and would require significant work in repaving driveways and avoiding impact to customers adjacent to the construction.

There are no anticipated issues with installing a VFD in the existing wellhouse, though this will be further investigated during design.

4.1.1.6 Residuals

No residuals will be produced as a result of connecting Well 2 to the WTP.

4.1.1.7 Potential Industrial/Commercial/Institutional

The City has provided input on planned growth and development. These areas reflect available land such as undeveloped parcels in the industrial park and recent interest in residential, commercial, and industrial development. The City has entered into a Cooperative Development Agreement with Oneida Township to supply some areas outside the City limits with water and sewer infrastructure. The City has seen development and growing interest for further development on sites in and around the City that will require water and sewer infrastructure.

The City currently serves industrial customers and expects to serve additional industrial users in the next five years.

4.1.1.8 Growth Capacity

The connection of Well 2 to the WTP is needed for additional raw water capacity for the WTP, which will help account for projected demands and improved plant operation.

4.1.1.9 Contamination

The original project plan contains Map 5, which shows the location of the contaminated sites within the service area. No adverse site conditions are anticipated for the water main installation area.

5.0 Selected Alternatives

5.1 Expansion of Raw Water Supply System

5.1.1 Installation of Raw Water Main for Well 2

5.1.1.1 Description

The selected raw water supply expansion alternative was installation of a raw water main connection between Well 2 and the WTP. This alternative is the only current one available to the City to improve the capacity of the raw water system. The use of Wells 9 and 10 has not been approved by EGLE yet, though this option is still under active review. No additional sites for new wells have been identified or procured to date despite efforts to locate suitable properties.

5.1.1.2 Design Parameters

5.1.1.2.1 Well 2 Raw Water Main

An 8-inch HDPE raw water main would be installed connecting Well 2 to the WTP. This would improve the raw water capacity of the treatment plant without needing to drill an additional well. It should be noted that another option for raw water exists in Well 9, which has already been drilled but is not approved to be outfitted and connected to the water system by EGLE. The approximate length of the water main is about 6,000 feet and the expected route is as follows:

- From Well 2 south out of the Jaycee Park to River Street.
- Southeast along River Street to Franklin Street.
- Southwest along Franklin Street to the intersection of Degroff Street.
- South along Degroff Street to Saginaw Highway (M-43).
- West along Saginaw Highway to the WTP driveway.
- South along the WTP driveway to a connection point within the WTP property likely to a connection point between Well 7 and the plant.

The raw water main would be 8-inches in diameter. Generally, the main will be run in the Right of Way (ROW) of the roads down which it travels. It will be tied into the transmission main from Well 7 on the existing WTP site. In addition, some yard piping will be completed on the Water Plant and Well 2 site to connect Well 2 to the Water Plant.

A new VFD will be installed on the Well 2 pump to allow it to pump to the WTP, which has a reduced pressure condition as compared to the distribution system. The VFD will allow the pump to decrease in speed to supply the WTP but still have the ability to ramp up and supply the distribution system directly in an emergency. Additional controls and electrical improvements will be needed to allow Well 2 to operate with a VFD.

5.1.1.3 Maps

A map indicating the route of the raw water main is included in Figure 2. The topography of the area is shown in the original project plan, which contains Map 6.

5.1.1.4 Schedule for Design and Construction

The installation of Well 2 raw water main is proposed to start construction following SRF Financing Quarter 4 of fiscal year 2023. The proposed schedule is shown in Table 5-1.

Table 5-1 – Schedule of Design and Bidding – Installation of Well 2 Raw Water Main

Task	Completion Date
Submittal of Draft Plans and Specifications to EGLE	1/20/2023
Submittal of Final Plans and Specifications to EGLE	4/3/2023
Publication of Bid Advertisement	5/15/2023
Submittal of DWSRF Application Parts 1 & 2	5/15/2023
Opening of Bids	6/15/2023
Resolution of Tentative Contract Award	6/26/2023
Submittal of DWSRF Application Part 3	7/5/2023
EGLE Order of Approval	8/7/2023

5.1.1.5 Project Cost Estimate

The estimated project cost for the selected alternative is included in Table 5-2. The costs are provided in 2023 dollars in contrast to the original Project Plan submittal.

Table 5-2 – Well 2 Raw Water Main Project Cost Estimate

Cost Category	Estimated Cost
Legal/Financial Service Fees	$42,000
Bond Counsel Fees	$25,000
Construction Cost Opinion	$3,498,000
Architectural/Engineering Fee and Expenses	$510,000
Project Contingency (6%)	$245,000
Total Project Cost Opinion	$4,320,000

5.2 User Costs

The annual debt service payment for the capital cost of $3.24 million funding, the project cost of $4.32 million less the American Rescue Plan (ARP) grant funds of $1.08 million, at 2.125% for 30 years is estimated to be $147,200. This debt payment creates a total increase of $2.82 per Residential Equivalent Unit (REU) per month.

No additional O&M expenses are expected as part of these projects.

5.3 Disadvantaged Community

The disadvantaged community qualification is determined for each loan that is applied for by the community. A Disadvantaged Community Status Determination Worksheet was submitted to EGLE along with the Intent To Apply. EGLE has determined that the City does not meet the disadvantaged community qualifications.

5.4 Ability to Implement the Selected Alternative

The City has the ability to implement the selected alternatives. The City owns and operates the water supply, WTP, and distribution systems. The proposed improvement projects will occur within the City. No amendments to any water service agreements will be necessary. All financial and loan-related work will be handled by the City's Financial Department.

6.0 Environmental Evaluation

6.1 Historical/Archeological/Tribal Resources

Reference the original project plan for details on the resources compiled to evaluate the impacts on Historical/Archeological/Tribal Resources in the area of the project.

The Michigan State Historic Preservation Office (SHPO) and the Tribal Historic Preservation Officers were not contacted since the proposed projects have been deemed non-equivalency projects.

6.2 Water Quality

The proposed project will meet compliance requirements of the Safe Drinking Water Act. Reference the original project plan for details on the resources compiled to evaluate the impacts on Water Quality in the area of the project.

6.3 Land/Water Interface

The proposed project will not impact any wetlands. Reference the original project plan for details on the resources compiled to evaluate the impacts on Land/Water Interface in the area of the project.

6.4 Endangered Species

The proposed project will not impact endangered species. Reference the original project plan for details on the resources compiled to evaluate the impacts on Endangered Species in the area of the project.

It should be noted that no or little tree removal is expected as part of this project. If any tree removal is identified, consideration will be given to impact on habitat for endangered species in the area.

6.5 Agricultural Land

The proposed project will not impact any prime farmland. Reference the original project plan for details on the resources compiled to evaluate the impacts on Agricultural Land in the area of the project.

6.6 Social/Economic Impact

The proposed water system improvements will result in direct economic and social benefits. Public health and safety will benefit from meeting the compliance set forth by the Safe Drinking Water Act, increased water system quality, and greater system reliability.

The construction of the projects will create jobs and contribute favorably to local contractors and the economy.

6.7 Construction/Operational Impact

The installation of the raw water main will likely involve some roadway demolition and rerouting traffic to allow for the work to be completed. Routine construction for a typical water main replacement is anticipated. Limited tree removal is anticipated. Construction hours for projects of this type are generally limited to 7:00 a.m. to 7:00 p.m. Monday through Friday. Access to all properties will be maintained throughout construction.

6.8 Indirect Impacts

6.8.1 Changes in Development

No significant changes in development are anticipated due to the proposed improvements. However, the proposed projects will enhance the existing raw water supply system.

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 surface 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 sensitive ecosystems.

6.8.5 Changes to Aesthetic Aspects of the Community

The proposed projects will not have long-term aesthetic changes because the work is underground, and the land will be restored post-construction.

6.8.6 Resource Consumption

Resource consumption in the form of materials, labor, and equipment will be required to construct the proposed projects.

7.0 Mitigation Measures

The proposed projects were evaluated for long-term adverse impacts. There are no long-term negative impacts associated with the construction activities. However, suitable mitigation measures will be considered to safeguard from any irreversible adverse impacts on the environment.

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 of heavy equipment to reduce exhaust emissions.
- Noise control: Use of designated daytime work hours, use of mufflers on all equipment, and minimizing work on weekends and/or holidays.
- Restoration: Areas of grass, curb, sidewalk, and pavement that are disturbed as a result of the proposed project will be restored as closely as possible to their original appearance.

Long-term environmental impacts are not anticipated for the proposed project. There is limited anticipated tree removal or adverse impact on any sensitive environmental features. However, measures will be taken to avoid, eliminate, or mitigate potential long-term environmental impacts. Using vacuum boring excavation, hand digging, conventional machine excavation, or a combination thereof will be used such that disturbance is minimal.

The proposed project is not anticipated to create additional indirect environmental impacts.

8.0 Public Participation

8.1 Public Hearing Advertisement

On February 19, 2023, a Notice of Public Hearing for the DWSRF Project Plan for the proposed projects will be published in the Grand Ledge Independent. The advertisement will briefly describe the proposed projects and estimated costs, mentioning the availability of the report for viewing, and inviting written comments from the public. The Project Plan will be made available on the City's website for public review and comment starting February 19, 2023. Written comments received before 5:00 PM on the day of the public hearing, March 27, 2023, will be addressed in the Project Plan Amendment.

The public notice affidavit of publication will be included in the appendices.

8.2 Presentation of the Project Plan

A formal public hearing along with a presentation of the project plan will be held at City Hall, on March 27, 2023, at 7:30 p.m. The following items will be discussed during the public hearing:

1. A description of the drinking water quality needs and problems to be addressed by the proposed projects and the principal alternatives that were considered.
2. A description of the selected alternatives, including their capital costs and a cost breakdown by project components.
3. A discussion of project financing and costs to users, including the proposed method of project financing and estimated monthly debt retirement; the proposed annual, quarterly, or monthly charge to the typical residential customer; and any special fees that will be assessed.
4. A description of the anticipated social and environmental impacts associated with the recommended alternatives and the measures that will be taken to mitigate adverse impacts.

Records of the presentation, questions, and comments at the public hearing will be kept. These records will be included in the appendices.

8.3 Public Hearing

The public hearing comments received will be included in the appendices.

8.4 Adoption of the Project Plan

A resolution to formally adopt the Project Plan and implement the selected alternatives will be considered at the City Council session on March 27, 2023. The resolution will be included in the appendices.

Figures

PLOT INFO: Z:\2022\221916\CAD\GIS\ProProj\DWSRF Project Plan Amendment.aprx Date: 2/9/2023 9:47 AM User: prbaskins

WATER SERVICE AREA

NORTH

0 750 1,500 FEET

LEGEND

- Project Planning Area
- Water Service Area
- City Limit

DATA SOURCES: ESRI WORLD STREET MAP & CITY OF GRAND LEDGE GIS.

FIGURE NO. 1

PROJECT NO. 221916

City of Grand Ledge

Clinton County and Eaton County, Michigan

DWSRF Project Plan Amendment

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Clinton County

Eaton County

Ground Storage Tank
Volume = 0.75 MG

Booster Pump Station
Capacity = 1,400 gpm

Elevated Tank
Volume = 0.1 MG

Wellhouse No. 2
Capacity = 400 gpm

Elevated Tank
Volume = 0.5 MG

Wellhouse No. 7
Capacity = 500 gpm

Well No. 9

Well No. 10

Wellhouse No. 6
Capacity = 1,100 gpm

Iron Removal Plant
Capacity = 1,600 gpm

Wellhouse No. 8
Capacity = 400 gpm

LEGEND

- Treatment Plant
- Water Storage Tank
- Pump Station
- Production Well
- Proposed Production Well
- Water System Valve
- Potable Water
- Raw Water
- Project Planning Area
- City Limit

WATER SYSTEM MAP
PROJECT PLANNING AREA

NORTH

0 750 1,500 FEET

DATA SOURCES: ESRI WORLD STREET MAP. CITY OF GRAND LEDGE GIS & EATON COUNTY GIS.

FIGURE NO. 2

PROJECT NO. 221916

City of Grand Ledge
Clinton County and Eaton County, Michigan

DWSRF Project Plan Amendment

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Appendix 1

Present Worth Analysis

Community Name: City of Grand Ledge

Federal Discount Rate for Water Resources Planning (Interest Rate) i = 0.004

Number of Years, n = 20 years

Construction of Well 2 Raw Water Main

Initial Capital Costs =	$3,498,000
Annual Operations & Maintenance Costs =	$10,000
Future Salvage Value =	$1,749,000
Present Worth of 20 years of O & M =	$0

PW = Annual OM $*\frac{(1+i)^n-1}{i*(1+i)^n}$

Present Worth of 20 yr Salvage Value =	$1,615,000

PW =

$$FSV*\frac{1}{(1+i)^n}$$

Alternate 1 Total Present Worth =	$1,883,000