

A background image featuring a close-up, high-speed shot of a water droplet splashing, creating a vertical column of water with a central void, set against a blurred, light blue sky.

City of Northville

FY 2024 Project Planning Document
Drinking Water State Revolving Fund

Draft: April 2023



TABLE OF CONTENTS

I. INTRODUCTION	1
II. PROJECT BACKGROUND.....	2
A. DELINEATION OF STUDY AREA	2
B. POPULATION PROJECTIONS.....	2
C. EXISTING ENVIRONMENTAL EVALUATION.....	3
D. EXISTING FACILITIES.....	15
E. NEED FOR THE PROJECT	19
F. PROJECTED FUTURE NEEDS	21
III. NEW WATER SUPPLY WELL PROCEDURES.....	22
IV. ANALYSIS OF ALTERNATIVES	23
A. NO-ACTION	23
B. OPTIMUM PERFORMANCE OF EXISTING FACILITIES.....	23
C. REGIONAL ALTERNATIVES.....	23
D. PRINCIPAL ALTERNATIVES	23
E. MONETARY EVALUATION.....	26
F. ENVIRONMENTAL EVALUATION	29
G. TECHNICAL CONSIDERATIONS	31
H. NEW/INCREASED WATER WITHDRAWALS	31
V. SELECTED ALTERNATIVE	32
VI. ENVIRONMENTAL EVALUATION	39
A. DIRECT IMPACTS.....	39
B. INDIRECT IMPACTS	42
C. CUMULATIVE IMPACTS.....	42
VII. MITIGATION	43
A. SHORT TERM IMPACTS.....	43
B. LONG TERM IMPACTS	43
C. INDIRECT IMPACTS	43
VIII. PUBLIC PARTICIPATION	44
A. PUBLIC MEETING	44
B. PUBLIC MEETING ADVERTISEMENT.....	44
C. PUBLIC MEETING SUMMARY	44
D. ADOPTION OF THE PROJECT PLANNING DOCUMENT	44

LIST OF TABLES

Table 1: Present and Future Population Projections for the City of Northville	2
Table 2: Storage Details (WRS 2021).....	16
Table 3: Pumping Details (WRS 2021).....	16
Table 4: 2020 DSMI Information	17
Table 5: Service Lead Percent Composition by Pipe Materials (WRS 2021)	17
Table 6: Distribution System Composition by Pipe Materials (WRS 2021)	17
Table 7: Water Main Pipe Diameter and Lengths in Northville’s Distribution System (WRS 2021)	18
Table 8: Demand Projections	21
Table 9: Proposed Improvements and Locations	24
Table 10: Construction Restoration Criteria.....	26
Table 11: Present Worth Comparison.....	27
Table 12: Pipe Characteristics, Construction Method, and Material	33
Table 13: Useful Life of Assets.....	34
Table 14: Design and Construction Schedule	35
Table 15: Phasing Schedule.....	35
Table 16: Summary of Cost by Project.....	36
Table 17: Summary of Cost by Project Phase	36
Table 18: User Cost Analysis	37
Table 19: USFWS Rare Species Review Summary	40
Table 20: Traffic Disruptions.....	41

LIST OF FIGURES

Figure 1: City of Northville Cultural and Historic Resources	4
Figure 2: City of Northville Wetlands and Hydric Soils	6
Figure 3: City of Northville 100-Year Floodplain	8
Figure 4: City of Northville Topography	10
Figure 5: City of Northville Soils.....	12
Figure 6: Northville Zoning District Map	14

LIST OF APPENDICES

APPENDIX A	PROJECTS AND STUDY/SERVICE AREA MAP
APPENDIX B	2021 WATER RELIABILITY STUDY
APPENDIX C	2021 CONSUMERS ANNUAL REPORT ON WATER QUALITY
APPENDIX D	DIXON ENGINEERING REPORT
APPENDIX E	ADMINISTRATIVE CONSENT ORDER AND SIGNIFICANT DEFICIENCIES VIOLATION NOTICE
APPENDIX F	SERVICE LINE MATERIAL SUMMARY TABLES
APPENDIX G	RESERVOIR FEASIBILITY STUDY
APPENDIX H	COST OPINIONS
APPENDIX I	STATE HISTORIC PRESERVATION OFFICE APPLICATION AND RESPONSE
APPENDIX J	PUBLIC HEARING DOCUMENTS

ABBREVIATIONS

ACO	Administrative Consent Order
BJ	Bore and Jack
CIP	Capital Improvement Plan
DSMI	Distribution System Materials Inventory
DI-54	Class 54 Ductile Iron
DWSRF	Drinking Water State Revolving Fund
ESA	Endangered Species Act
EGLE	Michigan Department of Environment, Great Lakes, and Energy
F&V	Fleis and VandenBrink
GLWA	Great Lakes Water Authority
GPCL	Galvanized Previously Connected to Lead
GPM	Gallons Per Minute
HDD	Horizontal Directional Drilling
HDPE DR-11	High density polyethylene dimension ratio 11
IPAC	Information for Planning and Consulting
ISO	Insurance Services Office
ITA	Intent To Apply
MDNR	Michigan Department of Natural Resources
MG	Million Gallons
MGD	Million Gallons per Day
MNFI	Michigan Natural Features Inventory
NAAQS	National Ambient Air Quality Standards
OHM	OHM Advisors
O&M	Operation and Maintenance
PRV	Pressure Reduction Valve
SCADA	Supervisory Control and Data Acquisition
SDWA	Safe Drinking Water Act
SDVN	Significant Deficiency Violation Notice
SEMCOG	Southeast Michigan Council of Governments

SHPO	State Historic Preservation Offices
U.S.	United States
USFWS	United States Fish and Wildlife Service
VFD	Variable Frequency Drive
WRS	Water Reliability Study

I. INTRODUCTION

The City of Northville (City) is submitting this Project Planning document to apply for a Drinking Water State Revolving Fund (DWSRF) low interest loan to address needs in their drinking water distribution system, including:

1. Facility upgrades to resolve the significant deficiency violations related to the City's underground storage tank and maintain regulatory compliance as outlined in the City's Administrative Consent Order (ACO) ACO-399-07-2022
2. Replacement of water main that has reached the end of its useful life and is identified in the City's 2021 Water Reliability Study (WRS)
3. Looping to eliminate dead-ends and poor water quality
4. Lead service line replacements

The Project Planning document has been developed using the Michigan Department of Environment, Great Lakes, and Energy (EGLE) DWSRF Project Planning Guidance Document dated January 2023.

An Intent to Apply (ITA) form was submitted to EGLE by Fleis and VandenBrink Engineering (F&V) on October 7th, 2022. The ITA included a brief description of the desired projects and a preliminary cost. OHM Advisors (OHM) has discussed the transition of consulting engineer for the City's DWSRF project with EGLE.

II. PROJECT BACKGROUND

A. DELINEATION OF STUDY AREA

The City of Northville (City) is a 2.04 square mile community located in both Oakland and Wayne Counties, between the City of Novi and the Township of Northville. The study and service area include the entire distribution system which extends across the City.

The City's WRS by F&V, 2023 Capital Improvement Plan (CIP) and the recommendations from their draft 2023 Underground Storage Reservoir Feasibility Study were used as a basis for the identification of project areas contained in this Project Planning document. Project areas include:

1. Disconnection of the existing underground water storage reservoir and replacement of the associated pump station with a new booster pump station near Great Lakes Water Authority (GLWA) Feed Point NL-01
2. 21,320 feet of water main replacement and/or looping within 19 project areas.
3. 35 lead service line replacements located within the proposed limits of the water main replacement.
4. Construction of three pressure reducing valve (PRV) vaults to address pressure differential across the City and reestablish proper pressure districts.

The location of these projects and study and service areas are depicted in Appendix A.

The City's public water supply is provided by GLWA through two master meters. There are no locations within the City where well water is drawn for public water supply.

B. POPULATION PROJECTIONS

The population of the City of Northville at the time of the 2020 Census was 6,119 according to the United States (U.S.) Census Bureau. The Southeast Michigan Council of Governments (SEMCOG) approximates a 0.04% annual growth from 2020 U.S. Census data into 2045, estimating a total population of 6,183. The City's WRS projected an annual growth of approximately 1% per year from 2020 until 2040 to account for the planned redevelopment of the Northville Downs racetrack into a mixed residential and commercial area (the WRS is provided in Appendix B). Construction within this area is anticipated to be completed in 2028 or 2029. Table 1 below summarizes the 2020 and projected 2043 population estimates. Estimates reflect complete buildout of the Northville Downs at full capacity and a 0.04% annual growth rate (SEMCOG). Considered cumulatively, the City is expected to grow by approximately 16% from 2020 to 2043. Proposed projects are not anticipated to stimulate development as many of the projects include replacement of existing water mains. There is no seasonal variance in population within the City of Northville.

Table 1: Present and Future Population Projections for the City of Northville

Source	2020	2043	% Change 2020 - 2043
SEMCOG	6,119	6,178	0.96%
Northville Downs Redevelopment Population Estimate	0	1,100	---
Total	6,119	7,278	16%

C. EXISTING ENVIRONMENTAL EVALUATION

CULTURAL AND HISTORIC RESOURCES

Within the City limits the following properties are listed in the National Register of Historic Places:

1. Yerkes, Robert, House, 535 E Base Line Rd. (near Project 1f — Baseline Rd. pipe replacement)
2. Ford Valve Plant, 235 E Main St. (near Project 1b — Main St. pipe replacement)
3. Northville Historic District, bounded roughly by Cady, Rogers, and Randolph Streets (includes sections of Project 1a-1d, 3b, and 4d — Cady St., Main St., and Church St. pipe replacements. Lower Griswold St. pipe looping. Linden St./Ct., and Randolph St. pipe replacement)

In addition to the three properties listed in the National Register of Historic Places, the State of Michigan's database identifies the additional properties as historical markers:

4. Detroit Edison Company Building, 200 N Center St (nearest to Project 1a — Cady St. pipe replacement)
5. First Presbyterian Church of Northville, 200 E Main St (near Project 1c — Church St. pipe replacement)
6. Mill Race Historical Village, 215 Griswold St (near Project 2c — Butler Ave. pipe replacement)

The improvements are not anticipated to negatively impact the appearance or structural integrity of the historical sites. Figure 1 shows locations of the historic sites listed on the state and national register.

The City has contracted with OHM Advisors and their subconsultant Commonwealth to complete the State Historical Preservation Office (SHPO) requirements for DWSRF. The SHPO application will be submitted to EGLE once available.

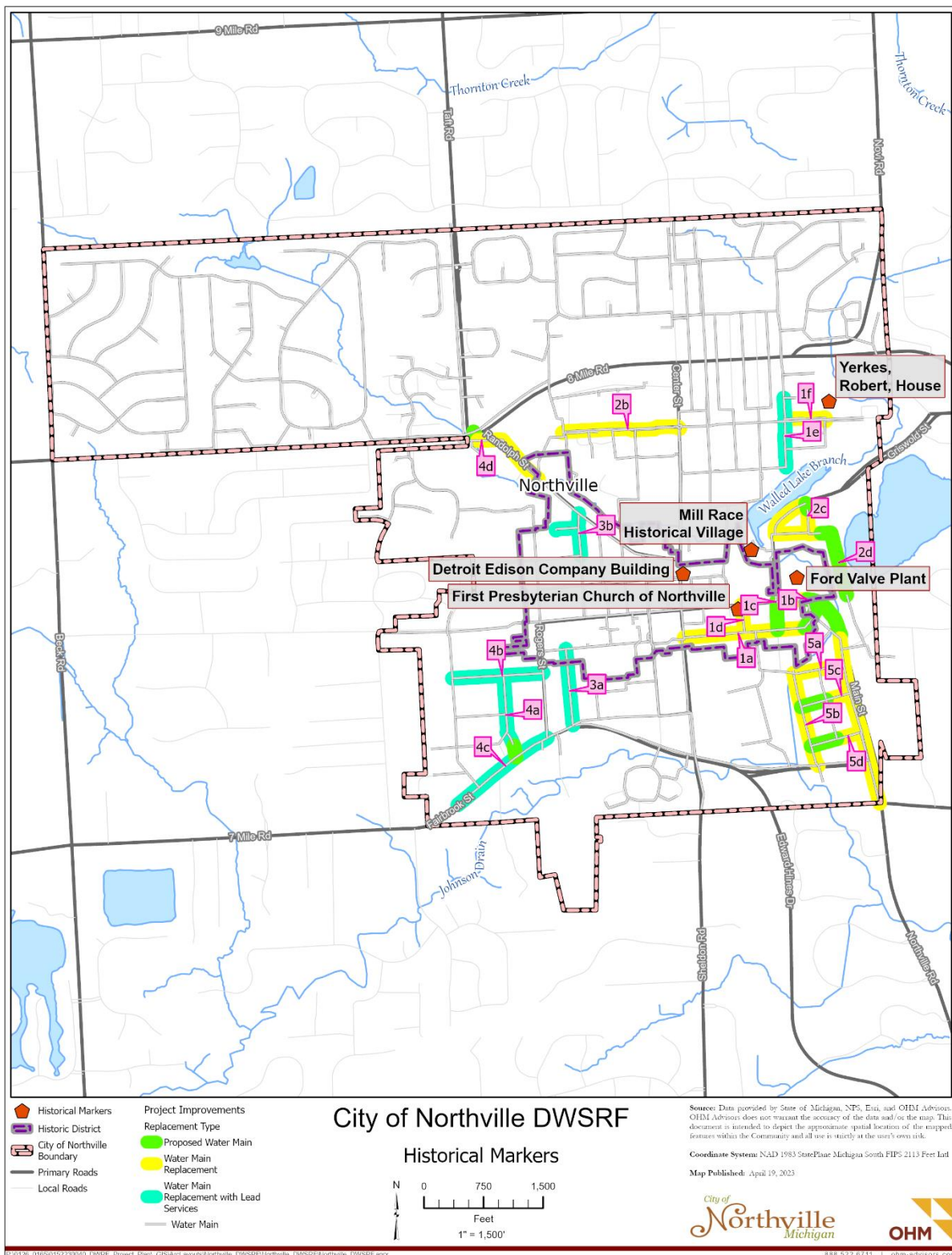


Figure 1: City of Northville Cultural and Historic Resources

AIR QUALITY

The closest in-state monitoring location to the City of Northville is Eliza Howell-NR in Wayne County, Michigan. However, Eliza Howell-NR does not monitor all contaminants therefore other locations had to be considered to understand surrounding air quality. The closest ozone monitoring locations are Oak Park in Oakland County, Michigan and Ypsilanti in Washtenaw County, Michigan. According to EGLE's 2021 Michigan Air Quality Annual Report, there was one recorded day over the 8-hour exceedance day National Ambient Air Quality Standards (NAAQS) for ozone at the Oak Park location. Three-year averages of the annual mean and 24-hr 98th percentile concentrations for 2019-2021 were below the NAAQS for 2.5 micrometer particulate matter at all three locations. There were no violations of the 1-hour carbon monoxide, max three-month average for lead, annual nitrogen dioxide NAAQS at testing locations near Northville in Michigan. 1-hour 99th percentile sulfur dioxide levels were only violated at the Port Huron in St. Claire County, Michigan, testing location which is not near Northville. 10 micrometer particulate matter levels were below 24-hr average NAAQS for all of Michigan. (Data accessed from: [2021 Michigan Air Quality Annual Report](#)).

No new development or industry is anticipated so future air quality should remain the same.

WETLANDS

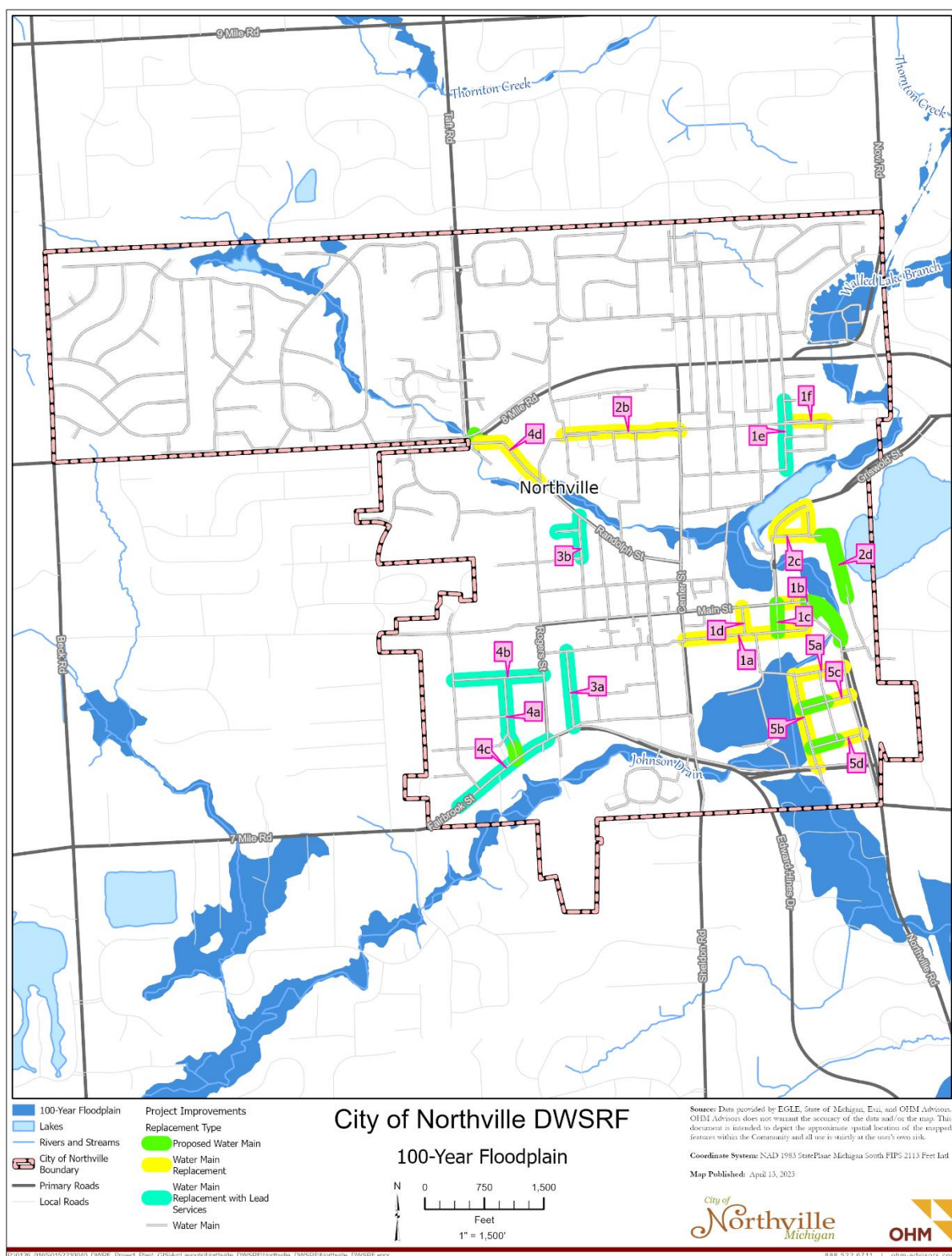
The wetlands in the City of Northville are shown in Figure 2. Wetlands surround the drains/creeks associated with Rouge River, Mill Pond, Lake Success, and are scattered throughout the City. For projects near wetlands, a more detailed assessment will be performed to determine if a wetland permit is required. In addition, a proper mitigation plan will be prepared and implemented if necessary, during the design process.

GREAT LAKES SHORELANDS, COASTAL ZONES, AND COASTAL MANAGEMENT AREAS

There are no shoreline, coastal zones, or coastal management areas within the City of Northville.

FLOODPLAINS

The 100-year floodplain, lakes, rivers, and streams in the City of Northville are shown in Figure 3. The floodplain surrounds the drains/creeks associated with the Rouge River.



NATURAL OR WILD AND SCENIC RIVERS

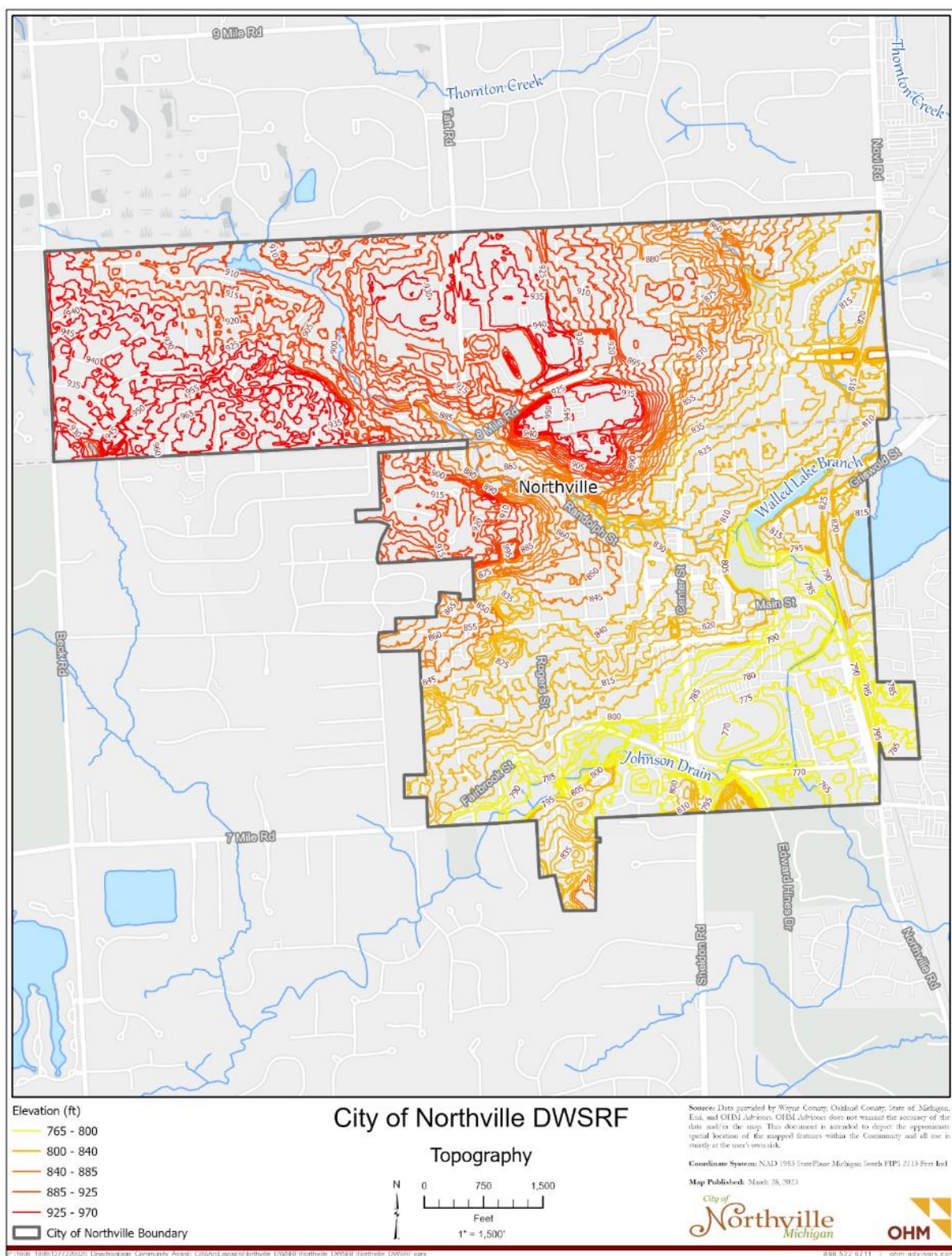
There are no Natural Rivers as designated by the Michigan Department of Natural Resources (MDNR) or Wild and Scenic Rivers as designated by the National Fisheries and Wildlife Service's National and Scenic Rivers System within the City.

MAJOR SURFACE WATERS

There are no major surface waters within the City. Drains/creeks associated with Rouge River flow through the City. The Yerkes Mill Pond located along the Walled Lake Branch of the Rouge River is the largest surface water within the City with a surface area of approximately 7.3 acres. None of the surface waters within the City serve as a water supply source. The City's water is treated and supplied by GLWA.

TOPOGRAPHY

The topography of Northville is shown in Figure 4. The northwestern portion of the City has the highest elevation. Elevation begins to decrease in the center of the City and lower elevations are seen in the south-southeast region of the City near the Johnson Drain. Elevations begin to rise again near the southwestern border. The approximate elevation range in Northville is 765 to 955 ft.



GEOLOGY

The bedrock geology below the City predominately consists of Antrim shale with a small portion of Bedford shale in the City's northeast section (Information from: [GeoWebFace Map Page \(state.mi.us\)](https://www.geo.mtu.edu/geoWebFace/MapPage/state.mi.us/))

SOIL TYPES

Figure 5 shows the soil types in Northville. Soils mostly consist of loamy sand, loam, sandy loam, and sand varieties. There are some smaller, scattered areas consisting of silty clay loam and a larger urbanized region.

AGRICULTURAL RESOURCES

According to Northville's 2021 zoning map, there is no agricultural land use within Northville. Figure 6 shows the zoning map.

Fauna and Flora

OHM has reviewed the Threatened and Endangered Species list generated by the Michigan Natural Features Inventory (MNFI) Web Database, conducted on April 14th, 2023. During this Review, the project location was checked against known localities for rare species, and 0 state threatened, endangered, or species of special concern have been documented within the 1.5-mile project area buffer.

The Endangered Species Act (ESA), Section 7, species were generated via the U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) website, identifying nine federally listed threatened, endangered, or candidate species potentially in the project area. The following species were identified:

1. Indiana Bat (*Myotis sodalis*),
2. Northern Long-Eared Bat (*Myotis septentrionalis*),
3. Tricolored Bat (*Perimyotis subflavus*),
4. Piping Plover (*Charadrius melodus*)
5. Red Knot (*Calidris canutus rufa*),
6. Eastern Massasauga (*Sistrurus catenatus*),
7. Northern Riffleshell (*Epioblasma rangiana*),
8. Monarch Butterfly (*Danaus plexipuss*),
9. Eastern Prairie Fringed Orchid (*Platanthera leucophaea*)

Follow-up research and consultation for federally listed species will be made utilizing the USFWS IPaC website as the project develops.

D. EXISTING FACILITIES

The City owns and operates all public drinking water assets within their City limits, which includes water mains, service lines, an underground storage reservoir, elevated storage tank, and a pump station. Drinking water is sourced from GLWA, the regional supplier, and supplied through GLWA meter vaults and master meters. No treatment facilities are maintained by the City. A map of the overall water supply and distribution system is provided in Appendix A.

The WRS was used to populate these sections (see Appendix B).

CONDITION OF SOURCE FACILITIES

Northville receives treated water from GLWA via two metered connections, NL-01 and NL-02. Water flows from the NL-01 connection to an underground storage tank before being pumped to an elevated storage tank. At the elevated storage tank, water is gravity fed through the distribution network to meet City demands. The City does not operate or own their GLWA metered connections. There are no current concerns regarding the quality or quantity of their source water supply.

WATER TREATMENT

The City of Northville receives its potable water from GLWA. The GLWA water source is the Detroit River which is treated at the GLWA Springwells Water Treatment Plant located at 8300 W. Warren Avenue in Dearborn. The City's drinking water meets federal and state requirements. The City has no violations reported in their 2021 Consumers Annual Report on Water Quality (see Appendix C).

STORAGE TANK AND PUMP STATION FACILITIES

Northville owns an underground finished storage reservoir that feeds an elevated storage tank through an existing pump station located in the original filter building above the underground reservoir. Table 2 and Table 3 provide details for the storage and pumping facilities.

Table 2: Storage Details (WRS 2021)

Storage Tank	Year of Installation	Volume (Gallons)
Elevated Storage	1964	520,000
Underground Reservoir	Unknown*	450,000

Note: the underground reservoir is suspected to be over 100-yr old.

Table 3: Pumping Details (WRS 2021)

Pump	Year of Installation	Rated Cap. (TDH)
1	1979	1100 gpm (168 ft)
2	Unknown	1100 gpm (125 ft)

Note: gallons per minute (gpm)

All pumps and storage features have met or exceeded their useful life.

The 520,000-gallon underground reservoir was inspected, and maintenance was recommended by Dixon Engineering in July 2018 (see Appendix D.) Conclusions from the inspection are summarized below:

1. Vegetation and protruding tree roots should be removed from the roof and the roof repaired, including fixing of the interior roof spalls.
2. Sediment needs to be removed from the bottom of the reservoir for inspection of covered areas.
3. Pipe and steel appurtenances should be cleaned and repainted.
4. A pipe overflow support should be replaced.
5. Screens should be installed in the control building over vent and pipe penetration.

On March 10th, 2022, EGLE issued a Significant Deficiency Violation Notice (SDVN) for noncompliance identified in their last Sanitary Survey. Violations are summarized below in section *E. Need for the Project*. Subsequently, on December 7th, 2022, EGLE administered an Administrative Consent Order (ACO-399-07-2022) to address the City's noncompliance with Act 399 of the Safe Drinking Water Act (SDWA) for violations noted in the SDVN. Both the ACO and SDVN are included in Appendix E.

SERVICE LINES

In EGLE's December 2020 Preliminary Distribution System Materials Inventories (DSMI) report, Northville had identified service lines as indicated in Table 4 (Information from: [Michigan Service Line Materials Estimates PDSMI](#)).

Table 4: 2020 DSMI Information

Material	Number
Lead	8
Known Galvanized Previously Connected to Lead (GPCL)	0
Unknown – Likely Lead	218
Unknown – No Information	118
Unknown – Likely Not Lead	0
No Lead or GPCL	2,183
Total	2,527

Service lead percent composition by pipe material, as reported in 2021, is presented in Table 5.

Table 5: Service Lead Percent Composition by Pipe Materials (WRS 2021)

Material	Percent Composition
Copper or Plastic	85
Galvanized	13
Lead	1
Unknown	1

Since the Preliminary DSMI was submitted to EGLE, the City has identified additional lead and GPCL service lines in need of replacement. Confirmed service line material summary tables are provided in Appendix F for those project limits that included known lead or GPCL service lines. There are 35 known lead and/or GPCL service lines proposed for replacement within the scope of this Project Planning document.

DISTRIBUTION MAINS AND VALVES

Distribution system percent composition by pipe material is presented in Table 6.

Table 6: Distribution System Composition by Pipe Materials (WRS 2021)

Material	Percent Composition
Ductile iron	54
Cast iron	42
High density polyethylene	2
Asbestos cement	2

All major line replacements and looping to be funded through DWSRF are expected to use 8-in or larger water mains to meet the ten-state standards minimum diameter requirements and the City's minimum diameter mandate of 8-in in residential areas. Commercial districts will receive 12-in water main based on the City's sizing requirement for commercial areas. Existing system water mains range in size from 4-16 inches in diameter (see Table 7). In 2021, approximately 44% of the distribution system was undersized, or less than 6-inches as defined by EGLE (WRS 2021).

Table 7: Water Main Pipe Diameter and Lengths in Northville's Distribution System (WRS 2021)

Diameter (in)	Length (ft)
4	28,094
6	51,136
8	67,749
10	19,970
12	11,560
16	1,282
Total	179,791

The exact age of the water distribution system is generally unknown, although portions of the system date back to approximately 1892 when the original water system was constructed to serve the Village of Northville. An overall water system map from approximately the late 1920's / early 1930's includes the majority of the piping within the downtown core of the City and south of Eight Mile Road. Based on the available information, it is assumed that all water main piping identified for replacement in the Project Planning document is at least 90 years old, with some sections up to 130 years old. Most associated appurtenances such as gate valves and fire hydrants are of the same vintage as the water mains and the City has reported issues with the operability of many of the appurtenances.

The distribution network is separated by a series of isolation valves, forming two pressure districts. The upper, lower-pressure district is supported by the elevated storage tank. The lower, higher-pressure district is predominately supplied by the upper pressure district through three slightly cracked open valves. Additionally, four inoperable and closed pressure reducing valves exist throughout the system. The City reverted to using partially closed valves in an effort to maintain two pressure districts.

In the WRS, fire hydrant flow tests revealed that available fire protection does not meet the Insurance Services Office (ISO) suggested target flow in certain areas. Low flow areas have been reported by customers and the fire department, likely due to undersized water mains and corrosion increasing along pipe walls with age (WRS 2021). Additionally, the Sanitary Survey Letter Supplemental reports high pressures of 120 pounds per square inch in the southern district that may increase the likelihood of water main breaks. In the five years preceding 2021, the WRS reports an average of 17 water main breaks per year; commonly, breaks were occurring in undersized pipes.

The majority of the City's projects in this Project Planning document include the replacement of existing water main to restore structural integrity of the system, and reduce the number of breaks, and address the undersized and limited capacity areas within the City's system.

RESIDUALS HANDLING

The City of Northville does not have a drinking water treatment plant so managing residuals does not apply to this Project Planning document.

WATER METERS

At the time of the 2021 WRS, Northville had 2,564 metered connections and 86% had been replaced with Neptune meters over the previous few years. The remaining meters were around 20-30 years old and were planned for replacement. Water meter replacement is not within the scope of proposed improvements.

OPERATION AND MAINTENANCE

Operation and Maintenance (O&M) is continually performed on the system by City staff, including annual hydrant flushing. The most recent WRS recommended replacement of inoperable valves and creation of a valve-turning program.

Currently, the existing pressure districts within the system cannot be operated as intended due to several inoperable pressure reducing valves. The original system design included northern and southern pressure districts and the lack of routine maintenance resulted in the current scenario where system gate valves are partially closed to regulate system pressures.

DESIGN CAPACITY OF WATERWORKS SYSTEM

The City's maximum day and peak hour water demand rates were taken from the recently negotiated GLWA contract which takes effect July 1st, 2023. The City's maximum day demand rate is 1.13 million gallons per day (MGD) and the City's peak hour demand rate is 3.59 MGD. The GLWA water treatment plant has sufficient capacity to meet the needs of the City of Northville.

The City's underground reservoir has a design capacity of 520,000 gallons; however, recent inspection of the reservoir revealed substantial accumulation of sediment, which reduces the effective storage volume. The total design capacity of the City's pump station, which pumps from the ground reservoir to their elevated storage tank is 2,200 gpm. The City's elevated storage tank has a design capacity of 450,000 gallons.

The City's water system customers are roughly 80% residential, 15% commercial, and 5% industrial. The City's available water system capacity is utilized by customers and for firefighting purposes.

CLIMATE RESILIENCY

Currently, the City has a backup power generator located at the dual-pump facility that allows for emergency operation during power outages.

Because the existing and proposed water mains are buried and pressurized, there is no more susceptibility to flooding due to climate change. The primary objectives of these projects are to improve the condition of the water system, comply with Act 399 requirements, and resolve the significant deficiencies identified from the City's 2022 Sanitary Survey.

E. NEED FOR THE PROJECT

Administrative Consent Order (Underground Storage and Booster Station)

The underground storage tank and pump control house need several improvements to preserve water quality, prevent failure, and to comply with Act 399 requirements. EGLE issued a SDVN on March 10th, 2023, detailing significant deficiencies in the underground storage facility and pump control house. The significant deficiencies were as follows:

1. **Hornets' Nest Inside Underground Reservoir Air Vent and Outside Pump/Control Building**
2. **Poorly Designed Underground Reservoir Roof Hatches**
There is potential for contaminant inflow.
3. **Cracks in Roof/Sidewalls on Underground Reservoir**
Dixon Engineering identified cracks near exposed rebar and penetration areas from roots in 2018.
4. **Unprotected Cross Connections in the Underground Reservoir and Pump Control Buildings**
Exposure between unused and active underground reservoir chambers, an overflow pipe and sanitary sewers, and lubricating water for pumps into the reservoir.

5. **Unsealed Gaps at the Base of the Pumps**

There is potential for contaminant inflow.

EGLE left notes for other deficiencies and a recommendation, including:

1. **Build-up of Sediment in the Underground Reservoir**

Sediment prevented inspection of the bottom surface of the reservoir.

2. **Corrosion of Metal Surfaces in the Underground Reservoir**

3. **Woody Vegetation Growing along the Western Side of the Underground Reservoir**

Removal is recommended to prevent penetration of the roof and walls of the reservoir.

As a result of the SDVN, EGLE issued an ACO requiring the City to prepare and submit a Reservoir Feasibility Study report evaluating options for rehabilitating, replacing, or removing the underground concrete reservoir from service (see Appendix E for a copy of ACO-399-07-2022). The City signed the ACO on December 7, 2022, and commissioned OHM to prepare a Reservoir Feasibility Study with regard for the future use of the underground reservoir. The Reservoir Feasibility Study is being prepared concurrently with this Project Planning document and identifies the scope of work required to address deficiencies at the underground reservoir. A draft of the Reservoir Feasibility Study is attached in Appendix G.

The selected alternative from the Reservoir Feasibility Study is to fill and abandon the old underground reservoir and to install a new connection from GLWA Feed Point NL-01 to the existing elevated storage tank. An 1,100 gpm booster pump station near the intersection of N Center St and Main St will be constructed to pump water from the NL-01 connection point into the elevated storage tank. The pump station will provide redundancy with variable frequency drives (VFDs) to allow water system pressures to be maintained with the elevated storage tank out of service.

Water Main Replacement, Looping and PRVs

The identified water main replacement projects are needed due to low flow/capacity issues, age/condition issues, and the increased frequency of breaks in the City's system. As previously noted, specific water main age is not available, but most segments identified are 90-130 years old based on available maps and records. According to the WRS, the City averaged 17 main breaks annually in the 5 years leading up to 2021. Most frequently water main breaks occur on older, undersized mains but are expected to increase for all aging pipes (WRS 2021). Several water mains are being replaced in combination with lead service lines.

Water main replacement and looping improvement plans include:

1. **Replace 6-in with 12-in on Cady St.**
2. **Replace 4, 6, and 8-in and loop with an 8-in and 12-in on Main St.**
3. **Loop 8-in on Griswold St.**
4. **Replace 4-in with an 8-in on Church St.**
5. **Replace 6-in with 12-in on Novi St.**
6. **Replace 6-in with 12-in on Baseline Rd.**
7. **Replace 12-in with new 12-in from Center St. to elevated storage tank**
8. **Replace 4 and 6-in with an 8-in on Griswold St., Butler Ave., and Pennell St.**
9. **Loop an 8-in from Butler Ave. to Railroad St.**
10. **Replace 4-in with an 8-in on 1st St.**
11. **Replace 4-in with an 8-in on Linden St./Ct.**
12. **Replace 4 and 6-in and loop an 8-in on Eaton Dr.**
13. **Replace 4 and 6-in with an 8-in on Thayer Blvd.**
14. **Replace 4-in with an 8-in on Fairbrook St.**

15. Replace 4-in with an 8-in on Randolph St. and loop 12-in under 8 Mile Rd.
16. Replace 4-in with an 8-in on Beal St.
17. Replace 6-in with an 8-in on River St.
18. Replace 4-in with an 8-in and loop 8-in on Johnson Ave.
19. Replace 4 and 6-in with an 8-in and loop 8-in on Gardner St.

In conjunction with the proposed booster station project, up to three PRVs will be installed to re-establish a pressure boundary between the northern and southern pressure districts.

Lead Service Line Replacement

In accordance with Michigan's Lead and Copper Rule, Northville plans to replace easy-access lead service lines concurrently with water main improvements. So far, Northville plans to replace:

1. 7 lead service lines on Novi St.
2. 2 lead service lines on 1st St.
3. 3 lead service lines on Linden St./Ct.
4. 10 lead service lines on Eaton Dr.
5. 7 lead service lines on Thayer Blvd.
6. 6 lead service lines from on Fairbrook St.

Reference Appendix F for a listing of the addresses associated with each lead service line.

F. PROJECTED FUTURE NEEDS

In the WRS, SEMCOG population projections and the known plans to redevelop the Northville Downs racetrack into a mixed residential and commercial site led to the future 2025 and 2040 demands in Table 8. These demands were further analyzed with more current information in 2023 for the Underground Storage Reservoir Feasibility Study, resulting in the current 2023 demands and projected 2043 demands.

Table 8: Demand Projections

Year	Average Day Demand (MGD)	Maximum Day Demand (MGD)	Peak Hour Demand (MGD)
Demand Projections in 2021 WRS by F & V			
2025	0.705	1.339	2.007
2040	0.818	1.554	2.331
Current Demand Projections			
2023	0.72	1.13	3.59
2043	0.86	1.35	4.29

Assuming the projection is accurate and using the current GLWA maximum day contract limit of 1.45 MGD (1007 gpm), the elevated storage tank, which can hold 0.45 million gallons (MG), will be able to provide for future maximum day demand projections.

III. NEW WATER SUPPLY WELL PROCEDURES

Northville is not proposing a project in which a new supply well will be constructed. This section is not applicable.

IV. ANALYSIS OF ALTERNATIVES

A. NO-ACTION

If the underground reservoir and control pump station are left in place as they are now, then the community will continue to be in non-compliance with the ACO issued by EGLE. Further, significant deficiencies may result in contamination due to cracking in the structure, poor hatching, improper sealing of pumping equipment, dispelling of lubricant water into the reservoir, connections between unused and active compartments in the reservoir, and an overflow structure discharging directly to the sewers. Structural integrity may continue to degrade/deteriorate without any maintenance of woody vegetation. Additionally, reservoir bottom condition would remain unknown and corrosive metal may continue to leak into the water supply.

If sections of water main are not replaced, they will continue to age further beyond their useful life and result in more water main breaks and unreliable service. This will increase O&M costs for repairing breaks that will become more frequent over time. Water main breaks also leave the system vulnerable to loss of pressure and possible contamination, forcing users to be put on a boil water notice.

If water main loops are not constructed, portions of the water system will continue to experience reduced pressures, inadequate capacity, and a high likelihood of loss of pressure during water main breaks.

There are no alternatives to lead service line replacements. Per the 2018 State of Michigan Lead and Copper Rule, water supplies are required to replace all lead service lines by January 1, 2041, including portions on both public and private property. Removing only part of the lead service line is prohibited unless emergency repairs are necessary. Galvanized service lines that are or were attached to a lead service line must also be replaced. A water supply can use a different replacement schedule based on the water supply's asset management plan if they receive permission from EGLE. To comply with the requirements of this rule, Northville must replace its lead service lines.

B. OPTIMUM PERFORMANCE OF EXISTING FACILITIES

The City continues to learn about its poorly documented system on a trial-and-error basis and could therefore find areas for improvement. However, the City cannot reverse the effects of aging and undersized water mains, nor can they operate many of their valves and PRVs. Therefore, expected potential improvements from system optimization could be considered marginal. Optimization will not eliminate Northville's need for ground storage removal, system water main breaks, and lead service lines.

C. REGIONAL ALTERNATIVES

Northville is already part of the regional GLWA system. There are no other authorities nearby and adding nearby communities into GLWA would not protect Northville's system against the need for ground storage removal, system water main breaks, and lead service lines.

D. PRINCIPAL ALTERNATIVES

Projects will be phased in for construction over a 5-year period. A Project ID has been given to each individual project. The project number represents the phase year, and the letter represents an alphanumeric rating for priority to occur within the given phase year.

The proposed improvements and locations are as listed in Table 9.

Table 9: Proposed Improvements and Locations

Project ID	Proposed Improvement	Location
1a	Replacement of 6-in water main and proposed looping with a 12-in	Cady St. from Center St. to new connection at Main St.
1b	Replacement of 4, 6, and 8-in water main and proposed looping with an 8 and 12-in	Main St. from new connection at Cady/Main St. to 7 Mile Rd. (8-in) Main St. from Griswold St. to new connection at Cady/Main St. (12-in)
1c	Proposed looping of 8-in water main	Griswold St. from Baseline Rd. to Cady St.
1d	Replacement of 4-in water main with an 8-in	Church St. from Main St. to Cady St.
1e	Replacement of 6-in water main with a 12-in and lead service lines	Novi St. from Park Grove Ct. to Lake St.
1f	Replacement of 6-in water main with a 12-in	Baseline Rd. from Novi St. to Oakland Ave.
2a	Construction of booster station & abandonment of underground reservoir	N Center St. & Baseline Rd. (booster station) West end of W. Baseline Rd. (underground reservoir)
2b	Replacement of 12-in water main with a 12-in	West end of W. Baseline Rd. to Baseline Rd.
2c	Replacement of 4 and 6-in water main with an 8-in	Griswold St., Butler Ave., and Pennell St. loop
2d	Proposed looping of 8-in water main	East end of Butler Ave. to Railroad St.
2e	Construction of three PRVs	
3a	Replacement of 4-in water main with an 8-in and lead service lines	1st Ave from Cady St. to Fairbrook St.
3b	Replacement of 4-in water main with an 8-in and lead service lines	Linden Ct. and Linden St. from Randolph St. to Dubuar St.
4a	Replacement of 4 and 6-in water main and proposed looping with an 8-in	Eaton Dr.
4b	Replacement of 4 and 6-in water main with an 8-in and lead service lines	Thayer Blvd. from Rogers St. to Orchard Dr.
4c	Replacement of 4-in water main with an 8-in and lead service lines	Fairbrook St. from Rogers St. to the end of the city limits
4d	Replacement of 4 and 6-in water main and proposed looping with a 12-in	Upper Randolph St. to 8 Mile Rd.
5a	Replacement of 4-in water main with an 8-in	Beal St. from Main St. to River St.
5b	Replacement of 6-in water main with an 8-in	River St. from Beal St. to 7 Mile Rd.
5c	Replacement of 4-in water main and proposed looping with an 8-in	Johnson Ave.
5d	Replacement of 4 and 6-in water main and proposed looping with an 8-in	Gardner St.

Maps of the proposed project locations are included in Appendix A.

Administrative Consent Order (Underground Storage and Booster Station)

The underground storage tank and pump control house need several improvements to preserve water quality, prevent failure, and to comply with Act 399 requirements. According to the Reservoir Feasibility Study, the preferred option is to disconnect the underground storage reservoir and to connect NL-01 directly to the elevated storage tank. The underground storage reservoir will be abandoned and filled and a new booster station will be required.

Water Main Replacement/Looping

Water mains are aging, undersized, and unreliable. Additionally, age has led to inoperable valves that, in conjunction with undersized water mains, lead to low operability, high system pressures, and frequent water main breaks. Proposed improvements include water main replacement/looping and insertion of PRVs at key locations to help maintain reasonable system pressure and to lower system maintenance costs.

When applicable, two alternatives were considered for each pipe improvement location: horizontal directional drilling (HDD) with high density polyethylene dimension ratio 11 (HDPE DR-11) and open cut (OC) with class 54 ductile iron (DI-54). In some cases, nearby Part 201 and 213 contaminant sites will require either directionally drilled or open cut with DI-54. For projects identified nearby 201 or 213 contamination sites, directionally drilled DI-54 was priced, and HDPE DR-11 was not considered. If casing is required for railroad or a county road crossing, then sections of bore and jack (BJ) have been included in both alternatives. Similarly, a section of the river crossing will have to employ trenchless techniques and will be priced the same for both alternatives. Pipe bursting is not applicable due to replacement of smaller pipes with larger pipes. Therefore, removal and replacement of existing pipes at their current location would be cost prohibitive. Instead, new pipes will be placed in available space.

Valve and fire hydrant replacements are included as necessary to meet City appurtenance spacing requirements. Additionally, eight-inch diameter piping is the minimum size used for all water main replacements and looping in accordance with City specifications.

Routing, preferred cut and material for pipe replacements considered many factors including:

- existing water, sanitary, and storm mains
- connection points
- existing and replacement pipe diameters
- obstructions, like railroads and county roads

and proximity to:

- vegetation and trees
- wetlands and floodplains
- land and water resource impact
- cultural and historic sites
- Part 201 and 213 contamination sites

Planned project routing is identified in Appendix A.

PRVs are recommended in the Reservoir Feasibility Study to isolate pressure districts and maintain adequate distribution system pressure.

Lead Service Line Replacement

Lead services lines must be replaced in accordance with Michigan's Lead and Copper Rule. No additional alternatives will be considered.

E. MONETARY EVALUATION

The booster station is priced for brick cladding, a metal roof, and to include supervisory control and data acquisition (SCADA) controls. The booster station is a required component for the disconnection of the underground reservoir therefore no alternative was considered.

For water main replacements, material and method combinations considered in the opinion of probable cost are described below:

1. Open-cut excavation of the pavement or greenbelt with DI-54
2. Directional drilling with DI-54 or HDPE DR-11; surfaces were not differentiated
3. Bore and jack with DI-54 and steel casing under a railroad crossing or county road

Restoration is considered in the road costing on a per foot basis and as an additional percentage of the cost of road main and appurtenance replacements. Percentages were assigned according to the criteria in Table 10.

Table 10: Construction Restoration Criteria

Method	Assigned Restoration Percentage
Open cut excavation of the road in an urban environment	75%
Open cut excavation of the road in a residential/rural environment	50%
Directional drilling in an urban environment	60%
Directionally drilling in a residential/rural environment	40%

Pressure reducing valves are assumed to be encased in a 9'x11' concrete vault and optimized with SCADA controls.

Lead service line costing estimates assumed a standard length (40 linear feet) and 1-inch copper pipe with a stop box. The estimated cost per line is \$8,000 plus a 15% engineering fee.

The cost opinions are organized by project number area and are provided in Appendix H. A summary of the present worth of different alternatives is presented in Table 11. For simplicity, Alternative 1 includes open cut excavation. Alternative 2 considers directional drilling. Entire alternatives will not be selected. Both alternatives include the abandon and filling of the underground reservoir, construction of the booster station and PRVs, and lead service line replacement. Pipe replacement and looping projects will be evaluated individually.

Operation and maintenance costs would be similar for each of the alternatives and were therefore omitted from the evaluation. Present worth analysis was performed using a 2% interest rate evaluated over the 20-year project life. Subtotal present worth is calculated by subtracting the present worth of salvage value from the capital cost.

Table 11: Present Worth Comparison

	Alternative 1	Alternative 2
Project 1a -- Cady St.		
Capital Cost	\$1,790,000	\$1,850,000
Salvage Value	\$370,000	\$420,000
Present Worth of Salvage Value	\$249,000	\$283,000
Subtotal Present Worth	\$1,541,000	\$1,567,000
Project 1b -- Main St.		
Capital Cost	\$3,000,000	\$3,050,000
Salvage Value	\$620,000	\$690,000
Present Worth of Salvage Value	\$417,000	\$464,000
Subtotal Present Worth	\$2,583,000	\$2,586,000
Project 1c -- Lower Griswold St.		
Capital Cost	\$270,000	\$280,000
Salvage Value	\$50,000	\$60,000
Present Worth of Salvage Value	\$34,000	\$40,000
Subtotal Present Worth	\$236,000	\$240,000
Project 1d -- Church St.		
Capital Cost	\$330,000	\$350,000
Salvage Value	\$70,000	\$80,000
Present Worth of Salvage Value	\$47,000	\$54,000
Subtotal Present Worth	\$283,000	\$296,000
Project 1e -- Novi St.		
Capital Cost	\$1,010,000	\$830,000
Salvage Value	\$210,000	\$210,000
Present Worth of Salvage Value	\$141,000	\$141,000
Subtotal Present Worth	\$869,000	\$689,000
Project 1f -- Baseline Rd.		
Capital Cost	\$570,000	\$470,000
Salvage Value	\$120,000	\$120,000
Present Worth of Salvage Value	\$81,000	\$81,000
Subtotal Present Worth	\$489,000	\$389,000
Project 2a -- Booster Station		
Capital Cost	\$3,300,000	NA
Salvage Value	\$950,000	NA
Present Worth of Salvage Value	\$639,000	NA
Subtotal Present Worth	\$2,661,000	NA
Project 2a -- Underground Reservoir		
Capital Cost	\$350,000	NA
Salvage Value	\$0	NA
Present Worth of Salvage Value	\$0	NA
Subtotal Present Worth	\$350,000	NA
Project 2b -- W. Baseline Rd. to Baseline Rd. & N. Center St.		
Capital Cost	\$1,070,000	\$960,000
Salvage Value	\$240,000	\$250,000
Present Worth of Salvage Value	\$162,000	\$168,000
Subtotal Present Worth	\$908,000	\$792,000

Project 2c -- Upper Griswold St., Butler Ave., and Pennell St.		
Capital Cost	\$1,140,000	\$1,120,000
Salvage Value	\$250,000	\$290,000
Present Worth of Salvage Value	\$168,000	\$195,000
Subtotal Present Worth	\$972,000	\$925,000
Project 2d -- Butler Ave. to Railroad St.		
Capital Cost	\$780,000	\$840,000
Salvage Value	\$190,000	\$220,000
Present Worth of Salvage Value	\$128,000	\$148,000
Subtotal Present Worth	\$652,000	\$692,000
Project 2e -- PRV Vaults		
Capital Cost	\$1,900,000	NA
Salvage Value	\$490,000	NA
Present Worth of Salvage Value	\$330,000	NA
Subtotal Present Worth	\$1,570,000	NA
Project 3a -- 1st Ave.		
Capital Cost	\$780,000	\$700,000
Salvage Value	\$160,000	\$180,000
Present Worth of Salvage Value	\$108,000	\$121,000
Subtotal Present Worth	\$672,000	\$579,000
Project 3b -- Linden St/Ct.		
Capital Cost	\$950,000	\$850,000
Salvage Value	\$200,000	\$190,000
Present Worth of Salvage Value	\$135,000	\$128,000
Subtotal Present Worth	\$815,000	\$722,000
Project 4a -- Eaton Dr.		
Capital Cost	\$840,000	\$760,000
Salvage Value	\$170,000	\$190,000
Present Worth of Salvage Value	\$114,000	\$128,000
Subtotal Present Worth	\$726,000	\$632,000
Project 4b -- Thayer Blvd.		
Capital Cost	\$930,000	\$850,000
Salvage Value	\$190,000	\$220,000
Present Worth of Salvage Value	\$128,000	\$148,000
Subtotal Present Worth	\$802,000	\$702,000
Project 4c -- Fairbrook St.		
Capital Cost	\$940,000	\$1,060,000
Salvage Value	\$230,000	\$270,000
Present Worth of Salvage Value	\$155,000	\$182,000
Subtotal Present Worth	\$785,000	\$878,000
Project 4d -- 8 Mile Rd. to Upper Randolph St.		
Capital Cost	\$1,080,000	\$1,150,000
Salvage Value	\$260,000	\$270,000
Present Worth of Salvage Value	\$175,000	\$182,000
Subtotal Present Worth	\$905,000	\$968,000
Project 5a -- Beal St.		
Capital Cost	\$570,000	\$520,000

Salvage Value	\$120,000	\$130,000
Present Worth of Salvage Value	\$81,000	\$87,000
Subtotal Present Worth	\$489,000	\$433,000
Project 5b -- River St.		
Capital Cost	\$1,010,000	\$890,000
Salvage Value	\$210,000	\$230,000
Present Worth of Salvage Value	\$141,000	\$155,000
Subtotal Present Worth	\$869,000	\$735,000
Project 5c -- Johnson Ave.		
Capital Cost	\$530,000	\$470,000
Salvage Value	\$110,000	\$120,000
Present Worth of Salvage Value	\$74,000	\$81,000
Subtotal Present Worth	\$456,000	\$389,000
Project 5d -- Gardner St.		
Capital Cost	\$500,000	\$440,000
Salvage Value	\$100,000	\$110,000
Present Worth of Salvage Value	\$67,000	\$74,000
Subtotal Present Worth	\$433,000	\$366,000
Service Leads		
Capital Cost	\$340,000	NA
Salvage Value	\$170,000	NA
Present Worth of Salvage Value	\$114,000	NA
Subtotal Present Worth	\$226,000	NA

F. ENVIRONMENTAL EVALUATION

There are six known historical sites near the proposed projects. These locations are listed below:

- Yerkes, Robert, House, 535 E Base Line Rd. (near Project 1f — Baseline Rd.)
- Ford Valve Plant, 235 E Main St. (near Project 1b — Main St.)
- Northville Historic District, bounded roughly by Cady, Rogers, and Randolph Streets (includes sections of Project 1a-1d, 3b, and 4d — Cady St., Main St., and Church St., lower Griswold St., Linden St./Ct., and Randolph St.)
- Detroit Edison Company Building, 200 N Center St (nearest to Project 1a — Cady St.)
- First Presbyterian Church of Northville, 200 E Main St (near Project 1c — Church St.)
- Mill Race Historical Village, 215 Griswold St (near Project 2c — Butler Ave.)

There is no anticipated impact on these historical sites due to the proposed project's construction methods. The application to SHPO for Section 106 review will be prepared during project plan review and the results will be submitted to EGLE for review once available in late 2023 (see Appendix I). It is anticipated that the results of the review will yield a finding of no anticipated impacts expected due to the construction activities. See Figure 1 for the locations of state listed historic sites within the City.

Water main replacement and looping will primarily occur along the existing roadway or in adjacent greenbelts. Placement is expected to be within right-of-way, easements, or under existing asphalt. Open cut in the road and directionally drilling in the greenbelt should minimize tree/vegetation removal. When open cut

construction methods are utilized, the trench will be 10 to 12 feet wide and surface restoration will be completed as soon as possible.

Impacts to air quality will be limited to standard temporary construction impacts such as dust.

There are four locations with potential wetland impacts attributable to standard construction methods. These locations are summarized below:

- 1b — Main St. replacement
- 4d — 8 Mile Rd. looping and replacement along Randolph St.
- 5a — Beal St. replacement
- 5b — River St. replacement

The City is not located on or near the coast. No impact to the coast and shorelands is expected.

Like wetlands, there are four locations with potential floodplain impacts attributable to standard construction methods. These locations are summarized below:

- 1b — Main St. replacement
- 5a — Beal St. replacement
- 5b — River St. replacement
- 5c — Johnson Ave. replacement and looping

Minimal effects are anticipated for existing wetlands and floodplains. Projects listed above include pipe looping and replacement. Alterations to the landscape will be reduced as much as possible. If open cut trench construction is required, the backfill over the new main will return the construction site to its original grade. Additionally, construction will follow proper soil erosion and sedimentation control methods, such as installing silt fencing and catch basin liners, therefore reducing any potential environmental impacts to the ecosystem. All construction within wetlands and floodplains will obtain the required permits.

The depth of frost in the project areas is anticipated to be around three feet below grade. Currently, shallow water mains exist at Butler Ave. and Thayer Blvd. At these locations, water mains require continuous flushing to avoid pipe freezing in the winter. Replacement pipe depth will be lower than frost depth to avoid water and energy inefficiencies.

Major surface waters and natural or wild and scenic rivers do not exist in the project area. Additionally, there are no unique features pertaining to topography, geology, or soils within the construction zones.

The City is mostly urban and residentially developed land. Therefore, no agricultural resources should be impacted by the proposed projects.

The USFWS has identified four endangered, one proposed endangered, three threatened, one candidate species that may inhabit or occur within project areas. However, due to the nature of the water main construction activities, there is low anticipated threat to the protected species. All construction, except for the booster station and looping from Butler Ave. to Railroad St., will remain within right-of-way or easements and minimal trees will be disturbed or removed. Should tree removal be required, all removal work will be completed from October 1st through March 31st to avoid potential presence or interference with federally protected bat species. The USFWS reports are available upon request.

Within the City, there are numerous open/closed Part 201 and 213 sites, listed Part 201 sites, and active/closed Part 213 sites. Soil tests will be used to confirm contamination at project locations near

contaminated sites. Any replacement or looping of water main near contaminants will be installed via directional drilling with ductile iron pipe. This method of installation and material should eliminate any exposure to potential contaminants, exacerbation of the contaminant, and pipe failure due to a reaction.

G. TECHNICAL CONSIDERATIONS

The City receives treated water from the regional supplier GLWA. None of the proposed improvements are intended to change the quality of water supplied. Pumps proposed at the booster station are adequately sized to send water from NL-01 to the elevated storage tank which will be emptied to supply water to the City. Component redundancy requirements will be met for the booster station and a standby power generator will be maintained for emergency power outages. The volume of the elevated storage tank is adequately sized to meet max day demand for the next 20 years.

H. NEW/INCREASED WATER WITHDRAWALS

No new water withdrawals are being proposed.

V. SELECTED ALTERNATIVE

The selected alternative includes the replacement/looping of 21,320 feet of existing water main with new water main using open cut, directional drill, and bore and jack methods. A proposed 1,100 gpm booster pump station will be installed in coordination with the abandonment of the existing underground water storage reservoir and pump station. Finally, three new PRV vaults will be installed to create proper connections. The project is proposed to be built in five phases to match available funding to perform roadwork in coordination with the proposed water main replacement. Appendix A has maps showing the project locations and identifies the areas by phase.

Design Criteria

The City will not be treating its own water or residuals resulting from the implementation of any of the projects specified above.

The underground reservoir will be abandoned and filled. Storage will be provided by the 450,000-gallon elevated storage tank which should provide enough capacity for maximum day demand into 2043. Booster station pumps will be designed with three identical 550 gpm pumps to have a firm capacity of 1,100 gpm to meet future maximum day demands.

A generator will be available to power pumps during emergency power outages. SCADA controls will be added to the new booster station and PRVs.

Water main replacement and looping projects will have the pipe characteristics, construction method, and material in Table 12.

Table 12: Pipe Characteristics, Construction Method, and Material

Project ID — Location	Pipe Diameter (inches)	Pipe Length (feet)	Method	Material
1a — Cady St.	12	1950	OC	DI-54
1b — Main St.	8 & 12	3190	OC (Main St.)/HDD (Main St. river crossing)	DI-54/DI-54 w/ steel casing
1c — Lower Griswold St.	8	360	HDD	DI-54
1d — Church St.	8	360	OC	DI-54
1e — Novi St.	12	890	OC	DI-54
1f — Baseline Rd.	12	530	OC	DI-54
2b — W Baseline Rd. to Baseline Rd. & N. Center St.	12	1370	OC (W. Baseline Rd.)/HDD (forest)	DI-54/HDPE DR-11
2c — Upper Griswold St., Butler Ave., and Pennell St.	8	1600	OC (Butler Ave. and Pennell St.)/HDD (Griswold St.)	DI-54/HDPE DR-11
2d — Butler Ave. to Railroad St.	8	900	OC (green space)/BJ (across railroad)	DI-54/DI-54 w/ steel casing
3a — 1 st Ave.	8	960	OC	DI-54
3b — Linden St./Ct.	8	1170	OC	DI-54
4a — Eaton Dr.	8	1050	OC	DI-54
4b — Thayer Blvd	8	1140	OC	DI-54
4c — Fairbrook St.	8	1420	HDD	DI-54
4d — 8 Mile Rd to Upper Randolph St.	12	1110	HDD (Randolph St.)/BJ (across 8 Mile Rd)	DI-54/DI-54 w/ steel casing
5a — Beal St.	8	650	OC	DI-54
5b — River St.	8	1200	OC	DI-54
5c — Johnson Ave.	8	630	OC	DI-54
5d — Gardner St.	8	630	OC	DI-54

Water main material considers preference of the City, nearby contaminants, and total costs. Upgraded pipe sizing is to comply with the City's standards for 8-inch water main in residential districts and 12-inch water main within commercial/industrial districts. Routing and proposed project improvements are as shown in Appendix A.

Lead or galvanized service lines will be replaced at the locations identified, which coincides with water main replacement projects. These water services will be completely replaced to the extent required in accordance with EGLE requirements.

Useful Life

The weighted useful life for the selected projects was calculated to be 45 years. The useful life for each asset included in the cost opinions were determined based on the values provided in the DWSRF Project Planning Document Preparation Guidance and Professional Engineer's opinion. Table 13 includes the useful life that was assumed for each asset included in the cost opinions and the present worth analysis.

Table 13: Useful Life of Assets

Asset	Useful Life
Water Main and Appurtenances	50
Water Services	50
Pump Station Building	50
Pump Station Process/Mechanical	30
Pump Station Electrical	50
PRV Vaults	50
PRV Process/Mechanical	30
SCADA/Controls	30

Water and Energy Efficiency

Currently, water flows from NL-01 to the underground reservoir before being pumped to the elevated storage tank. The underground reservoir is old and has many structural defects that could result in water losses.

Streamlining water flows to the elevated storage tank should result in increased water and energy efficiency. The current method of free discharge to the underground reservoir prior to pumping to the elevated tank results in a decrease in the hydraulic grade line of the overall system and unnecessary loss of energy. The proposed pump station will pump water directly from the GLWA system to the elevated storage tank, resulting in no intermediate loss of energy. Based on the normal range of pressures supplied by GLWA, this represents the conservation of approximately 40 to 80 feet of head as compared to the existing system.

Aging distribution systems, most of which are prone to water main breaks, allow extracted and treated drinking water to escape the distribution system. Replacing aging water mains would therefore reduce the likelihood of main breaks and increase water and energy efficiency.

Installation of new pressure reduction valves, in lieu of partially closed gate valves, will help to maintain system pressure, potentially reducing water main breaks and increasing water and energy efficiency.

SCADA controls at the elevated storage tank, new booster station, and PRVs will help to promote efficient operation of the system, resulting in further energy savings.

Schedule for Design and Construction

The detailed schedule for the DWSRF Project Plan and subsequent first phase of the project is as included in Table 14 below:

Table 14: Design and Construction Schedule

Task	Submittal Date
Advertise Public Hearing	April 28, 2023
Public Hearing	May 9, 2023
City Council Adoption	May 15, 2023
Final Project Plan Submittal to MDEQ	June 1, 2023
Design Completed	February 5, 2024
Permits Received	March 1, 2024
Advertise for Bids	March 6, 2024
Bid Date	April 9, 2024
Loan Closing	June 5, 2024
Begin Construction	June 1, 2024
End Construction	May 1, 2025

The overall timeline for all phases of work is shown below in Table 15. Each year the design, approval, bidding and closing schedules will coincide with the layout of Phase 1. Phase 2 will have a prolonged construction phase due to the associated Booster Station, PRVs and reservoir abandonment work.

Table 15: Phasing Schedule

Project	Dates				
	Planning	EGLE Approved Design	Permitting	Loan Closing (Q3)	Construction
DWSRF Project Plan	June 1, 2023	–	–	–	–
Phase 1 Projects (Water Main)	–	January 2024	February/March 2024	June 5, 2024	June 2024 – May 2025
Phase 2 Projects (Water Main, Booster Station, PRVS, Reservoir Removal)	–	January 2025	February/March 2025	June, 2025	June 2025 – November 2026
Phase 3 Projects (Water Main)	–	January 2026	February/March 2026	June 2026	June 2026 – May 2027
Phase 4 Projects (Water Main)	–	January 2027	February/March 2027	June, 2027	June 2027 – May 2028
Phase 5 Projects (Water Main)	–	January 2028	February/March 2028	June 2028	June 2028 – May 2029

Cost Summary

A summary of the cost by project area is presented in Table 16 and an overall summary for each project phase is provided in Table 17.

Table 16: Summary of Cost by Project

Project	Cost
Project 1a -- Cady St.	\$1,790,000
Project 1b -- Main St.	\$3,000,000
Project 1c -- Lower Griswold St.	\$280,000
Project 1d -- Church St.	\$330,000
Project 1e -- Novi St.	\$1,010,000
Project 1f -- Baseline Rd.	\$570,000
Project 2a -- Booster Station	\$3,300,000
Project 2a -- Underground Reservoir	\$350,000
Project 2b -- W. Baseline Rd. to Baseline Rd. & N. Center St.	\$1,070,000
Project 2c -- Upper Griswold St., Butler Ave., and Pennell St.	\$1,140,000
Project 2d -- Butler Ave. to Railroad St.	\$780,000
Project 2e -- PRV Vaults	\$1,900,000
Project 3a -- 1st Ave.	\$780,000
Project 3b -- Linden St/Ct.	\$950,000
Project 4a -- Eaton Dr.	\$840,000
Project 4b -- Thayer Blvd.	\$930,000
Project 4c -- Fairbrook St.	\$1,060,000
Project 4d -- 8 Mile Rd. to Upper Randolph St.	\$1,150,000
Project 5a -- Beal St.	\$570,000
Project 5b -- River St.	\$1,010,000
Project 5c -- Johnson Ave.	\$530,000
Project 5d -- Gardner St.	\$500,000
Lead Service Lines	\$340,000

Table 17: Summary of Cost by Project Phase

Category	Cost
Phase 1 Cost	\$6,980,000
Phase 2 Cost	\$8,540,000
Phase 3 Cost	\$1,730,000
Phase 4 Cost	\$3,980,000
Phase 5 Cost	\$2,610,000
Lead Service Line Replacement Cost	\$340,000
Total Project Cost	\$24,180,000

Current bi-monthly user costs were estimated at \$166, using average demand and number of customers reported in the Water Feasibility Study and Northville's billing rates. Loan repayment for project costs will be paid through an adjustment to current user rates. Bi-monthly user cost increase rates have been calculated as \$103 for a 20-year loan period using a 2.75 annual percentage rate (see Table 18.)

Table 18: User Cost Analysis

Project Area Name	Initial Capital Investment	Annual Debt Retirement (20 yrs. @ 2.75% interest)	Annual Cost per Household	Bi-Monthly Cost per Household
Project 1a -- Cady St.	\$1,790,000	\$117,600	\$45.87	\$7.64
Project 1b -- Main St.	\$3,000,000	\$197,000	\$76.83	\$12.81
Project 1c -- Lower Griswold St.	\$280,000	\$18,400	\$7.18	\$1.20
Project 1d -- Church St.	\$330,000	\$21,700	\$8.46	\$1.41
Project 1e -- Novi St.	\$1,010,000	\$66,300	\$25.86	\$4.31
Project 1f -- Baseline Rd.	\$570,000	\$37,400	\$14.59	\$2.43
Project 2a -- Booster Station	\$3,300,000	\$216,700	\$84.52	\$14.09
Project 2a -- Underground Reservoir	\$350,000	\$23,000	\$8.97	\$1.50
Project 2b -- W. Baseline Rd. to Baseline Rd. & N. Center St.	\$1,070,000	\$70,300	\$27.42	\$4.57
Project 2c -- Upper Griswold St., Butler Ave., and Pennell St.	\$1,140,000	\$74,900	\$29.21	\$4.87
Project 2d -- Butler Ave. to Railroad St.	\$780,000	\$51,200	\$19.97	\$3.33
Project 2e -- PRV Vaults	\$1,900,000	\$124,800	\$48.67	\$8.11
Project 3a -- 1st Ave.	\$780,000	\$51,200	\$19.97	\$3.33
Project 3b -- Linden St/Ct.	\$950,000	\$62,400	\$24.34	\$4.06
Project 4a -- Eaton Dr.	\$840,000	\$55,200	\$21.53	\$3.59
Project 4b -- Thayer Blvd.	\$930,000	\$61,100	\$23.83	\$3.97
Project 4c -- Fairbrook St.	\$1,060,000	\$69,600	\$27.15	\$4.52
Project 4d -- 8 Mile Rd. to Upper Randolph St.	\$1,150,000	\$75,500	\$29.45	\$4.91
Project 5a -- Beal St.	\$570,000	\$37,400	\$14.59	\$2.43
Project 5b -- River St.	\$1,010,000	\$66,300	\$25.86	\$4.31

Project 5c -- Johnson Ave.	\$530,000	\$34,800	\$13.57	\$2.26
Project 5d -- Gardner St.	\$500,000	\$32,800	\$12.79	\$2.13
Service Leads	\$340,000	\$22,300	\$8.70	\$1.45
Total Cost.	\$24,180,000	\$1,587,900	\$619	\$103

Implementability

The selected alternative will be implemented by the City. All work is under the jurisdiction of the City and requires no intermunicipal agreements. Northville has the legal, institutional, technical, financial, and managerial capacity to implement the projects. All work will be performed in road rights-of-way or City-owned property.

VI. ENVIRONMENTAL EVALUATION

Adoption of the selected alternative will improve the reliability of the distribution system by replacing aged water mains. In addition, public health would be protected through the replacement of the underground reservoir and lead service lines.

A. DIRECT IMPACTS

Construction Impacts

The principal intent of projects included in this Project Planning document are to replace aged water mains that are experiencing an excessive number of water main breaks, replace lead service lines, and to remove the underground storage tank that is structurally deficient and has the potential to impact water quality.

The water mains that are proposed to be replaced have an immediate benefit on the existing customers. Water main breaks interrupt service and can also adversely affect water quality.

Archaeological, Historical or Cultural Impacts

Selected improvements are not expected to negatively affect the structural integrity of homes or archaeological, historical, and cultural resources within the project area. The SHPO Part 106 Application will be completed as part of the design to verify no impacts will occur and will be submitted to EGLE upon completion.

Sensitive Features

The following projects may impact delineated wetlands and/or floodplains:

- 1b — Main St. replacement
- 4d — 8 Mile Rd. looping and replacement along Randolph St.
- 5a — Beal St. replacement
- 5b — River St. replacement
- 5c — Johnson Ave. replacement and looping

All applicable local, state, and federal permits will be obtained before construction in these areas. Additionally, Projects 1b and 4d will be directionally drilled to limit impact to wetlands and floodplains. Projects 5a-5c will be open-cut excavation replacements occurring in the road so no impact to wetlands and floodplains is expected. Trench width for all pipe replacements should be 10-12 feet. The grading of the original landscape will be restored at the end of the project and soil erosion and sedimentation controls will be implemented to reduce impact to the environment.

The City is not located on or near the coast so there will be no impact on shorelands.

Impacts to ground water are not anticipated but will be evaluated by obtaining soil borings during detailed design. If required, the design process will include submission of a Part 327 water withdrawal registration or permit to EGLE when anticipated dewatering levels are above identified thresholds.

There are no natural or wild and scenic rivers.

Major surface waters may be impacted by Project 1b, the pipe replacement along Main Street. Project 1b will need to cross a section of the River Rouge. This site will be directionally drilled to minimize impact to the river.

There are no unique features pertaining to topography, geology, or soils within the construction zones. Northville is mostly residential and urban with no known agricultural resources.

Rare, Threatened, Endangered and Special Concern Species

The MNFI web database was used to check project locations against known localities for rare species, and no state threatened, endangered, or species of special concern have been documented within project area buffer.

In contrast, the USFWS identified 9 additional species that may be present in the project areas, as summarized in Table 19.

Table 19: USFWS Rare Species Review Summary

Species	Potential Impact (worst case – varies by project)
Indiana Bat	Not likely to adversely affect (NLAA)
Northern Long-Eared Bat	Not likely to adversely affect (NLAA)
Tricolored Bat	Not likely to adversely affect (NLAA)
Piping Plover	No effect
Red Knot	No effect
Eastern Massasauga	Not likely to adversely affect (NLAA)
Northern Riffleshell	No effect
Monarch Butterfly	May affect
Eastern Prairie Fringed Orchid	No effect

There will be some work in wooded areas for the construction of the booster station, and minor tree removal will be needed. Trees will be strategically removed October 1st through March 31st to protect the habitat of federally protected bats. Other disturbances are limited to the roadway, graded driveways, and greenspace so minimal impact is expected to other listed species' habitats. Looping from Butler Avenue to Railroad St. could affect monarch butterfly habitat.

Sites of Environmental Contamination

A review of the EGLE Environmental Mapper identified Part 201 and 213 sites in proximity to the following proposed project areas:

- 1a — Cady St. replacement
- 1b — Main St. replacement
- 1c — Lower Griswold St. looping from Cady St. to Main St.
- 1d — Church St., replacement
- 2d — Butler Ave. looping to Railroad St.
- 4b — Thayer Blvd. replacement
- 4c — Fairbrook St. replacement
- 4d — 8 Mile Rd. looping and replacement along Randolph St.
- 5a — Beal St. replacement

If contamination risk is identified from soil boring tests, or proximity to the contamination source, water main materials may need to be changed to account for the contamination. Generally, projects with potential contamination must include ductile iron pipe with gaskets selected based on the type of contamination. Cost estimates for the project locations identified above include the sole use of ductile iron, including for pipe installed by directional drill. Impact from underground contamination sources will therefore be mitigated during design and construction.

Other Minor Impacts

Other potential impacts include those associated with standard construction including temporary noise, dust, and traffic disruptions. Short-term traffic disruptions will occur during improvements. These impacts should be temporary, existing only during the construction phase of the project. Traffic disruptions are summarized in Table 20.

Table 20: Traffic Disruptions

Project ID — Location	Traffic Disruption
1a — Cady St.	Full road closure
1b — Main St.	One lane closure
1c — Lower Griswold St.	NA
1d — Church St.	Full road closure
1e — Novi St.	One lane closure
1f — Baseline Rd.	One lane closure
2b — W Baseline Rd. to Baseline Rd. & N. Center St.	One lane closure for W. Baseline Rd.
2c — Upper Griswold St., Butler Ave., and Pennell St.	One lane closure for Butler Ave. and Pennell St.
2d — Butler Ave. to Railroad St.	NA
3a — 1 st Ave.	One lane closure
3b — Linden St./Ct.	One lane closure
4a — Eaton Dr.	One lane closure
4b — Thayer Blvd	One lane closure
4c — Fairbrook St.	NA
4d — 8 Mile Rd to Upper Randolph St.	NA
5a — Beal St.	One lane closure
5b — River St.	One lane closure
5c — Johnson Ave.	One lane closure
5d — Gardner St.	One lane closure

Operational Impacts

The replacement of water mains and service lines will have some impact on traffic in the vicinity of where the construction is occurring. The project may require lane closures along adjacent segments of road. Expected traffic disturbances are summarized above in Table 20. The existing water mains will continue to be in service while the new water mains are installed. However, minor short term service disruption may occur when connection of the replacement main to the existing main is performed.

The proposed booster station includes a standby generator to provide redundancy in the case of power loss. Although it will be sound attenuated, this generator will create noticeable noise during its infrequent operation.

Social Impacts

Impacts on materials, land, and energy will be minimized by selection of qualified contractors.

The proposed improvements represent a significant increase in user costs. However, improvements in the locations identified are required and further delay of these projects will result in increased costs and exponential growth in routine impacts due to frequent water main breaks. Grant funding and low interest loans over the extended repayment period will help to reduce negative financial impact to residents.

Traffic disturbances will be planned to avoid major inconveniences in residential and commercial areas.

B. INDIRECT IMPACTS

There are no anticipated impacts to the rate, density, or type of development due to this project. The City is almost completely developed and future development would occur separately from the projects.

Impacts on cultural, human, social, and economic sources are expected to be minimal, and may occur during the construction phase because of the traffic routing around the construction area. These impacts are expected to be short-term.

Impacts related to air quality may result from this project but are limited to direct short-term impacts due to traffic and construction equipment.

Work may occur in floodplains, but surfaces should be backfilled to their original elevations and restored to existing conditions. Similarly, sections of open space, wetlands and forests will be used for looping and pipe replacement projects. However, wetlands, trees and major vegetation removal should be avoided by directional drilling in sensitive areas. Impact to open space should be temporary during construction. The construction of the booster pump station will occur in a wooded area, so some tree removal is expected. Removal of trees will be minimized to the extent possible and will be timed such that trees are removed from October 1st through March 31st to avoid potential impact to federally protected bat species. Northville is not located on the coast so no impact on shorelands is anticipated. None of these are anticipated to result in changes in land use or water quality.

The projects are not expected to lead to secondary growth so no sensitive or protected natural areas, species, or ecosystems should be indirectly impacted.

Other than the construction of the booster pump station, no major aesthetic changes are proposed within the scope of the project plan. The booster pump station will be located to the west of N. Center St. within existing unoccupied road right of way to minimize any sound or visible impacts.

There is no anticipated additional resource consumption over the useful life of the water system, and the project is not expected to generate waste. The booster station will utilize electricity to pump water to the elevated storage tank but the new pump station will be more efficient than the existing pump station at the underground reservoir that will be abandoned.

C. CUMULATIVE IMPACTS

No cumulative impacts, for example population growth, are anticipated because of the improvement projects.

VII. MITIGATION

A. SHORT TERM IMPACTS

Typical construction mitigation is expected for the selected alternative. Traffic control may be required during the replacement of the water mains. Access to some roads may be temporarily restricted to provide a safe working environment. The project design process will include development of appropriate traffic control plans for both vehicular and pedestrian traffic to minimize overall impacts.

Soil erosion and sedimentation control measures will be required to ensure nearby sanitary and storm lines are not impacted by the construction process. Vegetation disrupted by the construction process will be restored to its original condition. Service will be maintained for residents during construction, with short-term disruptions expected during the connection of the new water main and service lines to the existing system.

Construction activities will begin in 2024. All Construction activities are anticipated to conclude in 2029.

B. LONG TERM IMPACTS

No long-term impacts are anticipated for any of the proposed projects. Most projects will occur at or near existing water facilities and infrastructure. The underground reservoir will be stripped of corrosive metals and potential pollutants to avoid contamination of the backfill and surrounding soils. Pumps will be salvaged and the old pump station site will be repurposed. The new booster pump station will be located in a wooded area that will require some minor tree removal. Likewise, water main replacement and looping may require limited tree removal. Areas that would require major alterations to vegetation, wetlands, or surface waters will be installed via trenchless methods to mitigate impacts.

When tree clearing is required, the trees will be identified during the design phase. Protection measures will be taken to ensure that no endangered or threatened species will be affected during the tree clearing phase. Trees that are removed will be replaced.

PRVs will be installed along existing pipe locations so no long-term impacts are expected.

C. INDIRECT IMPACTS

The underground storage tank and pump control house need several improvements to preserve water quality, prevent failure, and to comply with Act 399 requirements.

The identified water main replacement projects are needed due to low flow/capacity issues, age/condition issues, and the increased frequency of breaks in the City's system.

In conjunction with the proposed booster station project, up to three PRV's will be installed to re-establish a pressure boundary between the northern and southern pressure districts.

The proposed projects are intended to preserve water quality, maintain compliance with Act 399 requirements, and improve reliability and operability of the existing system. No system expansion is proposed. The project is not intended to induce growth within the project area.

VIII. PUBLIC PARTICIPATION

A. PUBLIC MEETING

A public meeting is scheduled to be held on May 9, 2023.

B. PUBLIC MEETING ADVERTISEMENT

The public meeting notice was published on April 28, 2023, on the City of Northville website and at City Hall. In addition, a copy of the draft Project Planning document was provided for public review. A copy of the advertisement for the public meeting can be found in Appendix J.

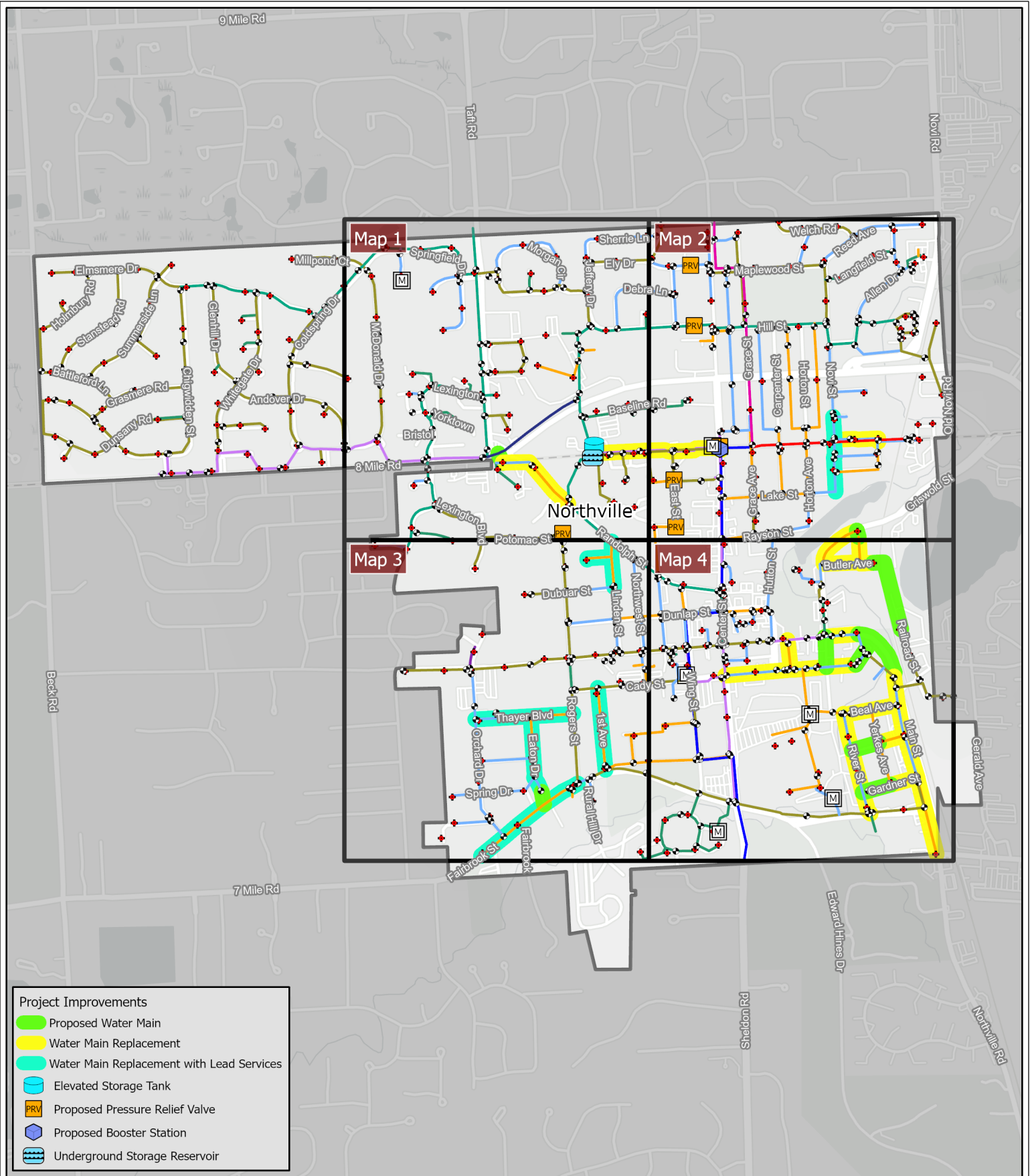
C. PUBLIC MEETING SUMMARY

A summary of the public meeting can be found in Appendix J. This includes the presentation slides, a list of attendees, along with concerns that were noted and comments received.

D. ADOPTION OF THE PROJECT PLANNING DOCUMENT

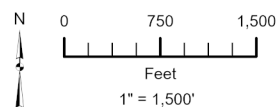
The City Council adopted a resolution following the public meeting on May 15, 2023. A signed copy of the resolution is included in Appendix J, along with the DWSRF Submittal Form.

APPENDIX A: PROJECTS AND STUDY/SERVICE AREA MAP



City of Northville DWSRF

Project Improvements



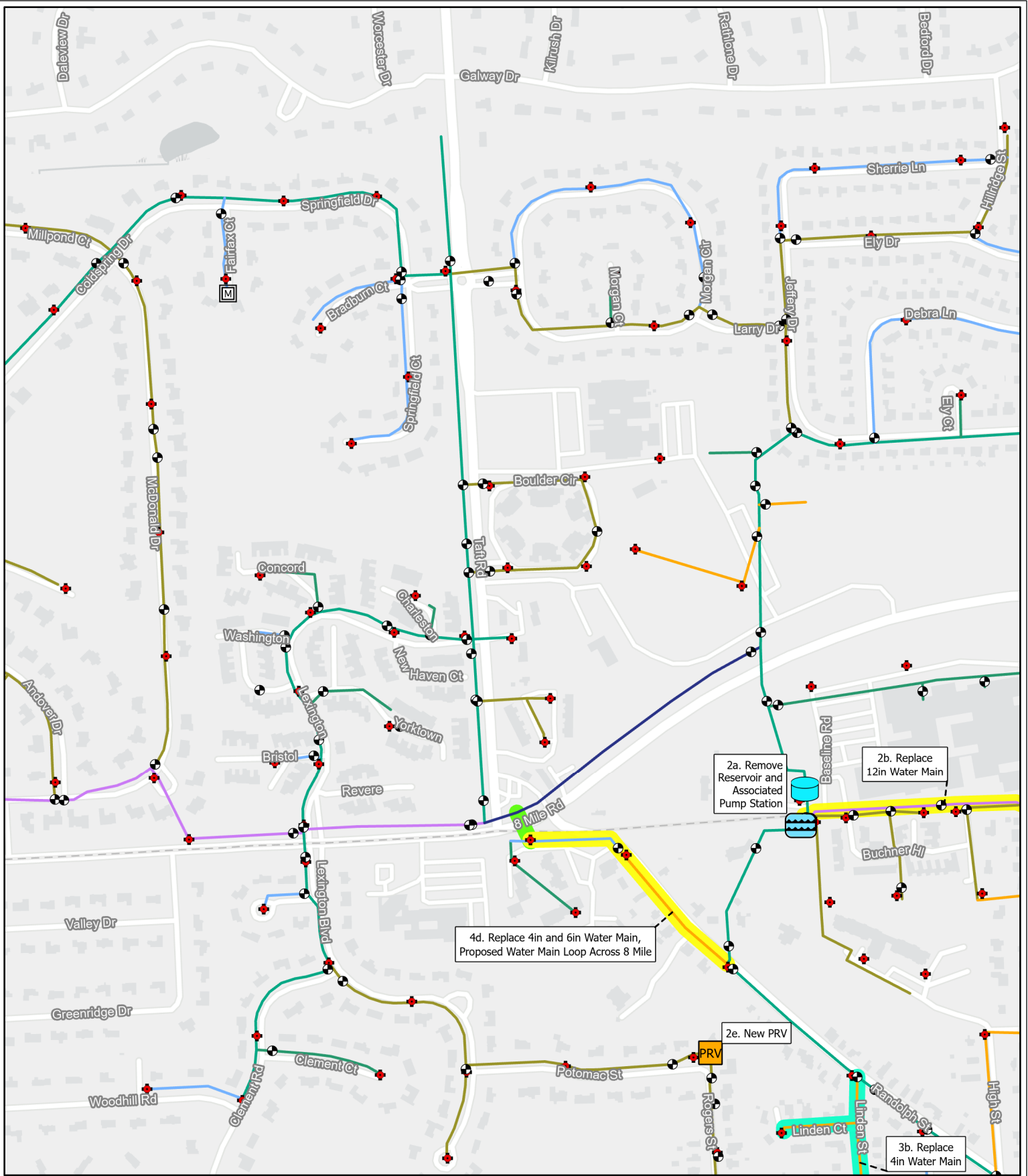
Source: Data provided by City of Northville, State of Michigan, Esri, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl

Map Published: April 19, 2023

City of
Northville
Michigan

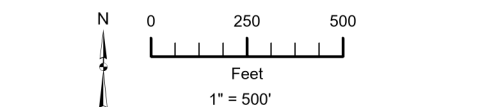




Project Improvements		Water Main	
—	Proposed Water Main	—	Diameter (in)
—	Water Main Replacement	—	Unknown
—	Water Main Replacement with Lead Services	—	3
		—	4
		—	6
		—	8
		—	10
		—	12
		—	16
		—	20
		—	24

—	30
—	Elevated Storage Tank
—	Proposed Pressure Relief Valve
—	Proposed Booster Station
—	Underground Storage Reservoir
—	Water Meter
—	Water Valve
—	Hydrant

City of Northville DWSRF Project Improvements: Map 1

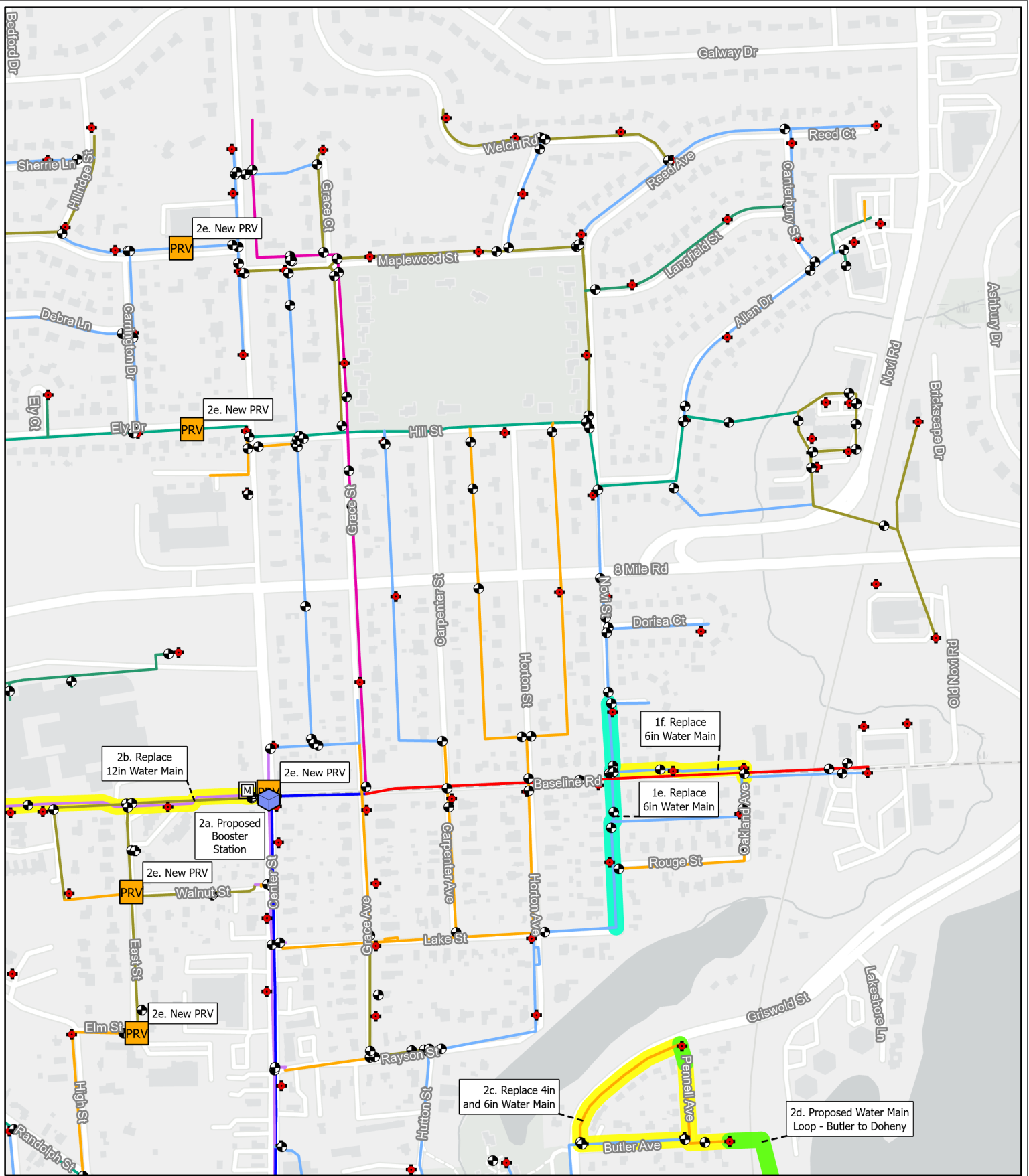


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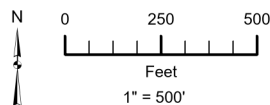




- Project Improvements**
- Proposed Water Main
 - Water Main Replacement
 - Water Main Replacement with Lead Services
- Water Main Diameter (in)**
- Unknown
 - 3
 - 4
 - 6
 - 8
 - 10
 - 12
 - 16
 - 20
 - 24
- Other Features**
- 30' Elevated Storage Tank
 - Proposed Pressure Relief Valve
 - Proposed Booster Station
 - Underground Storage Reservoir
 - Water Meter
 - Water Valve
 - Hydrant

City of Northville DWSRF

Project Improvements: Map 2



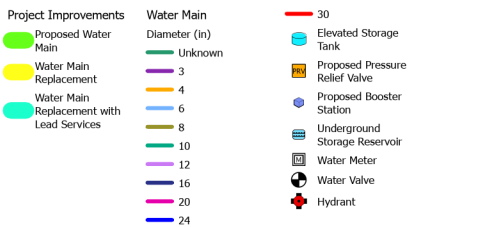
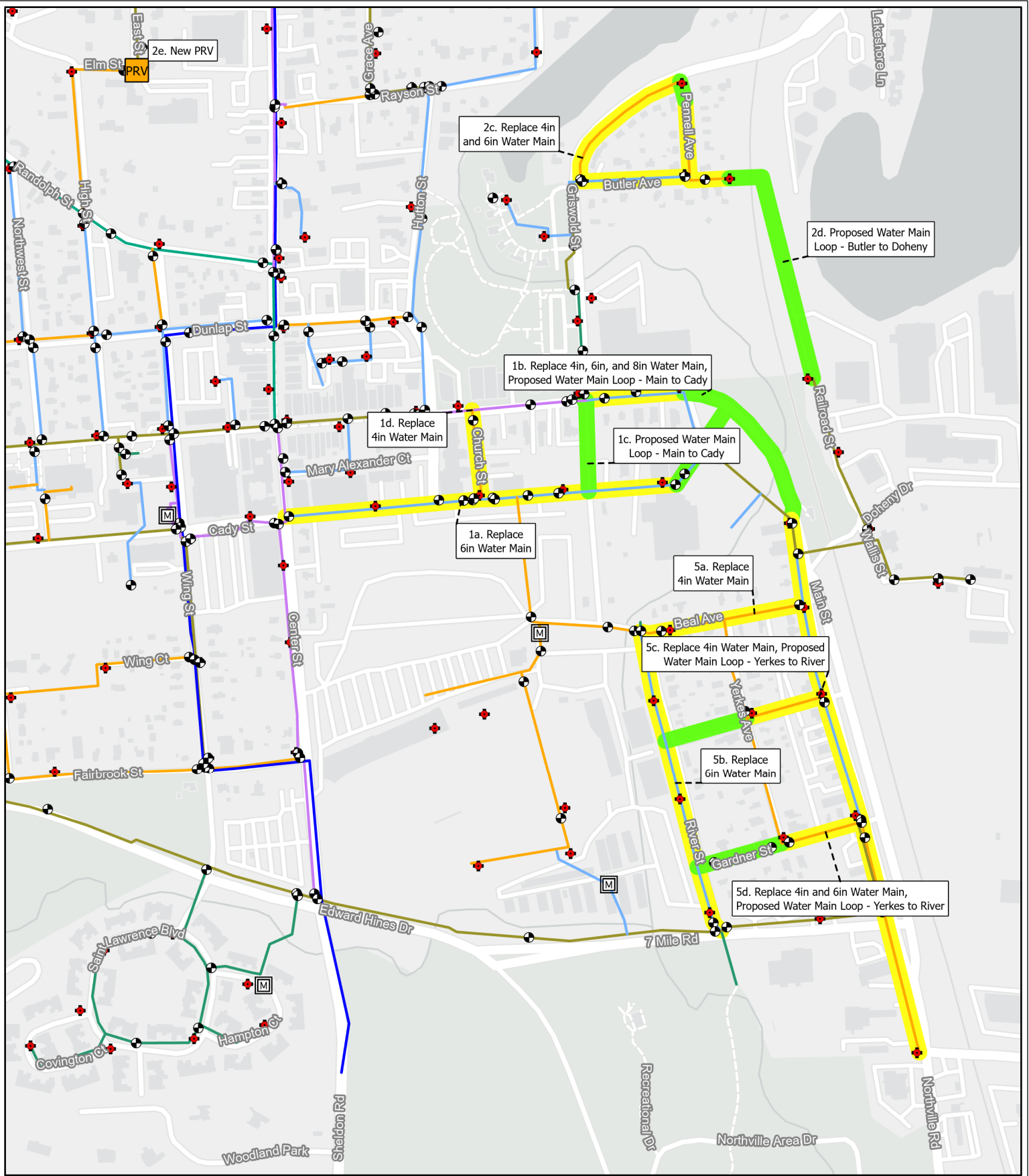
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Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl

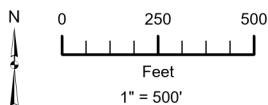
Map Published: April 19, 2023

City of
Northville
Michigan





City of Northville DWSRF Project Improvements: Map 4



Source: Data provided by City of Northville, State of Michigan, Esri, and OHM Advisors. OHM Advisors does not warrant the accuracy of the data and/or the map. This document is intended to depict the approximate spatial location of the mapped features within the Community and all use is strictly at the user's own risk.

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl

Map Published: April 19, 2023

City of Northville Michigan

OHM

APPENDIX B: 2021 WATER RELIABILITY STUDY
TO BE INCLUDED IN THE FINAL DRAFT

APPENDIX C: 2021 CONSUMERS ANNUAL REPORT ON WATER QUALITY

City of Northville

2021 Consumers Annual Report on Water Quality

What is the purpose of this report?

Northville Public Works Department wants you to know that your tap water is safe to drink and that it *meets or surpasses* all 2021 Federal and State monitoring and reporting standards for quality and safety.

The City of Northville's source water comes from the Detroit River, situated within Lake St. Clair, Clinton River, Detroit River, Rouge River, Ecorse River in the U.S., and parts of Thames River, Little River, Turkey Creek and Sydenham watersheds in Canada. The Michigan Department of Environmental Quality, in partnership with the U. S. Geological Survey, the Detroit Water and Sewerage Department (now known as the Great Lakes Water Authority or GLWA), and the Michigan Public Health Institute, performed a source water assessment in 2004 to determine the susceptibility of potential contamination. The susceptibility rating is on a seven-tiered scale from "very low" to "very high" based primarily on geologic sensitivity, water chemistry, and contaminant sources. The susceptibility of our Detroit River source water intakes were determined to be highly susceptible to potential contamination. *However, all four GLWA water treatment plants that service the City of Detroit and draw water from the Detroit River have historically provided satisfactory treatment and meet drinking water standards.*

GLWA has initiated source-water protection activities that include chemical containment, spill response, and a mercury reduction program. GLWA participates in a National Pollution Discharge Elimination System permit discharge program and has an emergency response management plan. In 2016, the Michigan Department of Environmental Quality approved the GLWA Surface Water Intake Protection Program plan. The program includes seven elements that include the following: roles and duties of government units and water supply agencies, delineation of a source water protection area, identification of potential sources of contamination, management approaches for protection, contingency plans, siting of new sources, public participation and public education activities.

If you would like to know more information about the Source Water Assessment report please contact GLWA at 313-926-8102.

What do you mean by "contaminants"?

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves *naturally occurring* minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity. Unregulated contaminants are those for which the EPA has not established drinking water standards. Monitoring helps the EPA to determine where certain contaminants occur and whether it needs to regulate them. Beginning in July 2008-April 2009, monitoring began for unregulated contaminants under the Unregulated Contaminant Monitoring Rule (UCMR2). Contaminants that may be present in source water include:

- *Microbial contaminants*, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- *Inorganic contaminants*, such as salts and metals, which can be naturally occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- *Pesticides and herbicides*, which may come from a variety of sources such as agriculture, urban storm water runoff, and residential uses.
- *Organic chemical contaminants*, including synthetic and volatile organics, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban storm water runoff, and septic systems.
- *Radioactive contaminants*, which are naturally occurring or the result of oil and gas production and mining activities.

"Northville's tap water meets or surpasses all 2021 Federal and State standards for quality and safety."

SPRINGWELLS WATER TREATMENT PLANT

2021 Regulated Detected Contaminants Tables

The Great Lakes Water Authority voluntarily monitors for the protozoans *Cryptosporidium* and *Giardia*. Systems using surface water, like GLWA, must provide treatment so that 99.9% of *Giardia Lamblia* is removed or inactivated.

2021 Inorganic Chemicals - Annual Monitoring at Plant Finished Tap

Regulated Contaminant	Test Date	Unit	Health Goal MCLG	Allowed Level MCL	Highest Level Detected	Range of Detection	Violation	Major Sources in Drinking Water
Fluoride	4-13-2021	ppm	4	4	0.52	n/a	no	Erosion of natural deposit; Water additive, which promotes strong teeth; Discharge from fertilizer and aluminum factories.
Nitrate	4-13-2021	ppm	10	10	0.34	n/a	no	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.
Barium	5-16-2017	ppm	2	2	0.01	n/a	no	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits.

2021 Disinfection Residual - Monitoring in the Distribution System

Regulated Contaminant	Test Date	Unit	Health Goal MRDLG	Allowed Level MRDL	Highest Level RAA	Range of Quarterly Results	Violation	Major Sources in Drinking Water
Total Chlorine Residual	2021	ppm	4	4	0.69	0.59-0.76	no	Water additive used to control microbes

2021 Disinfection By-Products - Stage 2 Disinfection By-Products Monitoring in the Distribution System

Regulated Contaminant	Test Date	Unit	Health Goal MCLG	Allowed Level MCL	Highest Level LRAA	Range of Quarterly Results	Violation	Major Sources in Drinking Water
(TTHM) Total Trihalomethanes	2021	ppb	n/a	80	27	14 - 39	no	By-product of drinking water chlorination
(HAA5) Haloacetic Acids	2021	ppb	n/a	60	19	<1 - 28	no	By-product of drinking water chlorination

2021 Turbidity - Monitored Every 4 Hours at the Plant Finished Water Tap

Highest Single Measurement Cannot Exceed 1 NTU	Lowest Monthly % of Samples Meeting Turbidity Limit of 0.3 NTU (minimum 95%)	Violation	Major Sources in Drinking Water
0.20 NTU	100%	no	Soil Runoff

Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

Symbol	Abbreviation	Definition / Explanation
>	Greater than	
<	Less than	
AL	Action Level	The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
HAA5	Haloacetic Acids	HAA5 is the total of bromoacetic, chloroacetic, dibromoacetic, dichloroacetic, and trichloroacetic acids. Compliance is based on the total.
LRAA	Locational Running Annual Average	The average of analytical results for samples at a particular monitoring location during the previous four quarters.
MCL	Maximum Contaminant Level	The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
MCLG	Maximum Contaminant Level Goal	The level of contaminant in drinking water below which there is no known or expected risk to health.
MRDL	Maximum Residual Disinfectant Level	The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
MRDLG	Maximum Residual Disinfectant Level Goal	The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
n/a	Not applicable	
ND	Not Detected	
NTU	Nephelometric Turbidity Units	Measures the cloudiness of water.
pCi/L	Picocuries Per Liter	A measure of radioactivity.
ppb	Parts per billion (one in one billion)	The ppb is equivalent to micrograms per liter. A microgram = 1/1000 milligram.
ppm	Parts per million (one in one million)	The ppm is equivalent to milligrams per liter. A milligram = 1/1000 gram.
RAA	Running Annual Average	The average of analytical results for all samples during the previous four quarters.
TT	Treatment Technique	A required process intended to reduce the level of a contaminant in drinking water.
TTHM	Total Trihalomethanes	Total Trihalomethanes is the sum of chloroform, bromodichloromethane, dibromochloromethane, and bromoform. Compliance is based on the total.
°C	Celsius	A scale of temperature in which water freezes at 0° and boils at 100° under standard conditions.
µohms	Microhms	Measure of electrical conductance of water

Is the water tested for lead?

If present, elevated levels of lead can cause serious health problems, especially for pregnant woman and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Northville is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the **Safe Drinking Water Hotline at (800) 426-4791** or at <http://www.epa.gov/safewater/lead>

Other steps to take include:

- * Anytime your water has not been used for more than six hours, run your water for 30 seconds to two minutes.
- * Always use cold water for drinking, cooking, or making baby formula.
- * Use faucets and plumbing material that are either lead free or will not leach unsafe levels of lead into your water. For more information call the **Safe Drinking Water Hotline at (800) 426-4791** or at www.epa.gov/safewater/lead

Lead and Copper Monitoring at the Customer's Tap in 2021									
Regulated Contaminant	Test Date	Unit	Health Goal MCLG	Action Level AL	90 th Percentile Value*	Number of Samples Over AL	Range of Individual Samples Results	Violation	Major Sources in Drinking Water
Lead	2021	ppb	0	15	2.4	0	<1.0 – 3.5	no	Lead services lines, corrosion of household plumbing including fittings and fixtures; erosion of natural deposits"
Copper	2021	ppm	1.3	1.3	0.22	0	0.018 - 0.57	no	Corrosion of household plumbing system; Erosion of natural deposits; leaching from wood preservatives.
<ul style="list-style-type: none"> The 90th percentile value means 90 percent of the homes tested have lead and copper levels below the given 90th percentile value. If the 90th percentile value is above the AL additional requirements must be met. 									
Total number of service lines: 2,527 Water Customers. 3 known lead service lines, 103 service lines of unknown material.									

Who is responsible for safe drinking water?

In order to ensure that tap water is safe to drink, the Environmental Protection Agency (EPA) prescribes regulations, which limit the amount of specific contaminants in water provided by public water systems. In turn, the City annually tests the water to ensure the regulations are being met. Additionally, the Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water, which provide the same protection for public health.

2021 Special Monitoring						
Contaminant	Test Date	Unit	MCLG	MCL	Highest Level Detected	Source of Contaminant
Sodium	4-13-2021	ppm	n/a	n/a	4.36	Erosion of natural deposits
Regulated Contaminant	Treatment Technique					Typical Source of Contaminant
Total Organic Carbon ppm	The Total Organic Carbon (TOC) removal ratio is calculated as the ratio between the actual TOC removal and the TOC removal requirements. The TOC is measured each quarter and because the level is low, there is no requirement for TOC removal.					Erosion of natural deposits

Should I be concerned about drinking the City's water?

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. However, some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/ CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline at (800) 426-4791.



215 West Main St. Northville, MI 48167

Concerns About Lead?

The United States Environmental Protection Agency (EPA) and the City of Northville are concerned about lead in your drinking water. Although most homes may have very low levels of lead in their drinking water, some homes in our community (mostly because of their age) may have lead levels above the EPA action level of 15 parts per billion (ppb). Under Federal law, we are required to have a program in place to minimize lead in your drinking water. Since 1996 the Detroit Water and Sewerage Department, now called the Great Lakes Water Authority, has provided corrosion control treatment for our drinking water, and whenever Northville DPW encounters a lead water service line to a home, we remove it and replace it with copper or plastic lines.

Keep in mind that elevated lead levels, if detected, are primarily from piping materials. This includes the service line to your home and all the plumbing in your home. Lead is colorless, odorless and tasteless. If you are interested in testing your water for lead, you can contact the Department of Public Works (248) 449-9930 to obtain a list of local labs who can do this for you for a fee.

The Michigan Department of Environmental Quality at (586) 753-3700, the Oakland County Health Division at (248) 858-1280, or Wayne County Health Department at (734) 727-7000 can provide you with information about the health effects of lead and how you can have your child's blood tested.

This report contains important information about your drinking water. If you have difficulty understanding anything in this report, have someone translate it for you, or speak with someone who understands it. This notice is being sent to you by the City of Northville Department of Public Works at 248-449-9930.

The Northville Department of Public Works will update this report annually and will keep you informed of any problems that may occur throughout the year, as they happen. Copies of this report are available at Northville City Hall, 215 W. Main Street, Northville, Michigan 48167 or at www.ci.northville.mi.us. The City of Northville invites public participation in decisions that affect drinking water quality. Please refer to the City's website, www.ci.northville.mi.us for meeting dates and agendas of the City Council. For more information about your water, or the contents of this report, contact the Public Works Department at (248) 449-9930. For more information about safe drinking water, visit the U. S. Environmental Protection Agency at www.epa.gov/safewater.

¹ TTHM, also known as total Trihalomethanes, are tested by collecting one sample and testing that sample for chloroform, bromodichloromethane, dibromochloromethane, and bromoform.

² HAA5, also known as haloacetic acids, are tested by collecting one sample and testing that sample for monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, and monobromoacetic acid, and dibromoacetic acid.

APPENDIX D: DIXON ENGINEERING REPORT

Dixon Engineering, Inc.

Maintenance Inspection

500,000 Gallon Concrete Reservoir

Northville, Michigan

Inspection Performed: July 30, 2018
Reviewed by Joseph T. Hoban, P.E.: August 27, 2018

Dixon Engineering Inc.
1104 Third Ave. Lake Odessa, MI 48849

Phone (616) 374-3221
Fax (616) 374-7116
<http://www.dixonengineering.net>
dixon@dixonengineering.net

CONCLUSIONS:

1. The exterior roof is covered by soil with grass and trees growing on top. The control/pump building is on top of part of the tank. There are several cracks on the control building floor.
2. The interior roof is in fair condition overall. There are several cracks on the roof and roof beams with efflorescence present. There is some spalling and a few areas of exposed rebar on the beams. There are some tree roots that penetrate through the roof and through one roof hatch curb. The interior sidewalls are in good condition overall. There are a few cracks with a vertical/diagonal orientation. There is efflorescence at the cracks. There were no spalls on the sidewalls. The interior floor is covered in sediment and the condition could not be determined.
3. The exterior metal appurtenances include a roof hatch and a roof vent. There are also two vents, six additional roof hatches, piping, and pumps in the control building. The coating on the appurtenances is an unknown system that is in good condition overall. There are a few minor coating failures on the piping.
4. The wet interior metal appurtenances including the ladder cleats, fill pipe, draw pipe, and overflow pipe are not coated. There is significant corrosion with some metal loss on all of the appurtenances.

RECOMMENDATIONS:

1. Complete the recommended work as soon as possible.
2. Remove the trees and shrubs from the top of the tank and around the tank. The soil should be removed where the tree roots have penetrated the roof, the concrete would be repaired and sealed before backfilling. The estimated cost is \$10,000.
3. Budget to repair the interior roof spalls with a cementitious mortar. The estimated cost is \$5,000.
4. The sediment should be removed from the floor so it can be inspected.
5. Abrasive blast clean the wet interior piping and steel appurtenances to a near white metal (SSPC-SP10) condition and repaint with a three coat epoxy polyamide system. The estimated cost is \$5,000.
6. Replace the overflow pipe support in the wet interior. The estimated cost is \$1,000.

7. Install a screen over the vent and other pipe penetration located inside of the control building. The work can be performed in-house.

COST SUMMARY:

Exterior concrete repair	\$10,000
Interior spall repair	5,000
Interior pipe repaint	5,000
Overflow pipe support	<u>1,000</u>
Subtotal	\$21,000
Engineering and Contingencies	<u>\$10,000</u>
Total	\$31,000

Notes: Best pricing for this work would be obtained if combined with another larger repair or repainting project.

The contingency is higher than typical, the amount of concrete repair could be much higher once the floor is exposed when the tank can be drained and thoroughly inspected.

INSPECTION:

On July 30, 2018, Dixon Engineering, Inc., performed a preliminary maintenance inspection on the 500,000 gallon concrete reservoir owned by the City of Northville, Michigan. Purposes of the inspection were to evaluate the interior and exterior coatings' performance and life expectancy, assess the condition of concrete surfaces and the tank's appurtenances, review safety and health aspects and make budgetary recommendations for continued maintenance of the tank. All recommendations, with budgeting estimates for repairs, are incorporated in this report. The inspection was performed by Kyle Lay, Engineering Technician. The inspector was assisted by Dustin Houghton, ROV Operator, and Trevor Jessup, Staff Technician. Scheduling and arrangements for the inspection were completed through Mike Domine.

The wet interior inspection was completed with a remotely operated vehicle (ROV). Video of the inspection and still photos are included with this report. No cleaning was performed in the wet interior during the ROV inspection. A float could not be performed because the water level was too close to the roof to fit a raft.

TANK INFORMATION:

The tank is underground. The walls, floor, and sidewall were cast-in-place.

CONDITIONS AND RECOMMENDATIONS:

EXTERIOR STRUCTURE CONDITIONS:

The sidewalls are not visible because the tank is underground. Outside the control building the roof is covered with soil with grass. There are trees and shrubs growing on top of the structure. There is no evidence of settling or deformation noted on the soil cover. The roof is only exposed inside the control building where there is some minor cracking at a pipe penetration.

EXTERIOR STRUCTURE RECOMMENDATIONS:

Remove the trees and shrubs from the top of the tank and around the tank. The soil should be removed where the tree roots have penetrated the roof, the concrete would be repaired and sealed before backfilling. The estimated cost is \$10,000.

INTERIOR STRUCTURE CONDITIONS:

The roof is in fair condition overall. There are several cracks that appear tight. The cracks are randomly located throughout the roof and roof beams. There is efflorescence at all of the cracks. The efflorescence is likely due to moisture vapor entering and exiting the gaps. Slight buildup of efflorescence is common at cracks and joints that are open to the environment. Moisture migrating through the crack will leave a deposit of efflorescence on the surface. This deposit can act like a scar sealing the crack. There are a few spalls on the roof and roof beams. Most of the spalls appear shallow. There are few spalls with rebar exposed. The corroding rebar has expanded causing the surrounding concrete to move and spall.

The tank roof is supported by concrete roof beams that form a cross hatch pattern. The beams are in fair condition with some cracking and spalling throughout. The roof beams are supported by box columns. The columns are in good condition with no significant deterioration.

The sidewalls are in good condition overall. There are a few tight cracks with vertical and diagonal orientation. The cracks likely formed during the original construction and remain active. Efflorescence is present on the walls at all of the cracks. There are no spalls on the sidewall.

The tank bottom was covered with approximately 2 to 4 inches of sediment limiting the amount of surface visible with the ROV. Sediment was uniform across the floor indicating no leaks through the floor slab.

INTERIOR STRUCTURE RECOMMENDATIONS:

Repair the spalls by saw cutting around the repair area, remove all of the loose concrete by chipping out to the saw cut and apply a cementitious mortar. Larger repairs would be made using a concrete mix. The estimated cost is \$5,000.

EXTERIOR COATING CONDITIONS:

The exterior steel appurtenances including the roof hatches, vents, and piping inside of the control building are coated with an unknown system. The coating is in good condition with only minor deterioration on some of the piping.

EXTERIOR COATING RECOMMENDATIONS:

Take no immediate action on the exterior appurtenance coating.

WET INTERIOR COATING CONDITIONS:

There is no coating on the wet interior concrete.

The wet interior appurtenances include the ladder cleats, fill pipe, draw pipe, and overflow pipe. The appurtenances are not coated and there is significant corrosion throughout with some steel loss.

WET INTERIOR COATING RECOMMENDATIONS:

Remove the coating system on the interior steel by abrasive blast cleaning the metal to a near-white metal (SSPC-SP10) condition and apply an epoxy coating system with a zinc primer. Wet interior coating systems must be approved for potable water storage tanks contingent upon meeting requirements of NSF/ANSI 61.

DIXON recommends application of epoxy coating systems in most applications because they have good adhesion and abrasion resistant qualities. Their drawbacks include a minimum application temperature of 50°F (35°F for fast cure), and long cure times. A typical cure time can be 7 days at 70°F and up to 28 days at 35°F. The estimated cost to apply the three coat epoxy system is \$5,000.

OVERFLOW PIPE CONDITIONS:

The overflow pipe routes along the sidewall, exits the tank, and routes underground and into a storm drain downhill from the tank. There is a deteriorated support that connects the pipe to the sidewall in the wet interior.

OVERFLOW PIPE RECOMMENDATIONS:

Replace the overflow pipe support in the wet interior. The estimated cost is \$1,000.

HATCH AND MANWAY CONDITIONS:

There is a 24 inch square hatch located inside of the control building. The hatch is in good condition.

There is a secondary hatch located outside and is surrounded by trees and shrubs. The hatch is 24 inches square and is in good condition. The inside of the curb is lined with bricks and there are tree roots growing through the mortar joints between bricks.

There are five additional roof hatches located inside of the control building that are not regularly used by the owner. The hatches were not opened during the inspection.

VENT CONDITIONS:

There are two roof vents, one located inside the control building and one outside. The vent located outside routes up the control building wall and goose necks downward. The end of the vent is screened. The screen is in good condition. The vent inside of the control building extends above the floor and is not screened. There is an additional penetration through the roof located inside of the control building that may also serve as venting. The additional penetration is not screened.

VENT RECOMMENDATIONS:

Install a screen on the vent located inside of the control building and on the additional pipe penetration. Work can be performed in-house.

LADDER CONDITIONS:

There are cleats that route along the sidewall from the roof to the floor at two of the roof hatches. The cleats appear to be in poor condition with corrosion and steel loss throughout.

LADDER RECOMMENDATIONS:

The cleats should be inspected when the tank is drained. If needed, the cleats could be removed and a portable ladder used for maintenance and inspections. For reference, installation of a new fiberglass ladder is estimated at \$5,000.

FILL/DRAW PIPE CONDITIONS:

There is a single fill pipe and two draw pipes that penetrate through the roof. There are pipes that route through the wall between the small chamber and the main chamber.

DIXON ENGINEERING, INC.
CONCRETE TANK FIELD INSPECTION REPORT

DATE: July 30, 2018

OWNER: City of Northville

CLIENT CODE: 22-82-01-02

LOCATION: Street: 422 Mountainview Drive

City: Northville

State: Michigan

TANK SIZE: Capacity: 500,000 gallons

Height to overflow (HWL): 12 1/2 feet (from Owner)

CONSTRUCTION: Cast in Place

Type of Roof: Flat

Tank Layout: Below grade

DATE CONSTRUCTED: Unknown

MANUFACTURER: Unknown

CONTRACT NUMBER: Unknown

PERSONNEL: Inspector Kyle Lay, Top person Trevor Jessup,

ROV operator Dustin Houghton

TYPE OF INSPECTION: Preliminary Maintenance

METHOD OF INSPECTION: ROV

DATE LAST INSPECTED: Unknown

SITE CONDITIONS:

Fenced: Yes

Site large enough for contractor's equipment: Yes

Control building: Yes

Neighborhood: Woods, school

Power lines within 50 feet: Yes

Are power lines attached to the Control building: Yes

Site drainage: Away from tank

Indications of underground leakage: No

Shrub, tree, etc. encroachment: Yes - around manway in the woods. There are some roots present through the roof and through the mortar joints in the bricks at the hatch.

EXPOSED PIPING:

Location: On top of the tank (in control building)

Condition of structure: Good

Structure is: Dry

Altitude valve: No

EXPOSED PIPING:

Condition of pipe coating: **Good**

Describe coating: **Delaminating**

Condition of metal: **Good**

EXTERIOR:

SIDEWALL:

Not exposed

Roof:

Not exposed outside. Inside the control building there are a few cracks.

Tank Sidewall To Roof Connection:

Not exposed

EXTERIOR APPURTENANCES:

Sidewall manway:

N/A

Overflow pipe:

Diameter: **12 inches (estimated)**

Flap gate: **No**

Air gap: **No**

Splash pad: **Yes**

Type: **Storm drain**

Overflow comments: **Overflow routes underground, downhill to west and ties into storm drain at the street below.**

Sample Tap:

N/A

Threaded Tap (For chemical feed on the fill/draw pipe:

N/A

Roof hatch: (in control building)

Number: **1**

Neck size: **24 inch square**

Hatch security: **None**

Coating condition: **Fair**

Metal condition: **Good**

EXTERIOR APPURTENANCES:

Secondary hatches: (in woods)

Number: **1**

Neck size: **24 inch square**

Hatch security: **None**

Coating condition: **Poor**

Metal condition: **Good**

Hatch comments: **Overgrown with trees, shrubs, etc.**

Vacant Hatches:

Number: **5**

Neck size: **24 inch square**

Hatch security: **None**

Coating condition: **Good**

Metal condition: **Good**

Hatch comments: **All in control building.**

Ventilation:

Number: **2**

Type: **Flow-through**

Location: **Control building in interior and on the exterior.**

Size: **10 inches**

Vent material: **Steel**

Coating condition: **Good**

Material condition: **Good**

Vent comments: **One stubs up 65 inches above control building floor with no cover or screen on top. The other vent routes up the exterior wall and goose necks down and is screened. There is an additional penetration through the roof in the building that is not screened that may also serve as venting.**

WET INTERIOR:

Tank roof:

Concrete condition: **Fair**

Rusting at surface: **No**

Coating Present: **No**

Cracking (interior roof):

Number of cracks: **30+**

Total length of cracking: **100 ± feet**

WET INTERIOR:

Crack Descriptions:

Location: **All cracks were between the roof beams, almost every opening.**

Grade: **1**

Length: **2-10 feet**

Orientation: **All perpendicular to wall**

Active: **Yes**

Efflorescence present: **Yes**

Tank Sidewall:

Concrete condition: **Good**

Rusting at surface: **No**

Coating Present: **No**

Cracking (interior sidewall):

Number of cracks: **5-10**

Total length of cracking: **50 ±feet**

Crack Descriptions:

Location: **3-5 on sidewall opposite hatch with overflow.**

Grade: **1**

Length: **4-6 feet each**

Orientation: **Vertical**

Active: **Yes**

Efflorescence present: **Yes**

Location: **3-5 on each end sidewall.**

Grade: **1**

Length: **4-6 feet each**

Orientation: **Vertical**

Active: **Yes**

Efflorescence present: **Yes**

Tank floor:

Interior Floor comments: **Could not inspect with ROV due to sediment.**

Wall to Floor Junction:

Floor to wall separation: **No**

Curb present: **No**

Water stop accessible: **No**

Sediment and Sump:

WET INTERIOR:

Sediment depth: **2-4 inches**

Sediment distribution: **Uniform**

Could sediment distribution indicate a leak: **No**

Sump present: **No**

WET INTERIOR ACCESSORIES:

Tank ladder: x2

Ladder material: **Steel cleats**

Toe clearance: **Less than 7 inches**

Shape of rungs: **Cleats**

Coating condition: **Poor**

Material condition: **Unknown, appear solid but with some corrosion and steel loss.**

Fall prevention device: **No**

Interior ladder comments: **One set at each manway opened during the inspection (southernmost in control building and one in the woods).**

Roof Beams:

Number: **28 east to west, and 6 north to south**

Material: **Concrete**

Shape: **Box**

Location: **Across roof**

Condition: **Fair**

Roof beam comments: **Some spalls visible on beam edges. Some rebar appears to be showing at some spalls.**

Columns:

Number: **32 (estimated)**

Dimensions: **12 x 12 estimated inches**

Shape: **Square**

Condition: **Good**

Base flare: **No**

Roof flare: **No**

Overflow:

Type of inlet: **Funnel**

Condition: **Good**

Coating condition: **Poor**

Overflow comments: **The pipe support appears to be deterioration.**

WET INTERIOR ACCESSORIES:

Fill pipe:

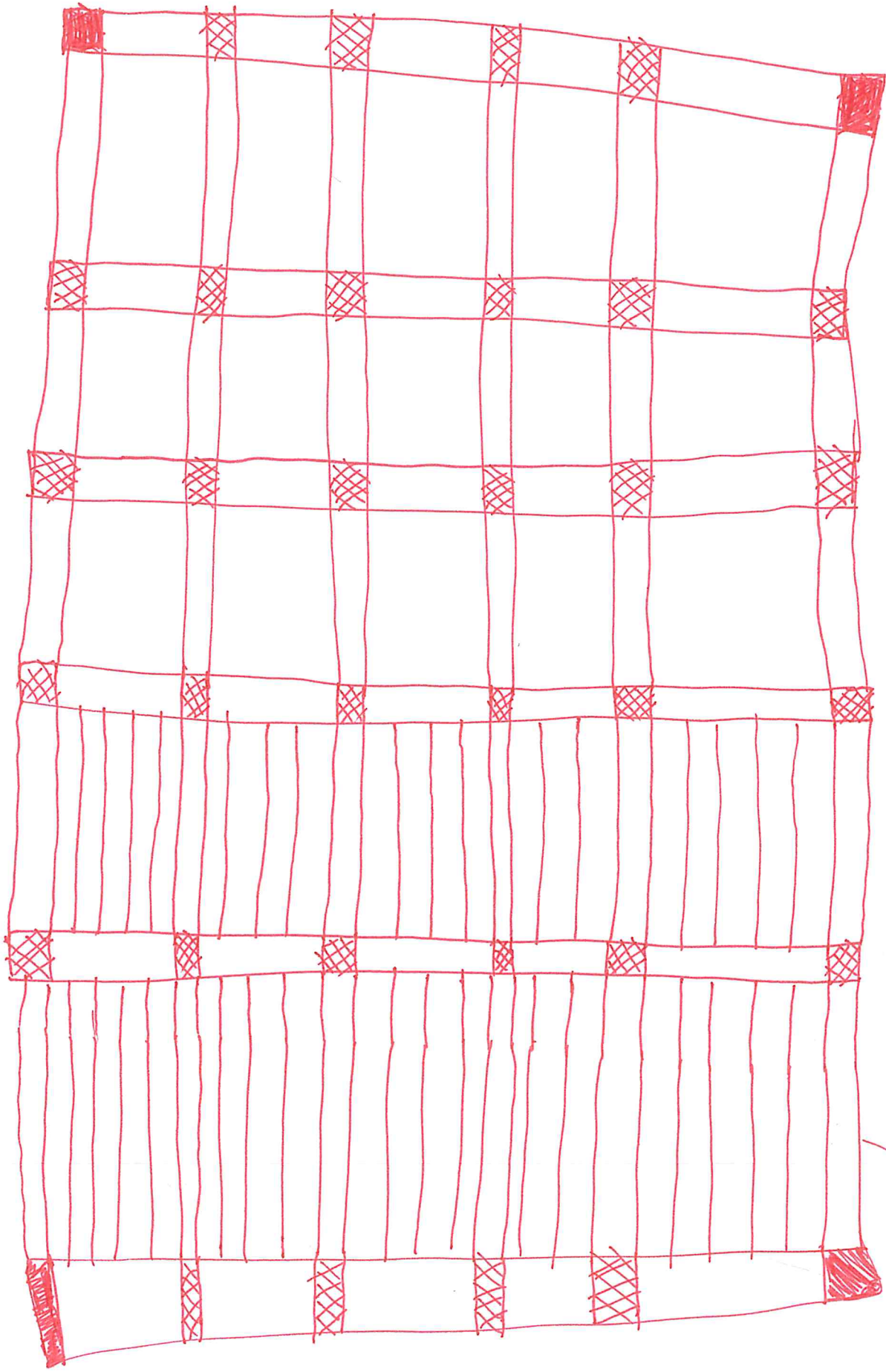
Diameter: **12 inches**

Fill pipe comments: **It is believed to enter into a smaller chamber that connects to large reservoir via small pipes on northern wall.**

Separate draw pipe:

Diameter: **12 inches**

Field Inspection Report is prepared from the contractor's viewpoint. It contains most of the information the contractor needs to prepare his bid for any repairs or repainting. The Engineer uses it to prepare the engineering report. Cost estimates are more accurate if contractor problems can be anticipated. While prepared from the contractor's viewpoint, the only intended beneficiary is the owner. These reports are completed with diligence, but the accuracy is not guaranteed. The contractor is still advised to visit the site.



8x
beams E-W

← N



1) 500,000 gallon underground concrete water storage tank located in Northville, Michigan.

2) Control building and soil with grass over the tank roof.



3) The tank is located underground.



4) Fence located at the outer edge of the tank.

5) Roof hatch located in wooded area on top of the tank.



6) The interior of the hatch is lined with bricks.



7) Exterior vent routing up the control building wall.

8) The vent screen is in good condition.



9) Piping in the control building and cracking on the floor.



10) There are minor coating failures on the piping inside the control building.

11) Vent located inside the control building.



12) Penetration into the tank likely intended as a vent.



13) Hatch located inside the control building.



14) Same.



15) Same.



16) Hatch located inside the control building.

17) Roof hatch used during the ROV inspection.



18) The inside of the hatch is lined with brick.



19) Roof section and cleats at a roof hatch.

20) Vent penetration through the roof.



21) Cracking on the roof.



22) Cracking with efflorescence on the roof.

23) Same.



24) Same.



25) Typical roof beam.

26) Exposed rebar on a roof beam.



27) Column support at a roof beam.



28) Typical column is in good condition.



29) Typical column connection at the floor is in good condition.



30) Column located at a sidewall.



31) Overflow pipe with funnel at the top.



32) Overflow pipe connection is deteriorated.



33) Piping routed through the bottom of the sidewall and piping from the roof to the floor.

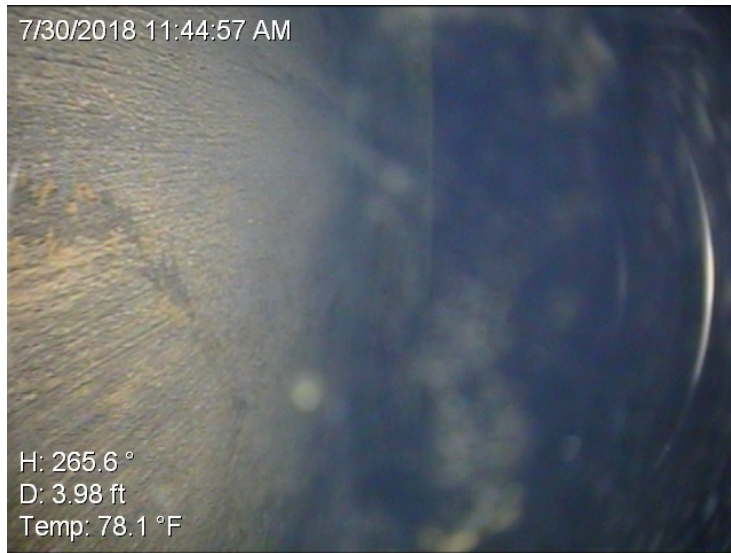


34) Tree roots growing through bricks at a manway.

35) Tree roots penetrated through the roof.



36) Sensors hanging from the roof.



37) Typical sidewall section.

38) Same.



39) Same.



40) Typical sidewall section.

41) Cracking with efflorescence on the sidewall.



42) Same.



43) Pipe penetration through the sidewall.

44) Pipe routing from the roof to the floor with significant corrosion.



45) Pipe penetration through the lower sidewall.



46) Sediment on the floor.



47) Same.



48) Same.

**APPENDIX E: ADMINISTRATIVE CONSENT ORDER AND SIGNIFICANT
DEFICIENCIES VIOLATION NOTICE**

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
DRINKING WATER AND ENVIRONMENTAL HEALTH DIVISION

ADMINISTRATIVE CONSENT ORDER

In the matter of:

DWEHD Order No. ACO-399-07-2022

SECTION I

FACILITY OWNER/OPERATOR

NAME City of Northville		OWNER <input checked="" type="checkbox"/>	OPERATOR <input checked="" type="checkbox"/>
DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS BUSINESS IDENTIFICATION NUMBER			
ADDRESS 215 West Main Street			
CITY Northville	STATE Michigan	ZIP CODE 48167	
CONTACT NAME/TITLE Patrick Sullivan, City Manager		PHONE # 248-449-9905	

FACILITY NAME AND LOCATION

FACILITY NAME City of Northville		WATER SUPPLY SERIAL NUMBER 04830	
FACILITY OWNER IF NOT IDENTIFIED ABOVE			
ADDRESS 215 West Main Street			
CITY Northville	STATE Michigan		ZIP CODE 48167
COUNTY Wayne			
CONTACT NAME Michael Domine		PHONE # 248-305-2840	

- 1.1 This document results from allegations by the Department of Environment, Great Lakes, and Energy (EGLE), Drinking Water and Environmental Health Division (DWEHD). EGLE alleges that the City of Northville (Owner/Operator), owner/operator of the above-referenced facility, is in violation of the Safe Drinking Water Act, 1976 PA 399, as amended (Act 399), and the administrative rules promulgated thereunder.
- 1.2 Specific alleged violations are referenced in the EGLE Significant Deficiency Violation Notice (SDVN) attached to this Administrative Consent Order (Consent Order) as Exhibit A. The Owner/Operator and EGLE agree to resolve the alleged violations set forth therein through entry of this Consent Order. The Owner/Operator agrees to resolve all remaining alleged compliance issues set forth in Exhibit A in accordance with the requirements contained in this Consent Order. Exhibit B summarizes the alleged significant deficiencies listed in the SDVN that the Owner/Operator has completed to date. This Consent Order, in its entirety, shall consist of Section I, the attached Sections

City of Northville
Administrative Consent Order

II, III, and IV, Exhibits A and B, and any other referenced attachments, exhibits, or appendices. This Consent Order shall be considered null and void if it does not include, at a minimum, Sections I, II, III, and IV and Exhibits A and B. The Owner/Operator further agrees that this Consent Order shall become effective on the date it is signed by the DWEHD Director, designee of the EGLE Director.

- 1.3 Upon receipt of written notice from EGLE, the Owner/Operator agrees within 30 days of receipt, to pay a civil fine of \$500 per day for the first thirty (30) days and \$1,000 per day thereafter and provide public notification for failure to complete corrective actions as specified in Section II, Compliance Schedule, unless an extension has been approved under Paragraph 4.14. Failure to make a timely payment constitutes a violation of this Consent Order.
- 1.4 The Owner/Operator agrees to make payment of all funds due pursuant to this agreement by certified check made payable to the "State of Michigan" and mailed to the Accounting Services Division, Cashier's Office for EGLE, P.O. Box 30657, Lansing, Michigan 48909-8157. To ensure proper credit, all payments made pursuant to this Consent Order must include "Payment Identification Number RMD90096" on the check. The Owner/Operator agrees not to contest the legality of the civil fine.
- 1.5 The Owner/Operator agrees to provide a Special Notice in its annual Consumer Confidence Report (CCR) beginning with the 2022 CCR, due in 2023, until all items in Section II are resolved.
- 1.6 EGLE acknowledges that the Owner/Operator has an agreement with the Great Lakes Water Authority, which includes specific operation requirements, for the use of the City of Northville's storage tank between May 1 - September 30, annually. This agreement may require alterations in the schedule (approved under Paragraph 2.1, below) associated with this Consent Order when activities would affect the operation of the tank during this period of time. In addition, if applicable, the Owner/Operator will notify EGLE when the availability of funding, as identified in the Feasibility Study Report may require alternations in the schedule.

Signatories

DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

E-SIGNED by Eric J. Oswald
on 2022-12-09 08:33:56 EST

Eric J. Oswald, Director
Drinking Water and Environmental Health Division

2022-12-09 08:33:56 UTC

Date

I, the undersigned, CERTIFY that I am fully authorized by the party identified above to enter into this Consent Order to comply by consent and to EXECUTE and LEGALLY BIND that party to it. I further attest that all information provided herein is accurate and true.

CITY OF NORTHVILLE

E-SIGNED by Patrick Sullivan
on 2022-12-07 09:58:28 EST

Patrick Sullivan, City Manager

2022-12-07 09:58:28 UTC _____ Date

SECTION II - COMPLIANCE SCHEDULE

IT IS THEREFORE AGREED AND ORDERED THAT the Owner/Operator shall take the following actions to prevent further alleged violations of Act 399 and the administrative rules promulgated thereunder and/or to correct the unresolved alleged significant deficiencies and deficiencies identified in the SDVN attached to this Consent Order as Exhibit A and not identified as resolved in Exhibit B.

- 2.1 Not later than 210 days from the effective date of this Consent Order, the Owner/Operator shall submit to EGLE, for review and approval, a feasibility study report (FS Report) evaluating options for rehabilitating, replacing, or removing from service the underground concrete reservoir. The FS Report shall include the Owner/Operator's preferred alternative, source(s) of financing, and a detailed schedule for implementing the selected alternative. The FS Report shall explain how the selected alternative resolves the unresolved alleged significant deficiencies and deficiencies identified in the SDVN attached to this Consent Order as Exhibit A. The schedule shall include, but is not limited to, design, Act 399 permitting, construction, and startup. EGLE will notify the Owner/Operator, in writing, of approval or any deficiencies in the FS Report or schedule.
- 2.2 Within 21 days from EGLE's written approval of the FS Report and schedule in Paragraph 2.1, above, the Owner/Operator shall commence activities identified in the EGLE approved schedule, as incorporated by reference.
- 2.3 Not later than 60 days after commencement of activities in Paragraph 2.2, above, and on the first of each month thereafter, the Owner/Operator shall provide a written progress report to EGLE for review. The progress report shall include the percent complete for each task, a statement regarding whether tasks are on schedule, a list of upcoming tasks, and a list of any challenges and proposed resolutions. The Owner/Operator may submit a request to EGLE, for review and approval, proposing an alternative frequency

City of Northville
Administrative Consent Order

for the progress reports. EGLE will notify the Owner/Operator of approval or any deficiencies in the request.

- 2.4 Not later than 180 days from the Owner/Operator's commencement of activities in Paragraph 2.2, above, the Owner/Operator shall submit to EGLE, for review and approval, an administratively complete Act 399 permit application to construct the preferred alternative. The permit application shall include plans and specifications in accordance with Section 4 of Act 399, MCL 325.1004. EGLE will notify the Owner/Operator, in writing, of the approval of or any deficiencies in the permit application.
- 2.5 The Owner/Operator shall complete construction in accordance with the EGLE-approved schedule and EGLE-approved construction permit(s). The Owner/Operator shall notify EGLE, in writing, after construction completion, that the newly constructed components have been properly disinfected and contain water of quality that is ready to be distributed, prior to putting the newly constructed components into service.
- 2.6 Not later than 60 days following construction completion, the Owner/Operator shall submit to EGLE a written completion report (Completion Report) documenting with detailed photographic documentation the work completed to address the unresolved Exhibit A items. EGLE will notify the Owner/Operator, in writing, of the acceptance of the Completion Report or if additional information is required.

Sections III and IV of this Consent Order shall not be altered in any way, including adding or eliminating any language, striking terms or parts of terms, retyping in whole or in part, or using a different format. Any changes to this document without written approval from EGLE renders the Consent Order null and void.

SECTION III - STIPULATIONS

The Owner/Operator and EGLE stipulate as follows:

- 3.1 EGLE is authorized to enter this Consent Order requiring the Owner/Operator to comply with state law under Section 15 of Act 399.
- 3.2 The Owner/Operator consents to the issuance and entry of this Consent Order and stipulates that the entry of this Consent Order constitutes a final order of EGLE and is enforceable as such under the appropriate provisions of state law identified in this Consent Order. The Owner/Operator agrees not to contest the issuance of this Consent Order and that the resolution of this matter by the entry of this Consent Order is appropriate and acceptable.
- 3.3 The Owner/Operator and EGLE agree that the signing of this Consent Order is for settlement purposes only and does not constitute an admission by the Owner/Operator that the law has been violated.

- 3.4 The Signatory to this Consent Order on behalf of the Owner/Operator agrees and attests that he/she is fully authorized to ensure that the Owner/Operator will comply with all requirements under this Consent Order.
- 3.5 The Owner/Operator shall achieve compliance with the aforementioned regulations in accordance with the requirements contained in Section II of this Consent Order.

SECTION IV - GENERAL PROVISIONS

The Owner/Operator and EGLE further stipulate as follows:

- 4.1 With respect to any violations not specifically addressed and resolved by this Consent Order, EGLE reserves the right to pursue any other remedies to which it is entitled for any failure on the part of the Owner/Operator to comply with the requirements of Act 399 and the administrative rules promulgated thereunder.
- 4.2 EGLE and the Owner/Operator consent to enforcement of this Consent Order in the same manner and by the same procedures for all final orders entered pursuant to the provisions of Act 399.
- 4.3 This Consent Order in no way affects the Owner/Operator's responsibility to comply with any other applicable local, state, or federal laws or regulations.
- 4.4 EGLE reserves its right to pursue appropriate action, including injunctive relief to enforce the provisions of this Consent Order, and applicable statutory fines for any violation of this Consent Order.
- 4.5 Nothing in this Consent Order is or shall be considered to affect any liability the Owner/Operator may have for natural resource damages caused by the Owner/Operator's acts or omissions at the facility. The State of Michigan does not waive any rights to bring an appropriate action to recover such damages to the natural resources.
- 4.6 In the event the Owner/Operator sells or transfers the facility, he/she shall advise any purchaser or transferee of the existence of this Consent Order in connection with such sale or transfer. Within 30 calendar days, the Owner/Operator shall also notify the DWEHD District Supervisor, in writing, of such sale or transfer, the identity and address of any purchaser or transferee, and confirm the fact that notice of this Consent Order has been given to the purchaser and/or transferee. The purchaser and/or transferee of this Consent Order must agree, in writing, to assume all of the obligations of this Consent Order. A copy of that agreement shall be submitted to the DWEHD District Supervisor within 30 days of assuming the obligations of this Consent Order.
- 4.7 The provisions of this Consent Order shall apply to and be binding upon the parties to this action and their successors and assigns.

- 4.8 This Consent Order constitutes a civil settlement and satisfaction as to the resolution of the violations specifically addressed herein; however, it does not resolve any criminal action that may result from these same violations.

Reporting

- 4.9 The Owner/Operator shall make all submittals and written notifications required by this Consent Order, to the DWEHD District Supervisor, EGLE, Warren District Office, 27700 Donald Court, Warren, Michigan 48092-2793. The cover letter with each submittal or notification shall identify the specific paragraph and requirement of this Consent Order that the submittal or notification is intended to satisfy.
- 4.10 The Owner/Operator shall verbally report any violation(s) of the terms and conditions of this Consent Order to the DWEHD District Supervisor at 586-817-9120 by no later than the close of the next business day following detection of such violation(s) and shall follow such notification with submittal of a written report within five business days following detection of such violation(s). The written report shall include a detailed description of the violation(s), as well as a description of any actions proposed or taken to correct the violation(s). The Owner/Operator shall report any anticipated violation(s) of this Consent Order to the above-referenced individual in advance of the relevant deadlines whenever possible.

Retention of Records

- 4.11 Upon request by an authorized representative of EGLE, the Owner/Operator shall make available to EGLE all records, plans, logs, and other documents required to be maintained under this Consent Order or pursuant to applicable laws or rules. All such documents shall be retained by the Owner/Operator for at least a period of three years from the date of generation of the record unless a longer period of record retention is required by the applicable law or its rules.

Right of Entry

- 4.12 The Owner/Operator shall allow any authorized representative or contractor of EGLE, upon presentation of proper credentials, to enter upon the premises of the facility at all reasonable times for the purpose of monitoring compliance with the provisions of this Consent Order. This paragraph in no way limits the authority of EGLE to conduct tests and inspections pursuant to Act 399 and the administrative rules promulgated thereunder or any other applicable statutory provision.

EGLE Approval of Submittals

- 4.13 For any work plan, proposal, or other document, excluding applications for permits or licenses, that are required by this Consent Order to be submitted to EGLE by the Owner/Operator, the following process and terms of approval shall apply:

City of Northville
Administrative Consent Order

- a. All work plans, proposals, and other documents required to be submitted by this Consent Order shall include all of the information required by the applicable statute and/or rule and all of the information required by the applicable paragraph(s) of this Consent Order.
- b. In the event EGLE disapproves a work plan, proposal, or other document, it will notify the Owner/Operator, in writing, specifying the reasons for such disapproval. The Owner/Operator shall submit, within 30 days of receipt of such disapproval, a revised work plan, proposal, or other document that adequately addresses the reasons for EGLE's disapproval. If the revised work plan, proposal, or other document is still not acceptable to EGLE, EGLE will notify the Owner/Operator, in writing, of this disapproval.
- c. In the event EGLE approves with specific modifications, a work plan, proposal, or other document, it will notify the Owner/Operator, in writing, specifying the modifications required to be made to such work plan, proposal, or other document prior to its implementation and the specific reasons for such modifications. EGLE may require the Owner/Operator to submit, prior to implementation and within 30 days of receipt of such approval with specific modifications, a revised work plan, proposal, or other document that adequately addresses such modifications. If the revised work plan, proposal, or other document is still not acceptable to EGLE, EGLE will notify the Owner/Operator, in writing, of this disapproval.
- d. Upon EGLE approval, or approval with modifications, of a work plan, proposal, or other document, such work plan, proposal, or other document shall be incorporated by reference into this Consent Order and shall be enforceable in accordance with the provisions of this Consent Order.
- e. Failure by the Owner/Operator to submit an approvable work plan, proposal, or other document, within the applicable time periods specified above, constitutes a violation of this Consent Order, and shall subject the Owner/Operator to the enforcement provisions of this Consent Order.
- f. Any delays caused by the Owner/Operator's failure to submit an approvable work plan, proposal, or other document when due shall in no way affect or alter the Owner/Operator's responsibility to comply with any other deadline(s) specified in this Consent Order.
- g. No informal advice, guidance, suggestions, or comments by EGLE regarding reports, work plans, plans, specifications, schedules, or any other writing submitted by the Owner/Operator will be construed as relieving the Owner/Operator of his/her obligation to obtain written approval, if and when required by this Consent Order.

Extensions

- 4.14 The Owner/Operator and EGLE agree that EGLE may grant the Owner/Operator a reasonable extension of the specified deadlines set forth in this Consent Order. Any extension shall be preceded by a written request to the DWEHD District Supervisor no later than ten business days prior to the pertinent deadline and shall include:

City of Northville
Administrative Consent Order

- a. Identification of the specific deadline(s) of this Consent Order that will not be met.
- b. A detailed description of the circumstances that will prevent the Owner/Operator from meeting the deadline(s).
- c. A description of the measures the Owner/Operator has taken and/or intends to take to meet the required deadline(s).
- d. The length of the extension requested and the specific date on which the obligation will be met.

No change or modification to this Consent Order shall be valid unless in writing from EGLE and, if applicable, signed by both parties.

Termination

- 4.15 This Consent Order shall remain in full force and effect until terminated by a written Termination Notice (TN) issued by EGLE. Prior to issuance of a written TN, the Owner/Operator shall submit a request consisting of a written certification that the Owner/Operator has fully complied with the requirements of this Consent Order and has made payment of any fines required in this Consent Order. Specifically, this certification shall include:
- a. The date of compliance with each provision of the compliance program in Section II of this Consent Order, and the date any fines or penalties were paid.
 - b. A statement that all required information has been reported to the DWEHD District Supervisor.
 - c. Confirmation that all records required to be maintained pursuant to this Consent Order are being maintained at the facility.

EGLE may also request additional relevant information. EGLE shall not unreasonably withhold issuance of a TN.

Exhibit A
Administrative Consent Order

Enforcement Type

Significant Deficiency Violation Notice

Issue Date

March 10, 2022

City of Northville
Administrative Consent Order

Exhibit B
Administrative Consent Order

Type

EGLE Site Visit Letter

Date

September 21, 2022



GRETCHEN WHITMER
GOVERNOR

EXHIBIT A
STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY
WARREN DISTRICT OFFICE



LIESL EICHLER CLARK
DIRECTOR

March 10, 2022

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Certified Mail Receipt Number: 7018 1830 0002 1892 8170

Mr. Michael Domine
Director, Department of Public Works
City of Northville
215 West Main Street
Northville, Michigan 48167

WSSN: 04830
County: Wayne

Dear Mr. Domine:

SUBJECT: Significant Deficiency Violation Notice (SDVN); City of Northville Water System Sanitary Survey (Survey)

This letter confirms the Department of Environment, Great Lakes, and Energy's (EGLE's) staff meeting with Mr. Domine, as well as Ms. Jennifer Chehab and/or Mr. Justin Rose of Fleis & Vandenbrink, on February 10 and 11, 2022, to conduct a survey of the City of Northville Water Supply (Supply) and to present the final findings, discuss areas for improvement, and identify timelines for corrective action where appropriate. The purpose of a survey is to evaluate the water supply system with respect to the requirements of the Michigan Safe Drinking Water Act, 1976 PA 399, as amended (Act 399). It is also an opportunity to update EGLE's records, provide technical assistance, and identify potential risks that may adversely affect drinking water quality. Enclosed is a copy of the Sanitary Survey Review Summary for your reference.

Since the last Survey, EGLE acknowledges that the Supply has completed the following:

1. Updated its Reliability Study and General Plan.
2. Completed an inspection of the elevated water storage tank and underground water reservoir.

3. Completed annual leak detection surveys and leak repairs on the distribution system.
4. Increased water main replacement efforts in last three years

The following table summarizes EGLE's final findings from the survey of the water system:

Survey Element	Findings
Source	Not Applicable
Treatment	Not Applicable
Distribution System	Recommendations Made
Finished Water Storage	Significant Deficiencies Identified
Pumps	Significant Deficiencies Identified
Monitoring & Reporting	Recommendations Made
Management & Operations	Recommendations Made
Operator Compliance	No Deficiencies/recommendations
Security	No Deficiencies/recommendations
Financial	No deficiencies/recommendations
Other	Not Applicable

All the findings including significant deficiencies, deficiencies, and recommendations from the survey are detailed in the attached supplemental document. Please review these findings and take actions as appropriate. Below is a summary of the significant deficiencies.

Significant Deficiencies:

Significant deficiencies represent an immediate health risk to consumers of water and indicate non-compliance with one or more Act 399 requirements. Significant deficiencies are serious sanitary deficiencies identified in water systems which include, but are not limited to, defects in design, operation, maintenance, or a failure or malfunction of the sources; treatment, storage, or distribution systems that are determined to be causing, or have the potential to cause, contamination into the public water supply (PWS).

Significant deficiencies must be corrected within 120 days of the date of this letter, or a Corrective Action Plan, approved by EGLE, must be completed within 120 days of the date of this letter. Failure to meet the 120-day deadline is a treatment technique violation.

During the survey, eight significant deficiencies were identified at the 520,000 gallon underground concrete finished water reservoir (ST301) and pump/control building (PS301), which is located directly above the reservoir, and are briefly summarized below. Further details regarding each significant deficiency are provided in the enclosed supplemental document.

1. A hornet's nest that was observed inside and behind the screen of the exterior down-turned air vent for the underground reservoir which is located on the back of

the pump/control building.

2. Improperly designed and maintained access hatches on the roof of the underground reservoir have the potential to allow contaminants to enter the reservoir.
3. The 2018 inspection of underground reservoir conducted by Dixon Engineering identified a number of cracks in roof and sidewalls and a couple locations on the roof where rebar was exposed and where roots were observed to penetrate the roof and exterior hatch.
4. Several unprotected cross connections were observed at the underground reservoir and pump/control building including connections between unused chambers and active chambers in the underground reservoir, the overflow pipe from the underground reservoir discharging directly to a storm sewer, and the discharge of the lubricating water for the vertical turbine pumps into the reservoir.
5. Unsealed gaps around the base of the vertical turbine pumps have the potential to allow contaminants to enter the reservoir.

In addition to the above significant deficiencies the following related deficiencies and recommendations were identified. Further details regarding these are provided in the attached supplemental document.

1. Deficiency: Several inches (an estimated 2 to 4 inches) of sediment was observed across the bottom of the underground reservoir (ST301). The presence of the sediment prohibited a thorough inspection of the condition of the bottom of the reservoir.
2. Deficiency: Metal surfaces within the underground reservoir (ST301) including piping and hatches were observed to be severely corroded.
3. Recommendation: Woody vegetation was observed growing alongside the western side of the underground reservoir and near the downturned air vent. The woody vegetation should be removed to create a buffer zone to prevent roots from penetrating the concrete roof and walls of the reservoir.

There is significant work involved to address the above significant deficiencies. Certain activities may reasonably be completed in the short-term while others may require an extend period to complete. If the work will take longer than 120 days, than it will be necessary for the Supply to enter a consent order that includes a corrective action schedule. The Supply should also consider the value of a feasibility study to compare rehabilitation of the underground reservoir to other alternatives such as removal from service and replacement with a new ground storage tank to determine the preferred alternative for the Supply's water storage needs.

March 10, 2022

EGLE's investigation is considered complete. This Significant Deficiency (SD) begins as of the date of this letter and will continue until City of Northville completes corrective action. City of Northville must complete corrective action within 120 days of the date of this letter or be in compliance with a Corrective Action Plan and schedule approved by this office. Please contact this office within 30 days of the date of this letter to discuss appropriate corrective action. You must also notify EGLE, in writing, within 30 days of correcting the significant deficiency.

If you have any factual information that you would like EGLE to consider regarding the significant deficiency identified in this SDVN, please provide it in a written response to this office by April 9, 2022.

Please note that any SD that remains unresolved at the time the annual Consumer Confidence Report (CCR) is distributed, the water supplier is required to provide a Special Notice in its CCR. The water supplier must inform your customers on the details regarding the unresolved SD including the date the SD was identified by EGLE; the EGLE approved plan and schedule for correction along with the current progress toward this approved plan. This Special Notice requirement shall be included in all future CCRs until the SD has been resolved.

Thank you for taking the time to meet with me and to review the status of your water supply. If you have any questions, please feel free to contact me by phone at 586-817-9120; by email at yuskokotimkot@michigan.gov; or in writing at EGLE, DWEHD, Warren District Office, 27700 Donald Court, Warren, Michigan 48092.

Sincerely,



Tiffany Yusko-Kotimko, District Engineer
Field Operations Section
Drinking Water and Environmental
Health Division

Enclosures

cc/enc: Ms. Jennifer Chehab, Fleis & Vandenbrink
Wayne County Department of Health, Human & Veterans Services
Mr. Patrick Brennan, EGLE
Mr. Brian Thurston, EGLE (via email)
Ms. Maureen Nelson, EGLE (via email)

Significant Deficiencies:

Significant deficiencies represent an immediate health risk to consumers of water and indicate non-compliance with one or more Act 399 requirements. Significant deficiencies are serious sanitary deficiencies identified in water systems which include, but are not limited to, defects in design, operation, maintenance, or a failure or malfunction of the sources; treatment, storage, or distribution systems that are determined to be causing, or have the potential to cause, contamination into the public water supply (PWS).

Significant deficiencies must be corrected within 120 days of the date of this letter, or a Corrective Action Plan, approved by EGLE, must be completed within 120 days of the date of this letter. Failure to meet the 120-day deadline is a treatment technique violation.

During the survey, eight significant deficiencies were identified:

1. R 325.11118 Protection of storage tanks.

Rule 1118. Public water supplies shall take reasonable precautions... to prevent introduction of contaminants into the distribution system.

The presence of a hornet's nest inside and behind the screen of the exterior downturned air vent for the underground finished water reservoir (ST301), which is located on the back of the pump/control building, is a violation of Rule 1118. Removal of the hornet's nest is needed for the water supply to return to compliance as insects have the potential to spread contaminants to the potable water in the reservoir.

2. R 325.11113 Gravity storage tanks.

Rule 1113. All gravity storage tanks shall be provided with all of the following: (a) A watertight and properly drained roof, ...

R 325.11118 Protection of storage tanks.

Rule 1118. Public water supplies shall take reasonable precautions... to prevent introduction of contaminants into the distribution system.

There are three access hatches located inside the control/pump building which is over top of a portion of the underground reservoir (ST301). One access hatch is located outside in the southwest corner of the reservoir and has been reportedly sealed shut with epoxy. Please provide detailed information on how this exterior hatch was sealed shut including materials used, who performed the work, and the expected life of the work.

None of the hatches are shoe box style lids as the lids are recessed. The top of the access hatches are a few inches to approximately a foot above the floor or ground. The lids do not close tightly; there are no gaskets, and some of the lids are

corroded, and there are gaps between the frame and the lid. The condition of the access

hatches creates the potential for non-potable water and other contaminants to enter the underground reservoir. Ten States 7.0.8.2 outlines the requirements for access manholes for ground level or flat roof finished water storage structures. These hatches will need to (1) be raised at least 24 inches above the floor, (2) fitted with a solid watertight cover which overlaps a framed opening and extends down around the frame at least two inches, (3) the frame shall be at least four inches high, and (4) the cover shall be hinged on one side and have a locking device. In addition, there shall be a gasket between the frame and the cover so that they seal tightly when latched shut. Cracks between the concrete floor and the base of the access hatch structure should be sealed.

3. R 325.11112 Storage tanks generally.

Rule 1112. All storage tanks, including hydropneumatics or gravity storage tanks which are used for the storage of finished water, shall meet all of the following requirements: (a) Be watertight below the maximum water level elevation, ...

R 325.11113 Gravity storage tanks.

Rule 1113. All gravity storage tanks shall be provided with all of the following: (a) A watertight and properly drained roof, ...

A 2018 inspection of underground reservoir (ST301) by Dixon Engineering, Inc. reported: (1) cracks in roof and sidewalls where efflorescence was present, (2) a couple locations on the roof of concrete spalling and a few areas rebar was exposed, and (3) roots were observed to penetrate the roof and exterior access hatchway. Cracks, spalled concrete, and areas of exposed rebar need to be properly repaired and sealed to meet the requirements of Rule 1112 and 1113. These conditions are also potential avenues for contaminants, including ground or surface water, to enter the tank. In addition, cracks and spalled concrete have the potential overtime to compromise the structural integrity of the concrete if unattended. Ten States 7.0.10 e. and f. stipulates that reservoirs with a concrete roof must have a minimum slope of 1.5% and earthen cover shall be sloped to facilitate drainage. If the roof is not properly sloped, then the roof must be made watertight with the use of waterproof membrane or similar product. The Supply should evaluate the construction of the concrete reservoir roof and ground cover to determine if modifications are needed to meet the requirements of Ten States.

4. R 325.11118 Protection of storage tanks.

Rule 1118. Public water supplies shall take reasonable precautions... to prevent introduction of contaminants into the distribution system.

R 325.114003 Cross-connections prohibited.

Rule 1403. (1) A temporary or permanent unprotected cross connection between a public water supply and any source, piping, or system that may contain nonpotable water or other substances is prohibited.

- a. The underground reservoir (ST301) overflow pipe is thought to discharge directly to a storm sewer without a proper air gap and is therefore an unprotected cross connection. Per Ten States 7.07, no overflow may be connected directly to any drain, sanitary sewer, or storm sewer. Overflow pipes should (1) be located so that any discharge is visible, (2) be brought to 12 to 24 inches above the ground surface and discharge over a drainage structure or splash plate, (3) open downward and be screened with 24-inch mesh non-corrodible screen, screened counter-weighted flapper, solid flapper with screen on inside, or similarly acceptable design.
 - b. The three unused chambers in the northwest corner of the underground reservoir (ST301) and the remain portion of the underground reservoir which is actively being used are only separated by valves in connective piping. Standing water of unknown quality was observed in at least one of the unused chambers. The valves are not an appropriate method to manage the cross connection between the non-potable water and potable water chambers in the reservoir. The connection between the unused and actively used chambers needs to be permanently sealed.
 - c. Lubricating water drain lines at the base of the vertical turbine pumps in the pump/control building (PS301) are piped to discharge directly into the underground reservoir (ST301). The lubricating water is nonpotable water of unknown quality. These drains must be reconfigured to discharge to the exterior of the building with the outlet at least 12 inches above ground or to a floor drain/storm drain with a proper air gap.
 - d. A hose bib vacuum breaker must be installed on the hose bib located inside the pump/control building (PS301) on the pump discharge line to the elevated water storage tank.
5. R 325.11112 Storage tank generally.
Rule 1112. All gravity storage tanks shall be provided with all of the following: ...(c)
Have no unprotected openings. ...

Unsealed gaps were observed around the base of vertical turbine pumps and the concrete base in the pump/control building (PS301). Depending on the presence and condition of a gaskets under the base plate, these gaps have the potential to allow contaminants into the underground reservoir (ST301). The gaps must be properly sealed.

Refer to the requirements and deadlines detailed in the March 10, 2022, sanitary survey letter for addressing the significant deficiencies listed above.

Deficiencies:

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

During the survey, two deficiencies were identified and are listed below:

1. The 2018 tank inspection report noted several inches (an estimated 2 to 4 inches) of sedimentation on the bottom of the tank in the underground reservoir (ST301) and a minor layer in the elevated water storage tank (ST300). The Supply must schedule a clean out of the reservoir. Both tanks should be monitored for sedimentation build up and the sedimentation should be routinely cleaned out as this can harbor bacteria and degrade water quality. The elevated water storage tank (ST300) has a mud valve which can be used to clean out sediment from the tank. Per Rule 325.11112 (f), the Supply should review what mechanisms are in place to prevent sediments that accumulate in the tanks from entering the distribution system.
2. The 2018 tank inspection reported noted that metal surfaces within the underground reservoir (ST301) including piping and hatches were observed to be corroded. Corrosion if left unattended will compromise the integrity of the metal and cause failure of metal components. The corroded metals also have the potential to introduce contaminants into the water. Per Rule 325.11118, the Supplies shall take reasonable precautions to prevent introduction of contaminants into the distribution system. Structurally compromised metals should be repaired or replaced. Metal surfaces should be cleaned and properly coated to prevent corrosion and coatings should be maintained as part of tank maintenance activities.

For the above deficiencies, provide a schedule for completing the necessary repairs or activities to address each deficiency to this office by April 9, 2022.

Recommendations:

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

During the survey, the following recommendations were identified:

1. Distribution System:
 - a. *Hydrants & Valves.* We understand that the Supply flushes hydrants annually as part of winterization but does not perform systematic flushing of the distribution

system. Systematic flushing at scouring velocities aids in the removal of buildup from pipe inner walls helping to improve water quality and carrying capacity. The Supply also does not have a valve turning program. EGLE encourages the Supply to develop these programs. As these programs are being developed, the Supply should consider tracking the valves turned during water main breaks or other construction or maintenance activities. This information will help assess the approximate number of valves currently being turned. It is recommended that the valve exercise program be coordinated and performed with the systematic hydrant flushing program and to schedule at least one third of the total number of valves to be exercised per year.

- b. *Construction & Maintenance.* This system routinely has a high number of breaks per year with an annual average of around 15 breaks, which translates to about a break every two miles of main. Cast iron pipe makes up 42% of the water main, and 54% is ductile iron. Information on the age of this pipe has not been provided but given the age of the community, some of the water main is likely over 60 years old and could be as old as 100 years. The Supply has an annual leak detection program and repairs the leaks that are identified. In addition, the Supply has recently purchased in-house leak detection equipment to supplement the annual program. The water main replacement program has doubled the length of water main being permitted for replacement. Pressure in the south district can be as high as 120 psi which could contribute to the higher number of breaks in this district. The 2021 Reliability Study includes several projects which may address some of these issues. EGLE encourages the Supply to implement these water system improvements and to continue the above efforts in earnest as frequent breaks are inconvenient to the Supply's customers and create the potential for contaminants to enter the distribution system.
- c. *General Plan (Part 16).* EGLE received the 2021 update to the Supply's reliability study, which also included General plan requirements under Part 16 of the Rules. EGLE provided comments in an email on February 11, 2022. **Please address these comments and provide this information to this office by April 9, 2022.**
- d. *Cross Connections (Part 14).* Please confirm that your cross connection program includes the requirement under R325.11405(3) that testers of backflow prevention devices hold a current American Society of Sanitary Engineers (ASSE) 5110 certification. This certification is needed for the test results to be considered valid. In addition, the Supply needs to confirm that certified testers are also being used in practice.
- e. *Capacity.* Please provide a copy of the most current agreement with Great Lakes Water Authority (GLWA) **to this office by April 9, 2022.**

2. Finished Water Storage:

- a. The Supply last conducted inspection of the elevated water storage tank (ST300) and the underground reservoir (ST301) in 2018 and should include routine inspections in the department's budget. Typically, inspections are recommended every five years and the next inspection should occur in 2023.
- b. Remove all woody vegetation around the perimeter of the underground reservoir and the woody vegetation growing at the exterior down-turned air vent. The area over the buried reservoir and around the perimeter of the reservoir needs to be maintained such that woody vegetation does not establish and grow. Woody vegetation is a concern due to the deeper root systems which can penetrate the concrete roof and walls of the reservoir and create an avenue for contaminants to enter affect water quality and can also affect the integrity of the concrete. **Please complete this by April 9, 2022 and provide photographic documentation that this work was completed.**
- c. Please provide a scaled map showing the underground reservoir (ST301) and the location adjacent storm and sanitary sewers. For sewers within less than 50 feet of the reservoir, please provide details on the type of sewer and construction of these sewers. **Please provide this information to this office by April 9, 2022.**
- d. At the elevated water storage tank (ST300), on the backside of the tank base, there is a small area between the concrete foundation and the baseplate of the tower where concrete is missing. This should be repaired and resealed to maintain the integrity of the foundation of the elevated tank.
- e. During the next opportunity or inspection for the elevated storage tank (ST300), please confirm that there is a 24-mesh screen present in the air vent and where this screen is located.
- f. During the next opportunity or inspection for the elevated storage tank (ST300), please confirm the presence of a gasket on the shoe-box style lids on the roof of the elevated tank. If they are not found to be present, then gaskets need to be installed to provide a watertight seal.
- g. During the next opportunity, install a clasp and lock on the wet interior hatch at the elevated storage tank (ST300) to prevent unauthorized access to the wet interior. This is especially important given that third party antenna vendors are given access to the roof.

3. Pumps:

- a. The downstream pressure gauge on the pressure reducing valve (PRV) in the pump/control building (PS301) on the fill line for the reservoir was observed to be non-functional. Please replace the pressure gauge as needed.
- b. An air/vacuum release device should be installed on the vertical turbine pump discharge line before the check valve. In addition, a meter should be installed on the discharge side of the pumps. The capacity of the pumps should be assessed on a regular basis to confirm the adequate performance of the pump and to aid in identifying when pump repair or replacement is needed.
- c. The metal above grade diesel fuel storage tank for the onsite generator for vertical turbine pump number one is located at the pump/control building (PS301) and is directly adjacent to the underground water reservoir (ST301). Appropriately sized secondary containment should be provided for the diesel tank and the battery for the generator.

4. Monitoring & Reporting:

- a. *Bacteriological Monitoring.* EGLE recommends that the Supply look for opportunities to add sites in the north pressure district. Currently, the sampling plan has only one site near the storage tanks, which should be maintained. The Supply may need to consider installing sampling stations as the north pressure district is primarily residential.
- b. *Chemical Monitoring.* The Supply should regularly review and evaluate monthly residual chlorine data collected by GLWA at the bacteriological sample sites. Act 399, Rule 325.10611a, *Filtration and disinfection; disinfection*, subpart (c), states: "The residual disinfectant concentration in the distribution system...shall not be undetectable in more than 5% of the samples each month for any 2 consecutive months that the supply serves water to the public. Water in the distribution system that has a heterotrophic bacteria concentration less than or equal to 500 per milliliter, measured as heterotrophic plate count (HPC), is considered to have a detectable disinfectant residual for purposes of determining compliance with this subdivision". For your supply, residual chlorine is measured at seven bacteriological sites each month; if one site has a non-detectable residual and HPC concentration over 500 and this occurs for two consecutive months, then the Supply would be in violation. Regularly reviewing residual chlorine data will increase the Supply's understanding of the water quality conditions in their distribution system and whether there are low residual chlorine levels that make the Supply susceptible to violations. This information can be used by the Supply to evaluate and adjust system operations or monitoring. This could include, but is not limited to, conducting supplemental investigations or monitoring, reviewing sample site conditions and sampling procedures, installing sampling stations, developing a hydrant flushing program, checking for closed

valves, or other actions that would increase water movement, reduce water age, or improve water quality conditions.

- c. *Lead and Copper Monitoring.* During the next monitoring period for lead and copper sampling, please increase the number of lead service lines (Tier I sites) that are sampled as the sampling plan lists 13. Last year, 3 out of these 13 lead service line sites were sampled.
- d. A Complete Distribution System Material Inventory (CDSMI) must be submitted to EGLE by January 1, 2025 per Rule 325.11604(c)(ii). Please visit our Lead and Copper Rule webpage (www.michigan.gov/LCR) for more details on how to develop your CDSMI and information on physical verification of service line materials. It is important that the Supply include this in their planning and budgeting to ensure that the Supply has a plan to meet this requirement.
- e. Per Rule 325.10604f (6), the requirement to replace all lead service lines and galvanized service lines that are currently or were previously connect to lead piping at a rate averaging 5% per year, not to exceed 20 years total for replacement of these service lines began January 1, 2021. The replacement of these service lines should be part of the Supply capital improvement plan and asset management plan to ensure that the Supply has a plan to meet this requirement.

5. Management & Operations:

- a. *Recordkeeping (Part 15).* The Supply should review the recordkeeping requirements under Part 15 of the Rules and update the Supply's record retention practices as appropriate. Enclosed with this letter is a table that provides a general summary of the requirements. The Supply may need to request documentation from GLWA or confirm the ability to obtain this documentation from GLWA to meet the recordkeeping requirements related to the Revised Total Coliform Rule and Revised Lead and Copper Rule.
- b. *Reliability Study (Part 12).* EGLE received the 2021 update to the Supply's reliability study and provided comments in an email on February 11, 2022 addressing required elements under Part 12 of the Rules. **Please address these comments and provide this information to this office by April 9, 2022.**



GRETCHEN WHITMER
GOVERNOR

Exhibit B
STATE OF MICHIGAN
DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY WARREN DISTRICT
OFFICE



LIESL EICHLER CLARK
DIRECTOR

September 21, 2022

Michael Domine
Director, Department of Public Works
City of Northville
215 West Main Street
Northville, Michigan 48167
Dear Michael Domine:

WSSN: 04830
County: Wayne
System: City of Northville

SUBJECT: Site Visit Confirming Corrections of Significant Deficiencies

A Significant Deficiency Violation Notice (SDVN) was issued by Department of Environment, Great Lakes, and Energy (EGLE) to the City of Northville on March 10, 2022, following a sanitary survey site visit conducted on February 10 and 11, 2022. Subsequently, the City of Northville provided notification to EGLE on April 9, 2022, via electronic mail, that several of the significant deficiencies had been addressed. However, a site visit was needed to confirm that these significant deficiencies had been resolved. This letter confirms the EGLE staff meeting with Michael Domine on September 16, 2022, to conduct a site inspection of the activities completed to address these significant deficiencies.

As a result of the site inspection, the following significant deficiencies have been confirmed as addressed and are considered resolved. Each significant deficiency is listed based on the enumeration used in the SDVN, includes the significant deficiency as identified in the SDVN, and is followed by the site inspection observations.

- Significant deficiency #1:

“R 325.11118 Protection of storage tanks.

Rule 1118. Public water supplies shall take reasonable precautions... to prevent introduction of contaminants into the distribution system.

The presence of a hornet's nest inside and behind the screen of the exterior down-turned air vent for the underground finished water reservoir (ST301), which is located on the back of the pump/control building, is a violation of Rule 1118. Removal of the hornet's nest is needed for the water supply to return to compliance as insects have the potential to spread contaminants to the potable water in the reservoir.”

Field observations confirmed the removal of the hornet's nest from the vent.

- Significant deficiency #4 c:

City of Northville

Page 2

September 21, 2022

“R 325.11118 Protection of storage tanks.

Rule 1118. Public water supplies shall take reasonable precautions... to prevent introduction of contaminants into the distribution system.

R 325.114003 Cross-connections prohibited.

Rule 1403. (1) A temporary or permanent unprotected cross connection between a public water supply and any source, piping, or system that may contain nonpotable water or other substances is prohibited.

Lubricating water drain lines at the base of the vertical turbine pumps in the pump/control building (PS301) are piped to discharge directly into the underground reservoir (ST301). The lubricating water is nonpotable water of unknown quality. These drains must be reconfigured to discharge to the exterior of the building with the outlet at least 12 inches above ground or to a floor drain/storm drain with a proper air gap.”

Field operations confirmed that piping was added from the discharge of the lubricating water drain lines at the base of each vertical turbine pump directing the water to the exterior of the building where the outlet is covered by a screen and is located at least 12-inches above the existing ground surface.

- Significant deficiency #4 d:

“R 325.11118 Protection of storage tanks.

Rule 1118. Public water supplies shall take reasonable precautions... to prevent introduction of contaminants into the distribution system.

R 325.114003 Cross-connections prohibited.

Rule 1403. (1) A temporary or permanent unprotected cross connection between a public water supply and any source, piping, or system that may contain nonpotable water or other substances is prohibited.

A hose bib vacuum breaker must be installed on the hose bib located inside the pump/control building (PS301) on the pump discharge line to the elevated water storage tank.”

Field operations confirmed that a hose bib vacuum breaker has been installed on the hose bib.

- Significant deficiency #5:

"R 325.11112 Storage tank generally.

Rule 1112. All gravity storage tanks shall be provided with all of the following:

...(c) Have no unprotected openings. ...

Unsealed gaps were observed around the base of vertical turbine pumps and the concrete base in the pump/control building (PS301). Depending on the presence and condition of a gaskets under the base plate, these gaps have the potential to

City of Northville

Page 3

September 21, 2022 allow contaminants into the underground reservoir (ST301). The gaps must be properly sealed."

Field observations confirmed that the gaps around the base of the vertical turbine pumps have been sealed.

Thank you for taking the time to meet with me. We look forward to continuing to work with the City of Northville to address the remaining unresolved significant deficiencies. If you have any questions, please feel free to contact me by phone at 586-817-9120; by email at yuskokotimko@michigan.gov; or in writing at EGLE, DWEHD, Warren District Office, 27700 Donald Court, Warren, Michigan 48092.

Sincerely,



Tiffany Yusko-Kotimko, District Engineer
Field Operations Section
Drinking Water and Environmental
Health Division

cc: Jennifer Chehab, Fleis & Vandenbrink
Wayne County Department of Health, Human & Veterans Services
Brandon Onan, EGLE (via email)
Maureen Nelson, EGLE (via email)

APPENDIX F: SERVICE LINE MATERIAL SUMMARY TABLES

City of Northville - Water Service Shut-Off						
Service Address	Size	Service Type				
		Copper	Plastic	GPCL	Lead	*Unknown
502 NOVI ST	5/8 INCH WATER METER			1		
515 NOVI ST	1 INCH WATER METER			1		
516 NOVI ST	5/8 INCH WATER METER			1		
520 NOVI ST	5/8 INCH WATER METER			1		
555 NOVI ST	5/8 INCH WATER METER	1				
601 NOVI ST	5/8 INCH WATER METER	1				
610 NOVI ST	5/8 INCH WATER METER			1		
613 NOVI ST	5/8 INCH WATER METER	1				
625 NOVI ST	5/8 INCH WATER METER	1				
633 NOVI ST	5/8 INCH WATER METER			1		
637 NOVI ST	1 INCH WATER METER	1				
659 NOVI ST	5/8 INCH WATER METER	1				
719 NOVI ST	5/8 INCH WATER METER	1				
729 NOVI ST	5/8 INCH WATER METER	1				
735 NOVI ST	5/8 INCH WATER METER	1				
745 NOVI ST	1 INCH WATER METER	1				
755 NOVI ST	5/8 INCH WATER METER	1				
765 NOVI ST	5/8 INCH WATER METER	1				
769 NOVI ST	5/8 INCH WATER METER	1				
811 NOVI ST	5/8 INCH WATER METER	1				
845 NOVI ST	1 INCH WATER METER	1				
857 NOVI ST	5/8 INCH WATER METER			1		
906 NOVI ST	5/8 INCH WATER METER	1				
916 NOVI ST	5/8 INCH WATER METER	1				
917 NOVI ST	5/8 INCH WATER METER	1				
926 NOVI ST	5/8 INCH WATER METER	1				
929 NOVI ST	5/8 INCH WATER METER	1				
936 NOVI ST	5/8 INCH WATER METER	1				
941 NOVI ST	5/8 INCH WATER METER	1				
946 NOVI ST	5/8 INCH WATER METER	1				
953 NOVI ST	5/8 INCH WATER METER	1				
956 NOVI ST	5/8 INCH WATER METER	1				
965 NOVI ST	5/8 INCH WATER METER	1				
966 NOVI ST	5/8 INCH WATER METER	1				
977 NOVI ST	5/8 INCH WATER METER	1				
986 NOVI ST	5/8 INCH WATER METER	1				
989 NOVI ST	5/8 INCH WATER METER	1				

<i>City of Northville - Water Service Shut-Off</i>						
Service Address	Size	Service Type				
		Copper	Plastic	GPCL	Lead	*Unknown
230 FIRST AVE	5/8 INCH WATER METER	1				
235 FIRST AVE	5/8 INCH WATER METER	1				
245 FIRST AVE	1 INCH WATER METER	1				
250 FIRST AVE	3/4 INCH WATER METER	1				
280 FIRST AVE	5/8 INCH WATER METER	1				
310 FIRST AVE	5/8 INCH WATER METER			1		
311 FIRST AVE	5/8 INCH WATER METER	1				
320 FIRST AVE	5/8 INCH WATER METER	1				
324 FIRST AVE	5/8 INCH WATER METER	1				
325 FIRST AVE	5/8 INCH WATER METER	1				
334 FIRST AVE	5/8 INCH WATER METER	1				
335 FIRST AVE	5/8 INCH WATER METER	1				
336 FIRST AVE	5/8 INCH WATER METER	1				
341 FIRST AVE	5/8 INCH WATER METER	1				
344 FIRST AVE	5/8 INCH WATER METER	1				
349 FIRST AVE	5/8 INCH WATER METER	1				
358 FIRST AVE	5/8 INCH WATER METER			1		
359 FIRST AVE	5/8 INCH WATER METER	1				
367 FIRST AVE	5/8 INCH WATER METER	1				
370 FIRST AVE	5/8 INCH WATER METER	1				
375 FIRST AVE	5/8 INCH WATER METER	1				
376 FIRST AVE	1 INCH WATER METER	1				
383 FIRST AVE	5/8 INCH WATER METER					1
384 FIRST AVE	5/8 INCH WATER METER	1				
385 FIRST AVE	5/8 INCH WATER METER					1
393 FIRST AVE	5/8 INCH WATER METER					1
394 FIRST AVE	1 INCH WATER METER	1				
395 FIRST AVE	5/8 INCH WATER METER					1

City of Northville - Water Service Shut-Off						
Service Address	Size	Service Type				
		Copper	Plastic	GPCL	Lead	*Unknown
626 THAYER BLVD	5/8 INCH WATER METER	1				
646 THAYER BLVD	5/8 INCH WATER METER	1				
647 THAYER BLVD	5/8 INCH WATER METER			1		
654 THAYER BLVD	5/8 INCH WATER METER	1				
656 THAYER BLVD	5/8 INCH WATER METER	1				
663 THAYER BLVD	5/8 INCH WATER METER			1		
672 THAYER BLVD	5/8 INCH WATER METER			1		
677 THAYER BLVD	1 INCH WATER METER	1				
682 THAYER BLVD	5/8 INCH WATER METER			1		
690 THAYER BLVD	5/8 INCH WATER METER	1				
703 THAYER BLVD	1 INCH WATER METER					1
712 THAYER BLVD	5/8 INCH WATER METER			1		
718 THAYER BLVD	5/8 INCH WATER METER	1				
726 THAYER BLVD	5/8 INCH WATER METER					1
727 THAYER BLVD	5/8 INCH WATER METER	1				
736 THAYER BLVD	5/8 INCH WATER METER	1				
744 THAYER BLVD	1 INCH WATER METER	1				
745 THAYER BLVD	1 INCH WATER METER	1				
745 THAYER BLVD	1 INCH WATER METER	1				
760 THAYER BLVD	5/8 INCH WATER METER	1				
761 THAYER BLVD	1 INCH WATER METER	1				
777 THAYER BLVD	5/8 INCH WATER METER	1				
789 THAYER BLVD	5/8 INCH WATER METER				1	
790 THAYER BLVD	1 1/2 INCH WATER MET					1
795 THAYER BLVD	5/8 INCH WATER METER	1				

<i>City of Northville - Water Service Shut-Off</i>						
Service Address	Size	Service Type				
		Copper	Plastic	GPCL	Lead	*Unknown
330 EATON DR	5/8 INCH WATER METER			1		
335 EATON DR	5/8 INCH WATER METER			1		
340 EATON DR	5/8 INCH WATER METER			1		
350 EATON DR	5/8 INCH WATER METER	1				
360 EATON DR	5/8 INCH WATER METER			1		
361 EATON DR	5/8 INCH WATER METER	1				
365 EATON DR	5/8 INCH WATER METER	1				
370 EATON DR	5/8 INCH WATER METER	1				
375 EATON DR	5/8 INCH WATER METER			1		
380 EATON DR	5/8 INCH WATER METER			1		
385 EATON DR	5/8 INCH WATER METER	1				
404 EATON DR	5/8 INCH WATER METER			1		
405 EATON DR	5/8 INCH WATER METER			1		
415 EATON DR	5/8 INCH WATER METER	1				
428 EATON DR	5/8 INCH WATER METER			1		
435 EATON DR	5/8 INCH WATER METER	1				
438 EATON DR	5/8 INCH WATER METER			1		
440 EATON DR	5/8 INCH WATER METER	1				
446 EATON DR	5/8 INCH WATER METER	1				
455 EATON DR	5/8 INCH WATER METER	1				
475 EATON DR	5/8 INCH WATER METER	1				
512 EATON DR	5/8 INCH WATER METER	1				

<i>City of Northville - Water Service Shut-Off</i>						
Service Address	Size	Service Type				
		Copper	Plastic	GPCL	Lead	*Unknown
515 LINDEN CT	1 INCH WATER METER	1				
525 LINDEN CT	1 INCH WATER METER	1				
531 LINDEN CT	5/8 INCH WATER METER	1				
535 LINDEN CT	1 INCH WATER METER	1				
541 LINDEN CT	1 INCH WATER METER	1				
105 LINDEN ST	5/8 INCH WATER METER	1				
115 LINDEN ST	5/8 INCH WATER METER			1		
117 LINDEN ST	5/8 INCH WATER METER			1		
118 LINDEN ST	5/8 INCH WATER METER			1		
217 LINDEN ST	5/8 INCH WATER METER	1				
220 LINDEN ST	5/8 INCH WATER METER	1				
222 LINDEN ST	5/8 INCH WATER METER	1				
223 LINDEN ST	5/8 INCH WATER METER	1				
224 LINDEN ST	5/8 INCH WATER METER	1				
226 LINDEN ST	5/8 INCH WATER METER			1		
228 LINDEN ST	5/8 INCH WATER METER	1				
229 LINDEN ST	5/8 INCH WATER METER	1				
238 LINDEN ST	5/8 INCH WATER METER	1				
248 LINDEN ST	5/8 INCH WATER METER	1				
254 LINDEN ST	5/8 INCH WATER METER	1				
265 LINDEN ST	5/8 INCH WATER METER	1				
320 LINDEN ST	5/8 INCH WATER METER	1				
335 LINDEN ST	1 INCH WATER METER	1				
336 LINDEN ST	1 INCH WATER METER			1		
373 LINDEN ST	5/8 INCH WATER METER	1				

City of Northville - Water Service Shut-Off						
Service Address	Size	Service Type				
		Copper	Plastic	GPCL	Lead	*Unknown
501 FAIRBROOK ST	5/8 INCH WATER METER			1		
504 FAIRBROOK ST	5/8 INCH WATER METER	1				
505 FAIRBROOK ST	5/8 INCH WATER METER	1				
508 FAIRBROOK ST	5/8 INCH WATER METER	1				
509 FAIRBROOK ST	5/8 INCH WATER METER	1				
513 FAIRBROOK ST	5/8 INCH WATER METER	1				
517 FAIRBROOK ST	5/8 INCH WATER METER	1				
522 FAIRBROOK ST	5/8 INCH WATER METER	1				
525 FAIRBROOK ST	2 INCH WATER METER	1				
532 FAIRBROOK ST	5/8 INCH WATER METER			1		
602 FAIRBROOK ST	5/8 INCH WATER METER	1				
607 FAIRBROOK ST	5/8 INCH WATER METER	1				
616 FAIRBROOK ST	5/8 INCH WATER METER	1				
619 FAIRBROOK ST	5/8 INCH WATER METER	1				
622 FAIRBROOK ST	1 INCH WATER METER			1		
623 FAIRBROOK ST	5/8 INCH WATER METER			1		
628 FAIRBROOK ST	1 INCH WATER METER			1		
637 FAIRBROOK ST	1 INCH WATER METER	1				
639 FAIRBROOK ST	1 INCH WATER METER	1				
640 FAIRBROOK ST	5/8 INCH WATER METER			1		
720 FAIRBROOK ST	5/8 INCH WATER METER	1				
726 FAIRBROOK ST	5/8 INCH WATER METER			1		
740 FAIRBROOK ST	5/8 INCH WATER METER	1				

APPENDIX G: RESERVOIR FEASABILITY STUDY
TO BE INCLUDED IN THE FINAL DRAFT

APPENDIX H: COST OPINIONS

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Open Cut Water Main Installation
Project 1a: Cady St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$56,000	\$56,000
2	Audio Video Route Survey	1	LSUM	\$4,000	\$4,000
3	Traffic Maintenance and Control	1	LSUM	\$11,000	\$11,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$6,000	\$6,000
5	Water Main, CL-54, DI, 12-inch, Pavement	1,950	Ft	\$260	\$507,000
6	Fire Hydrant	3	Ea	\$10,000	\$30,000
7	Gate Valve and Well	9	Ea	\$8,000	\$72,000
8	Connection to Existing Water Main	2	Ea	\$5,500	\$11,000
9	Restoration	75%		\$620,000	\$465,000
				SUBTOTAL:	\$1,162,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$35,000
	General Requirements	2%			\$24,000
	Contingencies	20%			\$233,000
				TOTAL CONSTRUCTION COST:	\$1,454,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$291,000
	Finance and Legal	2%			\$30,000
	Geotechnical Services	1%			\$15,000
				TOTAL PROJECT COSTS:	\$336,000
	Adjustment of Costs from ENR CCI	1.00			\$336,000
	ENGINEER'S OPINION OF PROJECT COST				\$1,790,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Directionally Drilled Water Main Installation
Project 1a: Cady St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$57,000	\$57,000
2	Audio Video Route Survey	1	LSUM	\$4,000	\$4,000
3	Traffic Maintenance and Control	1	LSUM	\$12,000	\$12,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$6,000	\$6,000
5	Water Main, CL-54, DI, 12-inch, Directional Drill	1,950	Ft	\$300	\$585,000
6	Fire Hydrant	3	Ea	\$10,000	\$30,000
7	Gate Valve and Well	9	Ea	\$8,000	\$72,000
8	Connection to Existing Water Main	2	Ea	\$5,500	\$11,000
9	Restoration	60%		\$698,000	\$418,800
				SUBTOTAL:	\$1,196,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$36,000
	General Requirements	2%			\$24,000
	Contingencies	20%			\$240,000
				TOTAL CONSTRUCTION COST:	\$1,496,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$300,000
	Finance and Legal	2%			\$30,000
	Geotechnical Services	1%			\$15,000
				TOTAL PROJECT COSTS:	\$345,000
	Adjustment of Costs from ENR CCI	1.00			\$345,000
	ENGINEER'S OPINION OF PROJECT COST				\$1,850,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Open Cut Water Main Installation
Project 1b: Main St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$93,000	\$93,000
2	Audio Video Route Survey	1	LSUM	\$6,000	\$6,000
3	Traffic Maintenance and Control	1	LSUM	\$19,000	\$19,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$10,000	\$10,000
5	Water Main, CL-54, DI, 12-inch, Pavement	2,950	Ft	\$260	\$767,000
6	Fire Hydrant	8	Ea	\$10,000	\$80,000
7	Gate Valve and Well	10	Ea	\$8,000	\$80,000
8	Connection to Existing Water Main	7	Ea	\$5,500	\$38,500
9	Water Main, CL-54, DI, 12-inch, Directional Drill	240	Ft	\$300	\$72,000
10	Restoration	75%		\$1,037,500	\$778,125
SUBTOTAL:					\$1,944,000
CONTRACTUAL REQUIREMENTS					
	General Conditions	3%			\$59,000
	General Requirements	2%			\$39,000
	Contingencies	20%			\$389,000
TOTAL CONSTRUCTION COST:					\$2,431,000
PROJECT COSTS					
	Design and Construction Engineering	20%			\$487,000
	Finance and Legal	2%			\$49,000
	Geotechnical Services	1%			\$25,000
TOTAL PROJECT COSTS:					\$561,000
	Adjustment of Costs from ENR CCI	1.00			\$561,000
ENGINEER'S OPINION OF PROJECT COST					\$3,000,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Directionally Drilled Water Main Installation
Project 1b: Main St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$95,000	\$95,000
2	Audio Video Route Survey	1	LSUM	\$6,000	\$6,000
3	Traffic Maintenance and Control	1	LSUM	\$19,000	\$19,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$10,000	\$10,000
5	Water Main, CL-54, DI, 12-inch, Directional Drill	3,190	Ft	\$300	\$957,000
6	Fire Hydrant	8	Ea	\$10,000	\$80,000
7	Gate Valve and Well	10	Ea	\$8,000	\$80,000
8	Connection to Existing Water Main	7	Ea	\$5,500	\$38,500
9	Restoration	60%		\$1,155,500	\$693,300
SUBTOTAL:					\$1,979,000
CONTRACTUAL REQUIREMENTS					
	General Conditions	3%			\$60,000
	General Requirements	2%			\$40,000
	Contingencies	20%			\$396,000
TOTAL CONSTRUCTION COST:					\$2,475,000
PROJECT COSTS					
	Design and Construction Engineering	20%			\$495,000
	Finance and Legal	2%			\$50,000
	Geotechnical Services	1%			\$25,000
TOTAL PROJECT COSTS:					\$570,000
	Adjustment of Costs from ENR CCI	1.00			\$570,000
ENGINEER'S OPINION OF PROJECT COST					\$3,050,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Open Cut Water Main Installation
Project 1c: Lower Griswold St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$8,000	\$8,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$2,000	\$2,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$2,000	\$2,000
5	Water Main, CL-54, DI, 8-inch, Pavement	360	Ft	\$210	\$75,600
6	Fire Hydrant	0	Ea	\$10,000	\$0
7	Gate Valve and Well	1	Ea	\$7,000	\$7,000
8	Connection to Existing Water Main	1	Ea	\$4,500	\$4,500
9	Restoration	75%		\$87,100	\$65,325
				SUBTOTAL:	\$167,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$6,000
	General Requirements	2%			\$4,000
	Contingencies	20%			\$34,000
				TOTAL CONSTRUCTION COST:	\$211,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$43,000
	Finance and Legal	2%			\$5,000
	Geotechnical Services	1%			\$3,000
				TOTAL PROJECT COSTS:	\$51,000
	Adjustment of Costs from ENR CCI	1.00			\$51,000
	ENGINEER'S OPINION OF PROJECT COST				\$270,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Directionally Drilled Water Main Installation
Project 1c: Lower Griswold St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$9,000	\$9,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$2,000	\$2,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$2,000	\$2,000
5	Water Main, CL-54, DI, 8-inch, Directional Drill	360	Ft	\$250	\$90,000
6	Fire Hydrant	0	Ea	\$10,000	\$0
7	Gate Valve and Well	1	Ea	\$7,000	\$7,000
8	Connection to Existing Water Main	1	Ea	\$4,500	\$4,500
9	Restoration	60%		\$101,500	\$60,900
				SUBTOTAL:	\$178,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$6,000
	General Requirements	2%			\$4,000
	Contingencies	20%			\$36,000
				TOTAL CONSTRUCTION COST:	\$224,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$45,000
	Finance and Legal	2%			\$5,000
	Geotechnical Services	1%			\$3,000
				TOTAL PROJECT COSTS:	\$53,000
	Adjustment of Costs from ENR CCI	1.00			\$53,000
	ENGINEER'S OPINION OF PROJECT COST				\$280,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Open Cut Water Main Installation
Project 1d: Church St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$11,000	\$11,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$2,000	\$2,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$2,000	\$2,000
5	Water Main, CL-54, DI, 8-inch, Pavement	360	Ft	\$210	\$75,600
6	Fire Hydrant	1	Ea	\$10,000	\$10,000
7	Gate Valve and Well	3	Ea	\$7,000	\$21,000
8	Connection to Existing Water Main	1	Ea	\$4,500	\$4,500
9	Restoration	75%		\$111,100	\$83,325
				SUBTOTAL:	\$212,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$7,000
	General Requirements	2%			\$5,000
	Contingencies	20%			\$43,000
				TOTAL CONSTRUCTION COST:	\$267,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$54,000
	Finance and Legal	2%			\$6,000
	Geotechnical Services	1%			\$3,000
				TOTAL PROJECT COSTS:	\$63,000
	Adjustment of Costs from ENR CCI	1.00			\$63,000
	ENGINEER'S OPINION OF PROJECT COST				\$330,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Directionally Drilled Water Main Installation
Project 1d: Church St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$11,000	\$11,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$3,000	\$3,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$2,000	\$2,000
5	Water Main, CL-54, DI, 8-inch, Directional Drill	360	Ft	\$250	\$90,000
6	Fire Hydrant	1	Ea	\$10,000	\$10,000
7	Gate Valve and Well	3	Ea	\$7,000	\$21,000
8	Connection to Existing Water Main	1	Ea	\$4,500	\$4,500
9	Restoration	60%		\$125,500	\$75,300
SUBTOTAL:					\$220,000
CONTRACTUAL REQUIREMENTS					
	General Conditions	3%			\$7,000
	General Requirements	2%			\$5,000
	Contingencies	20%			\$44,000
TOTAL CONSTRUCTION COST:					\$276,000
PROJECT COSTS					
	Design and Construction Engineering	20%			\$56,000
	Finance and Legal	2%			\$6,000
	Geotechnical Services	1%			\$3,000
TOTAL PROJECT COSTS:					\$65,000
	Adjustment of Costs from ENR CCI	1.00			\$65,000
ENGINEER'S OPINION OF PROJECT COST					\$350,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Open Cut Water Main Installation
Project 1e: Novi St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$32,000	\$32,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$7,000	\$7,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$3,000	\$3,000
5	Water Main, CL-54, DI, 12-inch, Pavement	890	Ft	\$260	\$231,400
6	Fire Hydrant	3	Ea	\$10,000	\$30,000
7	Gate Valve and Well	8	Ea	\$8,000	\$64,000
8	Connection to Existing Water Main	4	Ea	\$5,500	\$22,000
9	Restoration	75%		\$347,400	\$260,550
				SUBTOTAL:	\$653,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$20,000
	General Requirements	2%			\$14,000
	Contingencies	20%			\$131,000
				TOTAL CONSTRUCTION COST:	\$818,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$164,000
	Finance and Legal	2%			\$17,000
	Geotechnical Services	1%			\$9,000
				TOTAL PROJECT COSTS:	\$190,000
	Adjustment of Costs from ENR CCI	1.00			\$190,000
	ENGINEER'S OPINION OF PROJECT COST				\$1,010,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Directionally Drilled Water Main Installation
Project 1e: Novi St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$26,000	\$26,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$6,000	\$6,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$3,000	\$3,000
5	Water Main, DR-11, HDPE, 12-inch, Directional Drill	890	Ft	\$270	\$240,300
6	Fire Hydrant	3	Ea	\$10,000	\$30,000
7	Gate Valve and Well	8	Ea	\$8,000	\$64,000
8	Connection to Existing Water Main	4	Ea	\$5,500	\$22,000
9	Restoration	40%		\$356,300	\$142,520
				SUBTOTAL:	\$537,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$17,000
	General Requirements	2%			\$11,000
	Contingencies	20%			\$108,000
				TOTAL CONSTRUCTION COST:	\$673,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$135,000
	Finance and Legal	2%			\$14,000
	Geotechnical Services	1%			\$7,000
				TOTAL PROJECT COSTS:	\$156,000
	Adjustment of Costs from ENR CCI	1.00			\$156,000
	ENGINEER'S OPINION OF PROJECT COST				\$830,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Open Cut Water Main Installation
Project 1f: Baseline Rd.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$18,000	\$18,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$4,000	\$4,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$2,000	\$2,000
5	Water Main, CL-54, DI, 12-inch, Pavement	530	Ft	\$260	\$137,800
6	Fire Hydrant	2	Ea	\$10,000	\$20,000
7	Gate Valve and Well	3	Ea	\$8,000	\$24,000
8	Connection to Existing Water Main	2	Ea	\$5,500	\$11,000
9	Restoration	75%		\$192,800	\$144,600
				SUBTOTAL:	\$364,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$11,000
	General Requirements	2%			\$8,000
	Contingencies	20%			\$73,000
				TOTAL CONSTRUCTION COST:	\$456,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$92,000
	Finance and Legal	2%			\$10,000
	Geotechnical Services	1%			\$5,000
				TOTAL PROJECT COSTS:	\$107,000
	Adjustment of Costs from ENR CCI	1.00			\$107,000
	ENGINEER'S OPINION OF PROJECT COST				\$570,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Directionally Drilled Water Main Installation
Project 1f: Baseline Rd.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$15,000	\$15,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$3,000	\$3,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$2,000	\$2,000
5	Water Main, DR-11, HDPE, 12-inch, Directional Drill	530	Ft	\$270	\$143,100
6	Fire Hydrant	2	Ea	\$10,000	\$20,000
7	Gate Valve and Well	3	Ea	\$8,000	\$24,000
8	Connection to Existing Water Main	2	Ea	\$5,500	\$11,000
9	Restoration	40%		\$198,100	\$79,240
				SUBTOTAL:	\$300,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$9,000
	General Requirements	2%			\$6,000
	Contingencies	20%			\$60,000
				TOTAL CONSTRUCTION COST:	\$375,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$75,000
	Finance and Legal	2%			\$8,000
	Geotechnical Services	1%			\$4,000
				TOTAL PROJECT COSTS:	\$87,000
	Adjustment of Costs from ENR CCI	1.00			\$87,000
	ENGINEER'S OPINION OF PROJECT COST				\$470,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Booster Station
Project 2a: 1100 gpm Booster Station at GLWA Vault NL-01
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: AS
 Reviewer: CJE
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Site Work (Site prep, watermain, driveway, SESC)	1	LSUM	\$149,000	\$149,000
2	Landscape (grass restoration and tree replacement)	1	LSUM	\$27,000	\$27,000
3	Architectural (Booster station metal roof and brick cladding)	1	LSUM	\$180,000	\$180,000
4	Structural (booster station, generator foundations)	1	LSUM	\$75,000	\$75,000
5	Process (Booster Station)	1	LSUM	\$1,008,000	\$1,008,000
6	Mechanical (incl. with Process)	1	LSUM	\$0	\$0
7	Electrical (Generator, SCADA, Elec Utilities)	1	LSUM	\$700,000	\$700,000
				SUBTOTAL:	\$2,139,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$65,000
	General Requirements	2%			\$43,000
	Contingencies	20%			\$428,000
				TOTAL CONSTRUCTION COST:	\$2,675,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$535,000
	Finance and Legal	2%			\$54,000
	Geotechnical Services	1%			\$27,000
				TOTAL PROJECT COSTS:	\$616,000
	Adjustment of Costs from ENR CCI	1.00			\$616,000
	ENGINEER'S OPINION OF PROJECT COST				\$3,300,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Underground Reservoir
Project 2a: 520,000 Gallon Underground Reservoir and Filter Building Abandonment
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/20/2023
 Project No. 152230040
 Prepared By: AS
 Reviewer: CJE
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Site Work (Driveway Removal, Fence Removal, SESC)	1	LSUM	\$15,000	\$15,000
2	Landscape (grass restoration and plantings)	1	LSUM	\$15,000	\$15,000
3	Filter/Pump Station Building Demolition	1	LSUM	\$40,000	\$40,000
4	Reservoir Roof Demolition	1	LSUM	\$60,000	\$60,000
5	Wall removal to 3' below grade and floor drainage locations	1	LSUM	\$3,000	\$3,000
6	Reservoir Backfill	2,600	CYD	\$35	\$91,000
7	Utility Modifications	1	LSUM	\$2,000	\$2,000
				SUBTOTAL:	\$226,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$7,000
	General Requirements	2%			\$5,000
	Contingencies	20%			\$46,000
				TOTAL CONSTRUCTION COST:	\$284,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$57,000
	Finance and Legal	2%			\$6,000
	Geotechnical Services	1%			\$3,000
				TOTAL PROJECT COSTS:	\$66,000
	Adjustment of Costs from ENR CCI	1.00			\$66,000
	ENGINEER'S OPINION OF PROJECT COST				\$350,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Open Cut Water Main Installation
Project 2b: W. Baseline Rd. to Baseline Rd. & N. Center St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$33,000	\$33,000
2	Audio Video Route Survey	1	LSUM	\$4,000	\$4,000
3	Traffic Maintenance and Control	1	LSUM	\$7,000	\$7,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$5,000	\$5,000
5	Water Main, CL-54, DI, 12-inch, Pavement	900	Ft	\$260	\$234,000
6	Water Main, CL-54, DI, 12-inch, Greenbelt	470	Ft	\$245	\$115,150
7	Fire Hydrant	0	Ea	\$10,000	\$0
8	Gate Valve and Well	4	Ea	\$8,000	\$32,000
9	Connection to Existing Water Main	2	Ea	\$5,500	\$11,000
10	Restoration	63%		\$392,150	\$247,026
SUBTOTAL:					\$688,000
CONTRACTUAL REQUIREMENTS					
	General Conditions	3%			\$21,000
	General Requirements	2%			\$14,000
	Contingencies	20%			\$138,000
TOTAL CONSTRUCTION COST:					\$861,000
PROJECT COSTS					
	Design and Construction Engineering	20%			\$173,000
	Finance and Legal	2%			\$18,000
	Geotechnical Services	1%			\$9,000
TOTAL PROJECT COSTS:					\$200,000
	Adjustment of Costs from ENR CCI	1.00			\$200,000
ENGINEER'S OPINION OF PROJECT COST					\$1,070,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Directionally Drilled Water Main Installation
Project 2b: W. Baseline Rd. to Baseline Rd. & N. Center St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$30,000	\$30,000
2	Audio Video Route Survey	1	LSUM	\$4,000	\$4,000
3	Traffic Maintenance and Control	1	LSUM	\$6,000	\$6,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$5,000	\$5,000
5	Water Main, DR-11, HDPE, 12-inch, Directional Drill	1,370	Ft	\$270	\$369,900
6	Fire Hydrant	0	Ea	\$10,000	\$0
7	Gate Valve and Well	4	Ea	\$8,000	\$32,000
8	Connection to Existing Water Main	2	Ea	\$5,500	\$11,000
9	Restoration	40%		\$412,900	\$165,160
				SUBTOTAL:	\$623,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$19,000
	General Requirements	2%			\$13,000
	Contingencies	20%			\$125,000
				TOTAL CONSTRUCTION COST:	\$780,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$156,000
	Finance and Legal	2%			\$16,000
	Geotechnical Services	1%			\$8,000
				TOTAL PROJECT COSTS:	\$180,000
	Adjustment of Costs from ENR CCI	1.00			\$180,000
	ENGINEER'S OPINION OF PROJECT COST				\$960,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Open Cut Water Main Installation
Project 2c: Upper Griswold St., Butler Ave., and Pennell St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$36,000	\$36,000
2	Audio Video Route Survey	1	LSUM	\$4,000	\$4,000
3	Traffic Maintenance and Control	1	LSUM	\$7,000	\$7,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$5,000	\$5,000
5	Water Main, CL-54, DI, 8-inch, Pavement	980	Ft	\$210	\$205,800
6	Water Main, CL-54, DI, 8-inch, Greenbelt	620	Ft	\$195	\$120,900
7	Fire Hydrant	4	Ea	\$10,000	\$40,000
8	Gate Valve and Well	5	Ea	\$7,000	\$35,000
9	Connection to Existing Water Main	5	Ea	\$4,500	\$22,500
10	Restoration	61%		\$424,200	\$260,618
SUBTOTAL:					\$737,000
CONTRACTUAL REQUIREMENTS					
	General Conditions	3%			\$23,000
	General Requirements	2%			\$15,000
	Contingencies	20%			\$148,000
TOTAL CONSTRUCTION COST:					\$923,000
PROJECT COSTS					
	Design and Construction Engineering	20%			\$185,000
	Finance and Legal	2%			\$19,000
	Geotechnical Services	1%			\$10,000
TOTAL PROJECT COSTS:					\$214,000
	Adjustment of Costs from ENR CCI	1.00			\$214,000
ENGINEER'S OPINION OF PROJECT COST					\$1,140,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Directionally Drilled Water Main Installation
Project 2c: Upper Griswold St., Butler Ave., and Pennell St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$35,000	\$35,000
2	Audio Video Route Survey	1	LSUM	\$4,000	\$4,000
3	Traffic Maintenance and Control	1	LSUM	\$5,000	\$5,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$5,000	\$5,000
5	Water Main, DR-11, HDPE, 8-inch, Directional Drill	1,600	Ft	\$240	\$384,000
6	Fire Hydrant	4	Ea	\$10,000	\$40,000
7	Gate Valve and Well	5	Ea	\$7,000	\$35,000
8	Connection to Existing Water Main	5	Ea	\$4,500	\$22,500
9	Restoration	40%		\$481,500	\$192,600
				SUBTOTAL:	\$723,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$22,000
	General Requirements	2%			\$15,000
	Contingencies	20%			\$145,000
				TOTAL CONSTRUCTION COST:	\$905,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$181,000
	Finance and Legal	2%			\$19,000
	Geotechnical Services	1%			\$10,000
				TOTAL PROJECT COSTS:	\$210,000
	Adjustment of Costs from ENR CCI	1.00			\$210,000
	ENGINEER'S OPINION OF PROJECT COST				\$1,120,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Open Cut Water Main Installation
Project 2d: Butler Ave. to Railroad St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$24,000	\$24,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$3,000	\$3,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$4,000	\$4,000
5	Water Main, CL-54, DI, 8-inch, Greenbelt	900	Ft	\$195	\$175,500
6	Fire Hydrant	3	Ea	\$10,000	\$30,000
7	Gate Valve and Well	2	Ea	\$7,000	\$14,000
8	Connection to Existing Water Main	1	Ea	\$4,500	\$4,500
9	Water Main, CL-54 DI, 8-inch in 24-inch Steel Casing, Jack and Bore	110	Ft	\$800	\$88,000
10	Restoration	50%		\$312,000	\$156,000
SUBTOTAL:					\$502,000
CONTRACTUAL REQUIREMENTS					
	General Conditions	3%			\$16,000
	General Requirements	2%			\$11,000
	Contingencies	20%			\$101,000
TOTAL CONSTRUCTION COST:					\$630,000
PROJECT COSTS					
	Design and Construction Engineering	20%			\$126,000
	Finance and Legal	2%			\$13,000
	Geotechnical Services	1%			\$7,000
TOTAL PROJECT COSTS:					\$146,000
	Adjustment of Costs from ENR CCI	1.00			\$146,000
ENGINEER'S OPINION OF PROJECT COST					\$780,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Directionally Drilled Water Main Installation
Project 2d: Butler Ave. to Railroad St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$26,000	\$26,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$4,000	\$4,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$4,000	\$4,000
5	Water Main, CL-54, DI, 8 inch, Directional Drill	900	Ft	\$250	\$225,000
6	Fire Hydrant	3	Ea	\$10,000	\$30,000
7	Gate Valve and Well	2	Ea	\$7,000	\$14,000
8	Connection to Existing Water Main	1	Ea	\$4,500	\$4,500
9	Water Main, CL-54 DI, 8-inch in 24-inch Steel Casing, Jack and Bore	110	Ft	\$800	\$88,000
10	Restoration	40%		\$361,500	\$144,600
SUBTOTAL:					\$543,000
CONTRACTUAL REQUIREMENTS					
	General Conditions	3%			\$17,000
	General Requirements	2%			\$11,000
	Contingencies	20%			\$109,000
TOTAL CONSTRUCTION COST:					\$680,000
PROJECT COSTS					
	Design and Construction Engineering	20%			\$136,000
	Finance and Legal	2%			\$14,000
	Geotechnical Services	1%			\$7,000
TOTAL PROJECT COSTS:					\$157,000
	Adjustment of Costs from ENR CCI	1.00			\$157,000
ENGINEER'S OPINION OF PROJECT COST					\$840,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: PRV Vaults
Project 2e: 3 PRV Vaults (At New Booster Station, Hill St. and Rogers St.)
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: CJE
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$59,000	\$59,000
2	Traffic Maintenance and Control	1	LSUM	\$7,000	\$7,000
3	Soil Erosion and Sedimentation Control	1	LSUM	\$1,000	\$1,000
4	Water Main, CL-54, DI, 12 inch, Pavement	46	Ft	\$260	\$11,960
5	Water Main, CL-54, DI, 10 inch, Pavement	132	Ft	\$235	\$31,020
6	Gate Valve and Well	9	Ea	\$8,000	\$72,000
7	9' x 11' Precast Concrete Vault	3	Ea	\$160,000	\$480,000
8	12" Pressure Reducing Valve	1	Ea	\$24,000	\$24,000
9	10" Pressure Reducing Valve	2	Ea	\$20,000	\$40,000
10	Process Piping	3	Ea	\$45,000	\$135,000
11	SCADA and Controls (BS PRV Only)	1	Ea	\$50,000	\$50,000
12	Restoration	40%		\$793,980	\$317,592
SUBTOTAL:					\$1,229,000
CONTRACTUAL REQUIREMENTS					
	General Conditions	3%			\$37,000
	General Requirements	2%			\$25,000
	Contingencies	20%			\$246,000
TOTAL CONSTRUCTION COST:					\$1,537,000
PROJECT COSTS					
	Design and Construction Engineering	20%			\$308,000
	Finance and Legal	2%			\$31,000
	Geotechnical Services	1%			\$16,000
TOTAL PROJECT COSTS:					\$355,000
ENGINEER'S OPINION OF PROJECT COST					\$1,900,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Open Cut Water Main Installation
Project 3a: 1st Ave.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$24,000	\$24,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$3,000	\$3,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$3,000	\$3,000
5	Water Main, CL-54, DI, 8-inch, Pavement	960	Ft	\$210	\$201,600
6	Fire Hydrant	3	Ea	\$10,000	\$30,000
7	Gate Valve and Well	4	Ea	\$7,000	\$28,000
8	Connection to Existing Water Main	2	Ea	\$4,500	\$9,000
9	Restoration	75%		\$268,600	\$201,450
				SUBTOTAL:	\$503,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$16,000
	General Requirements	2%			\$11,000
	Contingencies	20%			\$101,000
				TOTAL CONSTRUCTION COST:	\$631,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$127,000
	Finance and Legal	2%			\$13,000
	Geotechnical Services	1%			\$7,000
				TOTAL PROJECT COSTS:	\$147,000
	Adjustment of Costs from ENR CCI	1.00			\$147,000
	ENGINEER'S OPINION OF PROJECT COST				\$780,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Directionally Drilled Water Main Installation
Project 3a: 1st Ave.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$22,000	\$22,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$4,000	\$4,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$3,000	\$3,000
5	Water Main, DR-11, HDPE, 8-inch, Directional Drill	960	Ft	\$240	\$230,400
6	Fire Hydrant	3	Ea	\$10,000	\$30,000
7	Gate Valve and Well	4	Ea	\$7,000	\$28,000
8	Connection to Existing Water Main	2	Ea	\$4,500	\$9,000
9	Restoration	40%		\$297,400	\$118,960
SUBTOTAL:					\$448,000
CONTRACTUAL REQUIREMENTS					
	General Conditions	3%			\$14,000
	General Requirements	2%			\$9,000
	Contingencies	20%			\$90,000
TOTAL CONSTRUCTION COST:					\$561,000
PROJECT COSTS					
	Design and Construction Engineering	20%			\$113,000
	Finance and Legal	2%			\$12,000
	Geotechnical Services	1%			\$6,000
TOTAL PROJECT COSTS:					\$131,000
	Adjustment of Costs from ENR CCI	1.00			\$131,000
ENGINEER'S OPINION OF PROJECT COST					\$700,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Open Cut Water Main Installation
Project 3b: Linden St./Ct.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$30,000	\$30,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$4,000	\$4,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$4,000	\$4,000
5	Water Main, CL-54, DI, 8-inch, Pavement	1,170	Ft	\$210	\$245,700
6	Fire Hydrant	2	Ea	\$10,000	\$20,000
7	Gate Valve and Well	7	Ea	\$7,000	\$49,000
8	Connection to Existing Water Main	3	Ea	\$4,500	\$13,500
9	Restoration	75%		\$328,200	\$246,150
				SUBTOTAL:	\$615,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$19,000
	General Requirements	2%			\$13,000
	Contingencies	20%			\$123,000
				TOTAL CONSTRUCTION COST:	\$770,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$154,000
	Finance and Legal	2%			\$16,000
	Geotechnical Services	1%			\$8,000
				TOTAL PROJECT COSTS:	\$178,000
	Adjustment of Costs from ENR CCI	1.00			\$178,000
	ENGINEER'S OPINION OF PROJECT COST				\$950,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Directionally Drilled Water Main Installation
Project 3b: Linden St./Ct.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$26,000	\$26,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$4,000	\$4,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$4,000	\$4,000
5	Water Main, DR-11, HDPE, 8-inch, Directional Drill	1,170	Ft	\$240	\$280,800
6	Fire Hydrant	2	Ea	\$10,000	\$20,000
7	Gate Valve and Well	7	Ea	\$7,000	\$49,000
8	Connection to Existing Water Main	3	Ea	\$4,500	\$13,500
9	Restoration	40%		\$363,300	\$145,320
				SUBTOTAL:	\$546,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$17,000
	General Requirements	2%			\$11,000
	Contingencies	20%			\$110,000
				TOTAL CONSTRUCTION COST:	\$684,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$137,000
	Finance and Legal	2%			\$14,000
	Geotechnical Services	1%			\$7,000
				TOTAL PROJECT COSTS:	\$158,000
	Adjustment of Costs from ENR CCI	1.00			\$158,000
	ENGINEER'S OPINION OF PROJECT COST				\$850,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Open Cut Water Main Installation
Project 4a: Eaton Dr.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$26,000	\$26,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$3,000	\$3,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$4,000	\$4,000
5	Water Main, CL-54, DI, 8-inch, Pavement	1,050	Ft	\$210	\$220,500
6	Fire Hydrant	1	Ea	\$10,000	\$10,000
7	Gate Valve and Well	6	Ea	\$7,000	\$42,000
8	Connection to Existing Water Main	4	Ea	\$4,500	\$18,000
9	Restoration	75%		\$290,500	\$217,875
SUBTOTAL:					\$544,000
CONTRACTUAL REQUIREMENTS					
	General Conditions	3%			\$17,000
	General Requirements	2%			\$11,000
	Contingencies	20%			\$109,000
TOTAL CONSTRUCTION COST:					\$681,000
PROJECT COSTS					
	Design and Construction Engineering	20%			\$137,000
	Finance and Legal	2%			\$14,000
	Geotechnical Services	1%			\$7,000
TOTAL PROJECT COSTS:					\$158,000
	Adjustment of Costs from ENR CCI	1.00			\$158,000
ENGINEER'S OPINION OF PROJECT COST					\$840,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Directionally Drilled Water Main Installation
Project 4a: Eaton Dr.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$24,000	\$24,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$4,000	\$4,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$4,000	\$4,000
5	Water Main, DR-11, HDPE, 8-inch, Directional Drill	1,050	Ft	\$240	\$252,000
6	Fire Hydrant	1	Ea	\$10,000	\$10,000
7	Gate Valve and Well	6	Ea	\$7,000	\$42,000
8	Connection to Existing Water Main	4	Ea	\$4,500	\$18,000
9	Restoration	40%		\$322,000	\$128,800
				SUBTOTAL:	\$486,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$15,000
	General Requirements	2%			\$10,000
	Contingencies	20%			\$98,000
				TOTAL CONSTRUCTION COST:	\$609,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$122,000
	Finance and Legal	2%			\$13,000
	Geotechnical Services	1%			\$7,000
				TOTAL PROJECT COSTS:	\$142,000
	Adjustment of Costs from ENR CCI	1.00			\$142,000
	ENGINEER'S OPINION OF PROJECT COST				\$760,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Open Cut Water Main Installation
Project 4b: Thayer Blvd.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$29,000	\$29,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$4,000	\$4,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$4,000	\$4,000
5	Water Main, CL-54, DI, 8-inch, Pavement	1,140	Ft	\$210	\$239,400
6	Fire Hydrant	3	Ea	\$10,000	\$30,000
7	Gate Valve and Well	6	Ea	\$7,000	\$42,000
8	Connection to Existing Water Main	2	Ea	\$4,500	\$9,000
9	Restoration	75%		\$320,400	\$240,300
				SUBTOTAL:	\$601,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$19,000
	General Requirements	2%			\$13,000
	Contingencies	20%			\$121,000
				TOTAL CONSTRUCTION COST:	\$754,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$151,000
	Finance and Legal	2%			\$16,000
	Geotechnical Services	1%			\$8,000
				TOTAL PROJECT COSTS:	\$175,000
	Adjustment of Costs from ENR CCI	1.00			\$175,000
	ENGINEER'S OPINION OF PROJECT COST				\$930,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Directionally Drilled Water Main Installation
Project 4b: Thayer Blvd.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$27,000	\$27,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$4,000	\$4,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$4,000	\$4,000
5	Water Main, CL-54, DI, 8-inch, Directional Drill	1,140	Ft	\$250	\$285,000
6	Fire Hydrant	3	Ea	\$10,000	\$30,000
7	Gate Valve and Well	6	Ea	\$7,000	\$42,000
8	Connection to Existing Water Main	2	Ea	\$4,500	\$9,000
9	Restoration	40%		\$366,000	\$146,400
SUBTOTAL:					\$550,000
CONTRACTUAL REQUIREMENTS					
	General Conditions	3%			\$17,000
	General Requirements	2%			\$11,000
	Contingencies	20%			\$110,000
TOTAL CONSTRUCTION COST:					\$688,000
PROJECT COSTS					
	Design and Construction Engineering	20%			\$138,000
	Finance and Legal	2%			\$14,000
	Geotechnical Services	1%			\$7,000
TOTAL PROJECT COSTS:					\$159,000
	Adjustment of Costs from ENR CCI	1.00			\$159,000
ENGINEER'S OPINION OF PROJECT COST					\$850,000

Project Summary **Engineer's Opinion of Probable Project Cost**



Owner: City of Northville
Project: DWSRF Project Planning Document FY2024
Work: Open Cut Water Main Installation
Project 4c: Fairbrook St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
Project No. 152230040
Prepared By: JAH
Reviewer: _____
Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$29,000	\$29,000
2	Audio Video Route Survey	1	LSUM	\$4,000	\$4,000
3	Traffic Maintenance and Control	1	LSUM	\$4,000	\$4,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$5,000	\$5,000
5	Water Main, CL-54, DI, 8-inch, Greenbelt	1,420	Ft	\$195	\$276,900
6	Fire Hydrant	3	Ea	\$10,000	\$30,000
7	Gate Valve and Well	8	Ea	\$7,000	\$56,000
8	Connection to Existing Water Main	3	Ea	\$4,500	\$13,500
9	Restoration	50%		\$376,400	\$188,200
	SUBTOTAL:				\$607,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$19,000
	General Requirements	2%			\$13,000
	Contingencies	20%			\$122,000
	TOTAL CONSTRUCTION COST:				\$761,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$153,000
	Finance and Legal	2%			\$16,000
	Geotechnical Services	1%			\$8,000
	TOTAL PROJECT COSTS:				\$177,000
	Adjustment of Costs from ENR CCI	1.00			\$177,000
ENGINEER'S OPINION OF PROJECT COST					\$940,000

Project Summary **Engineer's Opinion of Probable Project Cost**



Owner: City of Northville
Project: DWSRF Project Planning Document FY2024
Work: Directionally Drilled Water Main Installation
Project 4c: Fairbrook St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
Project No. 152230040
Prepared By: JAH
Reviewer: _____
Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$33,000	\$33,000
2	Audio Video Route Survey	1	LSUM	\$4,000	\$4,000
3	Traffic Maintenance and Control	1	LSUM	\$5,000	\$5,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$5,000	\$5,000
5	Water Main, CL-54, DI, 8-inch, Directional Drill	1,420	Ft	\$250	\$355,000
6	Fire Hydrant	3	Ea	\$10,000	\$30,000
7	Gate Valve and Well	8	Ea	\$7,000	\$56,000
8	Connection to Existing Water Main	3	Ea	\$4,500	\$13,500
9	Restoration	40%		\$454,500	\$181,800
	SUBTOTAL:				\$683,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$21,000
	General Requirements	2%			\$14,000
	Contingencies	20%			\$137,000
	TOTAL CONSTRUCTION COST:				\$855,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$171,000
	Finance and Legal	2%			\$18,000
	Geotechnical Services	1%			\$9,000
	TOTAL PROJECT COSTS:				\$198,000
	Adjustment of Costs from ENR CCI	1.00			\$198,000
	ENGINEER'S OPINION OF PROJECT COST				\$1,060,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Open Cut Water Main Installation
Project 4d: 8 Mile Rd. to Upper Randolph St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$34,000	\$34,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$5,000	\$5,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$4,000	\$4,000
5	Water Main, CL-54, DI, 12-inch, Greenbelt	1,110	Ft	\$245	\$271,950
6	Fire Hydrant	4	Ea	\$10,000	\$40,000
7	Gate Valve and Well	5	Ea	\$8,000	\$40,000
8	Connection to Existing Water Main	2	Ea	\$5,500	\$11,000
9	Water Main, CL-54 DI, 12-inch in 24-inch Steel Casing, Jack and Bore	80	Ft	\$900	\$72,000
10	Restoration	50%		\$434,950	\$217,475
SUBTOTAL:					\$698,000
CONTRACTUAL REQUIREMENTS					
	General Conditions	3%			\$21,000
	General Requirements	2%			\$14,000
	Contingencies	20%			\$140,000
TOTAL CONSTRUCTION COST:					\$873,000
PROJECT COSTS					
	Design and Construction Engineering	20%			\$175,000
	Finance and Legal	2%			\$18,000
	Geotechnical Services	1%			\$9,000
TOTAL PROJECT COSTS:					\$202,000
	Adjustment of Costs from ENR CCI	1.00			\$202,000
ENGINEER'S OPINION OF PROJECT COST					\$1,080,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
Project: DWSRF Project Planning Document FY2024
Work: Directionally Drilled Water Main Installation
Project 4d: 8 Mile Rd. to Upper Randolph St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
Project No. 152230040
Prepared By: JAH
Reviewer: _____
Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$36,000	\$36,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$5,000	\$5,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$4,000	\$4,000
5	Water Main, CL-54, DI, 12-inch, Directional Drill	1,110	Ft	\$300	\$333,000
6	Fire Hydrant	4	Ea	\$10,000	\$40,000
7	Gate Valve and Well	5	Ea	\$8,000	\$40,000
8	Connection to Existing Water Main	2	Ea	\$5,500	\$11,000
9	Water Main, CL-54 DI, 12-inch in 24-inch Steel Casing, Jack and Bore	80	Ft	\$900	\$72,000
10	Restoration	40%		\$496,000	\$198,400
				SUBTOTAL:	\$742,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$23,000
	General Requirements	2%			\$15,000
	Contingencies	20%			\$149,000
				TOTAL CONSTRUCTION COST:	\$929,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$186,000
	Finance and Legal	2%			\$19,000
	Geotechnical Services	1%			\$10,000
				TOTAL PROJECT COSTS:	\$215,000
	Adjustment of Costs from ENR CCI	1.00			\$215,000
	ENGINEER'S OPINION OF PROJECT COST				\$1,150,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Open Cut Water Main Installation
Project 5a: Beal St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$18,000	\$18,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$2,000	\$2,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$2,000	\$2,000
5	Water Main, CL-54, DI, 8-inch, Pavement	650	Ft	\$210	\$136,500
6	Fire Hydrant	2	Ea	\$10,000	\$20,000
7	Gate Valve and Well	4	Ea	\$7,000	\$28,000
8	Connection to Existing Water Main	2	Ea	\$4,500	\$9,000
9	Restoration	75%		\$193,500	\$145,125
				SUBTOTAL:	\$364,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$11,000
	General Requirements	2%			\$8,000
	Contingencies	20%			\$73,000
				TOTAL CONSTRUCTION COST:	\$456,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$92,000
	Finance and Legal	2%			\$10,000
	Geotechnical Services	1%			\$5,000
				TOTAL PROJECT COSTS:	\$107,000
	Adjustment of Costs from ENR CCI	1.00			\$107,000
	ENGINEER'S OPINION OF PROJECT COST				\$570,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Directionally Drilled Water Main Installation
Project 5a: Beal St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$16,000	\$16,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$3,000	\$3,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$2,000	\$2,000
5	Water Main, CL-54, DI, 8-inch, Directional Drill	650	Ft	\$250	\$162,500
6	Fire Hydrant	2	Ea	\$10,000	\$20,000
7	Gate Valve and Well	4	Ea	\$7,000	\$28,000
8	Connection to Existing Water Main	2	Ea	\$4,500	\$9,000
9	Restoration	40%		\$219,500	\$87,800
SUBTOTAL:					\$331,000
CONTRACTUAL REQUIREMENTS					
	General Conditions	3%			\$10,000
	General Requirements	2%			\$7,000
	Contingencies	20%			\$67,000
TOTAL CONSTRUCTION COST:					\$415,000
PROJECT COSTS					
	Design and Construction Engineering	20%			\$83,000
	Finance and Legal	2%			\$9,000
	Geotechnical Services	1%			\$5,000
TOTAL PROJECT COSTS:					\$97,000
	Adjustment of Costs from ENR CCI	1.00			\$97,000
ENGINEER'S OPINION OF PROJECT COST					\$520,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Open Cut Water Main Installation
Project 5b: River St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$31,000	\$31,000
2	Audio Video Route Survey	1	LSUM	\$4,000	\$4,000
3	Traffic Maintenance and Control	1	LSUM	\$4,000	\$4,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$4,000	\$4,000
5	Water Main, CL-54, DI, 8-inch, Pavement	1,200	Ft	\$210	\$252,000
6	Fire Hydrant	3	Ea	\$10,000	\$30,000
7	Gate Valve and Well	8	Ea	\$7,000	\$56,000
8	Connection to Existing Water Main	2	Ea	\$4,500	\$9,000
9	Restoration	75%		\$347,000	\$260,250
				SUBTOTAL:	\$650,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$20,000
	General Requirements	2%			\$13,000
	Contingencies	20%			\$130,000
				TOTAL CONSTRUCTION COST:	\$813,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$163,000
	Finance and Legal	2%			\$17,000
	Geotechnical Services	1%			\$9,000
				TOTAL PROJECT COSTS:	\$189,000
	Adjustment of Costs from ENR CCI	1.00			\$189,000
	ENGINEER'S OPINION OF PROJECT COST				\$1,010,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Directionally Drilled Water Main Installation
Project 5b: River St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$28,000	\$28,000
2	Audio Video Route Survey	1	LSUM	\$4,000	\$4,000
3	Traffic Maintenance and Control	1	LSUM	\$4,000	\$4,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$4,000	\$4,000
5	Water Main, DR-11, HDPE, 8-inch, Directional Drill	1,200	Ft	\$240	\$288,000
6	Fire Hydrant	3	Ea	\$10,000	\$30,000
7	Gate Valve and Well	8	Ea	\$7,000	\$56,000
8	Connection to Existing Water Main	2	Ea	\$4,500	\$9,000
9	Restoration	40%		\$383,000	\$153,200
				SUBTOTAL:	\$576,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$18,000
	General Requirements	2%			\$12,000
	Contingencies	20%			\$116,000
				TOTAL CONSTRUCTION COST:	\$722,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$145,000
	Finance and Legal	2%			\$15,000
	Geotechnical Services	1%			\$8,000
				TOTAL PROJECT COSTS:	\$168,000
	Adjustment of Costs from ENR CCI	1.00			\$168,000
	ENGINEER'S OPINION OF PROJECT COST				\$890,000

Project Summary **Engineer's Opinion of Probable Project Cost**



Owner: City of Northville
Project: DWSRF Project Planning Document FY2024
Work: Open Cut Water Main Installation
Project 5c: Johnson Ave.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
Project No. 152230040
Prepared By: JAH
Reviewer: _____
Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$17,000	\$17,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$2,000	\$2,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$2,000	\$2,000
5	Water Main, CL-54, DI, 8-inch, Pavement	630	Ft	\$210	\$132,300
6	Fire Hydrant	1	Ea	\$10,000	\$10,000
7	Gate Valve and Well	4	Ea	\$7,000	\$28,000
8	Connection to Existing Water Main	2	Ea	\$4,500	\$9,000
9	Restoration	75%		\$179,300	\$134,475
	SUBTOTAL:				\$338,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$11,000
	General Requirements	2%			\$7,000
	Contingencies	20%			\$68,000
	TOTAL CONSTRUCTION COST:				\$424,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$85,000
	Finance and Legal	2%			\$9,000
	Geotechnical Services	1%			\$5,000
	TOTAL PROJECT COSTS:				\$99,000
	Adjustment of Costs from ENR CCI	1.00			\$99,000
	ENGINEER'S OPINION OF PROJECT COST				\$530,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Directionally Drilled Water Main Installation
Project 5c: Johnson Ave.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$15,000	\$15,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$3,000	\$3,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$2,000	\$2,000
5	Water Main, DR-11, HDPE, 8-inch, Directional Drill	630	Ft	\$240	\$151,200
6	Fire Hydrant	1	Ea	\$10,000	\$10,000
7	Gate Valve and Well	4	Ea	\$7,000	\$28,000
8	Connection to Existing Water Main	2	Ea	\$4,500	\$9,000
9	Restoration	40%		\$198,200	\$79,280
				SUBTOTAL:	\$300,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$9,000
	General Requirements	2%			\$6,000
	Contingencies	20%			\$60,000
				TOTAL CONSTRUCTION COST:	\$375,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$75,000
	Finance and Legal	2%			\$8,000
	Geotechnical Services	1%			\$4,000
				TOTAL PROJECT COSTS:	\$87,000
	Adjustment of Costs from ENR CCI	1.00			\$87,000
	ENGINEER'S OPINION OF PROJECT COST				\$470,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Open Cut Water Main Installation
Project 5d: Gardner St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$16,000	\$16,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$2,000	\$2,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$2,000	\$2,000
5	Water Main, CL-54, DI, 8-inch, Pavement	630	Ft	\$210	\$132,300
6	Fire Hydrant	0	Ea	\$10,000	\$0
7	Gate Valve and Well	4	Ea	\$7,000	\$28,000
8	Connection to Existing Water Main	2	Ea	\$4,500	\$9,000
9	Restoration	75%		\$169,300	\$126,975
				SUBTOTAL:	\$319,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$10,000
	General Requirements	2%			\$7,000
	Contingencies	20%			\$64,000
				TOTAL CONSTRUCTION COST:	\$400,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$80,000
	Finance and Legal	2%			\$8,000
	Geotechnical Services	1%			\$4,000
				TOTAL PROJECT COSTS:	\$92,000
	Adjustment of Costs from ENR CCI	1.00			\$92,000
	ENGINEER'S OPINION OF PROJECT COST				\$500,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Directionally Drilled Water Main Installation
Project 5d: Gardner St.
☒ Conceptual ☐ Preliminary ☐ Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Mobilization, Max 5%	1	LSUM	\$14,000	\$14,000
2	Audio Video Route Survey	1	LSUM	\$3,000	\$3,000
3	Traffic Maintenance and Control	1	LSUM	\$2,000	\$2,000
4	Soil Erosion and Sedimentation Control	1	LSUM	\$2,000	\$2,000
5	Water Main, DR-11, HDPE, 8-inch, Directional Drill	630	Ft	\$240	\$151,200
6	Fire Hydrant	0	Ea	\$10,000	\$0
7	Gate Valve and Well	4	Ea	\$7,000	\$28,000
8	Connection to Existing Water Main	2	Ea	\$4,500	\$9,000
9	Restoration	40%		\$188,200	\$75,280
				SUBTOTAL:	\$284,000
	CONTRACTUAL REQUIREMENTS				
	General Conditions	3%			\$9,000
	General Requirements	2%			\$6,000
	Contingencies	20%			\$57,000
				TOTAL CONSTRUCTION COST:	\$356,000
	PROJECT COSTS				
	Design and Construction Engineering	20%			\$72,000
	Finance and Legal	2%			\$8,000
	Geotechnical Services	1%			\$4,000
				TOTAL PROJECT COSTS:	\$84,000
	Adjustment of Costs from ENR CCI	1.00			\$84,000
	ENGINEER'S OPINION OF PROJECT COST				\$440,000

Project Summary
Engineer's Opinion of Probable Project Cost



Owner: City of Northville
 Project: DWSRF Project Planning Document FY2024
 Work: Lead Service Line Replacement
Total Service Lines Throughout the City
☒ [X] Conceptual ☐ [] Preliminary ☐ [] Final

Date: 4/11/2023
 Project No. 152230040
 Prepared By: JAH
 Reviewer: _____
 Current ENR: 13745

Item No.	Item Description	Est. Quantity	Unit	Unit Price	Total Cost
1	Water Service	35		\$8,000	\$280,000
SUBTOTAL:					\$280,000
TOTAL CONSTRUCTION COST:					\$280,000
PROJECT COSTS					
	Design and Construction Engineering	20%			\$56,000
TOTAL PROJECT COSTS:					\$56,000
	Adjustment of Costs from ENR CCI	1.00			\$56,000
ENGINEER'S OPINION OF PROJECT COST					\$340,000

APPENDIX I: STATE HISTORIC PRESERVATION OFFICE APPLICATION AND RESPONSE

TO BE INCLUDED IN THE FINAL DRAFT

APPENDIX J: PUBLIC HEARING DOCUMENTS

TO BE INCLUDED IN THE FINAL DRAFT