

Project Planning Document

Water System Improvements

DRAFT

Prepared for
City of Cadillac

July 2026
2250978

Contents

- 1 Executive Summary..... 1**
- 2 Project Background..... 2**
 - 2.1 Regional Characteristics2
 - 2.2 Contamination Investigation2
 - 2.3 Study Area Characteristics2
 - 2.4 Existing Environmental Evaluation3
 - 2.5 Existing System.....4
 - 2.6 Summary of Project Needs5
- 3 Analysis of Alternatives..... 6**
 - 3.1 No Action6
 - 3.2 Optimum Performance of Existing System6
 - 3.3 Regionalization7
 - 3.4 Monetary Evaluation.....7
 - 3.5 Technical Considerations.....8
- 4 Selected Alternatives 9**
 - 4.1 Description of the Selected Alternative9
 - 4.2 Design Parameters10
 - 4.3 Useful Life.....11
 - 4.4 Water and Energy Efficiency11
 - 4.5 Project Schedule11
 - 4.6 Cost Summary12
- 5 Environmental and Public Health Impacts12**
 - 5.1 Direct Impacts12
 - 5.2 Indirect Impacts13
 - 5.3 Cumulative Impacts13
- 6 Mitigation.....13**
 - 6.1 Short Term Construction Related Mitigation13
 - 6.2 Potential Loss of Wildlife / Habitat14
- 7 Public Participation14**
 - 7.1 Public Meeting14
 - 7.2 Public Meeting Advertisement14

7.3 Public Meeting Summary 14
7.4 Adoption of the Project Plan Amendment..... 14

Tables

Table 1-1 – Summary of Projects 1

Figures

Appendices

Appendix A Environmental Review Memo
Appendix B EGLE MPART PFAS Community Meeting Presentation
Appendix C City of Cadillac PFAS Management Plan
Appendix D Land Use Map
Appendix E Cultural Resources Desktop Review
Appendix F Tribal Historic Preservation Officers Communications
Appendix G Wetlands Map
Appendix H Floodplain Maps
Appendix I Soils Map
Appendix J US Fish and Wildlife Documentation
Appendix K Michigan Natural Features Inventory Documentation
Appendix L Water System Reliability Study (WSRS) Water Supply and Storage
Appendix M Water System Reliability Study (WSRS) Population and Demand Projections
Appendix N Present Worth Calculations
Appendix O Project Cost Estimates
Appendix P Public Meeting Advertisement
Appendix Q Public Meeting Summary
Appendix R Resolution to Adopt

1 Executive Summary

This Project Planning Document (PPD) is prepared on behalf of the City of Cadillac (City), in Wexford County, Michigan, for the purpose of completing improvements to their drinking water distribution system. The improvements are needed to offer municipal water service to areas with private wells that have been impacted by contamination. The proposed projects have been selected for funding under the Emerging Contaminants grant program, administered by the State of Michigan Department of Environment, Great Lakes, and Energy (EGLE).

A map of the existing City of Cadillac water system is provided on **Figure 1**. The improvements identified herein have been segmented into five projects originally outlined by the Environmental Review Memo in **Appendix A**, each intended to provide municipal water to properties served by private wells.

Table 1-1 – Summary of Projects

<i>Project No.</i>	<i>Name</i>	<i>Description</i>	<i>Project Need</i>
1	Mary/Seneca Water Main Extension	Construct 1,950 feet of 8-inch water main in Mary Street and Seneca Place.	Connection of approximately 38 properties.
2	Division/Marathon Water Main Extension	Construct 2,800 feet of 6-inch water main in Division Street and Marathon Drive.	Connection of approximately 23 properties.
3	Indiana/Pennsylvania/Illinois Water Main Extension	Construct 1,150 feet of 6-inch water main in Indiana Avenue, Pennsylvania Avenue, and Illinois Avenue.	Connection of approximately 9 properties.
4	Crosby/Paluster/Cobb Water Main Extension	Construct 1,200 feet of 6-inch water main, 2,800 feet of 12-inch water main, and 2,400 feet of 16-inch water main in Crosby Road, Paluster Street, Warbler Lane, Cardinal Drive, and Cobb Street extension.	Connection of approximately 23 properties.
5	Water System Connections	Construct service lines to properties with existing access to municipal water and abandon private wells.	Connection of approximately 170 properties.

2 Project Background

2.1 Regional Characteristics

From a regional perspective, the City represents an urban center nestled amongst more rural jurisdictions in southeastern Wexford County. The City was first established in 1874 as the Village of Clam Lake, and has now grown to a population of more than 10,000. It has been home to various industries throughout the 20th century to present and now serves as the Wexford County seat.

The City of Cadillac owns and operates one of two municipal water supplies in the greater Cadillac area. Haring Township is located north of the City and also owns and operates a public water supply.

2.2 Contamination Investigation

A long history interspersed with industrial and commercial activities has left a legacy of contamination in the City. Two superfund sites are located within the City, as well as a variety of other known sites with potential for contaminating the soil and groundwater. A map of these sites is included in **Figure 2**. Due to the legacy of contamination from a variety of sources, a number of efforts have been made by state and local officials to characterize groundwater contamination of drinking water wells. A public presentation by the Michigan PFAS Response Team (MPART) given on May 29, 2025, is included in **Appendix B**, which provides a summary of known contamination to date.

Due to concerns over existing contamination and potential for migrating contamination, the City has developed a PFAS Management Plan which is included in **Appendix C**. The plan outlines an approach to provide municipal water service to properties served by private drinking water wells that have current or potential future PFAS contamination. The Plan includes connection of properties with municipal water available, as well as extension of municipal water service to areas where feasible.

2.3 Study Area Characteristics

The study area is comprised by the areas within and surrounding the existing City water system that are intended to provide municipal water service. The PFAS Management Plan included in Appendix C identifies areas that are currently served by private wells that are at risk of contamination, of which not all have municipal water readily available. All areas are further explored in Section 2.6 of this PPD.

Select areas within the city are designated for commercial or industrial use, however the primary land use consists of residential properties. An area of commercial and residential development lies north of

the City limits, and is served by the Haring Township public water supply. A Land Use Map of the city is included in **Appendix D**. No map is provided for Haring Township.

The population served by the water system is estimated to be 10,400. The number of service connections is approximately 4,000, however billing data by class is not available. Using the average household size of 2.25 per the U.S. Census Bureau, the estimated number of residential equivalent units served is 4,622.

2.4 Existing Environmental Evaluation

The study area has been assessed for unique environmental conditions that may warrant further consideration, including avoidance and/or mitigation.

Cultural and Historic Resources

A desktop review was completed by Orbis Environmental and is included in **Appendix E**. Culturally significant resources are identified within City limits. However, the specific project areas identified herein are not anticipated to cause any disturbance to these resources. A Section 106 application has been submitted to the Michigan State Historic Preservation Office.

In addition, notice and opportunity to comment on the project was sent to the applicable Tribal Historic Preservation Officers. One response was received from the Little River Band of Ottawa Indians, which identified some cultural resources near the City. These locations were reviewed by Orbis and determined to be outside the proposed project areas. Relevant documents are included in **Appendix F**.

Air Quality

The proposed projects have no anticipated impacts to air quality.

Wetlands

A map of area wetlands is provided in **Appendix G**. The proposed project areas do not intersect wetlands.

Floodplains

A map of area floodplains is provided in **Appendix H**. The proposed project areas do not intersect floodplains.

Soils

A map of area soils is included in **Appendix I**. The soils in and around the City of Cadillac are primarily sandy, and are not anticipated to impact detailed design of projects.

Fauna and Flora

The proposed work is located within existing road right-of-way. However, some tree removal may be required in the extension of Cobb Street.

Federally protected species were assessed using the U.S. Fish and Wildlife Service (USFWS) IPaC website to generate a species list and determination key, and other stipulations are provided in **Appendix J**. Eastern massasauga rattlesnakes (EMR) have been identified in the vicinity. A determination of “not likely to adversely affect” was made. However, the following conservation measures will be included for this project to protect EMR and critical habitat:

- Use wildlife-friendly erosion control and site restoration materials.
- Require contractors to review the EMR factsheet and watch the EMR video to increase human safety and awareness.
- Report any sightings of EMR to the USFWS within 24 hours.

State protected species were assessed by requesting a rare species review from the Michigan State University’s Michigan Natural Features Inventory (MNFI). The December 15, 2025, response letter is included in **Appendix K**, which lists threatened and endangered species historically found within 1.5 miles of the project location. The listed species will not be negatively impacted by the proposed projects.

Other Resources

The following environmental resources were reviewed and determined to have no relevance to the proposed projects:

- Great Lakes Shorelands, Coastal Zones, and Coastal Management Areas
- Topography
- Major Surface Waters
- Geology
- Agricultural Resources

2.5 Existing System

The existing water distribution system consists of a complex network of pipes that vary in age, material, and size. The configuration of the distribution pipe network is included in **Figure 1**.

2.5.1 Water Supply and Storage

The City water system is supplied by six groundwater wells. The total supply capacity is estimated to be 8.81 million gallons per day (MGD), and the firm supply capacity (with the largest well out of service) is estimated to be 7.34 MGD.

The City water system is served by a single elevated storage tank on East North Street. The nominal volume of the elevated tank is 1.0 million gallons. The Water System Reliability Study (WSRS) included a storage analysis, which concluded the existing storage tank is sufficiently sized to meet the system needs until at least 2044.

Excerpts from the WSRS pertaining to water supply and storage are included in **Appendix L**.

2.5.2 Water Demand Projections

The most recent WSRS was referenced for population and demand growth projections. Historical populations were gathered from the U.S. Census Bureau, and the projected population growth rate of 0.07% annual growth is estimated based on the historical data. Refer to **Appendix M** for excerpts from the WSRS.

2.6 Summary of Project Needs

Project No. 1 - Mary/Seneca Water Main Extension

Private wells along Seneca Place and Mary Street have been noted to have detections of regulated PFAS compounds above the Michigan Drinking Water Criteria (DWC), as presented in **Appendix A**. As such, a municipal water extension is needed to provide water that meets regulatory requirements. Existing wells will need to be abandoned after connection of properties to the municipal water system. There are approximately 38 properties to be served by this project.

Project No. 2 - Division/Marathon Water Main Extension

Private wells along Division Street and Marathon Drive have been noted to have detections of regulated PFAS compounds above the Michigan Drinking Water Criteria (DWC), as presented in **Appendix A**. As such, a municipal water extension is needed to provide water that meets regulatory requirements. Existing wells will need to be abandoned after connection of properties to the municipal water system. There are approximately 23 properties to be served by this project.

Project No. 3 – Indiana/Pennsylvania/Illinois Water Main Extension

Testing information for private wells along Indiana Avenue, Pennsylvania Avenue, and Illinois Avenue was not available. However, the prevalence of contamination sources in the City and frequent occurrence of PFAS detections support the need for municipal water availability for properties served by private wells. Existing wells will need to be abandoned after connection of properties to the municipal water system. There are approximately 9 properties to be served by this project.

Project No. 4 - Crosby/Paluster Water Main Extension

Testing information for private wells along Crosby Road, Paluster Street, Warbler Lane, Cardinal Drive was not available. However, the prevalence of contamination sources in the City and frequent occurrence of PFAS detections support the need for municipal water availability for properties served by private wells. Existing wells will need to be abandoned after connection of properties to the municipal water system. In addition, the proposed project will provide important reliability through water main looping, increased supply during peak demands, and improved water quality. There are approximately 23 properties to be served by this project.

Project No. 5 - Water System Connections

There are approximately 170 properties currently served by private wells that have municipal water currently available. The private wells in and around the City of Cadillac are susceptible to contamination. Existing wells will need to be abandoned after connection of properties to the municipal water system.

3 Analysis of Alternatives

3.1 No Action

The system needs were analyzed for the “no action” alternative. The “no action” alternative does not fulfill the project needs and is not acceptable. Making public water supply available where feasible is the prudent action, particularly considering the ubiquity of PFAS detections in the area and potential for PFAS contamination to move through the aquifer.

3.2 Optimum Performance of Existing System

The existing system was analyzed to determine if optimizing to meet the project need would be preferable.

The existing water system supply, distribution, and storage were determined to be sufficient to support the proposed expansion of the water system to make water service available. Previously completed

studies are included in **Appendix L** and **Appendix M** for reference, and summarized in Sections 2.5 and 3.5 of this PPD.

3.3 Regionalization

The project needs identified herein are regional in nature, as PFAS detections have occurred in areas outside the City limits.

- Many areas of private well study for PFAS in Wexford County as noted in Appendix B are not located proximally to municipal water.
- Project No. 1 is intended to serve properties located in Haring Township. However, the City water system is located more conveniently to this area than the existing Haring Township water system.
- Project No. 2 is located within a road right-of-way that serves as the municipal boundary between the City and Haring Township. As such, it has the potential to provide future service to adjacent municipalities.
- Project No. 3 is designed to serve properties located within the City of Cadillac, as well as two that are assessed by Clam Lake Township.
- Project No. 4 is located within a road right-of-way that serves as the municipal boundary between the City and Clam Lake Township. As such, it has the potential to provide future service to adjacent municipalities.

3.4 Monetary Evaluation

The present worth analysis provides a monetary comparison of costs for the viable alternatives and the estimated impact to water users. Factors that are included in the analysis are:

- Capital Costs
- Capitalized Interest Costs
- Operation, Maintenance, and Replacement (OM&R) Costs
- Energy Cost Savings
- Salvage Value of Capital
- Discount Rate

Several of the factors above are fixed known costs (Capital, Interest, and Salvage Value). Several other factors are variable and are estimated based on best available data (OM&R and Energy Cost Savings). Most of the projects include replacing existing infrastructure and will not have a major impact on existing OM&R costs. Nevertheless, it is anticipated that OM&R costs will be reduced overall with the proposed improvements by reducing the risk of watermain and water service breaks.

Appendix N shows the present worth analysis for each option discussed. Only grant eligible costs are included in the present worth analysis. The cost estimates include costs associated with engineering, construction, and mitigation cost if necessary. The present worth calculation was used to develop equivalent annual costs per month per residential equivalent unit (REU), which are summarized below:

Project No. 1:	\$0.26/month/REU
Project No. 2:	\$0.43/month/REU
Project No. 3:	\$0.15/month/REU
Project No. 4:	\$0.96/month/REU
Project No. 5:	\$0.81/month/REU

It is the intent of the City to fully utilize grant funding provided through the Emerging Contaminants grant program, resulting in no monetary contribution from the water system fund and therefore no burden on rate payers.

3.5 Technical Considerations

The primary technical considerations for the proposed projects are as follows:

3.5.1 Existing System Supply & Demand

The previous WSRS analysis presents the City’s water system supply has a firm capacity of 7.34 mgd, with projected 2044 maximum day demand of less than 4 MGD. The estimated average day demand for an additional 263 water system connections is 0.066 MGD using 100 gallons per capita per day and an average household size of 2.5. A typical ratio of maximum day demand to average day demand for the City of Cadillac is 1.77. This results in an estimated 0.12 MGD additional maximum day demand, which can be supplied by the existing system.

3.5.2 Existing System Storage

The previous WSRS analysis presents an analysis of the system-wide storage available. The study indicates the City’s water system has sufficient pumping and storage to supply the projected 2044

maximum day demand, 1 hour of projected 2044 peak demand, and 3 hours of fire protection at 3,500 gallons per minute, with approximately 670,000 gallons of excess storage. The addition of 263 residential water system connections is not anticipated to overwhelm the existing storage tank.

3.5.3 Pressure & Flow

Preliminary water main sizing and alignment is intended to supply sufficient pressure and flow to meet minimum requirements of Act 399 and industry design standards. Detailed design will confirm pressures and flows of the proposed system.

3.5.4 Materials

A variety of materials are available. The proposed water mains have been selected to be ductile iron due to the demonstrated history and reliability. The proposed service lines have been selected to be copper for workability, longevity, and standardized materials within the system.

4 Selected Alternatives

4.1 Description of the Selected Alternative

Project No. 1 - Mary/Seneca Water Main Extension

Extension of the existing City water system is proposed to include 1,950 feet of 8-inch diameter ductile iron water main. Looping is not available, but a hydrant will be installed to facilitate flushing the main to manage water quality. The project includes connection of 38 properties and all necessary hydrants, valves, fittings, restoration, and well abandonment.

Estimated Project Cost: \$900,000

Project No. 2 - Division/Marathon Water Main Extension

Extension of the existing City water system is proposed to include 2,800 feet of 6-inch diameter ductile iron water main. Water main running east on Division will not be looped, but a hydrant will be installed to facilitate flushing the main to manage water quality. The project includes connection of 23 properties and all necessary hydrants, valves, fittings, restoration, and well abandonment.

Estimated Project Cost: \$1,300,000

Project No. 3 - Pennsylvania Water Main Extension

Extension of the existing City water system is proposed to include 1,150 feet of 6-inch diameter ductile iron water main. All proposed water main will be looped. The project includes connection of 9 properties and all necessary hydrants, valves, fittings, restoration, and well abandonment.

Estimated Project Cost: \$460,000

Project No. 4 - Crosby/Paluster Water Main Extension

Extension of the existing City water system is proposed to include 1,200 feet of 6-inch, 2,800 feet of 12-inch, and 2,400 feet of 16-inch ductile iron water main. All proposed water main will be looped. Well abandonment is also included. The project includes connection of 23 properties and all necessary hydrants, valves, fittings, restoration, and well abandonment.

Estimated Project Cost: \$3,100,000

Project No. 5 - Water System Connections

An estimated 170 connections will be made in areas that currently have access to municipal water. Project includes tapping existing water main, installing copper service line, curb stop, and connection inside the building. Well abandonment is also included.

Estimated Project Cost: \$2,500,000

4.2 Design Parameters

Typical design parameters for the proposed water main extension projects include:

- **Diameter:** size of water main is typically determined by ability to meet peak demands. Minimum pipe size of 6-inch is required for water systems that provide fire protection. Larger diameter pipes are needed for areas where transmission of large quantities of water is needed. Preliminary sizing presented in this PPD will be confirmed during detailed design.
- **Alignment:** the location of water main is preliminarily selected within the existing road right-of-way and will be confirmed during detailed design.
- **Looping:** it is always preferred to avoid dead end water mains. Looping increases the available flow/pressure and improves reliability. Looping of water main is proposed where feasible.

Service lines will be installed according to the requirements of the Michigan Plumbing Code, and private well abandonments will be conducted according to the Michigan Well Construction Code.

4.3 Useful Life

An estimate of weighted useful life is needed to confirm the assets for the water system will exceed the terms of the loan, expected to be forty years. EGLE guidance was followed to determine the weighted useful life for each project.

Many project costs are heavily weighted towards the purchase and installation of ductile iron pipe which has a design life of at least 50 years. The weighted useful life for each project is included in the Present Worth analysis in **Appendix N**, and summarized below:

Project No. 1:	46.6 years
Project No. 2:	42.8 years
Project No. 3:	42.2 years
Project No. 4:	44.5 years
Project No. 5:	41.5 years

4.4 Water and Energy Efficiency

The proposed projects are not expected to provide a significant impact on the water and energy efficiency of the water system.

4.5 Project Schedule

The following table is a proposed schedule for the three projects identified in the PPD:

Proposed Project Schedule	
Milestone	Date
Advertise Public Meeting	July 7, 2026
Hold Public Meeting	July 20, 2026
Submit Final PPD to EGLE	August 20, 2026
Receive Approval of PPD	December 2026
Plans and Specifications Approved	March 2027
Advertise for Bids	May 2027
Receive Construction Bids	May 2027
EGLE Order of Approval	June 2027
Begin Construction	September 2027
Construction Completed	December 2028

4.6 Cost Summary

Appendix O contains cost estimates for the proposed water system improvements. The project cost estimates include the following:

- Construction costs including labor and materials.
- 35% for construction contingencies, legal, administrative, and project engineering costs.
- Restoration of construction area disturbances.

As noted in Section 3.4, the present worth analysis was used to estimate the system user charges for project alternatives. The combined user charges for the selected alternatives are estimated to be \$2.61 per month per REU. It is the intent of the City to fully utilize grant funding provided through the Emerging Contaminants grant program, resulting in no monetary contribution from the water system fund.

5 Environmental and Public Health Impacts

5.1 Direct Impacts

5.1.1 Construction

The direct impacts of the proposed project are primarily those associated with construction and are temporary in nature. Noise and dust are common due to heavy machinery working, and re-routing of local traffic is common.

Project area construction impacts will vary; however, impacts will generally be limited to existing right-of-way. The detailed design phase of each project will further identify impacted drainage features, sidewalks, or other features that will be disturbed and will include the replacement of those features.

5.1.2 Protected Species

The Fish and Wildlife Service online IPAC tool was run for the service area. A determination of “may affect, not likely to adversely affect” is included in **Appendix J**, which includes a list of 2 federally protected species. No direct impacts are anticipated, however mitigation measures are summarized in Section 2.4 and Section 6 of this PPD.

5.1.3 Dewatering

Projects may encounter groundwater during construction, however this is not anticipated due to the sandy soils in Cadillac and general observations of groundwater levels during past construction in the area.

If dewatering is determined to be necessary in areas with potential for contamination, there is a risk of mobilizing the contamination through the pumping and discharge process. Proper pretreatment and discharge of the groundwater would occur if dewatering of contaminated groundwater is necessary.

5.2 Indirect Impacts

The proposed water system facilities will be sized to provide service for at least 20 years of future growth in the study area, based on current trends and master planning. No agricultural land will be affected by the proposed projects. No expansion of the road system is proposed. No changes in air or water quality are expected, as projects are not intended to facilitate development for secondary growth.

The proposed work is intended to improve the existing water distribution system to better serve the customer service area. Area aesthetics will be maintained by specifying restoration and providing onsite construction inspection.

5.3 Cumulative Impacts

Cumulative impacts were not identified for the proposed projects.

6 Mitigation

6.1 Short Term Construction Related Mitigation

Standard practices used in the construction industry will be included in the construction contract documents to mitigate construction impacts. These include:

- Use of water and/or brine on construction roads to minimize dust.
- Require contractor to maintain construction equipment in good condition to minimize noise.
- Require effective traffic control during active construction hours, with clear markings of traffic restrictions during non-construction hours to avoid delays.

Construction activities associated with the water distribution system would occur primarily within existing easements or existing road right-of-way minimizing disturbance to residents. The majority of

lead service line replacements on the private side of the right-of-way will be directionally drilled, also minimizing disturbance to residents. Impacts within the right-of-way to existing signage, sidewalks, drainage structures, etc. will be restored to existing or better condition.

If slope disturbance is necessary, erosion control measures will be required.

6.2 Potential Loss of Wildlife / Habitat

Preliminary research with the USFWS for federally protected species has identified some opportunity for mitigation. Measures to protect the eastern massasauga rattlesnake are outlined in the USFWS letter in **Appendix J**, and summarized in Section 2.4 of this PPD.

7 Public Participation

7.1 Public Meeting

A public meeting describing the draft PPD will be held at 6:00PM on Monday, July 20, 2026, at the City of Cadillac Council Chambers at 200 N. Lake Street, Cadillac, MI 49601.

7.2 Public Meeting Advertisement

A notice of public meeting was provided on the City of Cadillac webpage starting on Tuesday, July 7, 2026. Hard copies were made available at City Hall at 200 N. Lake Street, Cadillac, MI 49601.

7.3 Public Meeting Summary

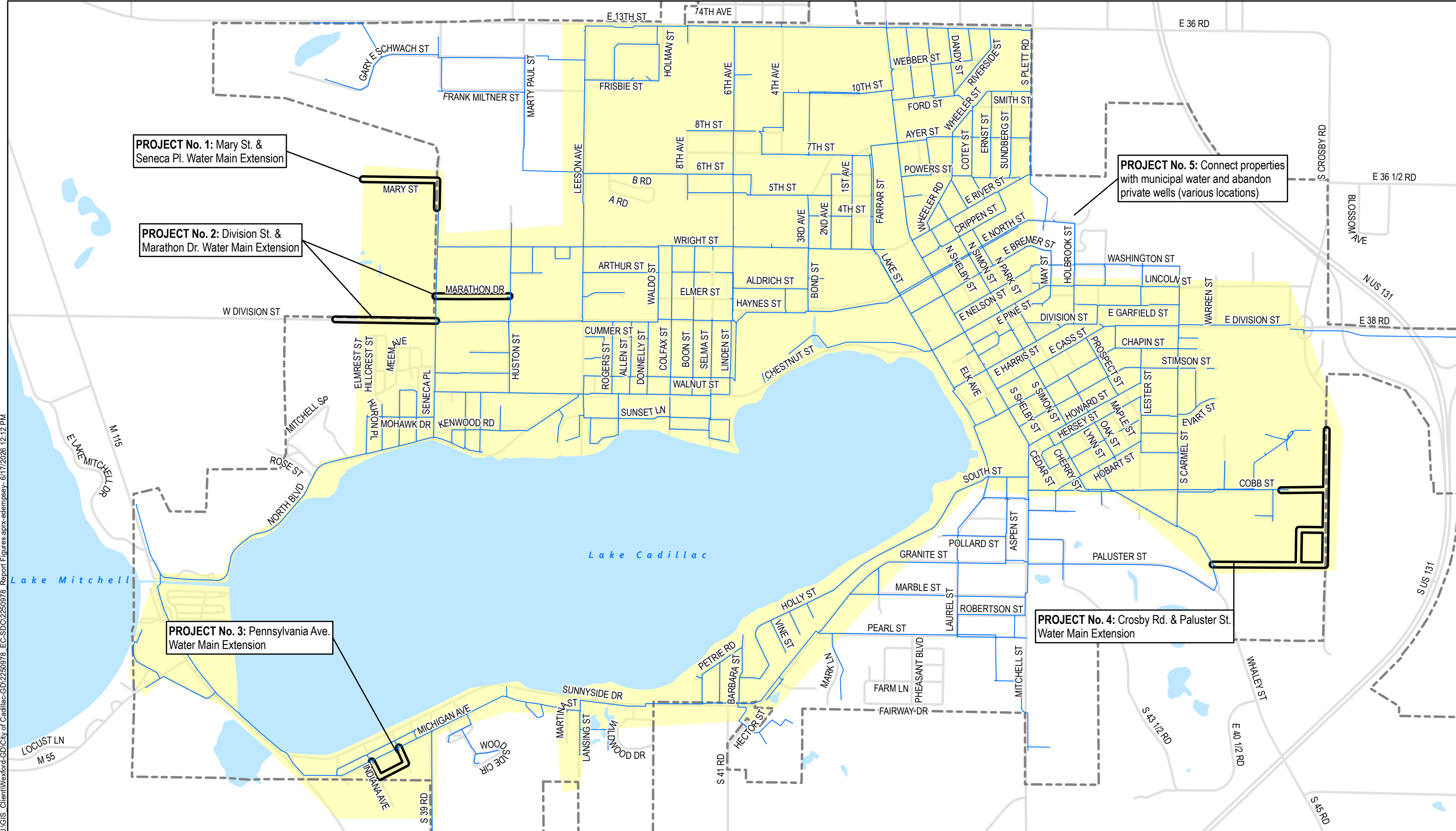
A summary of the selected projects will be provided at the public meeting, including cost estimates.

7.4 Adoption of the Project Plan Amendment

Following the public presentation, the City Council will vote on a resolution to adopt the PPD.

Figures

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PROJECT No. 1: Mary St. & Seneca Pl. Water Main Extension

PROJECT No. 2: Division St. & Marathon Dr. Water Main Extension

PROJECT No. 3: Pennsylvania Ave. Water Main Extension

PROJECT No. 5: Connect properties with municipal water and abandon private wells (various locations)

PROJECT No. 4: Crosby Rd. & Paluster St. Water Main Extension

LEGEND

- Proposed Project Location
- Proposed Project Location (Well Work Area)
- Existing Water Distribution System
- Cadillac City Limits



0 500 1,000 2,000 Feet

CITY OF CADILLAC
WEXFORD COUNTY, MI

PROPOSED PROJECTS

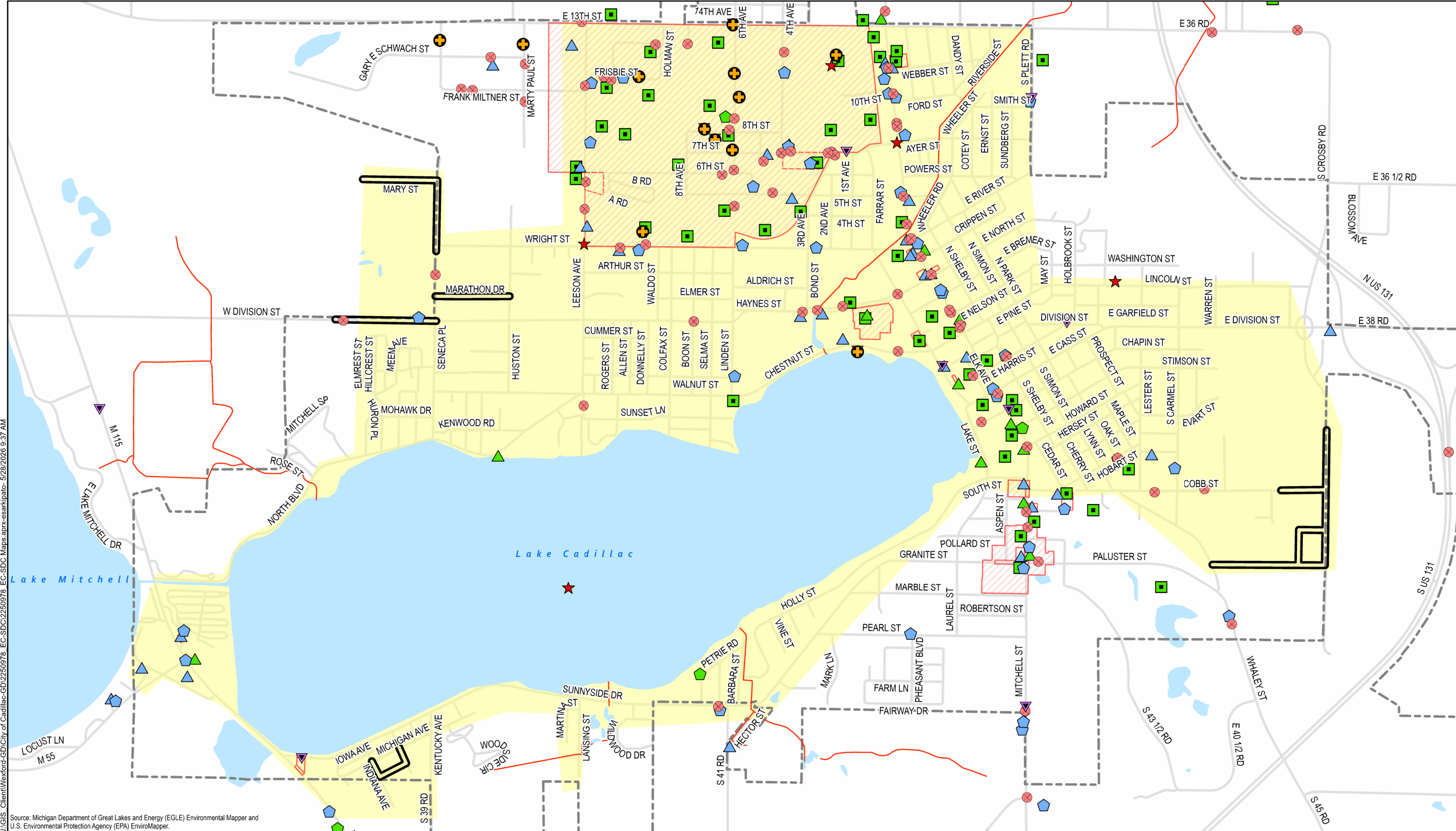
FIGURE 1

Prein&Newhof

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Source: Michigan Department of Great Lakes and Energy (EGLE) Environmental Mapper and U.S. Environmental Protection Agency (EPA) EnviroMapper.



LEGEND

- Proposed Project Location
- Proposed Project Location (Well Work Area)
- Superfund Site
- Hazardous Waste Site
- Part 201 Environmental Contamination Sites
- Leaking Storage Tank - Open (Part 213)
- Leaking Storage Tank - Closed (Part 213)
- Underground Storage Tank - Active (Part 211)
- Underground Storage Tank - Closed (Part 211)
- NPDES
- Toxic Release
- Impaired Streams
- Land Resource Use Restriction
- Cadillac City Limits



CITY OF CADILLAC
WEXFORD COUNTY, MI
ENVIRONMENTAL REVIEW
FIGURE 2
Prein&Newhof
2250978

Appendix A: Environmental Review Memo

Memorandum

Date:	June 3, 2026
To:	Mr. Eric Seguin, P.E.
Company:	Prein&Newhof
From:	Tim Woodburne, CPG and Scott Cathey
Project #:	2250978- City of Cadillac
Re:	Environmental Review for the City of Cadillac Water System Improvements

1 INTRODUCTION

Per and Polyfluoroalkyl Substances (PFAS) contamination has been identified in the groundwater within certain areas of the City of Cadillac. This project will construct new water main to provide PFAS free municipal water to anyone still on private water wells in the City of Cadillac. The purpose of this Environmental Review is to identify known environmental sites along or in the vicinity of the proposed water main routes to determine the potential environmental impact to the Project Corridor. This project includes new water main in four sections, as follows: 1. Mary Street and Seneca Place; 2. West Division Street and Marathon Drive; 3. Indiana Avenue, Pennsylvania Avenue and Illinois Avenue; and 4. Paluster Street, Warbler Lane, Cardinal Drive, South Crosby Road, and Cobb Street extended (collectively, herein after the “Project Corridor”). The Project Corridor is shown on the maps in Appendix A.

This Environmental Review of the Project Corridor includes a search of environmental contamination sources near the project on the Remediation Information Data Exchange (RIDE) Environmental Mapper program maintained by the Michigan Department of Environment, Great Lakes, and Energy (EGLE) as well as the United States Environmental Protection Agency (EPA) EnviroMapper. The identified environmental sites were evaluated to determine the potential environmental impact on the proposed Project.

2 ENVIRONMENTAL MAPPER REVIEW

Environmental sites identified on the EGLE RIDE Mapper and EPA Enviromapper are shown on the map included in Appendix B. The four sections of the Project Corridor are discussed below.

2.1 Mary Street and Seneca Place

No environmental sites were identified adjacent to this section of the Project Corridor.

One Resource Conservation and Recovery Act (RCRA) hazardous waste site was identified approximately 0.14 miles south of the intersection of Seneca Place and Wright Street. Given that the RCRA site is not adjacent to the Project Corridor, this site is not expected to have a direct environmental impact on the Project Corridor.

2.2 West Division Street and Marathon Drive

No environmental sites were identified adjacent to Marathon Drive.

Two environmental sites were identified on parcels adjacent to Division Street. The sites identified are outlined below.

Westside Auto at 6732 West Division Street is a RCRA very small quantity generator (VSQG) site. Based on review of the EPA RCRA site database, this site generates ignitable waste and does not have any reported violations of the permit. Given that there are no violations of the permit or spills at the facility, this site is not expected to have a direct environmental impact on the Project Corridor. A copy of the US EPA RCRA facility information is provided in Appendix C.

Convenience Foods at 2104 West Division Street is an underground storage tank (UST) site. The site had two 2,000-gallon gasoline tanks that were removed from the ground in 1987. According to the facility information reviewed in the EGLE RIDE database, no spills or releases associated with either tank were identified during the removal. Therefore, this site is not expected to have a direct environmental impact on the Project Corridor.

West Division Street Nearby Environmental Sites

Site Name and Address	Database Identified	Distance Direction from the Project	Additional Comments
Westside Auto Service 6732 West Division Street	RCRA-VSQG	North Adjacent	Waste code D001- Ignitable waste. No reported violations or spills.
Convenience Foods 2104 West Division Street	Part 211 UST	North Adjacent	Two 2,000-gallon gasoline tanks removed from the ground on 9/1/1987 and closed.

2.3 Indiana Avenue, Pennsylvania Avenue, and Illinois Avenue

No environmental sites were identified adjacent to this section of the Project Corridor. The nearest identified sites included two UST sites and one closed leaking underground storage tank (LUST) site along M-115 approximately 0.2 miles southwest of the intersection of Indiana Avenue and Pennsylvania Avenue. Both UST sites do not have any confirmed releases, so these two sites are not expected to have a direct environmental impact to the Project Corridor. A closed LUST site on a non-adjacent parcel is not expected to have a direct environmental impact on the Project Corridor due to the distance away from the Project Corridor.

2.4 Paluster Street, Warbler Lane, Cardinal Drive, South Crosby Road, and Cobb Street Extended

No environmental sites were identified adjacent to this section of the Project Corridor. The nearest identified sites were a closed UST site approximately 0.17 miles south of Paluster Street and the Old Cadillac Dump Part 201 site located approximately 0.2 miles west-southwest of the intersection of Paluster Street and Whaley Street. Based on review of United States Geologic Survey (USGS) topographic maps of the area, the groundwater in the vicinity of the Old Cadillac Dump site is expected to flow southerly towards Twin Lakes, away from the Project Corridor. Given the groundwater flow

direction as well as the UST site's distance from the Project Corridor, these two sites are not expected to have a direct environmental impact on the Project Corridor.

3 CONCLUSIONS

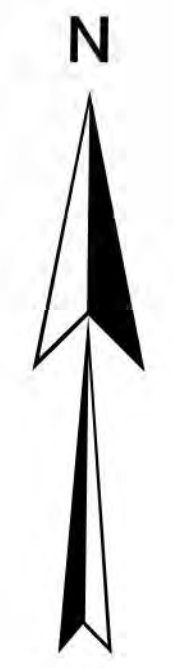
The proposed Project will be constructed along the routes referenced in this report. Soil will need to be excavated and temporarily stockpiled while the utility is constructed, and then the area will be backfilled. If groundwater is encountered within the excavations during construction, dewatering for construction may be necessary. Therefore, this review focused on the risk of environmental impact due to contamination identified in soil or groundwater near the proposed Project that could have impact on construction activities. The results of this review have not identified any sites that are likely to have a direct environmental impact on the Project.

Appendix A

Project Location Maps

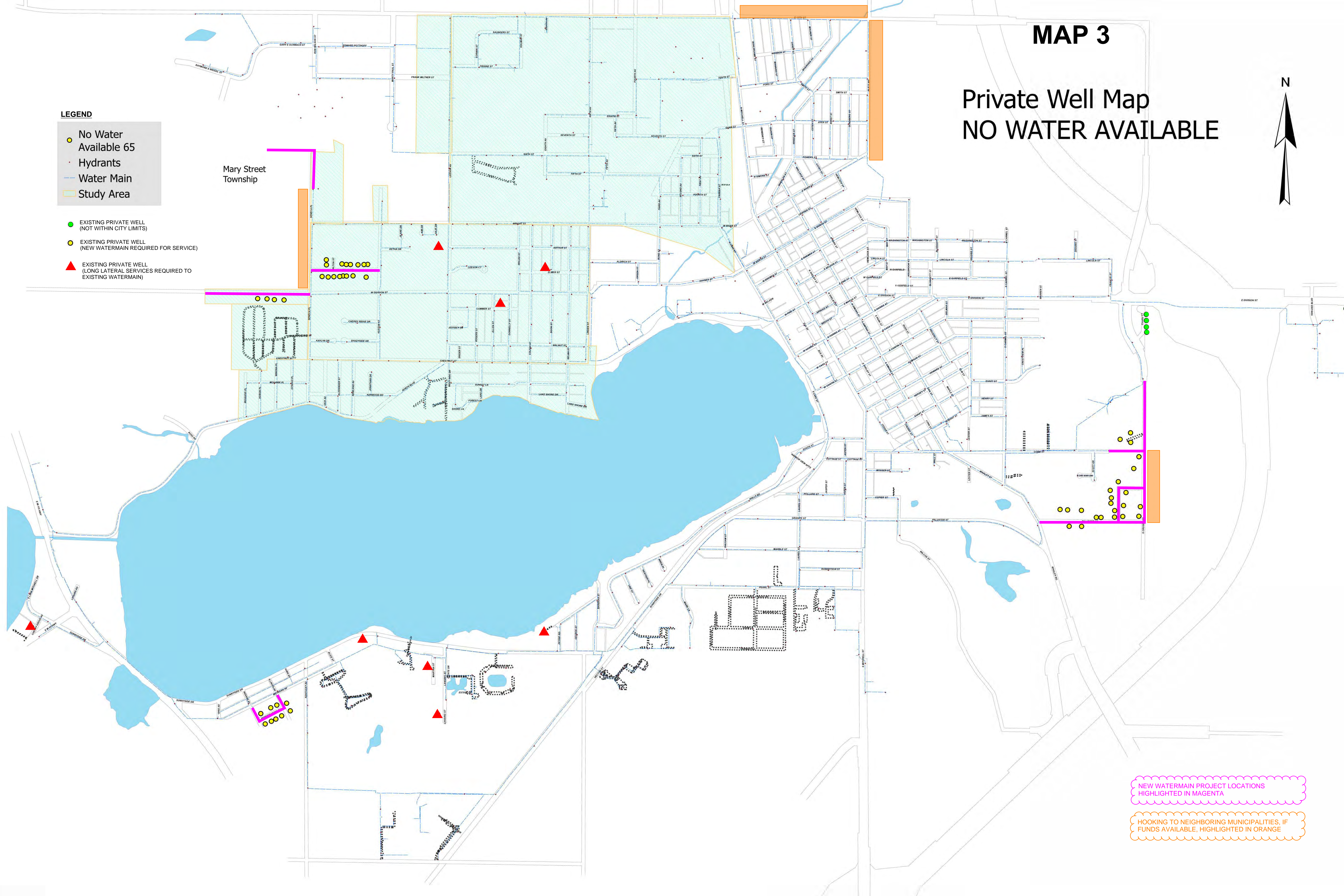
MAP 3

Private Well Map NO WATER AVAILABLE



- LEGEND**
- No Water Available 65
 - Hydrants
 - Water Main
 - Study Area

- EXISTING PRIVATE WELL (NOT WITHIN CITY LIMITS)
- EXISTING PRIVATE WELL (NEW WATERMAIN REQUIRED FOR SERVICE)
- EXISTING PRIVATE WELL (LONG LATERAL SERVICES REQUIRED TO EXISTING WATERMAIN)



Mary Street Township

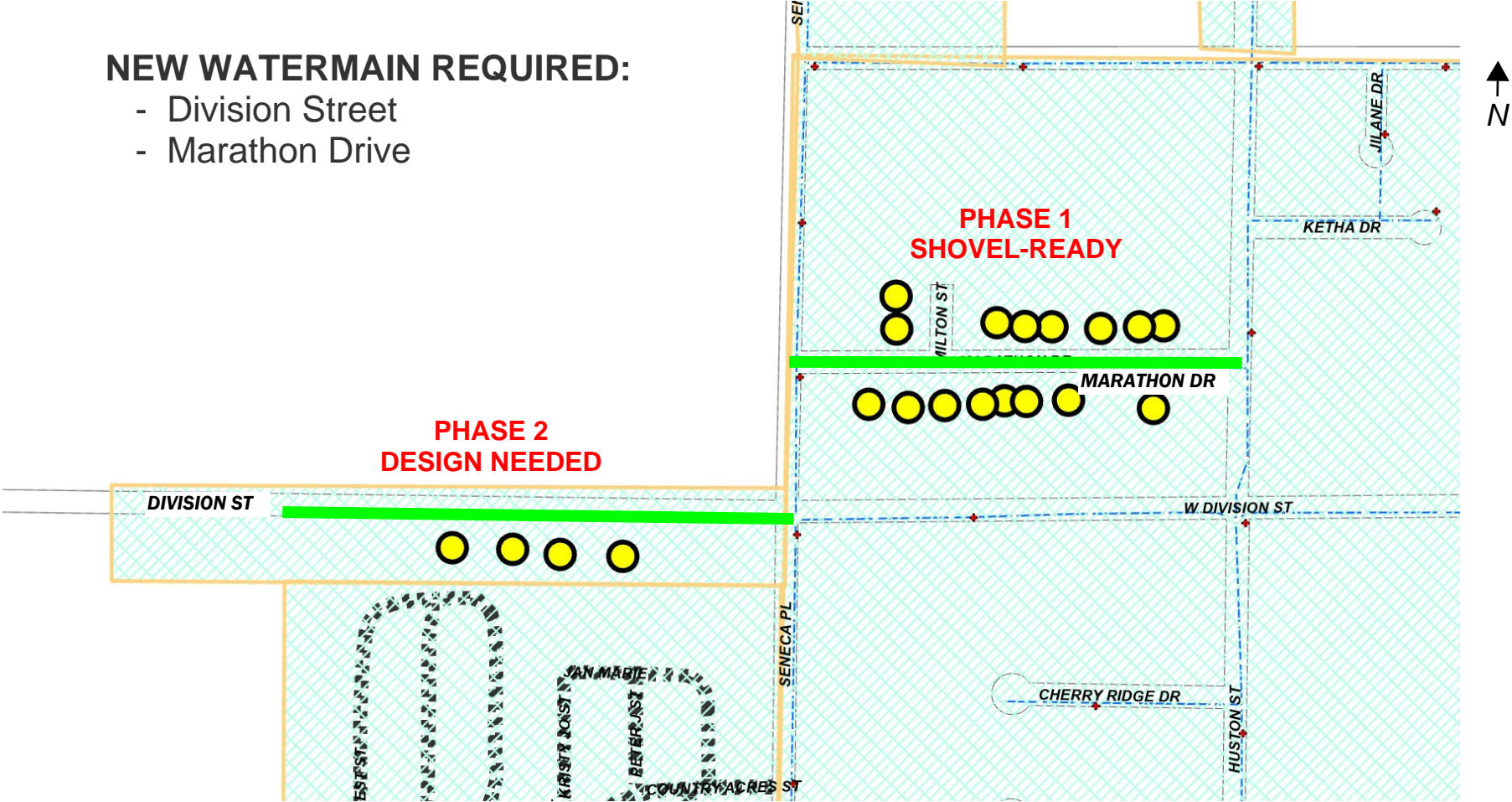
NEW WATERMAIN PROJECT LOCATIONS HIGHLIGHTED IN MAGENTA

HOOKING TO NEIGHBORING MUNICIPALITIES, IF FUNDS AVAILABLE, HIGHLIGHTED IN ORANGE

MAP 4

NEW WATERMAIN REQUIRED:




- Division Street
- Marathon Drive

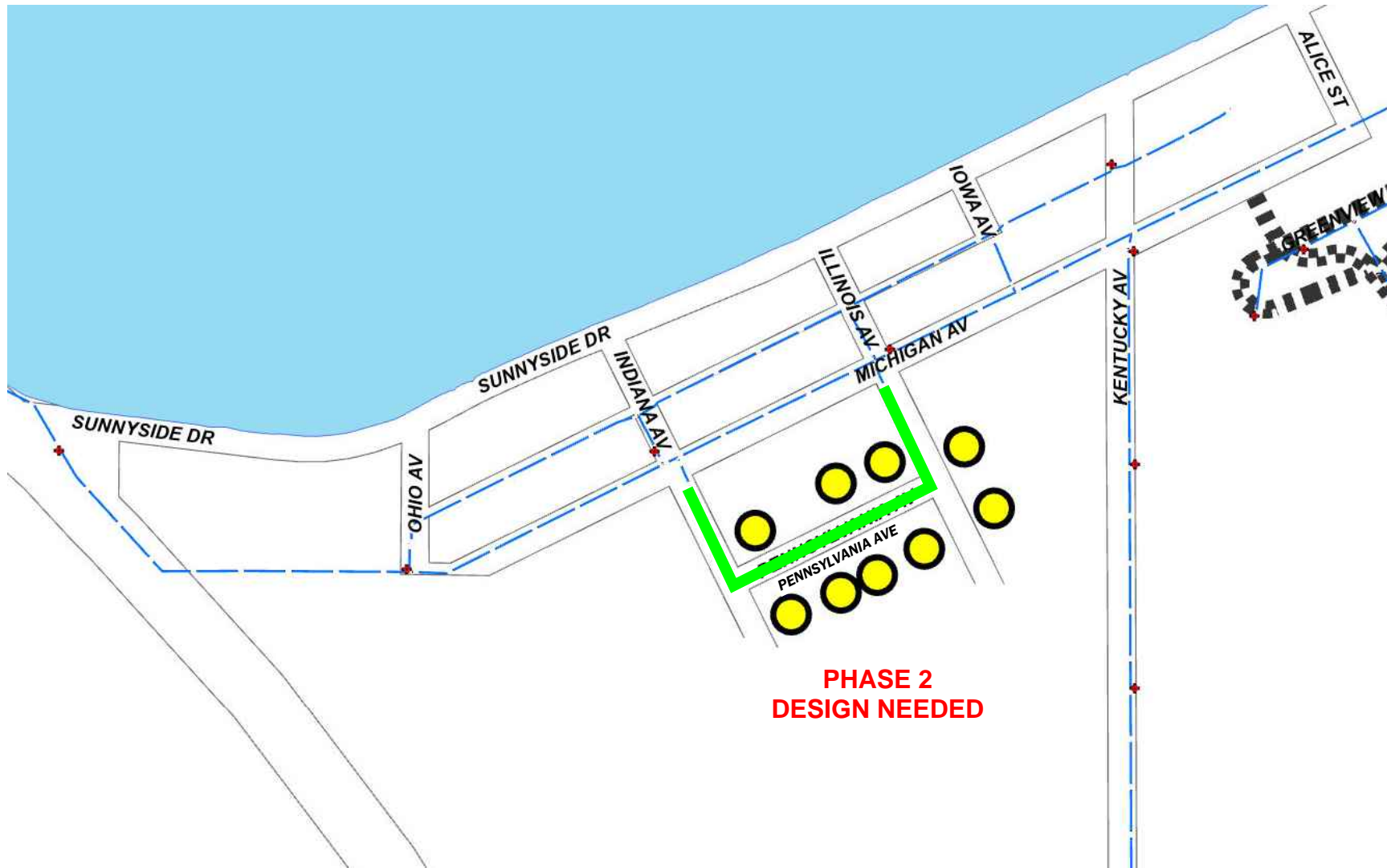


**PHASE 2
DESIGN NEEDED**

**PHASE 1
SHOVEL-READY**

LEGEND




-  EXISTING PRIVATE WELL
-  EXISTING WATERMAIN
-  PROPOSED WATERMAIN



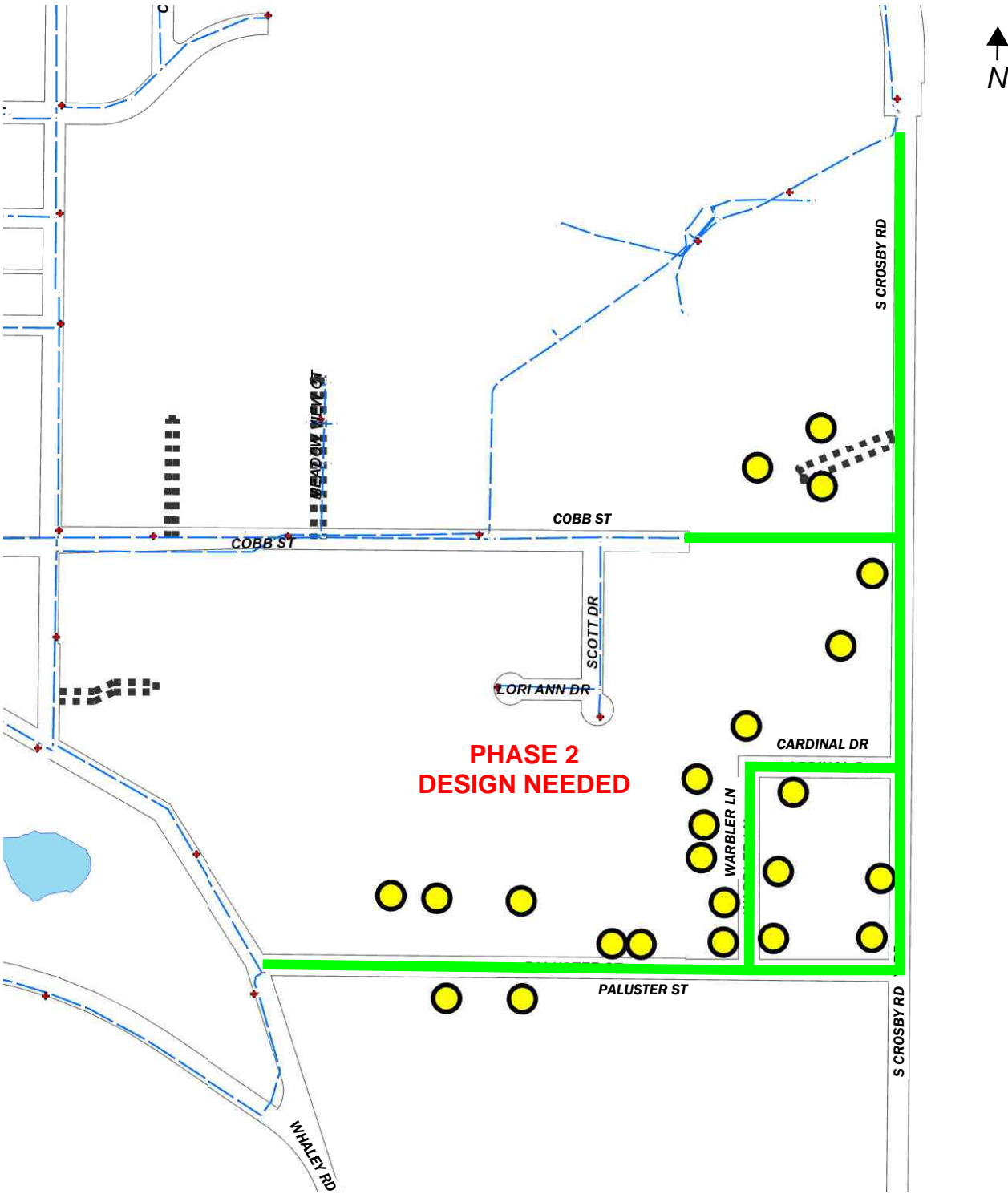
NEW WATERMAIN REQUIRED:

- Indiana Avenue
- Pennsylvania Avenue
- Illinois Avenue

LEGEND

-  EXISTING PRIVATE WELL
-  EXISTING WATERMAIN
-  PROPOSED WATERMAIN




MAP 6



NEW WATERMAIN REQUIRED:

- Paluster Street
- Warbler Lane / Cardinal Drive
- S. Crosby Road
- Cobb Street extension

LEGEND

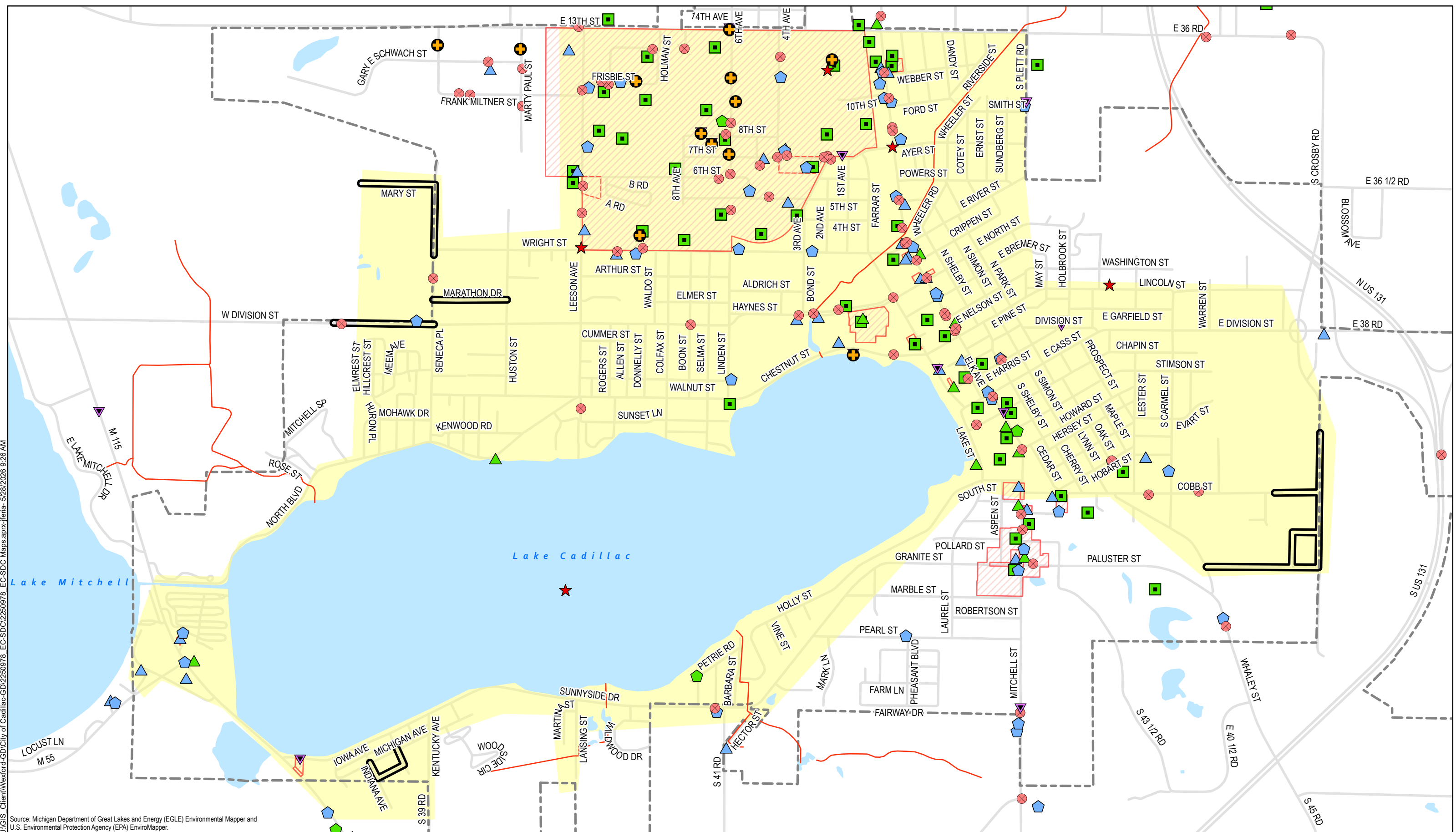
-  EXISTING PRIVATE WELL
-  EXISTING WATERMAIN
-  PROPOSED WATERMAIN

Appendix B

Map of Identified Environmental Sites

J:\GIS Client\Westford-GD\City of Cadillac-GD\2250978 EC-SDC\2250978 EC-SDC Maps.aprx-feria- 5/28/2026 9:26 AM

Source: Michigan Department of Great Lakes and Energy (EGLE) Environmental Mapper and U.S. Environmental Protection Agency (EPA) EnviroMapper.



LEGEND

- Proposed Project Location
- Proposed Project Location (Well Work Area)
- Superfund Site
- Hazardous Waste Site
- Part 201 Environmental Contamination Sites
- Leaking Storage Tank - Open (Part 213)
- Leaking Storage Tank - Closed (Part 213)
- Underground Storage Tank - Active (Part 211)
- Underground Storage Tank - Closed (Part 211)
- NPDES
- Toxic Release
- Impaired Streams
- Land Resource Use Restriction
- Cadillac City Limits



CITY OF CADILLAC
WEXFORD COUNTY, MI
ENVIRONMENTAL REVIEW
MAY 2026
Prein&Newhof
2250978

Appendix C

Nearby Environmental Site Documentation



RCRAInfo Facility

Home <<https://epa.gov/>> | Multisystem Search <<https://epa.gov/envirofacts/multisystem/search>>
| Topic Searches <<https://www.epa.gov/enviro/topic-searches>> | System Data Searches
<<https://www.epa.gov/enviro/system-data-searches>> | About the Data
<<https://www.epa.gov/enviro/about-data>> | Data Downloads <<https://www.epa.gov/enviro/data-downloads>> | Widgets <<https://www.epa.gov/enviro/widgets>> | Services
<<https://www.epa.gov/enviro/web-services>> | Mobile <<https://www.epa.gov/enviro/uv-index-mobile-app>> | Other Datasets <<https://www.epa.gov/enviro/other-datasets>>

Facility Information

WESTSIDE AUTO SVC
Handler ID: MID985649342
6732 W DIVISION ST
CADILLAC, MI 49601
County Name: WEXFORD
Latitude: 44.252457
Longitude: -85.442685
Hazardous Waste Generator:
Very Small Quantity Generator
Owner Name: WHITEHEAD KELLY

BIENNIAL REPORT SUMMARY

No Biennial Report data is available for the facility listed above.

LIST OF FACILITY CONTACTS

NAME	STREET	CITY	STATE	ZIP CODE	PHONE	TY CC
KELLY WHITEHEAD	6732 W DIVISION ST	CADILLAC	MI	49601	231- 775- 3323	Pu
KELLY WHITEHEAD	6732 W DIVISION ST	CADILLAC	MI	49601	231- 775- 3323	Pe



HANDLER / FACILITY CLASSIFICATION

Unspecified Universe for the facility listed above.

No Handler information is available for the facility listed above.

LIST OF PROCESS UNIT INFORMATION FOR GROUP

<https://epa.gov/envirofacts/metadata/table/rcra/rcr_pm_unit>

No Process Information is available for the facility listed above.

LIST OF NAICS CODES AND DESCRIPTIONS

NAICS CODE	NAICS DESCRIPTION
11131	ORANGE GROVES

LIST OF WASTE CODES AND DESCRIPTIONS



WASTE CODE	WASTE DESCRIPTION
D001	IGNITABLE WASTE

Contact Us <<https://www.epa.gov/enviro/forms/contact-us-about-envirofacts>> to ask a question, provide feedback, or report a problem.

Last updated on May 6, 2026

Appendix B: EGLE MPART PFAS Community Meeting Presentation

MPART PFAS Community Meeting Wexford Area of Interest Self-Sampling Investigation

May 29, 2025

MPART

MICHIGAN PFAS ACTION RESPONSE TEAM

MPART PFAS Community Meeting Wexford Area of Interest Self-Sampling Investigation

Abigail Hendershott, MPART Executive Director
Michigan PFAS Action Response Team
(616) 888-0528

HendershottA@Michigan.gov

MPART

MICHIGAN PFAS ACTION RESPONSE TEAM

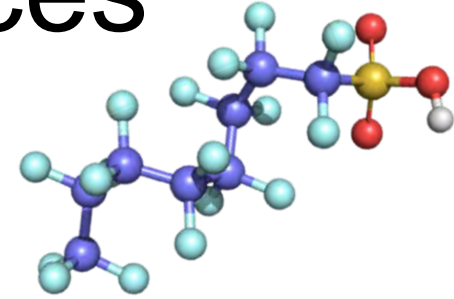
Agenda

- Introductions – Abigail Hendershott, MPART Executive Director
- Agenda:
 - MPART Overview – Abby Hendershott
 - Health – Joshua Lee, Michigan Department of Health and Human Services
 - Filters – Robert Crane, District Health Department #10
 - Investigation Area – Brandi Wheeler, Michigan Department of Environment, Great Lakes, and Energy
 - Public Water Supplies – Scott Kendzierski, Michigan Department of Environment, Great Lakes, and Energy
- Q&A

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MICHIGAN PFAS ACTION RESPONSE TEAM

Per- and Polyfluoroalkyl Substances (PFAS)



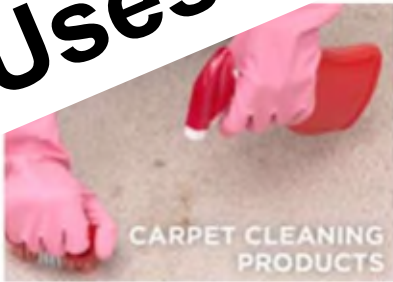
What are they?

- Strong Carbon-Fluorine Bonds
- Surfactants
- Highly Stable
- Repel Water, Oil, Fat, and Grease
- Began Developing in 1940s
- Thousands of Compounds Today

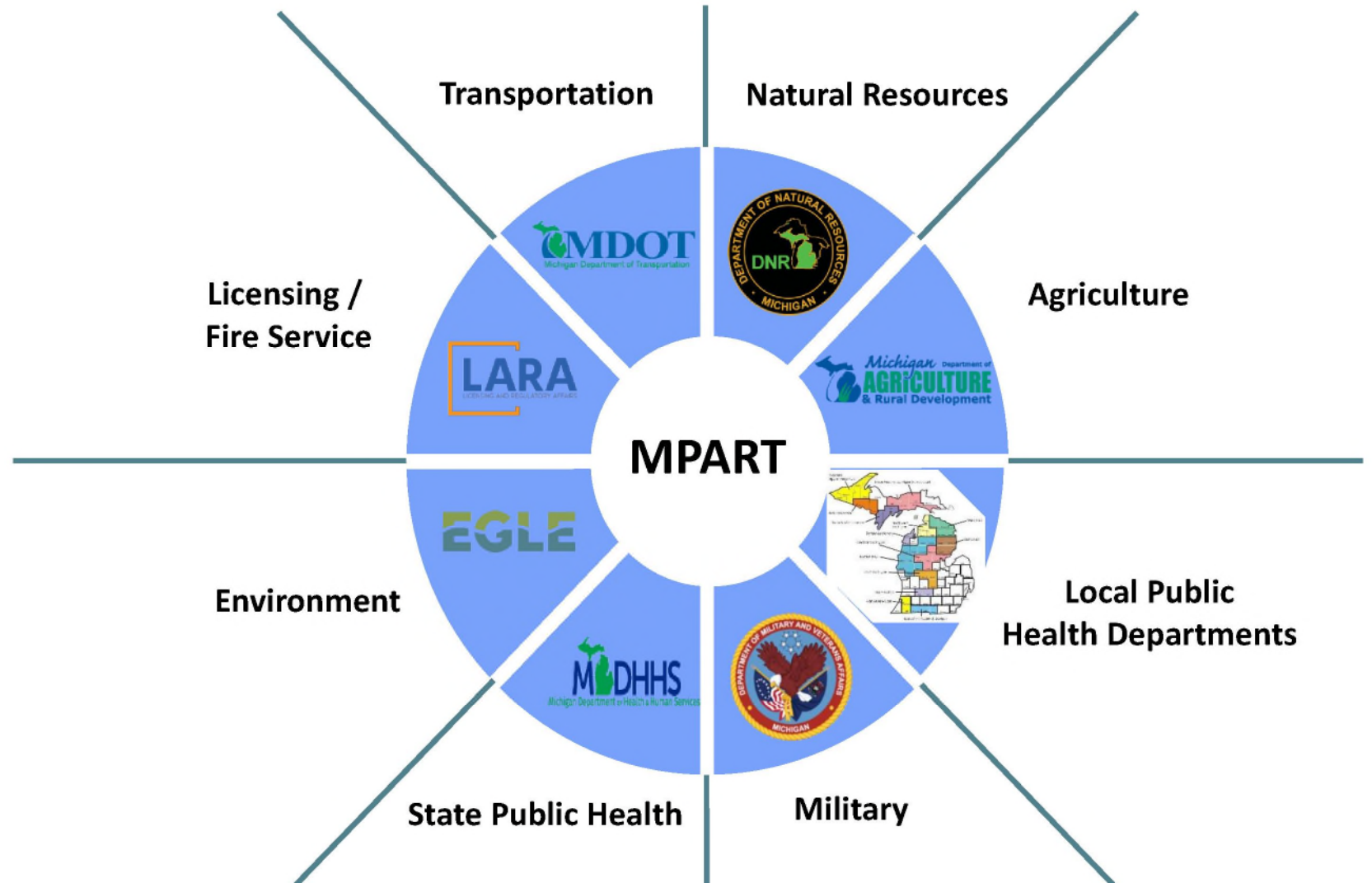
Why the concern?

- Widespread through the ecosystem
- Don't Break Down Easily - Hard to Get Rid of
- Bioaccumulate – Build Up in Our Bodies
- Some PFAS May Affect Health
- Some emerging science/information
- Federal Standards

PFAS Uses



Michigan PFAS Action Response Team (MPART)



MPART

MICHIGAN PFAS ACTION RESPONSE TEAM

Project Team

EGLE, DHHS, Local Health

(other MPART agencies as needed)

- Review groundwater flow, science/data available, residential wells, and determine drinking water sampling needs

EGLE

Leads Investigation:

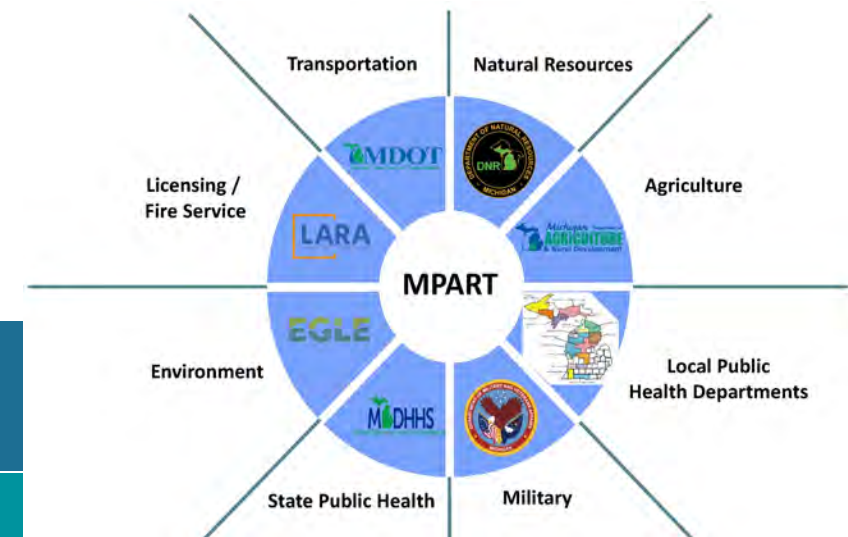
- Groundwater
- Residential Well Sampling
- Wastewater Discharge
- Surface Water
- Fish Collection
- Public Drinking Water
- Biosolids

DHHS:

- Toxicologist
- Geologist
- Epidemiologist
- Health Educator
- Community Engagement
- Fish Eating Guidelines

Local Health:

- Filter deployment (if recommended)
- Community Outreach



MPART

MICHIGAN PFAS ACTION RESPONSE TEAM

The Investigation Process

- Typical ways the process starts
 - When MPART becomes aware of a site where groundwater is over criteria
 - Elevated results from a private drinking water self-sample
 - When surface water sampling results indicate a potential source
 - Other routine monitoring data indicates a potential concern
- The project team forms to evaluate potential public health exposures (i.e., drinking water)
 - Investigations continue to delineate affected homes

Michigan's Drinking Water and Groundwater Cleanup Standards

Compound	Standards
PFNA	6 ppt
PFOA	8 ppt
PFOS	16 ppt
PFHxS	51 ppt
GenX (HFPO-DA)	370 ppt
PFBS	420 ppt
PFHxA	400,000 ppt

Michigan Surface Water Quality Values

Compound	Water Quality Value
PFOA	170 ppt
<i>If Drinking Water Source</i>	<i>66 ppt</i>
PFOS	12 ppt
<i>If Drinking Water Source</i>	<i>11 ppt</i>
PFBS	670,000 ppt
<i>If Drinking Water Source</i>	<i>8,300 ppt</i>
PFHxS	210 ppt
<i>If Drinking Water Source</i>	<i>59 ppt</i>
PFNA	30 ppt
<i>If Drinking Water Source</i>	<i>19 ppt</i>

*Michigan's Rule 57 Water Quality Values
apply to NPDES discharges*

Self Testing for PFAS

- The easiest way to address the risk of repeated exposure to PFAS in your drinking water is by **testing your private drinking water well**
 - Contact a [Certified PFAS Laboratory](#) to order a test kit
 - Video - [Homeowner's Guide: Collecting Samples for PFAS Water Analysis](#)
- Once you get your results, contact the MDHHS Drinking Water Hotline at 800-648-6942 to figure out what your results mean, and if you should start filtering your water



PFAS and Health

Joshua Lee, Toxicologist

Michigan Department of Health and Human Services

Phone: 517-243-9522

Email: LeeK28@michigan.gov

MPART

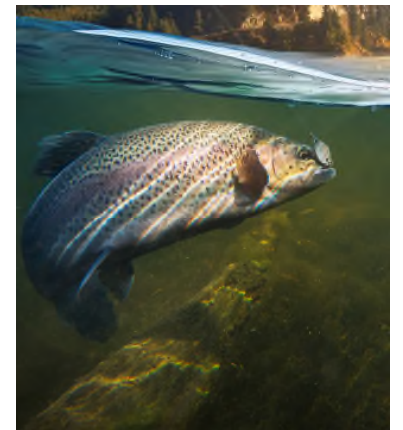
MICHIGAN PFAS ACTION RESPONSE TEAM

The Role of MDHHS/ Local Health Department (LHD)

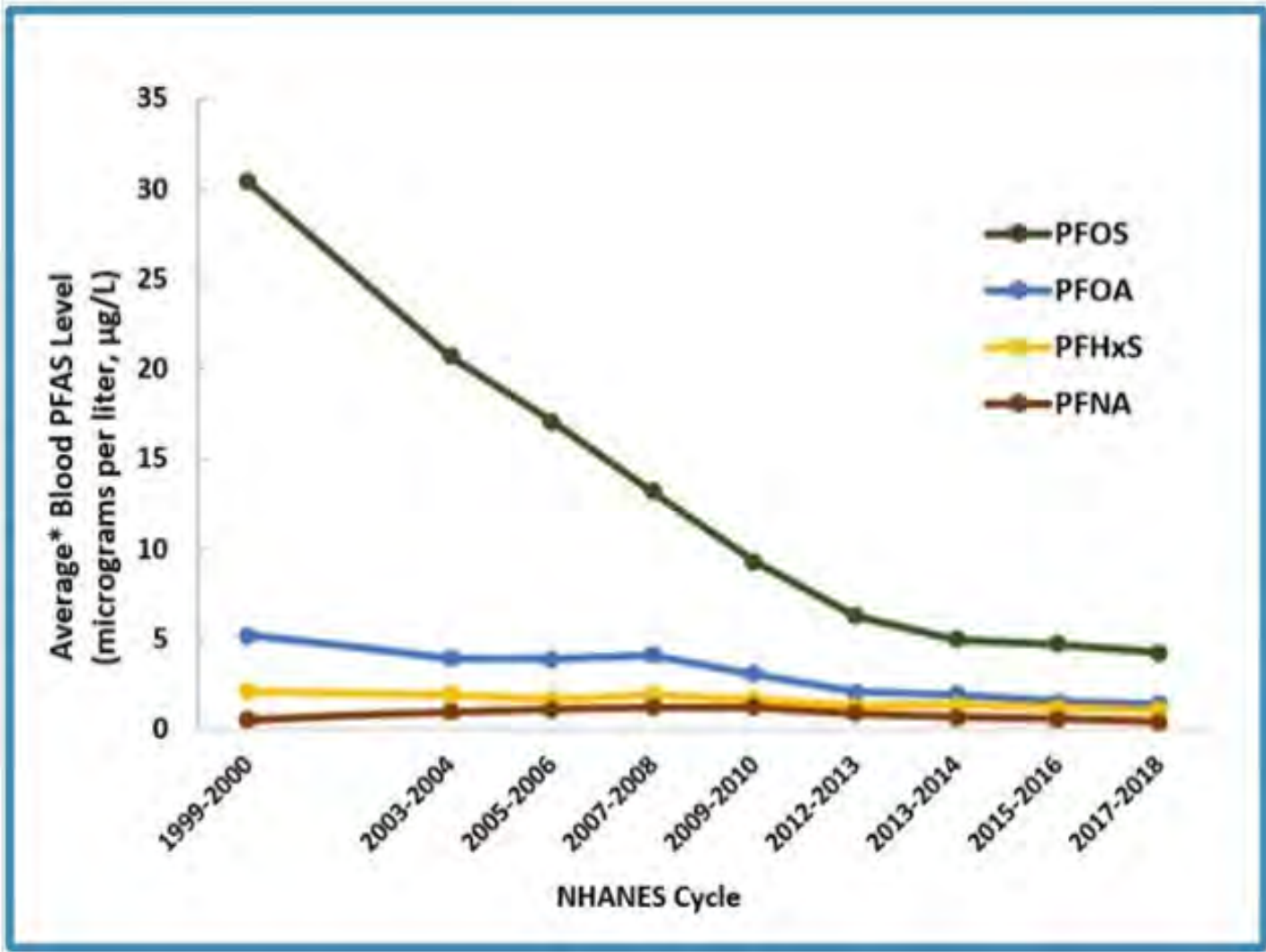
- Understand the health concerns facing your community
- Develop a plan to investigate and address health risks
 - EGLE leads the site investigation
 - MDHHS and the Local Health Department lead the public health planning and response
- Evaluate PFAS exposures to residents in the community
 - Recommend public health actions as needed

Exposure to PFAS Chemicals

- Drinking contaminated water
- Eating fish caught from water contaminated by PFAS
 - “Eat Safe Fish” Guidelines
- Incidental swallowing of contaminated soil or dust
- Eating food packaged in materials containing PFAS
- Using some consumer products
- PFAS absorption through skin is typically not a concern



Blood levels of the most common PFAS in people in the United States 2000-2018



Associated Human Health Outcomes PFOA and/or PFOS

- Reduced fertility
- High blood pressure or pre-eclampsia in pregnant women
- Small decreases in infant birth weight
- Higher cholesterol
 - Especially total cholesterol and LDL cholesterol

Associated Human Health Outcomes PFOA and/or PFOS

- Thyroid disease
- Liver damage
- Decreased immune system response to vaccines
- Developing certain types of cancer
 - In particular, kidney and testicular cancers*

* PFOA only

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MICHIGAN PFAS ACTION RESPONSE TEAM

Multiple Lines of Consideration for Determining Public Health Response Actions

- MDHHS Comparison Values
- Residential Well Results (individually and collectively)
- Site-specific information (e.g., known source, geology, etc.)

MDHHS Comparison Values

- MDHHS Comparison Values are the lowest of:
 - MDHHS Public Health Drinking Water Screening Level
 - MPART Health-Based Value or Maximum Contaminant Level (MCL)
- Both the MDHHS screening levels and the MCL were set to protect everyone
 - including those most at risk of harm to their health: fetuses and breastfed babies

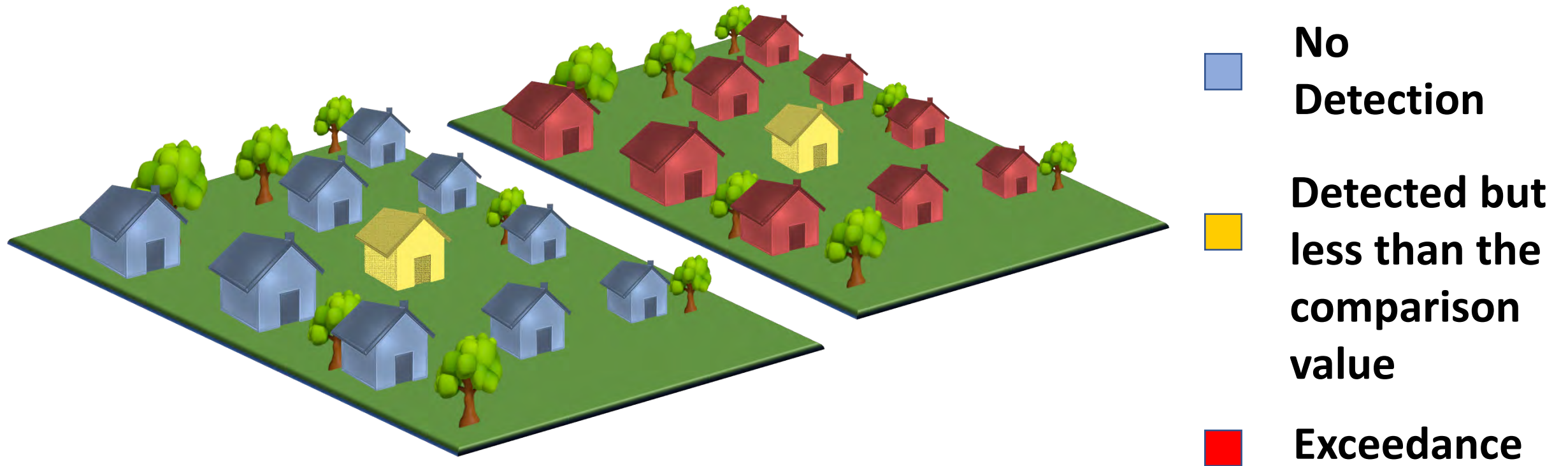
MDHHS Comparison Values

PFAS	Comparison Values
PFOS	8 ppt ^A
PFOA	8 ppt ^B
PFNA	6 ppt ^B
PFHxS	51 ppt ^B
PFBS	420 ppt ^B
PFHxA	400,000 ppt ^B
GenX	370 ppt ^B

A. MDHHS Public Health Drinking Water Screening Level

B. MPART Health-Based Value or Maximum Contaminant Level (MCL)

Residential Well Results (individually and collectively)



MPART

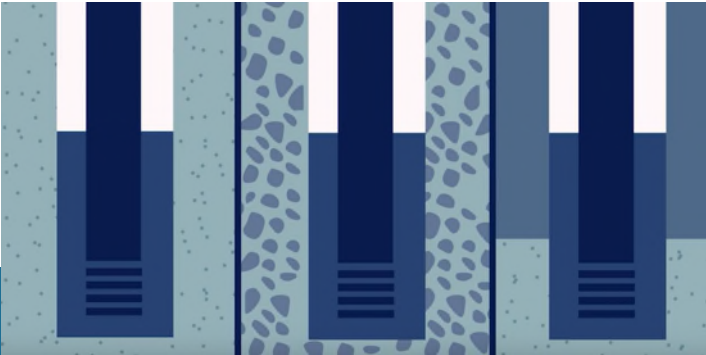
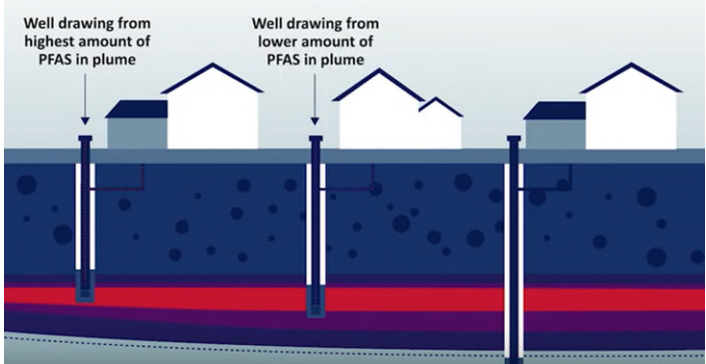
MICHIGAN PFAS ACTION RESPONSE TEAM

Site-Specific Information

Known Source



Geology



Plume



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MDHHS/LHD

Public Health Response Actions

- No public health actions necessary
- Recommend filter or use of alternate water
 - Need time to conduct investigation
 - Provides residents with protection from potential fluctuations in PFAS levels, if any, while investigation is ongoing
- Education
 - Provide information on PFAS in drinking water

What to Look for When Selecting a Filter



<http://bit.ly/PFASHomeFilter>

- Make sure the filter has a NSF/ANSI Standard 53 for PFOA and PFOS reduction.
- Follow all manufacturing instructions to make sure it is reducing the PFAS as expected.

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MICHIGAN PFAS ACTION RESPONSE TEAM

Fish Collection Data



MPART

MICHIGAN PFAS ACTION RESPONSE TEAM

Eating Fish from Michigan's Lakes & Rivers

Michigan.gov/eatsafefish



Lake Cadillac

Type of Fish	Chemicals of Concern	Size of Fish (length in inches)	MI Servings per Month*
Largemouth Bass	Mercury	Under 18"	2
		Over 18"	1
Northern Pike	Mercury	Under 30"	4
		Over 30"	2
Smallmouth Bass	Mercury	Under 18"	2
		Over 18"	1

Lake Mitchell

Type of Fish	Chemicals of Concern	Size of Fish (length in inches)	MI Servings per Month*
Largemouth Bass	Mercury	Under 18"	2
		Over 18"	1
Smallmouth Bass	Mercury	Under 18"	2
		Over 18"	1
Walleye	Mercury	Any	1

MPART
 AS ACTION RESPONSE TEAM



***District Health
Department #10***
Healthy People, Healthy Communities

Point-of-Use Home Filters

DISTRICT HEALTH DEPARTMENT #10 (DHD#10)

MAY 29, 2025

How do you know if you qualify for a free point-of-use filter?

1

You will receive communication from the Michigan Department of Health and Human Services (MDHHS) recommending use of a water filtration system.

2

You will receive a follow-up communication from DHD#10 encouraging you to pick up a free point-of-use filter from your local DHD#10 office.

Your local office is:
521 Cobb St A, Cadillac, MI
49601

3

If you have questions or concerns about receiving a filter, filter installation, or filter maintenance contact:

Robert Crane
231-519-7541
rccrane@dhd10.org

What to expect when picking up your filtration system

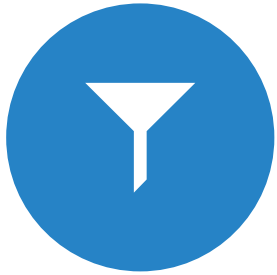
What to bring:

Your MDHHS or DHD#10 letter as proof you are eligible to receive a filter

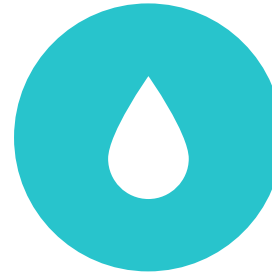
What you'll receive:

- A filter and one box of replacement cartridges, good for one year
- A phone number for you to call to have a plumber install your filter, free of charge
- Instructions on how to maintain your filter, replace cartridges, and what to do if a part breaks

About your filter



Your filter is certified by both NSF and the American National Standard Institute (ANSI).



Each filter cartridge is set to last for about 6 months, or through 800 gallons of water. You will need to get a new set of cartridges from DHD#10 every 6 months.



It is to be installed under the kitchen sink and stay within the home where drinking water is found to contain PFAS.



You may dispose of used cartridges in your household trash as they are not considered hazardous material.

For Filter Questions
or Concerns,
sampling questions,
Well Permitting and
Abandonment



CONTACT:

Robert Crane

231-902-7541

rcrane@dhd10.org

Investigations in Wexford County

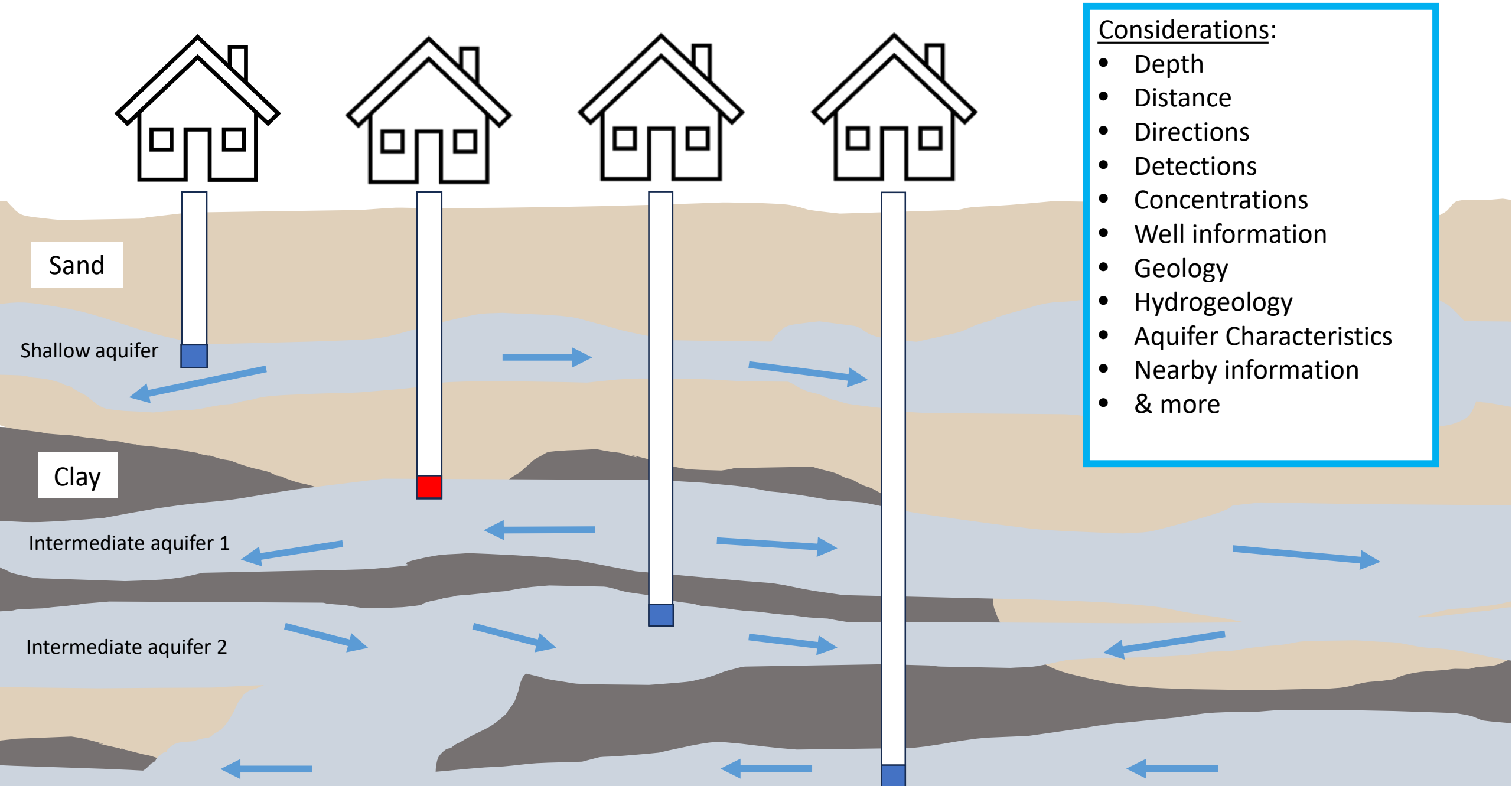
Brandi Wheeler, PFAS Site Lead & District Geologist
Michigan Department of Environment, Great Lakes, and Energy

231-878-8066

wheelerb5@michigan.gov

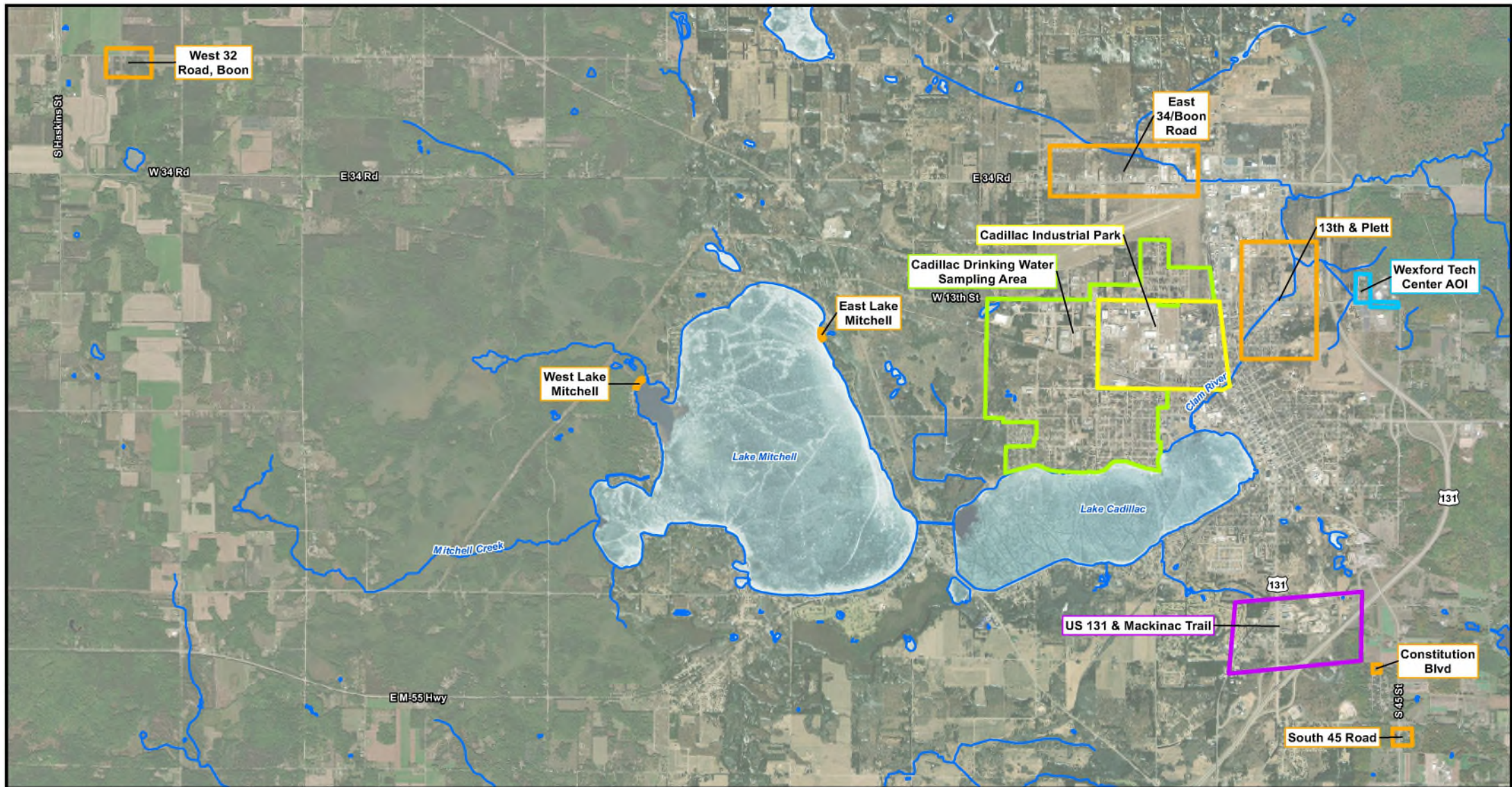
MPART

MICHIGAN PFAS ACTION RESPONSE TEAM



- Considerations:
- Depth
 - Distance
 - Directions
 - Detections
 - Concentrations
 - Well information
 - Geology
 - Hydrogeology
 - Aquifer Characteristics
 - Nearby information
 - & more

*This diagram is an **example** of how multiple aquifers may appear; this is **not** an accurate rendering*



AECOM

Drawn: DP	Date: 5/9/2025
Approved: DB	Date: 5/9/2025
Project #: 60560354	



- Legend**
- Wexford AOI Sampling Areas
 - Cadillac Industrial Park
 - Cadillac Drinking Water Sampling Area
 - US 131 & Mackinac Trail AOI Sampling Area
 - Wexford Tech Center AOI Sampling Area
 - Surface Water Body

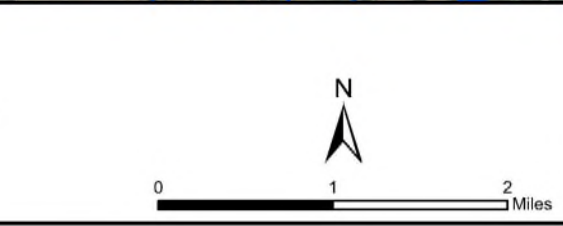
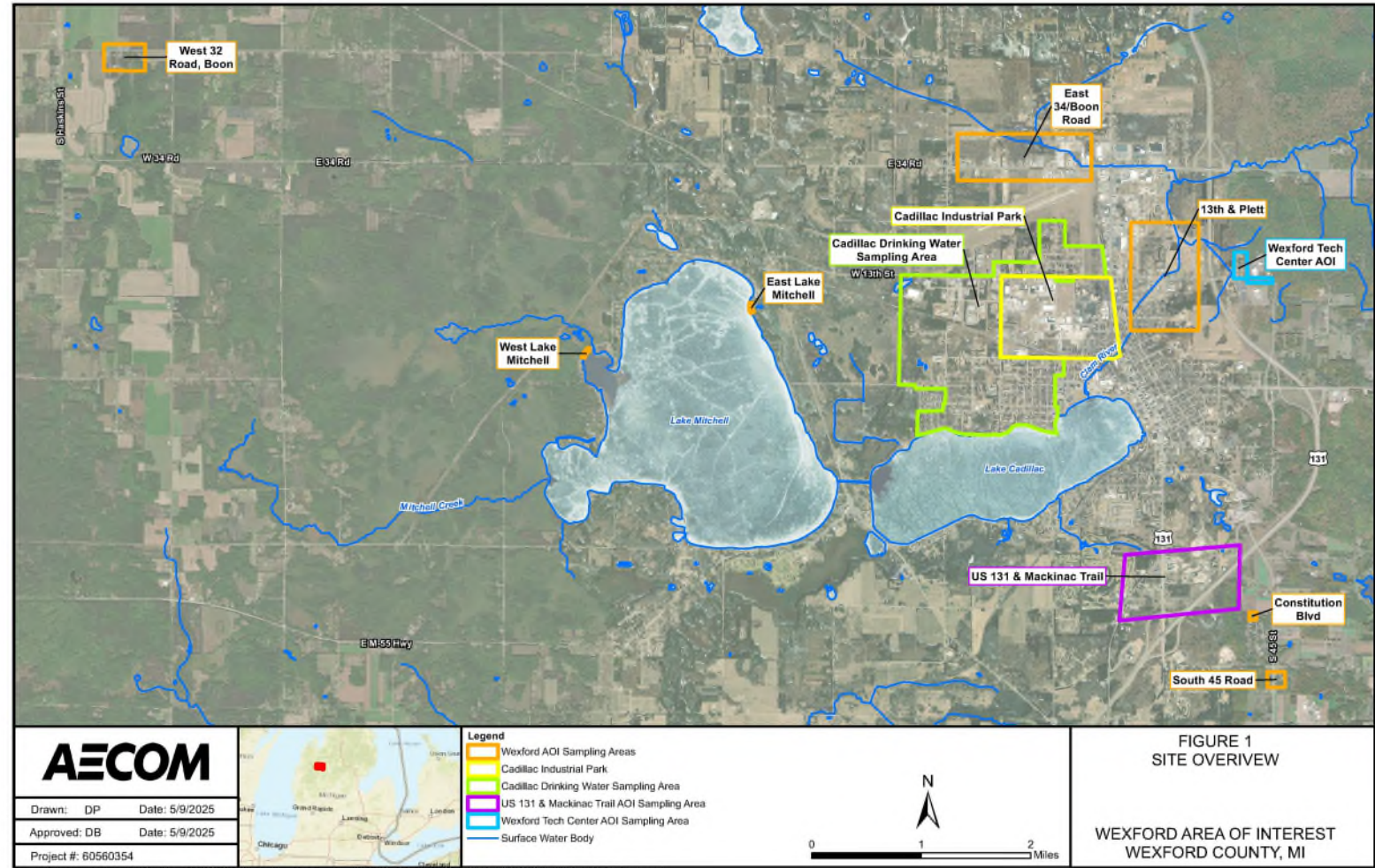


FIGURE 1
SITE OVERVIEW

WEXFORD AREA OF INTEREST
WEXFORD COUNTY, MI

Data-driven Approach

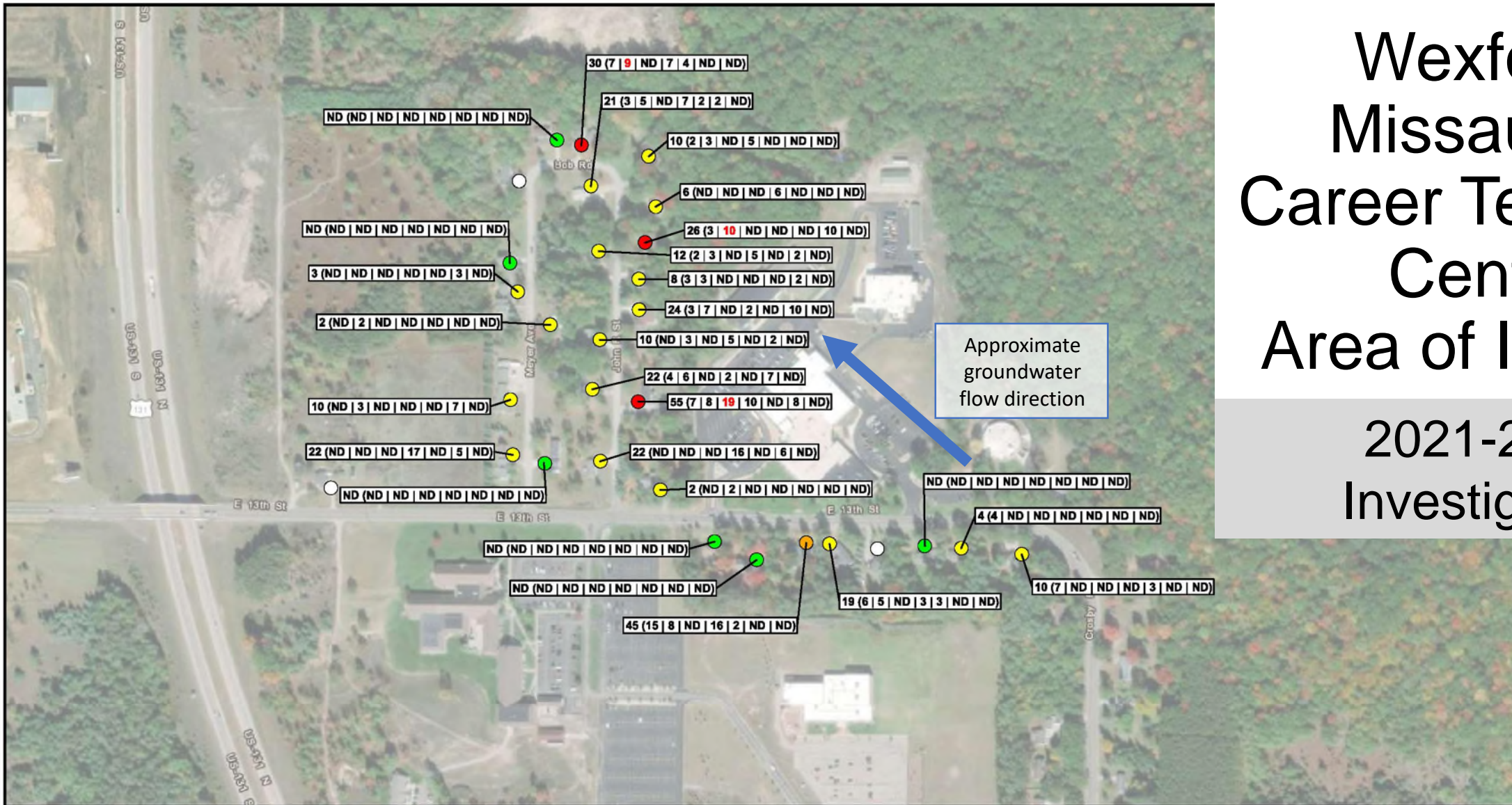
- The MPART investigation is intended to mitigate **exposure** and human health **risk**
- MPART is investigating numerous **potential** PFAS sources based on community input and historic records
- MPART evaluates all scientific data / records received with project team
 - MPART
 - EGLE
 - DHHS
 - Local Health
- MPART holds routine update meetings with the city, township, and local health to discuss new developments and data and coordinate drinking water sampling
 - MPART is focused on **drinking water results** to help guide response



Overview of all the areas of interest throughout Wexford County

Wexford-Missaukee Career Technical Center Area of Interest

2021-2022 Investigation



AECOM

Drawn: DP Date: 3/16/2022

Approved: DB Date: 3/16/2022

Project #: 60560354



- Legend**
- Residential Well Location**
- No Detections of the 18 Analyzed PFAS
 - One or more of the 18 Analyzed PFAS Detected
 - One or more of the 7 PFAS with Michigan Part 201 Drinking Water Criteria Detected Equal to Criteria
 - One or more of the 7 PFAS with Michigan Part 201 Drinking Water Criteria Detected Above Criteria
 - Canvassed - No Sample Collected

Michigan Part 201 Residential & Nonresidential Drinking Water Criteria (DWC), ng/L

PFHxA = 400,000	PFHxS = 51
PFOA = 8	PFOS = 16
PFNA = 6	HFPO-DA = 370
PFBS = 420	

red text indicates exceedance of Part 201 DWC
ND = non-detect

Total PFAS (PFHxA | PFOA | PFNA | PFBS | PFHxS | PFOS | HFPO-DA)

0 300 600 Feet

WEXFORD-MISSAUKEE PFAS HEAT MAP

WEXFORD COUNTY, MI

Cadillac Industrial Park AOI

- MPART has sampled 90 drinking water wells in the Cadillac Industrial Park area as of 5/20/2025.
- Of these, 13 were above current criteria, 61 had detections below criteria, 15 were non-detect, 1 pending result.
- Data suggests there are multiple potential sources of PFAS in the area.
- Cadillac has a lot of sand; contaminants move down into groundwater quickly

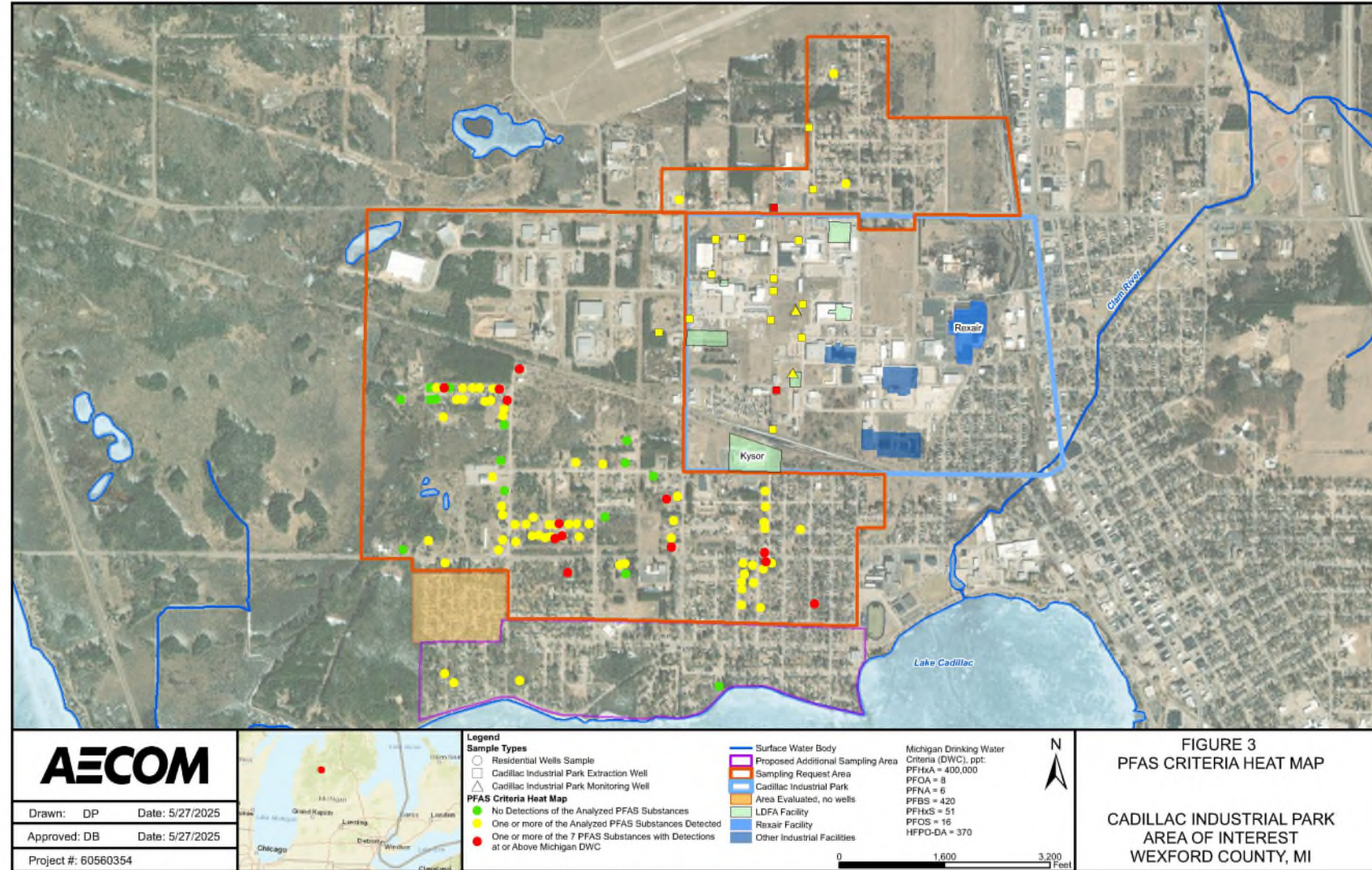
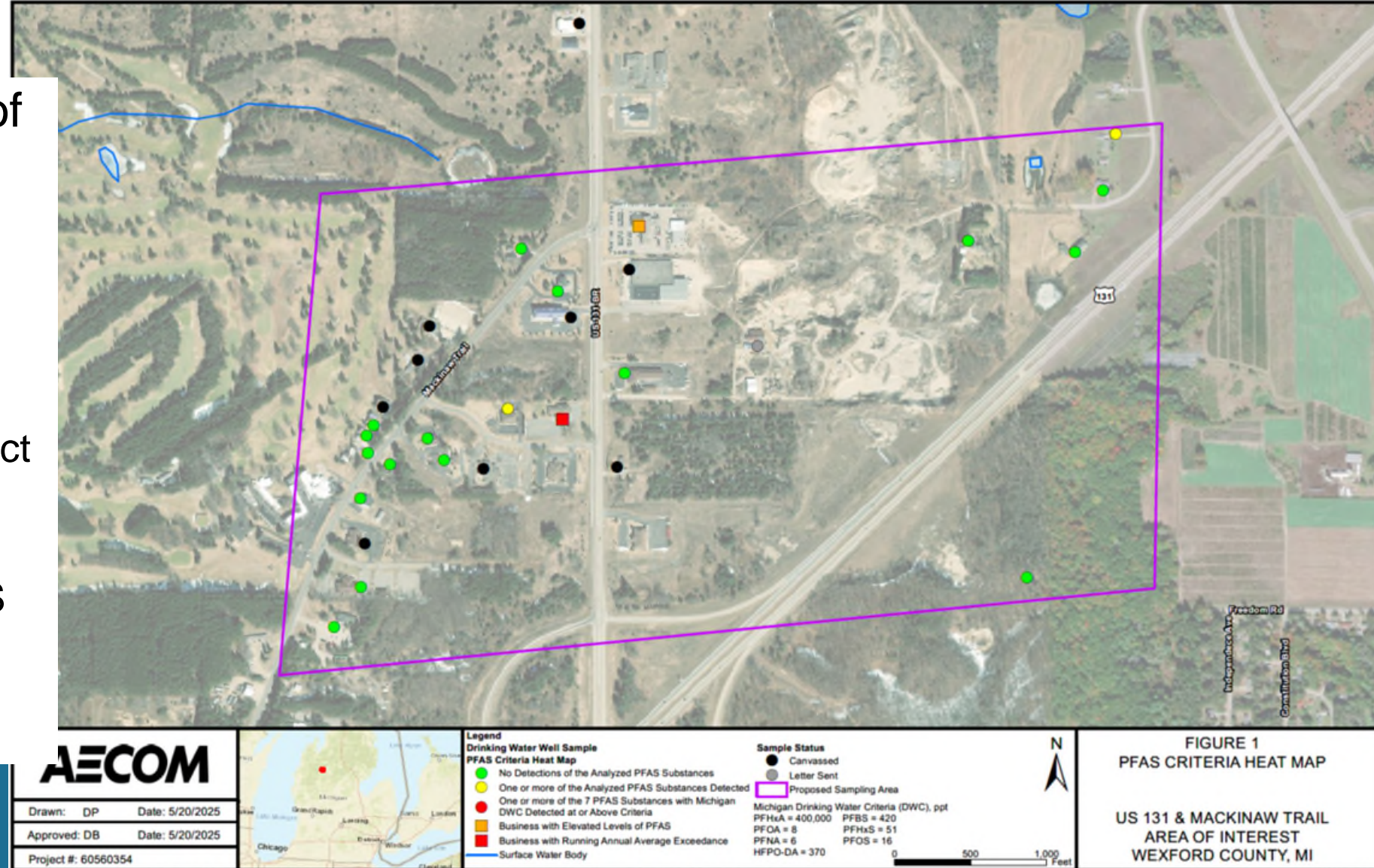


FIGURE 3
PFAS CRITERIA HEAT MAP

CADILLAC INDUSTRIAL PARK
AREA OF INTEREST
WEXFORD COUNTY, MI

US 131 & Mackinaw Trail Area of Interest

- Investigated because of a drinking water exceedance at a business
- 18 properties sampled as of 5/15/2025
 - 16 wells were non-detect
 - 1 well had 2 ppt PFOA (compared to 8 ppt)
 - 1 well had 4 ppt PFHxS (compared to 51 ppt)



MPART

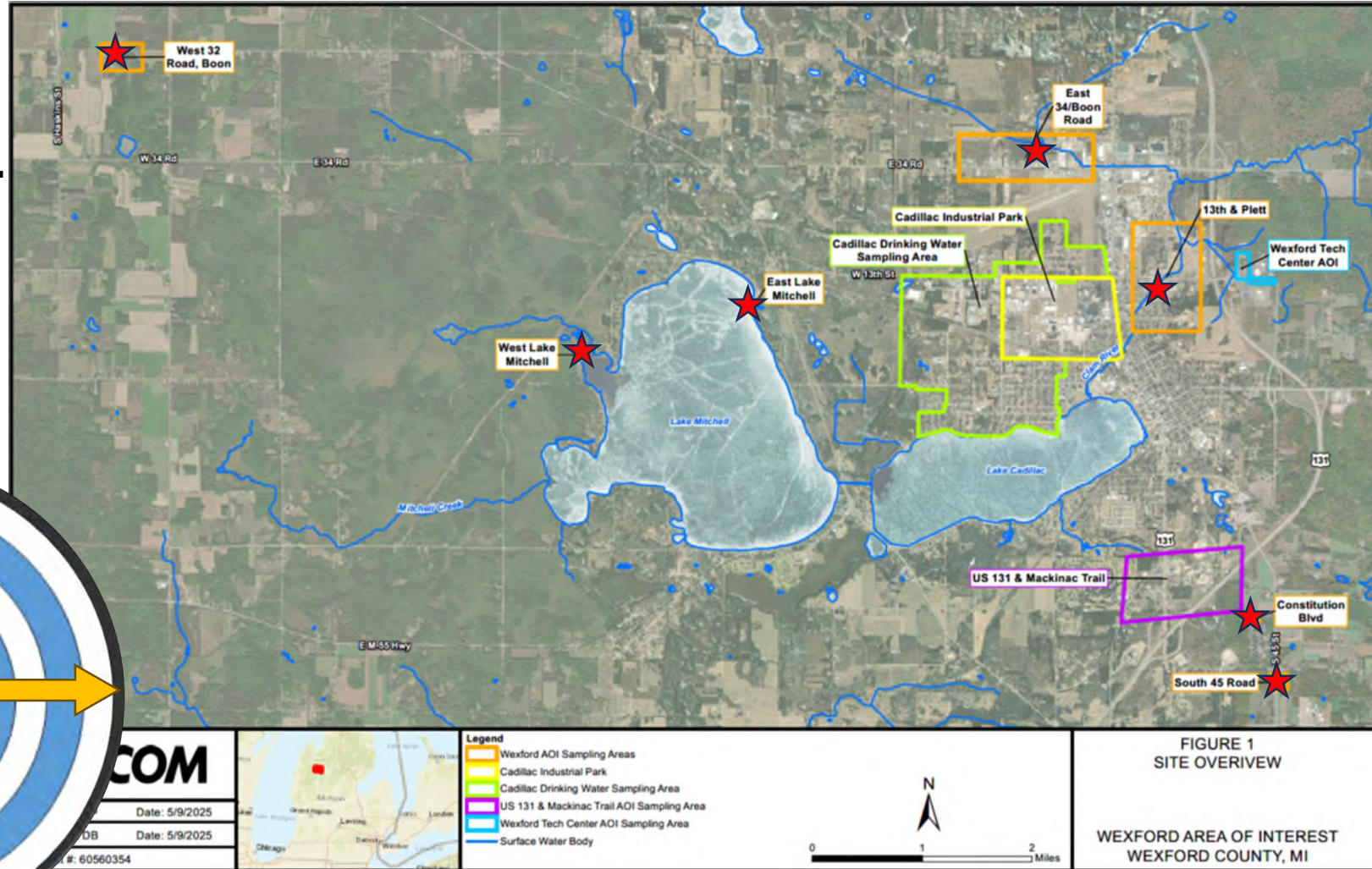
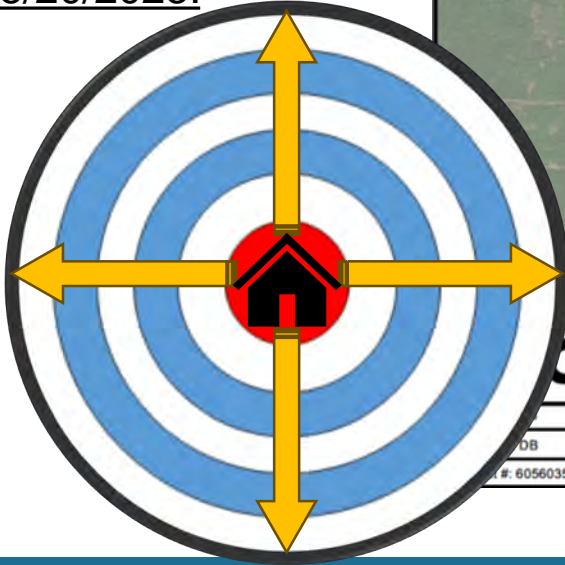
MICHIGAN PFAS ACTION RESPONSE TEAM

Wexford Self-Sampling Area of Interest

Targeting drinking water wells **immediately adjacent** to self sample exceedances to evaluate exposure and risk.

★ Current Sampling Areas and number of samples collected as of 5/20/2025:

- W. 32 Rd., Boon - 7
- E. Lake Mitchell - 4
- W. Lake Mitchell - 3
- Constitution Blvd - 4
- S. 45 Rd. -3
- 13th & Plett - 21
- E. 34/Boon Rd. – 3



MPART

MICHIGAN PFAS ACTION RESPONSE TEAM

Wexford Self-Sampling Area of Interest

45 samples collected as of 5/20/2025

W. 32 Rd., Boon – 7 out of 8 canvassed

- 7 ND

E. Lake Mitchell – 4 out of 5 homes canvassed

- 3 ND, 1 detection below criteria*

W. Lake Mitchell – 3 out of 5 homes canvassed

- 2 ND, 1 pending result

Constitution Blvd – 4 out of 6 homes canvassed

- 1 ND, 3 detections below criteria

S. 45 Rd. – 3 out of 6 homes canvassed

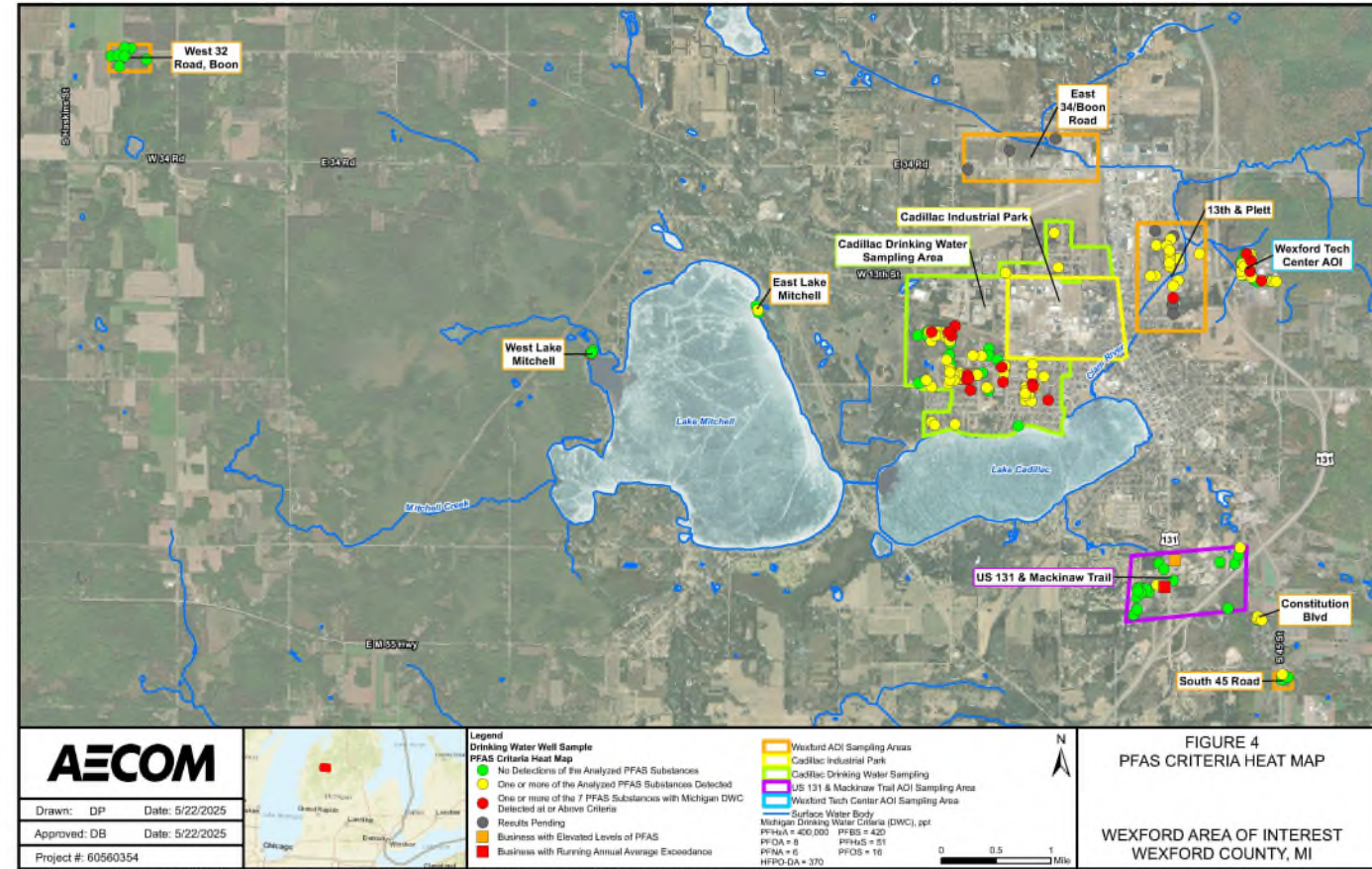
- 2 ND, 1 detection below criteria

13th & Plett – 21 out of 34 locations canvassed

- 16 detections below criteria, 1 above criteria, 4 pending results

E. 34/Boon Rd. – 3 out of 9 locations canvassed

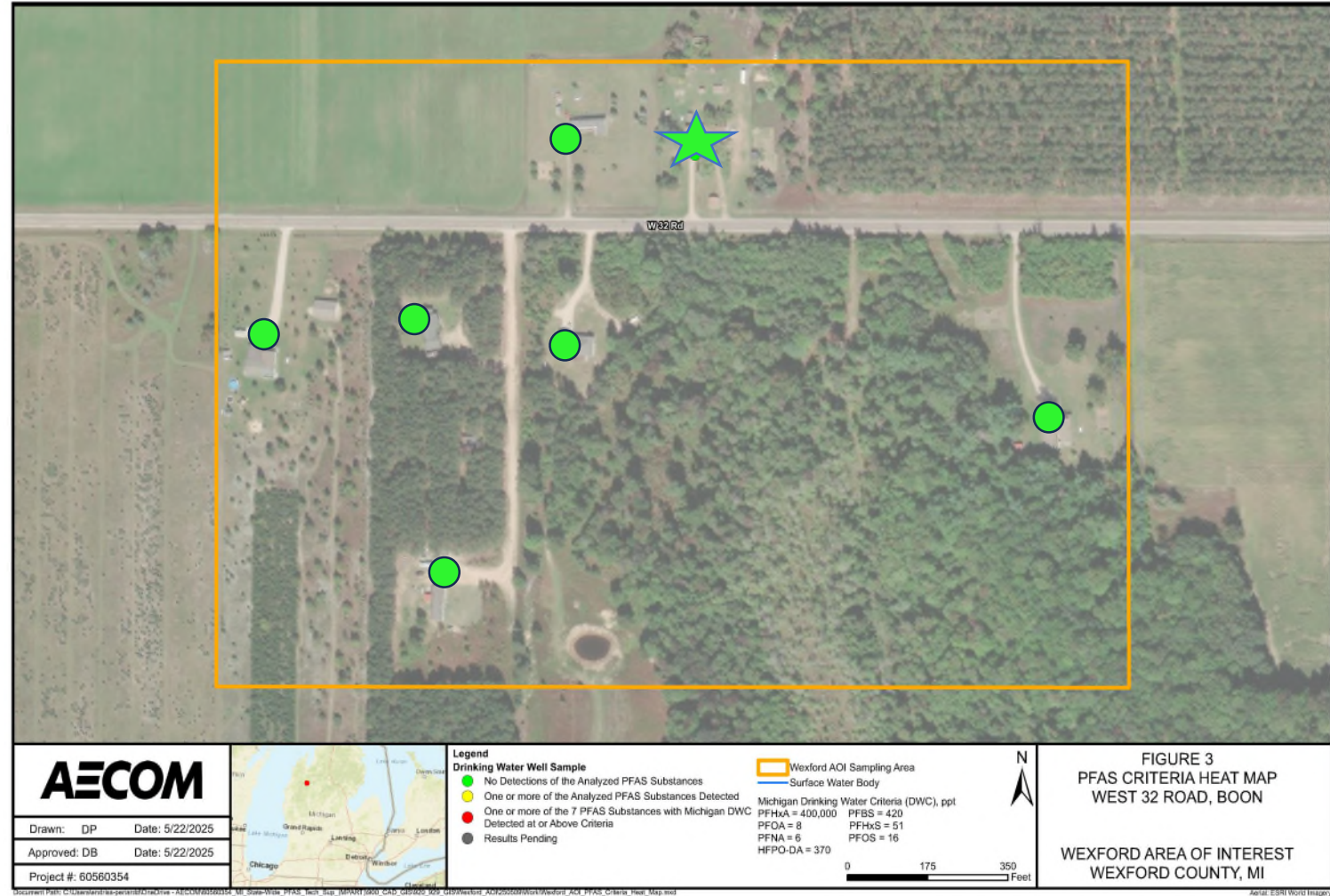
- 3 pending results



W 32 Rd, Boon



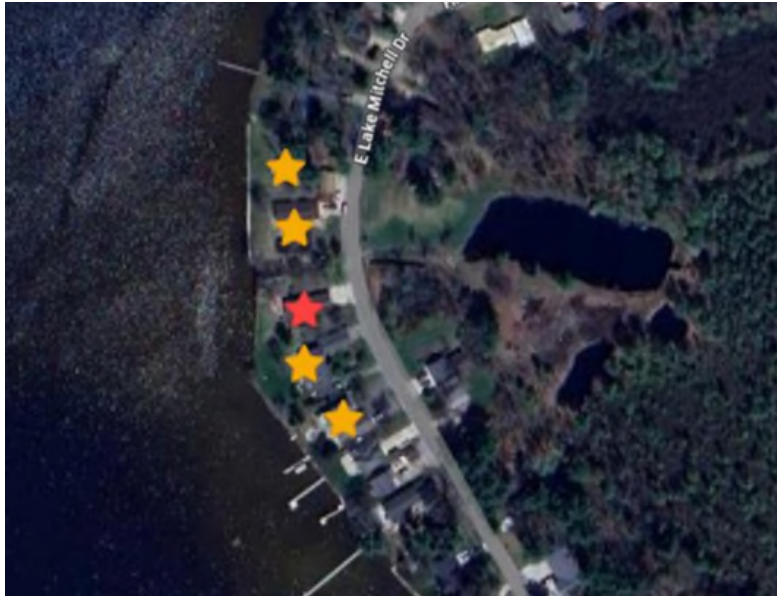
Red star indicates the original property that self-sampled. Yellow stars indicate additional properties that EGLE offered sampling to.



MPART

MICHIGAN PFAS ACTION RESPONSE TEAM

East Lake Mitchell






Red star indicates the original property that self-sampled. Yellow stars indicate additional properties that EGLE offered sampling to.



Legend

Drinking Water Well Sample

-  No Detections of the Analyzed PFAS Substances
-  One or more of the Analyzed PFAS Substances Detected
-  One or more of the 7 PFAS Substances with Michigan DWC Detected at or Above Criteria

MPART

MICHIGAN PFAS ACTION RESPONSE TEAM

West Lake Mitchell



Red star indicates the original property that self-sampled. Yellow stars indicate additional properties that EGLE offered sampling to.



Legend

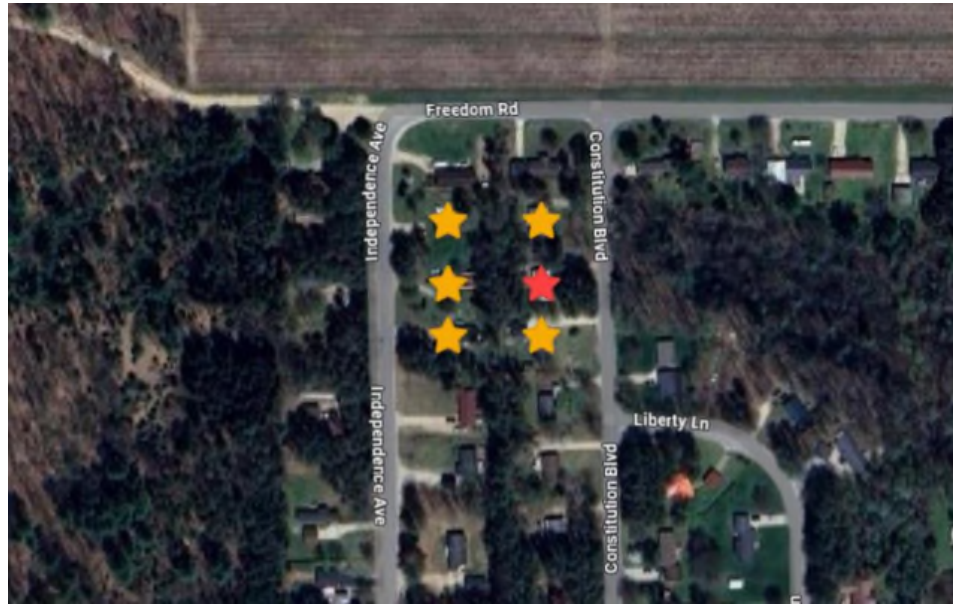
Drinking Water Well Sample

- No Detections of the Analyzed PFAS Substances
- One or more of the Analyzed PFAS Substances Detected
- One or more of the 7 PFAS Substances with Michigan DWC Detected at or Above Criteria
- Results Pending

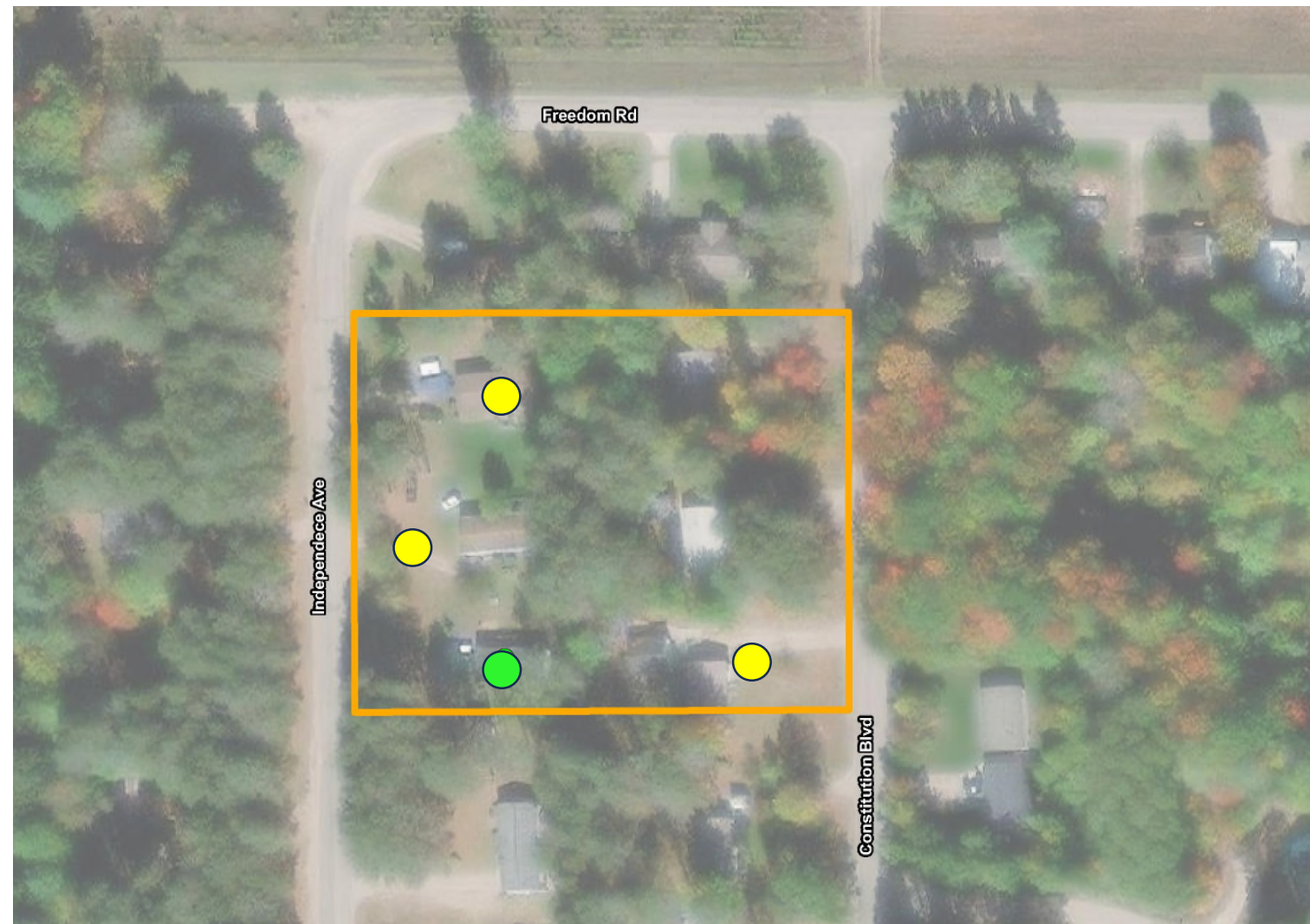
MPART

MICHIGAN PFAS ACTION RESPONSE TEAM

Constitution Blvd





Red star indicates the original property that self-sampled. Yellow stars indicate additional properties that EGLE offered sampling to.



Legend

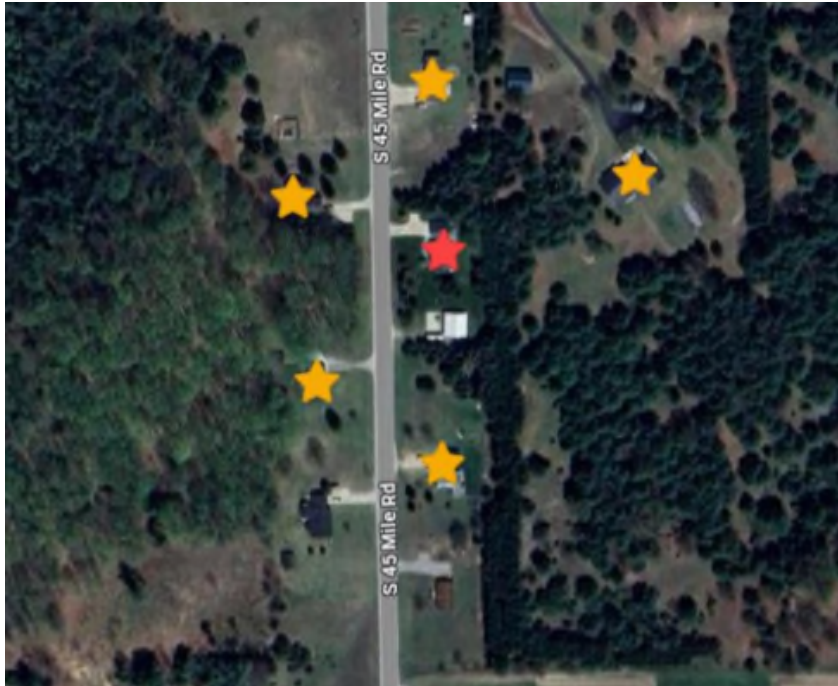
Drinking Water Well Sample

-  No Detections of the Analyzed PFAS Substances
-  One or more of the Analyzed PFAS Substances Detected
-  One or more of the 7 PFAS Substances with Michigan DWC Detected at or Above Criteria

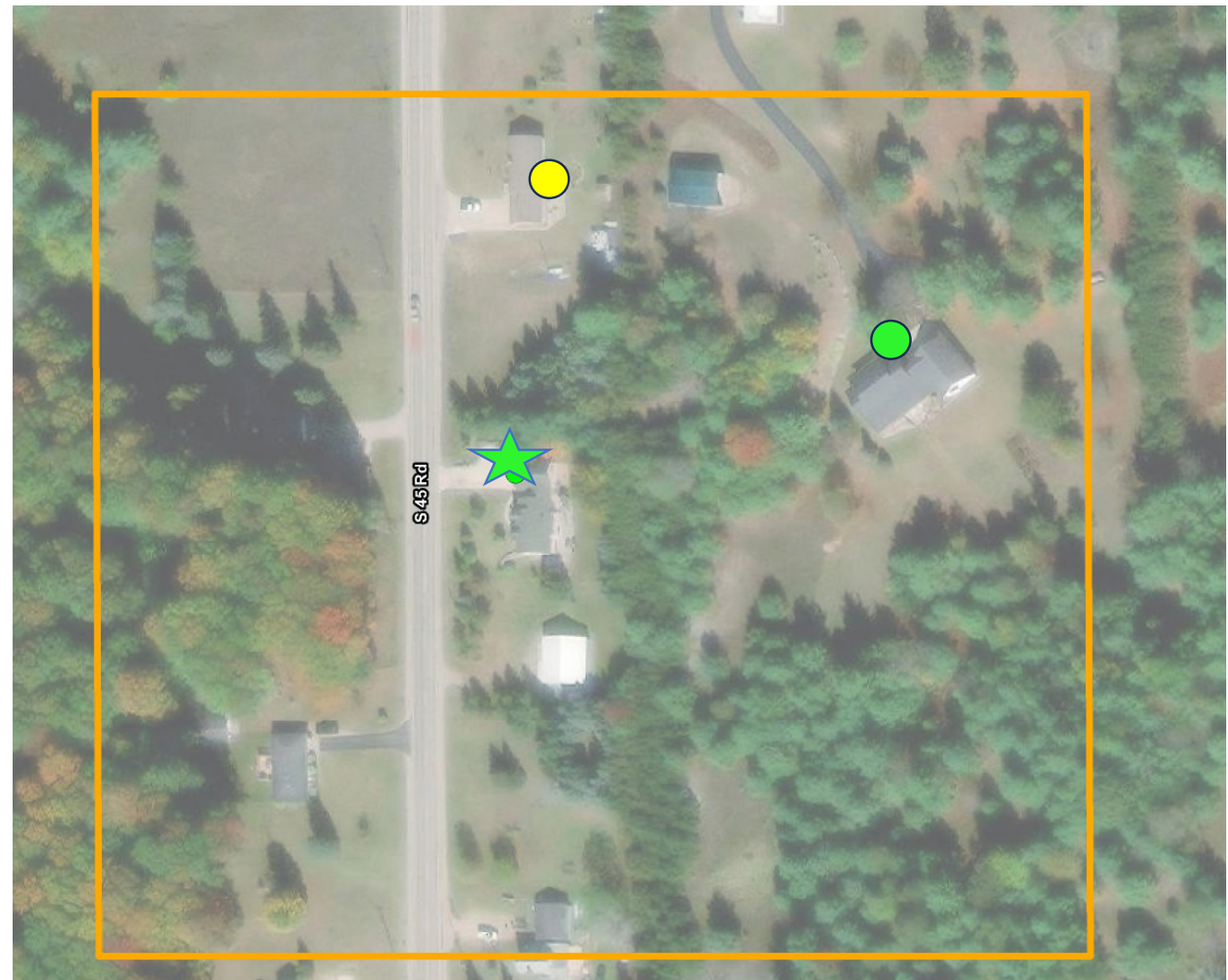
MPART

MICHIGAN PFAS ACTION RESPONSE TEAM

South 45 Rd






Red star indicates the original property that self-sampled. Yellow stars indicate additional properties that EGLE offered sampling to.



Legend

Drinking Water Well Sample

-  No Detections of the Analyzed PFAS Substances
-  One or more of the Analyzed PFAS Substances Detected
-  One or more of the 7 PFAS Substances with Michigan DWC Detected at or Above Criteria

MPART

MICHIGAN PFAS ACTION RESPONSE TEAM





13th and Plett



MPART

MICHIGAN PFAS ACTION RESPONSE TEAM

Drinking Water Well Sample

-  No Detections of the Analyzed PFAS Substances
-  One or more of the Analyzed PFAS Substances Detected
-  One or more of the 7 PFAS Substances with Michigan DWC Detected at or Above Criteria
-  Results Pending



Red star indicates the original property that self-sampled.

East 34 / Boon Rd

Results Pending



MPART

MICHIGAN PFAS ACTION RESP

Cyclopure Self-Sample Test Kits

- The City of Cadillac has offered Cyclopure self test kits to residents that haven't sampled previously
- Haring Township is also coordinating Cyclopure self-sampling
- Results from self test kits are provided to MPART from local units of government
 - *Private results are **not** being shared with the public* because we do not have expressed permission from each resident
 - MPART maps the results internally to identify patterns and potential sources

Cyclopure and EGLE Lab

- Cyclopure uses a different collection method, but follows the similar lab methods used in the EPA methods
 - analysis of water samples is validated to the requirements of EPA Methods
- Because PFAS sampling is extremely sensitive and there is a potential for cross contamination, rigorous sampling and quality control procedures are necessary
- EGLE attempted to resample 6 locations w/exceedances to verify results but were only given permission to resample 4 locations
- EGLE results did not confirm the presence of PFAS at the four locations
 - EGLE's samples are collected using EPA quality control methods, by staff that have collected over 6,000 samples
 - EGLE Lab is an EPA-certified lab that performs EPA's approved drinking water methods

Cyclopure/ EGLE Comparison Data

	Cyclopure Collected 3/8/2025	EGLE Lab Collected 4/29/2025
PFOA	11.6	ND
PFOS	22	ND
PFHxS	ND	ND
PFNA	ND	ND
GenX (HFPO-DA)	ND	ND
PFBS	ND	ND

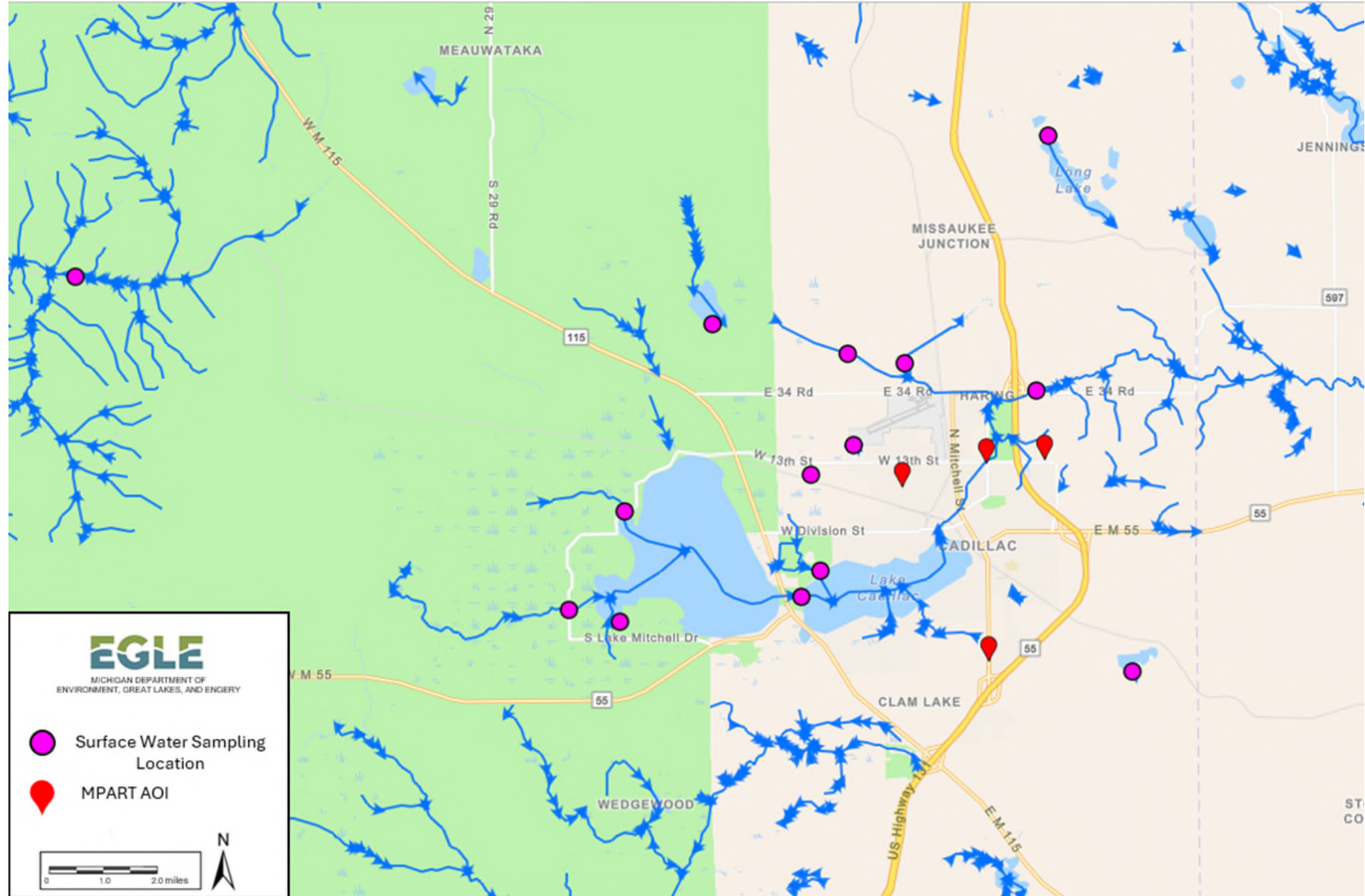
	Cyclopure Collected 3/6/2025	EGLE Lab Collected 4/29/2025
PFOA	19.4	ND
PFOS	24.1	ND
PFHxS	ND	ND
PFNA	ND	ND
GenX (HFPO-DA)	ND	ND
PFBS	ND	ND

	Cyclopure Collected 3/9/2025	EGLE Lab Collected 4/30/2025
PFOA	24.7	ND
PFOS	24.2	ND
PFHxS	ND	ND
PFNA	ND	ND
GenX (HFPO-DA)	ND	ND
PFBS	ND	ND
PFHpS	1.2	ND

	Cyclopure Collected Date N/A	EGLE Lab Collected 4/30/2025
PFOA	22.3	ND
PFOS	31.8	ND
PFHxS	ND	ND
PFNA	ND	ND
GenX (HFPO-DA)	ND	ND
PFBS	ND	ND

Surface Water Sampling

- EGLE previously sampled surface water in Cadillac for PFAS in 2022
 - No exceedances were found
 - Concentrations of PFAS were predominately at or around background levels
- Map shows locations planned for sampling today (May 29th)



Cadillac Area Public Water Supplies

Scott Kendzierski, Emerging Contaminants Unit
Michigan Department of Environment, Great Lakes, and Energy
231-340-8376

KendzierskiS@michigan.gov

MPART

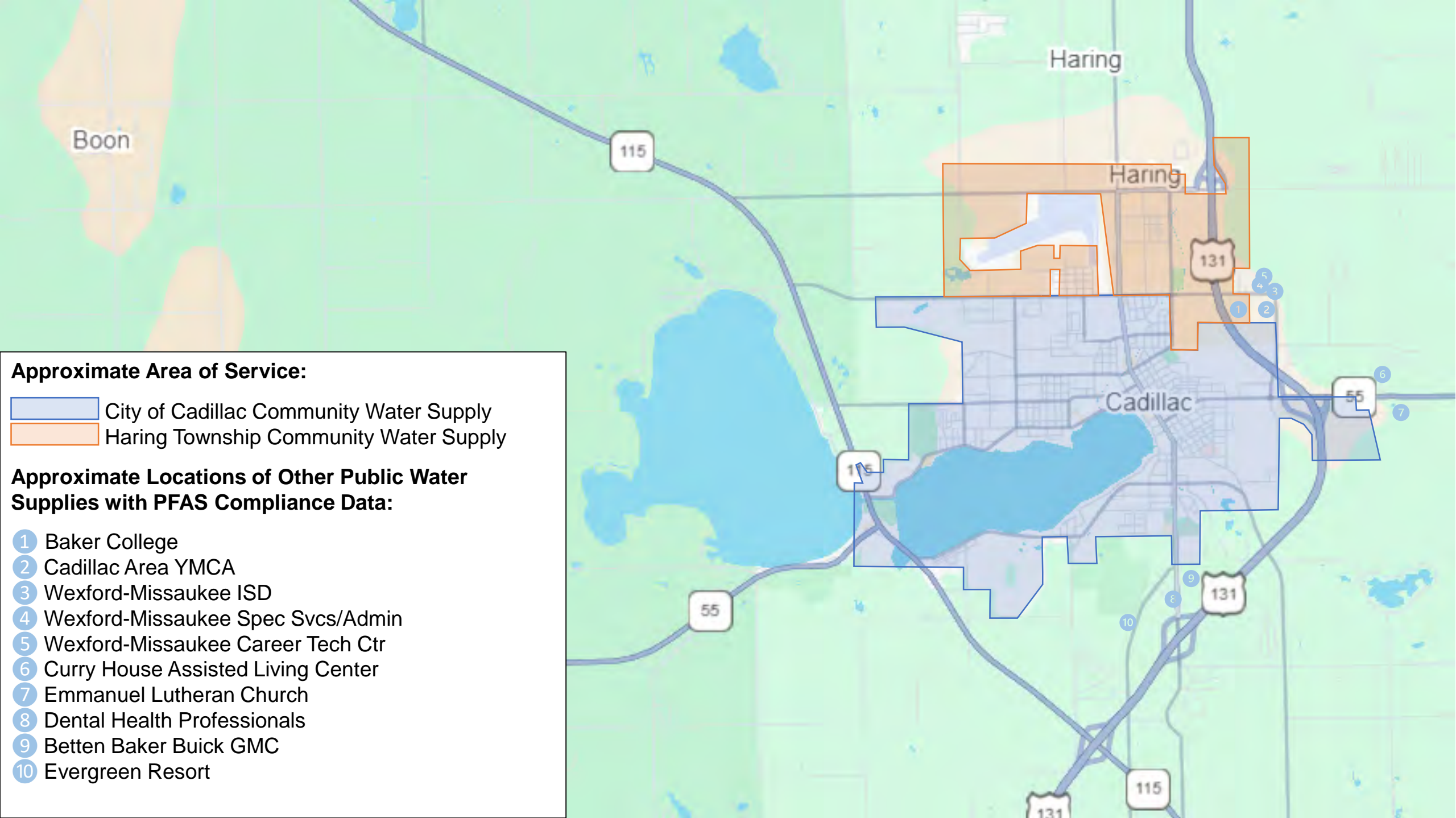
MICHIGAN PFAS ACTION RESPONSE TEAM

Public Water Supplies



The region in and around the areas of interest includes two municipal community water supplies (CWS). These are the City of Cadillac CWS and the Haring Charter Township CWS.

- The City of Cadillac CWS is currently on an annual sampling schedule with all past compliance monitoring results non-detect for all tested PFAS.
- The Haring Charter Township CWS is currently on a quarterly sampling schedule with past compliance monitoring detections below corresponding MI MCLs or non-detect for all tested PFAS.

The remainder of the region primarily utilizes private residential wells for drinking water with several smaller community and noncommunity water supplies present as well.



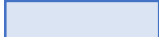
Approximate Area of Service:

-  City of Cadillac Community Water Supply
-  Haring Township Community Water Supply

Approximate Locations of Other Public Water Supplies with PFAS Compliance Data:


- 1 Baker College
- 2 Cadillac Area YMCA
- 3 Wexford-Missaukee ISD
- 4 Wexford-Missaukee Spec Svcs/Admin
- 5 Wexford-Missaukee Career Tech Ctr
- 6 Curry House Assisted Living Center
- 7 Emmanuel Lutheran Church
- 8 Dental Health Professionals
- 9 Betten Baker Buick GMC
- 10 Evergreen Resort


Approximate Area of Service:

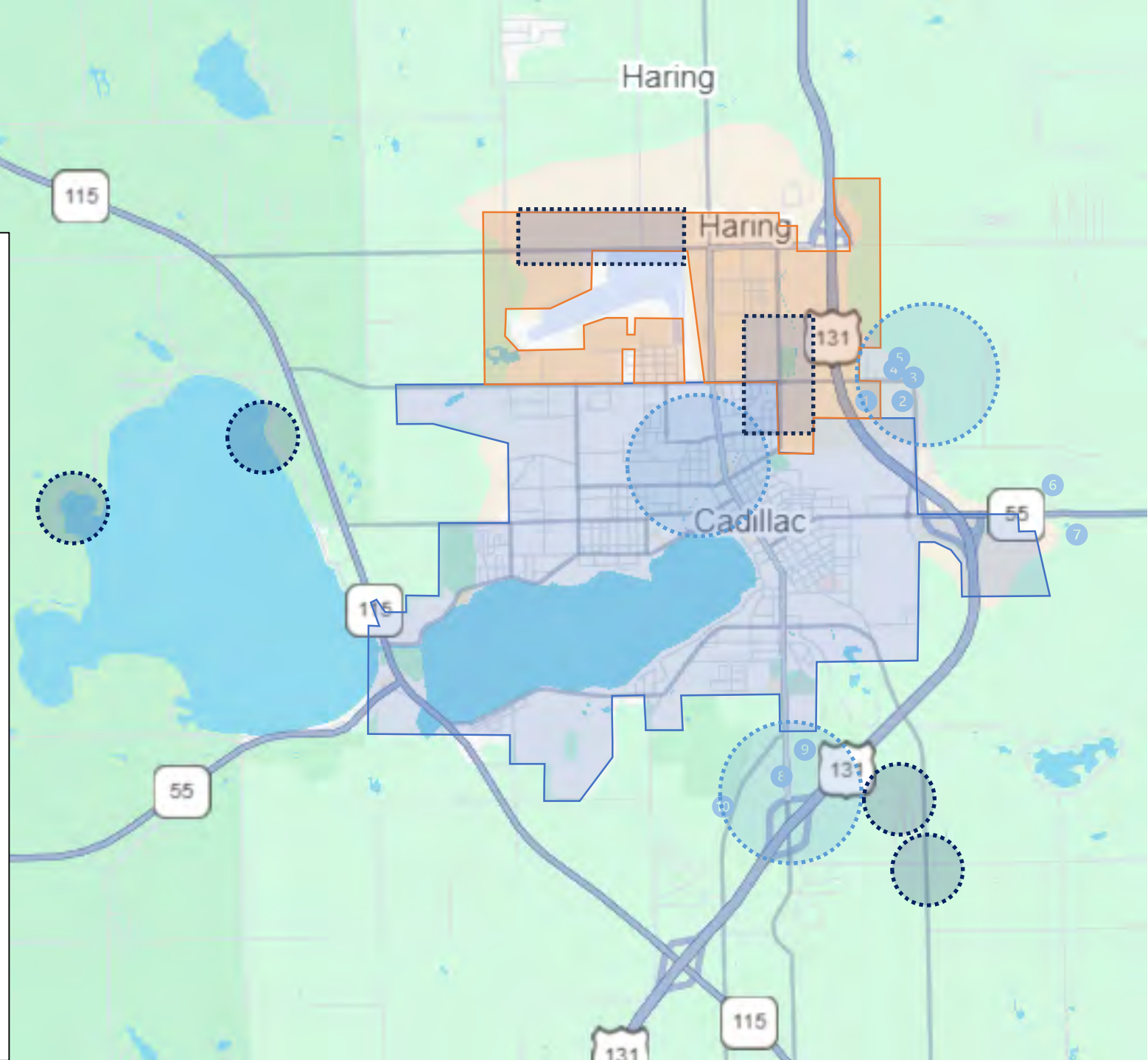
-  City of Cadillac Community Water Supply
-  Haring Township Community Water Supply

Approximate Locations of Other Public Water Supplies with PFAS Compliance Data:

- 1 Baker College
- 2 Cadillac Area YMCA
- 3 Wexford-Missaukee ISD
- 4 Wexford-Missaukee Spec Svcs/Admin
- 5 Wexford-Missaukee Career Tech Ctr
- 6 Curry House Assisted Living Center
- 7 Emmanuel Lutheran Church
- 8 Dental Health Professionals
- 9 Betten Baker Buick GMC
- 10 Evergreen Resort

 Wexford-Missaukee CTC, Cadillac Industrial Park, and US 131 & Mackinaw Trail Areas of Interest

 Wexford Area of Interest Self-Sampling Investigation – Approximate Sample Locations



Summary:

- The best thing a private well owner can do is sample their well and/or purchase a filter to protect your family
- There are 1 million residential wells in Michigan
- MPART will continue to review self-sample results provided to us
- The project team will continue to evaluate if additional investigation / sampling is needed
 - Science/data will drive these decisions

Questions ?

MPART

MICHIGAN PFAS ACTION RESPONSE TEAM

MICHIGAN PFAS ACTION RESPONSE TEAM (MPART)

www.Michigan.gov/PfasResponse



MICHIGAN DEPARTMENT OF
ENVIRONMENT, GREAT LAKES, AND ENERGY



MPART

MICHIGAN PFAS ACTION RESPONSE TEAM

Appendix C: City of Cadillac PFAS Management Plan

CITY OF CADILLAC PFAS MANAGEMENT PLAN

Updated October 27, 2025

The City of Cadillac has a municipal water system that provides drinking water to the city residents. The water for this system is supplied by groundwater wells that meet all State of Michigan drinking water standards – including PFAS limits.

Of concern, there are several properties within the city with private drinking water wells that are not connected to the city’s water system. PFAS has been detected in several of these private wells and is especially prevalent in areas around the city’s Industrial Park area. The best solution to address the PFAS detection in these private wells is to connect the properties to the city’s water system and close the PFAS impacted private wells. The connection of these PFAS impacted properties to the city water system is critical to preserve the public health for the people who are living with these PFAS impacted wells. The city is working collaboratively with state and local leaders to secure financial assistance for these property owners to connect to the city’s water system.

Excerpt map of private wells near the Industrial Park Area



Of the estimated 220 properties that have private wells. The municipal water availability breakdown is as follows:

- 150 properties have municipal water service immediately available but are not hooked up.
- 70 properties do not have municipal water service available and watermain extension is needed to connect these properties.

The testing that has been performed to date found that several of these private wells contain PFAS at levels both above and below State of Michigan drinking water standards. To create a forever solution, the residents need to be connected to the city's water system, and the ultimate priority is to connect all properties to the city water system, which is being planned in **two phases**:

PHASE 1

Phase 1 will connect all residents with private wells that have water service immediately available and include a short water main extension to serve approximately 20 residents of Marathon Drive (this area currently does not have municipal water service). Marathon Drive is located within the influence of the City's Industrial Park and is one of the most heavily impacted PFAS areas.

Map of Proposed Watermain for Marathon Drive - See Attached Map for Phase 1 Project Area



The city would like to complete this phase ideally using outside funding sources, as soon as possible and feasible. The estimated cost from summer 2025 for this phase is: **\$1.825 million**, the following is a breakdown of the costs associated with Phase 1:

Marathon Drive Watermain	\$325,000
Water Services to Properties with Private Wells	\$1,500,000
Total:	\$1,825,000

The estimated cost of Phase 1 amounts to almost **\$11K** per impacted property, this is a substantial sum for a property owner to come up with to finance this project phase, and why outside funding is essential.

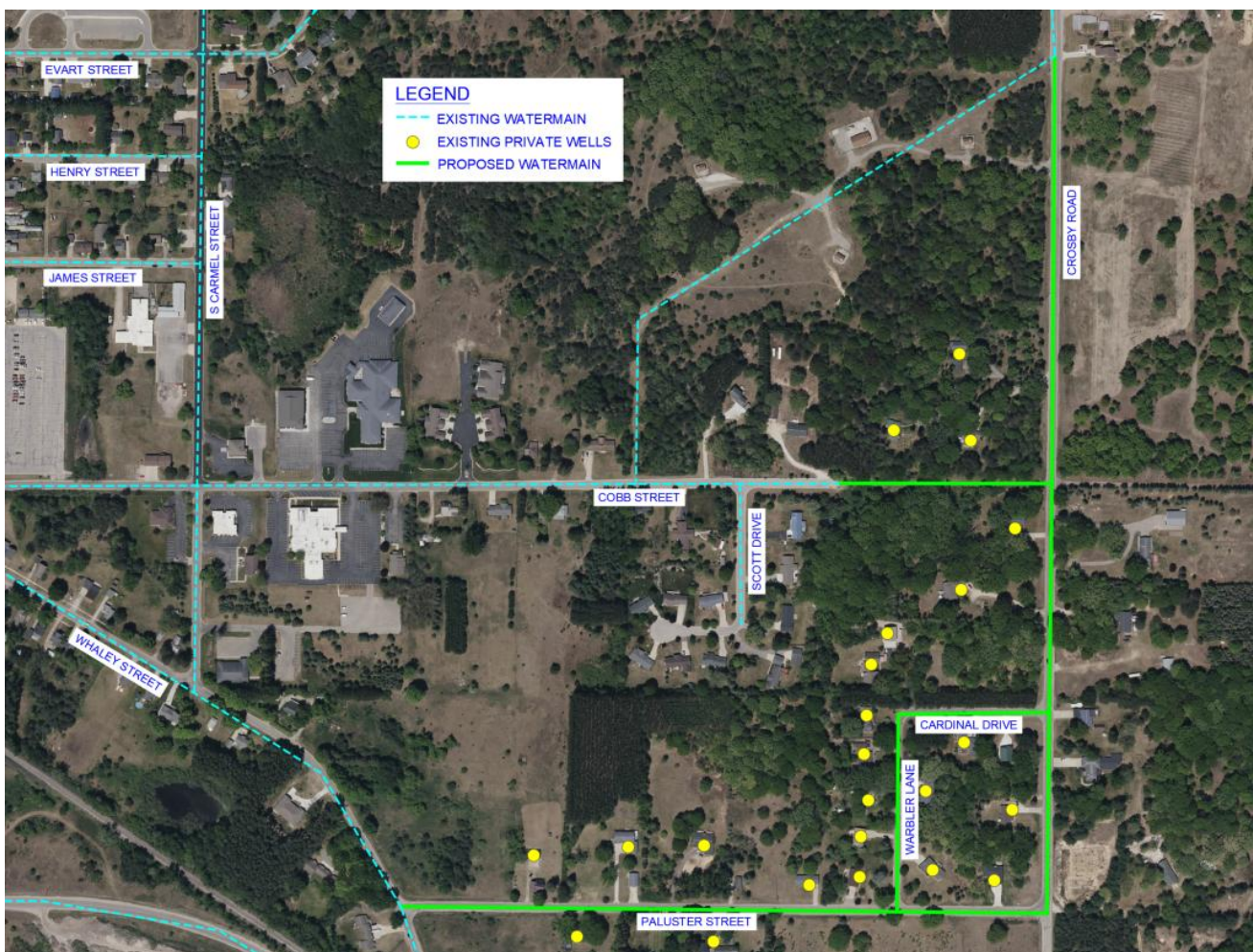
PHASE 2

Phase 2 will include water infrastructure extension to areas with private wells where municipal water service is currently not available. These areas include:

- Pennsylvania Avenue
- West Division Street
- South Crosby Road
- Crosby Court
- Cardinal Drive
- Warbler Lane
- Paluster Street

Excerpt of Phase 2 – Map

Proposed Watermain Extension for Crosby Rd, Cardinal Dr, Warbler Ln, and Paluster St.
(See attached for Phase 2 Project Area)



The estimated cost for Phase 2 is **\$6.1 million**.

The estimated cost of Phase 2 amounts to over **\$120K** per impacted property which is an unreasonable sum to request from these property owners, and why outside funding is essential.

SUMMARY

Summary of the total infrastructure Cost for the Current PFAS Management Scope:

Phase 1	\$1.825 Million
Phase 2	\$6.1 Million
Total:	\$7.925 Million

Addressing PFAS contamination in the City of Cadillac is going to take a substantial financial investment and due to the potential impact on public health this critical issue needs to be addressed as soon as possible.

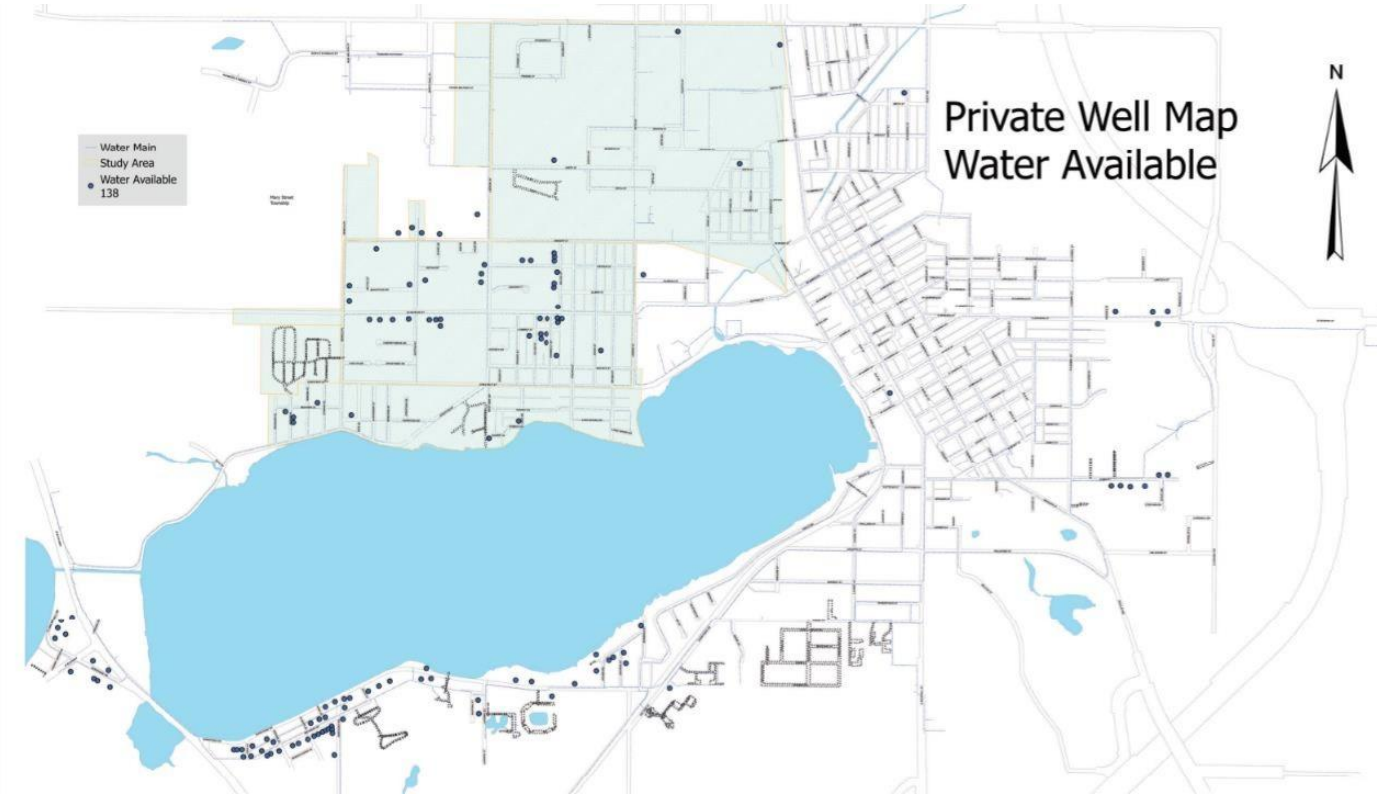
The City has applied and lobbied for funding at the federal and state levels of government, but as of this update, the State of Michigan did not include in their Fiscal Year 2026 Budget an appropriation for funding. There also has not yet been any update from the federal government, possibly because they are still shut down. Opportunities that are being pursued, however, still include looking at a grant or appropriation for just a portion of Phase 1, if the larger infrastructure requests are not feasible.

In the interim, the Michigan PFAS Action Response Team (MPART) does have information and access to assistance for people on their own private system. For more information on MPART, visit <https://www.michigan.gov/pfasresponse>

These initial infrastructure projects are critical to protect city residents where the problems and potential impacts are known. There is much that is still unknown, and the city intends to continue to investigate the range of the PFAS contamination and evaluate management strategies. Please keep the city in consideration as planning for current and future funding opportunities are developed to address critical public health emergencies such as PFAS contamination.

For more information on the scope of PFAS Management in the City of Cadillac, please visit the City's PFAS Resources website at: [PFAS Resources | Cadillac, MI - Official Website](#)

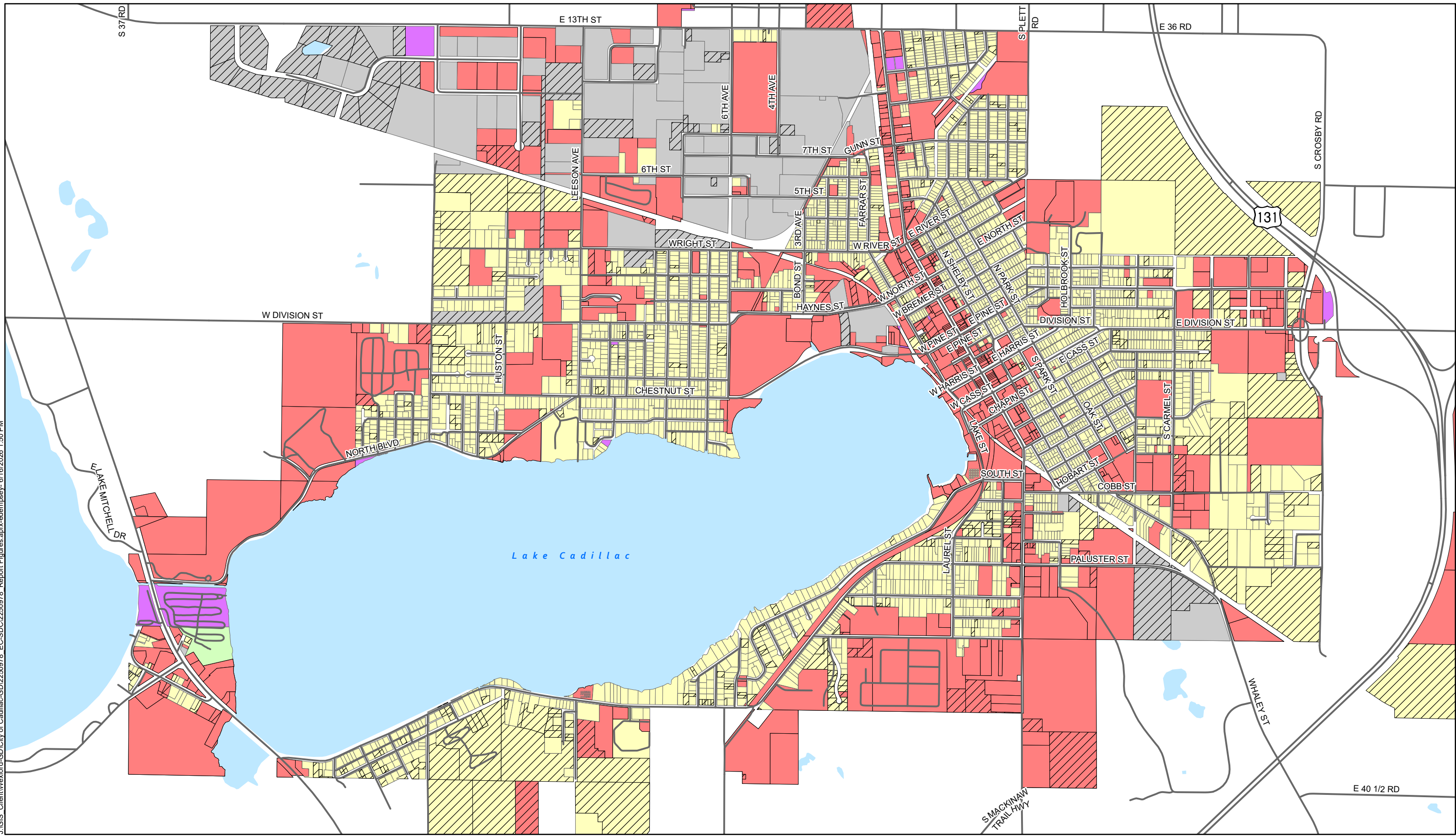
Phase 1 Project Area Map – blue dots indicate private wells with water service currently available












Phase 2 Project Area Map - yellow dots indicate private wells with no current water service availability



Appendix D: Land Use Map



LEGEND

- | | | |
|---|--|--|
|  Agricultural |  Industrial Improved |  Residential Vacant |
|  Commercial Improved |  Industrial Vacant |  Residential Lease |
|  Commercial Vacant |  Residential Improved |  Exempt |

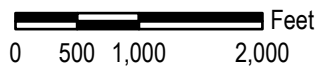
CITY OF CADILLAC
WEXFORD COUNTY, MI

EXISTING LANDUSE

APPENDIX D

Prein&Newhof

2250978



Appendix E: Cultural Resources Desktop Review



APPLICATION FOR SHPO SECTION 106 CONSULTATION

Submit one application for each project for which comment is requested. Consult the *Instructions for the Application for SHPO Section 106 Consultation Form* when completing this application.

Submit application materials online at www.michigan.gov/shposection106 or mail to: Michigan State Historic Preservation Office, 300 North Washington Square, Lansing, MI 48913

I. GENERAL INFORMATION

New submittal

More information relating to SHPO ER# [SHPO Project #](#)

Submitted under a Programmatic Agreement (PA)

PA Name/Date: [PA name/date, if applicable](#)

a. **Project Name:** Cadillac Watermain EC Project

b. **Project Location(s):** City-wide

If there is more than one location for your project, additional rows may be added to the table below. Township, Range, Section/Private Claim refer to the public land survey sections. Each Township/Range group must have its own row in the table below and must include the corresponding county and municipal unit.

County	Municipality	Street Address	Township (N/S)	Range (E/W)	Section(s) or Private Claim
Wexford County	City of Cadillac	N/A	T22N	09W	31, 32, 33, and 34
Wexford County	City of Cadillac	N/A	T21N	09W	07, 08, and 09

II. FEDERAL AGENCY INVOLVEMENT AND RESPONSE CONTACT INFORMATION

a. **Federal Agency:** Michigan Department of Environment, Great Lakes, and Energy

Contact Name: Jonathan M. Berman, SRF Compliance Specialist

Contact Address: PO Box 30457 **City:** Lansing **State:** MI **Zip:** 48909-7957

Email: BermanJ@michigan.gov

Specify the federal agency involvement in the project: Specify Source(s) of Federal Funding (e.g. CW/DW SRF capitalization grant, BIL, etc.)

b. **If HUD is the Federal Agency:** 24 CFR Part 50 or Part 58

Responsible Entity (RE): [Name of the entity that is acting as the Responsible Entity](#)

Contact Name: [RE Contact name](#)

Contact Address: [RE mailing address](#) **City:** [RE city](#) **State:** [RE State](#) **Zip:** [RE zip code](#)

RE Email: [RE contact's email](#) **Phone:** [RE contact's phone #](#)

c. **State Agency Contact (if applicable):** Michigan Department of Environment, Great Lakes, and Energy

Contact Name: Jessica Ferris, Project Manager

Contact Address: ferrisj6@michigan.gov **City:** **Zip:**

Email: **Phone:**

d. **Applicant (if different than federal agency):** City of Cadillac

Contact Name: Owen Roberts

Contact Address: 200 N Lake Street **City:** Cadillac **State:** MI **Zip:** 49601



APPLICATION FOR SHPO SECTION 106 CONSULTATION

Email: oroberts@cadillac-mi.net **Phone:** 231-779-7333

- e. **Consulting Firm (if applicable):** Prein&Newhof
 Contact Name: Eric E. Seguin, P.E.
 Contact Address: 3355 Evergreen Drive NE **City:** Grand Rapids **State:** MI **Zip:** 49525
Email: eseguina@preinnewhof.com **Phone:** 231-468-3456

III. PROJECT INFORMATION

a. Project Work Description

Describe all work to be undertaken as part of the project:

This project involves water system improvements in the City of Cadillac, Michigan. This project involves connecting homes that currently use a private well to the city water supply along with installing new water main line. A total of 138 homes will have a private well abandoned and hooked to into the city water supply that runs in front of their house. A new watermain will be installed in five locations to hook up 65 houses to the city water supply (Figure 3). The proposed ground disturbance involves a hydrovac excavation measuring one to three feet in diameter above the existing watermain. The service line will be installed through directional drilling and will not require a trench. Eight homes may require the excavation of an additional hydrovac excavation to allow for a turn in the service line.

b. Project Location and Area of Potential Effect (APE)

i. **Maps.** Please indicate all maps that will be submitted as attachments to this form.

- Street map, clearly displaying the direct and indirect APE boundaries
- Site map
- USGS topographic map Name(s) of topo map(s): Cadillac North, Cadillac South, Jennings, and Lucas, MI
- Aerial map
- Map of photographs
- Other: Private Well Map

ii. **Site Photographs**

iii. **Describe the APE:**

The APE for direct effects includes the construction limits at select wells. The proposed ground disturbance involves a hydrovac excavation measuring one to three feet in diameter above the existing watermain. The service line will be installed through directional drilling and will not require a trench. As we understand it, the contractor will select the specific location of the hydrovac excavation once in the field based on local conditions.

The APE for indirect effects includes the area adjacent to the replacement involving the temporary visual and noise effects of the excavation. All project activities will be installed below ground and will create no additional indirect effects.

iv. **Describe the steps taken to define the boundaries of the APE:**

The APE for direct effect corresponds to the extent of the proposed hydrovac excavation. The APE for indirect effects corresponds to the area adjacent to each excavation.



APPLICATION FOR SHPO SECTION 106 CONSULTATION

IV. IDENTIFICATION OF HISTORIC PROPERTIES

a. Scope of Effort Applied

- i. **List sources consulted for information on historic properties in the project area** (including but not limited to SHPO office and/or other locations of inventory data).

Historic atlases, aerials, MSHPO records

- ii. Provide documentation of previously identified sites as attachments.
- iii. **Provide a map** showing the relationship between the previously identified properties and sites, your project footprint and project APE.
- iv. Have you reviewed existing site information at the SHPO: Yes No
- v. Have you reviewed information from non-SHPO sources: Yes No

b. Identification Results

i. Above-ground Properties

- A. **Are you submitting above-ground identification information?** Yes No

B. If yes, please indicate level:

- Literature Review Reconnaissance Survey Report Intensive Survey Report

C. Total number of properties surveyed **Zero**:

D. Total number of previously identified Historic Properties in your APE **Two** - Cadillac Historic Commercial District, and the Cadillac Residential Historic District. See the desktop review for additional detail.

E. Total number of newly identified properties recommended eligible for listing in the National Register of Historic Places **Zero**

F. Summarize, briefly, your findings for above-ground resources.

See the cultural desktop review

G. Attach the appropriate Michigan SHPO Architectural Identification Form for each resource or site 50 years of age or older in the APE. Refer to the *Instructions for the Application for SHPO Section 106 Consultation Form* for guidance on this.

H. Provide the name and qualifications of the person who made recommendations of eligibility for the above-ground identification forms.

Name Bruce Harvey **Agency/Consulting Firm:** Harvey Research and Consulting

Is the individual a 36CFR Part 61 Qualified Historian or Architectural Historian Yes No

Are their credentials currently on file with the SHPO? Yes No

If NO attach this individual's qualifications form and resume.

ii. Archaeology

Submit the following information using attachments, as necessary.



APPLICATION FOR SHPO SECTION 106 CONSULTATION

- A. **Are you submitting archaeological information?** Yes No
- B. **If yes, please indicate:** Assessment (Desktop Review) Archeological Report
- C. **Width(s), length(s), and depth(s) of proposed ground disturbance(s):** Individual hydrovac excavations will measure 1-3ft in diameter, excavated to the depth of the existing watermain, approximately 5'-6'.
- D. **Is a portion of the APE underwater?** Yes No
If the assessment did not include the underwater portions of the APE, please briefly justify:
[Justification for not assessing the potential for submerged historic resources:](#)
- E. **Potential to adversely affect significant archaeological resources:**
 Low Moderate High

Is fieldwork recommended? Yes No
Briefly justify the recommendation:
[Justification for recommendation of fieldwork](#)
- F. **Have you attached an Archaeological Sensitivity Map?** Yes No
- G. **Summary of previously reported archaeological sites and surveys:**
 See the cultural desktop review
- H. **Summarize past and present land use:**
 The project area is the existing water well and watermain infrastructure at select locations in the city of Cadillac.
- I. **If archaeological fieldwork has been conducted, please attach a copy of the report copy and provide full report reference here:**
[Full report reference](#)
- J. **Provide the name and qualifications of the person who provided the information for the Archaeology section:**
Name: J Ryan Duddleson **Agency/Firm:** Orbis Environmental Consulting
 Is the person a 36CFR Part 61 Qualified Archaeologist? Yes No
 Are their credentials currently on file with the SHPO? Yes No
If NO, attach this individual's qualifications form and resume.

***Archaeological site locations are legally protected.
 This application may not be made public without first redacting sensitive archaeological information.***

V. IDENTIFICATION OF CONSULTING PARTIES

- a. **Provide a list of all consulting parties**, including Native American tribes, local governments, applicants for federal assistance/permits/licenses, parties with a demonstrated interest in the undertaking, and public comment:
 Grand Traverse Band of Ottawa and Chippewa Indians - Aaron Chivis: Aaron.Chivis@gtb-nsn.gov, Erik Olsen: erik.olsen@gtb-nsn.gov, Courtney Hessell: Courtney.Hessell@gtb-nsn.gov
 Little River Band of Ottawa Indians - Gary Lewis: garylewis@lrboi-nsn.gov, Frank Beaver: williambeaver@lrboi-nsn.gov, Corey Wells – coreywells@lrboi-nsn.gov
 Little Traverse Bay Bands of Odawa Indians - Melissa Wiatroluk: mwiatroluk@ltbbodawa-nsn.gov, Caroline Moellering: cmoellering@ltbbodawa-nsn.gov, Winnay Wemigawase: wwemigawase@ltbbodawa-nsn.gov, Match-E-Be-Nash-She-Wish Band of Pottawatomi (MBPI) Indians: section106@gltnsn.gov



APPLICATION FOR SHPO SECTION 106 CONSULTATION

- b. **Provide a summary of consultation with consultation parties:**
Shared project map and details, was informed of burial mounds in certain sections of the city.
- c. **Provide summaries of public comment and the method by which that comment was sought:**
No public comment have been made yet. Announcements about this project have been made in local newspaper and television, as well as during city council meetings.

VI. DETERMINATION OF EFFECT

Guidance for applying the Criteria of Adverse Effect can be found in *the Instructions for the Application for SHPO Section 106 Consultation Form*.

a. Basis for determination of effect:

The records on file with the MSHPO list 12 archaeological sites and 17 historic districts within one mile of the project.

The known archaeological sites are associated with a significant precontact and post contact occupation in and around Cadillac. Seven of these sites are located within the project boundary (Table 2).

The records list 17 individual historic structures and four historic districts in the City of Cadillac. Three of these historic districts are in the project boundary and two are eligible for listing on the NRHP. Additionally, 10 individual resources in the project boundary are NRHP listed or eligible. Historic atlas maps show the City of Cadillac was well established as early as 1889.

The project activities involve small excavations above existing watermains (1-3 ft in diameter). The new service lines will be installed through directional boring rather than a trench. As we understand it, the contractor will select the specific location of the hydrovac excavation once in the field based on local conditions.

While this scale of ground disturbance has a low potential to encounter intact archaeological resources, the cultural context shows occupation of the region in and around Cadillac from precontact through the present day and any excavation may encounter archaeological materials if present. In particular, any ground disturbance near documented mound sites (20Wx5, 20Wx7, 20Wx56, 20Wx167) has the potential to encounter human remains or associated burial items, even if these materials are in disturbed contexts. However, based on available information, no ground disturbance will occur near these mounds because water service lines already existing in these locations.

We recommend developing an Unanticipated Discovery Plan (UDP) to establish the protocol in the event precontact or historic archaeological deposits and/or human remains are encountered during the course of the proposed work. The UDP should include protocol for the unanticipated discovery of both precontact period and historic period human remains and grave goods, as well as any other significant archaeological deposits. The MSHPO has a UDP template available to use.

Given that the new water service lines will be installed below ground any project effects will be temporary and unlikely to alter the significant aspects of the listed historic districts or individual structures. Ongoing indirect effects are not anticipated because the project activities remain consistent with the current use of the area.

We recommend a determination of No Adverse Effect on the condition that a UDP is prepared before the project begins. Otherwise, further consultation with MSHPO is necessary. If there are changes to the project activities that require more extensive excavation, additional work may be required.

b. Determination of effect



APPLICATION FOR SHPO SECTION 106 CONSULTATION

- No historic properties will be affected
- Historic properties will be affected and the project will (check one):
 - have **No Adverse Effect** on historic properties within the APE.
 - have an **Adverse Effect** on one or more historic properties in the APE and the federal agency, or federally authorized representative, will consult with the SHPO and other parties to resolve the adverse effect under 800.6.
- More Information Needed:** We are initiating early consultation. A determination of effect will be submitted to the SHPO at a later date, pending results of survey.

Federally Authorized Signature: Jonathan M. Berman Date: 06/03/2026

Type or Print Name: Jonathan M. Berman

Title: State Revolving Fund Compliance Specialist



APPLICATION FOR SHPO SECTION 106 CONSULTATION

ATTACHMENT CHECKLIST

Identify any materials submitted as attachments to the form:

- Additional federal, state, local government, applicant, consultant contacts
- Maps of project location
 - Number of maps attached: 14
- Site Photographs
 - Map of photographs
- Plans and specifications
- Other information pertinent to the work description: [Identify the type of materials attached](#)
- Updated documentation of previously identified historic properties
- New Architectural Properties Identification Forms
- Map showing the relationship between identified historic properties, your project footprint, and project APE
- Above-ground qualified person's qualification form and resume
- Above-ground survey report
- Archaeological sensitivity map
- Archaeology survey report
- Archaeologist and Historian qualifications and resume- if not on file already.
- Other: Cultural Resources Desktop Review



February 19, 2026

Eric E. Seguin, P.E.
Prein & Newhof
3355 Evergreen Drive NE
Grand Rapids, MI 49525

Re: Cultural Resources Desktop Review for the Cadillac Watermain EC Project, City of Cadillac, Wexford County, Michigan

Eric:

PROJECT DESCRIPTION

This project involves water system improvements in the City of Cadillac, Michigan (City) (Figures 1-2). This project involves connecting homes that currently use a private well to the city water supply along with installing new water main line. A total of 138 homes will have a private well abandoned and hooked to into the city water supply that runs in front of their house. A new watermain will be installed in five locations to hook up 65 houses to the city water supply (Figure 3). The proposed ground disturbance involves a hydrovac excavation measuring one to three feet in diameter above the existing watermain. The service line will be installed through directional drilling and will not require a trench. Eight homes may require the excavation of an additional hydrovac excavation to allow for a turn in the service line.

The project will receive federal funding which requires review and consultation under Section 106 of the National Historic Preservation Act (NHPA). The purpose of this consultation is to examine the areas for the presence or absence of known cultural resources and provide this information to the MSHPO along with an Application for Section 106 Review.

CULTURAL RESOURCES DESKTOP REVIEW

The records on file at the Michigan State Historic Preservation Office (MSHPO) show the following resources within 1.0 miles of the project area boundary (study area).

Historic Structures

The MSHPO records list 17 individual historic resources and four historic districts in the study area (Table 1, Figure 4). Of the individual resources, nine are NRHP listed, and two have been deemed eligible for the National Register of Historic Places (NRHP). Seven resources have not been evaluated for National Register eligibility. The historic structures include a post office, City Hall, an Elks Temple, a historic marker, a Masonic Temple, a library, a state park, a hotel, a courthouse, a rail depot, a lumber company

office, and six houses. Most of these resources are located within the current project area (see Table 1 for details).

In addition to these individual resources, there are four historic districts in the study area. Three of these districts are located in downtown Cadillac, within the project area. They include the Courthouse Hill Historic District, the Cadillac Historic Commercial District, and the Cadillac Residential Historic District. Both the commercial and residential districts have been identified as eligible for listing on the NRHP. The Courthouse Hill district has not been evaluated. One additional historic district, the Cooley Alternative School/Cooley Innovation High School Complex, is located outside of the project area and is listed on the NRHP. These resources reflect the residential, public, and commercial history of the City of Cadillac.

Direct effects on above-ground resources may include installing water service lines in the structures. These effects should be minor, may be below ground, and will not change the character or construction of the structures nor will the proposed project diminish the significant aspects of these historic properties. Indirect effects to above-ground structures are not anticipated due to the lack of ongoing above-ground disturbance or significant alteration in the character of the buildings and neighborhoods.

Cemeteries

There are two cemeteries in the study area. The Maple Hill Cemetery is 0.23 miles south of the project area and the Mt. Carmel Cemetery is 0.48 miles south of the project area. Neither will be impacted by the proposed work.

Archaeological Sites

MSHPO records list 12 previously recorded archaeological sites in the study area, eight of which are located within the project area (Table 2; Figure 5). There is a significant number of Woodland period mound sites in Cadillac, including Sites 20Wx5-8, 20Wx56, and 20Wx167. Most of these sites have been reported in historical documents and only a small number have been investigated by professional archaeologists. While many of these mound sites are located in the general project area, there are currently no plans to dig in these specific areas because they are not in places with existing water wells (Figure 6).

Site 20Wx5 is mentioned in historic documents and has been mentioned in a professional archaeological report, which documented a small artifact scatter at the site (Hinsdale 1931, Holman and Brunette 1989). The site is located within the proposed project area.

Site 20Wx6 is the location of two “moated” mounds recorded in Cadillac, one of which has been destroyed (Hinsdale 1931, Holman and Brunette 1989). It is possible that these mounds are natural, rather than man-made (Branstner 2000). Site 20Wx6 is outside the current project area.

Site 20Wx7 is one of the few mounds in the area that have been professionally investigated. It has been identified as eligible for listing on the NRHP and is one of the few intact mounds in the immediate area. Site 20Wx8 has also been professionally documented, but more information is needed to determine whether it is eligible for the NRHP (Mead 1978). 20Wx7 is located in the project area, 20Wx8 is not.

Site 20Wx56 was reported by an amateur archaeologist and has not been professionally investigated (Jackson et al 1996). Site 20Wx56 is not in the project area.

Finally, Site 20Wx167 is a burial mound that was disturbed by the construction of a pump house in Mitchell State Park. More information is required to determine if it is eligible for listing in the NRHP (Jackson et al. 1996). It is located in the project area.

In addition to the Woodland period mound sites, there is a Late Woodland camp, which yielded stone tools and pottery. Site 20Wx268 is disturbed, but further investigation is still required to determine whether it is NRHP eligible (Branstner and Hambacher 1992, Dunham, et al. 1993, Jackson et al. 1996). This site is located in the project area.

There is one additional precontact period site, 20Wx110. More work is needed at this site to determine its function and eligibility (Hargiss et al. 2020). This site is located in the project area.

There are four Postcontact sites in the study area. They are all homesteads or farmsteads that have not been evaluated for NRHP eligibility. Two of these sites (20Wx224-225) have structural depressions. Two of them are located in the project area (20Wx221 and 20Wx225).

Previous Cultural Resource Management Reports

MSHPO records list 11 previous cultural resources surveys in the study area, seven of which included portions of the current project area.

In 1978, Grand Valley State College conducted a survey of 2 acres outside of the project area prior to sewer and water service construction (Flanders 1978a). A second survey by Grand Valley included 9 acres slated for a housing development (Flanders 1978b). This survey area was located inside the current project boundary. Neither Grand Valley survey reported archaeological sites. A similar survey in the same year covered 8.6 acres outside of the current project area and yielded a smattering of historic sherds that were the result of sporadic refuse dumping. The location was not assigned a site number (Caister and Rivera 1978).

Archaeologists on behalf of the Huron-Manistee National Forest surveyed an unknown number of acres across multiple locations slated for various projects. They identified a number of archaeological sites, including 20Wx110, and visited mound sites, including 20Wx7-8 (discussed above) (Mead and Brashler 1978). It is unclear exactly where the National Forest survey took place, but it must have included portions of the current project area because some mound sites within the current project area are discussed in the report.

Archaeologists on behalf of Michigan State University (MSU) surveyed approximately 2,824 acres of proposed highway right-of-way for US-31. They documented one precontact site and 21 postcontact sites in Wexford County (20Wx217-238), some of which are located within the current project area (Holman and Robertson 1988).

Prior to the expansion of Wexford County Airport's runway, MSU conducted a survey of 54 acres and found no archaeological sites or materials. Surveyors also observed Mound 1 at Site 20Wx6, which had been badly damaged by looters. They could not locate Mound 2 at the site, even though it was documented in 1977. They also mention the exact location of the mound at Site 20Wx5 and note an artifact scatter at that location (Holan and Brunett 1989). Site 20Wx5 is the only portion of this survey that was located within the current project boundaries.

In 1992, Great Lakes Research conducted a survey of approximately 1.72 acres in William Mitchell State Park prior to the construction of a boat ramp that identified site 20Wx268 (Branstner and Hambacher 1992). Following the initial survey, a Phase II investigation revealed that the site was disturbed (Dunham et al. 1993). The site is located in the current project area.

In 2000, Great Lakes Research, Inc. conducted a Phase I survey of approximately 122 acres, which were slated for commercial and industrial development. The surveyors did not encounter any archaeological sites and, in fact, suggested that the mounds reported at Site 20Wx6 are most likely natural, rather than man-made (Branstner 2000). This survey did not include any of the current project area.

A 2006 survey of less than one acre prior to cell tower construction that did not identify any archaeological sites (Andrews 2006). The survey included a small portion of the current project area.

In 2016, the Environmental Corporation of America surveyed less than one acre ahead of the construction of a 120-foot-tall pole structure, that did not find any archaeological sites (Radke and Dubois 2016). The survey was not within the current project area.

Historic Atlas Maps

Orbis reviewed three available historic atlases of the study area from between 1889 and 1914 (Hayes 1889, Ogle 1908, Standard Map Company 1914).

The 1889 plat map of the City of Cadillac shows that the boundaries of the city were smaller at that time, including only the east half of present-day Cadillac (Figure 7). Maple Hill and Mt. Carmel cemeteries appear on this map, outside of the boundary of the current project area. At this time, Maple Hill Cemetery was called Prospect Park and Mt. Carmel is only listed as "Catholic Cemetery." This map also shows numerous schools, churches, businesses, industrial buildings, and residential structures throughout the city. Several railroads are mapped in the city.

The 1908 map of Cadillac shows that the city had grown, but not yet to its current boundary (Ogle 1908; Figure 8). The map shows numerous industrial, public, and residential structures, as well as the railroads and associated buildings. The map shows several neighborhoods containing numerous numbered lots, which suggests a dense and growing community.

The 1914 atlas map shows that the town was still growing and had nearly reached its current boundaries (Standard Map Company 1914; Figure 9). This map does not show individual structures in the town proper, but it is clear that neighborhoods were growing and the railroads and cemeteries are still depicted.

Topographic maps from 1956 and 1957 show that Cadillac was still slightly smaller than it is today, though much of the city had reached its current configuration (Figure 10). The railroads and major roadways that pass through the town today had been established by this time. Both Maple Hill and Mt. Carmel Cemeteries had reached their current extent (USGS 1956, 1957).

In addition to these historic atlases, Orbis reviewed Hinsdale's (1931) Archaeological Atlas of Michigan. The atlas depicts numerous mounds and mound groups in Cadillac, particularly near Lake Cadillac. Due to the scale of the map, it is difficult to identify the precise location of many of these structures. However, they are reflected in the above discussion of previously documented archaeological sites (Hinsdale 1931; Figure 11).

CONCLUSIONS AND RECOMMENDATIONS

The records on file with the MSHPO list 12 archaeological sites and 17 historic districts within one mile of the project.

The known archaeological sites are associated with a significant precontact and post contact occupation in and around Cadillac. Seven of these sites are located within the project boundary (Table 2).

The records list 17 individual historic structures and four historic districts in the City of Cadillac. Three of these historic districts are in the project boundary and two are eligible for listing on the NRHP. Additionally, 10 individual resources in the project boundary are NRHP listed or eligible. Historic atlas maps show the City of Cadillac was well established as early as 1889.

The project activities involve small excavations above existing watermains (1-3 ft in diameter). The new service lines will be installed through directional boring rather than a trench. As we understand it, the contractor will select the specific location of the hydovac excavation once in the field based on local conditions.

While this scale of ground disturbance has a low potential to encounter intact archaeological resources, the cultural context shows occupation of the region in and around Cadillac from precontact through the present day and any excavation may encounter archaeological materials if present. In particular, any ground disturbance

near documented mound sites (20Wx5, 20Wx7, 20Wx56, 20Wx167) has the potential to encounter human remains or associated burial items, even if these materials are in disturbed contexts. However, based on available information, no ground disturbance will occur near these mounds because water service lines already existing in these locations.

We recommend developing an Unanticipated Discovery Plan (UDP) to establish the protocol in the event precontact or historic archaeological deposits and/or human remains are encountered during the course of the proposed work. The UDP should include protocol for the unanticipated discovery of both precontact period and historic period human remains and grave goods, as well as any other significant archaeological deposits. The MSHPO has a UDP template available to use.

Given that the new water service lines will be installed below ground any project effects will be temporary and unlikely to alter the significant aspects of the listed historic districts or individual structures. Ongoing indirect effects are not anticipated because the project activities remain consistent with the current use of the area.

We recommend a determination of *No Adverse Effect* on the condition that a UDP is prepared before the project begins. Otherwise, further consultation with MSHPO is necessary. If there are changes to the project activities that require more extensive excavation, additional work may be required.

Regards,



Elizabeth Straub
Archaeologist

Attachments:

Figure 1: Project Location

Figure 2: Project Aerial

Figure 3: Well Location Map

Figure 4: Historic Resources Map

Figure 5: Previously Recorded Archaeological Sites and Surveys

Figure 6: Well Location Map with Mound Site Locations

Figure 7: 1889 Hayes Historic Atlas

Figure 8: 1908 Ogle Historic Atlas

Figure 9: 1914 Standard Map Company Atlas

Figure 10: 1956 North Cadillac Topographic Map

Figure 11: 1957 South Cadillac Topographic Map

Figure 12: 1931 Hinsdale Archaeological Atlas

Project Planset

cc: #2512006

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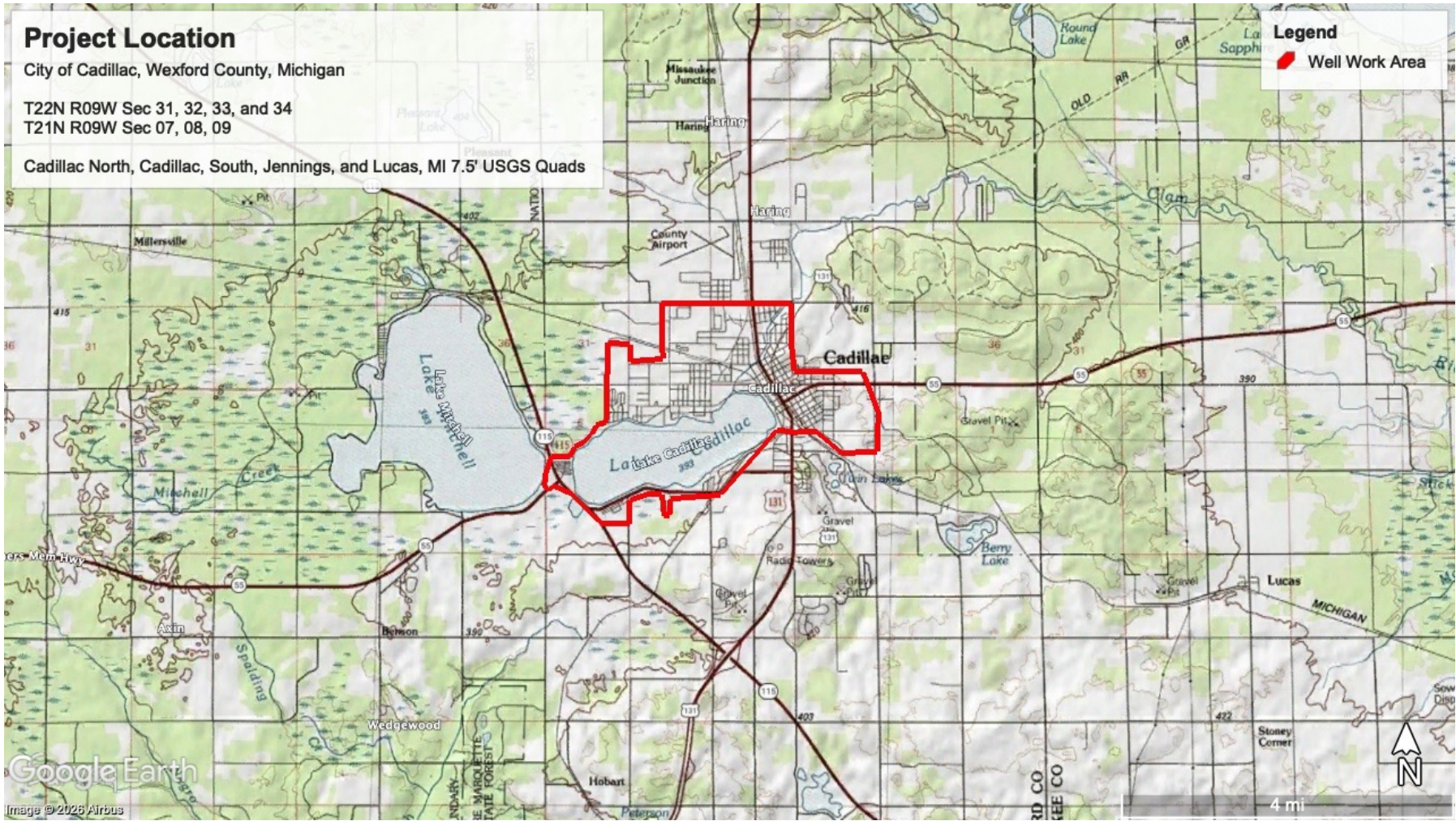
Appendix A

Project Maps and Imagery

Cultural Resources Desktop Review for the Cadillac Watermain EC Project

City of Cadillac, Wexford County,
Michigan





Cadillac Watermain EC Project
 Prein&Newhof
 Cadillac, Wexford County, Michigan


Figure #1
 Project Location
 #2512006

Cadillac Watermain EC Project

City of Cadillac, Wexford County, MI

Cadillac North, Cadillac South, Jennings, and Lucas, MI 7.5 USGS Quads

Legend

 Well Work Area

Survey
Google Earth

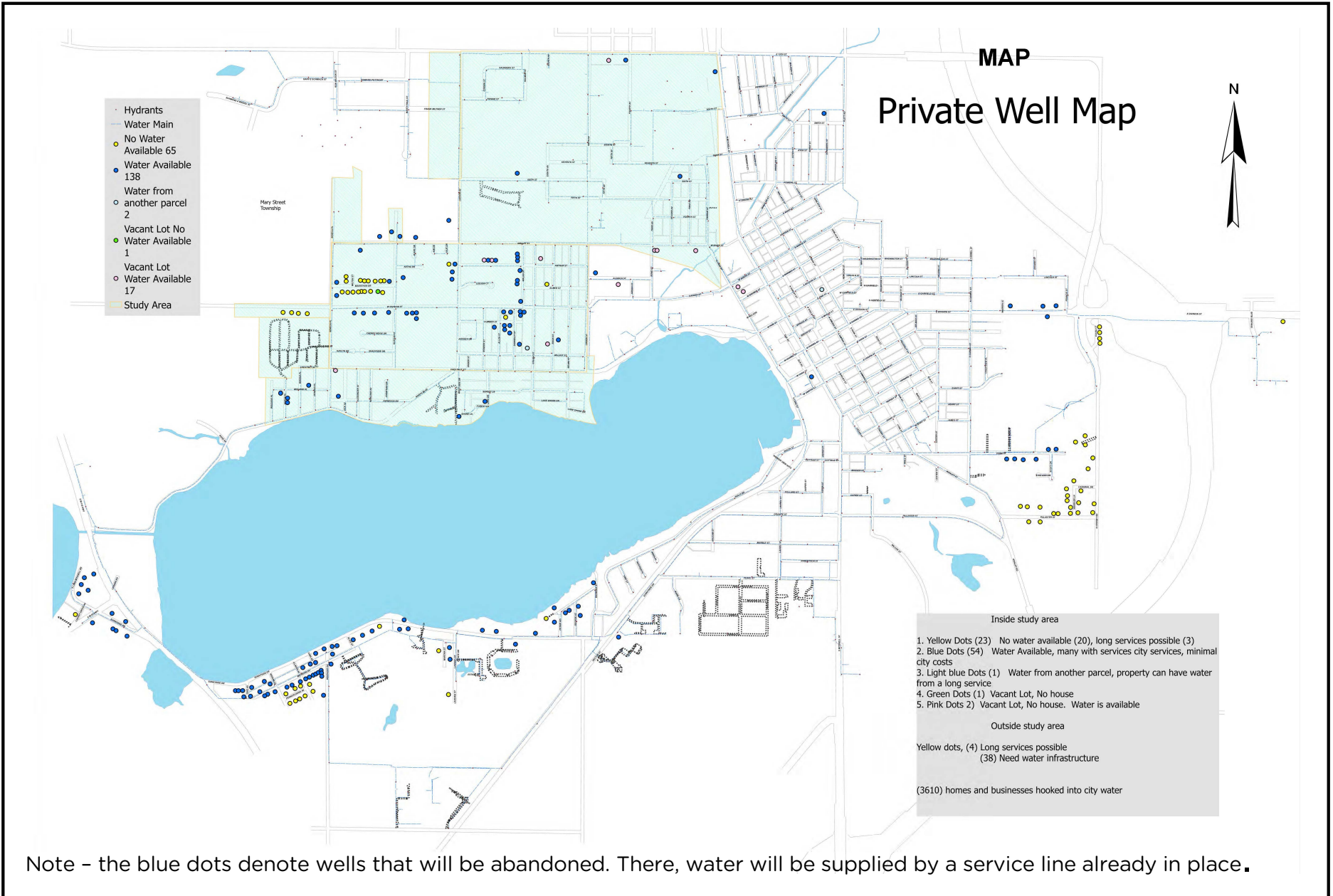
Image © 2026 Airbus

1 mi



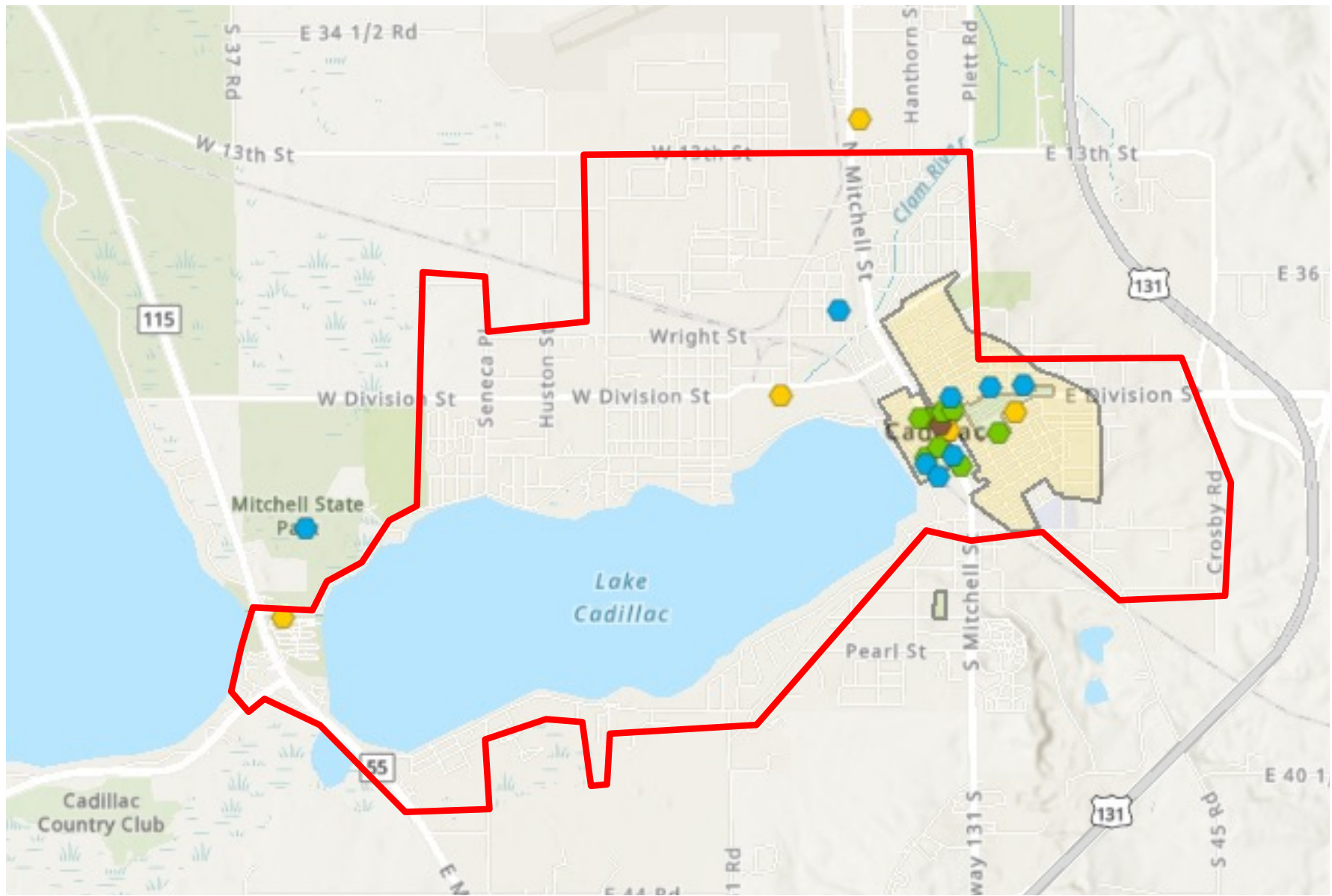
Cadillac Watermain EC Project
Prein&Newhof
Cadillac, Wexford County, Michigan

Figure #2
Project Location Aerial
#2512006



Cadillac Watermain EC Project
Prein&Newhof
Cadillac, Wexford County, Michigan

Figure #3
Well Location Map
#2512006



Cadillac Watermain EC Project
Prein&Newhof
Cadillac, Wexford County, Michigan


Figure #4
Historic Resources Map
#2512006

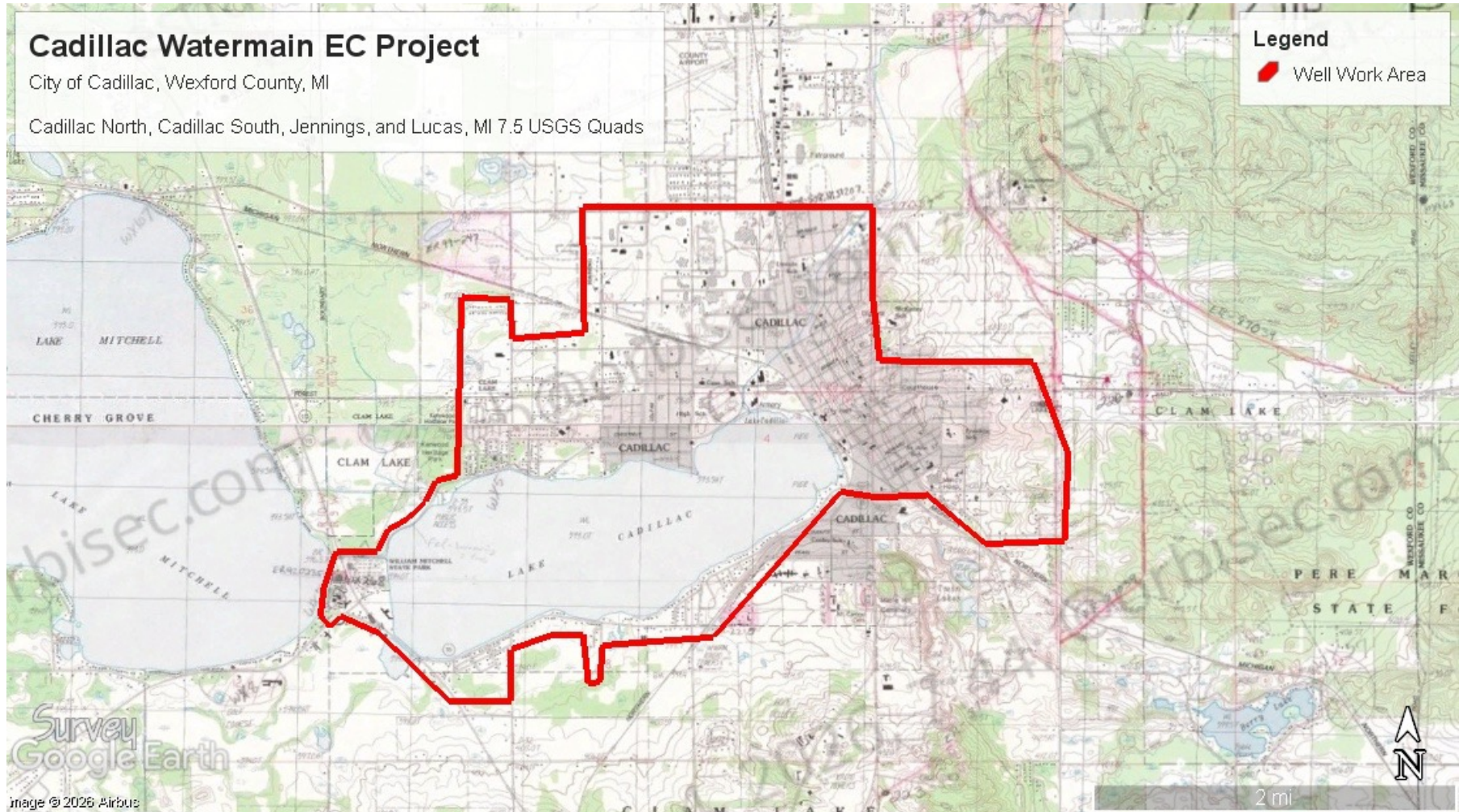
Cadillac Watermain EC Project

City of Cadillac, Wexford County, MI

Cadillac North, Cadillac South, Jennings, and Lucas, MI 7.5 USGS Quads

Legend

 Well Work Area



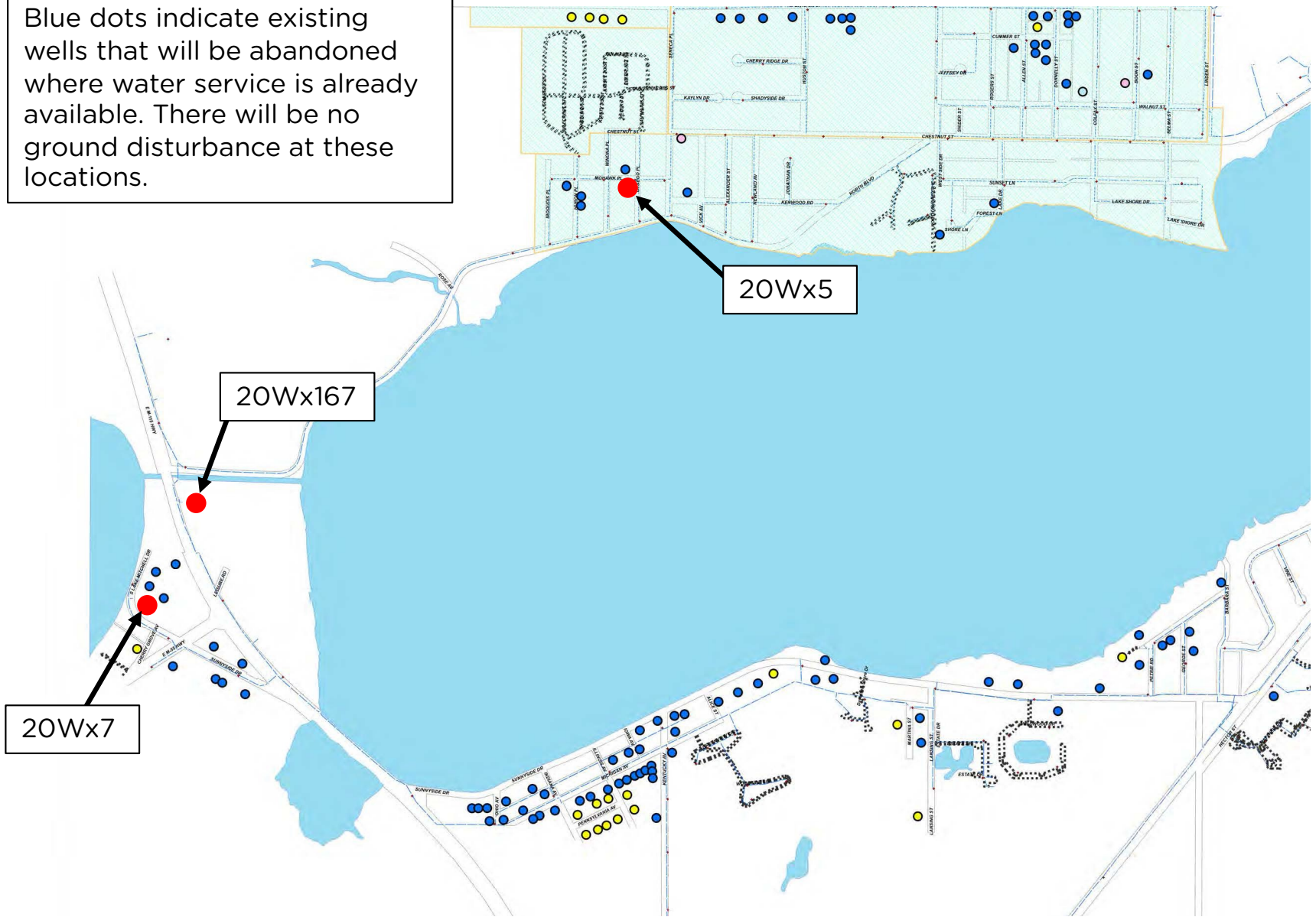
Records show numerous known sites in the project area, including mounds. The proposed ground disturbance is limited to 1-3ft diameter borings above existing watermains and will not occur near known sites. See the desktop review for additional detail.



Cadillac Watermain EC Project
Prein&Newhof
Cadillac, Wexford County, Michigan

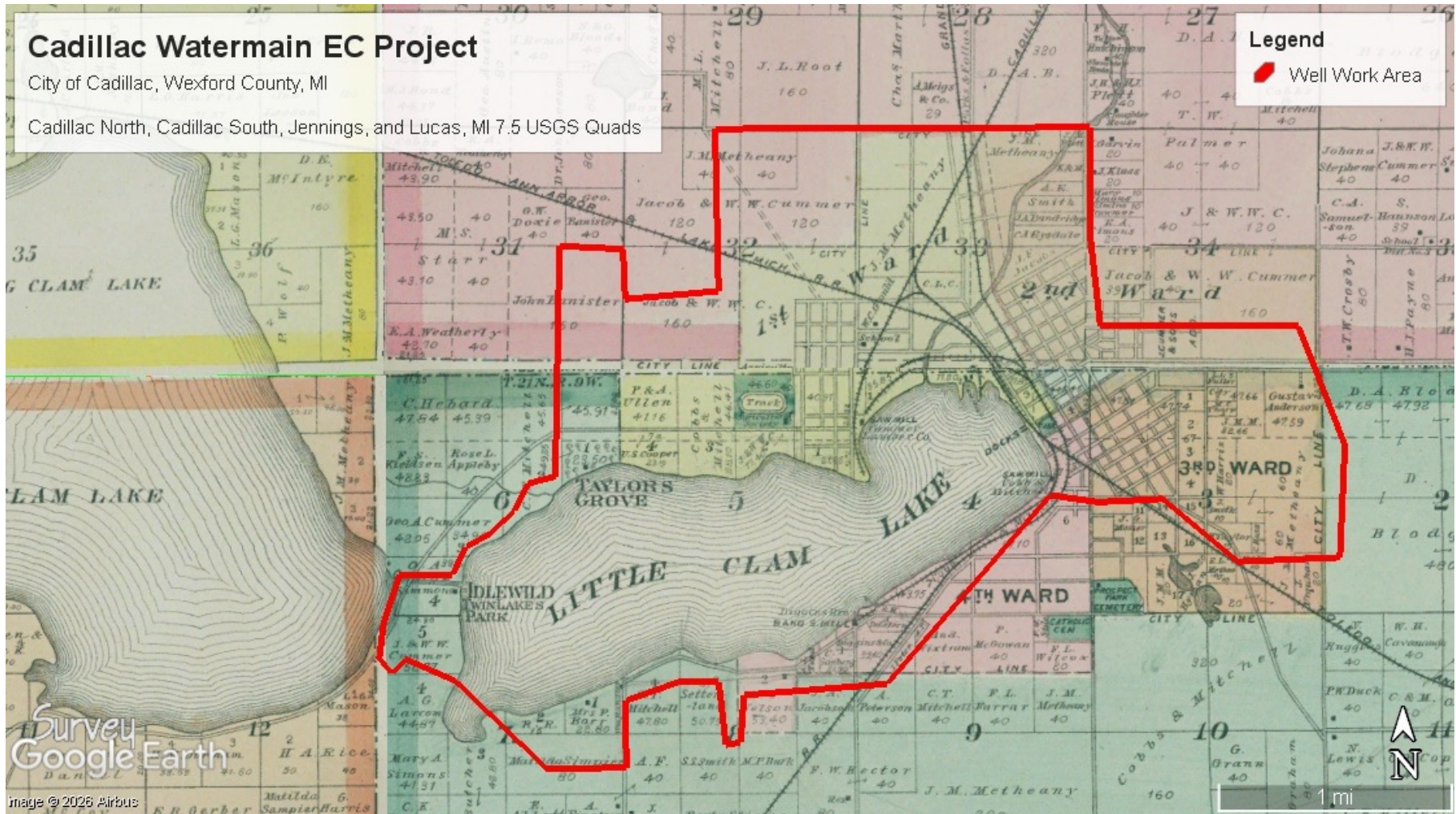
Figure #5
Archaeological Sensitivity
Map
#2512006

Blue dots indicate existing wells that will be abandoned where water service is already available. There will be no ground disturbance at these locations.



Cadillac Watermain EC Project
Prein&Newhof
Cadillac, Wexford County, Michigan

Figure #6
Well Location Map Depicting
Mound Sites
#2512006



Cadillac Watermain EC Project
 Prein&Newhof
 Cadillac, Wexford County, Michigan

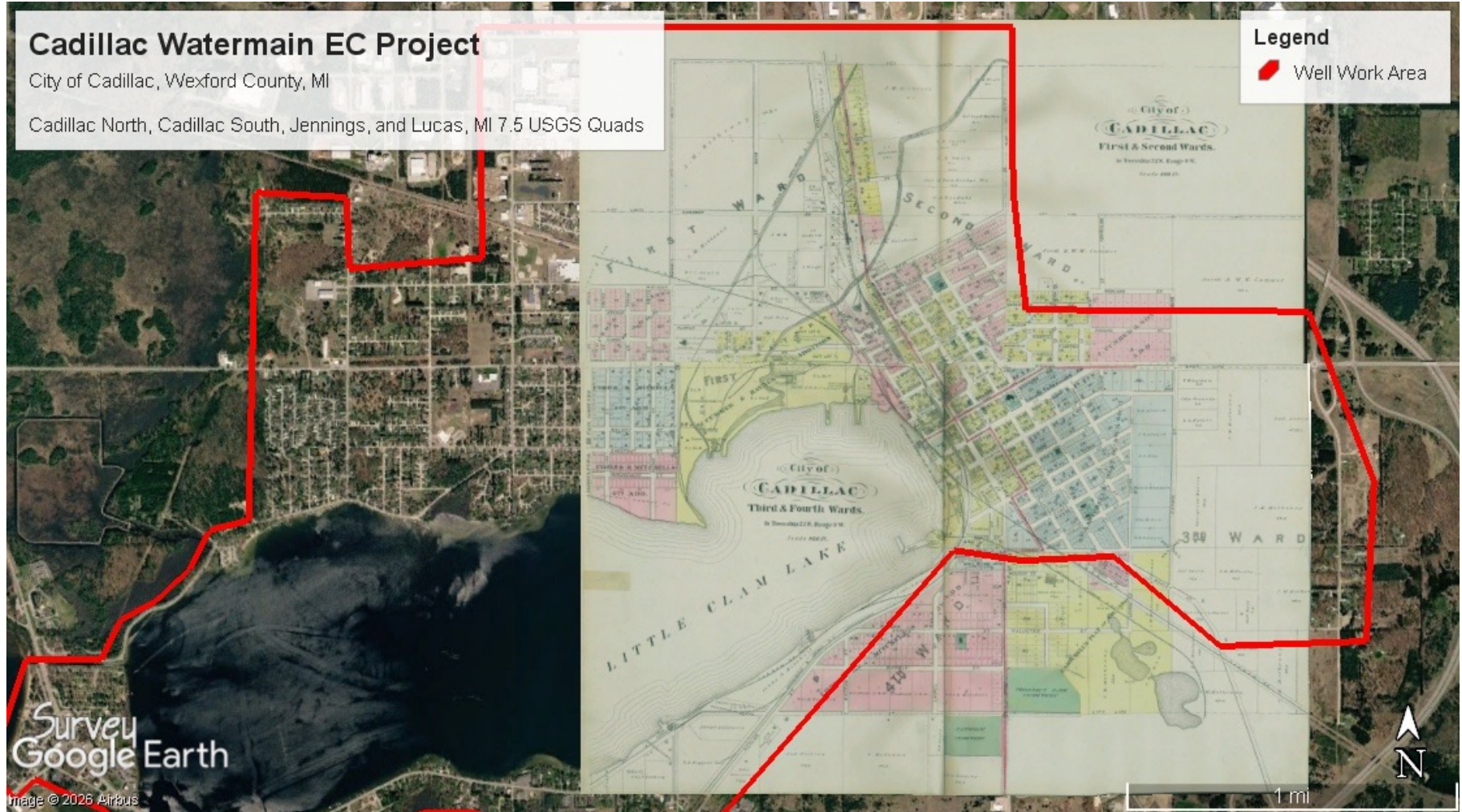
Figure #7a
 1889 Atlas
 #2512006

Cadillac Watermain EC Project

City of Cadillac, Wexford County, MI

Cadillac North, Cadillac South, Jennings, and Lucas, MI 7.5 USGS Quads

Legend
Well Work Area



Survey
Google Earth
Image © 2026 Airbus



Cadillac Watermain EC Project
Prein&Newhof
Cadillac, Wexford County, Michigan


Figure #7b
1889 Atlas
#2512006

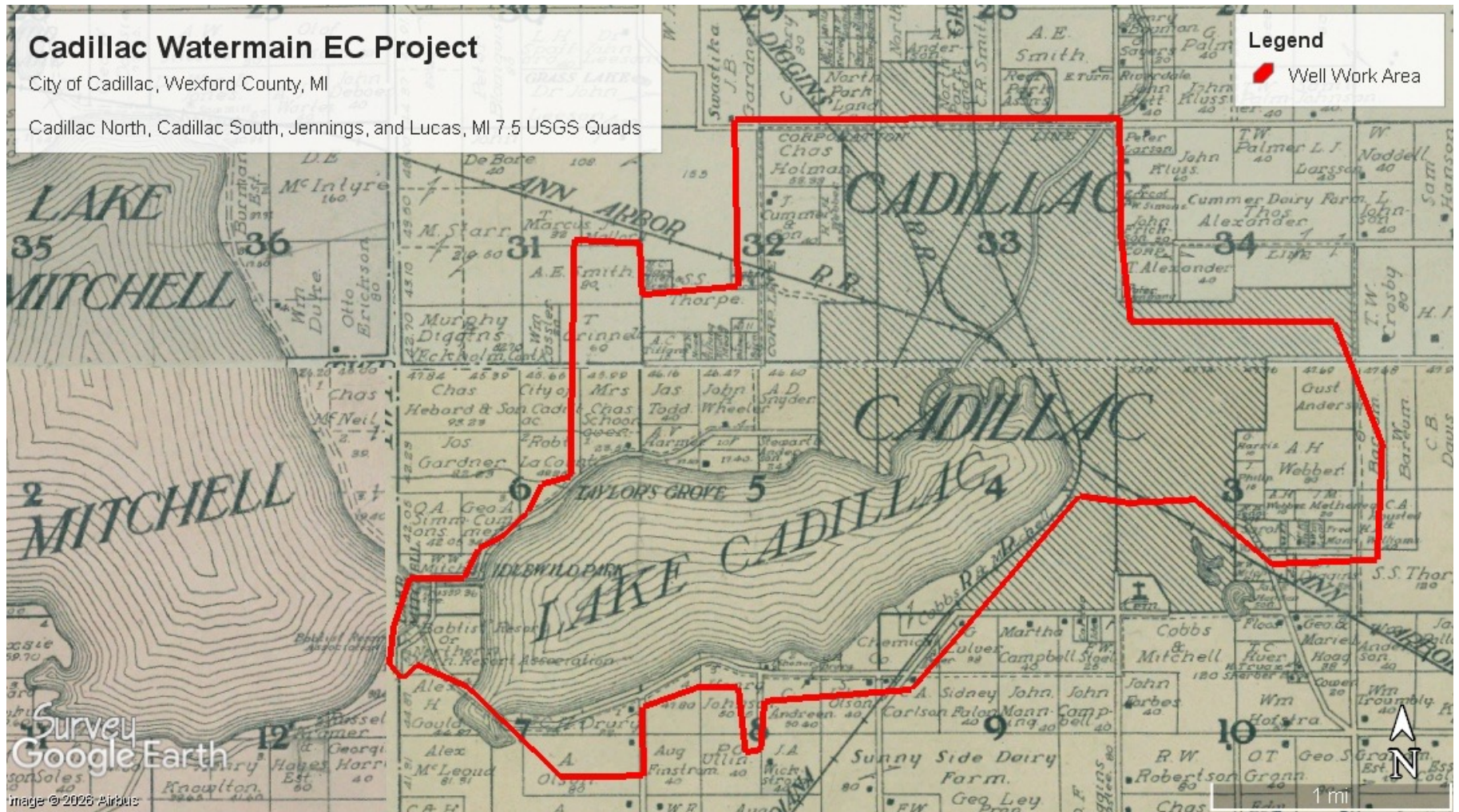
Cadillac Watermain EC Project

City of Cadillac, Wexford County, MI

Cadillac North, Cadillac South, Jennings, and Lucas, MI 7.5 USGS Quads

Legend

 Well Work Area



Cadillac Watermain EC Project
Prein&Newhof
Cadillac, Wexford County, Michigan

Figure #8a
1908 Atlas
#2512006

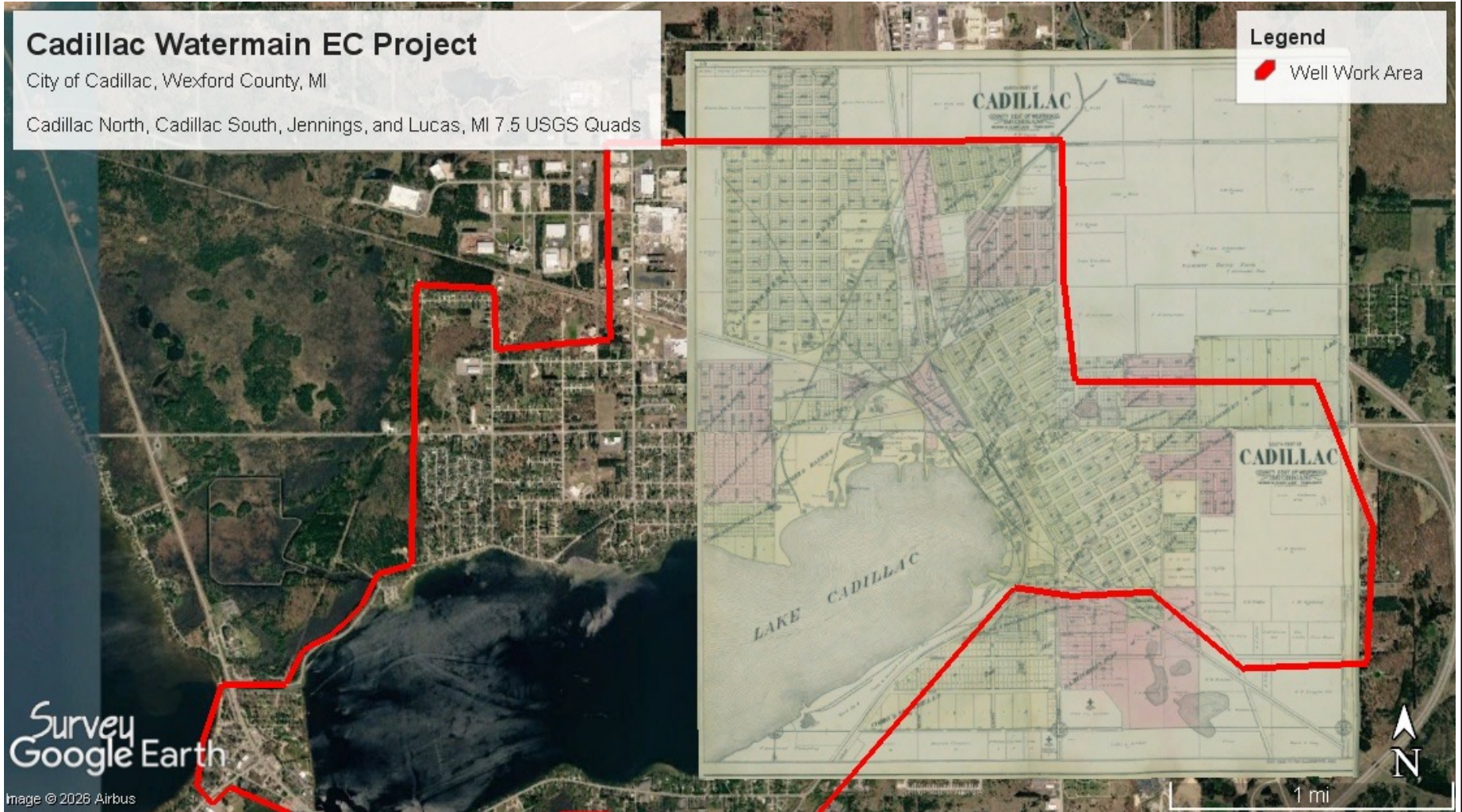
Cadillac Watermain EC Project

City of Cadillac, Wexford County, MI

Cadillac North, Cadillac South, Jennings, and Lucas, MI 7.5 USGS Quads

Legend

 Well Work Area



Cadillac Watermain EC Project
Prein&Newhof
Cadillac, Wexford County, Michigan


Figure #8b
1908 Atlas
#2512006

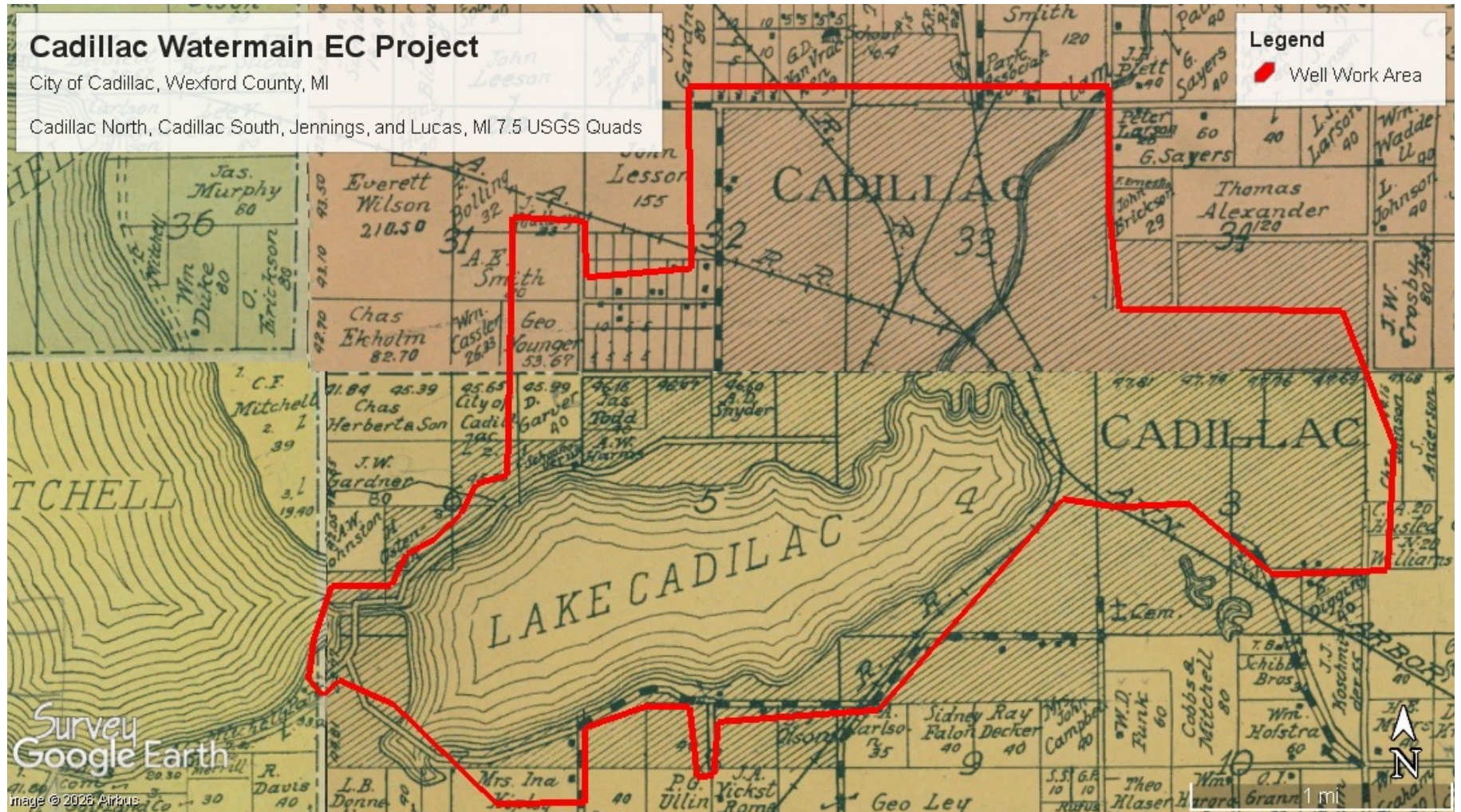
Cadillac Watermain EC Project

City of Cadillac, Wexford County, MI

Cadillac North, Cadillac South, Jennings, and Lucas, MI 7.5 USGS Quads

Legend

 Well Work Area



Cadillac Watermain EC Project
Prein&Newhof
Cadillac, Wexford County, Michigan


Figure #9a
1914 Atlas
#2512006

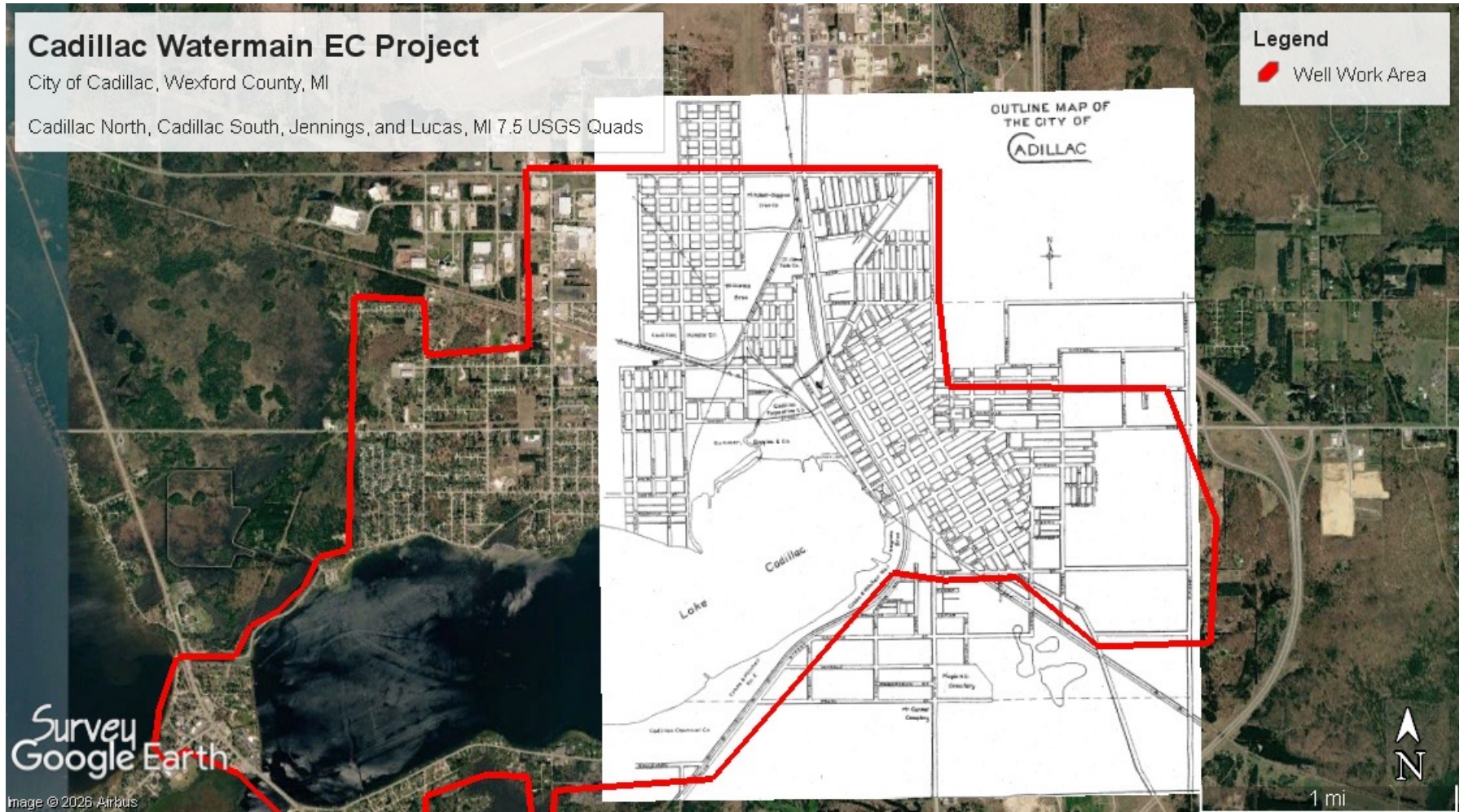
Cadillac Watermain EC Project

City of Cadillac, Wexford County, MI

Cadillac North, Cadillac South, Jennings, and Lucas, MI 7.5 USGS Quads

Legend

 Well Work Area



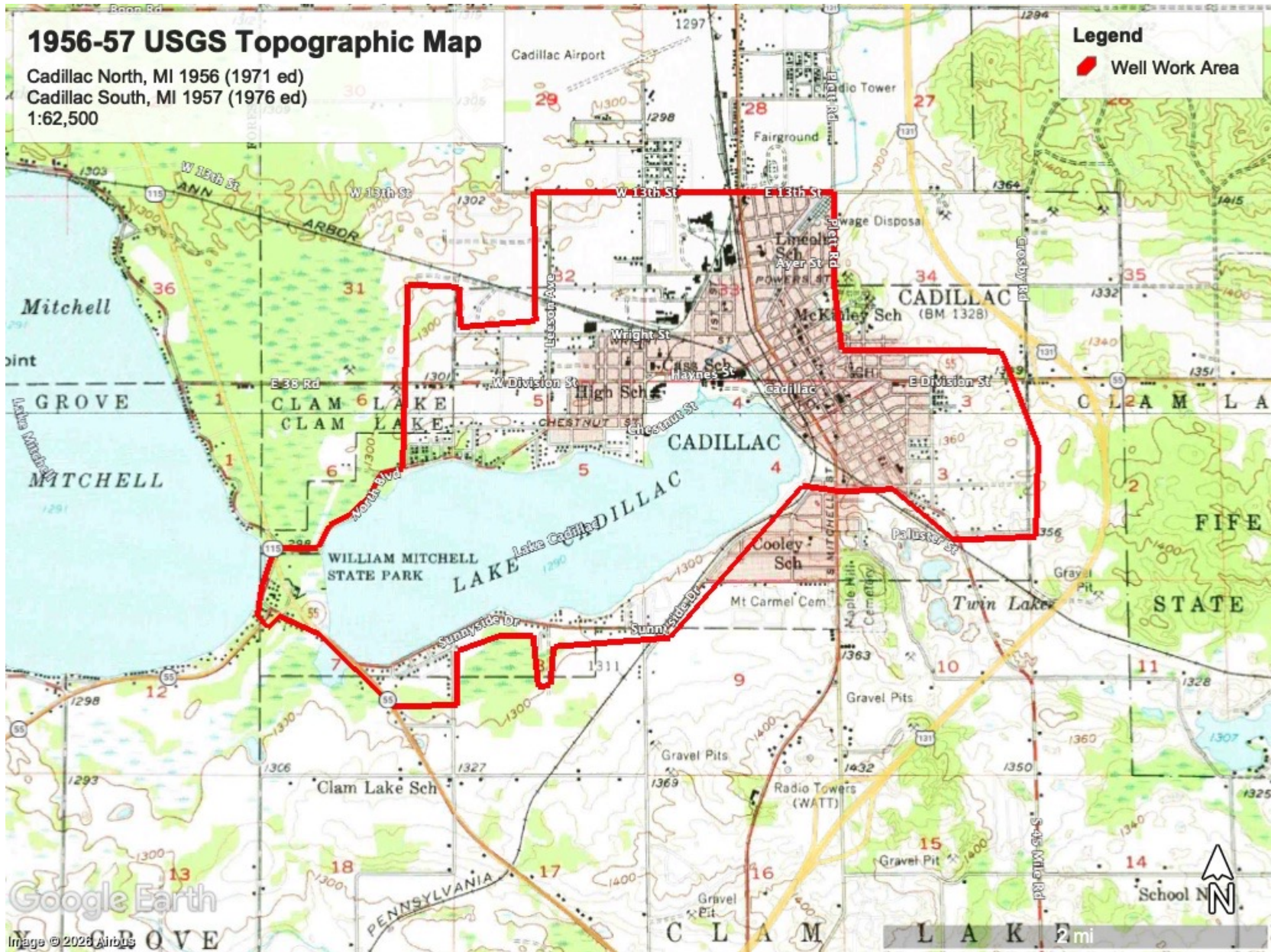
Cadillac Watermain EC Project
Prein&Newhof
Cadillac, Wexford County, Michigan

Figure #9b
1914 Atlas
#2512006

1956-57 USGS Topographic Map

Cadillac North, MI 1956 (1971 ed)
Cadillac South, MI 1957 (1976 ed)
1:62,500

Legend
Well Work Area

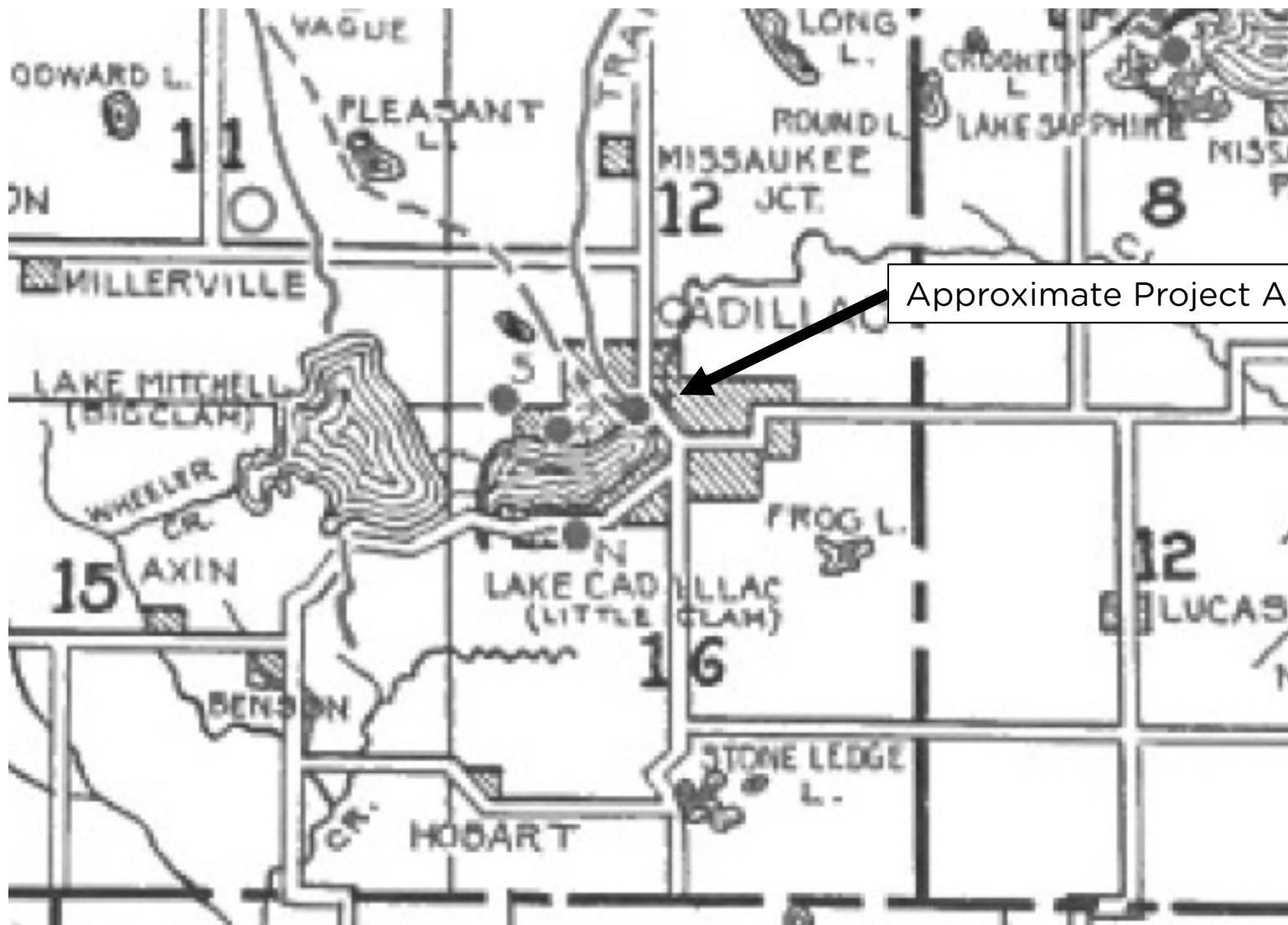


Google Earth
Image © 2026 Airbus



Cadillac Watermain EC Project
Prein&Newhof
Cadillac, Wexford County, Michigan

Figure #10
1956 North Cadillac
Topographic Map
#2512006



Cadillac Watermain EC Project
 Prein&Newhof
 Cadillac, Wexford County, Michigan

Figure #11
 1931 Archaeological Atlas
 #2512006

Appendix F: Tribal Historic Preservation Officers Communications

Ernie Sarkipato

From: Eric Seguin
Sent: Wednesday, January 28, 2026 3:35 PM
To: 'Aaron.Chivis@gtb-nsn.gov'; 'erik.olsen@gtb-nsn.gov'; 'Courtney.Hessell@gtb-nsn.gov'; 'garylewis@lrboi-nsn.gov'; 'williambeaver@lrboi-nsn.gov'; 'mwiatrolik@ltbbodawa-nsn.gov'; 'cmoellering@ltbbodawa-nsn.gov'; 'wwemigwase@ltbbodawa-nsn.gov'; 'section106@glt-nsn.gov'
Subject: RE: Tribal Coordination Review - City of Cadillac EC-SDC Project
Attachments: ltr 2025-12-23 Cadillac EC-SDC Grant.pdf

To whom it may concern,
We are past the 30 day period for responses from the initial letter. Does anyone have any comments about the proposed project?

Eric

Eric E. Seguin, P.E.

Prein&Newhof

t. 231-468-3456

c. 231-878-5094

[Website](#) | [Blog](#) | [LinkedIn](#)

From: Eric Seguin
Sent: Tuesday, December 23, 2025 10:01 AM
To: 'Aaron.Chivis@gtb-nsn.gov' <Aaron.Chivis@gtb-nsn.gov>; 'erik.olsen@gtb-nsn.gov' <erik.olsen@gtb-nsn.gov>; 'Courtney.Hessell@gtb-nsn.gov' <Courtney.Hessell@gtb-nsn.gov>; 'garylewis@lrboi-nsn.gov' <garylewis@lrboi-nsn.gov>; 'williambeaver@lrboi-nsn.gov' <williambeaver@lrboi-nsn.gov>; 'mwiatrolik@ltbbodawa-nsn.gov' <mwiatrolik@ltbbodawa-nsn.gov>; 'cmoellering@ltbbodawa-nsn.gov' <cmoellering@ltbbodawa-nsn.gov>; 'wwemigwase@ltbbodawa-nsn.gov' <wwemigwase@ltbbodawa-nsn.gov>; 'section106@glt-nsn.gov' <section106@glt-nsn.gov>
Subject: Tribal Coordination Review - City of Cadillac EC-SDC Project

To whom it may concern,

Please see the attached letter requesting your review of the City of Cadillac EC-SDC Water Service Expansion Project.

Please let me know if you have any questions or need any additional information.

Thank you,

Eric E. Seguin, P.E.

Prein&Newhof

t. 231-468-3456

c. 231-878-5094

[Website](#) | [Blog](#) | [LinkedIn](#)



Little River Band of Ottawa Indians
Tribal Historic Preservation
2608 Government Center Dr.
Manistee, MI 49660

January 9, 2026

Eric Seguin P.E.
Prein & Newhof

RE: Section 106 Review: Wexford County, MI- December 23, 2025
T21N, R09W, Sections 3-9 and 24
T21N, R06W, Sections 31-34
City of Cadillac EC-SDC Project

Hello Eric,

This is in reply to your request for Cultural affiliation in accordance with Section 106 of the National Historic Preservation Act and 36 CFR § 800 on the lands for the above-mentioned coordinates. On Behalf of the Little River Band of Indians Tribal Historic Preservation Officer (THPO) did a historical/cultural record search and finds **Potential Adverse Effects** for **T21N, R09W sections 3, 4, 6 & 7**

Sections **3** and **4** have the potential to have the remains of farmsteads, homesteads and undetermined occupation sites. Section **6** and **7** have several burial mound sites from the late woodland period. While we understand the importance of your project, we ask that if, throughout your project, you come across human remains and/or artifacts during the ground disturbance, structures or anything culturally significant you stop and contact the SHPO and LRBOI THPO.

When doing reviews in the future, in sections that might have impact, please understand that LRBOI is staff limited and will work as fast as possible to conduct a thorough and timely review.

The Little River Band of Ottawa Indians Office speaks only for themselves and no other Tribe.

The Little River Band of Ottawa Indians Community thanks you for your concern in this matter. You may contact me at (231) 410-8695 or via email coreyawells@lrboi-nsn.gov if you should have any questions or wish to discuss it further.

Sincerely,



Corey Wells, THPO
Little River Band of Ottawa Indians

December 23, 2025
2250978

RE: **Notice and Opportunity to Comment**
City of Cadillac EC-SDC Project – Private Well Abandonments and Water Main Expansion

To Whom It May Concern:

On behalf of the City of Cadillac, we are preparing documentation related to a proposed drinking water improvement project intended to protect public health within the City of Cadillac and surrounding communities. This environmental review is being completed as part of the requirements associated with funding through the EGLE Emerging Contaminants (EC) grant.

The proposed project is located within the City of Cadillac in Wexford County. Work will occur in Township 21 North, Range 9 West, Sections 3, 4, 5, 6, 7, 8, 9, and 24, and Township 21 North, Range 6 West, Sections 31, 32, 33, and 34. The Area of Potential Effect (APE) includes these project areas within the city limits, as shown on the attached water system improvements map.

The project involves the abandonment of approximately 150 contaminated private wells throughout the City of Cadillac and the provision of municipal water service to these properties. In addition, new water main will be installed to serve 65 homes currently relying on private wells that are not adjacent to existing municipal water infrastructure.

This notice is being provided to fulfill the consultation requirements of Section 106 of the National Historic Preservation Act. Section 106 requires federal agencies or applicants to consult with Tribal Historic Preservation Officers (THPOs) and federally recognized Indian tribes regarding potential effects on religious or culturally significant properties. The purpose of this notice is to provide your tribe with an opportunity to identify any interests or concerns related to the proposed project.

If you have comments regarding potential impacts to cultural, religious, or historically significant resources within the APE, please provide them within 30 days of the date of this notice.

Should you need additional information to complete your review, please contact me.

Sincerely,

Prein&Newhof

Eric Seguin, P.E.
esequin@preinnewhof.com

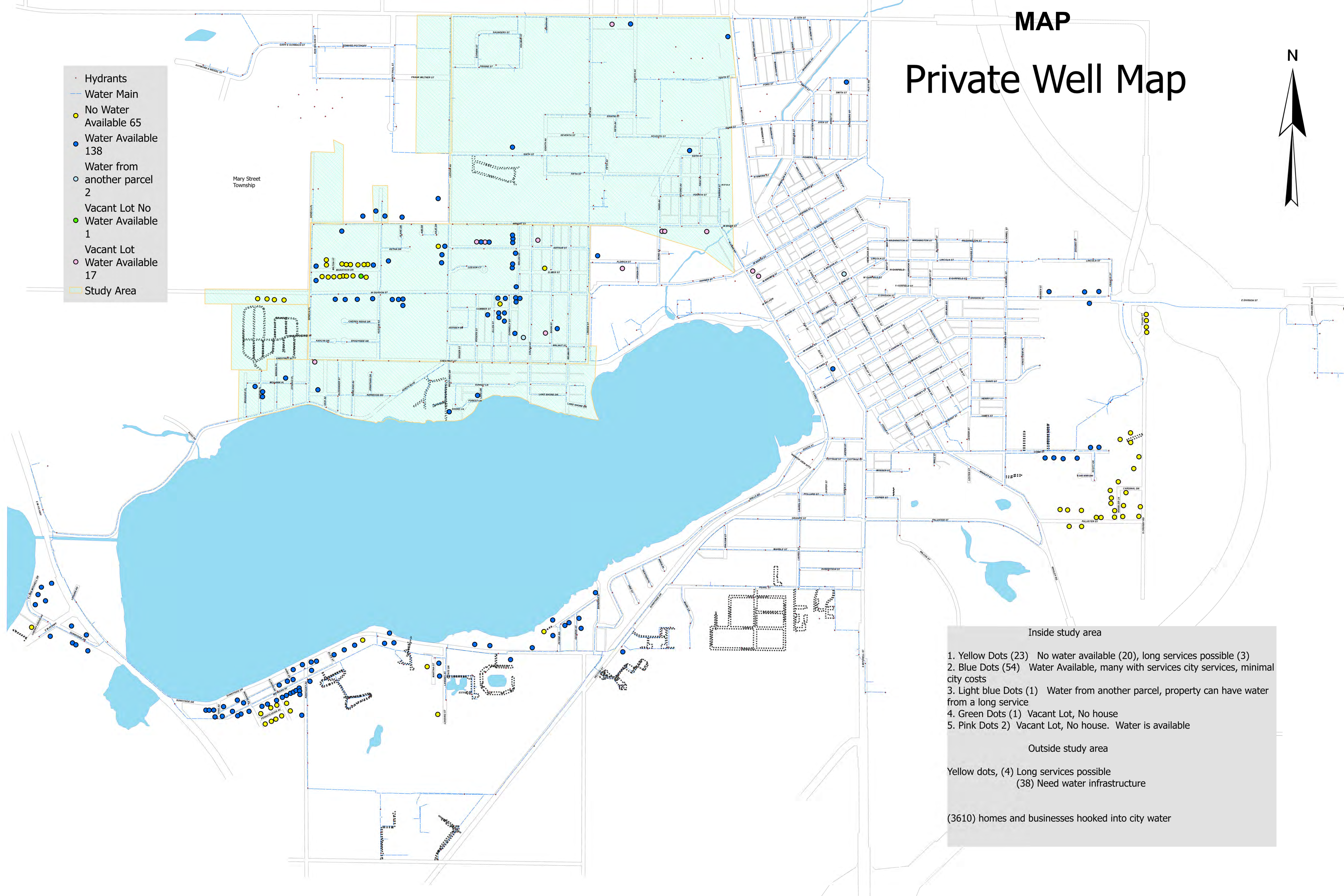
Enclosure(s): Location Maps With Project Extents

MAP

Private Well Map



- Hydrants
- Water Main
- No Water Available 65
- Water Available 138
- Water from another parcel 2
- Vacant Lot No 1
- Water Available 17
- Vacant Lot 17
- Study Area



- Inside study area
1. Yellow Dots (23) No water available (20), long services possible (3)
 2. Blue Dots (54) Water Available, many with services city services, minimal city costs
 3. Light blue Dots (1) Water from another parcel, property can have water from a long service
 4. Green Dots (1) Vacant Lot, No house
 5. Pink Dots 2) Vacant Lot, No house. Water is available
- Outside study area
- Yellow dots, (4) Long services possible
(38) Need water infrastructure
- (3610) homes and businesses hooked into city water

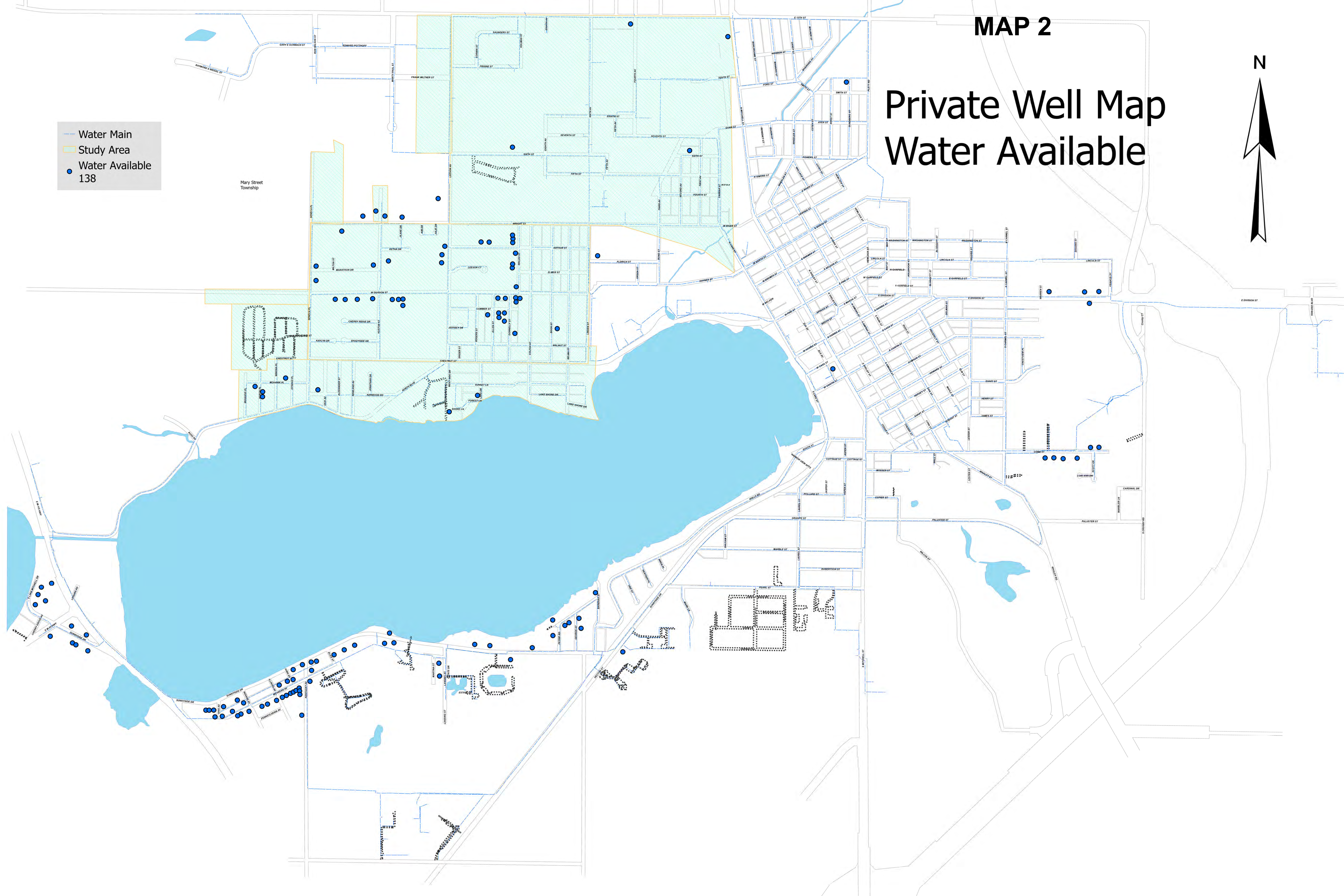
MAP 2

Private Well Map Water Available



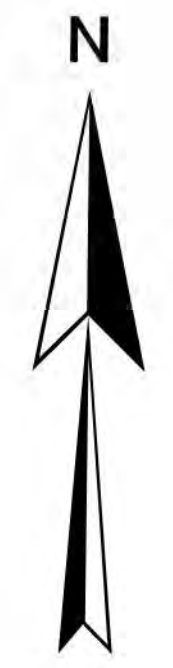
- Water Main
- Study Area
- Water Available
138

Mary Street
Township



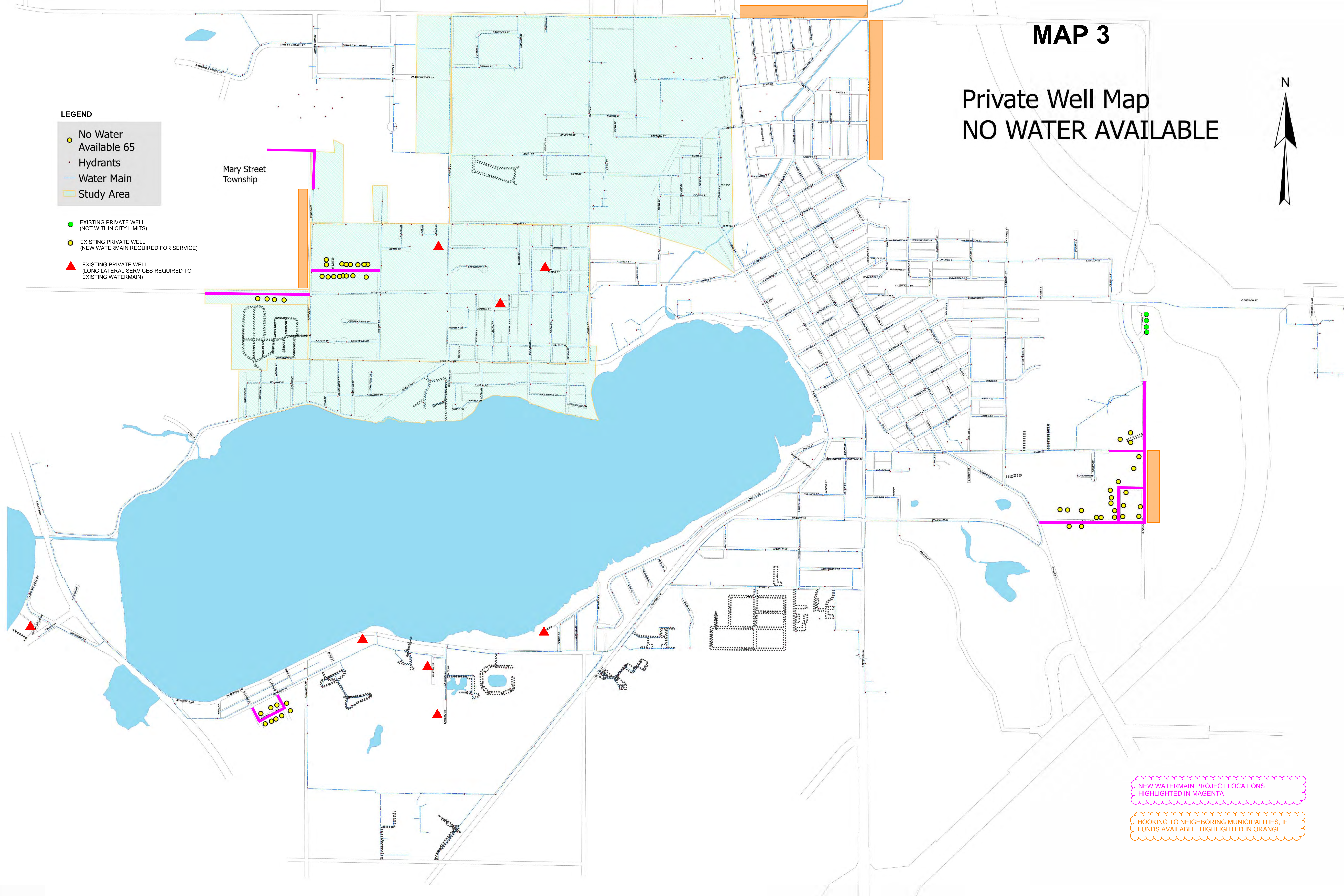
MAP 3

Private Well Map NO WATER AVAILABLE



- LEGEND**
- No Water Available 65
 - Hydrants
 - Water Main
 - Study Area

- EXISTING PRIVATE WELL (NOT WITHIN CITY LIMITS)
- EXISTING PRIVATE WELL (NEW WATERMAIN REQUIRED FOR SERVICE)
- EXISTING PRIVATE WELL (LONG LATERAL SERVICES REQUIRED TO EXISTING WATERMAIN)



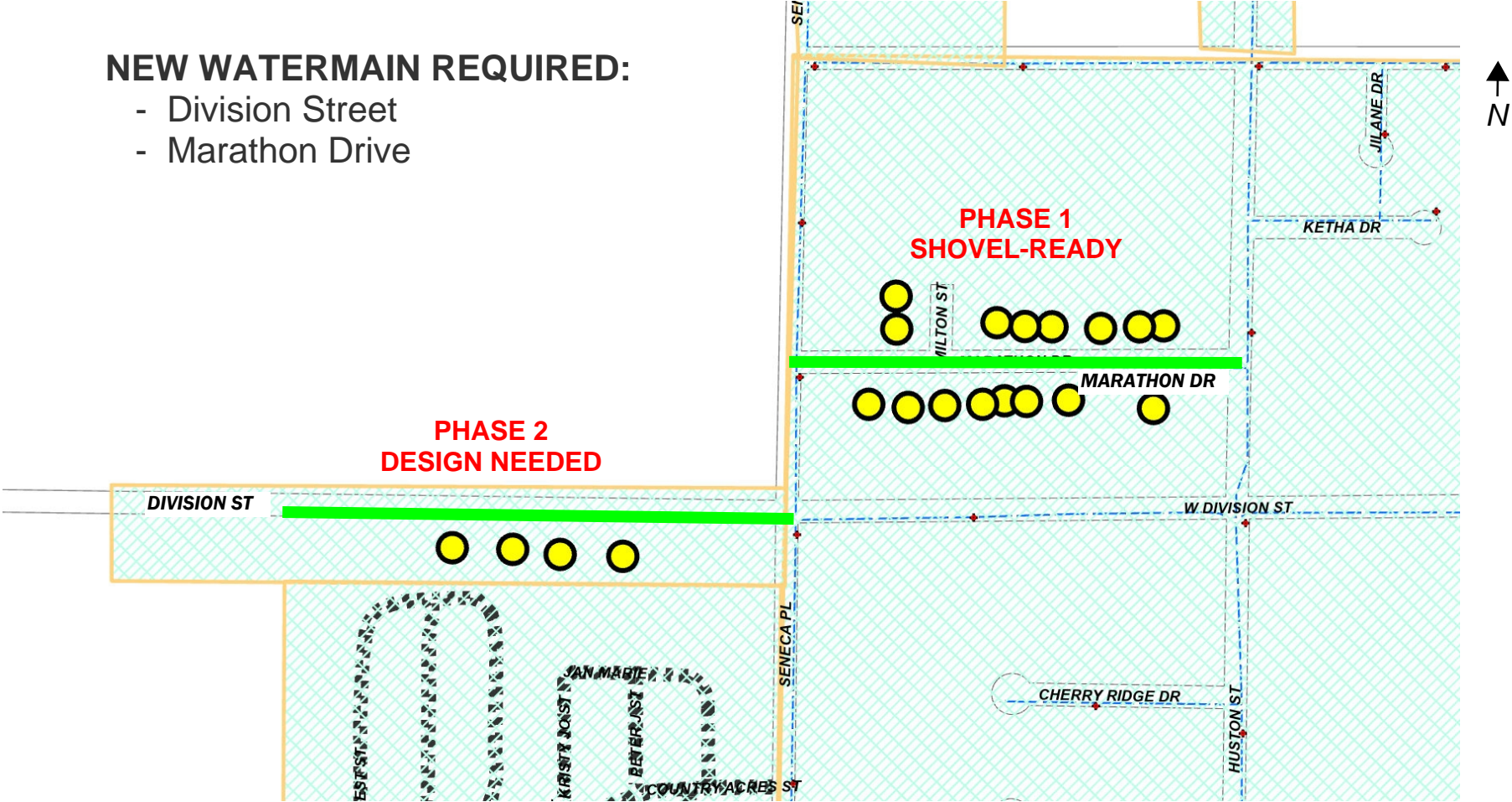
NEW WATERMAIN PROJECT LOCATIONS
HIGHLIGHTED IN MAGENTA

HOOKING TO NEIGHBORING MUNICIPALITIES, IF
FUNDS AVAILABLE, HIGHLIGHTED IN ORANGE




MAP 4

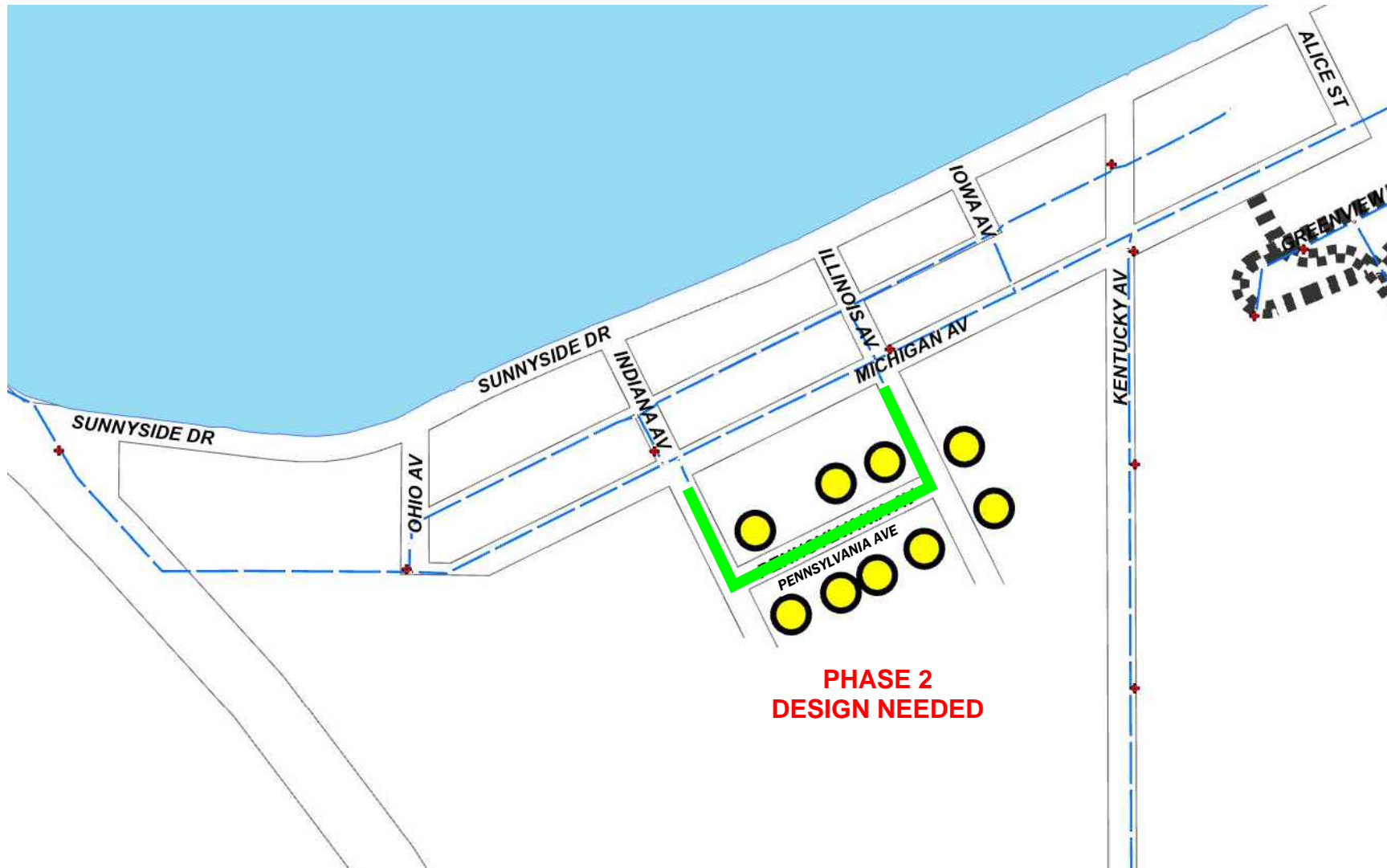
NEW WATERMAIN REQUIRED:

- Division Street
- Marathon Drive



LEGEND




-  EXISTING PRIVATE WELL
-  EXISTING WATERMAIN
-  PROPOSED WATERMAIN



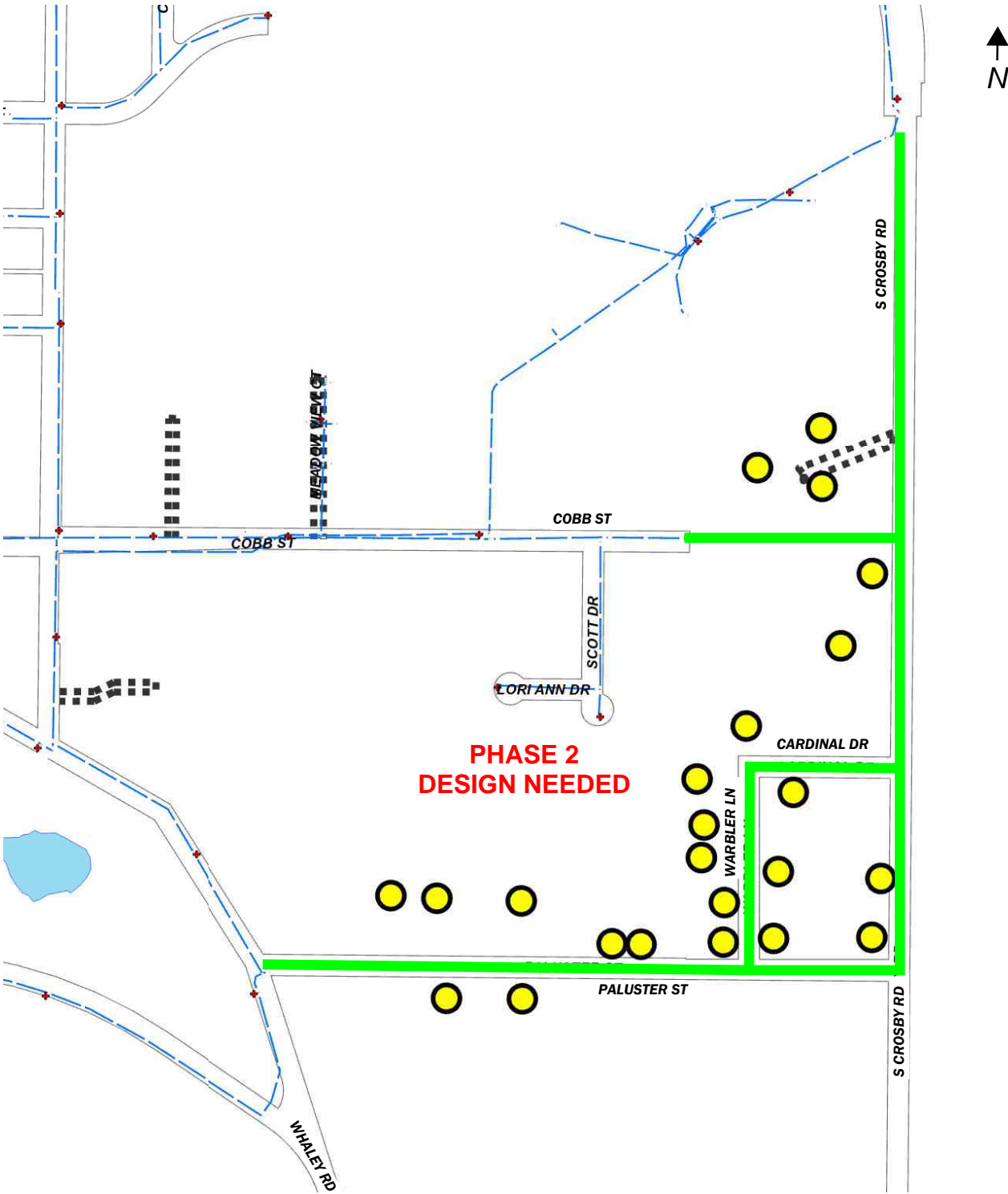
NEW WATERMAIN REQUIRED:

- Indiana Avenue
- Pennsylvania Avenue
- Illinois Avenue

LEGEND

-  EXISTING PRIVATE WELL
-  EXISTING WATERMAIN
-  PROPOSED WATERMAIN




MAP 6



NEW WATERMAIN REQUIRED:

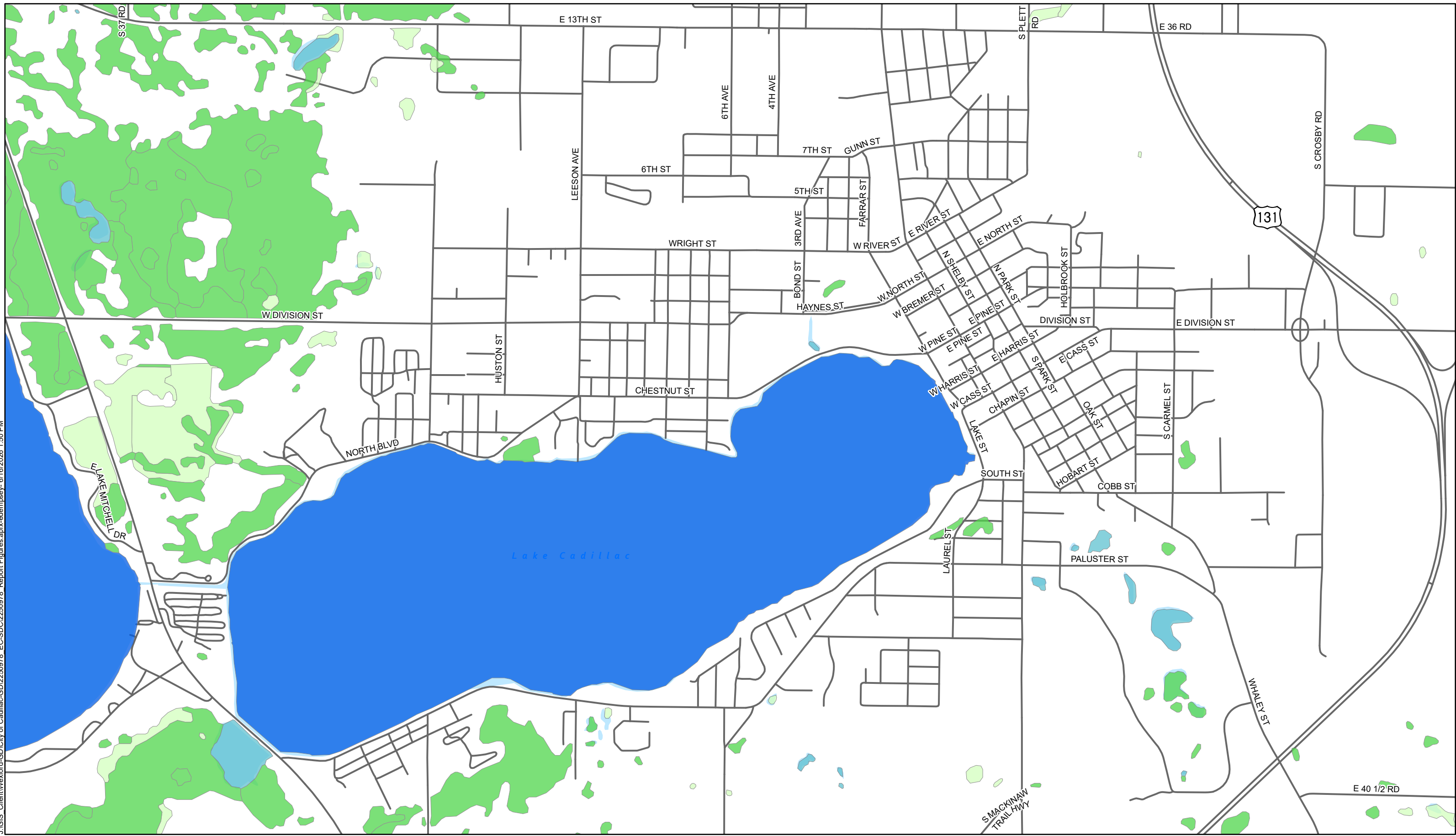
- Paluster Street
- Warbler Lane / Cardinal Drive
- S. Crosby Road
- Cobb Street extension

LEGEND







-  EXISTING PRIVATE WELL
-  EXISTING WATERMAIN
-  PROPOSED WATERMAIN

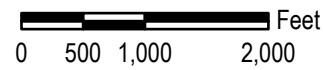
Appendix G: Wetlands Map

J:\GIS Client\Wexford-GD\City of Cadillac-GD\2250978 EC-SDC\2250978 Report Figures.aprx-edempsey-6/19/2026 1:50 PM



LEGEND

- | | | | |
|---|-----------------------------------|---|----------|
|  | Freshwater Emergent Wetland |  | Lake |
|  | Freshwater Forested/Shrub Wetland |  | Other |
|  | Freshwater Pond |  | Riverine |



CITY OF CADILLAC
WEXFORD COUNTY, MI

NATIONAL WETLAND INVENTORY

APPENDIX G

Prein&Newhof

2250978

Appendix H: Floodplain Maps

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, participants from local drainage sources of small size, or all government features outside Special Flood Hazard Areas. The community map repository should be consulted for additional flood hazard information prior to use of this map for property purchase or construction purposes.

Coastal zone flood elevation apply only to areas of 1/2 National Geodetic Vertical Datum of 1929 (NGVD) and include the effects of waves when these elevations may also affect significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of special flood hazard 100-year flood include Zones A, AE, AH, AO, AV, and VE. Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodhazards were computed at cross sections and interpolated between cross sections. The floodway areas based on hydraulic considerations were computed using the National Weather Service Hydrologic Engineering Center (HEC) Floodway Analysis Program.

Floodway widths in some areas may be too narrow to show in this floodway map. Corporate limits shown on this map are based on the best data available. The user should contact appropriate community officials to verify the corporate limits boundaries shown on this map.

For community map repository history, prior to countywide mapping, see section 6.3 of the Flood Insurance Study Report.

For adjoining map panels, see separate printed Map Index.

DIGITAL DATA AVAILABILITY: Digital maps containing the thematic floodhazard information shown on these maps are published by the Federal Emergency Management Agency on CD-ROM format on CD-ROM. Requests for data should include the full name of the community or county and the Flood Insurance Rate Map panel numbers covered by the request. Contact the Federal Emergency Management Agency, Map Service Center, 6750 Santa Monica Court, Charleston, Maryland 21022-4802. Telephone: 1-800-368-6868.

NOTE: The coordinate system used for the production of this Flood Insurance Rate Map (FIRM) is the National Geodetic Vertical Datum of 1929 (NGVD). Clarke 1866 spheroid. Corner coordinates shown on the FIRM are in latitude and longitude references to the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988. Contact the National Geodetic Survey at the following address:

Vertical Network Branch, N/CDD
National Geodetic Survey, NGA
Ellen Spring Main Center 3
330 East Street Highway
Ellen Spring, Maryland 20690
(301) 753-3391

BASE MAP SOURCE: Planimetric base map files were provided in digital format by the Michigan Department of Natural Resources. These files were compiled at a scale of 1:24,000 from U.S. Geological Survey 7.5-Minute Series Geographic Maps. Additional information may have been derived from other sources. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.



LEGEND

- SPECIAL FLOOD HAZARD AREAS INUNDATE BY 100-YEAR FLOOD**
- ZONE A** No base flood elevations determined.
 - ZONE AE** Base flood elevations determined.
 - ZONE AH** Flood depths of 1 to 3 feet usually areas of ponding; base flood elevations determined.
 - ZONE AO** Flood depths of 1 to 3 feet usually sheet flow; no wind-up areas; average depths determined; for areas of at least 1/2 acre, flooding velocity also determined.
 - ZONE AVF** To be protected from 100-year flood by Federal flood protection system, under construction; no base flood elevations determined.
 - ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
 - ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.
- FLOODWAY AREAS IN ZONE AE**
- OTHER FLOODWAY AREAS**
 - ZONE X** Areas of 500-year flood, areas of 100-year flood with average depths of less than 1 foot or with damage areas less than 1 square mile and areas protected by levees from 100-year flood.
- OTHER AREAS**
- ZONE X** Areas determined to be outside 500-year floodplain.
 - ZONE D** Areas in which flood hazards are undetermined.
- UNDEVELOPED COASTAL BARRIERS***
- Identified 1983
 - Identified 1990 or Later
 - Otherwise Potential Areas Identified 1991 or Later
- *Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.
- Floodplain Boundary
 - Floodway Boundary
 - Zone D Boundary
 - Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Undetermined Coastal Base Flood Elevations Within Special Flood Hazard Zones.
 - Base Flood Elevation Line: Elevation in Feet**
 - Cross Section Line
 - Base Flood Elevation in Feet Where Uniform Velocity Zone*
 - RM7 x Elevation Reference Mark
 - RM7.5 River Mile
- **Referenced to the National Geodetic Vertical Datum of 1929.

MAP REPOSITORY
Refer to Repository Listing on Map Index
EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP: AUGUST 3, 1998
EFFECTIVE DATES OF REVISIONS TO THIS PANEL:

Refer to the FLOOD INSURANCE RATE MAP effective date shown on this map to determine when additional maps apply to structures in the areas where measures to reduce loss have been identified. Coastal Base Flood Elevations Within Special Flood Hazard Areas. To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 800-638-6622.



NATIONAL FLOOD INSURANCE PROGRAM

FIRM FLOOD INSURANCE RATE MAP WEXFORD COUNTY, MICHIGAN (ALL JURISDICTIONS)

PANEL 338 OF 500

USER NAME INDEX FOR PANELS NOT PRINTED

COMMUNITY	SHEET	PANEL	DATE
CHARLETTON	038	038	C
CLARE LAKE	039	039	C
CLARE LAKE	040	040	C
CLARE LAKE	041	041	C
CLARE LAKE	042	042	C
CLARE LAKE	043	043	C
CLARE LAKE	044	044	C
CLARE LAKE	045	045	C
CLARE LAKE	046	046	C
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CLARE LAKE	097	097	C
CLARE LAKE	098	098	C
CLARE LAKE	099	099	C
CLARE LAKE	100	100	C

MAP NUMBER 26165C0338 C
EFFECTIVE DATE: AUGUST 3, 1998

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage facilities of small scale, or all groundwater features outside Special Flood Hazard Areas. The community map repository should be consulted for possible updated flood hazard information prior to use of this map for property purchase or construction purposes.

Coastal base flood elevations apply only to the west of U.S. National Geodetic Vertical Datum of 1929 (NGVD) and indicate the effects of wave action. These elevations may vary significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of special flood hazard (100-year flood) include Zones A, AE, AH, AO, AR, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic computations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show. Floodway widths are provided in the Flood Insurance Study Report.

Coastal limits shown on this map are based on the best data available. The user should contact appropriate community officials to verify the coastal limit elevations shown on the map.

For community map update history, refer to countywide mapping, see section 6.0 of the Flood Insurance Study Report.

For acquiring this graphic see separate printed map files.

DIGITAL DATA AVAILABILITY: Digital files containing the thematic floodplain information shown on this map are available by the Federal Emergency Management Agency on CD-ROM. Contact the National Geodetic Survey for details. The user should include the full name of the community or county and the Flood Insurance Study Map number covered by the request. Contact the Federal Emergency Management Agency, Map Service Center, 1775 Santa Barbara Court, Suitland, Maryland 21087-5802. Telephone 1-800-368-6868.

NOTE: The coordinate system used for the production of this Flood Insurance Study Map (FIRM) is National Geodetic Vertical Datum (NGVD), North American Datum of 1929 (NAD29). Corner 1988 referenced. Corner coordinates shown on the FIRM are a latitude and longitude reference to the National Geodetic Vertical Datum of 1929. Differences in the datum and different used in the production of FIRMs for adjacent counties may result in slight positional differences in their features at the county boundaries. These differences do not affect the accuracy of the information shown on the FIRM.

ATTENTION: Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be converted to structures and ground elevations referenced to the same datum. To do this, consult appropriate community officials for the National Geodetic Vertical Datum of 1929 and the North American Datum of 1983. Contact the National Geodetic Survey at the following address:

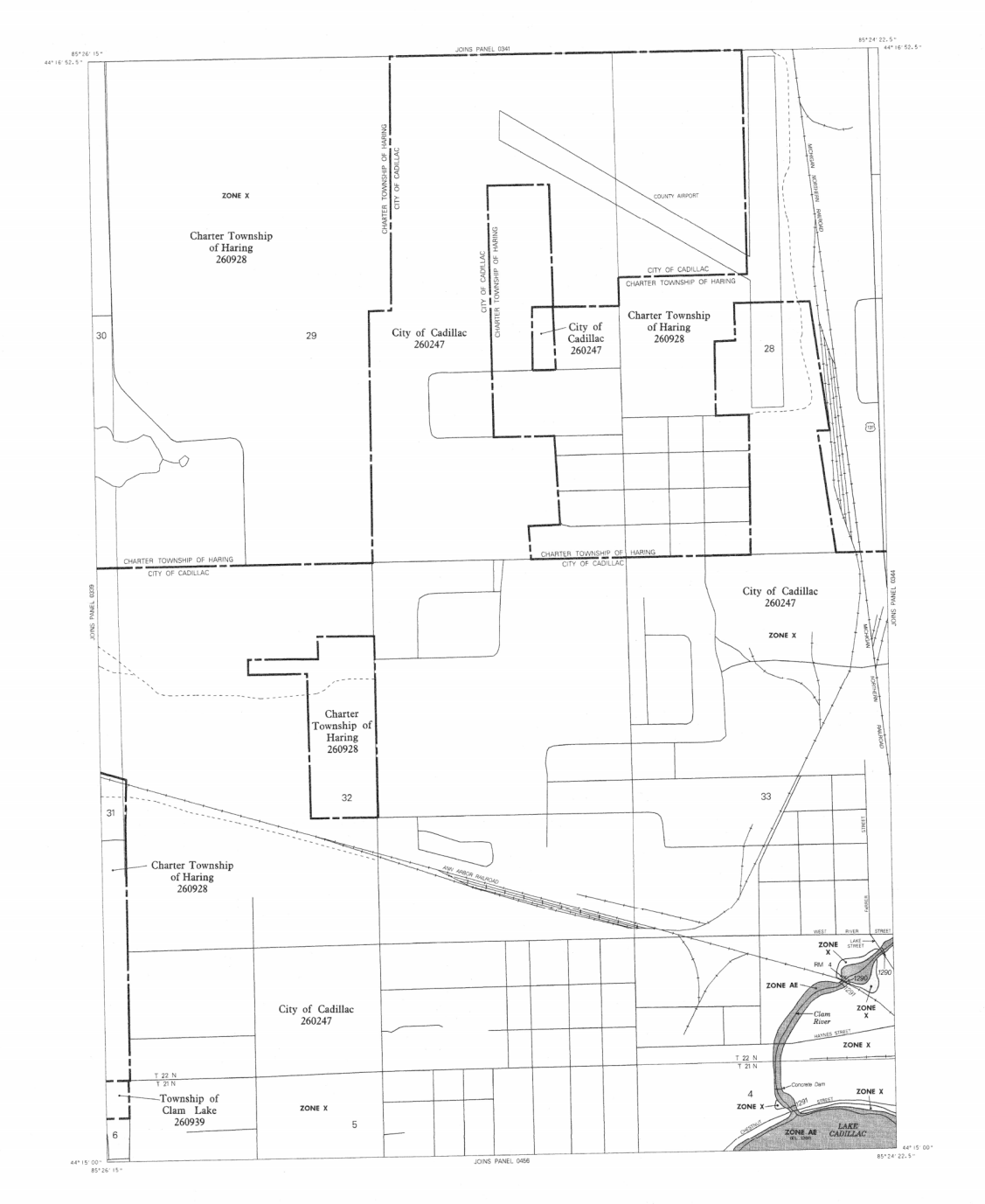
Vertical Network Branch, NCEM
National Geodetic Survey, NOAA
Cedar Spring Metro Center 3
1385 East-West Highway
Coral Gables, Maryland 20903
(301) 713-3561

BASE MAP SOURCE: Platements base map files were provided in digital format to the Michigan Department of Natural Resources. These files were converted at a scale of 1:24,000 from U.S. Geological Survey 7.5-Minute Series Topographic Maps. Additional information may have been derived from other sources. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION IN FEET (NGVD)	DESCRIPTION OF LOCATION
88 +	1,291.75	Obtained 8 ft to top of rebar steel rod as described above on station 11+00.00. Station located in western corner of lot 28, Charter Township of Haring, City of Cadillac, Michigan. Station and representative 100 feet northwest of intersection of Lake Street and Main Street.

National Geodetic Vertical Datum of 1929



LEGEND

- SPECIAL FLOOD HAZARD AREAS INUNDATE BY 100-YEAR FLOOD**
 - ZONE A** No base flood elevations determined.
 - ZONE AE** Base flood elevations determined.
 - ZONE AH** Flood depths of 1 to 3 feet usually areas of ponding; base flood elevations determined.
 - ZONE AO** Flood depths of 1 to 3 feet usually sheet flow on impervious surface; depths determined; for areas of shallow fast flowing velocity also determined.
 - ZONE AR** To be protected from 100-year flood by Federal flood protection system; under construction; no base flood elevations determined.
 - ZONE V** Coastal flood with velocity hazard; levee actions; no base flood elevations determined.
 - ZONE VE** Coastal flood with velocity hazard; levee actions; base flood elevations determined.
- FLOODWAY AREAS IN ZONE AE**
- OTHER FLOOD AREAS**
 - ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile and area protected by levees from 100-year flood.
- OTHER AREAS**
 - ZONE X** Areas determined to be outside 500-year flood.
 - ZONE D** Areas in which flood hazards are undetermined.
- UNDEVELOPED COASTAL BARRIERS***
 - Identified 1983
 - Identified 1992 or Later
 - Otherwise Protected Areas Identified 1991 or Later

* Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain Boundary
- Floodway Boundary
- Zone D Boundary
- Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Un-determined Coastal Base Flood Elevations Within Special Flood Hazard Zones.
- Base Flood Elevation Line: Elevation in Feet**
- Cross Section Line
- Base Flood Elevation in Feet Where Uniform Within Zone**
- EL. 067'1
- RM 7
- Elevation Reference Mark
- River Mile
- ** Referenced to the National Geodetic Vertical Datum of 1929

MAP REPOSITORY
Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
AUGUST 3, 1998

EFFECTIVE DATES OF REVISIONS TO THIS PANEL

Refer to the FLOOD INSURANCE RATE MAP effective date shown on this map to determine when additional rate data is available in the areas where revisions to RFRs have been introduced. Coastal Base Flood Elevations Available To Determine if Flood Insurance is Available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 639-8620.

APPROXIMATE SCALE
0 100 200 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM FLOOD INSURANCE RATE MAP WEXFORD COUNTY, MICHIGAN (ALL JURISDICTIONS)

PANEL 343 OF 500

USE MAP INDEX FOR PANELS NOT PRINTED

COUNTY	PANEL	DATE
WEXFORD	343	1998
CLAM LAKE TOWNSHIP OF	343	C
WEXFORD COUNTY OF	343	C

MAP NUMBER 261650343 C

EFFECTIVE DATE: AUGUST 3, 1998

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all placement features outside Special Flood Hazard Areas. The community map repository should be consulted for possible updated flood hazard information prior to use of this map for property purchase or construction purposes.

Coastal zone flood elevations apply only to areas of 0.5 National Geospatial Vertical Datum of 1929 (NGVD) and include the effects of wave action. These elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodhazards were compiled at cross sections and interpolated between cross sections. The floodhazards were based on historic considerations with regard to requirements of the Federal Emergency Management Agency. Floodway widths in some areas may be too narrow to show to make floodway widths are provided in the Flood Insurance Study Report.

Corporate limits shown on this map are based on the best data available. The user should contact appropriate community officials to verify the corporate and jurisdictional limits on this map.

For community map revision history refer to outside mapping, see section 6.5 of the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index.

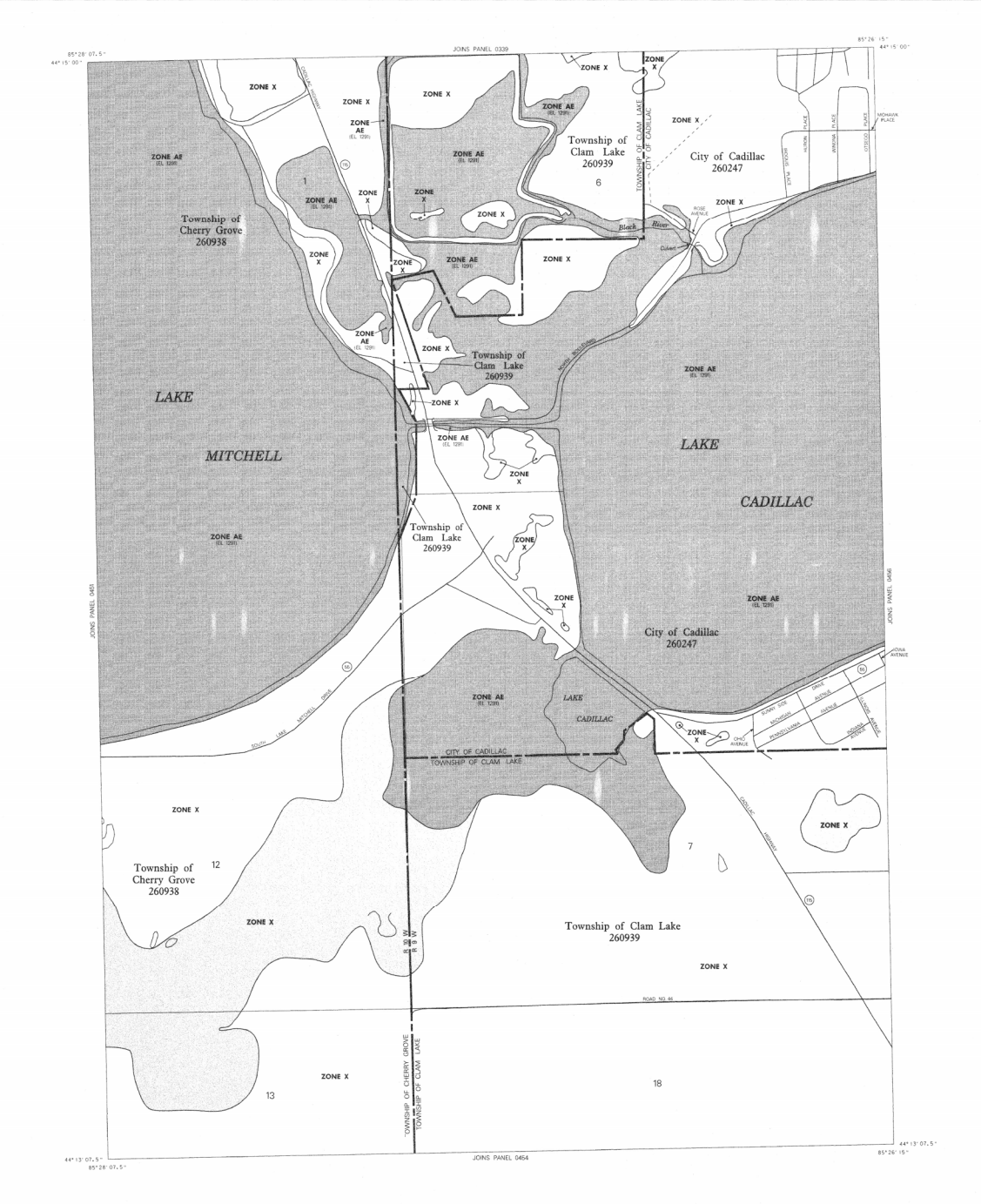
DIGITAL DATA AVAILABILITY: Digital files containing the National Flood Insurance information shown on this map are available to the Federal Emergency Management Agency on CD-ROM. Contact the National Flood Insurance Study Map Panel Numbers covered by the request. Contact the Federal Emergency Management Agency, Map Service Center, 675 Santa Barbara Court, Eastview, Maryland 21227-8822. Telephone: (410) 336-6066.

NOTE: The coordinate system used for the production of this Flood Insurance Rate Map (FIRM) is National Geospatial Vertical Datum (North American Datum of 1929) (NAD29). Clarke 1866 spheroid. Corner coordinates shown on the FIRM are in latitude and longitude referenced to the International Reference Meridian projection, NAD29. Differences in the datum and spheroid used in the production of FIRMs for adjacent counties may result in slight coordinate differences in map features at the county boundaries. These differences do not affect the accuracy of the information shown on the FIRM.

ATTENTION: Flood elevations on this map are referenced to the National Geospatial Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same datum. For information regarding conversion between the National Geospatial Vertical Datum of 1929 and the North American Vertical Datum of 1988, contact the National Geospatial Survey at the following address:

Vertical Network Branch, NCGS
National Geospatial Survey, NSGA
Silver Spring, Maryland Center 3
1705 East-West Highway
Belt Station, Maryland 20910
(301) 751-2861

BASE MAP SOURCE: Parameters base map files were provided in digital format to the Michigan Department of Natural Resources. These files were compiled at a scale of 1:24,000 from U.S. Geological Survey 7.5-Minute Series Topographic Maps. Additional information may have been derived from other sources. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.



LEGEND

- SPECIAL FLOOD HAZARD AREAS INUNDED BY 100-YEAR FLOOD**
- ZONE A** - No base flood elevations determined.
 - ZONE AE** - Base flood elevations determined.
 - ZONE AH** - Flood depths of 1 to 3 feet usually areas of ponding; base flood elevations determined.
 - ZONE AO** - Flood depths of 1 to 3 feet usually sheet flow on drainage terraces; average depths determined; for areas of actual tall flooding, velocities also determined.
 - ZONE APF** - To be protected from 100-year flood by Federal flood protection action; under construction; no base flood elevations determined.
 - ZONE V** - Coastal flood with velocity hazard; levee actions; no base flood elevations determined.
 - ZONE VE** - Coastal flood with velocity hazard; levee actions; base flood elevations determined.

- FLOODWAY AREAS IN ZONE AE**
- ZONE X** - Areas of 500-year flood; areas of 100-year flood with average depth of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

- OTHER AREAS**
- ZONE X** - Areas determined to be outside 500-year floodhazard.
 - ZONE D** - Areas in which flood hazards are undetermined.

- UNDEVELOPED COASTAL BARRIERS***
- Identified 1983
 - Identified 1990 or Later
 - Other Areas Protected Areas Identified 1990 or Later

- * Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.
- Floodplain Boundary
 - Floodway Boundary
 - Zone D Boundary
 - Boundary Dividing Special Flood Hazard Zones and Boundary Dividing Areas of CH-Stream Coastal Bar Flood Elevations Within Special Flood Hazard Zones
 - Base Flood Elevation Line (Elevation in Feet)**
 - Cross Section Line
 - Elev. (MFT)
 - Elev. (M7)
 - M1.5
 - River Mile

** Referenced to the National Geospatial Vertical Datum of 1929

MAP REPOSITORY
Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
AUGUST 3, 1998

EFFECTIVE DATES OF REVISIONS TO THIS PANEL

Refer to the "FLOOD INSURANCE RATE MAP" effective date shown on this map to determine when actual rates apply to structures in the areas where elevation or depth have been established. Coastal Bar Flood Elevations of CH-Stream Coastal Bar Flood Elevations are available in this community; contact your insurance agent or call the National Flood Insurance Program at (800) 638-6622.

APPROXIMATE SCALE
0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
WEXFORD COUNTY, MICHIGAN
(ALL JURISDICTIONS)

PANEL 452 OF 500

SEE MAP INDEX FOR PANELS NOT PRINTED

COUNTY	NUMBER	PANEL	DATE
OSHTON	1000	1000	A </td
OSHTON	1001	1001	C
OSHTON	1002	1002	C
OSHTON	1003	1003	C

MAP NUMBER
26165C0452 C

EFFECTIVE DATE:
AUGUST 3, 1998

Federal Emergency Management Agency

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all glaciometric features outside Special Flood Hazard Areas. The community map repository should be consulted for precise glaciometric flood hazard information prior to use of this map for property purchase or construction purposes.

Coastal base flood elevations apply only to buildings of 10 National Geospatial Vertical Datum of 1929 (NGVD) and include the effects of wave action. These elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of special hazard (100-year flood) include Zones A, AE, AH, AO, AV, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show on scale. Floodway widths are provided in the Flood Insurance Study Report.

Corporate limits shown on this map are based on the best data available. The user should consult appropriate community officials to verify the corporate limits boundaries shown on this map.

For community map section history, go to: www.fema.gov section 6.2 of the Flood Insurance Study Report.

For information on the general area, see: www.fema.gov section 6.3 of the Flood Insurance Study Report.

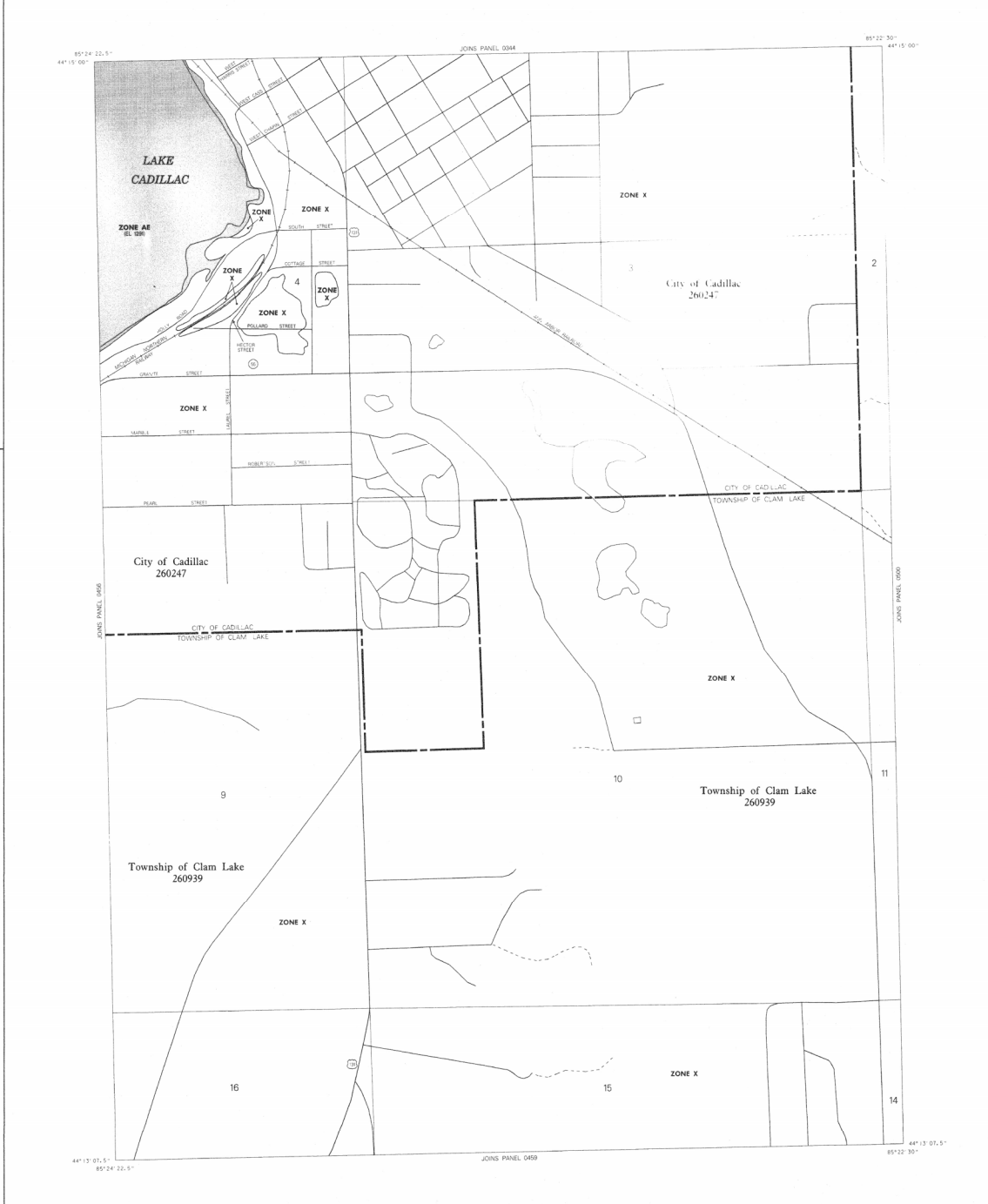
DIGITAL DATA AVAILABILITY: Digital data concerning the National Geospatial Vertical Datum of 1929 (NGVD) is contained on the CD-ROM. Requests for data should include the full name of the community or county and the Flood Insurance Rate Map panel number covered by the request. Contact the Federal Emergency Management Agency, Map Service Center (1705 Santa Barbara Court, Suitland, Maryland 21157-8002, Telephone: 1-800-368-6968).

NOTE: The coordinate system used for the production of this Flood Insurance Rate Map (IRM) is the National Geospatial Vertical Datum of 1929 (NGVD). The datum and datum used in the production of IRMs, by subsequent maps, may result in slight positional differences in the boundaries of the community. These differences do not affect the accuracy of the information shown on the IRM.

ATTENTION: Flood elevations on this map are referenced to the National Geospatial Vertical Datum of 1929. These flood elevations must be converted to structure and ground elevations referenced to the same datum. For information regarding conversions between the National Geospatial Vertical Datum of 1929 and the North American Vertical Datum of 1988, contact the National Geospatial Survey at the following address:

Vertical Network Branch, N-1003
National Geospatial Survey, NOAA
Silver Spring, Maryland Center 3
1705 East-West Highway
Silver Spring, Maryland 20910
202-775-2000

BASE MAP SOURCE: Parameters base map files were provided in digital format to the Michigan Department of Natural Resources. These files were converted at a scale of 1:24,000 from U.S. Geological Survey 7.5-Minute Series Topographic Maps. Additional information may have been derived from other sources. Users of this IRM should be aware that minor adjustments may have been made to specific base map features.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

- ZONE A:** No base flood elevations determined.
- ZONE AE:** Base flood elevations determined.
- ZONE AH:** Flood depths of 1 to 3 feet usually areas of ponding; base flood elevations determined.
- ZONE AO:** Flood depths of 1 to 3 feet usually areas of flow on sloping terrain; average depths determined for areas of abutment flooding; velocities also determined.
- ZONE AV:** To be protected from 100-year flood by Federal flood protection system, under construction; no base flood elevations determined.
- ZONE V:** Coastal flood with velocity hazard; no wave action; no base flood elevations determined.
- ZONE VE:** Coastal flood with velocity hazard; wave action; no base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- ZONE X:** Areas of 500-year flood, areas of 100-year flood with average depths of less than 1 foot, and areas protected by levees from 100-year flood.

OTHER AREAS

- ZONE X:** Areas determined to be outside 500-year floodway.
- ZONE D:** Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS*

- Identified 1981
- Identified 1990 or Later
- Offshore Potential Area Identified 1990 or Later

*Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Floodway Boundary

Zone D Boundary

Boundary Including Special Flood Hazard Zones and Boundaries (Including Areas of Off-Peak Coastal Base Flood Elevations Within Special Flood Hazard Zones)

Base Flood Elevation Line; Elevation in Feet**

Cross Section Line

Base Flood Elevation in Feet Where Uniform Within Zone*

Elevation Reference Mark

River Mile

**Referenced to the National Geospatial Vertical Datum of 1929.

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
AUGUST 3, 1998

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

Refer to the FLOOD INSURANCE RATE MAP effective date shown on this map to determine when additional areas apply to structures in the zones where elevations or depths have been shown.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE
0 50 100 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM FLOOD INSURANCE RATE MAP

WEXFORD COUNTY, MICHIGAN (ALL JURISDICTIONS)

PANEL 457 OF 500

USE MAP INDEX FOR PANELS NOT PRINTED

COUNTY	PANEL	DATE
WEXFORD	457	1998
CLAM LAKE TOWNSHIP	004	1998
CLAM LAKE TOWNSHIP	005	1998
CLAM LAKE TOWNSHIP	006	1998
CLAM LAKE TOWNSHIP	007	1998
CLAM LAKE TOWNSHIP	008	1998
CLAM LAKE TOWNSHIP	009	1998
CLAM LAKE TOWNSHIP	010	1998
CLAM LAKE TOWNSHIP	011	1998
CLAM LAKE TOWNSHIP	012	1998
CLAM LAKE TOWNSHIP	013	1998
CLAM LAKE TOWNSHIP	014	1998
CLAM LAKE TOWNSHIP	015	1998
CLAM LAKE TOWNSHIP	016	1998

MAP NUMBER 26165D0457 C

EFFECTIVE DATE: AUGUST 3, 1998


Federal Emergency Management Agency

Appendix I: Soils Map


Soil Map—Lake and Wexford Counties, Michigan
(Cadillac, Michigan)


MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)




















Soils







 Soil Map Unit Polygons

 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features


Water Features

 Streams and Canals

Transportation

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

Background

 Aerial Photography

MAP INFORMATION

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

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

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

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

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

Soil Survey Area: Lake and Wexford Counties, Michigan
Survey Area Data: Version 19, Sep 4, 2025

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

Date(s) aerial images were photographed: May 27, 2023—May 28, 2023

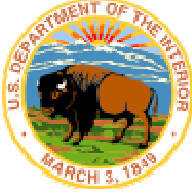
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
10A	Au Gres-Finch sands, 0 to 4 percent slopes	425.9	4.2%
12B	Emmet-Montcalm complex, 0 to 6 percent slopes	89.0	0.9%
12C	Emmet-Montcalm complex, 6 to 12 percent slopes	7.8	0.1%
14A	Allendale loamy sand, 0 to 4 percent slopes	151.2	1.5%
15B	Kalkaska sand, 0 to 6 percent slopes	49.0	0.5%
15C	Kalkaska sand, 6 to 18 percent slopes	12.4	0.1%
17A	Kawkawlin loam, 0 to 4 percent slopes	18.9	0.2%
18	Loxley peat	170.0	1.7%
20B	Montcalm-Graycalm complex, 0 to 6 percent slopes	997.6	9.8%
20C	Montcalm-Graycalm complex, 6 to 12 percent slopes	350.8	3.4%
20E	Montcalm-Graycalm complex, 12 to 30 percent slopes	75.2	0.7%
21B	Nester sandy loam, 1 to 6 percent slopes	25.9	0.3%
22	Tawas-Roscommon association	967.1	9.5%
23B	Grattan sand, 0 to 6 percent slopes	1,996.7	19.6%
23E	Rubicon sand, 6 to 18 percent slopes	640.0	6.3%
25	Pits	143.5	1.4%
26B	Manistee-Montcalm loamy sands, 0 to 6 percent slopes	485.6	4.8%
26C	Manistee-Montcalm loamy sands, 6 to 12 percent slopes	108.6	1.1%
28C	Dighton loam, 6 to 12 percent slopes	1.8	0.0%
29B	Coloma sand, 0 to 6 percent slopes	1,412.7	13.9%
CswaaA	Croswell sand, 0 to 6 percent slopes	411.2	4.0%
LupaaA	Lupton muck, snowy, 0 to 1 percent slopes	158.2	1.6%
W	Water	1,493.6	14.7%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Totals for Area of Interest		10,194.3	100.0%

Appendix J: US Fish and Wildlife Documentation



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Michigan Ecological Services Field Office
2651 Coolidge Road Suite 101
East Lansing, MI 48823-6360
Phone: (517) 351-2555 Fax: (517) 351-1443

In Reply Refer To:
Project code: 2026-0021007
Project Name: Cadillac EC-SDC Project

12/01/2025 18:27:30 UTC

Subject: Verification letter for the project named 'Cadillac EC-SDC Project' for specified threatened and endangered species that may occur in your proposed project location consistent with the Michigan Endangered Species Determination Key (Michigan DKey)

Dear Eric Seguin:

The U.S. Fish and Wildlife Service (Service) received on **December 01, 2025** your effect determination(s) for the 'Cadillac EC-SDC Project' (the Action) using the Michigan DKey within the Information for Planning and Consultation (IPaC) system. The Service developed this system in accordance with the Endangered Species Act of 1973 (ESA) (87 Stat.884, as amended; 16 U.S.C. 1531 et seq.).

Based on your answers and the assistance of the Service’s Michigan DKey, you made the following effect determination(s) for the proposed Action:

Species	Listing Status	Determination
Eastern Massasauga (=rattlesnake) (<i>Sistrurus catenatus</i>)	Threatened	NLAA
Monarch Butterfly (<i>Danaus plexippus</i>)	Proposed Threatened	No effect

The Service will notify you within 30 calendar days if we determine that this proposed Action does not meet the criteria for a “may affect, not likely to adversely affect” (NLAA) determination for Federally listed species in Michigan. If we do not notify you within that timeframe, you may proceed with the Action under the terms of the NLAA concurrence provided here. This verification period allows the Michigan Ecological Services Field Office to apply local knowledge to evaluation of the Action, as we may identify a small subset of actions having impacts that were unanticipated. In such instances, the Michigan Ecological Services Field Office may request additional information to verify the effects determination reached through the Michigan DKey.

Your agency has met consultation requirements by informing the Service of your “No Effect” determination(s). No consultation is required for species that you determined will not be affected by the Action.

Please provide sufficient project details on your project homepage in IPaC (Define Project, Project Description) to support your conclusions and the Service’s 30-day review period. Failure to disclose important aspects of your project that would influence the outcome of your effects determinations may negate your determinations and invalidate this letter. If you have site-specific information that leads you to believe a different determination is more appropriate for your project than what the Dkey concludes, you can and should proceed based on the best available information.

The Service recommends that you contact the Service or re-evaluate the project in IPaC if: 1) the scope or location of the proposed Action is changed; 2) new information reveals that the action may affect listed species or designated critical habitat in a manner or to an extent not previously considered; 3) the Action is modified in a manner that causes effects to listed species or designated critical habitat; or 4) a new species is listed or critical habitat designated. If any of the above conditions occurs, additional consultation with the Service should take place before project changes are final or resources committed.

For non-Federal representatives: Please note that when a project requires consultation under section 7 of the Act, the Service must consult directly with the Federal action agency unless that agency formally designates a non-Federal representative (50 CFR 402.08). Non-Federal representatives may prepare analyses or conduct informal consultations; however, the ultimate responsibility for section 7 compliance under the Act remains with the Federal agency. If the Federal agency concurs with your determination, the project as proposed has completed section 7 consultation. All documents and supporting correspondence should be provided to the Federal agency for their records.

Monarch butterfly and other pollinators:

Monarch butterfly was proposed for listing as threatened on December 12, 2024. Through May 19, 2025, we are gathering input through an extended public comment period to encourage the submission of any new information. We will review these comments and then will ultimately issue a final rule. If listed, protections would only go into place after the final rule is published. Section 7 conferences are required if a federal action is likely to jeopardize the continued existence of a proposed species.

For all projects, we recommend the following best management practices (BMPs) to benefit monarch and other pollinators.

Monarch and Pollinator BMP Recommendations

Consider monarch and other pollinators in your project planning when possible. Many pollinators are declining, including species that pollinate key agricultural crops and help maintain natural plant communities. Planting a diverse group of native plant species will help support the nutritional needs of Michigan’s pollinators. We recommend a mix of flowering trees, shrubs, and herbaceous plants so that something is always blooming and pollen is available during the active

periods of the pollinators, roughly early spring through fall (mid-March to mid-October). To benefit a wide variety of pollinators, choose a wide range of flowers with diverse colors, heights, structure, and flower shape. It is important to provide host plants for any known butterfly species at your site, including native milkweed for Monarch butterfly. Incorporating a water source (e.g., ephemeral pool or low area) and basking areas (rocks or bare ground) will provide additional resources for pollinators. Many pollinators need a safe place to build their nests and overwinter. During spring and summer, leave some areas unmowed or minimize the impacts from mowing (e.g., decrease frequency, increase vegetation height). In fall, leave areas unraked and leave plant stems standing. Leave patches of bare soil for ground nesting pollinators. Avoid or limit pesticide use. Pesticides can kill more than the target pest. Some pesticide residues can kill pollinators for several days after the pesticide is applied. Pesticides can also kill natural predators, which can lead to even worse pest problems. Planting native wildflowers can also reduce the need to mow and water, improve bank stabilization by reducing erosion, and improve groundwater recharge and water quality. Resources:

<https://www.fws.gov/initiative/pollinators/save-monarch>

<https://www.fws.gov/initiative/pollinators>

Bald and Golden Eagles:

Bald eagles, golden eagles, and their nests are protected under the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended, 16 U.S.C. 668a-d) (Eagle Act). The Eagle Act prohibits, except when authorized by an Eagle Act permit, the “taking” of bald and golden eagles and defines “take” as “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” The Eagle Act’s implementing regulations define disturb as “...to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”

If the Action may impact bald or golden eagles, additional coordination with the Service under the Eagle Act may be required. For more information on eagles and conducting activities in the vicinity of an eagle nest, please visit <https://www.fws.gov/library/collections/all-about-eagles>. In addition, the Service developed the National Bald Eagle Management Guidelines (May 2007) in order to assist landowners in avoiding the disturbance of bald eagles. The full Guidelines are available at <https://www.fws.gov/media/national-bald-eagle-management-guidelines-0>.

If you have further questions regarding potential impacts to eagles, please contact Chris Mensing, Chris_Mensing@fws.gov or 517-351-2555.

Wetland impacts:

Section 404 of the Clean Water Act of 1977 (CWA) regulates the discharge of dredged or fill material into waters (including wetlands) of the United States. Regulations require that activities permitted under the CWA (including wetland permits issued by the Michigan Department of Environment, Great Lakes, and Energy (EGLE)) not jeopardize the continued existence of species listed as endangered or threatened. Permits issued by the U.S. Army Corps of Engineers must also consider effects to listed species pursuant to section 7 of the Endangered Species Act. The Service provides comments to the agencies that may include permit conditions to help avoid

or minimize impacts to wildlife resources including listed species. For this project, we consider the conservation measures you agreed to in the determination key and/or as part of your proposed action to be non-discretionary. If you apply for a wetland permit, these conservation measures should be explicitly incorporated as permit conditions. Include a copy of this letter in your wetland permit application to streamline the threatened and endangered species review process.

Summary of conservation measures for your project You agreed to the following conservation measures to avoid adverse effects to listed species and our concurrence is only valid if the measures are fully implemented. These must be included as permit conditions if a permit is required and/or included in any contract language.

Eastern Massasauga: Materials used for erosion control and site restoration must be wildlife-friendly. Do not use erosion control products containing plastic mesh netting or other similar material that could entangle eastern massasauga rattlesnake (EMR). Several products for soil erosion and control exist that do not contain plastic netting including net-less erosion control blankets (for example, made of excelsior), loose mulch, hydraulic mulch, soil binders, unreinforced silt fences, and straw bales. Others are made from natural fibers (such as jute) and loosely woven together in a manner that allows wildlife to wiggle free.

Eastern Massasauga: To increase human safety and awareness of EMR, those implementing the project must first review the EMR factsheet (available at <https://www.fws.gov/media/eastern-massasauga-rattlesnake-fact-sheet>), and watch MDNR's "60-Second Snakes: The Eastern Massasauga Rattlesnake" video (available at https://www.youtube.com/watch?v=-PFnXe_e02w).

Eastern Massasauga: During project implementation, report sightings of any federally listed species, including EMR, to the U.S. Fish and Wildlife Service within 24 hours.

Eastern Massasauga: The project will not result in permanent loss of more than one acre of wetland or conversion of more than 10 acres of EMR upland habitat (uplands associated with high quality wetland habitat) to other land uses.

Eastern Massasauga: The project will occur entirely within the EMR active season (April 15 through October 15 in the southern Lower Peninsula; in the northern Lower Peninsula May 1 through October 1).

Action Description

You provided to IPaC the following name and description for the subject Action.

1. Name

Cadillac EC-SDC Project

2. Description

The following description was provided for the project 'Cadillac EC-SDC Project':

Abandonment of Private Wells, New Water Services to Existing Houses. Some areas will include road reconstruction, placement of new water main, and new services to houses.

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@44.2475161,-85.40851078206028,14z>



QUALIFICATION INTERVIEW

1. Are there any possible effects to any listed species or to designated critical habitat from your project or effects from any other actions or projects subsequently made possible by your project?

Note: select "Yes" even if the expected effects to the species or critical habitat are expected to be 1) extremely unlikely (discountable), 2) can't meaningfully be measured, detected, or evaluated (insignificant), or 3) wholly beneficial. Select "No" to confirm that the project details and supporting information allow you to conclude that listed species and their habitats will not be exposed to any effects (including discountable, insignificant, or beneficial effects) and therefore, you have made a "no effect" determination for all species. If you are unsure, select YES to answer additional questions about your project.

Yes

2. This determination key is intended to assist the user in the evaluating the effects of their actions on Federally listed species in Michigan. It does not cover other prohibited activities under the Endangered Species Act (e.g., for wildlife: import/export, Interstate or foreign commerce, possession of illegally taken wildlife, purposeful take for scientific purposes or to enhance the survival of a species, etc.; for plants: import/export, reduce to possession, malicious destruction on Federal lands, commercial sale, etc.) or other statutes.

Click **yes** to acknowledge that you must consider other prohibitions of the ESA or other statutes outside of this determination key.

Yes

3. Is the action the approval of a long-term (i.e., in effect greater than 10 years) permit, plan, or other action?

Note: For example, a new or re-issued hydropower license, a large-scale land management plan, or other kinds of documents that provide direction for projects or actions that may be conducted over a long term (>10 years) without the need for additional section 7 consultation.

No

4. Is the action being funded, authorized, or carried out by a Federal agency?

Yes

5. Does the action require a Michigan EGLE/Army Corps of Engineers joint permit?

Yes

6. Is this an NRCS-funded Forest Management Plan?

No

7. Does the action involve wind energy?

No

8. Does the action involve solar energy?

No

9. Are there at least 30 days prior to your action occurring?

Endangered species consultation must be completed before taking any action that may have effects to listed species. **If you have already started some components of the project on the ground (e.g., removed vegetation) before completing this Dkey, answer “no” to this question.** The only exception is if you have received approval from the Michigan Field Office to use the Dkey less than 30 days before the action will occur. The U.S. Fish and Wildlife Service also needs time to review projects before we can verify conclusions in some dkey output letters.

Yes

10. Does the action involve constructing a new communications tower or modifying an existing communications tower?

No

11. Does the activity involve aerial or other large-scale application of any chemical (including insecticide, herbicide, lampricide, etc.)?

No

12. Does your project include water withdrawal (ground or surface water) greater than 10,000 gallons/day?

No

13. Will your action permanently affect hydrology?

No

14. Will your action temporarily affect hydrology?

No

15. Will your project have any direct impacts to a stream or river (including Horizontal Directional Drilling (HDD) due to potential for frac out, hydrostatic testing, stream/road crossings, new storm-water outfall discharge, dams, other in-stream work, changes to water quality or hydrology, etc.)?

No

16. Does your project have the potential to indirectly impact the stream/river or the riparian zone (e.g., cut and fill, horizontal directional drilling due to the potential for frac out, hydrostatic testing, construction, vegetation removal, discharge, changes to water quality or hydrology, etc.)?

No

17. Are you applying for one of the following Michigan EGLE/Army Corps of Engineers joint permit application Minor Permit (MP) Categories:
MP 3 - Boat Hoist; MP 5 - Boal Wells; MP 7 - Completed Enforcement Actions; MP 13 - Dock;
MP 22 - Fish and Wildlife Habitat Structures;
MP 25 - Ford Stream Crossings for Commercial Forestry Operations;
MP 31 - Maintenance and Repair of Serviceable Structures;
MP 52 - Temporary Recreational Structures;
MP 54 - Wetland Habitat Restoration and Enhancement?

Verify the MP category number and associated description matches your project/application (https://www.michigan.gov/documents/egle/WRD-Minor-Project-Categories_733320_7.pdf). If you don't know what category applies for your project, answer no to this question.

No

18. Are you applying for one of the following Michigan EGLE/Army Corps of Engineers joint permit application General Permit (GP) Categories:
GP A - Aids to Navigation;
GP C - Clear Span Bridge;
GP J - Dry Fire Hydrant;
GP O - Minor Permit Revisions and Transfers;
GP Q - Mooring Buoy;
GP W - Scientific Measuring Devices;
GP X - Snow Road Stream Crossings for Forestry Operations;
GP Z - Spring Piles and Piling Clusters?

Verify the GP category number and associated description matches your project/application (https://www.michigan.gov/documents/deq/wrd-general-permit-categories_555828_7.pdf). If you don't know what category applies for your project, answer no to this question.

No

19. Will your action disturb the ground or existing vegetation?

Note: This includes any off road vehicle access, soil compaction, digging, seismic survey, directional drilling, heavy equipment, grading, trenching, placement of fill, pesticide application, vegetation management (including removal or maintenance using equipment or chemicals), tree clearing, cultivation, development, etc.

Yes

20. Does the action intersect the **monarch butterfly** species list area?

Automatically answered

Yes

21. Monarch butterfly was proposed for listing as threatened on December 12, 2024. Through May 19, 2025, we are gathering input through an extended public comment period to encourage the submission of any new information. We will review these comments and then will ultimately issue a final rule. If listed, protections would only go into place after the final rule is published. We encourage implementing measures that will remove or reduce threats to monarch. If your project will have no effect on monarch butterflies (for example, if your project won't affect their habitat or individuals), then you can make a "no effect" determination for this project.

Are you making a "**no effect**" determination for monarch? Please note that the FWS does not provide concurrence on "no effect" determinations.

Yes

22. Does the action intersect the **Eastern massasauga rattlesnake** species list area?

Automatically answered

Yes

23. Does your action involve prescribed fire?

No

24. Will this action occur entirely in the Eastern massasauga rattlesnake inactive season (October 2 through April 30)?

No

25. Will this action occur entirely in the Eastern massasauga rattlesnake active season (May 1 through October 1)?

Yes

26. Will the action result in permanent loss of more than one acre of wetland or conversion of more than 10 acres of uplands of potential Eastern massasauga rattlesnake habitat (uplands associated with high quality wetland habitat) to other land uses?

No

27. Will you use [wildlife safe materials](#) for erosion control and site restoration and eliminate the use of erosion control products containing plastic mesh netting or other similar material that could ensnare eastern massasauga rattlesnake? Please note that eastern massasauga rattlesnake have been ensnared in plastic erosion control netting outside known habitat.

Yes

28. Will you watch MDNR's ["60-Second Snakes: The Eastern Massasauga Rattlesnake \(EMR\)"](#) video or review the [EMR factsheet](#) to increase human safety and awareness of EMR?

Yes

29. Will all action personnel report any Eastern massasauga rattlesnake observations, or observation of any other listed threatened or endangered species, during action implementation to the Service within 24 hours?

Yes

30. Does the action area intersect the **Indiana bat** species list area?

Automatically answered

No

31. Does the action intersect the **tricolored bat** species list area?

Automatically answered

No

32. Does this project intersect the **Northern long-eared bat** species list area?

Automatically answered

No

33. The Michigan Field Office receives copies of all IPaC-generated output letters, and we routinely review all letters with the exception of May Affect Technical Assistance letters (which is one of five kinds of letters you may get depending on which determinations you receive). A biologist will reach out to you within 30 days via email (from MIFO_Dkey@fws.gov) if we have questions about your project description, answers to specific questions, or determinations.

If your agency has an urgent need for approval and would like to request our review more quickly than 30 days, you can request expedited review by selecting yes to this question. Based on your planning cycle, if you do not have an urgent need for concurrence (i.e., concurrence within 30 days is sufficient), please select no.

Are you requesting expedited review for this project?

No

IPAC USER CONTACT INFORMATION

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United States Department of the Interior



FISH AND WILDLIFE SERVICE
Michigan Ecological Services Field Office
2651 Coolidge Road Suite 101
East Lansing, MI 48823-6360
Phone: (517) 351-2555 Fax: (517) 351-1443

In Reply Refer To:
Project Code: 2026-0021007
Project Name: Cadillac EC-SDC Project

12/01/2025 17:04:44 UTC

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

Official Species List

The attached species list identifies any Federally threatened, endangered, proposed and candidate species that may occur within the boundary of your proposed project or may be affected by your proposed project. The list also includes designated critical habitat if present within your proposed project area or affected by your project. This list is provided to you as the initial step of the consultation process required under section 7(c) of the Endangered Species Act, also referred to as Section 7 Consultation.

Under 50 CFR 402.12(e) (the regulations that implement section 7 of the Endangered Species Act), the accuracy of this species list should be verified after 90 days. You may verify the list by visiting the IPaC website (<https://ipac.ecosphere.fws.gov/>) at regular intervals during project planning and implementation. To update an Official Species List in IPaC: from the My Projects page, find the project, expand the row, and click Project Home. In the What's Next box on the Project Home page, there is a Request Updated List button to update your species list. Be sure to select an "official" species list for all projects.

Consultation requirements and next steps

Section 7 of the Endangered Species Act of 1973 requires that actions authorized, funded, or carried out by Federal agencies not jeopardize Federally threatened or endangered species or adversely modify designated critical habitat. To fulfill this mandate, Federal agencies (or their designated non-Federal representative) must consult with the Fish and Wildlife Service if they determine their project may affect listed species or critical habitat.

There are two approaches to evaluating the effects of a project on listed species.

Approach 1. Use the All-species Michigan determination key in IPaC. This tool can assist you in making determinations for listed species for some projects. In many cases, the determination key

will provide an automated concurrence that completes all or significant parts of the consultation process. Therefore, we strongly recommend screening your project with the **All-Species Michigan Determination Key (Dkey)**. For additional information on using IPaC and available Determination Keys, visit <https://www.fws.gov/media/mifo-ipac-instructions> (and click on the attachment), or for a video overview, please visit: <https://www.youtube.com/watch?v=FfcerNCiL0I>. Please carefully review your Dkey output letter to determine whether additional steps are needed to complete the consultation process.

Approach 2. Evaluate the effects to listed species on your own without utilizing a determination key. Once you obtain your official species list, you are not required to continue in IPaC, although in most cases using a determination key should expedite your review. If the project is a Federal action, you should review our section 7 step-by-step instructions before making your determinations: <https://www.fws.gov/office/midwest-region-headquarters/midwest-section-7-technical-assistance>. If you evaluate the details of your project and conclude “no effect,” document your findings, and your listed species review is complete; you do not need our concurrence on “no effect” determinations. If you cannot conclude “no effect,” you should coordinate/consult with the Michigan Ecological Services Field Office. The preferred method for submitting your project description and effects determination (if concurrence is needed) is electronically to EastLansing@fws.gov. Please include a copy of this official species list with your request.

For all **wind energy projects**, please contact this field office directly for assistance, even if no Federally listed plants, animals or critical habitat are present within your proposed project area or may be affected by your proposed project.

Migratory Birds

Please see the “Migratory Birds” section below for important information regarding incorporating migratory birds into your project planning. Our Migratory Bird Program has developed recommendations, best practices, and other tools to help project proponents voluntarily reduce impacts to birds and their habitats. The Bald and Golden Eagle Protection Act prohibits the take and disturbance of eagles without a permit. If your project is near an eagle nest or winter roost area, see our Eagle Permits website at <https://www.fws.gov/program/eagle-management> to help you avoid impacting eagles or determine if a permit may be necessary.

Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your consideration of threatened and endangered species during your project

planning. Please include a copy of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Michigan Ecological Services Field Office

2651 Coolidge Road Suite 101

East Lansing, MI 48823-6360

(517) 351-2555

PROJECT SUMMARY

Project Code: 2026-0021007
Project Name: Cadillac EC-SDC Project
Project Type: Utility Infrastructure Maintenance
Project Description: Abandonment of Private Wells, New Water Services to Existing Houses.
Some areas will include road reconstruction, placement of new water main, and new services to houses.

Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@44.2475161,-85.40851078206028,14z>



Counties: Wexford County, Michigan

ENDANGERED SPECIES ACT SPECIES

There is a total of 2 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 1 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

REPTILES

NAME	STATUS
Eastern Massasauga (=rattlesnake) <i>Sistrurus catenatus</i> No critical habitat has been designated for this species. This species only needs to be considered under the following conditions: <ul style="list-style-type: none"> For all Projects: Project is within EMR Range Species profile: https://ecos.fws.gov/ecp/species/2202 General project design guidelines: https://ipac.ecosphere.fws.gov/project/IGXOCBCMUFEWFID7MCVO6PTGHY/documents/generated/5280.pdf	Threatened

INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> There is proposed critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9743	Proposed Threatened

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act ² and the Migratory Bird Treaty Act (MBTA) ¹. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate avoidance and minimization measures, as described in the various links on this page.

1. The [Bald and Golden Eagle Protection Act](#) of 1940.

2. The [Migratory Birds Treaty Act](#) of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are Bald Eagles and/or Golden Eagles in your [project](#) area.

Measures for Proactively Minimizing Eagle Impacts

For information on how to best avoid and minimize disturbance to nesting bald eagles, please review the [National Bald Eagle Management Guidelines](#). You may employ the timing and activity-specific distance recommendations in this document when designing your project/activity to avoid and minimize eagle impacts. For bald eagle information specific to Alaska, please refer to [Bald Eagle Nesting and Sensitivity to Human Activity](#).

The FWS does not currently have guidelines for avoiding and minimizing disturbance to nesting Golden Eagles. For site-specific recommendations regarding nesting Golden Eagles, please consult with the appropriate Regional [Migratory Bird Office](#) or [Ecological Services Field Office](#).

If disturbance or take of eagles cannot be avoided, an [incidental take permit](#) may be available to authorize any take that results from, but is not the purpose of, an otherwise lawful activity. For assistance making this determination for Bald Eagles, visit the [Do I Need A Permit Tool](#). For assistance making this determination for golden eagles, please consult with the appropriate Regional [Migratory Bird Office](#) or [Ecological Services Field Office](#).

Ensure Your Eagle List is Accurate and Complete

If your project area is in a poorly surveyed area in IPaC, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the [Supplemental Information on Migratory Birds and Eagles](#), to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to bald or golden eagles on your list, see the "Probability of Presence Summary" below to see when these bald or golden eagles are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read ["Supplemental Information on Migratory Birds and Eagles"](#), specifically the FAQ section titled "Proper

Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

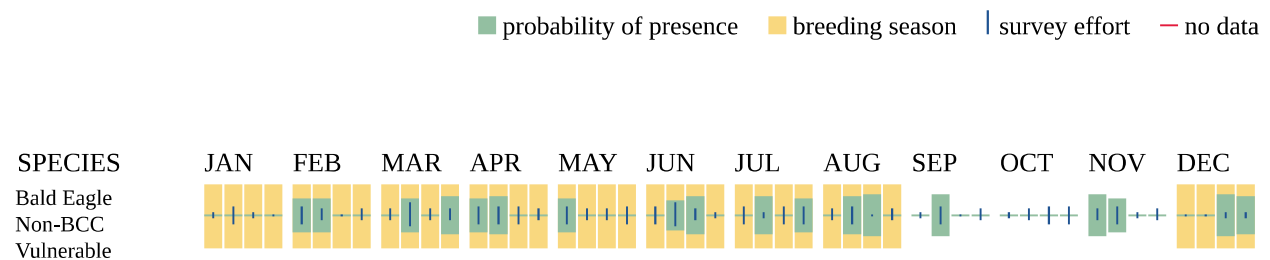
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide avoidance and minimization measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

MIGRATORY BIRDS

The Migratory Bird Treaty Act (MBTA) ¹ prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9643	Breeds May 20 to Aug 10
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Evening Grosbeak <i>Coccothraustes vespertinus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9465	Breeds May 15 to Aug 10
Golden-winged Warbler <i>Vermivora chrysoptera</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
Veery <i>Catharus fuscescens fuscescens</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/11987	Breeds May 15 to Jul 15
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read ["Supplemental Information on Migratory Birds and Eagles"](#), specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

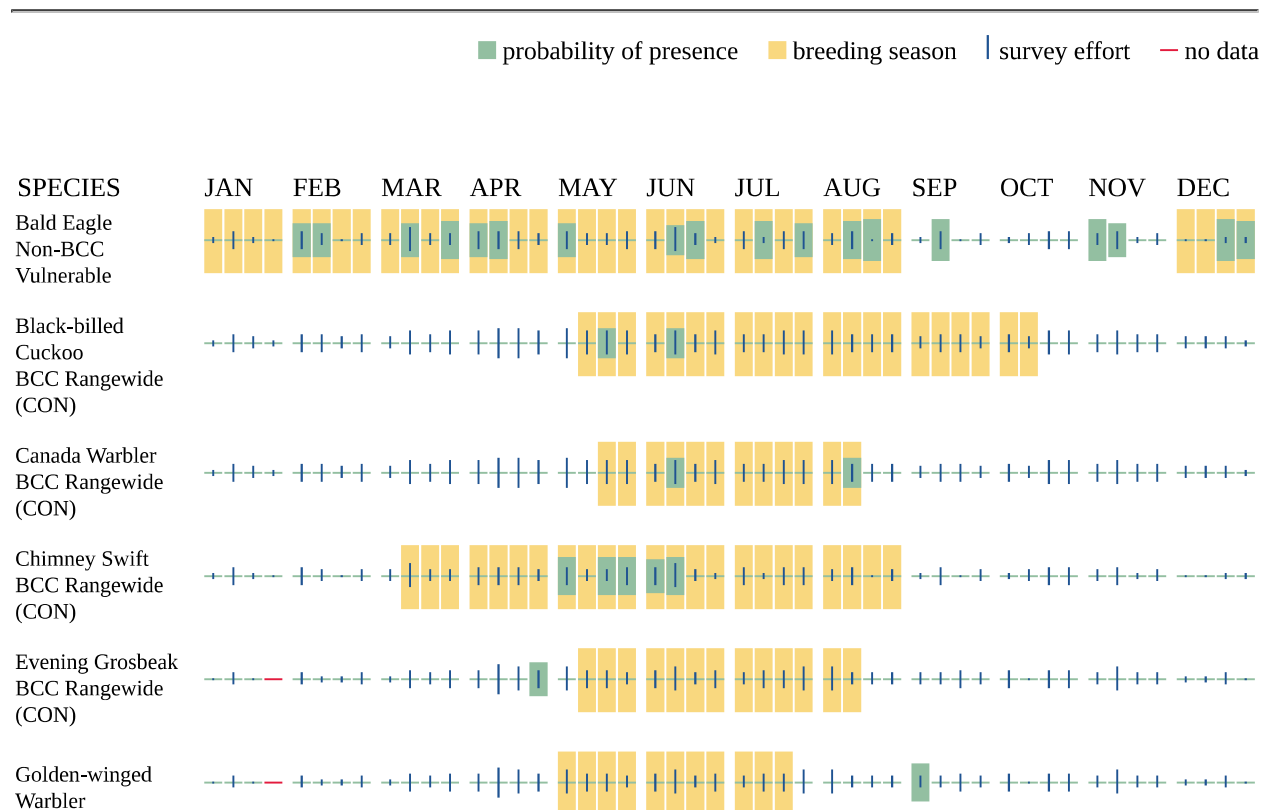
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (-)

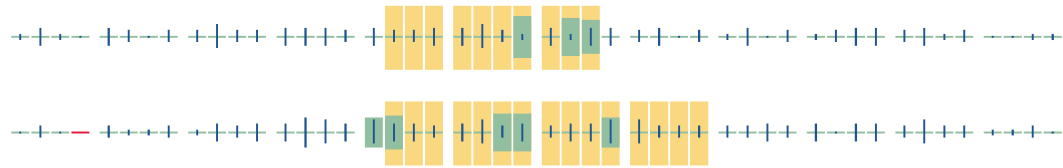
A week is marked as having no data if there were no survey events for that week.



BCC Rangewide
(CON)

Veery
BCC - BCR

Wood Thrush
BCC Rangewide
(CON)



Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

WETLANDS

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER EMERGENT WETLAND

- PEM1Cx
- PEM1C
- PEM1Fh

FRESHWATER FORESTED/SHRUB WETLAND

- PFO1B
- PFO1C
- PSS1Cd
- PSS1C
- PFO1Cd
- PSS3B
- PSS1/3B

- PSS1/EM1C

RIVERINE

- R5UBFx
- R4SBC
- R5UBH

FRESHWATER POND

- PUBG
- PUBGx
- PUBK

LAKE

- L1UBH

IPAC USER CONTACT INFORMATION

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City: Cadillac
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Zip: 49601
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Appendix K: Michigan Natural Features Inventory Documentation

Eric Seguin
Prein & Newhof
100 E. Chapin Street.
Suite A
Cadillac, MI 49601

December 15, 2025

Re: Rare Species Review #5716 – City of Cadillac - EC-SDC Project

Hello:

The location for the proposed project was checked against known localities for rare species and unique natural features, which are recorded in the Michigan Natural Features Inventory (MNFI) natural heritage database. This continuously updated database is a comprehensive source of existing data on Michigan's endangered, threatened, or otherwise significant plant and animal species, natural plant communities, and other natural features. Records in the database indicate that a qualified observer has documented the presence of special natural features. The absence of records in the database for a particular site may mean that the site has not been surveyed. The only way to obtain a definitive statement on the status of natural features is to have a competent biologist perform a complete field survey.

Under Act 451 of 1994, the Natural Resources and Environmental Protection Act, Part 365, Endangered Species Protection, “a person shall not take, possess, transport, ...fish, plants, and wildlife indigenous to the state and determined to be endangered or threatened,” unless first receiving an Endangered Species Permit from the Michigan Department of Natural Resources (MDNR), Wildlife Division. Responsibility to protect endangered and threatened species is not limited to the lists below. Other species may be present that have not been recorded in the database.



MSU EXTENSION

**Michigan Natural
Features Inventory**

PO Box 13036
Lansing MI 48901

(517) 284-6200
Fax (517) 373-9566

mnfi.anr.msu.edu

Several at-risk species and/or natural communities have been documented within 1.5 miles of the project location and it is possible that adverse impacts will occur. This response reflects a desktop review of the database and MNFI cannot fully evaluate this project without visiting the area. MNFI offers several levels of [Rare Species Reviews](#), including field surveys which I would be happy to discuss with you.

Sincerely,

Nicolette Sexton

Nicolette Sexton
Environmental Review Assistant
Michigan Natural Features Inventory

Comments for Rare Species Review #5716

It is important to note that it is the applicant's responsibility to comply with both state and federal threatened and endangered species legislation. Therefore, if a state listed species occurs at a project site, and you think you need an endangered species permit, please contact Amy Bleisch at DNR-Wildlife Division, DNR-StateTEPermit@michigan.gov and review details on the [MDNR's Threatened/Endangered Species](#) resource page. If a federally listed species is involved and, you think a permit is needed, please contact Jessica Pruden, U.S. Fish and Wildlife Service, East Lansing office, 517-351-8316, or Jessica.Pruden@fws.gov.

NOTE: Special concern species and natural communities are not protected under endangered species legislation, but efforts should be taken to minimize any or all impacts. Please consult MNFI's [Rare Species pages](#) for additional information on Michigan's rare plants and animals.

Table 1: Occurrences of Threatened & Endangered Species within 1.5 miles of Project Site

Element Category	Scientific Name	Common Name	Federal Status	State Status	G Rank	S Rank	EO Rank	First Observed Date	Last Observed Date
Animal	<i>Bombus affinis</i>	Rusty-patched bumble bee	LE	E	G2	SH	H	1960-08-22	1960-08-22
Animal	<i>Gavia immer</i>	Common loon		T	G5	S3	E	2000	2000

Comments for Table 1

The rusty-patched bumble bee EO is historical and not of concern, however impacts are possible for the common loon EO. See species comments below:

Species Comments for Table 1

Common loon (*Gavia immer*)

Habitat

Typically, Common loons nest in sheltered islands on large, undeveloped inland lakes, although they may nest in lakes as small as 11 acres (4.5 hectares). Preferred nest sites are on small islands or bog mats, at the water's edge. Nursery areas - quiet, shallow, sheltered coves - are important for rearing chicks. A common loon nest has been recently observed on Lake Cadillac, which is adjacent to portions of the project area.

Management Recommendations

Loons are sensitive to human disturbance during the breeding season. Minimize maintenance activities within 1/4 mile of active nests during the breeding season. Nursery areas may be vulnerable also. Schedule construction, maintenance, or habitat management activities during the non-breeding season, from September through February. Application of herbicide to control aquatic vegetation should only be conducted outside the nesting season on lakes where loons nest, particularly on small lakes.

For more information, see the [Gavia immer](#) species page on the MNFI website.

Table 2: Occurrences of Special Concern Species and Natural Communities within 1.5 miles of Project Site

Element Category	Scientific Name	Common Name	Federal Status	State Status	G Rank	S Rank	EO Rank	First Observed Date	Last Observed Date
Animal	<i>Emydoidea blandingii</i>	Blanding's turtle		SC	G4	S2S3	E	1995	2024-09-06
Animal	<i>Emydoidea blandingii</i>	Blanding's turtle		SC	G4	S2S3	AC	2002-05-22	2021-06-12
Animal	<i>Haliaeetus leucocephalus</i>	Bald eagle		SC	G5	S4	E	2014	2019
Animal	<i>Pandion haliaetus</i>	Osprey		SC	G5	S4	E	1989	2019
Community	<i>Bog</i>				G3G5	S4	AB	1987	1987-09

Comments for Table 2

The Osprey EO is far removed from the project area and not of concern, however impacts are possible for the Blanding’s turtle and Bald Eagle EO’s. See species comments below:

Species Comments for Table 2

Bald eagle (*Haliaeetus leucocephalus*)

Habitat

Bald eagles will nest in a wide variety of habitats that provide suitable nest sites close to open water. Nests may be placed in snags or large live trees as well as on constructed platforms or utility poles. They are resident (stay year round) as long as there is open water where they can forage. A Bald Eagle nest has recently been observed within 0.25 mile of the southwest corner of the project area.

Management Recommendations

Bald eagles are extremely sensitive to human activity during the first 12 weeks of the breeding season. Maintain a quarter mile buffer zone around the nest from mid-March through the end of June. Schedule maintenance and construction activities within the buffer zone to occur between August and February.

For more information, see the [Haliaeetus leucocephalus](#) species page on the MNFI website.

Blanding's turtle (*Emydoidea blandingii*)

Habitat

Blanding’s Turtles inhabit clean, shallow waters with abundant aquatic vegetation and soft muddy bottoms over firm substrates. This species is found in ponds, marshes, swamps, bogs, wet prairies, river

backwaters, embayments, sloughs, slow-moving rivers, and lake shallows and inlets. Blanding's Turtles also occupy terrestrial habitats in the spring and summer during the mating and nesting seasons and in the fall to a lesser extent. Females nest in open uplands adjacent to wetland habitats, preferring sunny areas with moist but well-drained sandy or loamy soil. They will nest in lawns, gardens, plowed fields or even gravel road embankments if suitable natural nesting habitat is not available. Two extant EO's have been observed within the portion of the project area along North Blvd. and within the 1.5-mile buffer both north and south of the project area.

Management Recommendations

The most critical conservation need for this species is protection and management of suitable wetland and adjacent upland habitats. Maintaining good water quality, restricting herbicide and pesticide use in or near wetlands, implementing minimum development set-back distances, leaving buffer zones during timber harvest, grazing and agricultural operations, and minimizing the construction of roads in or near suitable wetlands would be beneficial to this species. Timber harvesting can benefit this species by creating or maintaining open habitat conditions for thermoregulation and nesting. Minimizing adult mortality or removal is crucial for population viability given this species' life history. Thus, habitat management activities should be conducted in such a manner so as to minimize the potential for causing take of adults (e.g., timber harvesting during the inactive season). Minimizing road mortality and illegal collection also would be beneficial to this species. In some cases, on-site protection of nest sites and predator control may be necessary to facilitate or increase successful reproduction or population recruitment.

For more information, see the [*Emydoidea blandingii*](#) species page on the MNFI website.

Natural Communities

Be aware that a bog natural community is located near the project site. While not legally protected, natural communities harbor rare species that may not be documented in the database. For more information see:

[Bog \(msu.edu\)](#)

Codes to accompany table

State Protection Status Code Definitions

E = Endangered

T = Threatened

SC = Special concern

Federal Protection Status Code Definitions

LE = listed endangered

LT = listed threatened

LELT = partly listed endangered and partly listed threatened

PDL = proposed delist

E(S/A) = endangered based on similarities/appearance

PS = partial status (federally listed in only part of its range)

C = species being considered for federal status

Global Heritage Status Rank Definitions (G RANK)

The priority assigned by [NatureServe](#)'s national office for data collection and protection based upon the element's status throughout its entire world-wide range. Criteria not based only on number of occurrences; other critical factors also apply. Note that ranks are frequently combined.

G1 = critically imperiled globally because of extreme rarity (5 or fewer occurrences range-wide or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.

G2 = imperiled globally because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.

G3 = Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g. a single western state, a physiographic region in the East) or because of other factor(s) making it vulnerable to extinction throughout its range; in terms of occurrences, in the range of 21 to 100.

G4 = Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.

G5 = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

Q = Taxonomy uncertain

State Heritage Status Rank Definitions (S RANK)

The priority assigned by the Michigan Natural Features Inventory for data collection and protection based upon the element's status within the state. Criteria not based only on number of occurrences; other critical factors also apply. Note that ranks are frequently combined.

S1 = Critically imperiled in the state because of extreme rarity (5 or fewer occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extirpation in the state.

S2 = Imperiled in state because of rarity (6 to 20 occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extirpation from the state.

S3 = Rare or uncommon in state (on the order of 21 to 100 occurrences). S4 = apparently secure in state, with many occurrences.

S5 = demonstrably secure in state and essentially ineradicable under present conditions.

SX = apparently extirpated from state.

EO Rank Codes

Element Occurrence (EO) ranks refer to the viability or ecological integrity of the occurrence; they provide an assessment of the likelihood that if current conditions prevail the EO will persist for a defined period of time, typically 20-100 years.

- A - Excellent estimated viability/ecological integrity
- A? - Possibly excellent estimated viability/ecological integrity
- AB - Excellent or good estimated viability/ecological integrity
- AC - Excellent, good, or fair estimated viability/ecological integrity
- B - Good estimated viability/ecological integrity
- B? - Possibly good estimated viability/ecological integrity
- BC - Good or fair estimated viability/ecological integrity
- BD - Good, fair, or poor estimated viability/ecological integrity
- C - Fair estimated viability/ecological integrity
- C? - Possibly fair estimated viability/ecological integrity
- CD - Fair or poor estimated viability/ecological integrity
- D - Poor estimated viability/ecological integrity
- D? - Possibly poor estimated viability/ecological integrity
- E - Verified extant (viability/ecological integrity not assessed)
- F - Failed to find
- F? - Possibly failed to find
- H - Historical
- H? - Possibly historical
- X - Extirpated
- X? - Possibly extirpated
- U - Unrankable
- NR - Not ranked

Appendix L: Water System Reliability Study (WSRS)

Water Supply and Storage

City of Cadillac
 Water System Reliability Study

Table 4 – Well Data

Well Name	Well Field	Rated Capacity (gpm)	Rated Capacity (mgd)	Pressure (psi)
Well 8	Crosby	1,020	1.47	58
Well 9	Crosby	1,020	1.47	58
Well 10	Crosby	1,020	1.47	58
Well 11	44 Road	1,019	1.47	99
Well 12	44 Road	1,019	1.47	99
Well 13	44 Road	1,019	1.47	99
Total Supply Capacity		6,117	8.81	
Firm Supply Capacity		5,097	7.34	

City of Cadillac
Water System Reliability Study

Table 5 - Storage Tank Data

<i>Location</i>	<i>East North Street</i>
Volume (MG)	1.0
Type	Multi-Legged Elevated
Material	Steel
Overflow Elev. (ft)	1,518
Date Constructed	1961
Total Head Range (feet)	30
High Water Level	27.5
Low Water Level	21.5
Last Inspection	2016

City of Cadillac
Water System Reliability Study

Table 6 – System Wide Storage Analysis

Year	Firm Pump Capacity (gpm)	Maximum Day Demand (gpm)	Peak Hour Demand (gpm)	Fire-Flow Required (gpm)	Duration (hours)	Water Supplied (gallons)	Customer Demand (gallons)	Needed Fire Storage (gallons)	Needed Storage Vol. (gallons)	Storage Volume Provided (gallons)	Recommended Storage Volume (gallons)
2024	5,097	2,528	5,056	1,500	2	611,640	455,000	180,000	23,000	1,000,000	0
2024	5,097	2,528	5,056	2,500	2	611,640	455,000	300,000	143,000	1,000,000	0
2024	5,097	2,528	5,056	3,000	3	917,460	607,000	540,000	230,000	1,000,000	0
2024	5,097	2,528	5,056	3,500	3	917,460	607,000	630,000	320,000	1,000,000	0
2029	5,097	2,538	5,075	1,500	2	611,640	457,000	180,000	25,000	1,000,000	0
2029	5,097	2,538	5,075	2,500	2	611,640	457,000	300,000	145,000	1,000,000	0
2029	5,097	2,538	5,075	3,000	3	917,460	609,000	540,000	232,000	1,000,000	0
2029	5,097	2,538	5,075	3,500	3	917,460	609,000	630,000	322,000	1,000,000	0
2044	5,097	2,566	5,133	1,500	2	611,640	462,000	180,000	30,000	1,000,000	0
2044	5,097	2,566	5,133	2,500	2	611,640	462,000	300,000	150,000	1,000,000	0
2044	5,097	2,566	5,133	3,000	3	917,460	616,000	540,000	239,000	1,000,000	0
2044	5,097	2,566	5,133	3,500	3	917,460	616,000	630,000	329,000	1,000,000	0

- Notes:
1. Storage Methodology based on maximum day demand with 1 hour of peak hour demand for the duration, and fire flow for the entire duration.
 2. Fire demand and duration based on Table 1-1 of AWWA M-31 Manual.
 3. Firm Supply Capacity based on the 5 of 6 pumps operating.
 4. Recommended Storage Volume calculation is zero due to adequate supply from multiple wells.
 5. Customer Demand Volume based on 1 hour of peak demand and maximum day demands for the remaining duration.
 6. Emergency Storage based on Fire Flow Demand over the duration.
 7. Example Calculation (Year 2044; 3,500 gpm for 3 hours):
 Water Supplied = 5,097 gpm x (60 min x 3 hours) = 917,460 gallons
 Customer Demand = Max Day Demand x 2 hrs x 60 min + Peak Hour Demand x 1 hr x 60 min = 5,566 gpm x 2 hrs x 60 min + 5,133 gpm x 1 hr x 60 min = 616,000 gal.
 Needed Fire Storage = Fire-Flow Required x Duration = 3,500 gpm x 3 hrs x 60 min = 630,000 gallons
 Needed Storage Volume = Customer Demand + Needed Fire Storage – Water Supplied = 616,000 gal. + 630,000 gal. – 917,460 gal. = 329,000 gal.
 Recommended Storage Volume = Needed Storage Volume – Storage Volume Provided = 329,000-1,000,000=0

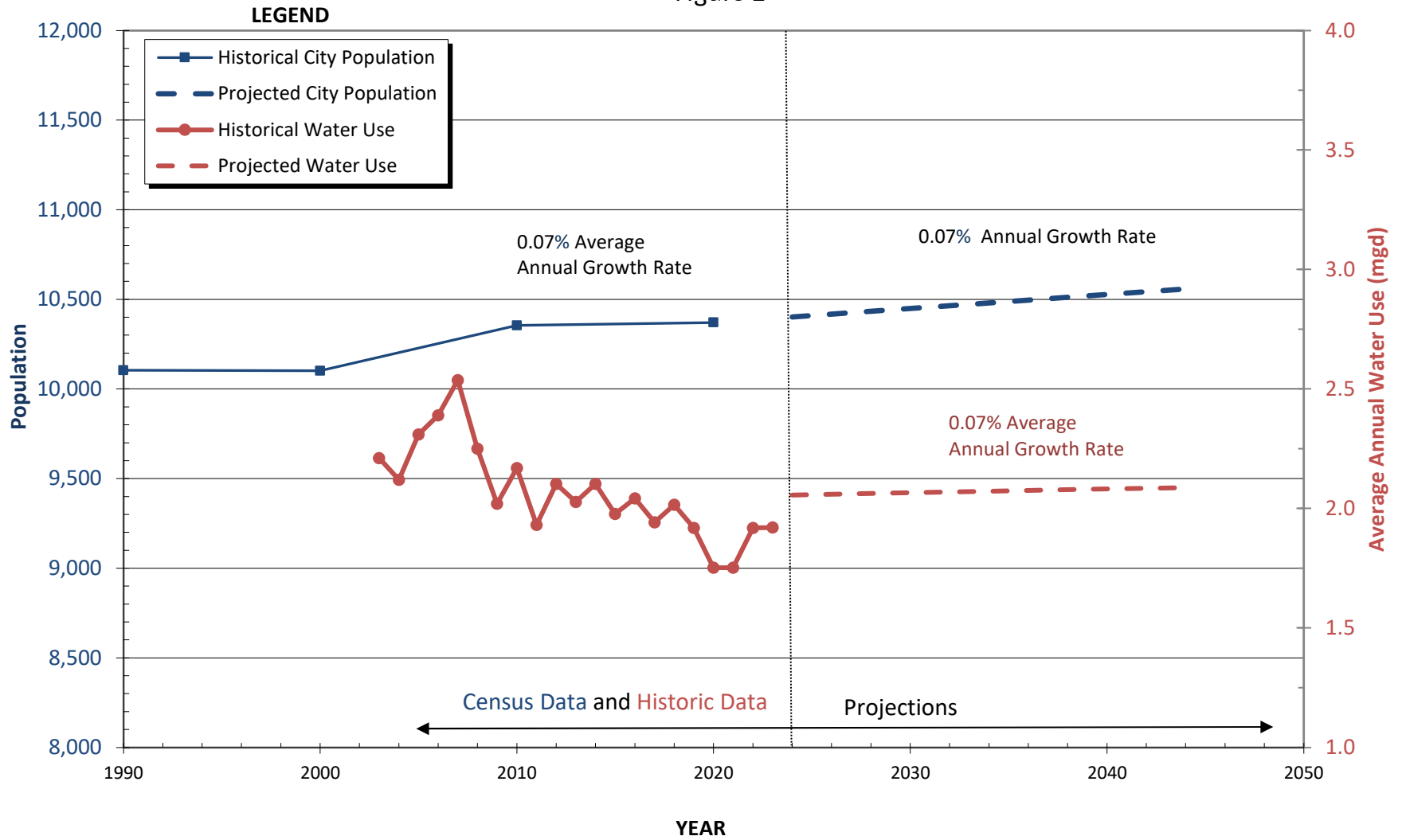
Appendix M: Water System Reliability Study (WSRS)

Population and Demand Projections

City of Cadillac Water System Reliability Study

Population and Water Use Projections

Figure 2

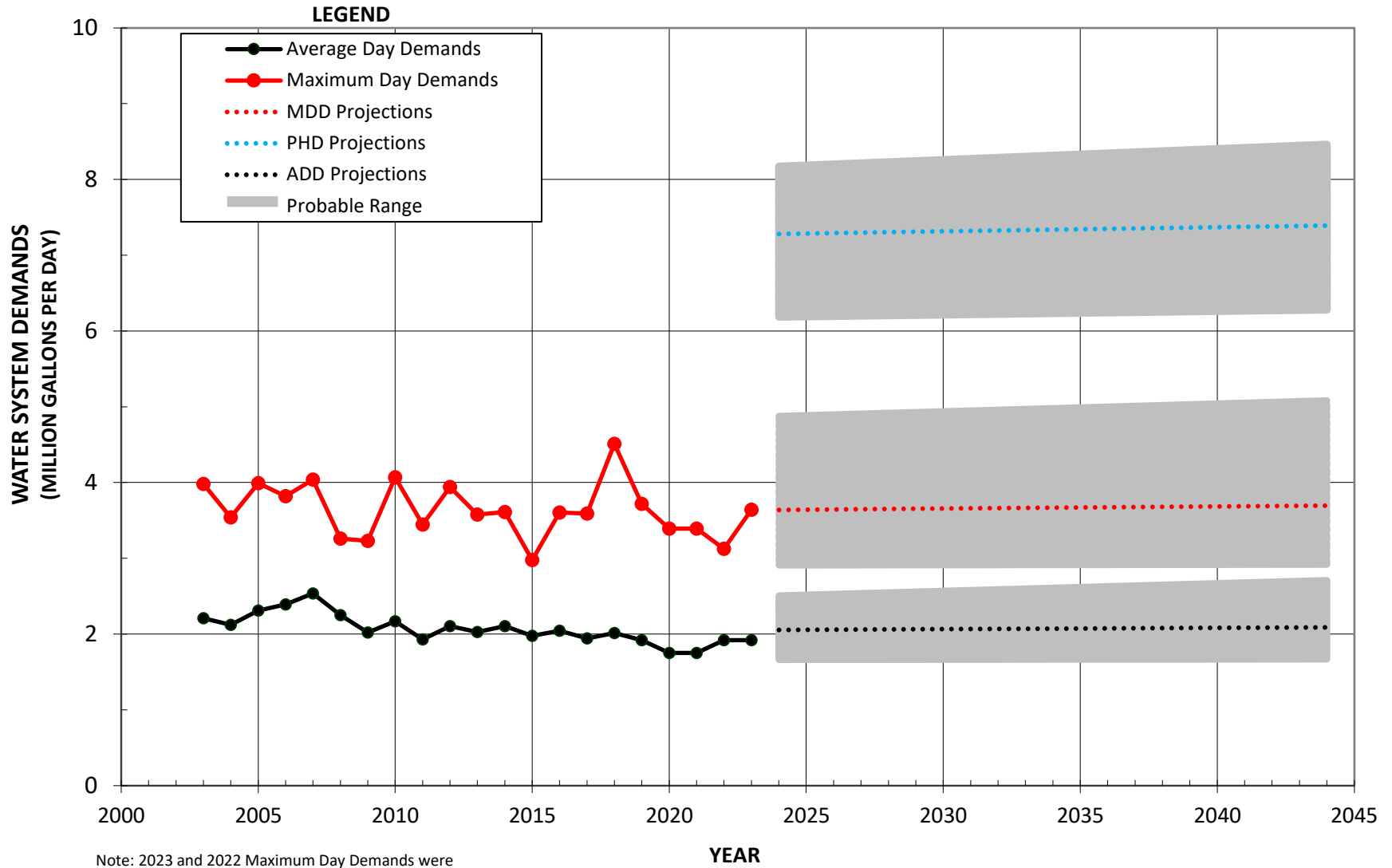


Note: Projected population based on historic growth trend from 1970 to 2020.

City of Cadillac Water System Reliability Study

Historical and Projected Water System Demands

Figure 3



Appendix N: Present Worth Calculations

	<u>Project 1</u>	<u>Project 2</u>	<u>Project 3</u>	<u>Project 4</u>	<u>Project 5</u>
Project Name/Description	<i>Seneca Place and Mary Street Water Main Extension</i>	<i>Division/Marathon Street Water Main Extension</i>	<i>Indiana/Pennsylvania/Illinois Street Water Main Extension</i>	<i>Crosby/Paluster/Cobb Street Water Main Extension</i>	<i>Citywide Well Abandonments / Municipal Connections</i>
SRF Eligible Capital Costs (including ELAC)					
Pipelines (50 yr)	\$506,943	\$688,074	\$221,613	\$1,663,200	\$909,890
Ancillary Items (10 yr)	\$13,111	\$15,308	\$1,531	\$16,292	\$1,995
Road Surface Improvements (15 yr)	\$39,075	\$160,755	\$61,235	\$290,838	\$290,754
Incidental Construction Costs	\$100,772	\$81,914	\$53,945	\$290,345	\$592,911
Engineering, Legal, Administrative, and Contingency	\$240,100	\$353,950	\$121,675	\$839,325	\$704,450
Project Cost (SRF Eligible)	\$900,000	\$1,300,000	\$460,000	\$3,100,000	\$2,500,000
(A) 40-yr Present Worth of Capital Costs ¹	\$571,123	\$824,956	\$291,907	\$1,967,202	\$1,586,453
Operation, Maintenance & Replacement (OM&R)					
Energy Cost Savings					
Annual O&M ² - <i>Not included/negligible</i>					
Ancillary Items Replacement (10 yr)	\$16,458	\$19,216	\$1,922	\$20,452	\$2,505
Road Surface Replacement (15 yr)	\$54,958	\$226,100	\$86,126	\$409,059	\$408,941
(B) 40-yr Present Worth of OM&R ¹	\$49,519	\$172,949	\$62,455	\$303,816	\$292,344
(C) 40-yr Present Worth of Energy Cost Savings ³	\$0	\$0	\$0	\$0	\$0
Salvage Value of Capital					
Salvage value at 40 years	\$75,339	\$30,445	\$3,499	\$138,748	-\$11,858
(D) 40-yr Present Worth of Salvage ¹	\$30,338	\$12,260	\$1,409	\$55,873	-\$4,775
Total Present Worth (A + B + C - D)	\$590,303	\$985,645	\$352,953	\$2,215,146	\$1,883,572
Equivalent Annual Cost ⁴	\$24,516	\$40,935	\$14,659	\$91,998	\$78,228
Total Existing Residential Equivalent Units (REUs)					
City of Cadillac REUs:	8,000	8,000	8,000	8,000	8,000
Unit of Government Responsible for Payment for:	Project 1	Project 2	Project 3	Project 4	Project 5
City of Cadillac	100.00%	100.00%	100.00%	100.00%	100.00%
City of Cadillac Annual Cost per REU	\$3.06	\$5.12	\$1.83	\$11.50	\$9.78
City of Cadillac Monthly Cost per REU	\$0.26	\$0.43	\$0.15	\$0.96	\$0.81
Total Proposed Project Cost	\$8,260,000				
Total Present Worth - FY2027:	\$5,241,642				
Total Equivalent Annual Cost FY2027 ⁴:	\$250,336				
Total Equivalent Monthly Cost per REU FY2027:	\$2.61				
Useful Life Calculation:	46.6	42.8	42.2	44.5	41.5

Notes:

- ¹ OMB Circular A-94, Appendix C discount rate: 2.300%
- ² Negative value indicates reduction in Annual O&M
- ³ Assumed energy cost rate of escalation is 3.75%
- ⁴ Based on Total Present Worth and interest rate of 2.75% 2.75%

Appendix O: Project Cost Estimates

Project No. 1
Seneca Place and Mary Street Water Main Extension

City of Cadillac and Haring Township

Item	Total Qty	Unit	Unit Price	Total Ext Price
Mobilization and Maintaining Traffic, Max. \$60,000	1	LSUM	\$	60,000.00 \$ 60,000.00
Maintenance Gravel, LM	50	Cyd	\$	50.00 \$ 2,500.00
Post, Mailbox	30	Ea	\$	175.00 \$ 5,250.00
HMA Surface, Rem	300	Syd	\$	25.00 \$ 7,500.00
Slope Restoration	4000	Syd	\$	6.00 \$ 24,000.00
Hand Patching	30	Ton	\$	250.00 \$ 7,500.00
Fire Hydrant Assembly	6	Ea	\$	8,500.00 \$ 51,000.00
Water Main, DI CI 52, 8 inch, Tr Det G	1950	Ft	\$	95.00 \$ 185,250.00
Water Main, Tee, 8 inch	1	Ea	\$	1,200.00 \$ 1,200.00
Water Main, Sleeve, 8 inch	1	Ea	\$	900.00 \$ 900.00
Water Main, Foster Adaptor, 8 inch	3	Ea	\$	700.00 \$ 2,100.00
Water Service, Copper Type K, 3/4 inch	4400	Ft	\$	43.00 \$ 189,200.00
Water Service, Corporation Stop, 3/4 inch	38	Ea	\$	300.00 \$ 11,400.00
Water Service, Curb Stop and Box, 3/4 inch	38	Ea	\$	450.00 \$ 17,100.00
House Connections and meters	38	Ea	\$	1,500.00 \$ 57,000.00
Abandon Well	38	Ea	\$	1,000.00 \$ 38,000.00
Subtotal				\$ 659,900.00
35% Engineering/Legal/Administrative/Contingency				\$ 240,100.00
Estimated Total				\$ 900,000.00

Printed:
June 15, 2026

Project No. 2
Division/Marathon Street Water Main Extension

City of Cadillac

Item	Qty	Unit	Unit Price	Ext Price
Mobilization and Maintaining Traffic, Max. \$80,000	1	LSUM	\$	80,000.00 \$ 80,000.00
Maintenance Gravel, LM	250	Cyd	\$	50.00 \$ 12,500.00
Post, Mailbox	14	Ea	\$	175.00 \$ 2,450.00
HMA Surface, Rem	4550	Syd	\$	25.00 \$ 113,750.00
Abandon Well	23	Ea	\$	1,500.00 \$ 34,500.00
Fire Hydrant Assembly	5	Ea	\$	8,500.00 \$ 42,500.00
Water Main, DI CI 52, 6 inch, Tr Det G	2800	Ft	\$	95.00 \$ 266,000.00
Water Main, Tee, 12 inch x 6 inch	3	Ea	\$	2,300.00 \$ 6,900.00
Water Main, El, 45 deg Bend, 6 inch	2	Ea	\$	800.00 \$ 1,600.00
Water Main, Sleeve, 12 inch	6	Ea	\$	1,500.00 \$ 9,000.00
Water Service, Copper Type K, 3/4 inch	1400	Ft	\$	50.00 \$ 70,000.00
Water Service, Corporation Stop, 3/4 inch	23	Ea	\$	300.00 \$ 6,900.00
Water Service, Curb Stop and Box, 3/4 inch	23	Ea	\$	450.00 \$ 10,350.00
House Connections and meters	23	Ea	\$	1,500.00 \$ 34,500.00
Hand Patching	50	Ton	\$	250.00 \$ 12,500.00
Subbase, CIP	2000	Cyd	\$	15.00 \$ 30,000.00
Curb and Gutter, Conc, Det F4	150	Ft	\$	50.00 \$ 7,500.00
Aggregate Surface Cse, 6 inch	3400	Syd	\$	14.00 \$ 47,600.00
Aggregate Base, 6 inch	4500	Syd	\$	13.00 \$ 58,500.00
HMA, 4EL	750	Ton	\$	100.00 \$ 75,000.00
Slope Restoration	4000	Syd	\$	6.00 \$ 24,000.00
Subtotal				\$ 946,050.00
35% Engineering/Legal/Administrative/Contingency				\$ 353,950.00
Estimated Total				\$ 1,300,000.00

Printed:
June 15, 2026

Project No. 3
Indiana/Pennsylvania/Illinois Street Water Main Extension

City of Cadillac

Item	Qty	Unit	Unit Price	Ext Price
Mobilization and Maintaining Traffic, Max. \$30,000	1	LSUM	\$	30,000.00 \$ 30,000.00
Maintenance Gravel, LM	250	Cyd	\$	50.00 \$ 12,500.00
Post, Mailbox	9	Ea	\$	175.00 \$ 1,575.00
Abandon Well	9	Ea	\$	1,500.00 \$ 13,500.00
Fire Hydrant Assembly	3	Ea	\$	8,500.00 \$ 25,500.00
Water Main, DI Cl 52, 6 inch, Tr Det G	1150	Ft	\$	90.00 \$ 103,500.00
Water Main, Tee, 6 inch	1	Ea	\$	1,500.00 \$ 1,500.00
Water Main, El, 45 deg Bend, 6 inch	4	Ea	\$	800.00 \$ 3,200.00
Water Main, Sleeve, 6 inch	2	Ea	\$	1,000.00 \$ 2,000.00
Water Service, Copper Type K, 3/4 inch	1000	Ft	\$	50.00 \$ 50,000.00
Water Service, Corporation Stop, 3/4 inch	9	Ea	\$	300.00 \$ 2,700.00
Water Service, Curb Stop and Box, 3/4 inch	9	Ea	\$	450.00 \$ 4,050.00
House Connections and meters	9	Ea	\$	1,500.00 \$ 13,500.00
Subbase, CIP	1500	Cyd	\$	15.00 \$ 22,500.00
Aggregate Surface Cse, 6 inch	3100	Syd	\$	13.00 \$ 40,300.00
Slope Restoration	2000	Syd	\$	6.00 \$ 12,000.00
Subtotal				\$ 338,325.00
35% Engineering/Legal/Administrative/Contingency				\$ 121,675.00
Estimated Total				\$ 460,000.00

Printed:
June 15, 2026

Project No. 4
Crosby/Paluster/Cobb Street Water Main Extension

City of Cadillac

Item	Qty	Unit	Unit Price	Ext Price
Mobilization and Maintaining Traffic, Max. \$200,000	1	LSUM	\$	200,000.00 \$ 200,000.00
Maintenance Gravel, LM	250	Cyd	\$	50.00 \$ 12,500.00
Post, Mailbox	23	Ea	\$	175.00 \$ 4,025.00
HMA Surface, Rem	15500	Syd	\$	25.00 \$ 387,500.00
Abandon Well	23	Ea	\$	1,500.00 \$ 34,500.00
Fire Hydrant Assembly	10	Ea	\$	8,500.00 \$ 85,000.00
Water Main, DI Cl 52, 6 inch, Tr Det G	1200	Ft	\$	90.00 \$ 108,000.00
Water Main, DI Cl 52, 12 inch, Tr Det G	2800	Ft	\$	105.00 \$ 294,000.00
Water Main, DI Cl 52, 16 inch, Tr Det G	2400	Ft	\$	125.00 \$ 300,000.00
Water Main, Tee, 16 inch x 12 inch	1	Ea	\$	3,000.00 \$ 3,000.00
Water Main, Tee, 16 inch x 6 inch	1	Ea	\$	2,500.00 \$ 2,500.00
Water Main, Tee, 12 inch x 6 inch	1	Ea	\$	2,300.00 \$ 2,300.00
Water Main, El, 45 deg Bend, 6 inch	2	Ea	\$	800.00 \$ 1,600.00
Water Main, Sleeve, 12 inch	2	Ea	\$	1,500.00 \$ 3,000.00
Water Main, Sleeve, 16 inch	1	Ea	\$	2,000.00 \$ 2,000.00
Water Service, Copper Type K, 3/4 inch	2300	Ft	\$	50.00 \$ 115,000.00
Water Service, Corporation Stop, 3/4 inch	23	Ea	\$	300.00 \$ 6,900.00
Water Service, Curb Stop and Box, 3/4 inch	23	Ea	\$	450.00 \$ 10,350.00
House Connections and meters	23	Ea	\$	1,500.00 \$ 34,500.00
Hand Patching	50	Ton	\$	250.00 \$ 12,500.00
Subbase, CIP	7000	Cyd	\$	15.00 \$ 105,000.00
Curb and Gutter, Conc, Det F4	300	Ft	\$	50.00 \$ 15,000.00
Aggregate Base, 6 inch	15500	Syd	\$	13.00 \$ 201,500.00
HMA, 4EL	2600	Ton	\$	100.00 \$ 260,000.00
Slope Restoration	10000	Syd	\$	6.00 \$ 60,000.00
Subtotal				\$ 2,260,675.00
35% Engineering/Legal/Administrative/Contingency				\$ 839,325.00
Estimated Total				\$ 3,100,000.00

Printed:
June 15, 2026

Project No. 5
Citywide Well Abandonments / Municipal Connections

City of Cadillac

Item	Qty	Unit	Unit Price	Ext Price
Mobilization and Maintaining Traffic, Max. \$200,000	1	LSUM	\$	200,000.00 \$ 200,000.00
Maintenance Gravel, LM	250	Cyd	\$	50.00 \$ 12,500.00
Easement for Long Service	8	Ea	\$	20,000.00 \$ 160,000.00
Post, Mailbox	10	Ea	\$	175.00 \$ 1,750.00
Abandon Well	160	Ea	\$	2,000.00 \$ 320,000.00
Water Service, Copper Type K, 3/4 inch	8800	Ft	\$	50.00 \$ 440,000.00
Water Service, Corporation Stop, 3/4 inch	170	Ea	\$	300.00 \$ 51,000.00
Water Service, Curb Stop and Box, 3/4 inch	170	Ea	\$	450.00 \$ 76,500.00
House Connections and meters	170	Ea	\$	1,500.00 \$ 255,000.00
Hand Patching	800	Ton	\$	250.00 \$ 200,000.00
Subbase, CIP	800	Cyd	\$	15.00 \$ 12,000.00
Curb and Gutter, Conc, Det F4	500	Ft	\$	50.00 \$ 25,000.00
Aggregate Base, 6 inch	1600	Syd	\$	13.00 \$ 20,800.00
Slope Restoration	3500	Syd	\$	6.00 \$ 21,000.00
Subtotal				\$ 1,795,550.00
35% Engineering/Legal/Administrative/Contingency				\$ 704,450.00
Estimated Total				\$ 2,500,000.00

Printed:
June 15, 2026

Appendix P: Public Meeting Advertisement

Appendix Q: Public Meeting Summary

Appendix R: Resolution to Adopt