

**Notice:** Use this form to request a **written response (on agency letterhead)** from the Department of Natural Resources (DNR) regarding technical assistance, a post-closure change to a site, a specialized agreement or liability clarification for Property with known or suspected environmental contamination. A fee will be required as is authorized by s. 292.55, Wis. Stats., and NR 749, Wis. Adm. Code., unless noted in the instructions below. Personal information collected will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Open Records law [ss. 19.31 - 19.39, Wis. Stats.].

### Definitions

**"Property"** refers to the subject Property that is perceived to have been or has been impacted by the discharge of hazardous substances.

**"Liability Clarification"** refers to a written determination by the Department provided in response to a request made on this form. The response clarifies whether a person is or may become liable for the environmental contamination of a Property, as provided in s. 292.55, Wis. Stats.

**"Technical Assistance"** refers to the Department's assistance or comments on the planning and implementation of an environmental investigation or environmental cleanup on a Property in response to a request made on this form as provided in s. 292.55, Wis. Stats.

**"Post-closure modification"** refers to changes to Property boundaries and/or continuing obligations for Properties or sites that received closure letters for which continuing obligations have been applied or where contamination remains. Many, but not all, of these sites are included on the GIS Registry layer of RR Sites Map to provide public notice of residual contamination and continuing obligations.

### Select the Correct Form

This form should be used to request the following from the DNR:

- Technical Assistance
- Liability Clarification
- Post-Closure Modifications
- Specialized Agreements (tax cancellation, negotiated agreements, etc.)

**Do not use this form if one of the following applies:**

- Request for an **off-site liability exemption or clarification** for Property that has been or is perceived to be contaminated by one or more hazardous substances that originated on another Property containing the source of the contamination. Use DNR's Off-Site Liability Exemption and Liability Clarification Application Form 4400-201.
- Submittal of an Environmental Assessment for the **Lender Liability Exemption**, s 292.21, Wis. Stats., **if no response or review by DNR is requested**. Use the Lender Liability Exemption Environmental Assessment Tracking Form 4400-196.
- Request for an **exemption to develop on a historic fill site** or licensed landfill. Use DNR's Form 4400-226 or 4400-226A.
- **Request for closure** for Property where the investigation and cleanup actions are completed. Use DNR's Case Closure - GIS Registry Form 4400-202.

**All forms, publications and additional information are available on the internet at:** [dnr.wi.gov/topic/Brownfields/Pubs.html](http://dnr.wi.gov/topic/Brownfields/Pubs.html).

### Instructions

1. Complete sections 1, 2, 6 and 7 for all requests. Be sure to provide adequate and complete information.
2. Select the type of assistance requested: Section 3 for technical assistance or post-closure modifications, Section 4 for a written determination or clarification of environmental liabilities; or Section 5 for a specialized agreement.
3. Include the fee payment that is listed in Section 3, 4, or 5, unless you are a "Voluntary Party" enrolled in the Voluntary Party Liability Exemption Program **and** the questions in Section 2 direct otherwise. Information on to whom and where to send the fee is found in Section 8 of this form.
4. Send the completed request, supporting materials and the fee to the appropriate DNR regional office where the Property is located. See the map on the last page of this form. A paper copy of the signed form and all reports and supporting materials shall be sent with an electronic copy of the form and supporting materials on a compact disk. For electronic document submittal requirements see: <http://dnr.wi.gov/files/PDF/pubs/rr/RR690.pdf>

The time required for DNR's determination varies depending on the complexity of the site, and the clarity and completeness of the request and supporting documentation.

# Technical Assistance, Environmental Liability Clarification or Post-Closure Modification Request

Form 4400-237 (R 12/18)

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## Section 1. Contact and Recipient Information

### Requester Information

This is the person requesting technical assistance or a post-closure modification review, that his or her liability be clarified or a specialized agreement and is identified as the requester in Section 7. DNR will address its response letter to this person.

Last Name Wahl	First Scott	MI	Organization/ Business Name Tyco Fire Products LP
Mailing Address 2700 Industrial Parkway South		City Marinette	State WI
Phone # (include area code) (715) 735-7411		Fax # (include area code)	Email scott.wahl@jci.com

The requester listed above: (select all that apply)

- Is currently the owner
- Is currently considering selling the Property
- Is renting or leasing the Property
- Is currently considering acquiring the Property
- Is a lender with a mortgagee interest in the Property
- Other. Explain the status of the Property with respect to the applicant:

### Contact Information (to be contacted with questions about this request)

Select if same as requester

Contact Last Name Verburg	First Ben	MI	Organization/ Business Name Arcadis
Mailing Address 126 N Jefferson Street, Suite 400		City Milwaukee	State WI
Phone # (include area code) (414) 276-7742		Fax # (include area code)	Email ben.verburg@arcadis.com

### Environmental Consultant (if applicable)

Contact Last Name Verburg	First Ben	MI	Organization/ Business Name Arcadis
Mailing Address 126 N Jefferson Street, Suite 400		City Milwaukee	State WI
Phone # (include area code) (414) 276-7742		Fax # (include area code)	Email ben.verburg@arcadis.com

## Section 2. Property Information

Property Name Tyco Fire Technology Center - PFCs		FID No. (if known) 438005590
BRRTS No. (if known) 0238580694		Parcel Identification Number
Street Address 2700 Industrial Parkway South		City Marinette
County Marinette		State WI
Municipality where the Property is located <input checked="" type="radio"/> City <input type="radio"/> Town <input type="radio"/> Village of Marinette		ZIP Code 54143
Property is composed of: <input type="radio"/> Single tax parcel <input checked="" type="radio"/> Multiple tax parcels		Property Size Acres 380

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1. Is a response needed by a specific date? (e.g., Property closing date) Note: Most requests are completed within 60 days. Please plan accordingly.

- No  Yes

Date requested by: \_\_\_\_\_

Reason: \_\_\_\_\_

2. Is the "Requester" enrolled as a Voluntary Party in the Voluntary Party Liability Exemption (VPLE) program?

- No. **Include the fee that is required for your request in Section 3, 4 or 5.**  
 Yes. **Do not include a separate fee.** This request will be billed separately through the VPLE Program.

Fill out the information in Section 3, 4 or 5 which corresponds with the type of request:

**Section 3. Technical Assistance or Post-Closure Modifications;**

**Section 4. Liability Clarification; or Section 5. Specialized Agreement.**

**Section 3. Request for Technical Assistance or Post-Closure Modification**

Select the type of technical assistance requested: [Numbers in brackets are for WI DNR Use]

- No Further Action Letter (NFA) (Immediate Actions) - NR 708.09, [183] - **Include a fee of \$350.** Use for a written response to an immediate action after a discharge of a hazardous substance occurs. Generally, these are for a one-time spill event.
- Review of Site Investigation Work Plan - NR 716.09, [135] - **Include a fee of \$700.**
- Review of Site Investigation Report - NR 716.15, [137] - **Include a fee of \$1050.**
- Approval of a Site-Specific Soil Cleanup Standard - NR 720.10 or 12, [67] - **Include a fee of \$1050.**
- Review of a Remedial Action Options Report - NR 722.13, [143] - **Include a fee of \$1050.**
- Review of a Remedial Action Design Report - NR 724.09, [148] - **Include a fee of \$1050.**
- Review of a Remedial Action Documentation Report - NR 724.15, [152] - **Include a fee of \$350**
- Review of a Long-term Monitoring Plan - NR 724.17, [25] - **Include a fee of \$425.**
- Review of an Operation and Maintenance Plan - NR 724.13, [192] - **Include a fee of \$425.**

Other Technical Assistance - s. 292.55, Wis. Stats. [97] (For request to build on an abandoned landfill use Form 4400-226)

- Schedule a Technical Assistance Meeting - **Include a fee of \$700.**
- Hazardous Waste Determination - **Include a fee of \$700.**
- Other Technical Assistance - **Include a fee of \$700.** Explain your request in an attachment.

Post-Closure Modifications - NR 727, [181]

- Post-Closure Modifications: Modification to Property boundaries and/or continuing obligations of a closed site or Property; sites may be on the GIS Registry. This also includes removal of a site or Property from the GIS Registry. **Include a fee of \$1050, and:**
  - Include a fee of \$300 for sites with residual soil contamination; and
  - Include a fee of \$350 for sites with residual groundwater contamination, monitoring wells or for vapor intrusion continuing obligations.

Attach a description of the changes you are proposing, and documentation as to why the changes are needed (if the change to a Property, site or continuing obligation will result in revised maps, maintenance plans or photographs, those documents may be submitted later in the approval process, on a case-by-case basis).

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Skip Sections 4 and 5 if the technical assistance you are requesting is listed above and complete Sections 6 and 7 of this form.

**Section 4. Request for Liability Clarification**

Select the type of liability clarification requested. Use the available space given or attach information, explanations, or specific questions that you need answered in DNR's reply. Complete Sections 6 and 7 of this form. [Numbers in brackets are for DNR Use]

"Lender" liability exemption clarification - s. 292.21, Wis. Stats. [686]

❖ **Include a fee of \$700.**

Provide the following documentation:

- (1) ownership status of the real Property, and/or the personal Property and fixtures;
- (2) an environmental assessment, in accordance with s. 292.21, Wis. Stats.;
- (3) the date the environmental assessment was conducted by the lender;
- (4) the date of the Property acquisition; for foreclosure actions, include a copy of the signed and dated court order confirming the sheriff's sale.
- (5) documentation showing how the Property was acquired and the steps followed under the appropriate state statutes.
- (6) a copy of the Property deed with the correct legal description; and,
- (7) the Lender Liability Exemption Environmental Assessment Tracking Form (Form 4400-196).
- (8) If no sampling was done, please provide reasoning as to why it was **not** conducted. Include this either in the accompanying environmental assessment or as an attachment to this form, and cite language in s. 292.21(1)(c)2., h.-i., Wis. Stats.:
  - h. The collection and analysis of representative samples of soil or other materials in the ground that are suspected of being contaminated based on observations made during a visual inspection of the real Property or based on aerial photographs, or other information available to the lender, including stained or discolored soil or other materials in the ground and including soil or materials in the ground in areas with dead or distressed vegetation. The collection and analysis shall identify contaminants in the soil or other materials in the ground and shall quantify concentrations.
  - i. The collection and analysis of representative samples of unknown wastes or potentially hazardous substances found on the real Property and the determination of concentrations of hazardous waste and hazardous substances found in tanks, drums or other containers or in piles or lagoons on the real Property.

"Representative" liability exemption clarification (e.g. trustees, receivers, etc.) - s. 292.21, Wis. Stats. [686]

❖ **Include a fee of \$700.**

Provide the following documentation:

- (1) ownership status of the Property;
- (2) the date of Property acquisition by the representative;
- (3) the means by which the Property was acquired;
- (4) documentation that the representative has no beneficial interest in any entity that owns, possesses, or controls the Property;
- (5) documentation that the representative has not caused any discharge of a hazardous substance on the Property; and
- (6) a copy of the Property deed with the correct legal description.

Clarification of local governmental unit (LGU) liability exemption at sites with: (select all that apply)

- hazardous substances spills - s. 292.11(9)(e), Wis. Stats. [649];
- Perceived environmental contamination - [649];
- hazardous waste - s. 292.24 (2), Wis. Stats. [649]; and/or
- solid waste - s. 292.23 (2), Wis. Stats. [649].

❖ **Include a fee of \$700, a summary of the environmental liability clarification being requested, and the following:**

- (1) clear supporting documentation showing the acquisition method used, and the steps followed under the appropriate state statute(s).
- (2) current and proposed ownership status of the Property;
- (3) date and means by which the Property was acquired by the LGU, where applicable;
- (4) a map and the ¼, ¼ section location of the Property;
- (5) summary of current uses of the Property;
- (6) intended or potential use(s) of the Property;
- (7) descriptions of other investigations that have taken place on the Property; and
- (8) (for solid waste clarifications) a summary of the license history of the facility.

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## Section 4. Request for Liability Clarification (cont.)

Lease liability clarification - s. 292.55, Wis. Stats. [646]

❖ **Include a fee of \$700 for a single Property, or \$1400 for multiple Properties and the information listed below:**

- (1) a copy of the proposed lease;
- (2) the name of the current owner of the Property and the person who will lease the Property;
- (3) a description of the lease holder's association with any persons who have possession, control, or caused a discharge of a hazardous substance on the Property;
- (4) map(s) showing the Property location and any suspected or known sources of contamination detected on the Property;
- (5) a description of the intended use of the Property by the lease holder, with reference to the maps to indicate which areas will be used. Explain how the use will not interfere with any future investigation or cleanup at the Property; and
- (6) all reports or investigations (e.g. Phase I and Phase II Environmental Assessments and/or Site Investigation Reports conducted under s. NR 716, Wis. Adm. Code) that identify areas of the Property where a discharge has occurred.

General or other environmental liability clarification - s. 292.55, Wis. Stats. [682] - Explain your request below.

❖ **Include a fee of \$700 and an adequate summary of relevant environmental work to date.**

No Action Required (NAR) - NR 716.05, [682]

❖ **Include a fee of \$700.**

Use where an environmental discharge has or has not occurred, and applicant wants a DNR determination that no further assessment or clean-up work is required. Usually this is requested after a Phase I and Phase II environmental assessment has been conducted; the assessment reports should be submitted with this form. This is not a closure letter.

Clarify the liability associated with a "closed" Property - s. 292.55, Wis. Stats. [682]

❖ **Include a fee of \$700.**

- Include a copy of any closure documents if a state agency other than DNR approved the closure.

Use this space or attach additional sheets to provide necessary information, explanations or specific questions to be answered by the DNR.

## Section 5. Request for a Specialized Agreement

Select the type of agreement needed. Include the appropriate draft agreements and supporting materials. Complete Sections 6 and 7 of this form. More information and model draft agreements are available at: [dnr.wi.gov/topic/Brownfields/Igu.html#tabx4](http://dnr.wi.gov/topic/Brownfields/Igu.html#tabx4).

Tax cancellation agreement - s. 75.105(2)(d), Wis. Stats. [654]

❖ **Include a fee of \$700, and the information listed below:**

- (1) Phase I and II Environmental Site Assessment Reports,
- (2) a copy of the Property deed with the correct legal description.

Agreement for assignment of tax foreclosure judgement - s.75.106, Wis. Stats. [666]

❖ **Include a fee of \$700, and the information listed below:**

- (1) Phase I and II Environmental Site Assessment Reports,
- (2) a copy of the Property deed with the correct legal description.

Negotiated agreement - Enforceable contract for non-emergency remediation - s. 292.11(7)(d) and (e), Wis. Stats. [630]

❖ **Include a fee of \$1400, and the information listed below:**

- (1) a draft schedule for remediation; and,
- (2) the name, mailing address, phone and email for each party to the agreement.

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**Section 6. Other Information Submitted**

Identify all materials that are included with this request.

Send both a paper copy of the signed form and all reports and supporting materials, and an electronic copy of the form and all reports, including Environmental Site Assessment Reports, and supporting materials on a compact disk.

Include one copy of any document from any state agency files that you want the Department to review as part of this request. The person submitting this request is responsible for contacting other state agencies to obtain appropriate reports or information.

- Phase I Environmental Site Assessment Report - Date: \_\_\_\_\_
- Phase II Environmental Site Assessment Report - Date: \_\_\_\_\_
- Legal Description of Property (required for all liability requests and specialized agreements)
- Map of the Property (required for all liability requests and specialized agreements)

Analytical results of the following sampled media: Select all that apply and include date of collection.

- Groundwater
- Soil
- Sediment
- Other medium - Describe: \_\_\_\_\_

Date of Collection: \_\_\_\_\_

- A copy of the closure letter and submittal materials
- Draft tax cancellation agreement
- Draft agreement for assignment of tax foreclosure judgment
- Other report(s) or information - Describe: \_\_\_\_\_

For Property with newly identified discharges of hazardous substances only: Has a notification of a discharge of a hazardous substance been sent to the DNR as required by s. NR 706.05(1)(b), Wis. Adm. Code?

- Yes - Date (if known): \_\_\_\_\_
- No


Note: The Notification for Hazardous Substance Discharge (non-emergency) form is available at:  
[dnr.wi.gov/files/PDF/forms/4400/4400-225.pdf](http://dnr.wi.gov/files/PDF/forms/4400/4400-225.pdf).

**Section 7. Certification by the Person who completed this form**

- I am the person submitting this request (requester)
- I prepared this request for: Scott Wahl

Requester Name

I certify that I am familiar with the information submitted on this request, and that the information on and included with this request is true, accurate and complete to the best of my knowledge. I also certify I have the legal authority and the applicant's permission to make this request.

  
\_\_\_\_\_  
Signature

5/16/19  
\_\_\_\_\_  
Date Signed

Senior Geologist  
\_\_\_\_\_  
Title

(414) 276-7742  
\_\_\_\_\_  
Telephone Number (include area code)

# Technical Assistance, Environmental Liability Clarification or Post-Closure Modification Request

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## Section 8. DNR Contacts and Addresses for Request Submittals

Send or deliver one paper copy and one electronic copy on a compact disk of the completed request, supporting materials, and fee to the region where the property is located to the address below. Contact a [DNR regional brownfields specialist](#) with any questions about this form or a specific situation involving a contaminated property. For electronic document submittal requirements see: <http://dnr.wi.gov/files/PDF/pubs/rr/RR690.pdf>.

### DNR NORTHERN REGION

Attn: RR Program Assistant  
Department of Natural Resources  
223 E Steinfest Rd Antigo, WI 54409

### DNR NORTHEAST REGION

Attn: RR Program Assistant  
Department of Natural Resources  
2984 Shawano Avenue  
Green Bay WI 54313

### DNR SOUTH CENTRAL REGION

Attn: RR Program Assistant  
Department of Natural Resources  
3911 Fish Hatchery Road  
Fitchburg WI 53711

### DNR SOUTHEAST REGION

Attn: RR Program Assistant  
Department of Natural Resources  
2300 North Martin Luther King Drive  
Milwaukee WI 53212

### DNR WEST CENTRAL REGION

Attn: RR Program Assistant  
Department of Natural Resources  
1300 Clairemont Ave.  
Eau Claire WI 54702



*Note. These are the Remediation and Redevelopment Program's designated regions. Other DNR program regional boundaries may be different.*

DNR Use Only			
Date Received	Date Assigned	BRRTS Activity Code	BRRTS No. (if used)
DNR Reviewer		Comments	
Fee Enclosed? <input type="radio"/> Yes <input type="radio"/> No	Fee Amount \$	Date Additional Information Requested	Date Requested for DNR Response Letter
Date Approved	Final Determination		

**Tyco Fire Products LP**

**REMEDIAL ACTION OPTIONS REPORT  
FOR LONG-TERM DRINKING WATER  
SUPPLY, TOWN OF PESHTIGO,  
WISCONSIN**

**Summary Report**

**Wisconsin Department of Natural Resources  
and Public Services Commission Submittal**

May 2019





# REMEDIAL ACTION OPTIONS REPORT FOR LONG-TERM DRINKING WATER SUPPLY, TOWN OF PESHTIGO, WISCONSIN



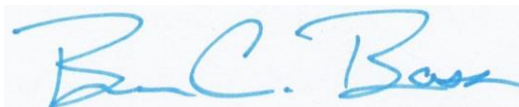
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Thomas F. Lachcik, PE  
Principal Project Director



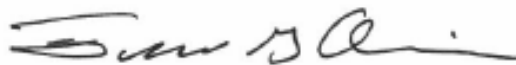
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James Cooper, PE  
Principal Water Engineer



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Brian C. Bass, MBA  
Senior Financial Services Consultant



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Timothy G. Alessi, PG  
Senior Geologist

Tyco Fire Products LP

Prepared for:  
Scott Wahl  
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Our Ref.:  
WI001605

Date:  
May 2019

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## APPENDICES

Appendix A	Tyco's Response Letter to WDNR's Additional Information Request
Appendix B	Cost Estimates

## ACRONYMS AND ABBREVIATIONS

AACE	Association for Advancement of Cost Engineering
AFFF	Aqueous film-forming foams
Arcadis	Arcadis US, Inc.
bgs	Below ground surface
CCF	Hundred cubic feet
EOCC	Engineer's Opinion of Construction Costs
FTC	Fire Technology Center
gpcd	Gallons per capita daily
gpd	Gallons per day
gpm	Gallons per minute
HAL	Health Advisory Level
hr(s)	hour(s)
MCL	maximum contaminant level
MGD	Million gallons per day
OM&R	operations, maintenance and replacement
OTA	Outdoor Testing/Training Area
pCi/L	picocuries per liter
PFAS	Per- and Poly-fluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic acid
POET	Point of entry treatment
ppt	parts per trillion
PSC	Public Service Commission
psi	pounds per square inch
PWS	Public Water System
R&D	Research and Development
SD	Sanitary District
SI	Site Investigation
USEPA	United States Environmental Protection Agency

WAC Wisconsin Administrative Code  
WDNR Wisconsin Department of Natural Resources



## EXECUTIVE SUMMARY

On behalf of Tyco Fire Products LP (Tyco), Arcadis US, Inc.(Arcadis) has prepared an interim evaluation of remedial action to provide long-term drinking water supply alternatives associated with response actions on the east side of the Town of Peshtigo along the southern border of the City of Marinette, Wisconsin, in accordance with Wisconsin Administrative Code (WAC), Chapter NR 700, where applicable. The Town of Peshtigo is in an area largely occupied by farmsteads and residences within Marinette County, located on the Bay of Green Bay. The residences in the well sampling area currently obtain drinking water from individual private water supply wells.

Arcadis has been conducting site investigations (SI) and sampling activities on behalf of Tyco to define the nature and extent of per- and poly-fluoroalkyl substances (PFAS) related to the Ansul Fire Technology Center (FTC) located at 2700 Industrial Parkway South, Marinette, Wisconsin. When Tyco drilled new borings near the perimeter of their property, they identified possible migration of the PFAS compounds away from their testing field, and upon learning this information, worked with the Wisconsin Department of Natural Resource (WDNR) to create and implement a plan to conduct groundwater testing outside of the FTC facility. The results of the groundwater tests showed that there were PFAS compounds in some individual private drinking water well locations in the Town of Peshtigo just south of the City of Marinette.

The site investigation was conducted as part of the response to the letter from the WDNR on January 16, 2018, which required additional investigation of PFAS in the area of the FTC. Groundwater, soil, surface water and sediment sampling were completed to further define the nature and extent of PFAS in media on the FTC Site and extending from the FTC Site.

This evaluation of long-term drinking water supply alternatives was conducted to identify potentially feasible options for the residences with affected private water supply wells within the Town of Peshtigo. This desktop evaluation did not include field surveying. The evaluation identified six drinking water supply alternatives and provides conceptual-level information for comparison of the alternatives.

The interim evaluation includes the following drinking water supply alternatives:

- Alternative 1 – City of Marinette Public Water System Expansion
- Alternative 2 – Town of Peshtigo Sanitary District
- Alternative 3 – Existing Private Wells w/ Point of Entry Treatment Systems
- Alternative 4 – Private Special Casing Deep Water Supply Wells
- Alternative 5 – Town of Peshtigo Public Water System
- Alternative 6 – Combination of Water Supply Methods

Arcadis has met with representatives of the City of Marinette, Town of Peshtigo, and WDNR to discuss various alternatives as potentially feasible and requirements for implementing each alternative. Eleven selection criteria were used to evaluate each alternative to determine which would be the most feasible for providing a safe and reliable long-term drinking water supply for proposed services in the well sampling area within a reasonable period of time.

Based on the evaluation of the initial six alternative and stakeholder feedback, three alternatives were selected for more detailed assessments:

- Alternative 1 – City of Marinette Public Water System Expansion - Connect residences in the well sampling area in the Town of Peshtigo to an expanded City of Marinette Public Water System as direct customers.
- Alternative 2 – Town of Peshtigo Sanitary District - Develop a Town of Peshtigo Sanitary District, with a Public Water Distribution System operated and maintained by the Town of Peshtigo and connected to the City of Marinette Public Water Utility for purchasing water through a master water meter.
- Alternative 4 – Private Special Casing Deep Water Supply Wells - Develop new private special casing deep water supply wells for residences in the well sampling area in the Town of Peshtigo.

As a part of the detailed desktop evaluation, Arcadis collected additional information for the three selected alternatives and defined the area of proposed drinking water supply services. The conceptual layout of the water supply service area generally includes the region bounded by University Drive, and along Rader Road, Shore Drive (County Road BB), Green Gable Road, and County Road B. Proposed water services within this region are defined as all residences with a private water well within the well sampling area of the Town of Peshtigo.

Based on the detailed evaluation results, the recommended long-term drinking water supply for the well sampling area in the Town of Peshtigo, as defined herein, is Alternative 1, City of Marinette Public Water System Expansion. This alternative consisted of all existing residences in the well sampling area in the Town of Peshtigo being connected to the City of Marinette public water system. The existing Marinette Water Utility water distribution system would be extended by installing additional water mains in the Town of Peshtigo and providing service connections to all properties along the newly-installed water mains.

This Summary Report presents the project background and current conditions, the alternatives evaluation process, and results of the detailed alternatives evaluation. Assumptions, findings, and recommendations in this report are based on data available at the time of the evaluation.

# 1 INTRODUCTION

On behalf of Tyco Fire Products LP (Tyco), Arcadis US, Inc.(Arcadis) has prepared an interim evaluation of remedial action to provide long-term drinking water supply alternatives associated with response actions on the east side of the Town of Peshtigo along the southern border of the City of Marinette, Wisconsin, in accordance with Wisconsin Administrative Code (WAC) Chapter NR 700, where applicable. The Town of Peshtigo is in an area largely occupied by farmsteads and residences within Marinette County, located on the Bay of Green Bay. **Figure 1-1** “Town of Peshtigo Zoning Map”, shows a zoning map for the Town of Peshtigo; the residences in this area obtain water from individual private water supply wells. The City of Marinette is located adjacent to and north of the Town of Peshtigo and operates a public water system (PWS).

Arcadis has been conducting site investigation activities (SI) on behalf of Tyco to define the nature and extent of per- and poly-fluoroalkyl substances (PFAS) related to the Ansul Fire Technology Center (FTC) located at 2700 Industrial Parkway South, Marinette, Wisconsin. When Tyco drilled new borings near the perimeter of their property, they identified possible migration of the PFAS compounds away from their testing field, and upon learning this information, worked with the Wisconsin Department of Natural Resources (WDNR) to create and implement a plan to conduct groundwater testing outside of the FTC facility. The results of the groundwater tests showed that there were PFAS compounds in the groundwater from some private drinking water well locations in the Town of Peshtigo just south of the City of Marinette.

The site investigation was conducted as part of the response to the letter from the WDNR on January 16, 2018, which required additional investigation of PFAS in the area of the FTC. Groundwater, soil, surface water and sediment sampling were completed to further define the nature and extent of PFAS in media on the FTC Site and extending from the FTC Site. **Figure 1-2** “Site Overview” shows the Tyco training center and the boundaries of the Town of Peshtigo, while also showing locations of individual private drinking water supply wells in the Town of Peshtigo.

In accordance with Wisconsin Administrative Code (WAC), Chapter NR 700, where applicable, Tyco has taken significant efforts to implement investigative actions and remediation measures with respect to PFAS that may have originated from their facility in Marinette, WI. Some of what Tyco has done to date includes:

- Testing individual private water wells, surface and ground water, soil, and sediment. This includes a total of 1,282 samples analyzed as of March 2019.
- Installation and maintenance of 37 point of entry treatment (POET) systems in homes of residents, even where PFAS compounds were found at levels significantly below the United States Environmental Protection Agency (USEPA) health advisory level
- Testing of ditches in the area, which led to proactively developing filtration treatment systems for two area ditches
- Offering bottled water to 118 residences in the Town of Peshtigo

As part of this report, an evaluation of long-term drinking water supply alternatives was conducted to identify potentially feasible long-term drinking water supply options for the well sampling area in the Town

of Peshtigo. The alternatives evaluation identified six drinking water supply alternatives and provides conceptual-level information for comparison of the alternatives.

## 1.1 Purpose of Evaluation

The purpose of this evaluation is to identify feasible alternatives and make a recommendation for providing safe and reliable long-term drinking water supply for the residences in the well sampling area in the Town of Peshtigo to be implemented in a reasonable period of time.

## 1.2 Key Assumptions

Throughout the evaluation process, several key assumptions were applied to develop and further evaluate each alternative. Assumptions include, but are not limited to:

- 1) The long-term drinking water supply solution shall:
  - a. Provide a safe, reliable drinking water supply for a minimum 20-year planning period. Any alternative that is not considered viable for at least 20 years shall be deemed non-feasible and eliminated from further consideration.
  - b. Replace the water supply that existed at the time of the identification of PFAS presence without intending to improve water quantity or provide for growth through development or subdividing parcels.
  - c. Be flexible so if the well sampling area expands, the solution can be altered to provide safe and reliable drinking water.
  - d. Not require residences to operate and maintain additional water treatment systems to meet state or federal regulatory drinking water standards.
- 2) The intent is to replace what was lost, not upgrade or improve on the previous supply method.
- 3) The hydraulic model used to evaluate alternatives was the latest provided to Arcadis and assumed to represent current system conditions in the City of Marinette, the demand in the existing model is approximately 3.98 million gallons per day (MGD).
- 4) Any new private water wells must be drilled through the unconsolidated sand unit and beneath the poorly yielding Galena-Platteville formation with special casings per the requirements of the WDNR to ensure sufficient yield and to minimize potential for migration of PFAS to unaffected aquifers.
- 5) Capital, operating, and maintenance costs to be developed will be Class 5, conceptual level cost opinions as defined by the Association for Advancement of Cost Engineering (AACE).
- 6) The evaluation of alternatives is based on the number of residences proposed to connect and all other associated data defined within the Summary Report. Any changes to the project conditions or changes in the validity of the assumptions defined within this Summary Report may require a review to determine the impact of the change, if any, on the results and recommendations presented.

Items not included in the long-term drinking water supply system include the following:

- 1) Adequate capacity for fire protection.
- 2) Available capacity in excess of current usage and peak demands.
- 3) Water for expansion or growth.

- 4) Water for areas that have not been developed, or potential subdividing parcels.
- 5) Capacity in distribution network for agricultural use, unless specifically requested by residences.
- 6) Distribution system storage, unless the service area utilized for this evaluation significantly changes.

### **1.3 Anticipated Future Actions**

The long-term drinking water supply evaluation and recommendations are documented in this Summary Report. Subsequent actions required to implement the safe and reliable long-term drinking water supply are:

- Ongoing Community Engagement
- Alternative Evaluation Approval by Regulatory Agencies
- Stakeholder Negotiations and Agreements
- Preliminary Design and Field Surveying
- Final Detailed Design and Permitting
- Bidding and Construction Administration
- Testing and Public Use of the Drinking Water Supply System

## 2 BACKGROUND AND CURRENT CONDITIONS

The Ansul FTC (Site) is a fire suppressant training, testing, research, and development facility built in the early 1960s. The Site encompasses approximately 380 acres with approximately 9 acres used as the Outdoor Testing/Training Area (OTA). The OTA includes the Firefighting School area (where firefighting scenarios are simulated) and the Research and Development (R&D) area (where product testing occurs). The location of the OTA is presented on **Figure 2-1** “Tyco Site Boundary”. The remaining area of the Site is used for manufacturing, warehousing, office, classroom, parking or is undeveloped.

The Site is bordered by industrial and commercial properties to the west, and industrial, commercial, and Marinette School District property to the north. Agricultural land, a cemetery, a golf course, a community center, and undeveloped land owned by the University of Wisconsin Board of Regents and private owners border the Site to the east and south. The Town of Peshtigo is located along the South border of the City of Marinette.

Aqueous film-forming foams (AFFF) historically have been used at the OTA as part of research and development, quality testing and firefighting training activities. Detailed history of the use of foams at the OTA was provided in **Appendix A** “Tyco’s response letter to WDNR’s Additional Information Request” letter, submitted March 12, 2018. While the presence of multiple PFAS compounds have been included in historical and recent investigation analyses, the primary focus of the recent Site investigation was on perfluorooctanoic acid (PFOA) and/or perfluorooctanesulfonic acid (PFOS). AFFF has not been sprayed outdoors at the OTA since November 2017.

When Tyco drilled new borings near the perimeter of their Site, they identified possible migration of the PFAS compounds away from their testing field, and upon learning this information, worked with the WDNR to create and implement a plan to conduct groundwater testing outside of the Site facility. The results of the groundwater tests showed that there were PFAS compounds in the groundwater from some of the private drinking water well locations in the Town of Peshtigo.

### 2.1 Drinking Water Wells

A residential drinking water monitoring program was implemented to evaluate the quality of groundwater used for drinking water in the study area adjacent to the FTC site. As of April 2019, groundwater samples have been collected from 171 water supply wells on 160 properties. Data through December 2018 for 168 wells has gone through the validation process and has been submitted to the WDNR as final. The data is discussed further below. Groundwater samples are analyzed for 14 compounds of PFAS using USEPA Method 537.1.

Federal standards for PFAS in drinking water have not been established to date. On February 14, 2019, USEPA released a PFAS Action Plan. Prior to the release of this Action Plan, USEPA developed a Health Advisory Level (HAL) of 70 parts per trillion (ppt) for lifetime exposure to PFOA and PFOS. Standards for PFAS in drinking water have not been established by the WDNR.

The number of drinking water supply wells that have shown detectable concentrations of PFOA and/or PFOS are shown below in **Table 2-1**. These results represent the data collected and validated through December 2018. These numbers may change as additional samples are collected and data validation is completed. Residential drinking water wells that have been sampled fall into one of three different

categories, including wells 1) with detections in groundwater above the HAL, 2) with detections in groundwater below the HAL, and 3) with groundwater test results below the reporting limit.

**Table 2-1: Residential Drinking Water Summary**

Category	Count
Above the HAL	16
Below the HAL	42
Below the Reporting Limit	110
Total	168

The location and categories that the residential drinking water supply wells are within are shown on **Figure 2-2** “Location of Drinking Water Wells Sampled”.

## 2.2 Determination of Proposed Services

The alternatives generally consider a service area near the region bounded by University Drive, along Shore Drive (County Road BB), Green Gable Road, and along County Road B. Proposed services within this region are defined as all properties with a private well within the Town of Peshtigo. The alternatives are not intended to support future growth/demands that may be created by subdividing parcels into developments; developers would be responsible for infrastructure necessary to support future development. The proposed replacement water supply is intended to allow for some growth; however, a balance must be achieved between designing a system for current demands versus designing a system to sustain all parcels being converted to subdivisions and potential significant growth within the town. This underscores the necessity to define anticipated service volumes as the basis for the alternative evaluation.

The proposed services in this alternative’s evaluation are defined based on all residences with private water wells within the Town of Peshtigo. Proposed services for the evaluations include up to 164 residences with private wells, which includes all of the Town of Peshtigo residences that could potentially be served in the well sampling area, as indicated on **Figure 2-2**.

## 2.3 Proposed Services Water Consumption

This evaluation considered replacement water supply to all existing parcels with private wells within the Town of Peshtigo’s well sampling area as of 2018, and a total of 164 properties and homes were considered. The sizing of water infrastructure for each alternative is based on the ability to serve the well sampling area in the Town of Peshtigo. Private well users typically do not retain well usage data; however, some well usage data was collected for the wells in the Town of Peshtigo area recently for the purposes of further evaluation. Available well usage data, along with standards for estimating water usage for residential and agricultural areas, were used to determine estimates of water consumption for

the Town of Peshtigo. The selected alternative will provide the long-term replacement water supply for private wells of varying use types. The following sections summarize the residential and non-residential demands.

### 2.3.1 Modeled Demands

Multiple sources are applicable for estimating existing residential water usage. Per Table 6 of *Water Use in Wisconsin*, domestic water use in Marinette County is 45 gallons per capita per day (gpcd) (USGS, 2018). According to the data obtained from available census information for Marinette County, there is an average of 2.1 occupants per household. Therefore, the average household usage is 94.5 gallons per day (gpd). Available well usage data from the Town of Peshtigo residents provided an estimate of approximately 97 gpd of water usage, this included a portion of the households that are only seasonally occupied in the Town of Peshtigo. Due to the estimate of well usage being the more conservative number, the available water usage average day value for existing wells was used to estimate water consumption in the Town of Peshtigo. Water usage varies throughout the day, and distribution systems are generally most economical when they are designed to supply up to maximum day demands with usage in excess of this rate (e.g. peak hour) supplied from distribution storage.

A summary of estimated historical water usage and final estimated total design usage for the 164 proposed services and up to 211 potential properties, which includes currently undeveloped properties, is presented in **Table 2-2**.

**Table 2-2: Estimated Proposed Services Water Consumption**

System Demand Scenario	Historical Usage		Total Design Demand (gpd) <sup>3</sup>	Demand Ratio
	Per Household (gpd) <sup>1</sup>	Total (gpd) <sup>2</sup>		
Annual Average Day	97	15,900	20,500	-
Annual Maximum Day	155.2	25,440	32,800	1.6
Annual Peak Hour	310.4	50,880	65,600	3.2

<sup>1</sup>Based on available well data for private well users.

<sup>2</sup>Proposed services multiplied by the Per Household usage information

<sup>3</sup>Potential properties multiplied by the Per Household usage.

As indicated in **Table 2-2**, water infrastructure is designed to provide water supply of 20,050 gpd on average for 211 potential properties. This amount is in excess of the 15,900 gpd estimated usage by the 164 proposed services, allowing flexibility for serving additional proposed services if required.

## 2.4 Geology and Physical Setting

Arcadis conducted a desktop geology study as part of this alternative’s evaluation. An overview of regional and local geology and hydrogeology is presented below.



## 2.4.1 Regional Geology

Marinette County’s regional geology is characterized by a series of unconsolidated glacial deposits underlain by a sequence of gently dipping sedimentary bedrock units (mostly dolomite and sandstone) above the crystalline basement. The various geologic units from youngest to oldest are summarized in **Table 2-3** below (Oakes and Hamilton 1973).

Marinette County is within the Menominee-Oconto-Peshtigo River basin, which is bounded by the Wisconsin, Wolf, and Fox Rivers, the Wisconsin-Michigan border along the Brule and Menominee Rivers, and Bay of Green Bay. The basin has an irregular rolling landscape consisting of uneven cover of glacial and lake deposits overlying an eroded bedrock surface. The surface slopes to the east and southeast. Drainage is toward the east and south (Oakes and Hamilton 1973).

In the southern half of the basin (i.e., where the study area is located), Precambrian crystalline bedrock is overlain by layered sedimentary bedrock (i.e., Ordovician and Cambrian). The slope on the crystalline rock surface is 30 feet per mile to the southeast, and the rock may be at a depth as great as 200 feet below sea level. The overlying sedimentary bedrock dips 30 feet per mile to the southeast (Oakes and Hamilton 1973).

**Table 2-3: Summary of Geologic Units**

Period	Lithology/Formation	Description
Quaternary	Glacial Deposits	Primarily glacial lake deposits. Contain beds of silt or clay, sand bars, and sandy beach and deltaic deposits. Underlain by silty clay till.
Ordovician	Galena, Decorah, and, Platteville Formation	Undifferentiated. Light-gray to blue-gray, fossiliferous, shaley dolomite. Up to 250 feet thick.
	St. Peter Sandstone	White to light gray, fine to medium grained. Up to 75 feet thick.
	Prairie du Chien Dolomite	Undifferentiated, white to gray, mostly dolomite. Up to 250 feet thick.
Cambrian	Sandstone and dolomite	Undifferentiated, Up to 500 feet thick.
Precambrian	Crystalline rock	Undifferentiated, igneous and metamorphic rocks, thickness unknown.

## 2.4.2 Regional Hydrology

In Marinette County, drinking water sources include municipal waterworks and private wells. There are eight municipal waterworks and an estimated 10,295 private wells in Marinette County (WGCC 2018). With the exception of the City of Marinette’s municipal water, the source water for these waterworks is

groundwater (WDNR 2019); the municipal water for the City of Marinette is drawn from Lake Michigan (i.e., the Bay of Green Bay). Within the study area (i.e., Town of Peshtigo), the source of drinking water is groundwater from private wells.

There are four aquifers in Marinette County, discussed below.

*Unconsolidated Sand and Gravel:* The sand and gravel aquifer is the uppermost aquifer. Large groundwater yields are available where the saturated thickness is at least 50 feet. Because the sand and gravel aquifer is shallow, it is directly connected to surface water and can be readily recharged through precipitation.

In Marinette County, groundwater is generally encountered at 10 feet or less below ground surface (bgs).

*Galena-Platteville:* This unit confines the St. Peter Sandstone. Maximum observed yield within this unit is 60 gallons per minute (gpm), and there are no known high capacity wells within this aquifer.

*Sandstone:* The sandstone aquifer consists of hydraulically connected sandstones and dolomites of Cambrian and Ordovician age. Anticipated yield from wells within this aquifer is 500 gpm or greater.

*Crystalline:* Precambrian crystalline rock is not considered a significant source of water. The majority of wells within this aquifer yield less than 5 gpm.

Naturally occurring water quality parameters that can affect drinking water quality within Marinette County include calcium, magnesium, sodium, iron, sulfate, bicarbonate, chloride, nitrate, and total dissolved solids (Oakes and Hamilton 1973). Additionally, radium (226 and 228) can affect drinking water quality; radium has been measured at concentrations greater than the federal maximum contaminant level (MCL) of 5 picocuries per liter (pCi/L) in raw water from wells associated with the nearby City of Peshtigo's waterworks, installed in the sandstone aquifer.

### 2.4.3 Local Geology

The surficial geology in the Marinette and Peshtigo area was mapped by the United States Geological Survey as glacial lake deposits, consisting mainly of clay, silt, and sand, overlying Ordovician dolomite bedrock (Oakes and Hamilton 1973). Site investigations and publicly available construction reports indicate that the sequence of glacial deposits varies across the study area. In general, the upper soils consist of well-sorted sands, typically present to 30 feet bgs or greater. Deeper sediments typically consist of lake-deposited silt and clay, with some sandy interbeds. A till unit has also been observed above bedrock in places. This package of overburden sediments thickens west-to-east as the bedrock surface slopes southeastward toward the Bay of Green Bay. Bedrock may be as shallow as 35 feet bgs beneath portions of the Site but deepens to approximately 100 feet bgs along the Bay of Green Bay shore. Boreholes completed near the Site have confirmed the shallow bedrock to be a shaley dolomite, consistent with the Galena-Platteville formation.

### 2.4.4 Local Hydrogeology

The Site is located in a low-relief plane bounded by the Bay of Green Bay, the Peshtigo River, and the Menominee River. The area near the Site is drained by ditches that flow to the Bay of Green Bay. The

water table depth in the area is typically shallow; at the Site the depth-to-water is normally less than 5 feet bgs. From the Site, groundwater flows to the east, and southeast, generally toward the Bay of Green Bay.

The unconsolidated sand aquifer, where the water table is present, provides water to at least half of the private wells within the well sampling area (i.e., Town of Peshtigo). Within this area, private wells range in depth from approximately 15 feet to 600 feet bgs. Few wells exist within the Galena-Platteville formation except where they are constructed at the rock surface. Based on boreholes completed during investigation activities, this formation, which is the first encountered bedrock from ground surface, is very poorly transmissive and would be unlikely to produce a sufficient quantity of water for residential use.

With respect to deeper wells (i.e., wells installed in the sandstone/dolomite underlying the Galena-Platteville formation), publicly available well construction logs and WDNR Drinking Water and Groundwater Use Information Systems indicate that the sandstone/dolomite aquifer can yield sufficient quantities of water for residential use within the well sampling area. Within a few miles of the well sampling area, there are several high capacity wells installed within the sandstone/dolomite aquifer. Of these high capacity wells, the maximum permitted withdrawal flow rate recorded is 620 gpm.

Note that, based on private well sampling results, wells that draw water from a bedrock aquifer have not been observed to be impacted by PFAS constituents.

## 2.5 Community Engagement

Shortly after the identification of potential PFAS migration from the Tyco site, Tyco reached out to the WDNR to initiate discussions regarding implementing a long-term water supply solution for the well sampling area. Discussions were held with officials from the City of Marinette, Town of Peshtigo, and WDNR about potential solutions for the well sampling areas in the Town of Peshtigo. As a part of the alternative's evaluation, Arcadis met with representatives of the City of Marinette and Town of Peshtigo to collect information for the evaluation.

### 3 ALTERNATIVES DEVELOPMENT AND FEASIBILITY

Various alternatives were conceptualized for potential long-term replacement drinking water supply for the wells. These are summarized as Alternatives 1 through 6. Each alternative is initially developed for a broad evaluation to refine and screen feasible alternatives for a more detailed desktop evaluation presented in subsequent sections of this Summary Report. The following sections present an overview of each of these alternatives.

#### 3.1 Identification of Alternatives

Due to the dynamic nature of the site conditions and overall project, a reference set of conditions must be established to serve as the basis for evaluating alternatives. This development of alternatives is based on the best available information at the time of this evaluation and as presented within this Summary Report.

##### 3.1.1 Alternative 1 – City of Marinette Public Water System Expansion

The City of Marinette is located adjacent to and north of the Town of Peshtigo and operates a public water system (PWS). The WDNR and the USEPA define a “public water system” as a system for the provision to the public of piped water for human consumption, if such a system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year. “Serving” water means that you have water available for drinking regardless of whether the water is actually being consumed. Facilities that provide drinking water and fits this definition, have a legal responsibility to monitor the quality of the water. The WDNR’s Bureau of Drinking Water and Groundwater works with public water system operators to meet safe drinking water regulations. For those individuals that get water from a municipality, the municipality is responsible for the water. However, those individuals that have private water wells are responsible for the water quality and will be subject to regulations.

This Alternative consists of expanding the City of Marinette PWS distribution pipe network to the proposed services with service connections to each user as shown on **Figure 3-1**. Users would be long-term water customers of the City of Marinette Water Utility. Improvements necessary to adequately serve the users were identified and included in this evaluation. This alternative will have sufficient capacity to add additional properties if the well sampling area changes and to support limited growth. This alternative would include approximately six miles of distribution piping and valves. The City of Marinette would provide water meters and service connections would be constructed along with the water mains.

Locations of existing City of Marinette water mains along with proposed water mains within the Town of Peshtigo are shown on **Figure 3-1** “City of Marinette Conceptual Layout for Water Main Expansion”. The long-term water supply must be reliable and redundant, and this alternative would extend an existing safe and reliable source (a public water system). For this alternative, the City of Marinette would complete all operation and maintenance of the expanded distribution system. Based on the preliminary evaluations of capacity requirements in the well sampling area in the Town of Peshtigo, the proposed water mains are anticipated to be 4-inch diameter, but will be confirmed during preliminary design.

### **3.1.2 Alternative 2 – Establish Town of Peshtigo Sanitary District**

This alternative would establish a Sanitary District (SD) that provides water from the City of Marinette PWS. The SD would be considered a consecutive system, purchasing bulk water from the City of Marinette before providing it to customers within the well sampling area of the Town of Peshtigo. All water system infrastructure operation, maintenance, water quality control and customers beyond the master water meter would be the responsibility of the newly developed Sanitary District. Water system infrastructure required to develop the SD is identified in **Figure 3-2** “Town of Peshtigo, WI Conceptual Layout for Water Main Interconnections”. Water main routes are similar to Alternative 1, with the exception that an additional structure is shown; an interconnection structure would be required and would contain the master water meter and backflow prevention.

### **3.1.3 Alternative 3 – Existing Private Individual Wells with Point of Entry Treatment (POET) Systems**

This alternative provides a temporary short-term interim water treatment system for the water supply through existing individual private wells that can be implemented in a timely manner, in accordance with WAC Chapter NR 738, where applicable. Individual wells must be capable of providing long-term water supply that meets public drinking water standards. As a result, point of entry treatment systems (POET) for well water for naturally occurring contaminants (e.g., radionuclides, iron, sulfate) or contaminants associated with regional land use (i.e., nitrate from agriculture) and PFAS would be necessary for water treatment. There are currently 37 POET systems installed and maintained in the Town of Peshtigo, and these POET systems require maintenance to ensure the treatment systems are functioning as designed over time.

### **3.1.4 Alternative 4 – Private Special Casing Deep Water Supply Wells**

This alternative would provide water supply through private individual or potentially cluster wells. Where feasible, up to two households would share a single private special casing deep water supply well without the reporting requirements of a public water system. Due to the rural nature of the area, most households would be provided with an individual well where cluster wells would not be geographically feasible. However, individual or cluster wells must be capable of providing long-term water supply that meets public drinking water standards. As a result, treatment of well water for naturally occurring contaminants (e.g., radionuclides, iron, sulfate) or contaminants associated with regional land use (i.e., nitrate from agriculture) may be necessary.

### **3.1.5 Alternative 5 – Town of Peshtigo Public Water System**

This alternative would establish a PWS with the source of water from new special casing deep wells or Lake Michigan. There is an assumption that sufficient quantity and quality of water would be available in the deep wells. A public water treatment system would also be needed, where the water distribution system would distribute treated water from the special casing deep wells or the lake to the proposed services. To provide a reliable and redundant long-term drinking water supply, a minimum of two deep

wells would be required, with each deep well of adequate capacity to supply the system demands. The PWS in this alternative would be physically separate and not reliant on the City of Marinette PWS.

### 3.1.6 Alternative 6 – Combination of Water Supply Methods

This alternative would provide a combination of the various water supply methods described to the proposed services through either retaining existing private wells and adding a POET system, or connecting to the municipal PWS that will be expanded to the Town of Peshtigo from the City of Marinette.

## 3.2 Alternatives for Detailed Evaluation

### 3.2.1 Alternatives Screening

Following an initial review of multiple parameters, including advantages and limitations associated with the six alternatives, as shown in **Table 3-1**, each alternative was scored based on 11 equally-weighted criteria. All criteria were scored a 1 (comparatively unfavorable) to a 5 (comparatively favorable) with a total possible score of 55. Scores and criteria are identified and presented in **Table 3-2**, which considered available information through March 2019. Alternatives 1, 2, and 4 scored the highest based on the evaluations of the criteria available at the time of the evaluation. Specific stakeholder preference for long-term water supply affected which alternatives were ultimately retained for further evaluation. As such, this additional input was considered.

Alternative 3 – Existing Private Wells with POET System is a good interim short-term treatment system that can be implemented in a timely manner; however, the unknown future condition of the water quality in the aquifers does not make this alternative a feasible long-term drinking water supply that would be acceptable to the WDNR. In addition, resident's acceptance is unlikely due to the inconvenience associated with the long-term operation, maintenance and replacement of water treatment and pumping systems.

The challenges facing the implementation of Alternative 5 – A new Town of Peshtigo Public Water System includes obtaining approval from Town and regulatory agencies, siting a location that provides sufficient groundwater or lake water for long-term water supply, and acquiring property for installing deep wells, lake water intake and a water treatment facility. A new water distribution system in the well sampling area would need to be constructed, and licensed operators and maintenance personnel would have to be retained by the Town to operate and maintain the system and ensure compliance with reporting and permitting requirements. The implementation of Alternative 5 would take several years, and the Town would have extensive long-term operation and maintenance costs in comparison to other alternatives. The practicality of providing a new PWS for the limited number of customers in the impacted area, and for the reasons stated above, does not make this alternative a beneficial long-term water supply solution for the Town of Peshtigo.

Alternative 6 – Combination of Water Supply Methods would require property owners to be involved in the operation and maintenance of the system. This alternative is also not acceptable to regulatory agencies because there would be multiple permit types, water quality monitoring requirements, and not a single

consolidated solution for a long-term water supply for the residents in the well sampling area in the Town of Peshtigo.

Based on the initial evaluation and stakeholder feedback, the following three alternatives were selected for further evaluations in Section 4:

- Alternative 1 – City of Marinette Public Water System Expansion - Connect residences to the City of Marinette Public Water System as direct customers. The system would be operated and maintained by the City of Marinette Water Utility.
- Alternative 2 – Town of Peshtigo Sanitary District - Establish Town of Peshtigo Sanitary District, with consecutive system to the Town of Peshtigo from the City of Marinette Water Utility through a master water meter and operated and maintained by the Town of Peshtigo.
- Alternative 4 – Private Special Casing Deep Water Supply Wells - New Private Special Casing Deep Wells to replace the existing private water wells. The deep well system would be operated, maintained and replaced by homeowners.

## **4 FEASIBLE WATER SUPPLY ALTERNATIVES EVALUATION**

Following the initial alternatives screening summarized in Section 3, each of the remaining alternatives are evaluated to potentially be a viable, long-term, safe and reliable drinking water supply for the proposed services. Each evaluation includes technical, regulatory, economic and additional considerations. A comparison of the evaluation results for each alternative is presented in Section 5. Results of the alternative comparison and final recommendations for the long-term water supply solution are reviewed and discussed in Section 6.

### **4.1 Alternative 1 – City of Marinette Municipal Water Expansion**

The City of Marinette owns and maintains a water treatment and distribution network with water mains north of and adjacent to the impacted area in the Town of Peshtigo. As the nearest PWS, it is a feasible source for long-term drinking water supply for the proposed services, as compared to the City of Peshtigo located several miles away from the well sampling area. However, the City of Marinette water system must have adequate capacity to sustain the additional water usage. Alternative 1 considers expanding the City of Marinette water distributions system to the proposed services in the well sampling area, and users would be direct customers of the City of Marinette. This extension of the water service beyond the current service area limits would require an Intergovernmental Border Agreement between the City of Marinette and Town of Peshtigo. Regulatory requirements, negotiations between Tyco and the City and Town and additional considerations are applicable to this alternative.

#### **4.1.1 Distribution System Hydraulic Assessment**

The City of Marinette provided a copy of their latest water distribution system hydraulic model to assist in evaluating their system for purposes of this work. The model was last calibrated by the City of Marinette in 2015 and is assumed to reasonably reflect current system conditions and operations. This latest model representing current system conditions as provided to Arcadis consists of a daily water demand of 3.98 MGD. A complete system analysis considers the following: high head loss, high and low pressures, distribution storage and turnover, reliability and redundancy, operations and maintenance, and water quality. The model provided by the City of Marinette was developed to perform calibrated extended period analyses. An extended period simulation was completed to evaluate portions of the system reliability and redundancy, hydraulic grade line (HGL), and pressures.

##### **4.1.1.1 Current System Conditions**

As stated in the Modeled Demands summary in Section 2.3.1, average day water demands for the Town of Peshtigo were estimated to be 1.68 MGD based on the previous two years of production data at the City of Marinette's WTP. The combination of the City of Marinette and Town of Peshtigo demands were projected to be 1.70 MGD. With the additional demand from the Town of Peshtigo, there were no additional booster pumping facilities or water storage tanks required to meet average or maximum day demand.



#### 4.1.1.2 Current Systems Assessment

The water source for the City of Marinette PWS has a Water Treatment Facility providing a firm capacity of 5.0 MGD. Current average day demands of 1.68 MGD are within the firm plant capacity. Including an average day water usage projection of 20,000 gpd for the additional users from the Town of Peshtigo would increase system demand by approximately 1.2 percent to 1.70 MGD. Based on average day demands totaling 1.70 MGD, the firm plant capacity of 5.0 MGD is adequate to supply existing system and projected design demands from the proposed services.

The proposed water infrastructure for Alternative 1 was added to the existing system hydraulic model for analysis. Model junctions were included at all pipe intersections and at high and low elevations along the water main routes. Results of the simulated distribution system pressures are presented in **Figure 6-1**. As shown on **Figure 6-1**, the conceptual layout of the Alternative 1 distribution system would be served with adequate pressures greater than the minimum 50 pounds per square inch (psi) required during maximum day demand conditions. Addition of an elevated tank or booster pumping station is not warranted due to system pressures in Alternative 1.

#### 4.1.2 Border or Supply Agreements

The need for a long-term water supply is driven by the condition of the groundwater wells in the Town of Peshtigo. While the Border Agreement provides the best protection for the Town of Peshtigo, it is recommended that a water agreement be entered into for extending water to the proposed services, so that developers cannot simply connect to the PWS network and develop a subdivision without Town of Peshtigo approval. It is recommended that any future development activities in this area require modification of the Border Agreement, as is the nature and intent of the Border Agreement and cooperative working relationship between the City of Marinette and the Town of Peshtigo.

#### 4.1.3 Regulatory Considerations

WAC Chapters NR 809 (Safe Drinking Water), NR 810 (Requirements for the Operation and Maintenance of Public Water Systems), NR 811 (Requirements for the Operation and Design of Community Water Systems) and NR 812 (Well Construction and Pump Installation) regulate various aspects of public water systems. These requirements are currently being met by the Marinette PWS and would extend to the proposed services. Failure to do so would result in a violation of State and Federal laws.

The Public Service Commission (PSC) of Wisconsin regulates public water utilities including major capital improvements and utility rates and requires various annual reports and financial statements from utilities be filed. The PSC also reviews new public wells and treatment and approves or denies them based on potential water supplies and sources in an area.

WAC Section NR 812.26 requires that water supply wells taken out of service be properly decommissioned. For properties where connection to the PWS will occur, the existing water supply well would be decommissioned by removing the pump, and then filling, sealing and capping the well. In the near term, WDNR may request that certain of these water supply wells be maintained for collection of groundwater samples to monitor groundwater quality as remediation progresses. In the long term, it is

assumed that each of the decommissioned water supply wells would be sealed in accordance with WAS Section NR 812.

#### 4.1.4 Additional Considerations

A key negotiation issue is for permission to install water service laterals onto each property and connect to the new water main system. The preliminary modeling indicates that the water mains would be 4-inch diameter mains adequate to provide water in quantity and quality similar to what previously existed. Further, hydrants may be required for water main flushing.

Extending the Marinette PWS service area to provide a reliable long-term, safe drinking water supply to the proposed services would be fairly straightforward. The Marinette PWS is already established, is adequately staffed, and is currently under the jurisdiction of regulators. This alternative provides the least concerns for operations, maintenance and long-term viability.

### 4.2 Alternative 2 – Establish Town of Peshtigo Sanitary District

This alternative would include the construction of a water distribution system within the well sampling area of the Town of Peshtigo, and laterals would be extended to the proposed services. Each existing water supply well would be decommissioned in accordance with WAC Chapter NR 812. The SD would obtain water from the Marinette PWS. Water would be transported to the point of connection where the Town of Peshtigo would purchase the water through a master water meter connection. The master water meter would be owned and maintained by the Town of Peshtigo SD. The proposed site for these facilities and a portion of the SD's distribution system downstream of these facilities would be constructed within the Town of Peshtigo limits (**Figure 3-2**). Easements and property transfers would be required to allow for operation and maintenance of SD facilities and water mains.

A SD is a quasi-governmental entity with taxing authority, similar to a town or city. SDs are established under Wisconsin Statutes, Chapter 60 – Towns, Subchapter IX –Town SD. These districts provide water and sometimes sanitary sewer service to protect the public health of an area where a water or sanitary sewer utility cannot provide service and where private systems are not considered feasible. When required, the WDNR can force establishment of a SD to protect public health.

A SD has the ability to own, operate, manage and maintain water and sewer utilities, as applicable. Once created, they are treated similarly to other types of public water or sanitary sewer utility. As such, administration, operation and maintenance of a SD are regulated by the Wisconsin Administrative Code, Wisconsin Statutes and Annotations, WDNR, and PCS. The utility would need to establish an income stream appropriate to operate, manage, and maintain the utility system in accordance with the appropriate Wisconsin Administrative Code. This alternative assumes creating a SD for the purpose of providing long-term, safe and reliable water supply for the proposed services.

#### 4.2.1 Water Supply Source

The SD would be required to obtain a safe supply of water and distribute this safe, reliable water to the proposed users. The Marinette PWS is considered the nearest and most viable source of public water supply in the area, as compared to the City of Peshtigo several miles away. The Marinette PWS has

sufficient quantity and quality of water to serve the needs of the PWS. Alternative 2 considers the Marinette PWS as the water source.

## 4.2.2 Facilities and Staffing

The most significant operating cost for a utility is typically personnel, including administrative support, customer service, licensed operators, equipment operators, service technicians, and meter readers. Emergency responders for main breaks and major equipment malfunctions would also be required. Some of this staffing could be provided through current Town of Peshtigo staff, if available. In accordance with WAC Chapter NR 810, the District is required to employ a certified operator to oversee water quality monitoring and preparation and submittal of monthly reports to WDNR. None of these positions justify full-time employment. The SD could also consider subcontracting these duties out to a public entity, such as the City of Marinette, or a private business, who already has trained personnel in the area that could be responsible for the monitoring, reporting, billings, financials and maintenance responsibilities needed by the SD.

It is anticipated that the SD would need a facility somewhere within the Town of Peshtigo for storing spare parts and materials. It is assumed for purposes of this study that existing Town of Peshtigo maintenance facilities would be used, thus no additional buildings are included. The SD would need to maintain this storehouse, ensure that the necessary items are available for repairs, operation and maintenance of the SD's distribution system. It is also expected that the SD would need to purchase a service vehicle to assist with day-to-day operations.

### 4.2.2.1 Interconnection Facility

Facility components for Alternative 2 include the check valve and master water meter. It is recommended that all of these components be incorporated into one Interconnections Facilities vault below grade or possibly a building, if determined necessary (**Figure 3-2**).

## 4.2.3 Regulatory Considerations

The regulatory consideration for this alternative is to establish a SD capable of serving the proposed services.

The PSC of Wisconsin regulates public water utilities (Section 4.1.3 above). As stated, they regulate, review and require reporting. For a new water system, reviews are expected to require between six and nine months and include additional time for public meetings and comments. Arcadis contacted the PSC regarding this evaluation and indicated that establishment of small SDs such as Alternative 2 is generally discouraged because utilities this small frequently encounter management, operational, or financial difficulties that can adversely affect users.

Establishing the SD would need to comply with Chapter 60, Subchapter IX, of the Wisconsin Statutes; however, it also could be established at the order of WDNR. This process would begin with WDNR giving the Town of Peshtigo Board 30 days' notice that they wish to hold a public hearing, and the Board then would be responsible for publishing a hearing notice. After the hearing, and upon receipt of notice from WDNR, the Town of Peshtigo Board would be ordered to establish a Town of Peshtigo SD. If the Town of

Peshtigo Board did not establish a SD within 45 days of the notice from WDNR, WDNR has the authority to issue orders establishing boundaries of the SD, declaring the District organized, and giving the District a corporate name.

WAC Section NR 812.26 requires that water supply wells taken out of service be properly decommissioned. For properties where connection to the SD will occur, the existing water supply well would be decommissioned as presented above in Section 4.1.3.

#### **4.2.4 Additional Considerations**

The water source supply would be the main factor to consider in negotiations. Supply from Marinette PWS would require the most significant negotiations.

As mentioned above, negotiating agreements for a water supply source from the City of Marinette would be more involved. The first issue would be changes to the City ordinances and whether the Border Agreement would require update, or whether a separate water supply agreement would suffice. The latter is recommended, and such a supply agreement should resolve issues regarding size of water mains to be attached, average and maximum flow rates desired at the point of connection, impact fees to be collected, quality of water delivered at the point of master water meter, rates charged for water, term of agreement, and how to modify the agreement over time for growth of the SD's water network.

Other operational issues could be included in the water supply agreement, such as possible desire to subcontract with the City of Marinette for operations, maintenance and management (customer service, meter reading, billings, etc.). Emergency repairs could also be contracted as part of such an agreement.

The list of regulated contaminants continues to be evaluated by USEPA and continues to grow. Over time SD operations could be increased, and more treatment for additional, currently unregulated contaminants could be required. This also increases costs to end users.

Time frame to set up a SD and get agreements in place prior to providing water to residents will be longer than the other alternatives. Inter-government relationships, procedures, and public meetings could pose significant time delays in final implementation of this alternative. Plan reviews for design can be expedited for the piping system.

### **4.3 Alternative 4 – Special Casing Deep Water Supply Wells**

The new special casing deep water supply well alternative would have to be a solution to work for all the properties in the well sampling area and would require the existing private water supply wells to be decommissioned well and a new special casing deep water supply well would be installed several hundred feet deep in the sandstone/dolomite aquifer to provide drinking water, after it is determined if there is a sufficient quantity of water in the deep aquifer in the well sampling area. Depending on the water quality in the deep well aquifer several different water treatment systems would be required along with the inconvenience of operation, maintenance and replacement of the systems. WAC Section NR 812.26 requires that water supply wells taken out of service be decommissioned. For properties where special casing deep wells are installed, the existing water supply well would be decommissioned by removing the pump, then filling, sealing and capping the well. In the near term, WDNR may request that certain water supply wells be maintained for collection of groundwater samples to monitor groundwater

quality as remediation progresses. In the long term, it is assumed that each of the decommissioned water supply wells would be sealed in accordance with WAS Section NR 812as presented above in Section 4.1.3.

Developing a groundwater source would be in accordance with WAC Chapter NR 811 and well construction and pump installation would be in accordance with WAC Chapter NR 812.

Several concerns were identified regarding installation of replacement water supply wells. The goal of this process is to provide properties with a long-term, safe and reliable source of drinking water. Naturally occurring parameters that can affect drinking water quality within Marinette County include calcium, magnesium, sodium, iron, sulfate, bicarbonate, chloride, nitrate, and total dissolved solids (Oakes and Hamilton 1973) and can often increase in concentration with depth. In addition, radium (226 and 228) can affect drinking water quality based on sampling data and treatment associated with the City of Peshtigo's PWS (i.e., closest PWS that utilizes deep wells for source water). In addition to treatment for radium, the City of Peshtigo's PWS requires the use of treatment methods for removal of iron and manganese.

It is anticipated that WDNR will establish additional standards for well construction to safeguard against migration from the well sampling area. Well construction safeguards including double cased private water well with more than 60 ft. of 10-inch grouted casing, plus more than 100 ft. of 6-inch grouted casing with well depths up to 600 ft. are being considered in this report. This alternative assumes that the wells would be installed to depth through the Galena-Platteville formation and into the Sandstone Aquifer.

A water quality analysis for wells that are in operation drawing from the Sandstone Aquifer was performed on existing data from wells throughout Marinette County. Based on results of that analysis, this alternative assumes that treatment for iron, manganese, and radium may be required for each well system; however, additional treatment for other naturally-occurring parameters (e.g., sulfate) may be needed. A test well would need to be constructed at one of the permanent well sites to confirm water quality before detailed design of individual treatment facilities.

Upon reviewing acceptable treatment methods described in WAC Chapter NR 811, contaminants listed above would be treated with an oxidation and filtration unit process along with adsorption media technology. Depending on the results of additional testing, further treatment methods may be required.

Individual well pumps may need to pump through pressure filters with chlorine feed pre-filtration for oxidation of the contaminants and another chlorine feed point post-filtration for disinfection or some other treatment technology such as ultraviolet disinfection, etc. The filtered water would then be re-pumped into a hydro-pneumatic tank to maintain system pressures, provide for backwash water, and attenuate surges during periods of peak demand.

Finally, the waste stream from the treatment process must be appropriately handled. Ideally, the filter backwash wastewater would be discharged directly to a sanitary sewer system, if there were any in the area, but since there are no sanitary sewers in the area another method of waste stream disposal would be required.

### 4.3.1 Regulatory Considerations

The regulatory considerations for the construction of private deep water supply wells are established in WAC Chapter NR 812, which establishes a minimum standard. The WDNR provides a more stringent construction methodology of double casing for water supply wells within the well sampling area.

Regulations for water supply wells used to serve groups of six single family homes or fewer are limited to those applicable to individual private water supply wells (i.e., NR 812) and associated with plumbing connections (Chapter SPS 382).

There is no state or Town regulatory requirement for sampling a private water supply well or a water supply well serving up to six single family homes. However, WAC Chapter NR 700, gives the WDNR authority to require investigation and remediation activities to address a release. Such activities can include implementation of a groundwater monitoring program under WAC Chapters NR 716 or NR 724. As stated earlier in this report, a groundwater monitoring program to evaluate groundwater quality has been implemented in the well sampling area. WDNR may require sampling of the newly installed water supply wells to confirm the absence of contaminants associated with the PFAS.

WAC Section NR 812.26 requires that water supply wells taken out of service be decommissioned. For properties where connection to the PWS will occur, the existing water supply well would be decommissioned by removing the pump, then filling, sealing and capping the well. In the near term, WDNR may request that certain water supply wells be maintained for collection of groundwater samples to monitor groundwater quality as remediation progresses. In the long term, it is assumed that each of the decommissioned water supply wells would be sealed in accordance with WAS Section NR 812.

### 4.3.2 Additional Considerations

If this alternative were selected, negotiations for implementation would be held directly with individual property owners or, in the case of cluster well usage, groups of property owners. The Town would not be included in these negotiations except as it relates to permitting required for well construction and infrastructure associated with water lines from cluster wells.

Additional negotiations would be necessary to implement cluster wells as an alternative. The well sampling area would be divided into groups of two or less single-family homes and a decision would then need to be made on where each water supply well would be constructed. Property deeds would require updating, placing easements across neighboring properties for operations, maintenance and/or replacement of wells, piping, etc. This could prove to be difficult and tenuous, resulting in strained neighbor relations and delays in implementing the alternative.

The use of cluster wells would require that the homes being grouped onto a single water supply well cooperate in initially establishing an agreed-upon location for the shared well and easement rights for future well maintenance. There are no legal requirements or oversight from WDNR, Town or Marinette County Health Department to force “cluster homes” to work amicably together to operate and maintain

wells. It is not uncommon for relationships among the property owners to become strained as individual properties are sold and new owners enter into the arrangement/easement relationship. As a result, there is a potential for future claims by individual property owners if a well fails and the parties cannot agree on upgrades or replacement.

The WDNR is developing updated specifications for construction of replacement water supply wells within the well sampling area. Construction methods include installation of a casing from the ground surface to sealing the casing within the rock. Protection of the aquifer would rely on the successful well construction and continued integrity of the casing and seal. A construction deficiency or seal failure could result in migration of contaminants to the aquifer.

There are no specific monitoring requirements for private water supply wells. In the absence of a monitoring program, there would be no mechanism to identify whether contaminants from the well sampling area have migrated to a replacement well. Additionally, other water quality parameters, such as radium, would potentially be present in the drinking water at concentrations greater than MCLs which would require consistent treatment and monitoring. Documentation from existing individual deep wells indicates water quality is questionable with varying levels of iron, radium, sulfate, and dissolved solids, in the deep aquifers requiring softeners, sediment filters, reverse osmosis, and potentially other treatment systems installed on the owner's property who would be responsible for operation and maintenance.

An Individual deep well does not provide the redundancy for sustainable long-term water supply.

The potential for drag-down of affected groundwater from the shallow sand aquifer is possible, if measures, such as double/triple casing, are not taken to prevent drag-down during well installations. Drag-down could cause prolonged and consequential impacts affecting just one well or multiple wells depending on proximity and concentrations in the overlying sand unit and communication within rock.

Continuous monitoring of individual deep wells may be necessary with multiple wells to access, which residents may resist, resulting in inefficient, time consuming, costly, continued property access and potential worker safety issues given the nature of the project/public relations.

The cost and inconvenience of operating, maintaining, replacing and monitoring associated with deep wells and water treatment systems will most likely be higher than the cost of municipal water.

The Town may benefit with new residents to support the taxes base with the new municipal water, which can easily provide water service to new residential and/or other development on vacant properties along the new water mains, which may not be the case for deep water supply wells.

Not all the property owner's in the well sampling area may elect to have a deep well and prefer a municipal water supply. Municipal water provides property owner's the option to "Opt-In" or Opt-Out" of connecting to municipal water, where deep wells do not provide this option. Municipal water also provides an option for non-affected property owners to connect to municipal water and abandon their existing well water.

Based on these additional considerations, this approach seems unlikely to be a viable and reliable, safe long-term water supply for generations to come..



## 5 WATER SUPPLY ALTERNATIVES COMPARATIVE ANALYSIS

Each alternative was evaluated separately to better define and identify key aspects. Each alternative was also compared to the remaining alternatives, to defensibly compare options and provide a single recommendation. The comparative analysis includes multiple criteria and an economic and timeline comparison.

### 5.1 Evaluation Criteria

A series of 11 evaluation criteria were considered for the Alternatives Comparative Analysis. Each of the 11 criteria was assigned a weighting percentage totaling 100 percent. All criteria were scored a 1 (comparatively unfavorable) to a 5 (comparatively favorable), and each score was factored by the criteria weight. The resultant overall alternative evaluation score was presented out of a total possible score of 5.0.

Three main categories were considered for the criteria weighting percentage. The categories and corresponding percentages are shown in **Table 5-1** below.

Table 5-1. Evaluation Criteria Weighting

Category	Percentage	Criteria
Efficiency to Implement	10	Technical Feasibility
	5	Schedule
	5	Cost
Long Term Viability	15	Water Quality
	15	Water Quantity
	15	Long Term Susceptibility
Long Term Viability	5	Operation and Maintenance
	5	Legal and Regulatory Complexities
	5	Monitoring and Reporting Compliance
	10	System Redundancy
	10	Anticipated Public Acceptance
<b>Total</b>	<b>100</b>	

#### 5.1.1 Long-Term Susceptibility

Each alternative was compared on its susceptibility as a long-term replacement water supply. The evaluation considered factors such as maintaining an adequate source, potential for long-term use and ability for adapting to long-term changes in property ownership. A public water system would be comparatively favorable due to its established resources and maintenance procedures and its ongoing regulatory sampling and reporting requirements.

### **5.1.2 Technical Feasibility**

Each alternative was compared on its technical feasibility as a long-term replacement water supply. The evaluation considered factors such as ability to meet the defined assumptions, best available technology for treatment and possibility of technical complications. Alternatives were also compared based on type and amount of water infrastructure required. A supply requiring additional treatment, pumping, or water storage was comparatively unfavorable to a supply not requiring treatment, pumping or storage.

### **5.1.3 Quantity of Water**

Each alternative was compared on the quantity of water available to be supplied to the proposed services. The evaluation considered factors such as available capacity for a public water system and volume of water available in the specific aquifer strata for drilling new deep wells. Alternatives with known available capacities would be comparatively favorable to alternatives with unknown specific available capacities from a deep well.

### **5.1.4 Quality of Water**

Each alternative was compared on the quality of water provided to the proposed services. The evaluation considered factors such as data available to determine water quality, untreated water quality of source and ability to maintain adequate water quality delivered to each user. Alternatives with historically adequate water quality data, ability to flush areas with high water age and ability to maintain quality water at customer taps would be comparatively favorable to alternatives with poor or little historical water quality data and lack of control to maintain water quality at customer taps.

### **5.1.5 Operations, Maintenance, and Replacement**

Each alternative was compared for its complexity and ability for the infrastructure owner(s) to operate, maintain and replace. The evaluation considered factors such as treatment equipment complexity, infrastructure useful life and ability for future replacement. Alternatives with minimal equipment, infrastructure with a high useful life and treatment equipment that could be easily removed and replaced were comparatively favorable to alternatives with complex or buried infrastructure, treatment requiring chemical addition and treatment resulting in conveyance or additional treatment of large quantities or high concentrations of treatment process waste streams.

### **5.1.6 Legal and Regulatory Complexity**

Each alternative was compared for its legal and regulatory complexity, considering alternative implementation as well as long-term operation. The evaluation considered factors such as infrastructure ownership, necessity to revise or supplement the existing Town of Peshtigo/City of Marinette Border Agreement and additional regulations applicable to the infrastructure within each alternative. Alternatives that were an extension of existing infrastructure or with minimal legal requirements were comparatively favorable to alternatives that developed a new public water entity or alternatives that may require multiple property owner easements.

### 5.1.7 Monitoring, Reporting, and Compliance

Each alternative was compared on its monitoring and reporting complexity and its long-term ability to maintain monitoring and reporting compliance. The evaluation considered factors such as assumed sampling frequency, technical expertise required of the personnel responsible for the infrastructure and past monitoring and reporting compliance. Alternatives considering private water supply were comparatively favorable to alternatives potentially requiring long-term raw water, treatment and distribution sampling and compliance.

### 5.1.8 Timing to Implement

Each alternative was compared on its estimated implementation schedule, from detailed design to water at the users' tap. The evaluation considered factors such as schedule estimates for design, regulatory and local approvals; pilot testing; plan reviews; capacity assurance plans; construction, startup and testing. Alternatives with the least time estimated to full implementation were comparatively favorable to alternatives with the longest estimated time to full implementation.

### 5.1.9 System Redundancy

Each alternative was compared on its reliability to continuously provide a long-term water supply through infrastructure redundancy. The evaluation considered backup from the water supply source, extent of looping within a distribution system, duplicate treatment or distribution equipment and power facilities. Alternatives with multiple redundancies within the source and distribution were comparatively favorable to alternatives with little or no source or distribution redundancy.

### 5.1.10 Anticipated Community Acceptance

Each alternative was compared on its anticipated community acceptance as a long-term water supply for the users. The evaluation weighed public perception of having a safe and reliable water supply from a public water system with the perception of no user cost for private well supply.

### 5.1.11 Cost

Each alternative was compared on its estimated operation and maintenance cost. Alternatives with lowest operation and maintenance cost estimate were comparatively favorable to alternatives with the highest operation and maintenance cost estimate. Capital cost is not part of this evaluation, since Tyco is providing the capital for the new infrastructure. Cost was evaluated with the 10 other specific criteria to provide an overall evaluation score encompassing all significant aspects of each alternative.

## 5.2 Evaluation Results

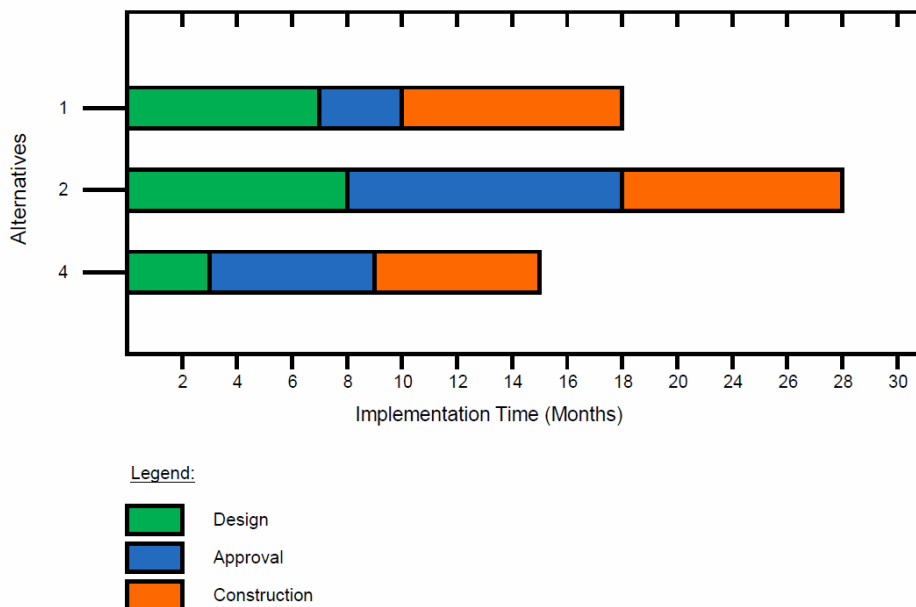
Results of the comparative analysis are summarized in **Table 5-2**. An overall comparative evaluation score is provided as an overall rank of alternatives based on the criteria defined within Section 5.1. Due to the criticality of the project timeline, additional comparison and evaluation of implementation schedule is provided. Further supporting information and assumptions in developing anticipated project costs and

operation and maintenance costs is also provided within the evaluation results. A brief summary of the comparative analysis results for each alternative is also provided.

## 5.2.1 Implementation Schedule Comparison

The general estimated implementation schedule is shown in **Figure 5-1** “Implementation Schedule Comparison”.

**Figure 5-1. Implementation Schedule Comparison**



The schedule considers multiple steps to alternative implementation ranging from detailed design through water at the user’s tap. The evaluation considers factors such as schedule estimates for design, regulatory and local approvals; pilot testing; plan reviews; capacity assurance plans; construction, startup and testing. Many of the specific requirements such as approval and testing are based on possible requirements that may or may not be imposed by regulatory agencies. Therefore, the following assumptions were considered in the implementation schedule estimate:

- 1) Alternatives for design and approval do not include any time needed for negotiations among various stakeholders.
- 2) Alternative 1 Negotiations:
  - a. City of Marinette to extend water into Town of Peshtigo.
  - b. Tyco and property owners to permit access to private property to install services and disconnect wells.
- 3) Alternative 2 Negotiations:
  - a. Same as Alternative 1
  - b. Marinette and Town of Peshtigo Water Supply Agreement.
  - c. WDNR and Town of Peshtigo to establish SD.
  - d. SD to establish utility ordinances, standards, and codes.
- 4) Alternative 4 Negotiations:

- a. Tyco and property owners to permit access to private property to install services for new deep water supply well and disconnect and abandon existing wells.
- b. WDNR acceptance of new deep well construction.
- c. Property owners with each other to create easements and operations, maintenance and expense sharing agreement and to file new easements or agreements with County recorder.

## 5.2.2 Conceptual Level Capital and O&M Cost Options

Cost opinions are Class 5, conceptual level cost opinions as defined by the AACE. These cost opinions were developed by Arcadis based on similar construction project bids and contracts as well as through Means Cost Estimating guides. Further, budgetary costs were provided by manufacturers for specialty equipment as determined necessary for the various alternatives. For well drilling, contractor input was also solicited and considered herein.

These costs are conceptual in nature, with unknowns regarding treatment for potential wells, resulting waste streams, cost opinions associated infrastructure and the sanitary district. Thus, a 30 percent contingency was added onto all the overall cost opinions. Cost opinions for water piping, valves, hydrants, and service connections are included. This portion of the capital cost comprises of the largest percentage of the engineer's opinion of construction cost (EOCC). Well installation costs within the well sampling area are significantly higher than outside of the well sampling area, because wells must comply with WDNR requirements. For Alternatives 1, 2, and 4 all of the private wells are anticipated to be abandoned. WDNR requirements for this area would include significantly deeper wells with special casing and specialized drilling and construction methods. Conversely, annual operating costs are relatively minor compared to the capital costs for developing a new sanitary district. Operating costs for a sanitary district include personnel, utilities, chemicals, facilities' needs, postage, consumables, etc.

**Table 5-3** "Anticipated Alternative Costs" summarize the EOCC for Alternatives 1, 2 and 4 at \$10.37 Million, \$10.59 Million, and \$3.89 Million, respectively. Additional factors must be considered to make a comparison among these alternatives. Maintenance and replacement costs are considered to be very low during the first five years and also over the 20-year planning period of this Alternatives Evaluation. The utility infrastructure will be new. Specialty equipment should not need much initial maintenance work and tends to have a design life of at least 20 years. Finally, the most significant portion of the capital cost is for piping infrastructure that has a minimum design life of 50 years. As with any utility, rates charged to users of the utility must be sufficient to cover operations, maintenance, and replacements of the infrastructure. A utility fund is an enterprise fund and is expected to be self-sufficient, not requiring outside taxes or general operating funds to support the utility. Table 5-3 shows a summary of the anticipated capital and OM&R cost for each alternative. The EOCC tables are included in **Appendix B** "Cost Estimates" for each alternative.

## 5.2.3 Alternative Results Summary

Each of the alternatives selected for further evaluation has been further defined, evaluated and compared. A brief summary of the alternatives evaluation results is provided herein, including the evaluation score for each alternative (**Table 5-2**).

### **5.2.3.1 Alternative 1 – City of Marinette Public Water System Expansion**

Alternative 1 would extend the City of Marinette PWS to supply water to the proposed services defined herein. Comparative analysis results indicate an evaluation score of 4.8 out of 5.0. The alternative ranked favorably due to its established resources, maintenance and reporting requirements; available data and ability to meet the defined assumptions; adequacy of water quality and quantity, and short implementation timeline. Potential extension of the City of Marinette PWS has been anticipated, studied, modeled and would be included in the Border Agreement between the City of Marinette and Town of Peshtigo. The system has a plan for maintaining a well-reinforced transmission grid as the water utility develops.

### **5.2.3.2 Alternative 2 – Establish Town of Peshtigo Sanitary District**

Alternative 2 would establish a SD with a water distribution system supplied by the Marinette PWS. Comparative analysis results indicate an evaluation score of 4.0 out of 5.0. The alternative ranked favorably due to the Marinette PWS water supply having adequate quality and quantity. The alternative ranked unfavorably because of the additional legal and regulatory complexity, lack of proven maintenance and necessity to develop a new water utility, and the additional implementation time and complexity of operating and maintaining a master water meter station. The SD start-up as a new utility would present challenges and complexities that would likely result in increased time required for implementation.

### **5.2.3.3 Alternative 4 – Private Special Casing Deep Water Supply Wells**

Alternative 4 would include new special casing deep water supply wells and would require the existing private water supply wells to be decommissioned by removing the well pump and a new deep water supply well would be installed to provide drinking water to the well sampling area in the Town of Peshtigo. Comparative analysis results indicate an evaluation score of 3.2 out of 5.0. The alternative ranked unfavorably due to the various unknown availability of siting and drilling new deep wells and the need for it to work for all residences along with the need for the development of individual water treatment systems, which would be based on results of needed test wells and pilot studies. The alternative scored the lowest for long term susceptibility, technical feasibility, quality of water, quantity of water, operation and maintenance, monitoring, reporting and compliance and system redundancy.

## 6 SELECTION AND RECOMMENDATION OF ALTERNATIVES

Through completion of the initial Alternatives Evaluation, multiple alternatives were considered to select potentially feasible options for providing reliable and safe long-term water supply to the well sampling area. A more detailed review of the alternatives selected in initial Alternatives Evaluation was conducted in the detailed Alternatives Evaluation. Through the specific evaluation of alternatives and their multi-parameter comparative analysis, a recommendation for the preferred alternative for a long-term water supply is provided herein.

### 6.1 Basis of Recommendation

The new special casing deep water supply wells, Alternative 4, has been excluded from further consideration based on the results of the feasible water supply alternatives evaluation presented in Section 4 and the water supply alternative comparative analysis presented in Section 5.

Alternatives 1 and 2 include the City of Marinette as the source water and a new distribution system service area near the region bounded by University Drive, along Shore Drive, Green Gable Road, and along County Road B. Considering the differences between these two alternatives, a direct City of Marinette supply, and operations, maintenance and ownership provides for a solution that can be implemented in a more expeditious timeframe and should require less effort and time for negotiations. It is Arcadis' opinion that the additional time needed to establish a SD and adequately develop and staff a new water utility would delay implementation of the long-term water solution well into 2021. In addition, the PSC has indicated that establishment of a utility as small as the one being considered for Alternative 2 is generally discouraged.

Based on the analysis summarized in this report, Arcadis recommends Alternative 1 as the long-term water supply solution for the proposed services included in this Alternative's Evaluation.

### 6.2 Conceptual Design

As a part of the detailed evaluation of Alternative 1, several different layouts were simulated using the City of Marinette's hydraulic model and anticipated demands for the Town of Peshtigo. These alternative layouts considered the wells in the well sampling area and how to best serve the Town of Peshtigo, they are presented in **Figure 6-1** "Potential Long-Term Water Supply Expansion". A summary of the layouts evaluated is presented in **Table 6-1** below.

**Table 6-1: Potential Long-Term Water Supply Expansion Scenarios**

Scenario	Description	Route on Figure 6-1	Number of Potential Customers
1 - Baseline			
1A	Services	Purple	58
1B	All Currently Developed Parcels		152
1C	All Potential Parcels		176
2 - Baseline and Loop			
2A	Services	Purple and Blue	58
2B	All Currently Developed Parcels		152
2C	All Potential Parcels		200
3 - Baseline, Loop, and Potential Expansion			
3A	Services	Purple, Blue, and Green	58
3B	All Currently Developed Parcels		164
3C	All Potential Parcels		211

The baseline Scenario 1A presented in **Table 6-1** provides water to the Town of Peshtigo residents that have private groundwater wells with sampling results detected, either above or below the detection limit. Scenario 1B provides water to all of the residents along the route shown in purple in the figure, and Scenario 1C provides water to all of the potential parcels, whether developed or not, along the purple route.

The baseline and loop Scenario 2A provide the same water quantity as Scenario 1A; however, it provides a looped pipe that discourages higher water age in the distribution system. Scenario 2B provides water to all of the residents along the purple and blue routes. Scenario 2C provides water to all of the potential parcels, whether developed or not, along the purple and blue routes.

The baseline, loop, and potential expansion in Scenario 3A provides the same water quantity as Scenario 1A and 2A; however, it provides the additional potential expansion pipes along Madsen Road and Stanley Lane. Scenario 3B provides water to all residents that can connect along the purple, blue, and green routes. Scenario 3C provides water to all of the potential parcels, whether developed or not, along the purple, blue, and green routes.

In the Scenarios modeled, the water supply from the City of Marinette was deemed sufficient. The pumps, tanks, pressures, and water age were compared to ensure that there are no negative affects to the City of Marinette’s distribution system as a result of the expansion into the Town of Peshtigo. The pipe sizes evaluated were 4-inch and do not provide fire flow for the Town of Peshtigo. Pressures observed were well within the standard range, with most locations showing 50-70 psi and the pipe velocities were within the acceptable 2-5 feet per second range. In the initial evaluation of water quality with the scenarios simulated, there was no change in the City of Marinette’s existing system due to the addition of the Town of Peshtigo residents. There are potential water quality issues in some areas in the proposed alternative layout, but those issues can potentially be resolved with looping watermains, providing automatic flushing



systems, manually flushing the system at certain locations, or providing control valves to regulate flow.

**Figures 6-2 through 6-5** present the preliminary water quality simulations for the model scenarios.

The proposed recommended layout for Alternative 1 is shown on **Figure 6-2** "Scenario 2B Water Age-All Current Parcels, hrs". This alternative includes approximately 5.9 miles of water mains along University Drive, Shore Drive, Green Gable Road, County Road B and Rader Road.

A total of 152 private wells would potentially be decommissioned. However, in the interest of maintaining the existing groundwater monitoring network, these wells may not be completely abandoned for the next few years. Homes in the Town of Peshtigo that desire to connect to the municipal system will be connected to the water system. If contaminants migrate and further wells are found to be contaminated over time, those homes that did not connect initially could also be connected to the water system.

No sanitary sewers or other facilities other than what is included above will be considered as part of this long-term water supply solution. Providing water via this Alternative does not require annexation of lands and will be agreed upon in the new Border Agreement between the City of Marinette and Town of Peshtigo.



Figure 6-2. Existing System Water Age, hrs.

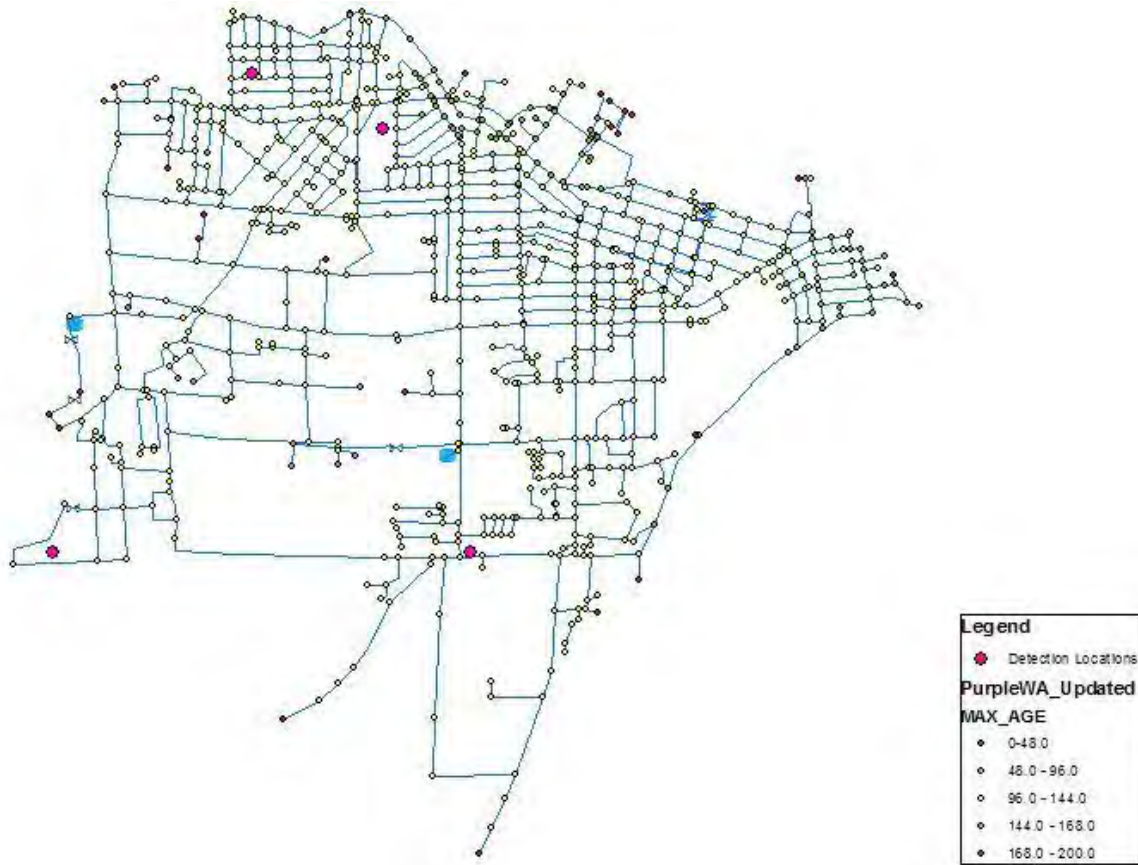


Figure 6-3. Scenario 1B Water Age-All Current Parcels, hrs.

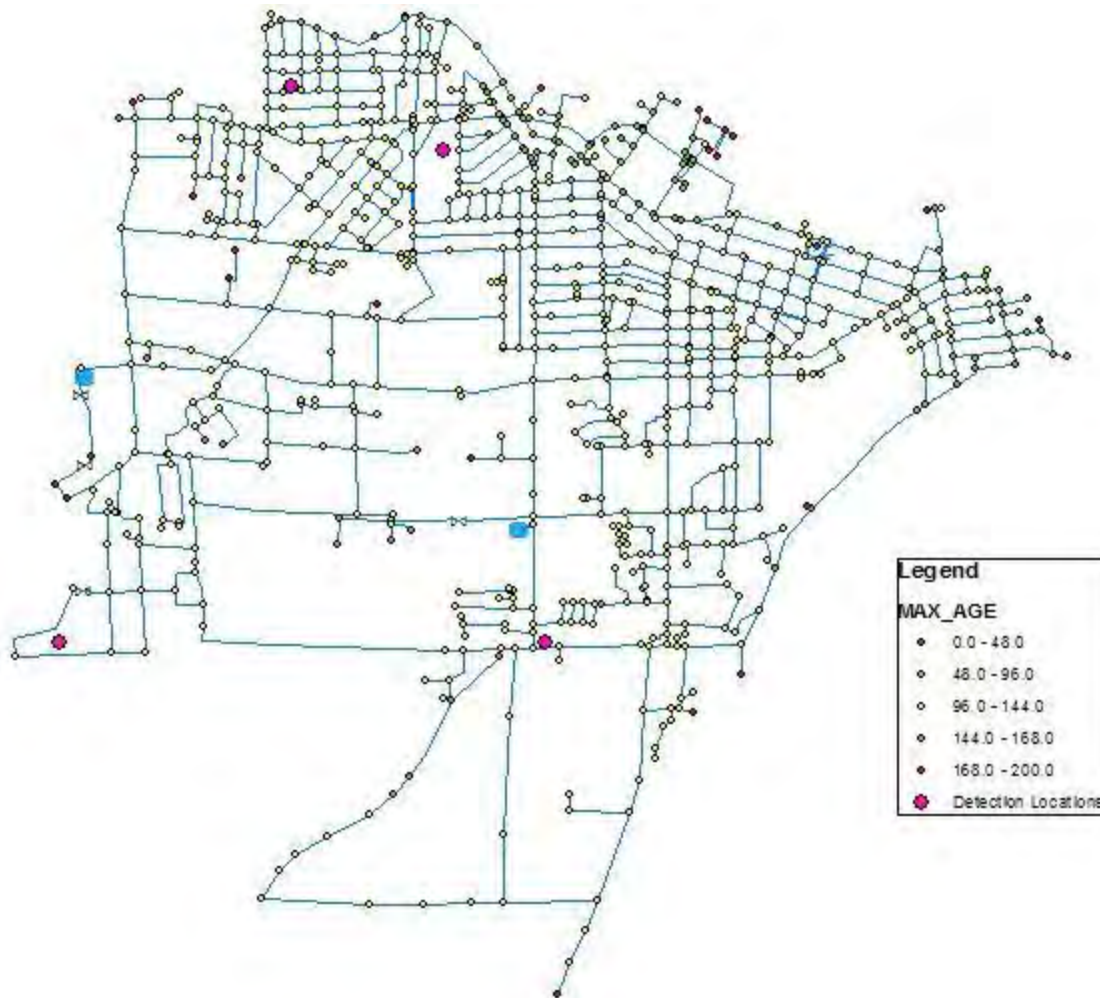


Figure 6-4. Scenario 2B Water Age-All Current Parcels, hrs.

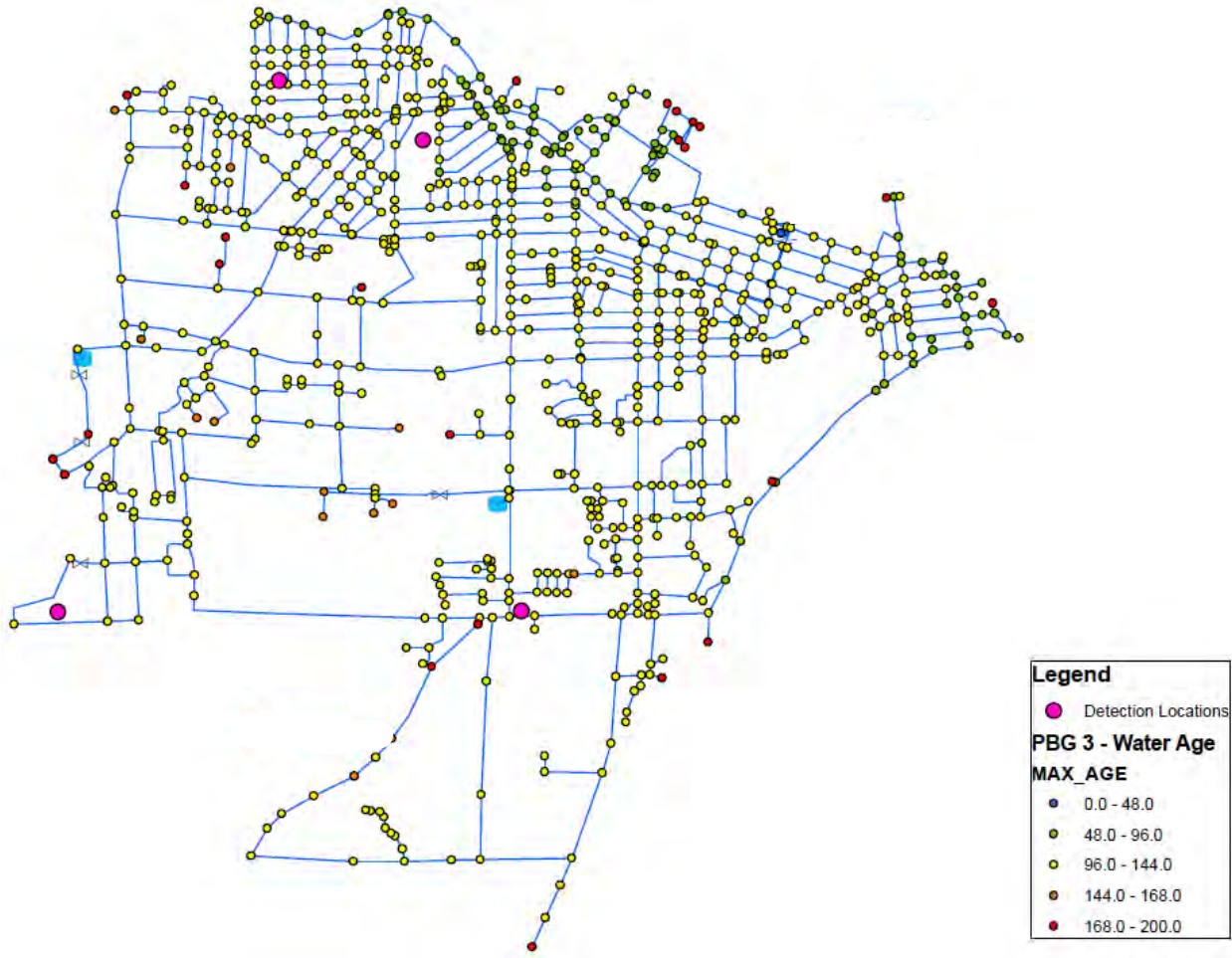
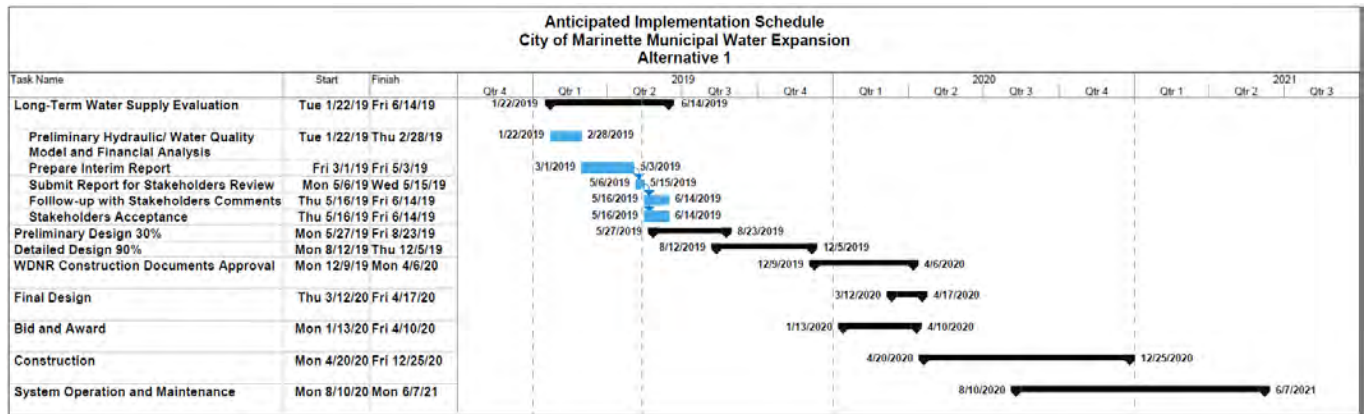


Figure 6-5. Scenario 3B Water Age-All Current Parcels, hrs.

### 6.3 Anticipated Implementation Schedule

Considering the assumptions set forth for Alternative 1 in Section 5.2.1, an anticipated implementation schedule for Alternative 1 is shown below in **Figure 6-6**.

Figure 6-6. Anticipated Implementation Schedule, Alternative 1



The schedule requires cooperation among various stakeholders throughout each project phase; however, one month of float is included so that implementation is completed by the end of 2021. This anticipated schedule shall be considered preliminary until confirmed following additional activities.

### 6.4 Financial Impact Analysis

Alternatives 1, 2 and 4 were selected for more detailed assessment based on the initial alternative’s evaluation and stakeholder feedback, and Alternative 1 was selected for a financial analysis. Under Alternative 2, the Town of Peshtigo could develop a SD. The Town of Peshtigo would purchase water as a wholesale customer from the City of Marinette in order to provide clean drinking water for its residents. In this alternative, the City of Marinette would enter into a negotiated service agreement to provide water to the point of delivery for the Town of Peshtigo’s SD. The City of Marinette would still own and operate assets necessary to deliver water, but the Town of Peshtigo’s SD would be responsible to purchase, maintain and operate assets for distributing water to its customers. Under this alternative, Town of Peshtigo customers would not benefit from the economies of scales associated with being a City of Marinette customer and would likely have high water rates. Under Alternative 4, typical monthly expenses would be higher than expenses associated with existing wells due to the additional depth of well. A comparison of annual costs for Town of Peshtigo customers is presented in Section 6.4.5.

A financial analysis was performed for the recommended alternative consisting of providing municipal water from the City of Marinette to the well sampling area in the Town of Peshtigo. The analysis evaluated three different components. First, the City of Marinette’s latest PSC of Wisconsin Water Rate Application Model was used to compare the status quo of not having Town of Peshtigo customers to having them to determine if existing City of Marinette customer’s water rates would be affected. Then the financial impact to the City of Marinette was evaluated by calculating the net income for each alternative from the revenue and expenses associated with including Town of Peshtigo customers. Third, the

financial impact to the Town of Peshtigo was evaluated by comparing the estimated annual water bill for average usage to the estimated annual cost of having a well.

### 6.4.1 Water Expansion Alternative 1 Scenarios for Financial Analysis

Nine different alternatives were used to compare providing municipal water to the Town of Peshtigo from the City of Marinette. The technical background and details of each alternative are discussed earlier in this report. **Table 6-2** lists the alternatives and the potential new customers associated with each one.

**Table 6-2. Municipal Water Alternative 1 Scenarios**

Scenarios	Miles of Water Pipe	Potential New Customers
1A – Baseline with Detects	4.6	58
1B – Baseline with All Currently Developed Parcels	4.6	152
1C – Baseline with All Potential Parcels	4.6	176
2A – Baseline and Loop with Detects	5.9	58
2B – Baseline and Loop with All Currently Developed Parcels	5.9	152
2C – Baseline and Loop with All Potential Parcels	5.9	200
3A – Baseline, Loop and Potential Expansion with Detects	6.7	58
3B – Baseline, Loop and Potential Expansion with All Currently Developed Parcels	6.7	164
3C – Baseline, Loop and Potential Expansion with All Potential Parcels	6.7	211

### 6.4.2 Financial Analysis Process

The City of Marinette used the Rate Application Model in 2014 to apply for its current water rates, and it will be used for the first step of this analysis to determine the water rate impact on City of Marinette customers when water service is provided to Town of Peshtigo customers. The status quo of the Rate Application Model will be the original one developed by the City of Marinette without any Town of Peshtigo customers and resulted in a 39.5 percent rate increase. The status quo will be compared to scenarios when Town of Peshtigo customers are added to the water system to calculate whether the proposed rate increase of 39.5 percent will increase or decrease. An increase would mean City of Marinette customers would have higher rates resulting in more expensive water bills and would be considered a negative effect for City of Marinette customers. Whereas no change or a decrease in the percentage would mean City of Marinette customers will have the same or lower rates resulting in the same or cheaper water bills and would be considered a positive effect for City of Marinette customers.

The Rate Application Model used by water municipal utilities to apply for requested rate increases includes the following data as inputs:

- Reason for the requested increase
- Historical meter sales
- Volume sales for the test year

- Meter sales for the test year
- Public fire protection revenue for the test year
- Operating revenues for the test year
- Taxes for the test year
- Property tax equivalent computation
- Operating expenses
- Utility plant in service
- Contributed plant
- Depreciation accrual and expenses
- Accumulated depreciation

For this analysis, the following categories were revised for scenarios including Town of Peshtigo customers: volume sales for the test year, meter sales for the test year, operating revenues for the test year and operating expenses. The remainder of the inputs were not changed as part of this analysis.

### 6.4.2.1 Volume Sales for the Test Year

The City of Marinette uses a declining block rate structure based on volumetric usage. **Table 6-3** shows water rates that were used in the 2014 Rate Application Model.

**Table 6-3. 2014 Water Rates**

Volume Block	Rate (\$/CCF)
First 2,600 CCF	\$3.56
Next 22,000 CCF	\$3.22
Next 24,600 CCF	\$2.24

The volume sales for Town of Peshtigo customers were based on the City of Marinette’s residential usage for customers with 5/8-inch water meters. The average residential customer in 2014 used 61.1 hundred cubic feet (CCF) per year. The typical volume used in each tier for the City of Marinette’s residential customers was also used for potential Town of Peshtigo customers. The distribution of residential volume in each tier for the City of Marinette was 98.2 percent in the first 2,600 CCF, 1.5 percent in the next 22,000 CCF and 0.3 percent in the next 24,600 CCF. The estimated volume for Town of Peshtigo customers was added to the volume sales for the test year based on each scenario and is shown in **Table 6-4**.

**Table 6-4. Town of Peshtigo Estimated Volume (CCF) per Volume Block**

Volume Block	1A	1B	1C	2A	2B	2C	3A	3B	3C
First 2,600 CCF	3,480	8,339	10,559	3,480	9,119	11,998	3,480	9,839	12,658
Next 22,000 CCF	52	124	157	52	136	179	52	147	189
Next 24,600 CCF	11	27	34	11	29	39	11	32	41

The volume sales were then calculated by multiplying the usage in each tier by the 2014 water rates for each tier.



### 6.4.2.2 Meter Sales for the Test Year

The City of Marinette charges a flat service charge for 5/8-inch residential meters on a monthly basis. For each scenario, the number of Town of Peshtigo customers were added to the 5/8-inch residential meter count. The meter sales were calculated by multiplying the number of meters by the monthly service charge, which was \$7.21 per month in 2014.

### 6.4.2.3 Operating Revenues for the Test Year

Operating revenues were revised to include revenues generated from additional volume and meter sales to Town of Peshtigo customers. Unmetered sales, private fire protection service revenue, and other operating revenues were not changed for this analysis.

### 6.4.2.4 Operating Expenses

The following expenses were escalated by 4.6 percent based on the maximum percentage increase in the customer base by providing for Town of Peshtigo customers:

- Source of Supply – operation and labor expenses
- Source of Supply – miscellaneous expenses
- Pumping labor and expense
- Pumping miscellaneous expenses
- Maintenance of pumping equipment
- Water treatment chemicals
- Water treatment – operation and labor expenses
- Water treatment – miscellaneous expenses
- Maintenance of water treatment expenses
- Meter reading labor
- Customer records and collection expenses
- Miscellaneous customer accounts expenses

Additional expenses related to transmission and distribution were added based on the 2017 Benchmarking Manual published by American Water Works Association. The manual lists distribution O&M costs as \$681,818 annually per 100 miles of pipe. This cost was included based on the number of miles of pipe associated with each scenario to provide water to the Town.

### 6.4.3 Rate Impact on City of Marinette Customers

After the Rate Application Model was updated to determine the water rate impact on City of Marinette customers when water service is provided to Town of Peshtigo customers, the scenarios in **Table 6-5** were calculated based on the potential new customers from the Town of Peshtigo and miles of new distribution piping. The results show that water rates for the existing City of Marinette customers would only increase in scenarios where 58 Town of Peshtigo customers are added to the system. The other scenarios show that water rates for existing City of Marinette customers would either stay the same or decrease. Under scenarios 1, 2 and 3, at least 125, 145 and 160 Town of Peshtigo customers would need to be added to maintain the same water rates for existing City of Marinette customers, respectively.

In scenarios where water rates are maintained or decrease, the City of Marinette customers are benefitting from higher water sales, which are used to calculate potential rate increases.

**Table 6-5. Rate Increase Comparison Using Rate Application Model**

Alternative	Potential New Customers	Impact to Required Rate Increase	Rate Increase in Rate Application Model
Status Quo	0	-	39.5%
1A	58	0.8%	40.3%
1B	139	-0.1%	39.4%
1C	176	-0.5%	39.0%
2A	58	1.1%	40.6%
2B	152	0.0%	39.5%
2C	200	-0.6%	38.9%
3A	58	1.2%	40.7%
3B	164	0.0%	39.5%
3C	211	-0.6%	38.9%

#### 6.4.4 Rate Impact on City of Marinette

The second step in the financial analysis evaluates the effect on the City of Marinette. Although existing City of Marinette customers benefit from higher water sales to maintain or lower rates in most alternatives, the City of Marinette could experience a slight decrease in net income because the revenue generated from Town of Peshtigo customers would be less than the expenses to serve Town of Peshtigo customers. The projected net income when considering only revenues and expenses related to Town of Peshtigo customers is shown in **Table 6-6**.

**Table 6-6. Comparison of the Town of Peshtigo Net Income**

Scenario	Town Revenue with 2014 Rates	Town Expenses	Annual Town Net Income
1A	\$17,597	\$54,423	(\$36,826)
1B	\$42,173	\$54,423	(\$12,250)
1C	\$53,399	\$54,423	(\$1,024)
2A	\$17,597	\$62,987	(\$45,390)
2B	\$46,117	\$62,987	(\$16,870)
2C	\$60,681	\$62,987	(\$2,306)

Scenario	Town Revenue with 2014 Rates	Town Expenses	Annual Town Net Income
3A	\$17,597	\$68,766	(\$51,169)
3B	\$49,758	\$68,766	(\$19,008)
3C	\$64,018	\$68,766	(\$4,748)

Town of Peshtigo revenues were then calculated using the City of Marinette’s current rates.

**Table 6-7. Comparison of the Town of Peshtigo Net Income Using Current Rates**

Scenario	Town Revenue with Current Rates	Town Expenses	Annual Town Net Income
1A	\$23,080	\$54,423	(\$31,343)
1B	\$55,313	\$54,423	\$890
1C	\$70,036	\$54,423	\$15,613
2A	\$23,080	\$62,987	(\$39,907)
2B	\$60,486	\$62,987	(\$2,501)
2C	\$79,586	\$62,987	\$16,599
3A	\$23,080	\$68,766	(\$45,686)
3B	\$65,261	\$68,766	(\$3,505)
3C	\$83,964	\$68,766	\$15,198

It would require at least 140, 160 and 180 Town of Peshtigo customers under Scenarios 1, 2 and 3, respectively, to reach a \$0 net income, which is shown in **Figure 6-7** “Net Income from Town of Peshtigo Customers”.

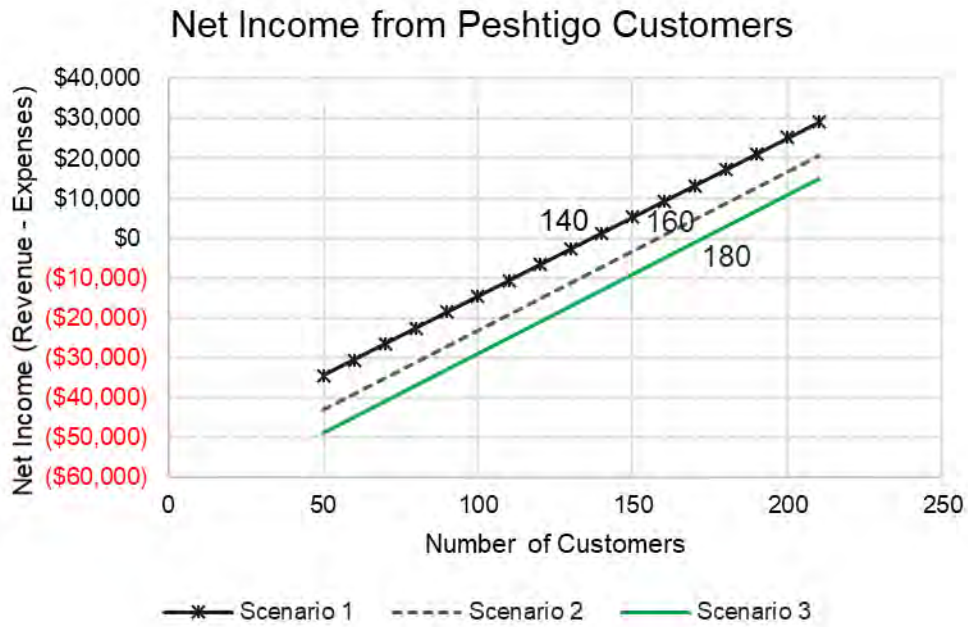


Figure 6-7. Net Income from Town of Peshtigo Customers

### 6.4.5 Water Bill Impact on Town of Peshtigo

The last step in the financial analysis evaluates the impact on the Town. The City of Marinette’s estimated average monthly residential water usage was calculated to be 5 CCF or 3,740 gallons per month. The average residential water usage for City of Marinette customers was used to estimate typical water bills for Town of Peshtigo customers. The current water rate is \$4.70 per CCF for the first 2,600 CF. The average residential water bill for Town of Peshtigo customers is estimated to be \$23.50 per month or \$282 annually. **Table 6-8** shows a range of water bills based on consumption.

Table 6-8. Estimated Water Bill for Town Customers

Usage (CCF)	Monthly Bill	Annual Bill
5	\$23.50	\$282
6	\$28.20	\$338
7	\$32.90	\$395
8	\$37.60	\$451
9	\$42.30	\$508
10	\$47.00	\$564
11	\$51.70	\$620
12	\$56.40	\$677
13	\$61.10	\$733

Usage (CCF)	Monthly Bill	Annual Bill
14	\$65.80	\$790

In comparison, it was estimated that Town customers spend between \$100 to \$600 annually for well water, which varies depending on age of pumps and motors, electrical usage and chemicals used for treatment. For special casing deep wells under Alternative 4, the estimated annual cost is between \$450 to \$830 annually. The average residential water bill of \$282 per year would be in the middle of the range for existing wells and below the range of deep wells.

### 6.4.6 Financial Impact Summary

The probable construction costs and financial impacts to the City of Marinette and Town of Peshtigo are summarized below in **Table 6-9**. The financial impact to the Town of Peshtigo was calculated by multiplying the average annual residential water bill by the number of customers for each alternative over 5-years. The financial impact to the City of Marinette was calculated by multiplying the annual net income using current water rates associated with the Town of Peshtigo for each alternative times the number of years. The total cost for recommended alternative 2B is estimated to be \$10,596,827.

**Table 6-9. Financial Impact Summary for Municipal Water Scenarios**

Scenarios	Probable Construction Cost	Town Water Bills (5-years)	City Net Income Offset (5-years)	Total
1A	\$7,020,000	\$81,780	\$156,715	\$7,258,495
1B	\$8,860,000	\$195,990	-	\$9,055,990
1C	\$9,700,000	\$248,160	-	\$9,948,160
2A	\$8,230,000	\$81,780	\$199,535	\$8,511,315
2B	\$10,370,000	\$214,320	\$12,507	\$10,596,827
2C	\$11,460,000	\$282,000	-	\$11,742,000
3A	\$9,340,000	\$81,780	\$228,430	\$9,650,210
3B	\$11,760,000	\$231,240	\$17,526	\$12,008,766
3C	\$12,820,000	\$297,510	-	\$13,117,510

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# TABLES





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# TABLES

**Table 3-1: Long-Term Water Supply Alternatives Summary**

**Table 3-1 - Long Term Water Supply Alternatives Summary - DRAFT**  
**Tyco - City of Marinette - Town of Peshtigo, WI**

Alternatives	Advantages	Limitations	Additional Comments
<p align="center"><b>1</b></p> <p align="center"><b>City of Marinette Municipal Water Expansion</b> <i>(City Owns/Operates/ Maintains Distribution System)</i></p>	<ul style="list-style-type: none"> <li>- Sustainable long-term drinking water supply</li> <li>- High quality drinking water supply from regulated water utility</li> <li>- Unlimited quantity of drinking water from known source</li> <li>- Drinking water treatment performed by regulated water utility</li> <li>- System redundancy minimizes water outage</li> <li>- Regulated utility responsible for monitoring/reporting/compliance</li> <li>- Regulated utility responsible for operation/maintenance</li> <li>- Short implementation time</li> <li>- Existing water utility customer's water rates will not be impacted</li> <li>- Town customers water rates same as existing utility customers</li> <li>- Annual water costs similar to existing well/treatment system</li> <li>- Town water customer bills cover O&amp;M for water utility expansion</li> <li>- Municipal water supply increases property value</li> <li>- Tyco to make City and Town financially net neutral</li> </ul>	<ul style="list-style-type: none"> <li>- City ordinance may need to be updated</li> <li>- Intergovernmental Agreement between City and Town</li> <li>- Development Agreement between City and Tyco</li> <li>- Development Agreement between Town and Tyco</li> <li>- Highest capital costs paid by Tyco</li> </ul>	<ul style="list-style-type: none"> <li>- City to own/operate/maintain expanded system</li> <li>- City and Town to agree on expansion</li> <li>- WDNR supports municipal water supply</li> <li>- PSC supports municipal water supply</li> </ul>
<p align="center"><b>2</b></p> <p align="center"><b>Town of Peshtigo Sanitary District</b> <i>(Town Purchases Water from City/Establishes Water Utility/ Owns/Operates/ Maintains Distribution System)</i></p>	<ul style="list-style-type: none"> <li>- Sustainable long-term drinking water supply</li> <li>- High quality drinking water supply from regulated water utility</li> <li>- Unlimited quantity of drinking water from known source</li> <li>- Drinking water treatment performed by regulated water utility</li> <li>- System redundancy minimizes water outage</li> <li>- Autonomy of having own Town water utility/sanitary district</li> <li>- City water utility has new wholesale water customer</li> <li>- Existing water utility customer's water rates will not be impacted</li> <li>- Municipal water supply increases property value</li> <li>- Tyco to make City and Town financially net neutral</li> </ul>	<ul style="list-style-type: none"> <li>- Town would have to develop a regulated water utility board</li> <li>- Town utility responsible for monitoring/reporting/compliance</li> <li>- Town utility responsible for operation/maintenance</li> <li>- Town customers water rates higher than existing utility customers</li> <li>- Town customers annual water costs higher than existing well/treatment system</li> <li>- Town customers water bill pays Town sanitary district O&amp;M expenses</li> <li>- Long implementation time</li> <li>- Higher capital costs paid by Tyco</li> <li>- City ordinance may need to be updated</li> <li>- Intergovernmental Agreement between City and Town</li> <li>- Wholesale Water Agreement between City and Town</li> <li>- Development Agreement between Town and Tyco</li> <li>- Development Agreement between City and Tyco</li> <li>- Second redundant water supply source/connection may likely be required and/or Town water storage for system reliability</li> </ul>	<ul style="list-style-type: none"> <li>- City and Town to agree on wholesale water</li> <li>- WDNR supports municipal water supply</li> <li>- PSC supports municipal water supply</li> </ul>
<p align="center"><b>3</b></p> <p align="center"><b>Existing Private Wells w/POET Systems</b> <i>(Property Owner Owns/Operates /Maintains Wells/POETS)</i></p>	<ul style="list-style-type: none"> <li>- Temporary short-term drinking water system accepted by WDNR</li> <li>- City water utility is not impacted</li> <li>- No intergovernmental agreement</li> <li>- Shortest implementation time</li> <li>- Lowest capital cost alternative</li> </ul>	<ul style="list-style-type: none"> <li>- Not a sustainable long-term drinking water supply</li> <li>- Unknown long-term quantity of drinking water from source</li> <li>- Unknown long-term quality of drinking water from source</li> <li>- Unknown quality of water from a source that is not regulated</li> <li>- No redundancy to minimize drinking water outage</li> <li>- Lower property value</li> <li>- Town property owners operate and maintain well/POET</li> <li>- Town property owners provide permanent space for POET</li> <li>- Property access agreement for POET system</li> <li>- WDNR only supported temporary short-term POET system</li> <li>- Continuous long-term monitoring of water supply</li> </ul>	<ul style="list-style-type: none"> <li>- WDNR supported temporary short-term drinking water system</li> <li>- Town property owners may not support as long-term solution</li> </ul>
<p align="center"><b>4</b></p> <p align="center"><b>Private Special Casing Deep Water Supply Wells</b> <i>(Property Owner Owns/Operates /Maintains Deep Wells/Treatment Systems)</i></p>	<ul style="list-style-type: none"> <li>- Town property owners understand well system</li> <li>- Relatively lower capital cost than municipal water</li> </ul>	<ul style="list-style-type: none"> <li>- Unknown long-term quantity of water from deep aquifer source may require alternative source of water</li> <li>- Unknown extent of natural occurring water quality parameters (i.e. hardness, iron, radium, etc.) in deep aquifer sources that may require continuous long-term monitoring, testing, sampling and treatment or alternative source of water.</li> <li>- Unknown impact of contaminants drag-down during deep well construction</li> <li>- Unregulated water quality for private deep well water supply</li> <li>- No redundancy to minimize drinking water outage</li> <li>- Lower property value</li> <li>- Town property owners inconvenience to operate and maintain deep well/treatment system</li> <li>- Town property owners provide permanent space for treatment system</li> <li>- Property access agreement for treatment system</li> </ul>	<ul style="list-style-type: none"> <li>- Unknown geology and hydrogeology of deep aquifers</li> <li>- Town property owners may not support as long-term solution</li> </ul>
<p align="center"><b>5</b></p> <p align="center"><b>Town of Peshtigo Public Water System</b> <i>(Town Establishes/ Owns/Operates/ Maintains PWS)</i></p>	<ul style="list-style-type: none"> <li>- Potential for sustainable long-term drinking water supply</li> <li>- Potential for high quality drinking water supply depending on source for new regulated water utility</li> <li>- Potential unlimited quantity of drinking water from depending on source</li> <li>- Drinking water treatment by regulated water utility</li> <li>- Potential System redundancy minimizes water outage</li> <li>- Autonomy of Town public water system</li> <li>- City water utility is not impacted</li> <li>- Existing wells are abandoned</li> <li>- Municipal water may increases property value</li> <li>- Tyco to make City and Town financially net neutral</li> </ul>	<ul style="list-style-type: none"> <li>- Such a small system is not cost effective (i.e. excessively high water rates) and typically discouraged by the PSC</li> <li>- Excessively long implementation time</li> <li>- New Town water utility would own/operate/maintain system</li> <li>- Extensive infrastructure (i.e. water treatment plant, pump stations, water distribution system)</li> <li>- Licensed operators and maintenance staff</li> <li>- Challenges for siting location of new water treatment plant</li> <li>- Long time for regulatory and governmental approvals</li> <li>- Extensive long term operation and maintenance costs</li> </ul>	<ul style="list-style-type: none"> <li>- Many other concerns with privately owned public water system</li> <li>- WDNR supports municipal water supply</li> <li>- Town of Peshtigo may not support operating and maintaining PWS as long-term solution</li> </ul>
<p align="center"><b>6</b></p> <p align="center"><b>Combination of Water Supply Methods</b></p>	<ul style="list-style-type: none"> <li>- See above, depending on the methods combined</li> </ul>	<ul style="list-style-type: none"> <li>- Potentially not acceptable to regulatory agencies and municipalities to have a combination of multiple drinking water supply methods</li> <li>- High capital and other costs</li> <li>- Excessively long implementation time</li> </ul>	<ul style="list-style-type: none"> <li>- Many other unknowns with a combination of water supply methods</li> </ul>

# TABLES

**Table 3-2: Alternatives Comparison Scorecard**

Table 3-2: Long Term Water Supply - Draft Alternatives Comparison Scorecard - Marinette, WI

Table 3-2: Long Term Water Supply - Draft Alternatives Comparison Scorecard - Marinette, WI															
Alternatives			Comparison Criteria											Key Highlights	Evaluation Score (out of 55)
			Tyco Liability	Technical Feasibility	Quality of Water	Operation, Maintenance & Replacement	Legal and Regulatory Complexity	Monitoring, Reporting and Compliance	Timing to Implement	System Redundancy	Cost	Quantity of Water	Anticipated Public Acceptance		
Extend Marinette PWS	Alt. 1	City of Marinette Municipal Water Expansion	5	5	5	5	4	4	5	5	4	5	4	This alternative, when compared to other viable alternatives, is the most favorable system for water quality, quantity, redundancy and long-term operation and maintenance.	51
Establish Sanitary District	Alt. 2	Town of Peshtigo Sanitary District	3	5	5	4	3	3	3	4	3	5	3	This alternative poses similar benefits as Alternative 1; however, development of a Water District will require the Town of Peshtigo to operate, maintain and comply with regulatory requirements, which may not be acceptable to the public.	41
POET System	Alt. 3	Existing Private Individual Wells with POET	3	3	3	2	3	3	5	1	2	3	2	This alternative is recognized as a temporary interim water supply, not a long term water supply by regulatory agencies, it lacks redundancy, may interfere with remediation efforts and may be unacceptable to homeowner due to the operational, maintain and water treatment and pumping system replacement.	30
Drill Deeper Wells	Alt. 4	Private Special Casing Deep Water Supply Wells	3	3	3	2	3	3	5	1	3	3	4	Drilling new deep wells leads to various unknowns such as water quality and quantity, draw-down contamination, lack of redundancy, homeowners operation, maintenance and replacement of water treatment and pumping systems.	33
Public Water System	Alt. 5	Town of Peshtigo Public Water System	3	4	5	3	3	2	1	3	2	4	2	Many concerns associated with the development of a new public water system for such a small community, including timing of implementation, higher operation and maintenance costs and public acceptance.	32
Combined	Alt. 6	Combination of Water Supply Methods	3	1	3	2	2	3	2	1	2	3	2	This alternative poses many unknowns making it technical unfeasible, without redundancy and potentially unacceptable to regulatory agencies due to various multiple water supply methods.	24
<b>Comparative Rating Legend</b>			1 Low (comparatively unfavorable)		2 Medium-Low		3 Medium		4 Medium-High		5 High (comparatively favorable)				

# TABLES

**Table 5-2: Alternatives Comparison Scorecard**

**Table 5-2  
Alternatives Comparison Scorecard**

Alternatives		Comparison Criteria and Weighting Percentage											Evaluation Score (out of 5.0)	
		Criteria	Long Term Susceptibility	Technical Feasibility	Quantity of Water	Quality of Water	Operations & Maintenance	Legal and Regulatory Complexity	Monitoring, Reporting, Compliance	Timing to Implement	System Redundancy	Anticipated Public Acceptance		Operation Maintenance Cost
		Weight	15	10	15	15	5	5	5	5	10	10		5
Alt. 1	City of Marinette Municipal Water Expansion	5	5	5	5	5	4	4	5	5	4	4	4.8	
Alt. 2	Establish Town of Peshtigo Sanitary District	4	5	5	5	4	3	3	3	3	3	3	4.0	
Alt. 4	New Private Special Casing Deep Water Supply Wells	3	3	3	3	3	3	3	5	3	4	3	3.2	
<b>Comparative Rating Legend</b>		1 Low (comparatively unfavorable)		2 Medium-Low		3 Medium		4 Medium-High		5 High (comparatively favorable)				

# TABLES

**Table 5-3: Anticipate Alternatives Cost**



Table 5-3 Anticipated Alternative Costs <sup>(1)</sup>					
Alternative	Component	No. of Services	EOCC <sup>(2)</sup>		Monthly OM&R <sup>(3)</sup>
			Total	Per Service	
<b>Alternative 1</b> City of Marinette Municipal Water Expansion	Total Construction Cost	152	\$10,370,000	\$68,230	\$23.50
<b>Alternative 2</b> Establish Town of Peshtigo Sanitary District	Total Construction Cost	152	\$10,590,000	\$69,680	\$72.00
<b>Alternative 4</b> Special Casing Deep Water Supply Wells	Total Construction Cost	58	\$3,890,000	\$67,070	\$69.20

<sup>(1)</sup> Legal challenges, remediation costs, and costs outside this report are not included.

<sup>(2)</sup> EOCC - engineers opinion of construction costs

<sup>(3)</sup> OM&R - operations, maintenance and replacement. Cost for Alts. 1 and 2 includes supplies, power, chemicals, treatment, etc as well as monthly water bills based on average customer usage. Cost for Alt 4 includes replacement well pump every 15 years, electric costs, etc. Monthly Rate for Alt. 4 is conservative based on water treatment (softening, etc). Without treatment, monthly cost is \$35.80/month.

# FIGURES

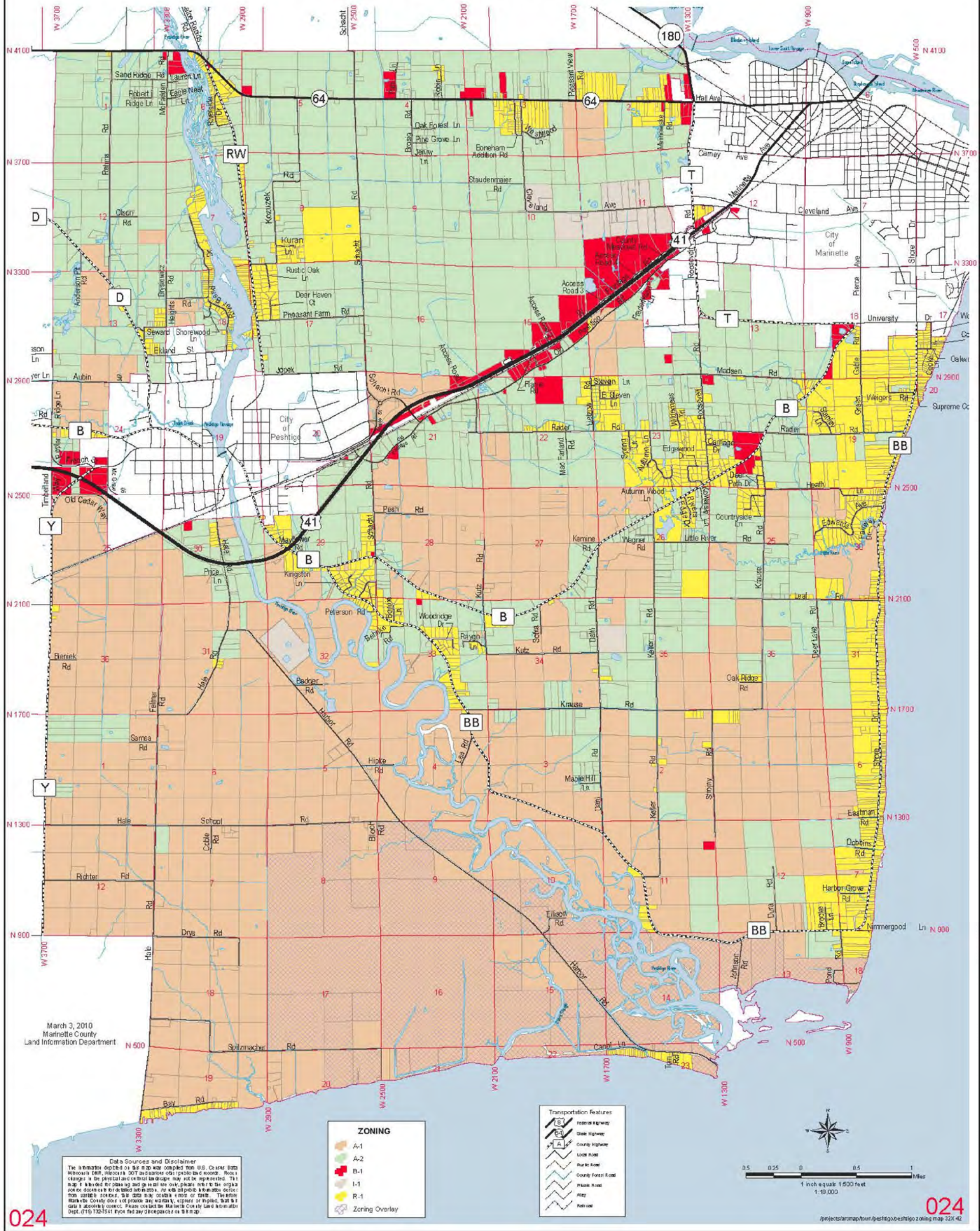


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# FIGURES

**Figure 1-1: Town of Peshtigo Zoning Map**

# Town of Peshtigo Zoning Map



**Legend:**

- A-1 - Agricultural (lot size > 5 acres)
- A-2 - Agricultural (lot size > 1.5 acres and >5 acres for farm animals)
- R-1 - Single-Family Residential (lot size > 1.5 acres)
- R-2 - Two-Family/Multi-Family Residential (lot size > 1.5 acre)
- B-1 - Business District
- I-1 - Industrial District

TYCO FIRE PRODUCTS, LP  
MARINETTE, WISCONSIN

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**TOWN OF PESHTIGO ZONING MAP**

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**FIGURE  
1-1**

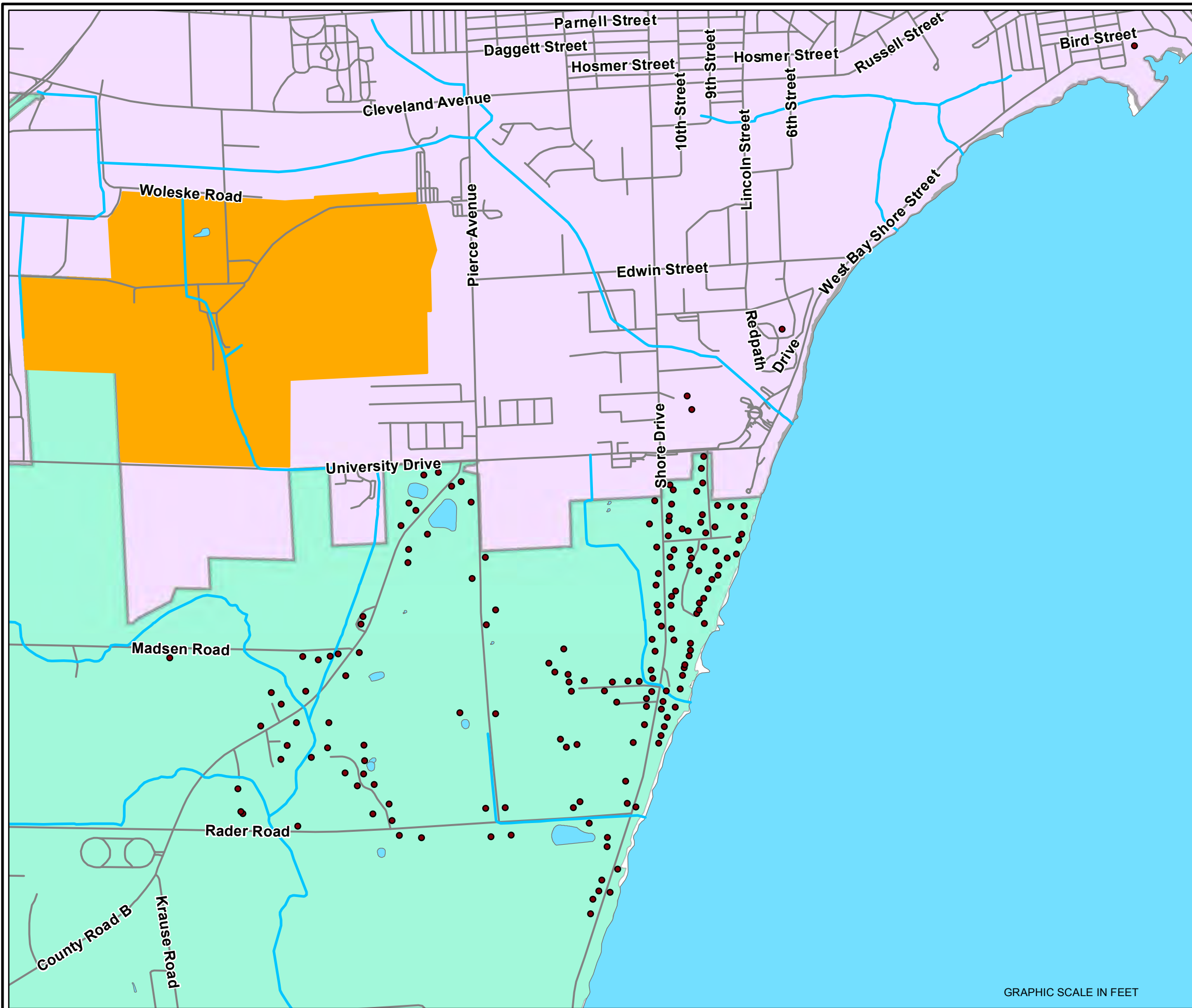
Source: Town of Peshtigo Website, <http://townofpeshtigo.org>

City: Minneapolis/Citrix Div/Group: IIMDVC Created By: RTippireddy TYCO Marquette, WI C:\Users\RTippireddy\Documents\Projects\TYCO\GIS\MXDs\Figure 1-1 Peshtigo Zoning.mxd 4/12/2019 4:49:01 PM

# FIGURES

**Figure 1-2: Site Overview**

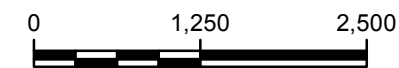
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TYCO Marinette, WI  
C:\Users\RTippireddy\Documents\Projects\Tyco\GIS\MXDs\Figure 1-2 Overview Map.mxd 4/12/2019 3:11:10 PM



LEGEND:

- APPROXIMATE TYCO SITE PROPERTY BOUNDARY
- APPROXIMATE MARINETTE CITY BOUNDARY
- TOWN OF PESHTIGO, WI
- ROAD
- DITCH/STREAM
- WATERBODY
- DRINKING WATER WELL LOCATION

4/12/2019



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MARINETTE, WISCONSIN

SITE OVERVIEW



FIGURE  
1-2

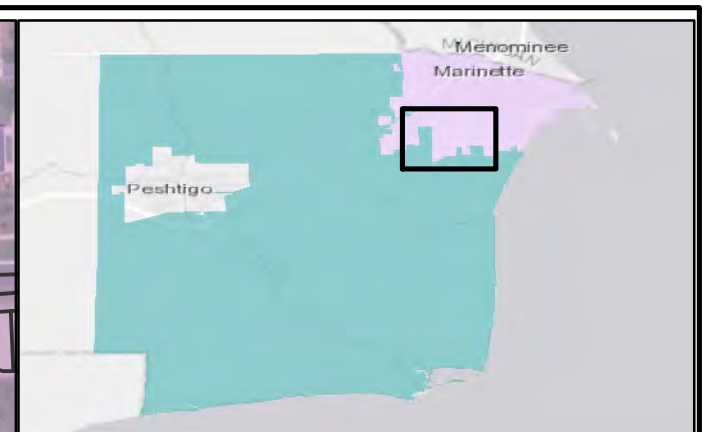
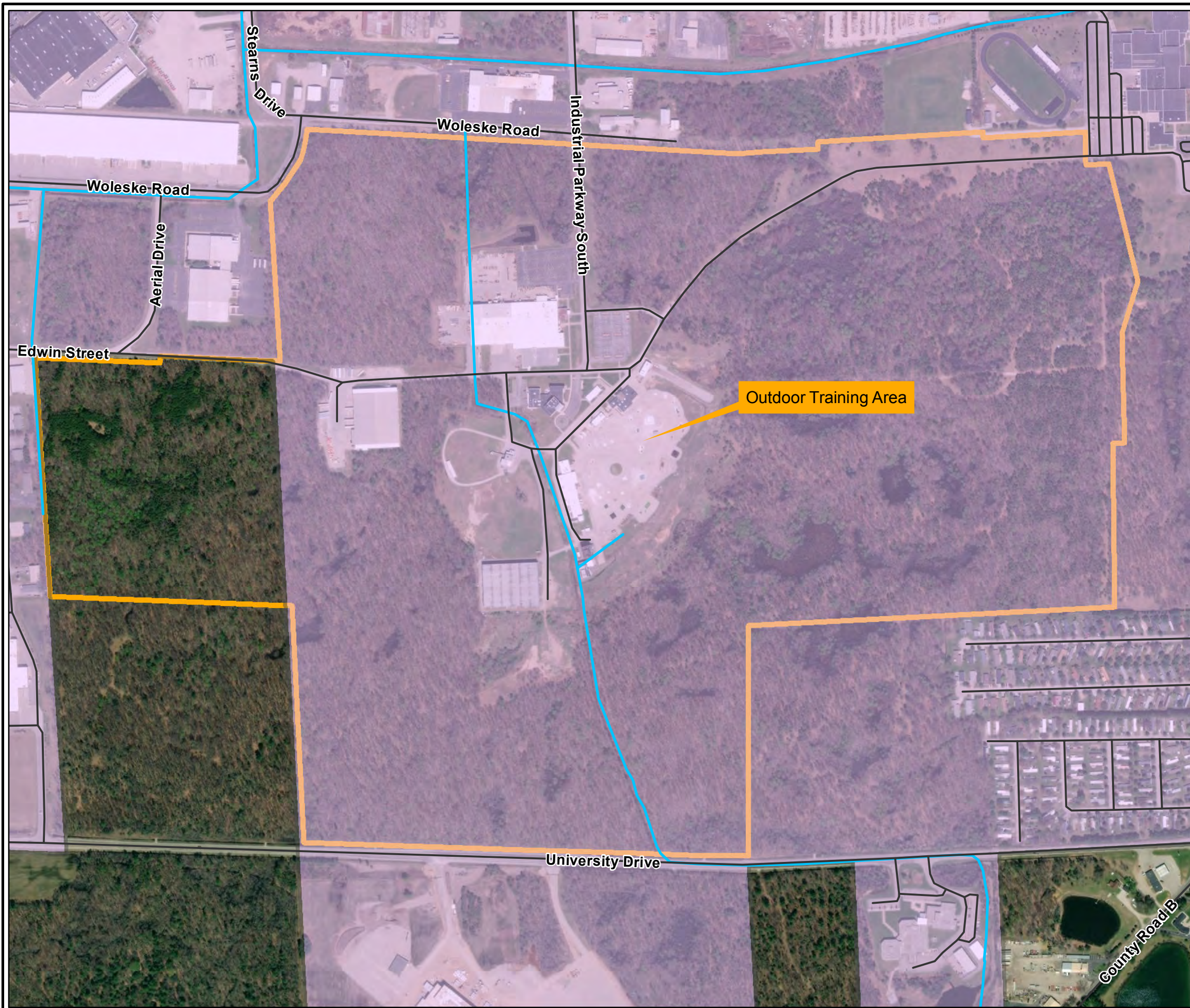
GRAPHIC SCALE IN FEET

# FIGURES

**Figure 2-1: Tyco Site Boundary**



City: Minneapolis/Citrix D:\Group: IMDVC Created By: Last Saved By: msmiller  
TYCO Marinette, WI  
Z:\GIS\Projects\_ENVTYCO\_Marinette\_WI\EXCHANGE\INCOMING\For Matt Miller\CIS\W\XDs\Figure 2-1 Tyco Site Map.mxd 5/9/2019 2:07:51 PM



LEGEND:

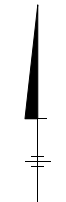
- APPROXIMATE TYCO SITE PROPERTY BOUNDARY
- ROAD
- DITCH/STREAM
- APPROXIMATE MARINETTE CITY BOUNDARY
- Town of Peshtigo

0 500 1,000  
GRAPHIC SCALE IN FEET

TYCO FIRE PRODUCTS, LP  
MARINETTE, WISCONSIN

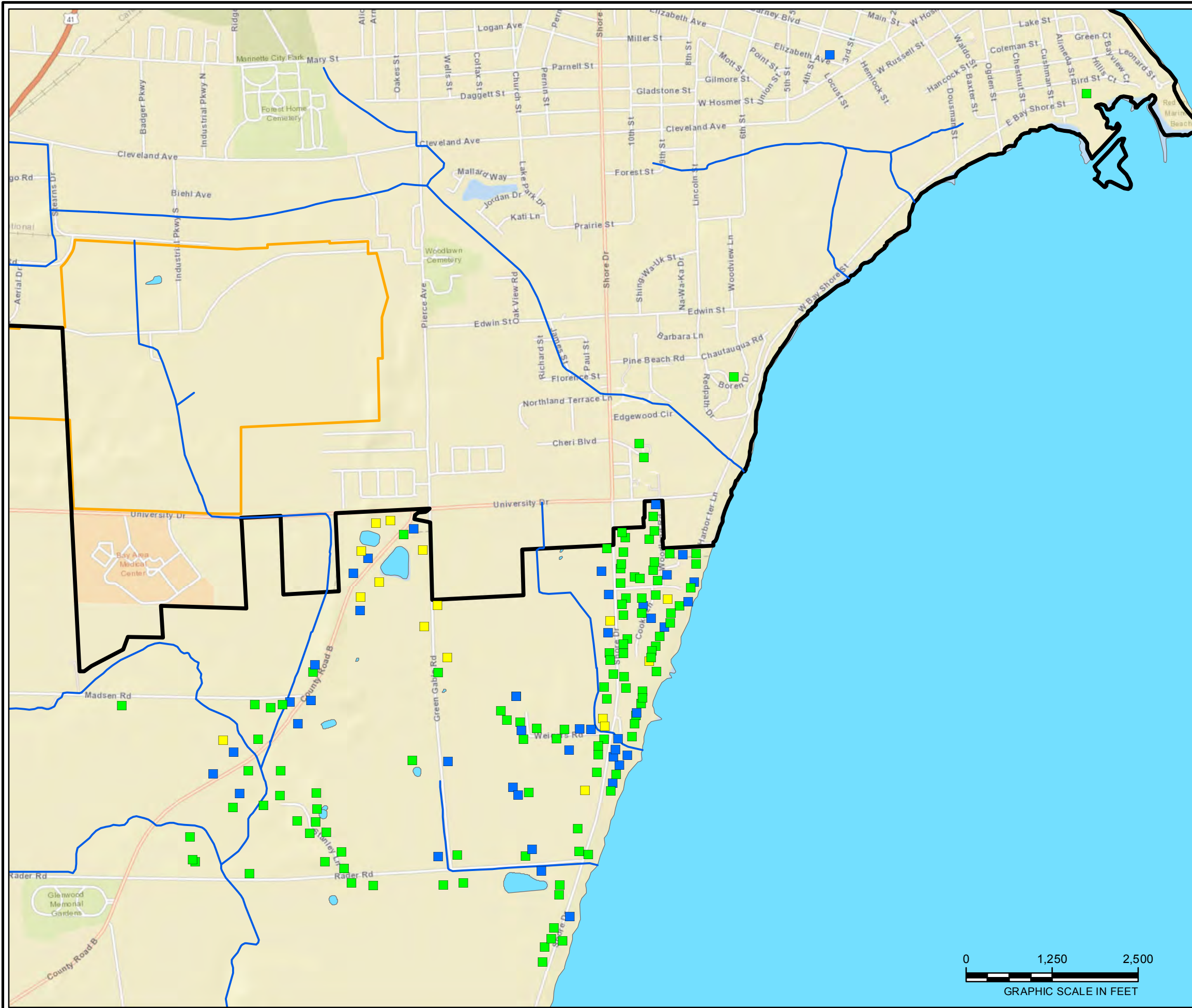
TYCO SITE BOUNDARY

| FIGURE 2-1



# FIGURES

**Figure 2-2: Town of Peshtigo Location of Drinking Water Wells Sampled Fall 2018**



**LEGEND:**

**LOCATION OF DRINKING WATER WELLS SAMPLED**

- PFOA AND/OR PFOS BELOW REPORTING LIMIT
- PFOA AND/OR PFOS DETECTION ABOVE HAL
- PFOA AND/OR PFOS DETECTION BELOW HAL
- APPROXIMATE TYCO SITE PROPERTY BOUNDARY
- APPROXIMATE MARINETTE CITY BOUNDARY
- DITCH/STREAM
- WATERBODY

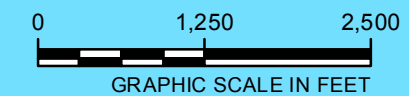
**NOTES:**

1. WELL LOCATIONS ARE APPROXIMATE.
2. HAL = HEALTH ADVISORY LIMIT.
3. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, USGS, INTERMAP, INCREMENT P, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI KOREA, ESRI (THAILAND), NGCC, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

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MARINETTE, WISCONSIN

**LOCATION OF DRINKING WATER  
WELLS SAMPLED FALL 2018**

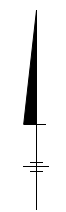
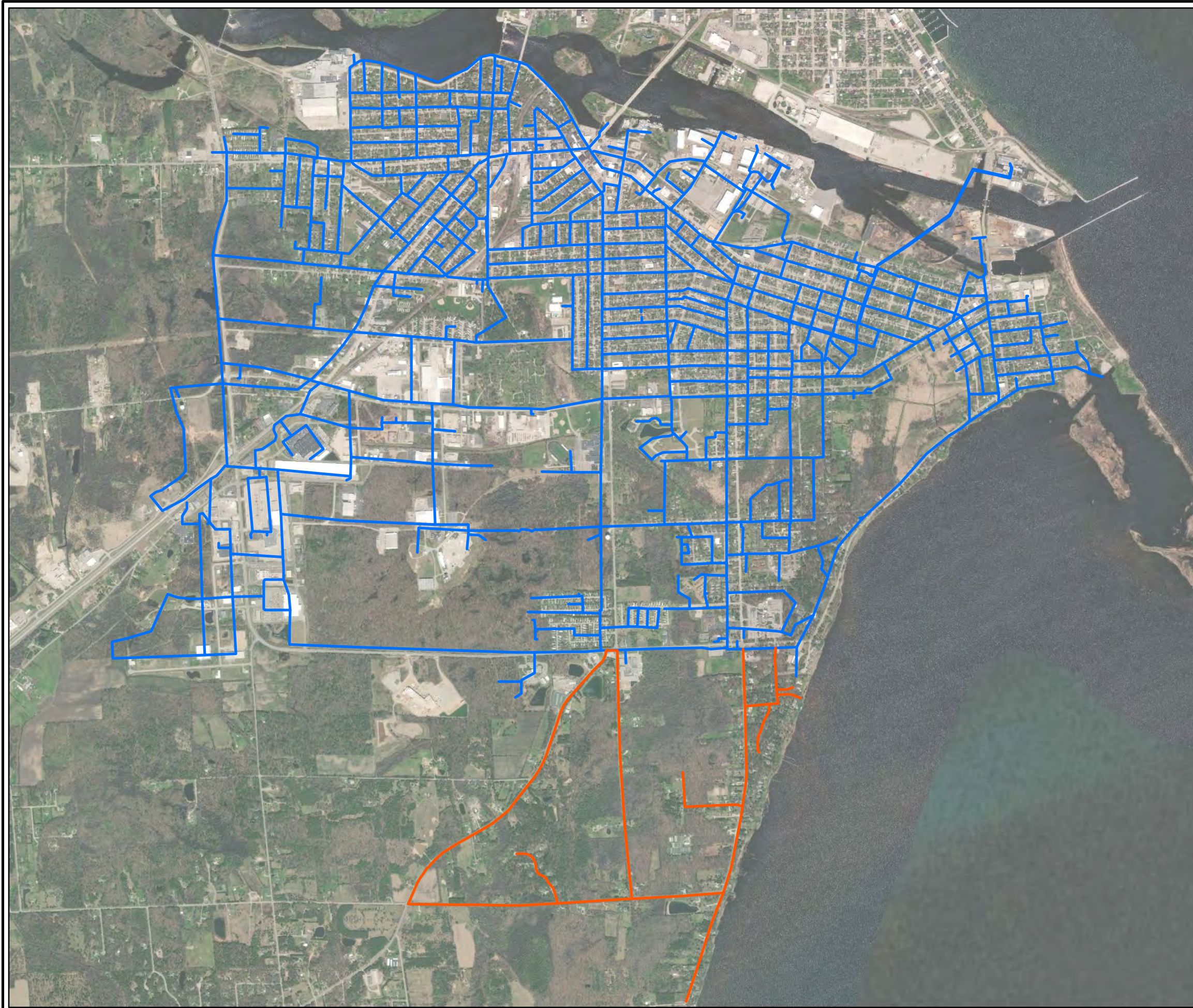
**FIGURE  
2-2**



# FIGURES

**Figure 3-1: City of Marinette Conceptual Layout for Water Main Extension**

City: Minneapolis/Citrix D:\Group: IMDVC Created By: Last Saved By: msmiller  
TYCO Marinette, WI  
Z:\GIS\Projects\_ENVTYCO\_Marinette\_WI\EXCHANGE\INCOMING\For Matt Miller\CIS\W\XDs\Figure 3-1 Peshtigo Pipeline Layout.mxd 5/9/2019 2:14:04 PM



LEGEND:  
— Existing Marinette Water Supply Pipelines  
— Conceptual Layout For Town of Peshtigo Water Supply Pipelines



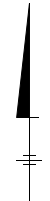
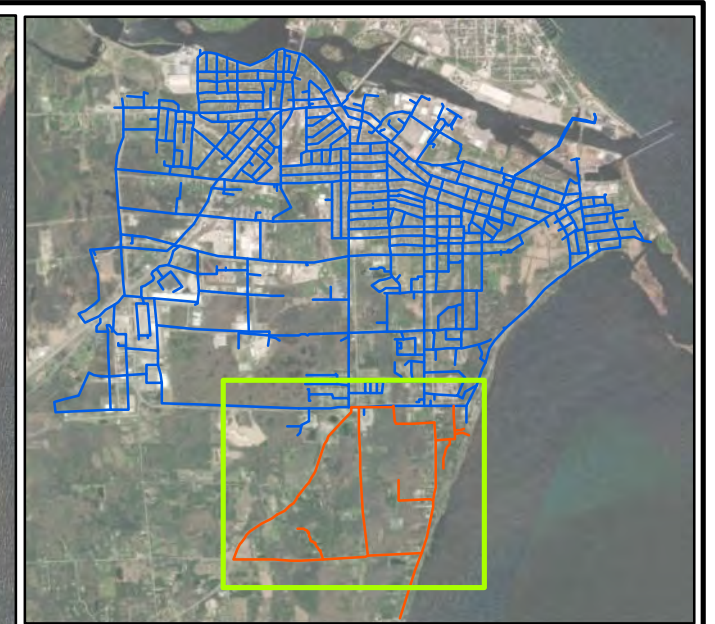
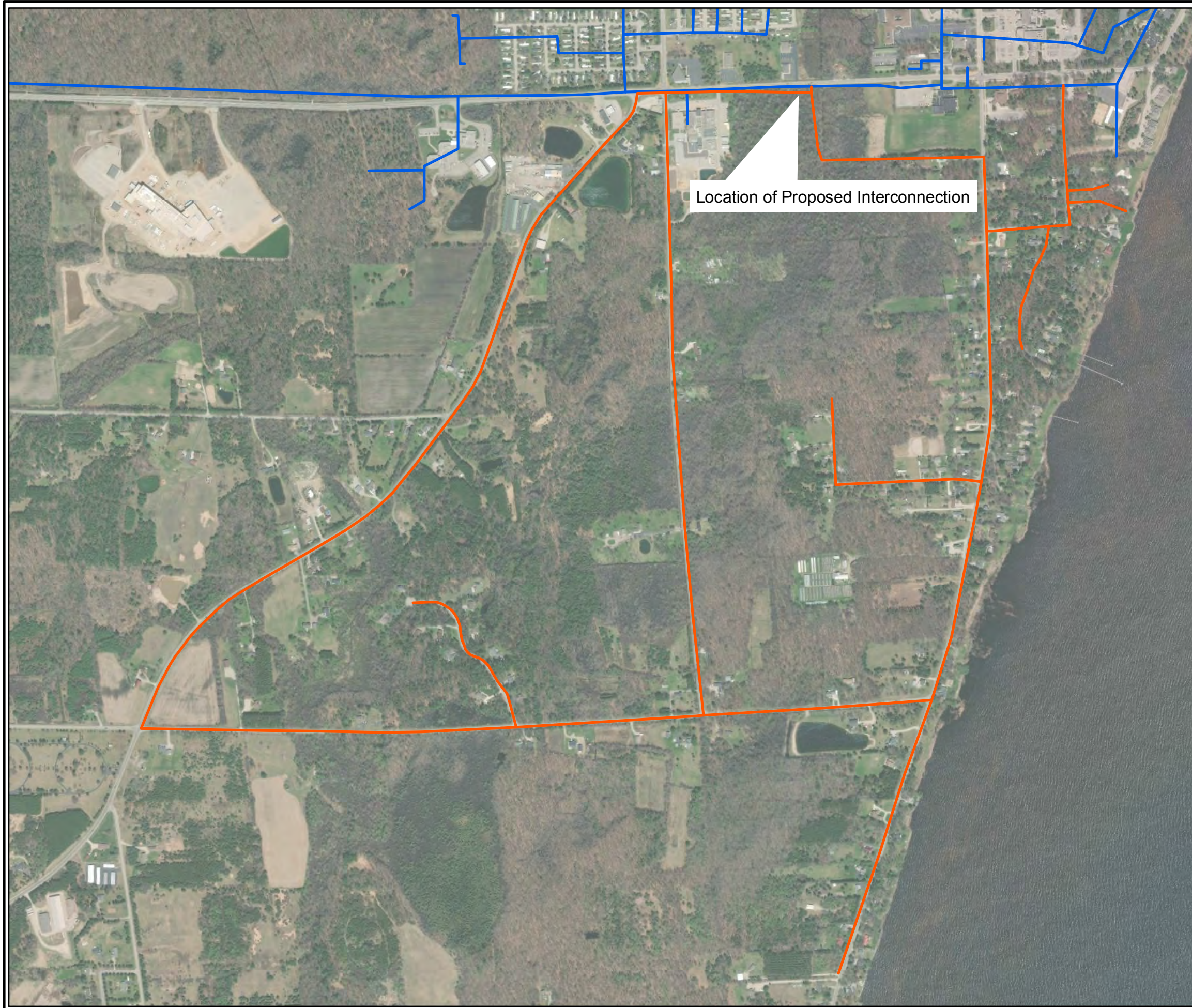
TYCO FIRE PRODUCTS, LP  
MARINETTE, WISCONSIN

**City of Marinette**  
**Conceptual Layout For Water Main Extension**



 **ARCADIS** | **FIGURE 3-1**

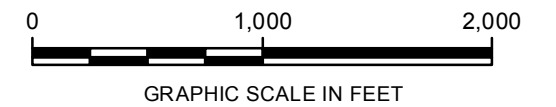
# FIGURES

**Figure 3-2: Town of Peshtigo Conceptual Layout for Water Main Interconnection**



**LEGEND:**

-  Existing Marinette Water Supply Pipelines
-  Conceptual Layout For Town of Peshtigo Water Supply Pipelines



TYCO FIRE PRODUCTS, LP  
MARINETTE, WISCONSIN

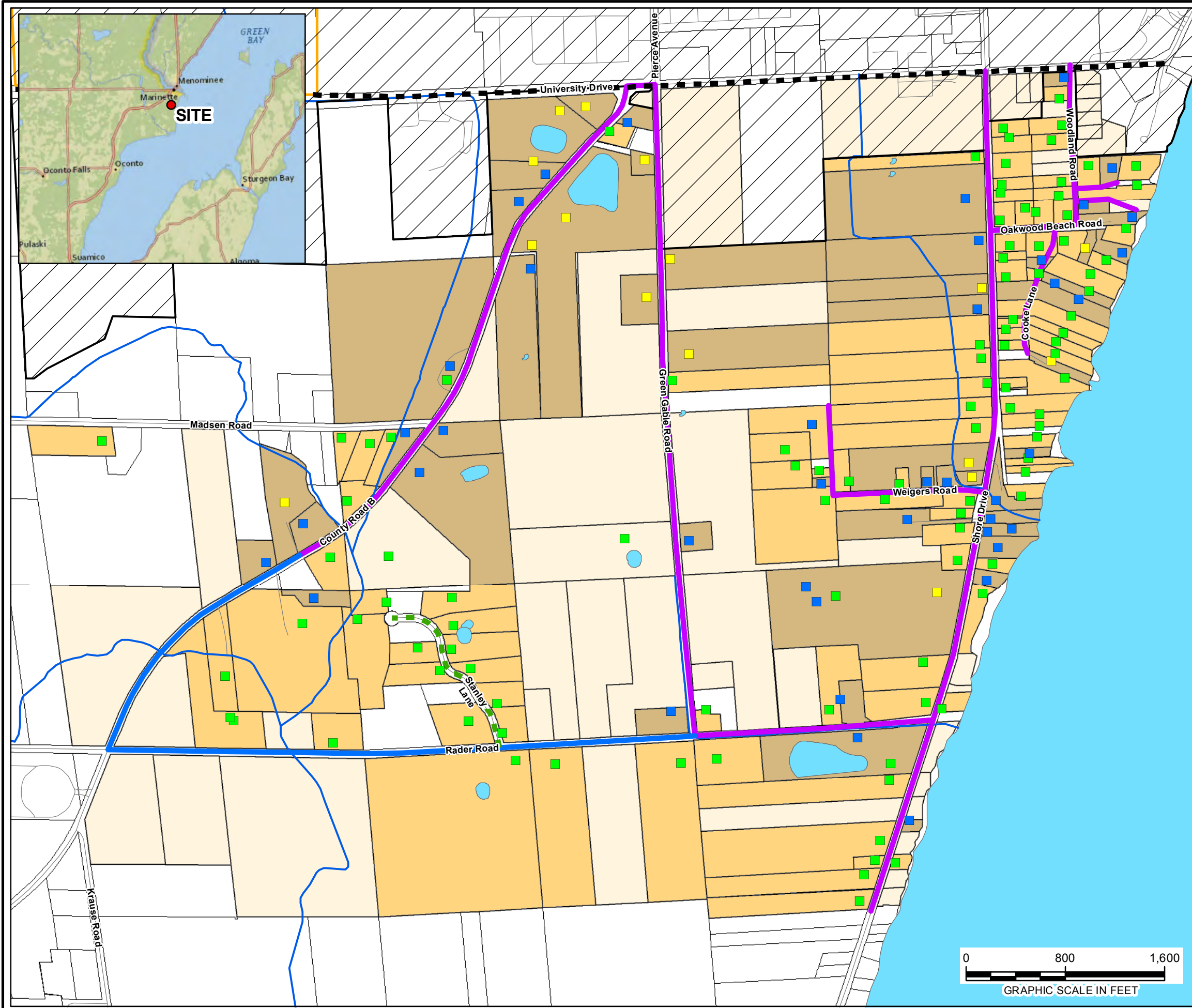
**Town of Peshtigo, WI  
Conceptual Layout For  
Water Main Interconnection**



# FIGURES

**Figure 6-1: Conceptual Layout for Long-Term Water Supply Expansion**



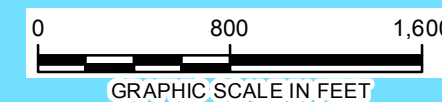


- LEGEND:**
- APPROXIMATE SITE PROPERTY BOUNDARY
  - APPROXIMATE MARINETTE CITY BOUNDARY
  - PARCEL BOUNDARY
  - ROAD
  - DITCH/STREAM
  - WATERBODY
  - PFOA AND/OR PFOS BELOW REPORTING LIMIT
  - PFOA AND/OR PFOS DETECTION ABOVE HAL
  - PFOA AND/OR PFOS DETECTION BELOW HAL
  - EXISTING WATER MAIN
  - SCENARIO 1 - BASELINE
  - SCENARIO 1 - BASELINE AND LOOP
  - POTENTIAL EXPANSION
  - WITH DETECTS
  - WITHOUT DEFECTS
  - POTENTIAL PARCELS THAT MAY BE DEVELOPED

**NOTE:**  
 1. THE PARCEL REPRESENTATIONS ON THIS MAP OR PRODUCT, OTHER THAN GRAPHIC ALTERATIONS THAT MAY BE INDICATED, ARE DERIVED FROM PUBLIC DOMAIN INFORMATION FROM VARIOUS SOURCES ROUTINELY PROVIDED TO AND MAINTAINED BY MARINETTE COUNTY. ALTHOUGH THE SOURCES ARE BELIEVED TO BE REASONABLY RELIABLE, THERE MAY BE ERRORS OR INCONSISTENCIES IN SAID REPRESENTATIONS. MARINETTE COUNTY DOES NOT MAKE ANY WARRANTY WHATSOEVER, EXPRESSED OR IMPLIED, THAT SAID REPRESENTATIONS ARE ACCURATE. IF THERE ARE DOUBTS AS TO THE ACCURACY OF ANY SUCH REPRESENTATIONS ON THIS MAP OR PRODUCT, AN INDEPENDENT INVESTIGATION IS RECOMMENDED.

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 MARINETTE, WISCONSIN

**CONCEPTUAL LAYOUT FOR LONG TERM  
 WATER SUPPLY EXPANSION**



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# APPENDIX A

Tyco's Response Letter to WDNR's Additional Information Request



Tyco Fire Products LP  
1400 Pennview Parkway  
Lansdale, Pennsylvania 19446



March 12, 2018

Mr. David Neste  
Remediation and Redevelopment Program  
Wisconsin Department of Natural Resources  
2984 Schwano Avenue  
Green Bay, Wisconsin 54313-6727  
dave.neste@wisconsin.gov

RE: Additional Information Request – WDNR Letter Dated January 16, 2018  
Tyco Fire Technology Center – PFAS; BRRTS Activity No. 02-38-580694

Dear Mr. Neste:

Tyco Fire Products LP (Tyco) is in receipt of the Wisconsin Department of Natural Resources' (WDNR) correspondence dated January 16, 2018. The letter requested the following of Tyco:

*In addition, within 60 days, please provide a history of products containing PFASs include such information as the specific PFASs used on site, the products they were used in, and the timeframe they were on site. Include the identification, nature or quantity of all materials containing PFASs which have been used or were generated, stored, used or dispose of at or near 2700 Industrial Parkway. Please provide any other locations you may have manufactured or used the product containing PFAS in the City of Marinette or Town of Peshtigo area that may have contributed to the release identified.*

Tyco has generated the enclosed informational summary in response to this request (Attachment A).

Tyco appreciates the WDNRs attention to this matter and looks forward to our continued cooperation. If you have any questions regarding this submission, please contact me at 215.393.0240 or [richard.mator@jci.com](mailto:richard.mator@jci.com).

Sincerely,

Richard Mator  
Sr. EHS Manager – Environmental Remediation

cc: Roxanne Chronert – WDNR

## Attachment A

### Tyco Fire Products, LP Response to WDNR Letter dated January 16, 2018 March 12, 2018

Wisconsin DNR requested the following information from Tyco Fire Products, LP:

***In addition, within 60 days, please provide a history of products containing PFASs include such information as the specific PFASs used on site, the products they were used in, and the timeframe they were on site. Include the identification, nature or quantity of all materials containing PFASs which have been used or were generated, stored, used or disposed of at or near 2700 Industrial Parkway. Please provide any other locations you may have manufactured or used the product containing PFAS in the City of Marinette or Town of Peshtigo area that may have contributed to the release identified.***

Tyco Fire Products, LP (TFP) response is provided below<sup>1</sup>. TFP emphasizes that the information provided in this response is based on the Company's reasonable and good faith searches conducted to date for responsive information. WDNR's request for information is broad, calling for information spanning different products, constituents, and activities that may date back a number of decades. TFP to date has not located comprehensive collections of information that are responsive to all parts of WDNR's requests, to the extent they may even exist. In particular, TFP has not located sufficient records to comprehensively track volumes of products against the various uses and timeframes, but will supplement this response as appropriate in the future. At this point, TFP has not provided detailed information on product names and formulations in order to protect proprietary, trade secret and/or confidential business information. This response is being provided in good faith and in the spirit of cooperation with WDNR. The Company reserves the right to amend this response as appropriate as it learns additional or different information.

#### 1. FTC Uses:

The Ansul Fire Technology Center (FTC) is located at 2700 Industrial Parkway, Marinette Wisconsin. It is a fire suppressant training, testing, research, and development facility. The Site encompasses approximately 380 acres with an Outdoor Testing Area that currently consists of approximately 9 acres that is used in connection with the Fire Training School, Research and Development (R&D) and Quality testing activities. (see Figure 1 for an aerial view of the FTC). There are various buildings at the FTC where other R&D, Quality, and fire training activities are conducted. The remaining area of the Site is used for equipment manufacturing, warehousing, offices, classrooms, parking, or is undeveloped. Further detail on the activities at the FTC is provided below.

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<sup>1</sup> This response is provided without any admission of liability of TFP or its officers, directors, employees, agents or representatives, or as a waiver of any rights, objections, privileges or defenses. TFP reserves the right to object to the use, in whole or in part, of any document or information submitted with this response in any proceeding for any purpose.

## **2. Background regarding Fluorosurfactants:**

Fire fighting foam<sup>2</sup> consists of a number of materials that are blended together to make what is referred to as a foam concentrate or foam agent. One of the materials in the blend is a surfactant, and for certain formulations, that surfactant contains a small percentage of perfluorinated compounds (fluorosurfactant)<sup>3</sup>. Note that not all foams contain fluorosurfactants, but for the purposes of this document, references to foam concentrate or foam agent are specific to those foams that do contain fluorosurfactants.

Historically, certain foam concentrates contained fluorosurfactants consisting of compounds with eight (8) carbon chain lengths (referred to as “C8” compounds). The 3M Company was the manufacturer of one particular fluorosurfactant that is believed to have been a C8 product, and due to the manufacturing process it used, those fluorosurfactants could also contain perfluorooctane sulfonate (PFOS). The 3M Company reportedly phased out the production of those fluorosurfactants in 2002.

The other process used to manufacture C8 fluorosurfactants (telomer-based) did not produce PFOS, but those compounds could contain or form perfluorooctanoic acid (PFOA). In cooperation with EPA, the manufacturers of the C8 fluorosurfactants worked to develop shorter chain length C6 products. These shorter chain C6 substances cannot form PFOA, however, due to the potential for impurities in the raw materials, PFOA or precursors could be present in the product as an impurity at trace levels.

As a note, perfluorinated compounds, is a broad term that can encompass PFOA and PFOS and other substances, and are also referred to as PFAS, which stands for per- and polyfluoroalkyl substances.

## **3. History of Products at the FTC:**

Based on information obtained to date, it appears that The Ansul Company (now known as TFP) may have first begun testing foam concentrate at the FTC in or around 1962. The initial foam concentrate was not manufactured by Ansul, but rather 3M, and was tested in combination with a dry chemical. Ansul became a distributor of the 3M-made foams and testing continued into the 1970s. Other manufacturer foams were also tested at the FTC at that time.

In approximately 1973, Ansul partnered with a chemical manufacturer to develop a telomer-based C8 foam concentrate. This product was introduced between 1973-1975 and around this time, Ansul would have terminated its distribution of the 3M foams. Some time between the mid-1990s - 2000, testing of some C6 fluorosurfactants began at the FTC.

From approximately 2006 – 2013 a mixture of C6 and C8 foams were tested at the FTC; and from approximately 2014 to present, testing was primarily of C6 foams. Note that some products referred to as C8 products may be predominantly C6-based.

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<sup>2</sup> There are a variety of fire fighting foams, one of which is commonly referred to as AFFF, aqueous film-forming foam.

<sup>3</sup> Certain foams may also contain fluoropolymers; references in this document to fluorosurfactants includes fluoropolymers.

In addition to testing of Ansul/TFP foams at the FTC, starting approximately in 1988, TFP began providing 3<sup>rd</sup> party laboratory scale testing services of foam agents for end users' and distributors' annual performance evaluation requirements.

Due to customer specifications and requirements, there are many variations of foam concentrate products that have contained different combinations of C6 and/or C8 fluorosurfactants. In general, those foam concentrates contain a small fraction of fluorosurfactants and the usage of the foam concentrate products range from 1% to 6% usage (for example, a 1% foam product means 1 part concentrate used in 99 parts water) when applied to a fire or in testing.

#### **4. Foam Testing and Training Activities at FTC:**

The activities associated with foam concentrate at the FTC began in the early 1960s and have varied over time. The site currently consists of an outdoor fire testing and training area, a hydraulics lab with an outdoor foam testing pad, and various buildings for fire testing, research, and development and quality testing activities. An overall site diagram showing the locations of the areas and buildings is provided in Figure 2. Discussion of the primary areas and buildings where foam-related testing and training activities have occurred is provided below.

##### Outdoor Testing/Training Area

The Outdoor Testing/Training Area (OTA) was constructed in approximately 1961 and has been used to conduct testing, demonstrations, and training on a range of fire suppressants (both dry chemical and foam-containing products).

The OTA has contained various concrete and clay pads and steel pans, some with "props" where a contained fire would be started and extinguished with the various products to test the performance of the fire suppression products. The testing of foam products began in the early 1960s.

Training and demonstration activities also occur at the OTA. The FTC hosts fire schools and foam schools during the summer months to train employees and customers on fire suppression techniques. Based on current practices, roughly 10-20 fire schools are scheduled per year with one foam demonstration per school. For the foam schools, approximately two are scheduled per year with two foam demonstrations per school. It is not clear when these schools formally began, but based on information gathered to date, the fire schools appear to have been occurring prior to the 1980s, and it is presently believed that the foam schools may have started at the FTC after the late 1990s.

The site also conducts additional schools with demonstrations and training for specific applications. Based on current practices, approximately 3-4 schools are conducted per year with two demonstrations per school. It is not clear at this time when these schools formally began but based on information gathered to date it is believed to have started in the late 1990s.

It is believed that there was another outdoor testing area that was referred to as the Marine testing area. This was indicated as being located between Buildings 110 and 115, and that it had

been dismantled. After a reasonable and good faith inquiry, we have been unable to locate sufficient information to document time period and uses.

#### Hydraulics Laboratory

The Hydraulics Laboratory (Bldg 105) was constructed in approximately 1985. It consists of a building with various tanks, pumps, and nozzles where foam concentrate is mixed with water and used to conduct performance testing of foam systems (proportioning and hardware). It has an outdoor foam monitor pad which as designed is sloped so that drainage of water/foam mixture is directed back into the building into a collection system.

#### Engineering Laboratory

The Engineering Laboratory (Bldg 102) was constructed in approximately 1962, with various additions over time. A range of laboratory scale research, development, and quality control activities on foam products have occurred inside this building including laboratory scale formulation, fire testing, physical and chemical parameter testing, and equipment testing and calibration. The products tested are primarily TFP products, although in approximately 1988, TFP began providing 3<sup>rd</sup> party laboratory scale testing services for its foam products as well as foam agents manufactured by others.

#### Fire Test Houses

The first Fire Test House (Bldg 107) was constructed in approximately 1967 and has been used for indoor fire testing, including, but not exclusively foam and foam sprinkler testing. A second Fire Test House (Bldg 127) was added in approximately 2016 for the same activities.

#### Cold Storage

The Cold Storage Building (Bldg 115) was constructed in approximately 1976 and has been used for foam testing activities, including test enclosure extinguishment testing and nozzle testing.

#### Center of Excellence

The Center of Excellence (Bldg 130) was constructed in approximately 2011 and contains a research laboratory and an instrument laboratory which have been used for foam products and fluorosurfactants. It also is used for a variety of non-foam activities (office areas, metallurgy laboratory, prototype manufacturing of equipment, small scale equipment assembly, etc.)

#### Warehouse

The Warehouse (Bldg 114) was constructed in approximately 1976 and is used to store foam fluorosurfactants and foam products.

The OTA and buildings noted above have gone through various improvements, expansions, and revisions over time, including the addition of concrete floors, oil/water separators, sewer line connections, and wastewater collection points.



## **5. Other locations in Marinette and Peshtigo:**

There are other locations in the City of Marinette and the Peshtigo area<sup>4</sup> where activities related to foam products have occurred or that are used for the storage of foam products.

The Stanton Street facility is located at 1 Stanton Street, Marinette. TFP conducts blending operations in its main production building to make foam concentrate products. There are also facilities where various quality control activities are conducted and where foam surfactants and products may be stored. ChemDesign, a chemical manufacturing facility, leases various buildings on the Stanton Street premises and manufactures for TFP the fluorosurfactants currently used by TFP in its foam concentrate in certain of its manufacturing buildings on site.

TFP rents a warehouse at 150 Pine Street in the City of Peshtigo, where it conducts indoor foam proportioning of high expansion foam (non-fluorinated) and foam products for research and development purposes.

TFP also rents a warehouse at 3100 Woleske Rd., Marinette, that TFP uses at times to store containers of foam surfactants and foam concentrate.

The location of these facilities are shown on attached Figure 3.

Due to the location of these facilities or the type of activity conducted, none are expected to have contributed to the presence of PFAS in groundwater that is currently being studied in the Marinette and Peshtigo areas.

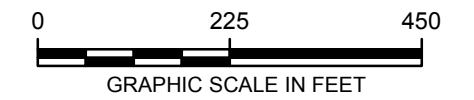
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<sup>4</sup> The letter requested information regarding locations the Town of Peshtigo, however, we included the City of Peshtigo for completeness of response.



**NOTES:**

- 1. IMAGERY SOURCE: 4/27/2016, DIGITALGLOBE, VIVID - USA.

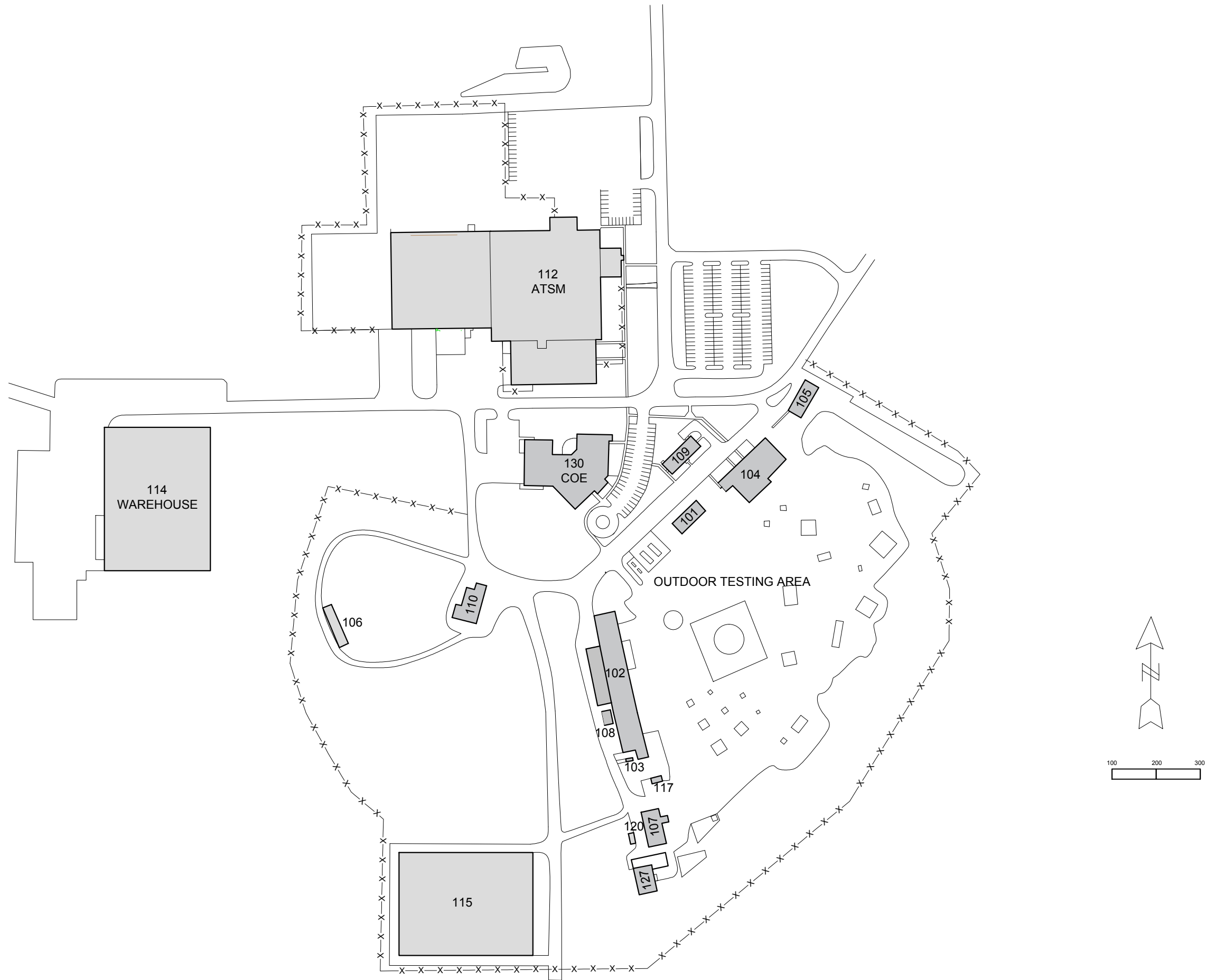


TYCO FIRE PRODUCTS, LP  
MARINETTE, WISCONSIN

**FACILITY AERIAL VIEW**

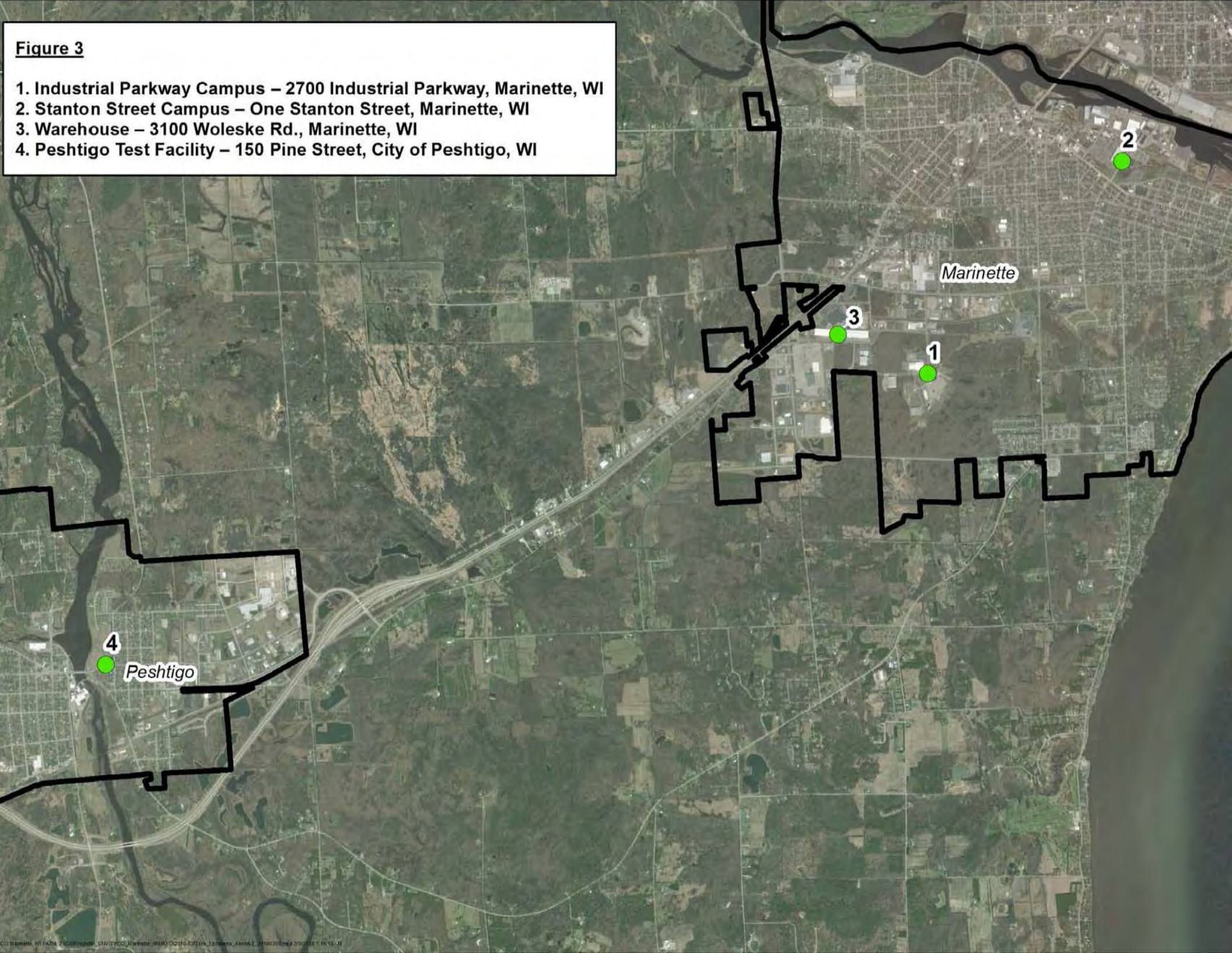


Figure 2



**Figure 3**

- 1. Industrial Parkway Campus – 2700 Industrial Parkway, Marinette, WI**
- 2. Stanton Street Campus – One Stanton Street, Marinette, WI**
- 3. Warehouse – 3100 Woleske Rd., Marinette, WI**
- 4. Peshtigo Test Facility – 150 Pine Street, City of Peshtigo, WI**



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# APPENDIX B

## Cost Estimates



CONCEPTUAL COST - 15 APRIL 2019

LONG TERM WATER SUPPLY ALTERNATIVES SUMMARY

Tyco - Marinette, WI

Alternative 1 - City of Marinette Municipal Water Expansion		
Scenarios	Description of Scenario	Estimated Construction Cost
1A	Baseline - Subject Services	\$ 7,020,000
1B	Baseline - All Current Parcels	\$ 8,860,000
1C	Baseline - All Potential Parcels	\$ 9,700,000
2A	Baseline and Loop - Subject Services	\$ 8,230,000
2B	Baseline and Loop - All Current Parcels	\$ 10,370,000
2C	Baseline and Loop - All Potential Parcels	\$ 11,460,000
3A	Baseline, Loop and Potential Expansion - Subject Services	\$ 9,340,000
3B	Baseline, Loop and Potential Expansion - All Current Parcels	\$ 11,760,000
3C	Baseline, Loop and Potential Expansion - All Potential Parcels	\$ 12,820,000

Alternative 2 - Establish Town of Peshtigo Sanitary District		
Scenarios	Description of Scenario	Estimated Construction Cost
-	Baseline and Loop - All Current Parcels with Town of Peshtigo Sanitary District	\$ 10,590,000

Alternative 4 - Special Casing Deep Water Supply Wells		
Scenarios	Description of Scenario	Estimated Construction Cost
-	Special Casing Deep Water Supply Wells	\$ 3,890,000

CONCEPTUAL COST - 15 APRIL 2019

LONG TERM WATER SUPPLY SCENARIOS

Tyco - Marinette, WI

Items	Quantities		Rate	Amount	
<b>ALTERNATIVE 1 - SCENARIO 1A - BASELINE AFFECTED SERVICES</b>					
1	4" DIP water main - Baseline includes water main, valves, culverts, road crossings (Cty Rd B, Green Gable, Shore, Wieggers, Oakwood Beach, Woodland, Country Lane, Cooke Lane, and Rader Rd)	4.6	mile	\$ 485,800	\$ 2,239,538
2	Service Laterals (58 laterals, average of 200 ft per house)	11,600	L.F.	\$ 70	\$ 812,000
3	Water Service Connections	58	each	\$ 1,900	\$ 110,200
4	Well Abandonment	58	each	\$ 1,600	\$ 92,800
5	Smart Flushing Systems (Cty Rd B; Shore Dr; Weiggers Rd; Cooke Lane)	4	each	\$ 110,900	\$ 443,600
6	Hydrants (Manual Flushing) (Madsen & Cty Rd B; Green Gable & Rader; Green Gable; Shore Dr & Oakwood; Shore Dr & Weiggers Rd; Shore Dr & Rader; Oakwood Beach & Woodland)	7	each	\$ 14,400	\$ 100,800
7	Paving	4.6	mile	\$ 261,200	\$ 1,204,132
8	Erosion Control and Stormwater Management	1	LS	\$ 74,000	\$ 74,000
9	Mob/Demob/Bonds/etc	1	each	\$ 320,000	\$ 320,000
<b>Total Construction Cost</b>				<b>\$</b>	<b>5,397,070</b>
<b>Contingencies</b>				<b>30%</b>	<b>\$ 1,619,100</b>
<b>Total Construction Cost</b>				<b>\$</b>	<b>7,020,000</b>



CONCEPTUAL COST - 15 APRIL 2019

LONG TERM WATER SUPPLY SCENARIOS

Tyco - Marinette, WI

Items		Quantities		Rate	Amount
<b>ALTERNATIVE 1 - SCENARIO 1B - BASELINE - ALL CURRENT PARCELS</b>					
1	4" DIP water main - Baseline includes water main, valves, culverts, road crossings (Cty Rd B, Green Gable, Shore, Wiegers, Oakwood Beach, Woodland, Country Lane, Cooke Lane, and Rader Rd)	4.6	mile	\$ 485,800	\$ 2,239,538
2	Service Laterals (139 laterals at an average of 200 ft per house)	27,800	L.F.	\$ 70	\$ 1,946,000
3	Water Service Connections	139	each	\$ 1,900	\$ 264,100
4	Well Abandonment	139	each	\$ 1,600	\$ 222,400
5	Smart Flushing Systems (Cty Rd B; Shore Dr; Weigers Rd; Cooke Lane)	4	each	\$ 110,900	\$ 443,600
6	Hydrants (Manual Flushing) (Madsen & Cty Rd B; Green Gable & Rader; Green Gable; Shore Dr & Oakwood; Shore Dr & Weigers Rd; Shore Dr & Rader; Oakwood Beach & Woodland)	7	each	\$ 14,400	\$ 100,800
7	Paving	4.6	mile	\$ 261,200	\$ 1,204,132
8	Erosion Control and Stormwater Management	1	LS	\$ 74,000	\$ 74,000
9	Mob/Demob/Bonds/etc	1	each	\$ 320,000	\$ 320,000
<b>Total Construction Cost</b>					<b>\$ 6,814,570</b>
<b>Contingencies</b>				<b>30%</b>	<b>\$ 2,044,400</b>
<b>Total Construction Cost</b>					<b>\$ 8,860,000</b>

CONCEPTUAL COST - 15 APRIL 2019

LONG TERM WATER SUPPLY SCENARIOS

Tyco - Marinette, WI

Items	Quantities		Rate	Amount	
<b>ALTERNATIVE 1 - SCENARIO 1C - BASELINE - ALL POTENTIAL PARCELS</b>					
1	4" DIP water main - Baseline includes water main, valves, culverts, road crossings (Cty Rd B, Green Gable, Shore, Wiegers, Oakwood Beach, Woodland, Country Lane, Cooke Lane, and Rader Rd)	4.6	mile	\$ 485,800	\$ 2,239,538
2	Service Laterals (176 laterals at an average of 200 ft per house)	35,200	L.F.	\$ 70	\$ 2,464,000
3	Water Service Connections	176	each	\$ 1,900	\$ 334,400
4	Well Abandonment	176	each	\$ 1,600	\$ 281,600
5	Smart Flushing Systems (Cty Rd B; Shore Dr; Weigers Rd; Cooke Lane)	4	each	\$ 110,900	\$ 443,600
6	Hydrants (Manual Flushing) (Madsen & Cty Rd B; Green Gable & Rader; Green Gable; Shore Dr & Oakwood; Shore Dr & Weigers Rd; Shore Dr & Rader; Oakwood Beach & Woodland)	7	each	\$ 14,400	\$ 100,800
7	Paving	4.6	mile	\$ 261,200	\$ 1,204,132
8	Erosion Control and Stormwater Management	1	LS	\$ 74,000	\$ 74,000
9	Mob/Demob/Bonds/etc	1	each	\$ 320,000	\$ 320,000
<b>Total Construction Cost</b>					<b>\$ 7,462,070</b>
<b>Contingencies</b>				<b>30%</b>	<b>\$ 2,238,600</b>
<b>Total Construction Cost</b>					<b>\$ 9,700,000</b>

CONCEPTUAL COST - 15 APRIL 2019

LONG TERM WATER SUPPLY SCENARIOS

Tyco - Marinette, WI

Items	Quantities	Rate	Amount	
<b>ALTERNATIVE 1 - SCENARIO 2A - BASELINE AND LOOP AFFECTED SERVICES</b>				
1	4" DIP water main - Baseline includes water main, valves, culverts, road crossings (Cty Rd B, Green Gable, Shore, Wieggers, Oakwood Beach, Woodland, Country Lane, Cooke Lane, and Rader Rd)	5.9 mile	\$ 485,800	\$ 2,846,788
2	Service Laterals (58 laterals, average of 200 ft per house)	11,600 L.F.	\$ 70	\$ 812,000
3	Water Service Connections	58 each	\$ 1,900	\$ 110,200
4	Well Abandonment	58 each	\$ 1,600	\$ 92,800
5	Smart Flushing Systems (Cty Rd B; Shore Dr; Weiggers Rd; Cooke Lane)	4 each	\$ 110,900	\$ 443,600
6	Hydrants (Manual Flushing) (Madsen & Cty Rd B; Green Gable & Rader; Green Gable; Shore Dr & Oakwood; Shore Dr & Weiggers Rd; Shore Dr & Rader; Oakwood Beach & Woodland)	7 each	\$ 14,400	\$ 100,800
7	Paving	5.9 mile	\$ 261,200	\$ 1,530,632
8	Erosion Control and Stormwater Management	1 LS	\$ 74,000	\$ 74,000
9	Mob/Demob/Bonds/etc	1 each	\$ 320,000	\$ 320,000
<b>Total Construction Cost</b>			<b>\$</b>	<b>6,330,820</b>
<b>Contingencies</b>			<b>30%</b>	<b>\$ 1,899,200</b>
<b>Total Construction Cost</b>			<b>\$</b>	<b>8,230,000</b>

CONCEPTUAL COST - 15 APRIL 2019

LONG TERM WATER SUPPLY SCENARIOS

Tyco - Marinette, WI

Items	Quantities		Rate	Amount	
<b>ALTERNATIVE 1 - SCENARIO 2B - BASELINE AND LOOP - ALL CURRENT PARCELS</b>					
1	4" DIP water main - Baseline includes water main, valves, culverts, road crossings (Cty Rd B, Green Gable, Shore, Wieggers, Oakwood Beach, Woodland, Country Lane, Cooke Lane, and Rader Rd)	5.9	mile	\$ 485,800	\$ 2,846,788
2	Service Laterals (50 laterals at an average of 200 ft per house)	30,400	L.F.	\$ 70	\$ 2,128,000
3	Water Service Connections	152	each	\$ 1,900	\$ 288,800
4	Well Abandonment	152	each	\$ 1,600	\$ 243,200
5	Smart Flushing Systems (Cty Rd B; Shore Dr; Weigers Rd; Cooke Lane)	4	each	\$ 110,900	\$ 443,600
6	Hydrants (Manual Flushing) (Madsen & Cty Rd B; Green Gable & Rader; Green Gable; Shore Dr & Oakwood; Shore Dr & Weigers Rd; Shore Dr & Rader; Oakwood Beach & Woodland)	7	each	\$ 14,400	\$ 100,800
7	Paving	5.9	mile	\$ 261,200	\$ 1,530,632
8	Erosion Control and Stormwater Management	1	LS	\$ 74,000	\$ 74,000
9	Mob/Demob/Bonds/etc	1	each	\$ 320,000	\$ 320,000
<b>Total Construction Cost</b>				<b>\$</b>	<b>7,975,820</b>
<b>Contingencies</b>				<b>30%</b>	<b>\$ 2,392,700</b>
<b>Total Construction Cost</b>				<b>\$</b>	<b>10,370,000</b>

CONCEPTUAL COST - 15 APRIL 2019

LONG TERM WATER SUPPLY SCENARIOS

Tyco - Marinette, WI

Items	Quantities	Rate	Amount	
<b>ALTERNATIVE 1 - SCENARIO 2C - BASELINE AND LOOP - ALL POTENTIAL PARCELS</b>				
1	4" DIP water main - Baseline includes water main, valves, culverts, road crossings (Cty Rd B, Green Gable, Shore, Wiegers, Oakwood Beach, Woodland, Country Lane, Cooke Lane, and Rader Rd)	5.9 mile	\$ 485,800	\$ 2,846,788
2	Service Laterals (200 laterals at an average of 200 ft per house)	40,000 L.F.	\$ 70	\$ 2,800,000
3	Water Service Connections	200 each	\$ 1,900	\$ 380,000
4	Well Abandonment	200 each	\$ 1,600	\$ 320,000
5	Smart Flushing Systems (Cty Rd B; Shore Dr; Weigers Rd; Cooke Lane)	4 each	\$ 110,900	\$ 443,600
6	Hydrants (Manual Flushing) (Madsen & Cty Rd B; Green Gable & Rader; Green Gable; Shore Dr & Oakwood; Shore Dr & Weigers Rd; Shore Dr & Rader; Oakwood Beach & Woodland)	7 each	\$ 14,400	\$ 100,800
7	Paving	5.9 mile	\$ 261,200	\$ 1,530,632
8	Erosion Control and Stormwater Management	1 LS	\$ 74,000	\$ 74,000
9	Mob/Demob/Bonds/etc	1 each	\$ 320,000	\$ 320,000
<b>Total Construction Cost</b>			<b>\$</b>	<b>8,815,820</b>
<b>Contingencies</b>			<b>30%</b>	<b>\$ 2,644,700</b>
<b>Total Construction Cost</b>			<b>\$</b>	<b>11,460,000</b>

CONCEPTUAL COST - 15 APRIL 2019

LONG TERM WATER SUPPLY SCENARIOS

Tyco - Marinette, WI

Items	Quantities	Rate	Amount	
<b>ALTERNATIVE 1 - SCENARIO 3A - BASELINE, LOOP AND POTENTIAL EXPANSION AFFECTED SERVICES</b>				
1	4" DIP water main - Baseline includes water main, valves, culverts, road crossings (Cty Rd B, Green Gable, Shore, Wieggers, Oakwood Beach, Woodland, Country Ln, Cooke Ln, Rader Rd, Madsen Rd, and Stanley Ln)	6.7 mile	\$ 485,800	\$ 3,259,718
2	Service Laterals (58 laterals, average of 200 ft per house)	11,600 L.F.	\$ 70	\$ 812,000
3	Water Service Connections	58 each	\$ 1,900	\$ 110,200
4	Well Abandonment	58 each	\$ 1,600	\$ 92,800
5	Smart Flushing Systems (Cty Rd B; Shore Dr; Weiggers Rd; Cooke Ln; Madsen Rd; Stanley Ln)	6 each	\$ 110,900	\$ 665,400
6	Hydrants (Manual Flushing) (Madsen & Cty Rd B; Green Gable & Rader; Green Gable; Shore Dr & Oakwood; Shore Dr & Weiggers Rd; Shore Dr & Rader; Oakwood Beach & Woodland)	7 each	\$ 14,400	\$ 100,800
7	Paving	6.7 mile	\$ 261,200	\$ 1,752,652
8	Erosion Control and Stormwater Management	1 LS	\$ 74,000	\$ 74,000
9	Mob/Demob/Bonds/etc	1 each	\$ 320,000	\$ 320,000
<b>Total Construction Cost</b>			<b>\$</b>	<b>7,187,570</b>
<b>Contingencies</b>			<b>30%</b>	<b>\$ 2,156,300</b>
<b>Total Construction Cost</b>			<b>\$</b>	<b>9,340,000</b>

CONCEPTUAL COST - 15 APRIL 2019

LONG TERM WATER SUPPLY SCENARIOS

Tyco - Marinette, WI

Items		Quantities		Rate	Amount
<b>ALTERNATIVE 1 - SCENARIO 3B - BASELINE, LOOP AND POTENTIAL EXPANSION - ALL CURRENT PARCELS</b>					
1	4" DIP water main - Baseline includes water main, valves, culverts, road crossings (Cty Rd B, Green Gable, Shore, Wieggers, Oakwood Beach, Woodland, Country Ln, Cooke Ln, Rader Rd, Madsen Rd, and Stanley Ln)	6.7	mile	\$ 485,800	\$ 3,259,718
2	Service Laterals (164 laterals at an average of 200 ft per house)	32,800	L.F.	\$ 70	\$ 2,296,000
3	Water Service Connections	164	each	\$ 1,900	\$ 311,600
4	Well Abandonment	164	each	\$ 1,600	\$ 262,400
5	Smart Flushing Systems (Cty Rd B; Shore Dr; Weiggers Rd; Cooke Ln; Madsen Rd; Stanley Ln)	6	each	\$ 110,900	\$ 665,400
6	Hydrants (Manual Flushing) (Madsen & Cty Rd B; Green Gable & Rader; Green Gable; Shore Dr & Oakwood; Shore Dr & Weiggers Rd; Shore Dr & Rader; Oakwood Beach & Woodland)	7	each	\$ 14,400	\$ 100,800
7	Paving	6.7	mile	\$ 261,200	\$ 1,752,652
8	Erosion Control and Stormwater Management	1	LS	\$ 74,000	\$ 74,000
9	Mob/Demob/Bonds/etc	1	each	\$ 320,000	\$ 320,000
<b>Total Construction Cost</b>					<b>\$ 9,042,570</b>
<b>Contingencies</b>				<b>30%</b>	<b>\$ 2,712,800</b>
<b>Total Construction Cost</b>					<b>\$ 11,760,000</b>

CONCEPTUAL COST - 15 APRIL 2019

LONG TERM WATER SUPPLY SCENARIOS

Tyco - Marinette, WI

Items	Quantities		Rate	Amount	
<b>ALTERNATIVE 1 - SCENARIO 3C - BASELINE, LOOP AND POTENTIAL EXPANSION - ALL POTENTIAL PARCELS</b>					
1	4" DIP water main - Baseline includes water main, valves, culverts, road crossings (Cty Rd B, Green Gable, Shore, Wiegers, Oakwood Beach, Woodland, Country Ln, Cooke Ln, Rader Rd, Madsen Rd, and Stanley Ln)	6.7	mile	\$ 485,800	\$ 3,259,718
2	Service Laterals (211 laterals at an average of 200 ft per house)	42,200	L.F.	\$ 70	\$ 2,954,000
3	Water Service Connections	211	each	\$ 1,900	\$ 400,900
4	Well Abandonment	211	each	\$ 1,600	\$ 337,600
5	Smart Flushing Systems (Cty Rd B; Shore Dr; Weigers Rd; Cooke Ln; Madsen Rd; Stanley Ln)	6	each	\$ 110,900	\$ 665,400
6	Hydrants (Manual Flushing) (Madsen & Cty Rd B; Green Gable & Rader; Green Gable; Shore Dr & Oakwood; Shore Dr & Weigers Rd; Shore Dr & Rader; Oakwood Beach & Woodland)	7	each	\$ 14,400	\$ 100,800
7	Paving	6.7	mile	\$ 261,200	\$ 1,752,652
8	Erosion Control and Stormwater Management	1	LS	\$ 74,000	\$ 74,000
9	Mob/Demob/Bonds/etc	1	each	\$ 320,000	\$ 320,000
<b>Total Construction Cost</b>				<b>\$</b>	<b>9,865,070</b>
<b>Contingencies</b>				<b>30%</b>	<b>\$ 2,959,500</b>
<b>Total Construction Cost</b>				<b>\$</b>	<b>12,820,000</b>



CONCEPTUAL COST - 15 APRIL 2019

LONG TERM WATER SUPPLY SCENARIOS

Tyco - Marinette, WI

Items	Quantities	Rate	Amount	
<b>ALTERNATIVE 2 - Establish Town of Peshtigo Sanitary District</b>				
1	4" DIP water main - Baseline includes water main, valves, culverts, road crossings (Cty Rd B, Green Gable, Shore, Wiegers, Oakwood Beach, Woodland, Country Lane, Cooke Lane, and Rader Rd)	5.9 mile	\$ 485,800	\$ 2,846,788
2	Service Laterals (152 laterals at an average of 200 ft per house)	30,400 L.F.	\$ 70	\$ 2,128,000
3	Water Service Connections	152 each	\$ 1,900	\$ 288,800
4	Well Abandonment	152 each	\$ 1,600	\$ 243,200
5	Smart Flushing Systems (Cty Rd B; Shore Dr; Weigers Rd; Cooke Lane)	4 each	\$ 110,900	\$ 443,600
6	Hydrants (Manual Flushing) (Madsen & Cty Rd B; Green Gable & Rader; Green Gable; Shore Dr & Oakwood; Shore Dr & Weigers Rd; Shore Dr & Rader; Oakwood Beach & Woodland)	7 each	\$ 14,400	\$ 100,800
7	Paving	5.9 mile	\$ 261,200	\$ 1,530,632
8	Erosion Control and Stormwater Management	1 LS	\$ 74,000	\$ 74,000
9	Mob/Demob/Bonds/etc	1 each	\$ 320,000	\$ 320,000
10	Master Meter/Meter Vault	1 LS	\$ 70,000	\$ 70,000
11	Set-up Sanitary District	1 LS	\$ 100,000	\$ 100,000
<b>Total Construction Cost</b>			<b>\$</b>	<b>8,145,820</b>
<b>Contingencies</b>			<b>30%</b>	<b>\$ 2,443,700</b>
<b>Total Construction Cost</b>			<b>\$</b>	<b>10,590,000</b>

CONCEPTUAL COST - 15 APRIL 2019

LONG TERM WATER SUPPLY ALTERNATIVES

Tyco - Marinette, WI

Items	Quantities	Rate	Amount
<b>ALTERNATIVE 4 - SPECIAL CASING DEEP WATER SUPPLY WELLS</b>			
1 Drill Deep Wells (500 ft Wells with special casing around top 60 ft, includes 12 gpm pump, 35 gal pressure tank and connection to existing utilities)	58 each	\$50,000	\$2,900,000
2 Well Abandonment - existing wells	58 each	\$ 1,600	\$ 92,800
<b>Total Construction Cost</b>			<b>\$ 2,992,800</b>
<b>Contingencies</b>		<b>30%</b>	<b>\$ 897,800</b>
<b>Total Construction Cost</b>			<b>\$ 3,890,000</b>

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