

Tyco Fire Products LP

# SUPPLEMENTAL SITE INVESTIGATION WORK PLAN

Tyco Fire Technology Center  
Marinette, Wisconsin

BRRTS No. 02-38-580694

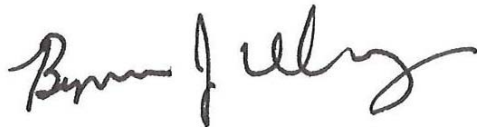
February 2019





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## SUPPLEMENTAL SITE INVESTIGATION WORK PLAN

Tyco Fire Technology Center  
Marinette, Wisconsin

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### APPENDICES

- Appendix A December 11, 2018 WDNR Wetland Delineation Confirmation Letter
- Appendix B Project-specific Endangered Resource Reviews

## ACRONYMS AND ABBREVIATIONS

AFFF	aqueous film-forming foams
APE	Area of Potential Effect
bgs	below ground surface
ERR	Endangered Resource Reviews
ft	feet
FTC	Fire Technology Center
HPT	Hydraulic Profiling Tool
LEAF	Leaching Environmental Assessment Framework
MS	matrix spike
MSD	matrix spike duplicate
NAD	North American Datum
NAVD	North American Vertical Datum
NR	Natural Resources
NTU	nephelometric turbidity unit
OTA	Outdoor Testing/Training Area
PFAS	per- and poly-fluorinated alkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
R&D	Research and Development
RCL	Residual Contaminant Level
SPLP	Synthetic Precipitation Leaching Procedure
TOC	total organic carbon
TSS	total suspended solids
UCL	upper confidence limit
USEPA	United States Environmental Protection Agency
VAP	vertical aquifer profiling
WDNR	Wisconsin Department of Natural Resources

## 1 INTRODUCTION

On behalf of Tyco Fire Products LP (Tyco), Arcadis US, Inc. (Arcadis) has prepared this Supplemental Site Investigation Work Plan (work plan) to continue investigation of the nature and extent of per- and poly-fluoroalkyl substances (PFAS) related to the Ansul Fire Technology Center (the Site) located at 2700 Industrial Parkway South, Marinette, Wisconsin (Figure 1). The investigation work proposed herein is based on evaluation of the data and identification of data gaps as well as in response to the Wisconsin Department of Natural Resources (WDNR) December 7, 2018 letter stating that additional investigation of PFAS must be completed in the area of the Site.

Investigation activities described in this work plan will consist of groundwater, soil, and pond surface water sampling. Objectives of this investigation include further delineation of the nature and extent of PFAS extending from the Site and collection of additional information about the site geology, hydrogeology, and soil properties. Note that Tyco is working closely with the WDNR to create a sampling plan for pond fish and a surface water sampling plan for the bay of Green Bay. These work plans will be provided to the WDNR under separate covers.

Activities described in this work plan are part of an ongoing process to identify the nature and extent of PFAS in environmental media due to historical operations at the Site. After completion of the work described below, additional investigation and evaluation work will likely be necessary, and that additional work will be described in subsequent work plans before execution. The data obtained from the work proposed herein, along with previously obtained information, will be used to guide future investigations.

## 2 SITE BACKGROUND

A description of the Site, regional and site-specific geology and hydrogeology, and previously completed investigation activities is provided in this section.

### 2.1 Site Description and History

The Site is a fire suppressant training, testing, research, and development facility built in the early 1960s. The Site occupies 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. 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.

Aqueous film-forming foams (AFFF) historically have been used at the OTA as part of R&D, quality testing, and firefighting training activities. While the presence of multiple PFAS compounds has been included in historical and recent investigation analyses, the primary focus of the recent site investigation

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has been on perfluorooctanoic acid (PFOA) and/or perfluorooctanesulfonic acid (PFOS), which have been present in various formulations of these foams. AFFF has not been sprayed outdoors at the OTA since November 2017.

### 2.2 Geology and Physical Setting

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. An on-site ditch is present, primarily on the west side of the OTA, and is oriented generally north to south through the Site. Stormwater runoff from the OTA that does not infiltrate appears to flow south, then through a series of connecting ditches and streams, then east to the bay of Green Bay.

The surficial geology in the Marinette 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). Based on site investigations and publicly available construction reports for wells near the Site, there is a generally consistent sequence in shallow soils as follows:

- A sand unit, consisting of brown fine to medium sand interbedded with silt or silty sand, extending from the surface to between 30 and 90 feet below ground surface (ft bgs)
- A confining unit, consisting of lake-deposited silt and clay, above areas of glacial till, typically comprising silt, sand, and gravel. The confining unit is, at a minimum, 12 feet thick at the Site and 8 feet thick south of the Site; however, it thickens eastward.

Site data and publicly available construction reports for wells located in the area show that the bedrock surface slopes southeastward toward the bay of Green Bay. Bedrock may be as shallow as 35 ft bgs beneath portions of the Site, but deepens to approximately 100 ft bgs along the bay of Green Bay shore.

The regional groundwater flow direction in the Marinette area is generally east toward the bay of Green Bay (Oakes and Hamilton 1973). The water table depth in the area is typically shallow; at the Site, the depth to water is normally less than 5 ft bgs. Historical water levels measured in the site monitoring well network, which is focused in the central and northeast portions of the Site, predict flow toward the east or northeast.

### 2.3 Recent Investigation Work

The results of recent PFAS investigations have been provided previously in the following documents:

- 2016 Site Investigation Report (BRRTS No. 03-38-001345; Arcadis 2016)
- 2018 Revised Site Investigation Work Plan (BRRTS No. 02-38-580694; Arcadis 2018a)
- 2018 Site Investigation Report (BRRTS No. 02-38-580694; Arcadis 2018b)

Note that investigation data collected in accordance with the 2018 Revised Site Investigation Work Plan that had not been included in the 2018 Site Investigation Report (i.e., data collected or processed between August 29, 2018 and December 31, 2018) will be provided in a forthcoming data summary report.

## 2.4 Natural and Cultural Resources

A natural and cultural resources desktop review was conducted for the Site and the expanded study area as part of the 2018 Revised Site Investigation Work Plan. Because the work proposed in this document is within the same study area, the natural and cultural resources review information presented in the 2018 Revised Site Investigation Work Plan is relevant for this work plan. Applicable updates to the natural and cultural resources are as follows:

1. On December 11, 2018, WDNR confirmed concurrence with wetland boundaries delineated by Arcadis during multiple field visits in 2018. Appendix A presents a copy of the wetland delineation confirmation letter and figures that depict delineated wetland and waterbody boundaries. Wetland and waterbody delineation surveys were conducted for the proposed installation of interim measure water treatment systems at two locations in the City of Marinette. The purpose of the wetland and waterbody delineation survey was to assess the presence or absence of wetlands and other waters that may be affected by the proposed interim measures and to assess general ecological conditions within the identified environmental survey area. Fifteen wetlands and two streams were identified within the environmental survey area.
2. Project-specific Endangered Resource Reviews (ERRs) were conducted through the WDNR Bureau of Natural Heritage Conservation for the proposed installation of interim measure water treatment systems at two locations in the City of Marinette. These ERRs are included in Appendix B.
3. Additionally, a formal area of potential effect (APE) was established, and Arcadis conducted site-specific records reviews and background research for the proposed installation of interim measure water treatment systems at two locations in the City of Marinette. The results of each were submitted with the Water Resource Application for Project Permits for each interim measure. Project-specific APEs will be established, and site-specific records reviews and background research will be conducted as needed for future work.

## 3 GENERAL FIELD ACTIVITIES

The following field activities apply to all investigation events described in this work plan.

### 3.1 Access and Utility Clearance

Investigation locations are planned on Tyco property, private properties or public rights of way. Prior to mobilization, permission for access to investigation locations will be obtained from the appropriate jurisdictional authorities.

Prior to mobilization, Wisconsin One Call (i.e., Diggers Hotline) will be contacted. In accordance with Arcadis standard policies, at minimum, three lines of evidence will be utilized for locating subsurface utilities. The anticipated lines of evidence include contracting a private utility locating service, conducting an inspection of each location, reviewing available utility drawings, and interviewing knowledgeable facility personnel. An air knife or hand auger may also be used to clear soil boring areas, if needed.



### 3.2 Surveying

All sample locations will be marked with a flag or staked and surveyed. Additionally, all new piezometers will be surveyed following installation activities. The ground surface elevation of each location will be referenced to the North American Vertical Datum of 1988 (NAVD88) system, and the horizontal coordinates will be reported in the Wisconsin State Plane North American Datum 1983 (NAD83) – Wisconsin Central 4802 Zone system as part of the survey work.

### 3.3 Investigation-Derived Waste

Purge water, soil, and drilling fluid generated during investigation activities will be containerized (e.g., in 55-gallon steel drums) and staged in a centralized and secured location on Tyco property, pending characterization. Waste disposal options will be assessed following waste characterization.

## 4 GROUNDWATER INVESTIGATION

### 4.1 Hydraulic Profiling

The hydrostratigraphic framework of the sand unit will be characterized using hydraulic profiling tool (HPT) soundings, in combination with logging at additional planned piezometer boreholes, as described in Section 4.2. Up to 28 HPT borings may be installed as shown on Figure 3. At each boring, the HPT sounding will be completed to assess the relative permeability vertically within the sand unit. Borings will extend downward to refusal or until low-permeability, fine-grained soils are encountered.

To complete the hydraulic profiling, the HPT is attached to the end of a Geoprobe® drill string that enables a continuously metered injection of a small volume of water mixture (50 to 300 milliliters per minute) during advancement of the probe. Simultaneously, the fluid backpressure due to the injection into the formation is measured and logged at frequent intervals along with the flow data. After correcting for the equipment head losses, the flow and pressure are plotted as a relative permeability (or hydraulic conductivity) curve by recognizing that hydraulic conductivity (K) is the constant of proportionality of flow divided by pressure. The resulting data (flow and pressure) from each location are comparable within the vertical profile at each location, as well as between soundings.

At a subset of HPT locations, soil borings will be completed adjacent to the HPT boring. At these locations, continuous soil cores will be collected and logged by an Arcadis field geologist. The logs will then be compared to the HPT results. Soil descriptions will include soil type, grain size, moisture content, and color. Fine-grained soil descriptions will also include plasticity and consistency. Coarse-grained soil descriptions will include angularity and sorting.

After the completion of each HPT location, the borings will be abandoned.

### 4.2 Piezometer Installations and Development

Up to 25 piezometers, installed singly or in pairs or clusters, will be installed as shallow, intermediate, and/or deep sand unit wells at locations north, east, and south of the Site to refine and supplement the understanding of groundwater flow patterns. Planned well locations are shown on Figure 4. Groundwater

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elevations at these wells will be used to assess groundwater flow direction as well as horizontal and vertical gradients within the surficial aquifer.

Piezometers will be installed via sonic drilling or a comparable method. During boring activities, continuous soil cores will be collected and logged by an Arcadis field geologist as described in Section 4.1. The screened intervals of each piezometer will be set based on the observed lithology. Additionally, other factors, such as depths of nearby private wells and historical vertical aquifer profiling (VAP) results, will be considered where applicable. Generally, shallow piezometers will be screened in proximity to the water table; deep piezometers will be screened at or near the base of the sand unit. At locations where the sand unit is sufficiently deep (e.g., southeast of the Site where the sand unit has been observed to a maximum depth of approximately 90 ft bgs), intermediate piezometers may be installed at a depth between the shallow and deep piezometers if a distinct permeable sand unit is present. All piezometers will be constructed with 5- or 10-foot-long by 2-inch-diameter schedule 40 polyvinyl chloride (PVC) 0.010-inch slotted screen and a 2-inch schedule 40 PVC riser to surface. Filter pack sand will be emplaced to 2 feet above the screen, with a filter pack seal (clean fine sand and bentonite or bentonite only based on the depth of the screened interval) to at least 2 feet above the filter pack. Once the bentonite has set (approximately 1 hour), the well will be grouted to surface.

Following piezometer installation and passage of a minimum of 24 hours, each piezometer will be developed via over-pumping and surging methods using a submersible pump to remove sediments from the well and surrounding filter pack. Groundwater parameters (pH, specific conductance, temperature, and turbidity) will be measured periodically, and well development will continue until up to 10 well volumes have been purged or turbidity has stabilized below 50 NTUs.

### 4.3 Groundwater Elevations at Piezometers

Water elevations will be manually measured using a water level meter at the newly-installed piezometers (Section 4.2), temporary wells installed in October/November 2018, select site-related monitoring wells, and paired surface water-related stilling wells and piezometers. As previously stated, these data will be used to assess groundwater flow direction as well as horizontal and vertical gradients within the surficial aquifer. Additionally, these data will be used to continue evaluating groundwater and surface water interactions. Water elevation measurements will be collected at locations shown on Figure 5.

### 4.4 Sand Unit VAP

Following the evaluation of HPT data and water elevations, the resulting data will be used to guide additional groundwater delineation activities to the north and northeast of the Site. Additional VAPs may be appropriate; however, the need for additional VAP borings, or their specific locations, will be determined following the aforementioned evaluation and concurrence from WDNR. Additional VAP borings would be installed using procedures established for previous VAP work at the Site.

## 5 SOIL INVESTIGATION

Shallow soil sampling will be conducted via direct-push drilling methods or hand auger to assess soil conditions on site and gather additional data to calculate site-specific Residual Contaminant Levels

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(RCLs) protective of groundwater quality. Approximately eight on-site soil borings, each with up to two sample depth intervals, will be advanced within and near the OTA. Sample interval depths will be determined based on field observations. The proposed soil boring locations are provided on Figure 6.

In accordance with Wisconsin Administrative Code Department of Natural Resources (NR), Chapter NR 720.19(4)(b), leaching tests may be conducted to evaluate the site-specific RCL for soil based on protection of groundwater. As such, leaching tests are proposed to be completed based on WDNR's Guidance on the Use of Leaching Tests for Unsaturated Soil to Determine Groundwater Contamination Potential (guidance; WDNR 2003). This guidance discusses several leaching tests and key issues that should be considered when developing site leaching tests. In general, the guidance recommends using the United States Environmental Protection Agency (USEPA) Method 1312 Synthetic Precipitation Leaching Procedure (SPLP).

Subsequent to the publication of the guidance, the USEPA developed a new series of leaching tests called the Leaching Environmental Assessment Framework (LEAF; USEPA 2017). The LEAF test methods are incorporated into the USEPA Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium (SW-846) as USEPA Methods 1313, 1314, 1315, and 1316. The LEAF tests evaluate the leaching of constituents from solid materials (e.g., soil) to the surrounding environment (e.g., groundwater). The four LEAF methods evaluate leaching under three conditions, including pH, liquid to solid ratio, and form of the soil (e.g., granular, solidified). The LEAF methods were considered for use on site-related soil samples; however, because the proposed leaching tests will be the first to be performed on site-related soil samples, the WDNR's recommended SPLP method with modifications will be used instead. The LEAF methods may be appropriate if subsequent leaching tests are determined to be necessary, particularly to evaluate remedial alternatives.

In accordance with the guidance, soil samples will be collected from areas that are representative of the compounds and the soil heterogeneity at the Site. The guidance recommends estimating the 95% upper confidence limit (UCL) of the leaching test results to calculate the RCL. Based on this guidance, eight locations are proposed to collect soil samples. The eight locations are distributed across the OTA and represent a range of PFAS concentrations. Soil leaching tests will be performed on up to two depth intervals from each location, depending on soil lithology. Soil samples will be collected from the unsaturated zone.

PFAS are anionic compounds and have increased partitioning to the solid phase (soil) at low pH (Higgins and Luthy 2006). As such, it is proposed to modify the SPLP eluant to a circumneutral eluant instead of using the typical low-pH (acidic) eluant. Because an acidic eluant may result in biased low results, using a circumneutral eluant will more accurately represent precipitation percolating through the soil. As such, a circumneutral eluant of site groundwater with low to non-detect concentrations of PFAS, collected from monitoring well MW-100-32, will be used to more accurately estimate soil leaching. This approach is consistent with the guidance, which states that acidic eluants should not be used for anionic metals species because the acidic eluant can result in biased results (WDNR 2003).

The SPLP includes particle size reduction if the soil grains are retained on a 9.5 mm (0.375 inch) standard sieve. This is medium pebble sized material or larger. Based on borings completed in the OTA, which have encountered primarily silt- and sand-sized material, it is expected that particle size reduction will not be needed for the leaching test.

## SUPPLEMENTAL SITE INVESTIGATION WORK PLAN

The SPLP includes filtering the sample after tumbling. Because of the potential for PFAS to sorb to filters, samples will be centrifuged rather than filtered. WDNR (2003) notes that centrifuging may be preferable to filtering given the analytes and site-specific conditions.

For each leaching test, soil samples will be analyzed for PFAS and the resulting leachate will be analyzed for PFAS.

## 6 POND WATER SAMPLING

Surface water samples will be collected from three privately owned ponds within the investigation area to evaluate the concentrations of PFAS present in surface water. Seasonal variability of concentrations will be assessed by collecting samples from all pond locations during three sampling events: snow melt (about March), spring rain (about May), and fall rain (about October).

Samples will be collected by hand using a clean beaker attached to a pole, then pouring the sample into appropriate lab-supplied containers. Sample locations will be accessed from the edge of water, by foot, with permission from property owners. All surface water samples will be analyzed for PFAS and Total Suspended Solids (TSS), following the quality assurance/quality control (QA/QC) and sampling handling procedures described in Section 7.

As previously indicated in Section 1, fish sampling in select ponds and surface water sampling in the bay of Green Bay will be proposed in subsequent work plans.

## 7 QUALITY ASSURANCE AND QUALITY CONTROL

### 7.1 Special Considerations for PFAS Sampling

The detection of PFAS compounds at very low concentrations can be influenced by common PFAS-containing materials that may be present at the sampling site. Therefore, sampling protocols are to be strictly followed by the sampling personnel. To minimize the potential for cross-contamination, attention will be given to sampling materials (i.e., tubing), decontamination procedures, as well as clothing and personal care products used by sampling personnel.

Sampling for PFAS compounds will include the submission of one laboratory-supplied reagent field blank per day to analyze for the presence of ambient PFAS in the sampling area. PFAS-free water used for the reagent field blank sample is brought to the Site in a laboratory-supplied bottle. Field staff will transfer the laboratory-supplied PFAS-free water into an empty sample bottle. This reagent field blank will be placed in the same cooler as other samples intended for PFAS analyses.

All equipment will be decontaminated between sample locations with PFAS-free water. Only Alconox, Liquinox, or methanol can be used as decontamination materials. To assess the adequacy of the decontamination process, a rinse blank will be collected every 20 samples or per day, whichever is more frequent. To prepare a rinse blank, a sample of PFAS-free water will be poured over or through decontaminated field equipment before collection of environmental samples.

## 7.2 Laboratory Methods and Analysis

Samples will be placed in laboratory-supplied containers, stored, shipped on ice, and handled with chain-of-custody documentation. All samples will be sent to TestAmerica or an equivalent lab that is accredited for PFAS analysis. Although the focus of investigation activities is on the transport and distribution of PFOA and PFOS, potable water samples will be analyzed for the all 14 PFAS compounds that are reportable using USEPA Method 537. However, because this analytical method is specific to drinking water, a modified version of Method 537 will be used to analyze other environmental media samples.

As part of the internal QA/QC, one matrix spike (MS) sample and one matrix spike duplicate (MSD) sample will be collected for every 20 field samples collected for each medium, as listed in Table 1. One field duplicate will be collected for every ten field samples for each medium, as listed in Table 1.

Table 1. Laboratory Methods and QA/QC Frequency

Matrix	Parameter	Laboratory Method	MS/MSD Frequency	Field Duplicate Frequency
Water	PFAS	Modified USEPA 537	1/20	1/10
Water	TSS	USEPA 160.2	None	1/10
Soil	PFAS	Modified USEPA 537	1/20	1/10
Soil	Specific Gravity (Porosity Calc)	ASTM D854	None	None
Soil	Bulk Density	ASTM D2937	None	None
Soil	Moisture Content	ASTM D2216-90	None	None
Soil	Total Organic Carbon	USEPA SW-846 9060A	None	None
Soil	PFAS – Leaching	Modified USEPA 1312 SPLP	None	None

Internal laboratory QA/QC should consist of one laboratory blank and one laboratory control sample (or blank spike) per batch of samples, and additional QA/QCs as indicated by the laboratory QA/QC procedures.

## 8 REPORTING

Field investigation information will be communicated to WDNR through data summaries and in a future Supplemental Site Investigation Report; however, the results of additional investigation work not proposed in this work plan (e.g., fish tissue sampling and surface water sampling in the bay of Green Bay) will also be provided in the Supplemental Site Investigation Report. As such, submission of the Supplemental Site Investigation Report is not anticipated until delineation of impacts in all media of

## SUPPLEMENTAL SITE INVESTIGATION WORK PLAN

concern is sufficient to meet the requirements as detailed in Chapter NR 716 of the Wisconsin Administrative Code.

Data summaries to the WDNR will include recommendations as to whether further characterization or monitoring work is needed.

## 9 ANTICIPATED SCHEDULE

The anticipated schedule for field investigation and reporting is as follows:

- Field sampling:
  - HPT borings: approximately May 2019
  - Surface water pond sampling, soil sampling, and piezometer installations and development: approximately May-June 2019
  - Groundwater elevation data collection at new piezometers, temporary piezometers, and select monitoring wells: approximately July 2019
  - Sand unit VAP borings: approximately August 2019
- Reporting:
  - Data summaries will be provided to WDNR after completion of significant investigation elements.
  - Supplemental Site Investigation Report submitted to WDNR: approximately December 2019, or as adjusted, if necessary, per the considerations presented in Section 8 above.

In the event the schedule is affected by weather, access, or other factors, WDNR will be provided an updated schedule for the activities.

## 10 REFERENCES

- Arcadis. 2016. Site Investigation Report. Ansul Fire Technology Center Site. 2700 Industrial Parkway, Marinette, Wisconsin. BRRTS No. 03-38-001345. November 22, 2016.
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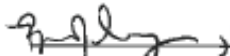
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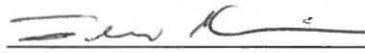
## 11 NR 712.09 CERTIFICATION

I, BENJAMIN J. VERBURG, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

, Principal Engineer, 31794-006  
Signature, title and P.E. number



I, TIMOTHY G. ALESSI, hereby certify that I am a hydrogeologist as that term is defined in s. NR 712.03 (1), Wis. Adm. Code, am registered in accordance with the requirements of ch. GHSS 2, Wis. Adm. Code, or licensed in accordance with the requirements of ch. GHSS 3, Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

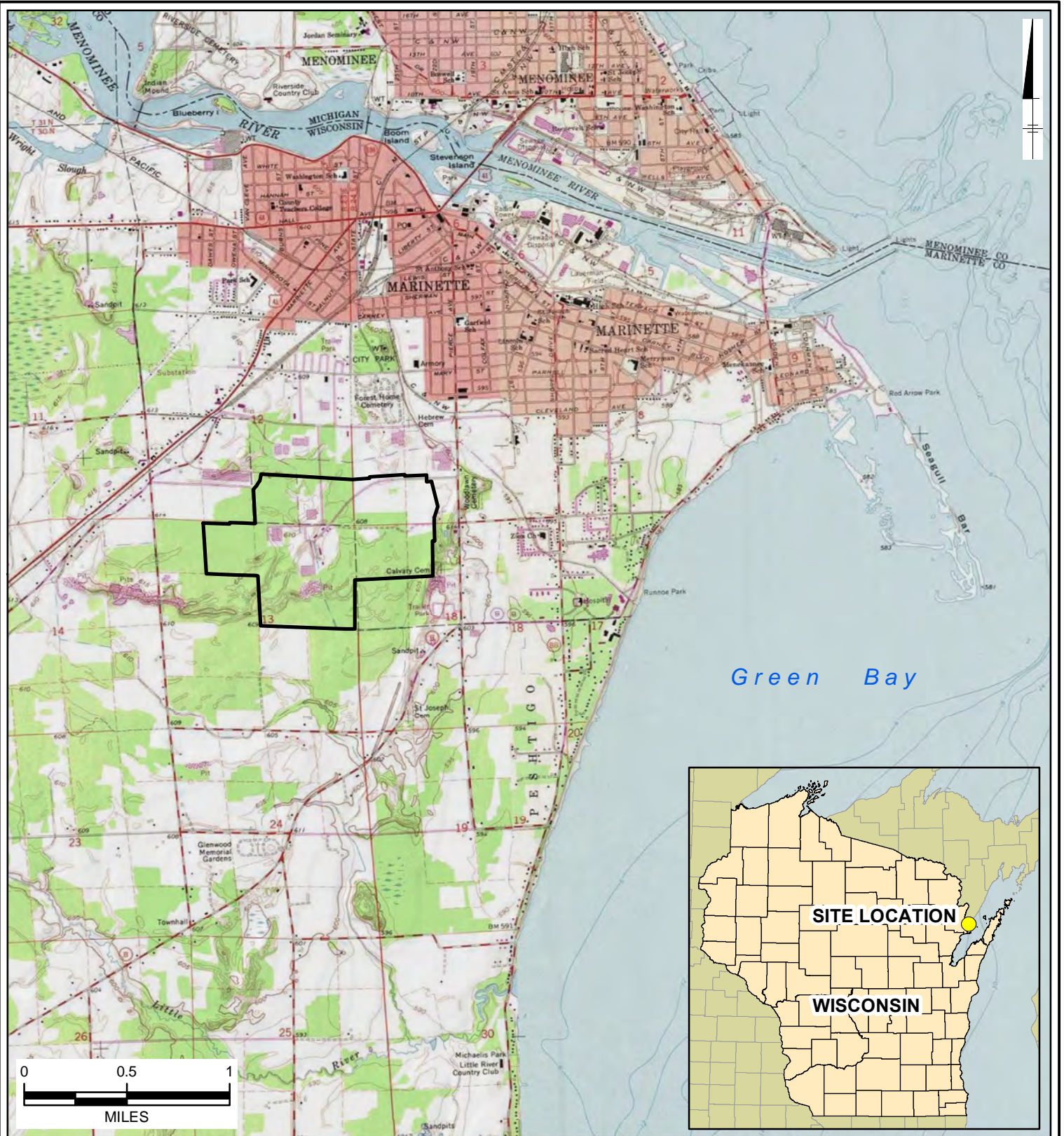
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Signature and title and P.G. number





# FIGURES





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**LEGEND:**


 APPROXIMATE SITE PROPERTY

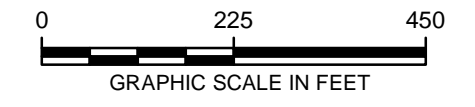
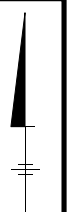
**NOTES:**

1. TOPOGRAPHIC MAP SOURCE: COPYRIGHT:© 2013 NATIONAL GEOGRAPHIC SOCIETY, I-CUBED, ACCESSED MARCH, 2018.

TYCO FIRE PRODUCTS, LP MARINETTE, WISCONSIN	
<b>SITE LOCATION</b>	
	<b>FIGURE 1</b>

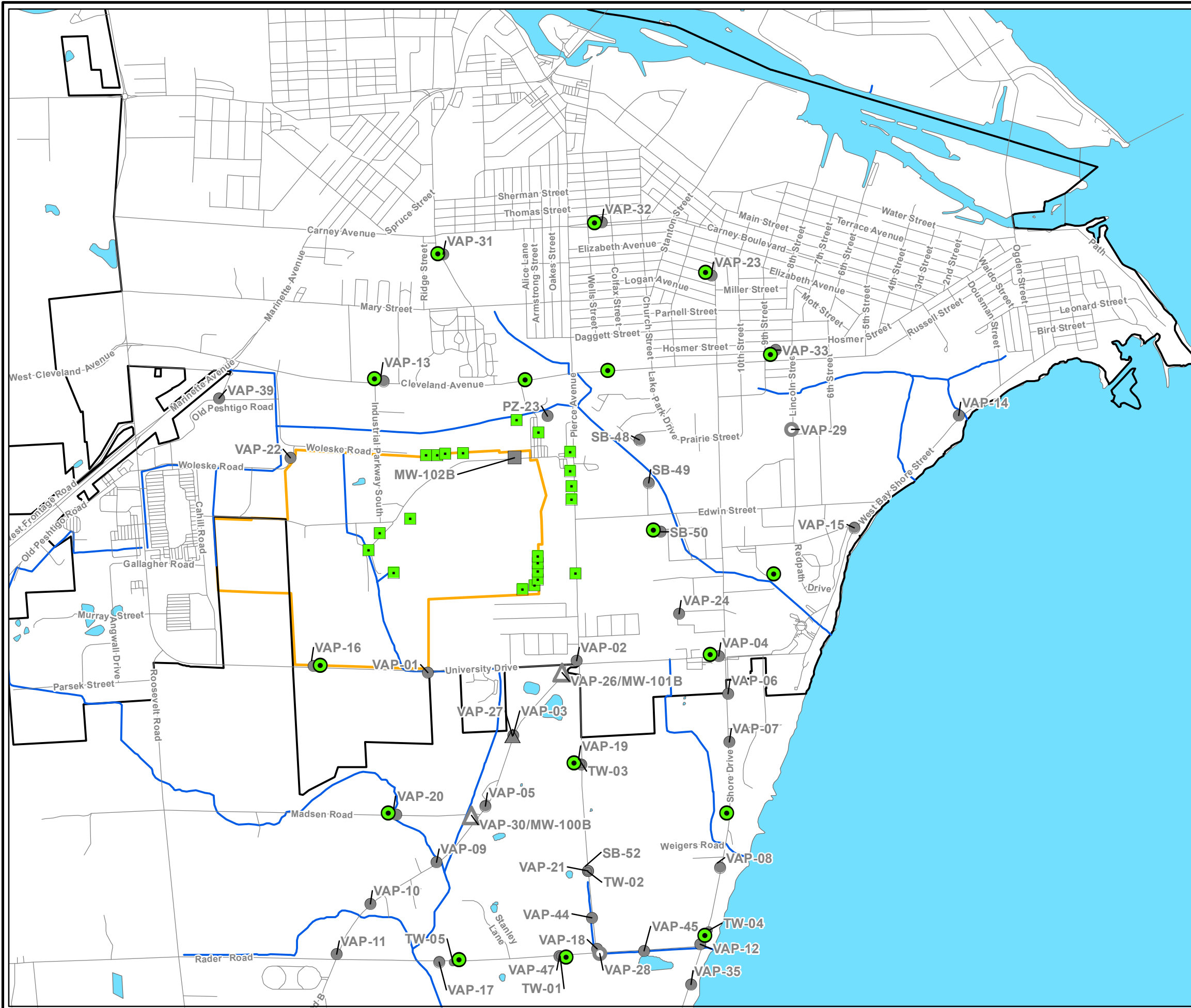


LEGEND:  
 OUTDOOR TESTING/TRAINING AREA



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

TYCO FIRE PRODUCTS, LP MARINETTE, WISCONSIN	
<b>OUTDOOR TESTING/TRAINING AREA</b>	
	<b>FIGURE 2</b>

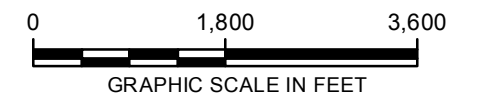


LEGEND:

- PROPOSED HPT BORING
- 2016 SAND UNIT HPT BORING
- TEMPORARY PIEZOMETER
- SAND-UNIT VAP BORING LOCATION
- ▲ CONFINING-UNIT VAP BORING LOCATION
- BEDROCK BOREHOLE LOCATION
- SAND-UNIT & CONFINING-UNIT VAP BORING LOCATION
- △ SAND-UNIT & CONFINING-UNIT VAP BORING AND BEDROCK BOREHOLE LOCATION
- APPROXIMATE SITE PROPERTY BOUNDARY
- APPROXIMATE MARINETTE CITY BOUNDARY
- ROAD
- DITCH/STREAM
- WATERBODY

NOTES:

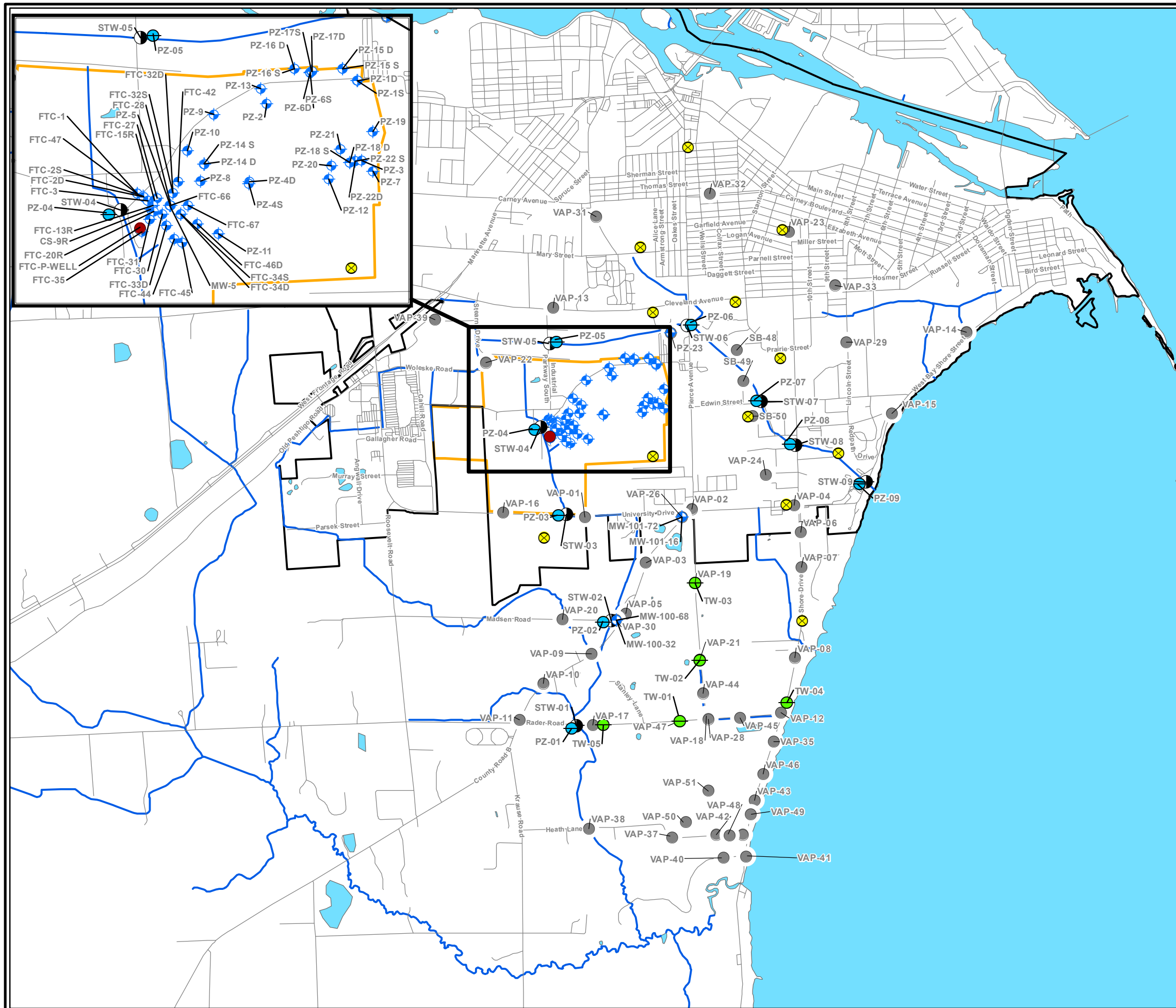
1. VAP = VERTICAL AQUIFER PROFILING
2. HPT = HYDRAULIC PROFILING TOOL
3. CITY BOUNDARY DATA SOURCE: WISCONSIN LEGISLATIVE TECHNOLOGY SERVICES BUREAU, WISCONSIN COUNTY CLERKS AND LAND INFORMATION OFFICES, ACCESSED FALL 2017.
4. DITCH/STREAM AND WATERBODY DATA SOURCE: U.S. GEOLOGICAL SURVEY NATIONAL HYDROGRAPHY DATASET, ACCESSED FALL 2017.
5. ROAD DATA SOURCE: OPEN STREET MAP, ACCESSED FALL 2017.



TYCO FIRE PRODUCTS, LP  
 MARINETTE, WISCONSIN

PROPOSED HPT BORING LOCATIONS

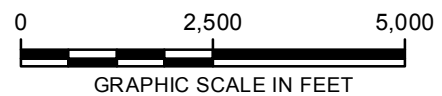




**LEGEND:**

- PROPOSED PIEZOMETER LOCATION
- MONITORING WELL
- PIEZOMETER
- STILLING WELL
- TEMPORARY PIEZOMETER
- SITE PRODUCTION WELL
- HISTORICAL VAP LOCATION
- APPROXIMATE SITE PROPERTY BOUNDARY
- APPROXIMATE MARINETTE CITY BOUNDARY
- ROAD
- DITCH/STREAM
- WATERBODY

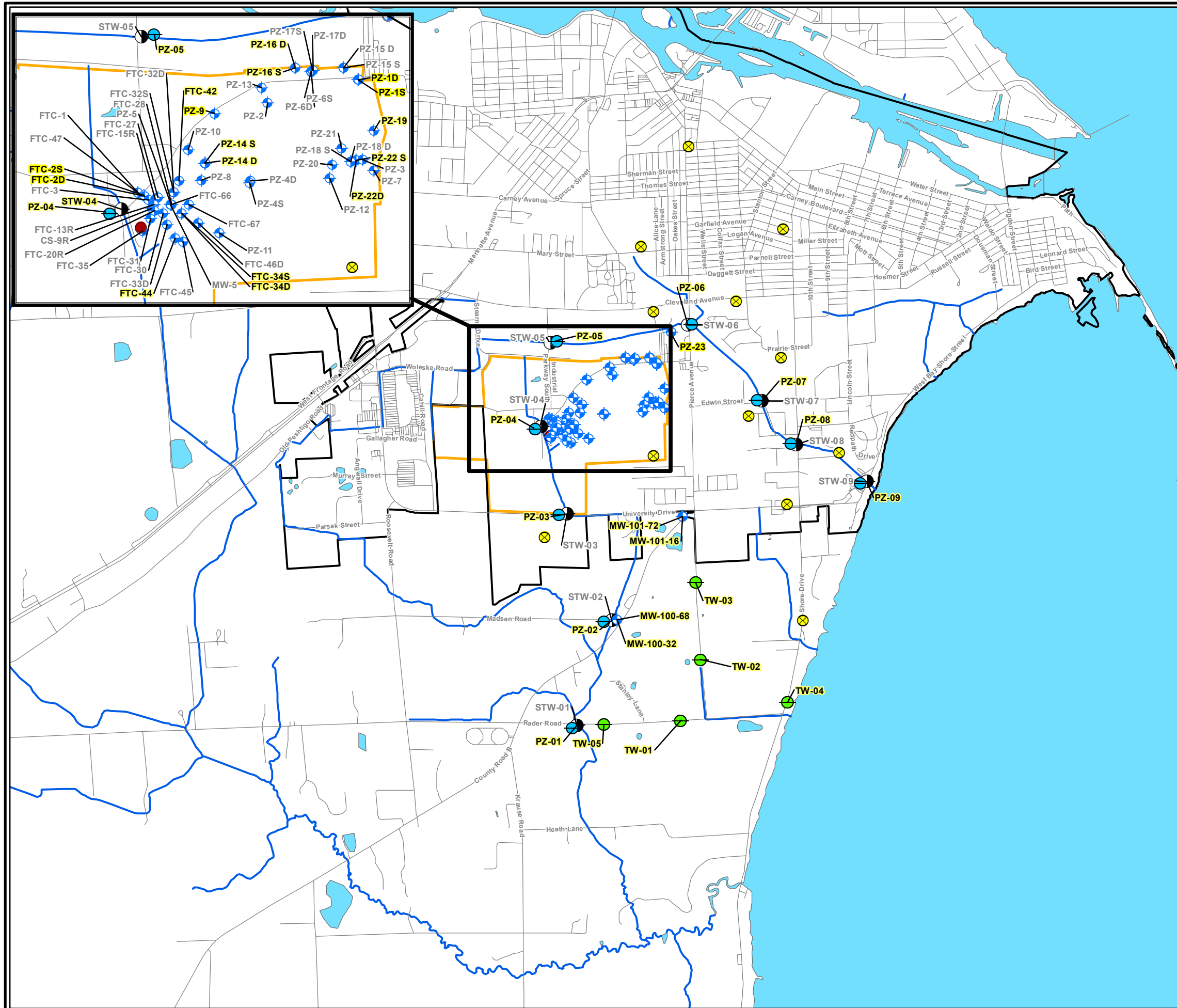
- NOTES:**
1. VAP = VERTICAL AQUIFER PROFILING
  2. UP TO THREE WELLS MAY BE INSTALLED AT PROPOSED PIEZOMETER LOCATIONS.
  3. CITY BOUNDARY DATA SOURCE: WISCONSIN LEGISLATIVE TECHNOLOGY SERVICES BUREAU, WISCONSIN COUNTY CLERKS AND LAND INFORMATION OFFICES, ACCESSED FALL 2017.
  4. DITCH/STREAM AND WATERBODY DATA SOURCE: U.S. GEOLOGICAL SURVEY NATIONAL HYDROGRAPHY DATASET, ACCESSED FALL 2017.
  5. ROAD DATA SOURCE: OPEN STREET MAP, ACCESSED FALL 2017.



TYCO FIRE PRODUCTS, LLC  
 MARINETTE, WISCONSIN

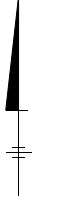
**PROPOSED PIEZOMETER LOCATIONS**

**FIGURE 4**



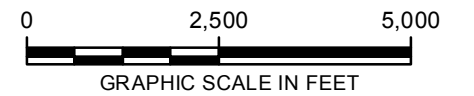
LEGEND:

- PROPOSED PIEZOMETER LOCATION
- MONITORING WELL
- PIEZOMETER
- STILLING WELL
- TEMPORARY PIEZOMETER
- PRODUCTION WELL
- APPROXIMATE SITE PROPERTY BOUNDARY
- APPROXIMATE MARINETTE CITY BOUNDARY
- ROAD
- DITCH/STREAM
- WATERBODY



NOTES:

1. GROUNDWATER LEVELS WILL BE GAUGED AT ALL HIGHLIGHTED LOCATIONS AND ALL PROPOSED PIEZOMETERS.
2. CITY BOUNDARY DATA SOURCE: WISCONSIN LEGISLATIVE TECHNOLOGY SERVICES BUREAU, WISCONSIN COUNTY CLERKS AND LAND INFORMATION OFFICES, ACCESSED FALL 2017.
3. DITCH/STREAM AND WATERBODY DATA SOURCE: U.S. GEOLOGICAL SURVEY NATIONAL HYDROGRAPHY DATASET, ACCESSED FALL 2017.
4. ROAD DATA SOURCE: OPEN STREET MAP, ACCESSED FALL 2017.



TYCO FIRE PRODUCTS, LLC  
 MARINETTE, WISCONSIN

**PROPOSED GROUNDWATER  
 ELEVATION GAUGING LOCATIONS**

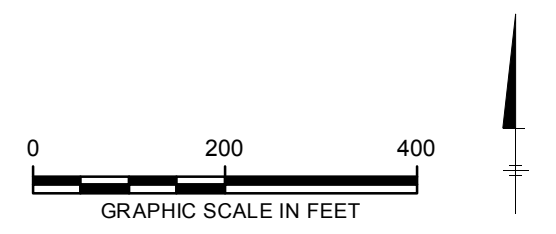




- LEGEND:**
- PROPOSED PFAS SAMPLING LOCATION
  - PROPOSED LEACH TESTING, TOTAL ORGANIC CARBON, BULK DENSITY, AND POROSITY SAMPLE LOCATION
  - ⊗ SOIL SAMPLE LOCATION (2013, 2014, 2016, 2018)

**NOTE:**

1. PFAS = PER- AND POLY-FLUORINATED ALKYL SUBSTANCES
2. IMAGERY SOURCE: 4/27/2016, DIGITALGLOBE, VIVID - USA.



TYCO FIRE PRODUCTS, LP  
MARINETTE, WISCONSIN

**PROPOSES SOIL SAMPLING LOCATIONS**

**ARCADIS** | **FIGURE 6**

# APPENDIX A

December 11, 2018 WDNR Wetland Delineation Confirmation Letter







December 11, 2018

WIC-NE-2018-38-04193

Tyco Fire Products, L.P.  
Attention: Chris Behrend  
2700 Industrial Parkway South  
Marinette, WI 54143

RE: Wetland Delineation Confirmation for Two Interim Water Treatment Systems on Properties located Section 13, Township 30 North, Range 23 East, City of Marinette, Marinette County

Dear Mr. Behrend:

We have reviewed the wetland delineation report from Arcadis U.S. Inc. prepared for the above-mentioned site. This letter will serve as confirmation that the wetland boundaries shown on the enclosed wetland delineation figure are acceptable. This finding is based upon a previous field visit by Tom Nedland, DNR Wetland Identification Coordinator. Any filling or grading within these areas may require DNR approvals. Our wetland confirmation is valid for five years. Be sure to send a copy of the report, as well as any approved revisions, to the U.S. Army Corps of Engineers.

In order to comply with Chapter 23.321, State Statutes, please supply the department with a polygon shapefile of the wetland boundaries delineated within the project area. Please do not include data such as parcel boundaries, project limits, wetland graphic representation symbols, etc. If internal upland polygons are found within a wetland polygon, then please label as UPLAND. The shapefile should utilize a State Plane Projection and be overlain onto recent aerial photography. If a different projection system is used, please indicate what system the data are projected to. In the correspondence sent with the shapefile, please supply a brief description of each wetland's plant community (eg: wet meadow, floodplain forest, etc.). Please send these data to Calvin Lawrence (608-266-0756, or [calvin.lawrence@wisconsin.gov](mailto:calvin.lawrence@wisconsin.gov)).

There is a potentially a navigable waterway identified within the project review limits. DNR Chapter 30 permits will be needed if earthwork (filling, dredging, etc.) or structures (culverts, bridges, erosion control, etc.) are proposed in or adjacent to the waterway if determined to be navigable.

If you are planning development on the property, you are required to avoid take of endangered and threatened species, or obtain an incidental take authorization, to comply with the state's Endangered Species Law. To insure compliance with the law, you should submit an endangered resources review form (Form 1700-047), available at <https://dnr.wi.gov/topic/ERReview/Review.html>. The Endangered Resources Program will provide a review response letter identifying any endangered and threatened species and any conditions that must be followed to address potential incidental take.

In addition to contacting WDNR, be sure to contact your local zoning office and U.S. Army Corps of Engineers to determine if any local or federal permits may be required for your project.

If you have any questions, please contact me at (715) 839-1638 or email [Travis.Holte@wisconsin.gov](mailto:Travis.Holte@wisconsin.gov).

Sincerely,

A handwritten signature in black ink, appearing to read 'Travis Holte', written over a horizontal line.

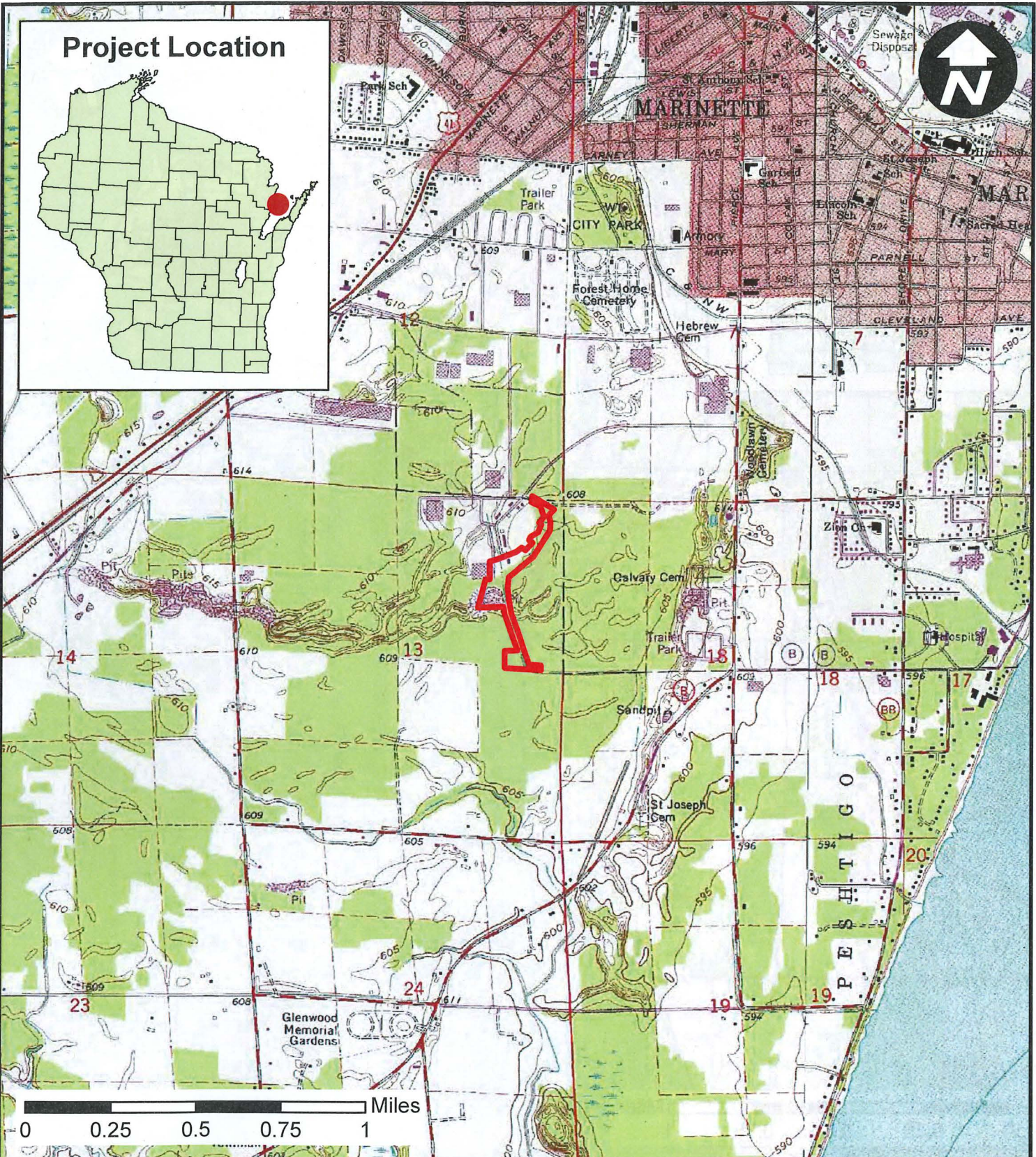
Travis Holte  
Wetland Identification Specialist

Enclosures: Project Location Figures, Wetland Delineation Figures

CC (via email):

Ryan Huber, Project Manager, U.S. Army Corps of Engineers  
John Lefebvre, Marinette County  
Crystal VonHoldt, DNR Water Management Specialist  
Ryan Bombeck, Arcadis U.S. Inc.

# Project Location



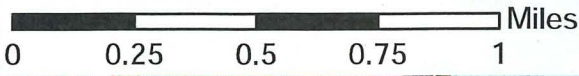
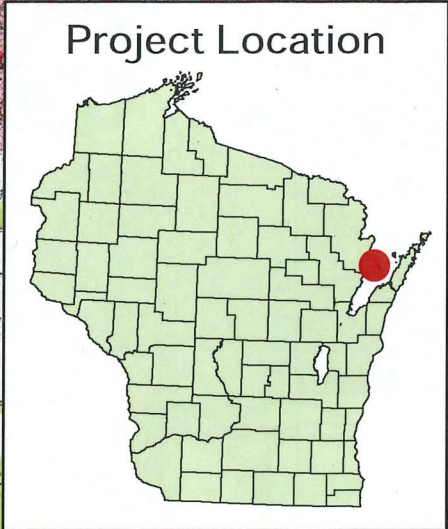
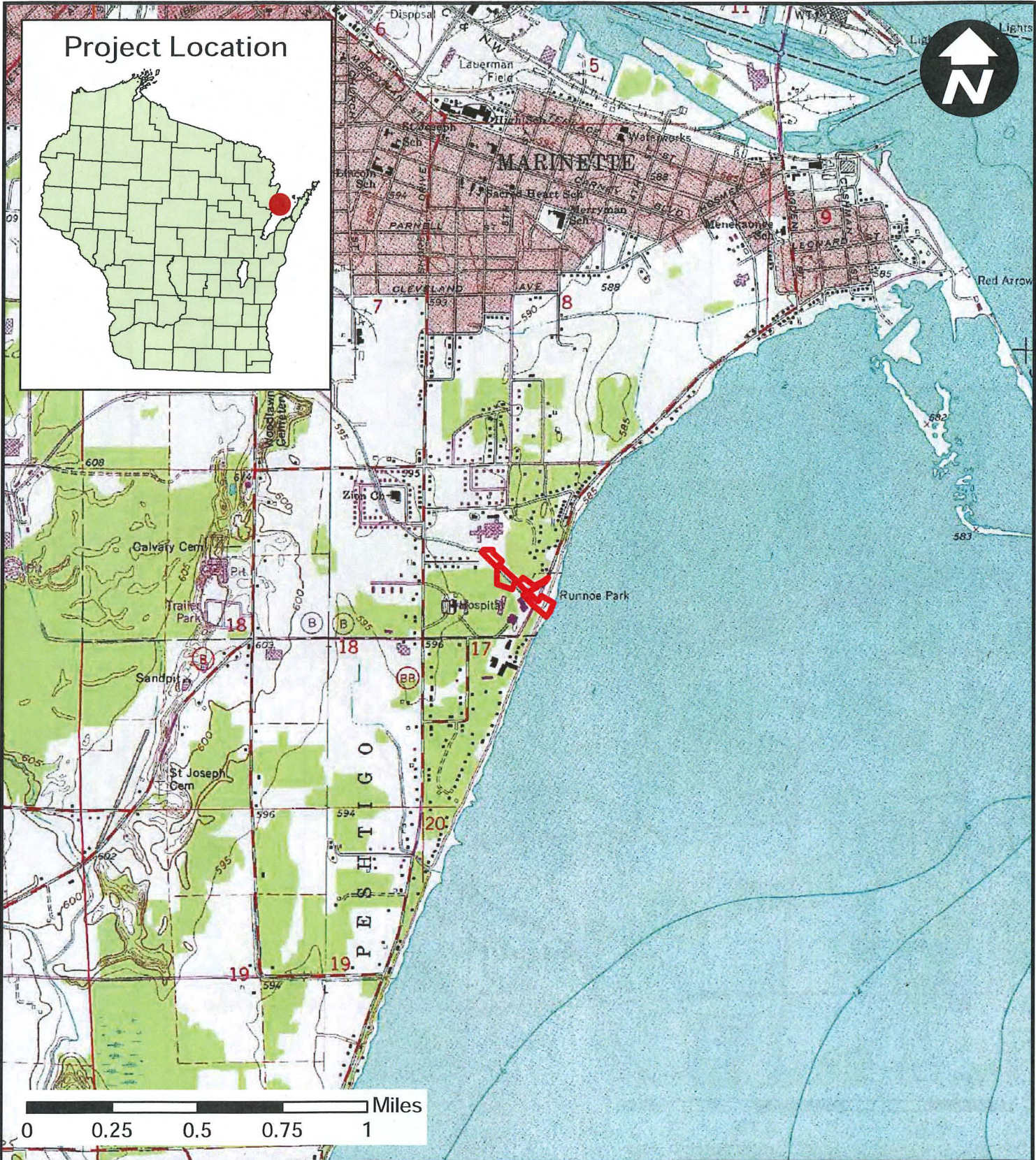
## Legend

 Environmental Survey Area


TYCO FIRE PRODUCTS, L.P.  
DITCH INVESTIGATION

**PROJECT LOCATION - SITE A**  
MARINETTE COUNTY, WISCONSIN

 **ARCADIS** **FIGURE 1A**



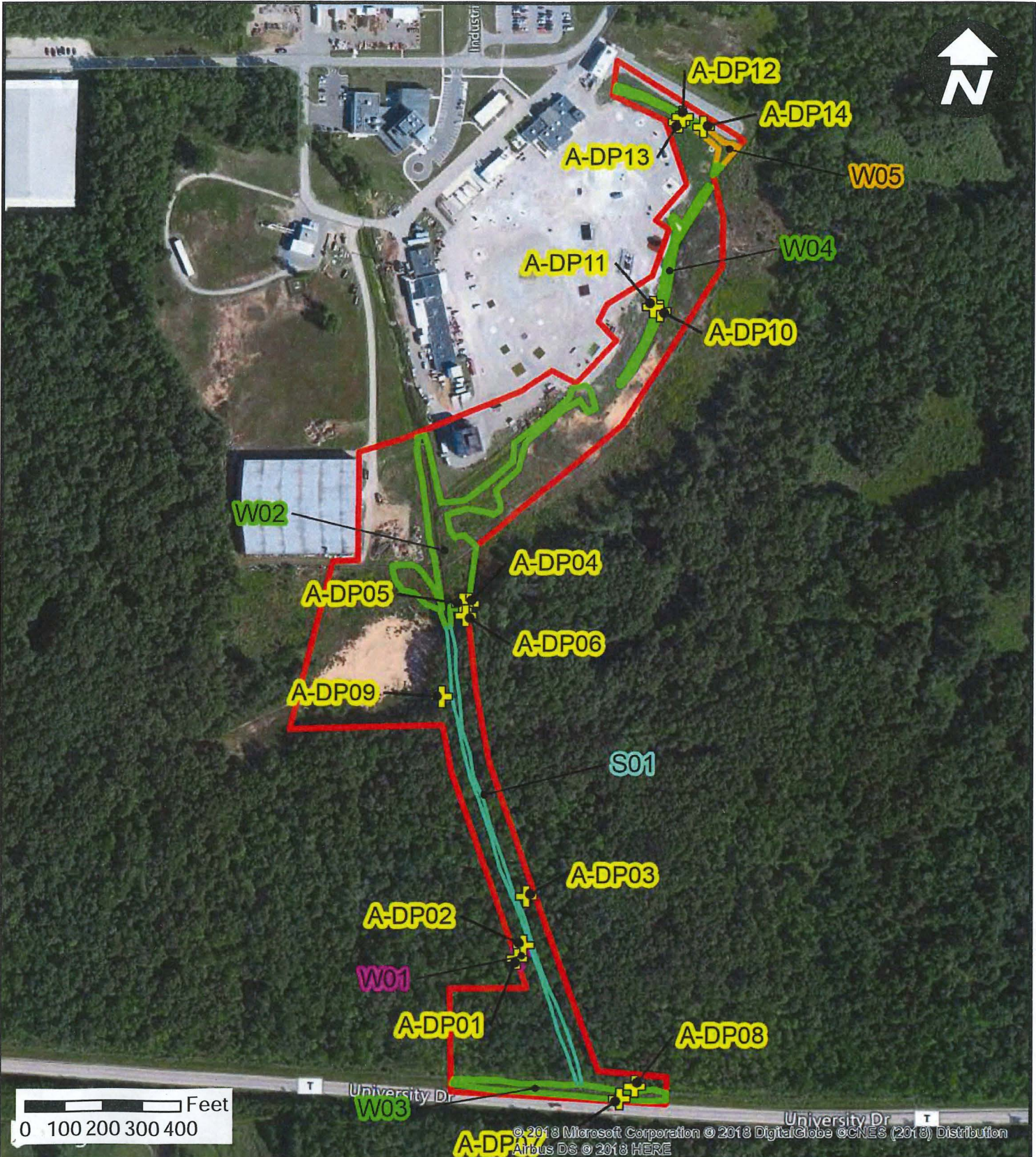
### Legend

 Environmental Survey Area

TYCO FIRE PRODUCTS, L.P.  
DITCH INVESTIGATION

PROJECT LOCATION - SITE B  
MARINETTE COUNTY, WISCONSIN

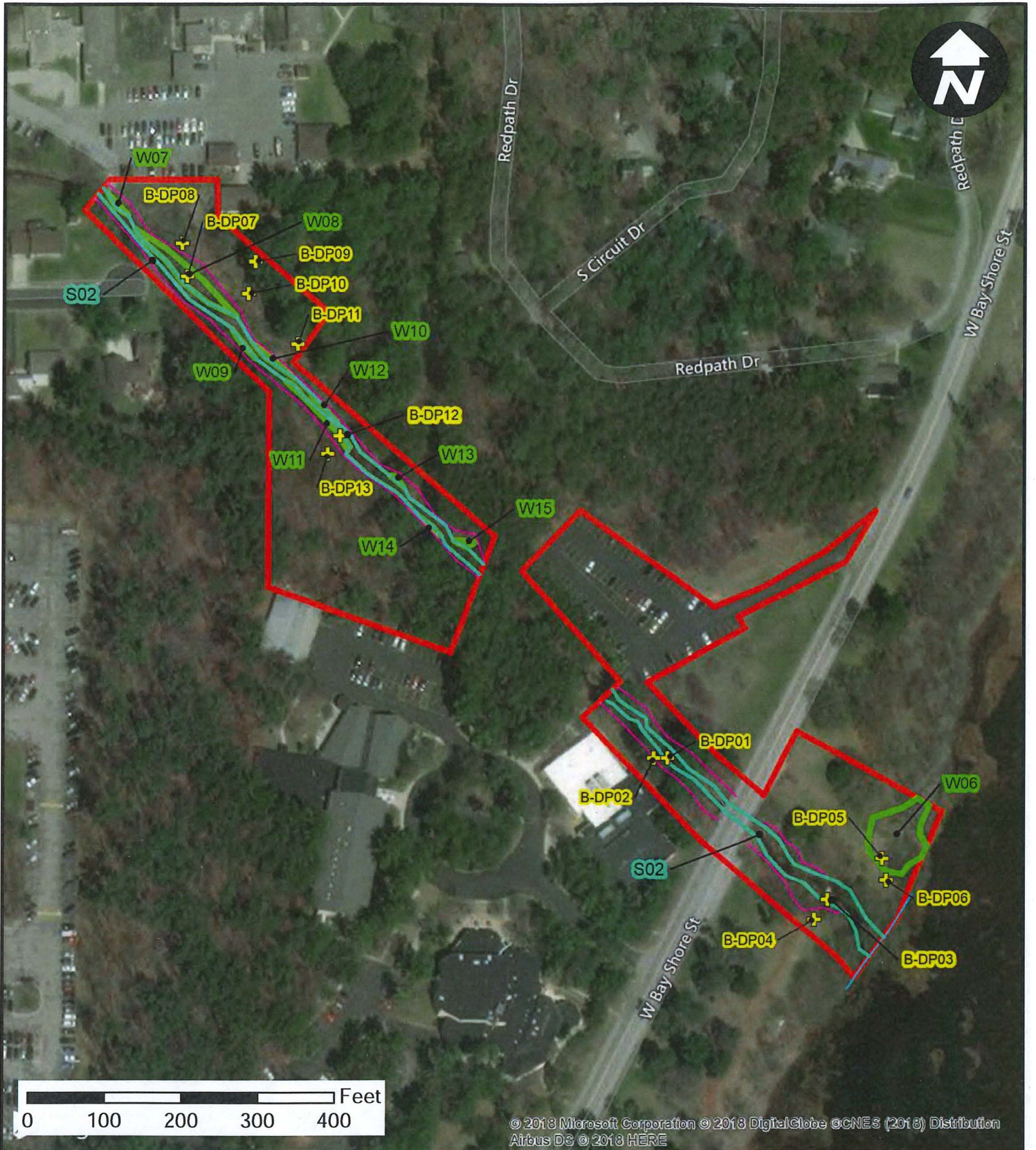
 **ARCADIS** FIGURE  
**1B**



**Legend**

- + Data Points
- Delineated OHWM
- Delineated PEM Wetlands
- Delineated PSS Wetlands
- Delineated PFO Wetlands
- Environmental Survey Area

<p><b>TYCO FIRE PRODUCTS, L.P.</b> DITCH INVESTIGATION</p>	
<p>DELINEATED WETLANDS AND WATERBODIES - SITE A MARINETTE COUNTY, WISCONSIN</p>	
	<p>FIGURE <b>6A</b></p>



### Legend

- + Data Points
- Lake Michigan Water Level (7/23/2018)
- Delineated OHWM
- Delineated PEM Wetlands
- Top of Bank
- Environmental Survey Area

TYCO FIRE PRODUCTS, L.P.  
DITCH INVESTIGATION

DELINEATED WETLANDS AND  
WATERBODIES - SITE B  
MARINETTE COUNTY, WISCONSIN

**ARCADIS**

FIGURE  
**6B**

# APPENDIX B

## Project-specific Endangered Resource Reviews



## Endangered Resources Review for the Proposed Tyco Area A, Marinette County

(ER Log # 18-576)

### Section A. Location and brief description of the proposed project

Based on information provided by the ER Certified Reviewer and attached materials, the proposed project consists of the following:

<b>Location</b>	Marinette County - T30N R23E S13
<b>Project Description</b>	The proposed project involves the installation of a combination active/passive water treatment system, which includes installation of a pump, associated water piping and conduit, treatment tanks, and a weir.
<b>Project Timing</b>	Fall 2018
<b>Current Habitat</b>	The proposed project is located within the existing previously disturbed footprint of the Tyco Fire Products, L.P. facility, within forested and herbaceous wetlands, and through forested uplands along an unnamed tributary to the Little River.
<b>Impacts to Wetlands or Waterbodies</b>	The proposed project will result in temporary impacts to herbaceous wetlands, forested wetlands, and the unnamed tributary to the Little River.
<b>Property Type</b>	Private
<b>Federal Nexus</b>	Yes

*It is best to request ER Reviews early in the project planning process. However, some important project details may not be known at that time. Details related to project location, design, and timing of disturbance are important for determining both the endangered resources that may be impacted by the project and any necessary follow-up actions. Please contact the Certified Coordinators whenever project plans change or new details become available to confirm if results of this ER Review are still valid.*

### Section B. Endangered resources recorded from within the project area and surrounding area

	<b>Group</b>	<b>State Status</b>	<b>Federal Status</b>
Northern Dry Forest ( <i>Northern dry forest</i> )	Community	NA	
Great Lakes Beach ( <i>Great lakes beach</i> )	Community~	NA	
Lake Sturgeon ( <i>Acipenser fulvescens</i> )	Fish~	SC/H	
Few-flowered Spike-rush ( <i>Eleocharis quinqueflora</i> )	Plant~	SC	

*For additional information on the rare species, high-quality natural communities, and other endangered resources listed above, please visit our Biodiversity (<http://dnr.wi.gov/topic/EndangeredResources/biodiversity.html>) page. For further definitions of state and federal statuses (END=Endangered, THR=Threatened, SC=Special Concern), please refer to the Natural Heritage Inventory (NHI) Working List (<http://dnr.wi.gov/topic/nhi/wlist.html>).*

### Section C. Follow-up actions

**Actions that need to be taken to comply with state and/or federal endangered species laws:** None

**Actions recommended to help conserve Wisconsin's Endangered Resources:**

- Northern Dry Forest - Community

**State Status:** NA

<b>Impact Type</b>	Impact possible
--------------------	-----------------



<b>Recommended Measures</b>	Other
<b>Description of Recommended Measures</b>	Northern dry forest may occur within the project site. Natural communities may contain rare or declining species and their protection should be incorporated into project design as much as possible. We recommend minimizing impacts to and/or incorporating buffers along the edges of northern dry forest.

Remember that although these actions are not required by state or federal endangered species laws, they may be required by other laws, permits, granting programs, or policies of this or another agency. Examples include the federal Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, State Natural Areas law, DNR Chapter 30 Wetland and Waterway permits, DNR Stormwater permits, and Forest Certification.

#### Additional Recommendations

The Wisconsin Natural Heritage Inventory (NHI Portal) database contains all current Northern Long-eared Bat roost sites and hibernacula in Wisconsin. The NHI Portal contains verified survey results from WI DNR, FWS, and private organizations. The NHI Portal was consulted for this project, and per U.S. Fish and Wildlife Service's 4(d) rule, it was determined that this project is more than 150 feet from a known maternity roost tree AND is more than 1/4 mile from a known hibernacula. In addition, this project is not located within a Rusty Patched Bumble Bee High Potential Zone. Therefore, this project can proceed without federal restrictions.

#### No actions are required or recommended for the following endangered resources:

##### • Great Lakes Beach - Community~

State Status: NA

<b>Impact Type</b>	No impact or no/low broad ITP/A
<b>Reason</b>	Lack of Suitable Habitat within Project Boundary
<b>Justification</b>	This natural community is present nearby the project area, however the habitat is not present on site. Therefore, no adverse impacts to Great Lakes beach are anticipated as a result of this project.

##### • Lake Sturgeon (*Acipenser fulvescens*) - Fish~

State Status: SC/H

<b>Impact Type</b>	No impact or no/low broad ITP/A
<b>Reason</b>	Lack of Suitable Habitat within Project Boundary
<b>Justification</b>	Lake sturgeon are known to occur in the Menominee River and shoal waters of Lake Michigan. The proposed project is not anticipated to result in impacts to the Menominee River or Lake Michigan and the unnamed tributary to the Little River does not provide suitable habitat due to insufficient depth and width. Therefore, no adverse impacts to lake sturgeon are anticipated as a result of this project.

##### • Few-flowered Spike-rush (*Eleocharis quinqueflora*) - Plant~

State Status: SC

<b>Impact Type</b>	No impact or no/low broad ITP/A
<b>Reason</b>	Lack of Suitable Habitat within Project Boundary
<b>Justification</b>	Few-flowered spike-rush are found on cold coniferous poor fen mats, but also in a variety of moist meadows in calcareous areas. The project site does not contain these habitat types. Therefore, no adverse impacts to few-flowered spike-rush are anticipated as a result of this project.

#### Section D. Next Steps

1. Evaluate whether the 'Location and brief description of the proposed project' is still accurate. All recommendations in this ER Review are based on

the information supplied in this ER Review letter and additional attachments. If the proposed project has changed, please contact the ER Review Program to determine if the information in this ER Review is still valid.

2. Determine whether the project can incorporate and implement the **'Follow-up actions'** identified above:
  - o 'Actions that need to be taken to comply with state and/or federal endangered species laws' represent the Department's best available guidance for complying with state and federal endangered species laws based on the project information that you provided and the endangered resources information and data available to us. If the proposed project has not changed from the description that you provided us and you are able to implement all of the 'Actions that need to be taken to comply with state and/or federal endangered species laws', your project should comply with state and federal endangered species laws. Please remember that if a violation occurs, the person responsible for the taking is the liable party. Generally this is the landowner or project proponent. For questions or concerns about individual responsibilities related to Wisconsin's Endangered Species Law, please contact the ER Review Program.
  - o If the project is unable to incorporate and implement one or more of the 'Actions that need to be taken to comply with state and/or federal endangered species laws' identified above, the project may potentially violate one or more of these laws. Please contact the ER Review Program immediately to assist in identifying potential options that may allow the project to proceed in compliance with state and federal endangered species laws.
  - o 'Actions recommended to help conserve Wisconsin's Endangered Resources' may be required by another law, a policy of this or another Department, agency or program; or as part of another permitting, approval or granting process. Please make sure to carefully read all permits and approvals for the project to determine whether these or other measures may be required. Even if these actions are not required by another program or entity for the proposed project to proceed, the Department strongly encourages the implementation of these conservation measures on a voluntary basis to help prevent future listings and protect Wisconsin's biodiversity for future generations.
3. No federally-protected species or habitats are involved.

## Section E. Contact Information

---

The Proposed ER Review for this project was requested and conducted by the following:

Requester: Ryan Bombeck, 126 North Jefferson Street, Suite 400, Milwaukee, WI 53202

Invoice will be sent to: Ryan Bombeck

Proposed ER Review conducted by: Ryan Bombeck, ryan.bombeck@arcadis-us.com, Arcadis, 320-296-6546

The Proposed ER Review was subsequently reviewed, modified (if needed), and approved by Wisconsin Department of Natural Resources (DNR):

Proposed ER Review approved by: Angela White, angelal.white@wi.gov, ER Review Program, DNR, 101 S. Webster St., PO Box 7921, Madison, Wisconsin 53707

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DNR Signature:

*Angela White*

08/01/18

## Section F. Standard Information to help you better understand this ER Review

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**Endangered Resources (ER) Reviews** are conducted according to the protocols in the guidance document *Conducting Proposed Endangered Resources Reviews: A Step-by-Step Guide for Certified ER Reviewers*. A copy of this document is available upon request by contacting the ER Certification Coordinator at 608-266-5241

**How endangered resources searches are conducted for the proposed project area:** An endangered resources search is performed as part of all ER Reviews. A search consists of querying the Wisconsin Natural Heritage Inventory (NHI) database for endangered resources records for the proposed project area. The project area evaluated consists of both the specific project site and a buffer area surrounding the site. A 1 mile buffer is considered for terrestrial and wetland species, and a 2 mile buffer for aquatic species. Endangered resources records from the buffer area are considered because most lands and waters in the state, especially private lands, have not been surveyed. Considering records from the entire project area (also sometimes referred to as the search area) provides the best picture of species and communities that may be present on your specific site if suitable habitat for those species or communities is present.

**Categories of endangered resources considered in ER Reviews and protections for each:** Endangered resources records from the NHI database fall into one of the following categories:

- **Federally-protected species** include those federally listed as Endangered or Threatened and Designated Critical Habitats. Federally-protected animals are protected on all lands; federally-protected plants are protected only on federal lands and in the course of projects that include federal funding (see Federal Endangered Species Act of 1973 as amended).
- **Animals** (vertebrate and invertebrate) listed as Endangered or Threatened in Wisconsin are protected by Wisconsin's Endangered Species Law on all lands and waters of the state (s. 29.604, Wis. Stats.).
- **Plants** listed as Endangered or Threatened in Wisconsin are protected by Wisconsin's Endangered Species Law on public lands and on land that the person does not own or lease, except in the course of forestry, agriculture, utility, or bulk sampling actions (s. 29.604, Wis. Stats.).
- **Special Concern** species, high-quality examples of natural communities (sometimes called High Conservation Value areas), and natural features (e.g., caves and animal aggregation sites) are also included in the NHI database. These endangered resources are not legally protected by state or federal endangered species laws. However, other laws, policies (e.g., related to Forest Certification), or granting/permitting processes may require or strongly encourage protection of these resources. The main purpose of the Special Concern classification is to focus attention on species about which some problem of abundance or distribution is suspected before they become endangered or threatened.
- **State Natural Areas** (SNAs) are also included in the NHI database. SNAs protect outstanding examples of Wisconsin's native landscape of natural communities, significant geological formations, and archeological sites. Endangered species are often found within SNAs. SNAs are protected by law from any use that is inconsistent with or injurious to their natural values (s. 23.28, Wis. Stats.).

**Please remember** the following:

1. This ER Review is provided as information to comply with state and federal endangered species laws. By following the protocols and methodologies described above, the best information currently available about endangered resources that may be present in the proposed project area has been provided. However, the NHI database is not all inclusive; systematic surveys of most public lands have not been conducted, and the majority of private lands have not been surveyed. As a result, NHI data for the project area may be incomplete. Occurrences of endangered resources are only in the NHI database if the site has been previously surveyed for that species or group during the appropriate season, and an observation was reported to and entered into the NHI database. As such, absence of a record in the NHI database for a specific area should not be used to infer that no endangered resources are present in that area. Similarly, the presence of one species does not imply that surveys have been conducted for other species. Evaluations of the possible presence of rare species on the project site should always be based on whether suitable habitat exists on site for that species.
2. This ER Review provides an assessment of endangered resources that may be impacted by the project and measures that can be taken to avoid negatively impacting those resources based on the information that has been provided to ER Review Program at this time. Incomplete information, changes in the project, or subsequent survey results may affect our assessment and indicate the need for additional or different measures to avoid impacts to endangered resources.
3. This ER Review does not exempt the project from actions that may be required by Department permits or approvals for the project. Information contained in this ER Review may be shared with individuals who need this information in order to carry out specific roles in the planning, permitting, and implementation of the proposed project.

**Endangered Resources Review for the Proposed Tyco Area B - Renewed 10/30/18, Marinette County**  
**(ER Log # 18-577)**

**Section A. Location and brief description of the proposed project**

Based on information provided by the ER Certified Reviewer and attached materials, the proposed project consists of the following:

<b>Location</b>	Marinette County - T30N R24E S17
<b>Project Description</b>	The proposed project involves the installation of a water treatment system, which includes installation of a pump, associated water piping and conduit, a treatment system, and a weir.
<b>Project Timing</b>	Fall 2018
<b>Current Habitat</b>	The proposed project is located within upland forest habitats and an unnamed tributary to Lake Michigan.
<b>Impacts to Wetlands or Waterbodies</b>	The proposed project will result in temporary impacts to the unnamed tributary to Lake Michigan.
<b>Property Type</b>	Public, Private
<b>Federal Nexus</b>	Yes

*It is best to request ER Reviews early in the project planning process. However, some important project details may not be known at that time. Details related to project location, design, and timing of disturbance are important for determining both the endangered resources that may be impacted by the project and any necessary follow-up actions. Please contact the Certified Coordinators whenever project plans change or new details become available to confirm if results of this ER Review are still valid.*

**Section B. Endangered resources recorded from within the project area and surrounding area**

	<b>Group</b>	<b>State Status</b>	<b>Federal Status</b>
Black Tern ( <i>Chlidonias niger</i> )	Bird~	END	SOC
Northern Dry Forest ( <i>Northern dry forest</i> )	Community	NA	
Great Lakes Beach ( <i>Great lakes beach</i> )	Community~	NA	
Lake Sturgeon ( <i>Acipenser fulvescens</i> )	Fish~	SC/H	
Few-flowered Spike-rush ( <i>Eleocharis quinqueflora</i> )	Plant~	SC	

*For additional information on the rare species, high-quality natural communities, and other endangered resources listed above, please visit our Biodiversity (<http://dnr.wi.gov/topic/EndangeredResources/biodiversity.html>) page. For further definitions of state and federal statuses (END=Endangered, THR=Threatened, SC=Special Concern), please refer to the Natural Heritage Inventory (NHI) Working List (<http://dnr.wi.gov/topic/nhi/wlist.html>).*

**Section C. Follow-up actions**

**Actions that need to be taken to comply with state and/or federal endangered species laws:** None

**Actions recommended to help conserve Wisconsin's Endangered Resources:**

- Northern Dry Forest - Community

**State Status: NA**

<b>Impact Type</b>	Impact possible
--------------------	-----------------

<b>Recommended Measures</b>	Other
<b>Description of Recommended Measures</b>	Northern dry forest may occur within the project site. Natural communities may contain rare or declining species and their protection should be incorporated into project design as much as possible. We recommend minimizing impacts to and/or incorporating buffers along the edges of northern dry forest.

• **Great Lakes Beach - Community~**

**State Status: NA**

<b>Impact Type</b>	Impact possible
<b>Recommended Measures</b>	Other
<b>Description of Recommended Measures</b>	Great Lakes beach may occur within the project site. Natural communities may contain rare or declining species and their protection should be incorporated into project design as much as possible. We recommend minimizing impacts to and/or incorporating buffers along the edges of the Great Lakes beach.

*Remember that although these actions are not required by state or federal endangered species laws, they may be required by other laws, permits, granting programs, or policies of this or another agency. Examples include the federal Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, State Natural Areas law, DNR Chapter 30 Wetland and Waterway permits, DNR Stormwater permits, and Forest Certification.*

**Additional Recommendations**

**Federal:**  
The Wisconsin Natural Heritage Inventory (NHI Portal) database contains all current Northern Long-eared Bat roost sites and hibernacula in Wisconsin. The NHI Portal contains verified survey results from WI DNR, FWS, and private organizations. The NHI Portal was consulted for this project, and per U.S. Fish and Wildlife Service’s 4(d) rule, it was determined that this project is more than 150 feet from a known maternity roost tree AND is more than 1/4 mile from a known hibernacula. In addition, this project is not located within a Rusty Patched Bumble Bee High Potential Zone. Therefore, this project can proceed without federal restrictions.

**Erosion:**  
The project site is located near Lake Michigan and there will be impacts to an unnamed tributary. We strongly recommend implementing erosion and runoff prevention measures during the course of the project where appropriate.

Please note that erosion control netting (also known as erosion control blankets, erosion mats or erosion mesh netting) used to prevent erosion during the establishment of vegetation can have detrimental effects on local snake and other wildlife populations. Plastic netting without independent movement of strands can easily entrap snakes moving through the area, leading to dehydration, desiccation, and eventually mortality. Netting that contains biodegradable thread with the “leno” or “gauze” weave (contains strands that are able to move independently) appears to have the least impact on snakes and should be used in areas adjacent to or near any waterbody.

If erosion matting will be used for this project, use the following matting (or something similar): American Excelsior “FibreNet” or “NetFree” products; East Coast Erosion biodegradable jute products; Erosion Tech biodegradable jute products; ErosionControlBlanket.com biodegradable leno weave products; North American Green S75BN, S150BN, SC150BN or C125BN; or Western Excelsior “All Natural” products.

**Any instream work:**  
Because this project has the potential to impact the an unnamed tributary, a silt curtain may need to be installed per the DNR’s Silt Curtain (1070) Conservation Practice Standards [http://dnr.wi.gov/topic/stormwater/documents/Silt\\_Curtain\\_1070.pdf](http://dnr.wi.gov/topic/stormwater/documents/Silt_Curtain_1070.pdf)

**No actions are required or recommended for the following endangered resources:**

• **Black Tern (*Chlidonias niger*) - Bird~**

**State Status: ENDFederal Status: SOC**

<b>Impact Type</b>	No impact or no/low broad ITP/A
<b>Reason</b>	Lack of Suitable Habitat within Project Boundary
<b>Justification</b>	Black terns prefer large shallow marshes with abundant vegetation adjacent to open water. No impacts to these habitat types are anticipated as a result of this project. Therefore, no adverse impacts to black terns are anticipated.

• **Lake Sturgeon (*Acipenser fulvescens*) - Fish~**

**State Status:** SC/H

<b>Impact Type</b>	No impact or no/low broad ITP/A
<b>Reason</b>	Lack of Suitable Habitat within Project Boundary
<b>Justification</b>	Lake sturgeon are known to occur in the Menominee River and shoal waters of Lake Michigan. The proposed project is not anticipated to result in impacts to the Menominee River or Lake Michigan, and the unnamed tributary to Lake Michigan does not provide suitable habitat due to insufficient depth and width. Therefore, no adverse impacts to lake sturgeon are anticipated.

• **Few-flowered Spike-rush (*Eleocharis quinqueflora*) - Plant~**

**State Status:** SC

<b>Impact Type</b>	No impact or no/low broad ITP/A
<b>Reason</b>	Lack of Suitable Habitat within Project Boundary
<b>Justification</b>	Few-flowered spike-rush are found on cold coniferous poor fen mats, but also in a variety of moist meadows in calcareous areas. The project site does not contain these habitat types. Therefore, no adverse impacts to few-flowered spike-rush are anticipated.

**Section D. Next Steps**

1. Evaluate whether the **'Location and brief description of the proposed project'** is still accurate. All recommendations in this ER Review are based on the information supplied in this ER Review letter and additional attachments. If the proposed project has changed, please contact the ER Review Program to determine if the information in this ER Review is still valid.
2. Determine whether the project can incorporate and implement the **'Follow-up actions'** identified above:
  - 'Actions that need to be taken to comply with state and/or federal endangered species laws' represent the Department's best available guidance for complying with state and federal endangered species laws based on the project information that you provided and the endangered resources information and data available to us. If the proposed project has not changed from the description that you provided us and you are able to implement all of the 'Actions that need to be taken to comply with state and/or federal endangered species laws', your project should comply with state and federal endangered species laws. Please remember that if a violation occurs, the person responsible for the taking is the liable party. Generally this is the landowner or project proponent. For questions or concerns about individual responsibilities related to Wisconsin's Endangered Species Law, please contact the ER Review Program.
  - If the project is unable to incorporate and implement one or more of the 'Actions that need to be taken to comply with state and/or federal endangered species laws' identified above, the project may potentially violate one or more of these laws. Please contact the ER Review Program immediately to assist in identifying potential options that may allow the project to proceed in compliance with state and federal endangered species laws.
  - 'Actions recommended to help conserve Wisconsin's Endangered Resources' may be required by another law, a policy of this or another Department, agency or program; or as part of another permitting, approval or granting process. Please make sure to carefully read all permits and approvals for the project to determine whether these or other measures may be required. Even if these actions are not required by another program or entity for the proposed project to proceed, the Department strongly encourages the implementation of these conservation measures on a voluntary basis to help prevent future listings and protect Wisconsin's biodiversity for future generations.
3. If federally-protected species or habitats are involved and the project involves federal funds, technical assistance or authorization (e.g., permit) and there are likely to be any impacts (positive or negative) to them, consultation with USFWS will need to occur prior to the project being able to proceed. If no federal funding, assistance or authorization is involved with the project and there are likely to be adverse impacts to the species, contact the USFWS Twin Cities Ecological Services Field Office at 612-725-3548 (x2201) for further information and guidance.

## Section E. Contact Information

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The Proposed ER Review for this project was requested and conducted by the following:

Requester: Ryan Bombeck, 126 North Jefferson Street, Suite 400, Milwaukee, WI 53202

Invoice will be sent to: Ryan Bombeck

Proposed ER Review conducted by: Ryan Bombeck, ryan.bombeck@arcadis-us.com, Arcadis, 320-296-6546

The Proposed ER Review was subsequently reviewed, modified (if needed), and approved by Wisconsin Department of Natural Resources (DNR):

Proposed ER Review approved by: Angela White, angelal.white@wi.gov, ER Review Program, DNR, 101 S. Webster St., PO Box 7921, Madison, Wisconsin 53707

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DNR Signature:

*Angela White*

10/31/18

## Section F. Standard Information to help you better understand this ER Review

**Endangered Resources (ER) Reviews** are conducted according to the protocols in the guidance document Conducting Proposed Endangered Resources Reviews: A Step-by-Step Guide for Certified ER Reviewers. A copy of this document is available upon request by contacting the ER Certification Coordinator at 608-266-5241

**How endangered resources searches are conducted for the proposed project area:** An endangered resources search is performed as part of all ER Reviews. A search consists of querying the Wisconsin Natural Heritage Inventory (NHI) database for endangered resources records for the proposed project area. The project area evaluated consists of both the specific project site and a buffer area surrounding the site. A 1 mile buffer is considered for terrestrial and wetland species, and a 2 mile buffer for aquatic species. Endangered resources records from the buffer area are considered because most lands and waters in the state, especially private lands, have not been surveyed. Considering records from the entire project area (also sometimes referred to as the search area) provides the best picture of species and communities that may be present on your specific site if suitable habitat for those species or communities is present.

**Categories of endangered resources considered in ER Reviews and protections for each:** Endangered resources records from the NHI database fall into one of the following categories:

- **Federally-protected species** include those federally listed as Endangered or Threatened and Designated Critical Habitats. Federally-protected animals are protected on all lands; federally-protected plants are protected only on federal lands and in the course of projects that include federal funding (see Federal Endangered Species Act of 1973 as amended).
- **Animals** (vertebrate and invertebrate) listed as Endangered or Threatened in Wisconsin are protected by Wisconsin's Endangered Species Law on all lands and waters of the state (s. 29.604, Wis. Stats.).
- **Plants** listed as Endangered or Threatened in Wisconsin are protected by Wisconsin's Endangered Species Law on public lands and on land that the person does not own or lease, except in the course of forestry, agriculture, utility, or bulk sampling actions (s. 29.604, Wis. Stats.).
- **Special Concern** species, high-quality examples of natural communities (sometimes called High Conservation Value areas), and natural features (e.g., caves and animal aggregation sites) are also included in the NHI database. These endangered resources are not legally protected by state or federal endangered species laws. However, other laws, policies (e.g., related to Forest Certification), or granting/permitting processes may require or strongly encourage protection of these resources. The main purpose of the Special Concern classification is to focus attention on species about which some problem of abundance or distribution is suspected before they become endangered or threatened.
- **State Natural Areas** (SNAs) are also included in the NHI database. SNAs protect outstanding examples of Wisconsin's native landscape of natural communities, significant geological formations, and archeological sites. Endangered species are often found within SNAs. SNAs are protected by law from any use that is inconsistent with or injurious to their natural values (s. 23.28, Wis. Stats.).

**Please remember** the following:

1. This ER Review is provided as information to comply with state and federal endangered species laws. By following the protocols and methodologies described above, the best information currently available about endangered resources that may be present in the proposed project area has been provided. However, the NHI database is not all inclusive; systematic surveys of most public lands have not been conducted, and the majority of private lands have not been surveyed. As a result, NHI data for the project area may be incomplete. Occurrences of endangered resources are only in the NHI database if the site has been previously surveyed for that species or group during the appropriate season, and an observation was reported to and entered into the NHI database. As such, absence of a record in the NHI database for a specific area should not be used to infer that no endangered resources are present in that area. Similarly, the presence of one species does not imply that surveys have been conducted for other species. Evaluations of the possible presence of rare species on the project site should always be based on whether suitable habitat exists on site for that species.
2. This ER Review provides an assessment of endangered resources that may be impacted by the project and measures that can be taken to avoid negatively impacting those resources based on the information that has been provided to ER Review Program at this time. Incomplete information, changes in the project, or subsequent survey results may affect our assessment and indicate the need for additional or different measures to avoid impacts to endangered resources.
3. This ER Review does not exempt the project from actions that may be required by Department permits or approvals for the project. Information contained in this ER Review may be shared with individuals who need this information in order to carry out specific roles in the planning, permitting, and implementation of the proposed project.



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