

Mr. David Neste  
Remediation and Redevelopment Program  
Wisconsin Department of Natural Resources  
2984 Shawano Avenue  
Green Bay, Wisconsin 54313-6727

Arcadis U.S., Inc.  
126 North Jefferson Street  
Suite 400  
Milwaukee  
Wisconsin 53202  
Tel 414 276 7742  
Fax 414 276 7603  
www.arcadis.com

Subject:  
Groundwater Sampling Work Plan  
Tyco Stanton Street Facility, Marinette, Wisconsin  
BRRTS No. 02-38-581955

ENVIRONMENT

Date:  
March 19, 2019

Dear Mr. Neste:

Contact:  
Ben Verburg

On behalf of Tyco Fire Products LP (Tyco), Arcadis US, Inc. (Arcadis) has prepared this Groundwater Sampling Work Plan (work plan) to collect groundwater samples for analysis of per- and poly-fluoroalkyl substances (PFAS) around the exterior of the barrier wall at the Tyco Facility located at 1 Stanton Street in Marinette, Wisconsin (Site). In addition, piezometer clusters are proposed to be installed to evaluate the groundwater flow patterns upgradient and in proximity to the Site.

Phone:  
414.277.6231

Email:  
Ben.Verburg@arcadis.com

Our ref:  
WI001651

## OVERVIEW

The work described herein consists of: 1) inspection and redevelopment, as needed, of monitoring wells proposed to be sampled; 2) groundwater sample collection for PFAS analyses from select existing monitoring wells around the exterior of the barrier wall; 3) installation and development of proposed upgradient water-level piezometers; and 4) collection of groundwater elevation data from proposed piezometers and select existing monitoring wells.

## SITE BACKGROUND

### Site Description and History

At the Site, Tyco operates a fire extinguisher and fire suppression system manufacturing facility. Other historical operations have taken place at the facility including lumber mill operations and agricultural manufacturing including herbicides (CH2M 2015).

The Site consists of multiple tax parcels, totaling approximately 66 acres. The Site is located in the north-northeastern portion of the City of Marinette, directly south of the Menominee River (**Figure 1**). The land surface within the site is generally flat, much of it paved or covered by industrial buildings. Shallow soils beneath the site, extending to at least the 4-foot depth range planned for this investigation, are understood to consist of fill and/or sandy alluvium. The water table is expected to be found between approximately 1 and 5 feet below ground surface (bgs).

## GROUNDWATER SAMPLING ACTIVITIES

### Access and Utility Clearance

Piezometers are planned to be installed within public rights of way (ROW) of the City of Marinette. Prior to completing work in a ROW, permission for access will be obtained from the City.

Prior to completing piezometer installations, 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, and reviewing available utility drawings. An air knife or hand auger may also be used to clear boring areas, if needed.

### Sample Collection

Groundwater sampling is planned at 19 existing monitoring wells located outside of the barrier wall as shown on **Figure 2**. Prior to collecting groundwater samples from the select monitoring wells, the wells will be inspected and redeveloped as needed. Groundwater sampling will be conducted after a minimum of two weeks following redevelopment. Note that there are transducers in several monitoring wells that are proposed to be sampled. These transducers, which are associated with the Resource Conservation and Recovery Act (RCRA) project at the Site, will be removed from the monitoring wells prior to redevelopment and sampling. As such, notification will be provided to the United States Environmental Protection Agency (US EPA) prior to removing the transducers. Following sampling activities, transducers will be returned to the appropriate wells.

Low-flow sampling procedures will be used for groundwater sampling, using a peristaltic pump and dedicated down-well disposable tubing. Analytical samples will be collected after groundwater parameters that are measured with a field probe, including dissolved oxygen, pH, specific conductivity, and oxidation-reduction potential, are shown to have stabilized at each well. All monitoring wells will be gauged for depth to water and depth to the bottom of the well.

Samples will be collected for PFAS analysis following the sample handling procedures described in the Quality Assurance and Quality Control (QA/QC) section in this work plan.

### Upgradient Piezometer Installation and Development

While groundwater elevation and flow patterns at the Site are well understood, approximately two piezometer clusters, each with up to three piezometers installed at different depth intervals within the overburden, will be installed southwest and south of the Site to understand groundwater flow patterns upgradient of the Site. Planned piezometer locations are shown on **Figure 3**. Groundwater 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. 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.

The screened intervals of each piezometer will be set based on the observed lithology. 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, 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 two feet above the screen<sup>1</sup>, with a filter pack seal (clean fine sand and bentonite or bentonite only based on the depth of the screened interval) to at least two feet above the filter pack. Once the bentonite has set (approximately one 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 activities will continue until up to 10 well volumes have been purged or turbidity has stabilized below 50 NTUs.

### Groundwater Elevation Data Collection

Water elevations will be manually measured using a water level meter at the newly-installed piezometers and select existing monitoring wells. These data will be used to assess groundwater flow direction as well as horizontal and vertical gradients within the surficial aquifer.

### Investigation Derived Waste

Purge water, soil, and drilling fluid generated while completing the proposed activities will be containerized (e.g., 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.

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<sup>1</sup> For shallow wells screened in proximity to the water table, the filter pack height may be reduced to 6 inches above the top of the well screen to allow for the required amount of annular space sealant to be placed.

## Survey

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 (NAVD 88) system and the horizontal coordinates will be reported in the Wisconsin State Plane North American Datum 1983 (NAD 83) – Wisconsin Central 4802 Zone system as part of the survey work.

## QUALITY ASSURANCE AND QUALITY CONTROL

### 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 Site or introduced by sampling equipment or personnel. 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 equipment, 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 will be 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 sampling equipment will be decontaminated between sample locations using an Alconox®, Liquinox®, or methanol solution between locations then rinsed with laboratory-supplied PFAS-free. To assess the adequacy of the decontamination process, a rinse blank will be collected every 20 samples or once 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 prior to collection of environmental samples.

### Laboratory Methods and Analysis

Samples will be placed in laboratory-supplied containers, stored and 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. Samples will be analyzed for all 14 PFAS compounds that are reportable using a modified version of US EPA Method 537.

As part of the field QA/QC, one matrix spike (MS) sample and one matrix spike duplicate (MSD) sample will be collected for every 20 field samples collected and one field duplicate will be collected for every ten field samples.

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/QC as indicated by the laboratory QA/QC procedures.

## REPORTING

After the investigation is complete and laboratory data are received, Arcadis will prepare a brief letter report summarizing the investigation results.

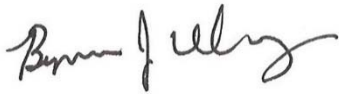
Mr. David Neste  
Wisconsin Department of Natural Resources  
March 19, 2019

## REFERENCES

CH2M Hill 2015. Revised Barrier Wall Groundwater Monitoring Plan Update. Tyco Fire Products LP. September 2015.

Sincerely,

Arcadis U.S., Inc.

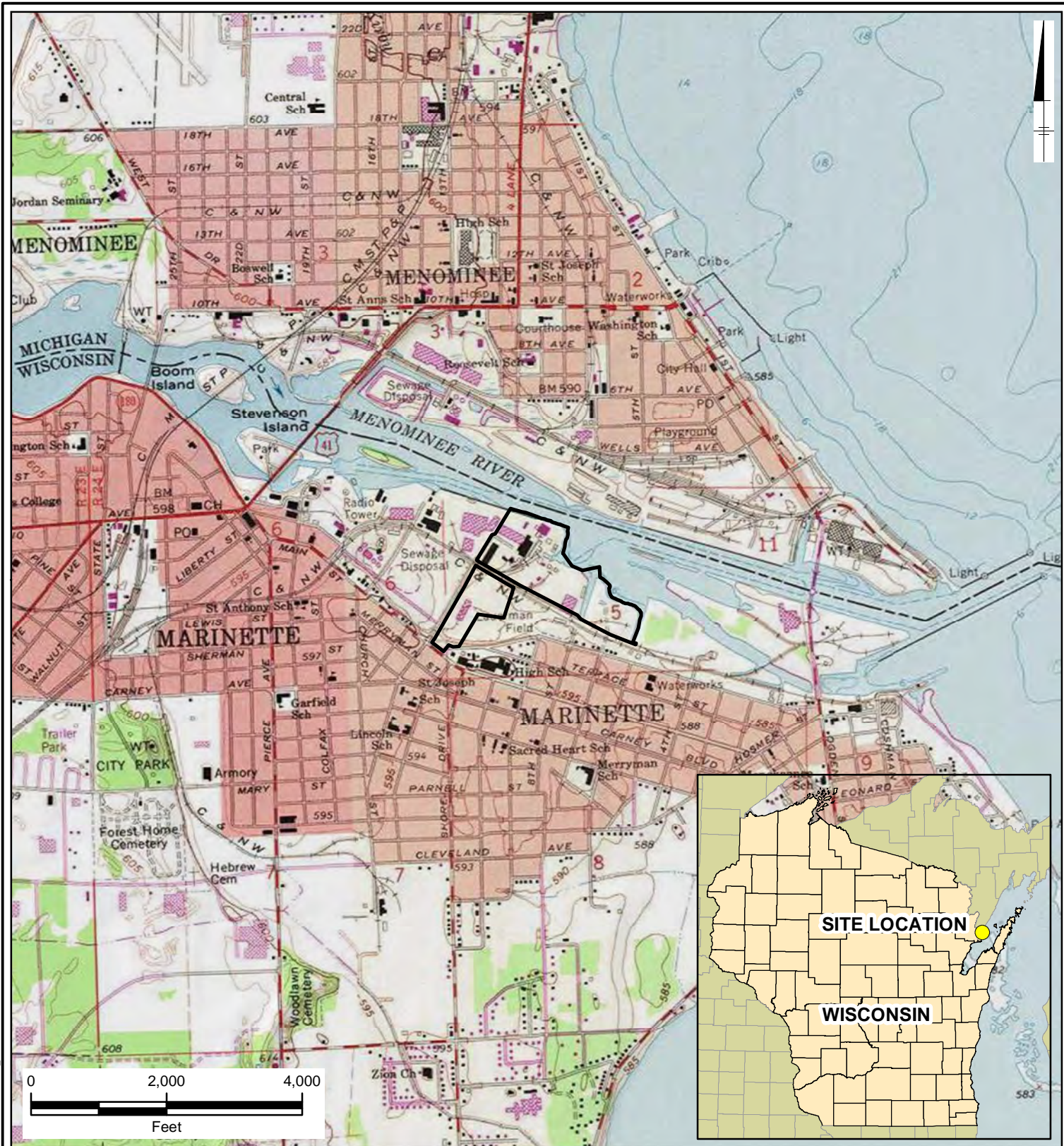


Benjamin J. Verburg, PE  
Principal Engineer

Enclosures:

### Figures

- 1 Site Location
- 2 Proposed Monitoring Well Sampling Locations
- 3 Proposed Piezometer Locations



**LEGEND:**

 APPROXIMATE SITE PROPERTY BOUNDARY

**NOTES:**

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

TYCO FIRE PRODUCTS LP  
MARINETTE, WISCONSIN

**SITE LOCATION**



**FIGURE  
1**



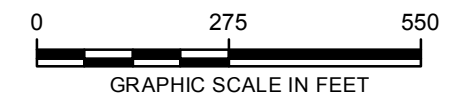
LEGEND:

- EXTRACTION WELL OR TEST WELL
- ⊕ MONITORING WELL - SHALLOW OR PEAT
- ⊕ MONITORING WELL - MEDIUM
- ⊕ MONITORING WELL - DEEP (BEDROCK)
- ▭ APPROXIMATE SITE PROPERTY BOUNDARY
- SHEET PILE WALL
- SLURRY WALL

**WELL ID** PROPOSED GROUNDWATER SAMPLING LOCATION

NOTES:

1. ALL WELL LOCATIONS DEPICTED ARE APPROXIMATE.
2. ROAD DATA SOURCE: OPEN STREET MAP, ACCESSED FALL 2017.
3. 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.

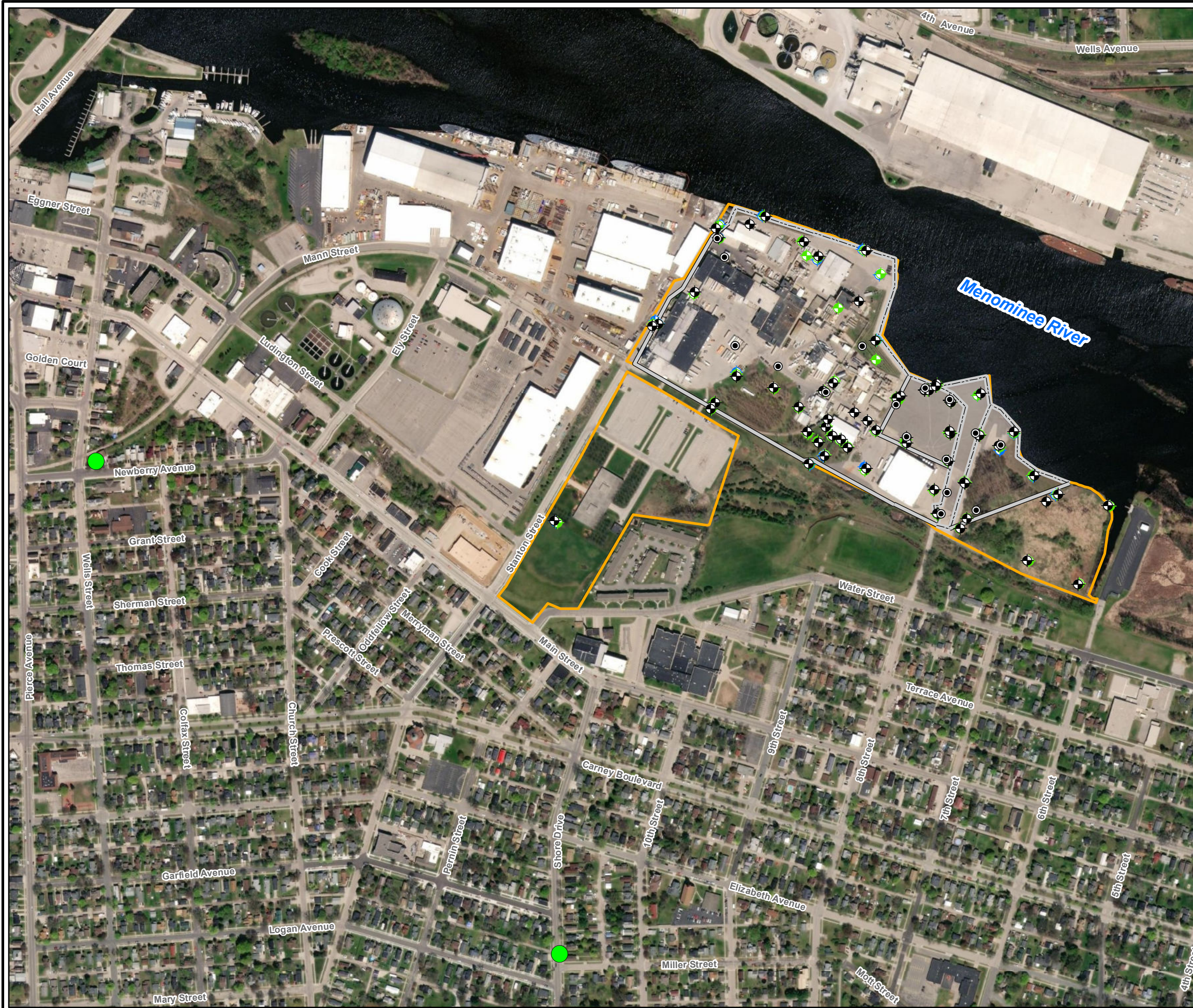


TYCO FIRE PRODUCTS, LP  
 MARINETTE, WISCONSIN  
 STANTON STREET WORK PLAN

PROPOSED GROUNDWATER SAMPLING LOCATIONS



City: Minneapolis/Citrix Div/Group: IMDVC Created By: Last Saved By: msmiller  
 TYCO Stanton St, Marinette, WI  
 Z:\GIS\Projects\_ENVTYCO\TYCO\_STANTON\_ST\MXD\2019-01\PROPOSED WATER-LEVEL PIEZOMETER LOCATIONS.mxd 1/31/2019 11:40:17 AM

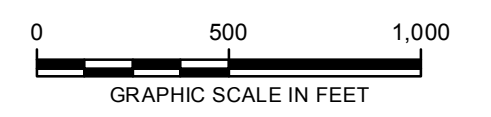


**LEGEND:**

- PROPOSED PIEZOMETER CLUSTER
- EXTRACTION WELL OR TEST WELL
- MONITORING WELL - SHALLOW OR PEAT
- MONITORING WELL - MEDIUM
- MONITORING WELL - DEEP (BEDROCK)
- APPROXIMATE SITE PROPERTY BOUNDARY
- SHEET PILE WALL
- SLURRY WALL

**NOTES:**

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TYCO FIRE PRODUCTS LP MARINETTE, WISCONSIN <b>STANTON STREET WORK PLAN</b>	
<b>PROPOSED WATER-LEVEL          PIEZOMETER LOCATIONS</b>	
	<b>FIGURE          3</b>